Implications of Carbon Deposition on the Fate of Semi-Volatile Organic Pollutants in the Great Lakes

BY

SOHEIL HOSSEINI

B.S., Isfahan University of Technology, 2007

M.S., Sharif University of Technology, 2009

THESIS

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Defense Committee:

Karl J. Rockne, Chair and Advisor, Civil and Material Engineering

Amid Khodadoust, Civil and Material Engineering

Sybil Derrible, Civil and Material Engineering

An Li, Environmental and Occupational Health Sciences

Asha Rani, College of Medicine

Neil Sturchio, Department of Geological Sciences, University of Delaware

This dissertation is dedicated to my wife, Azar Hosseini, who has supported me with her endless love, patience, empathy, assisting and encouragement, and to my parents and brother, Davood Hosseini, Pari Alavehzadeh, and Sepehr Hosseini, who have encouraged me to pursue advanced degree and kept my focus on the future.

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Abstract

The Laurentian Great Lakes are by far the largest freshwater ecosystem on earth, and their strategic and economical ($4.5 trillion GDP) importance for both the United States and Canada are undeniable. The very large surface area to volume ratio (~100X higher than the ocean) makes them sensitive to airborne pollution, and since the dilution rate the whole-system is small (<1% per year), persistent pollutants tend to accumulate in the system. Consequently, sediment often acts as the final reservoir for hydrophobic contaminants, particularly for the class of compounds called persistent, bio-accumulative toxic compounds (PBTs).

I investigated the spatial and temporal impacts of human activities on the Great Lakes during the past 100+ years through the geochemical analysis of >40 sediment cores and >180 grab samples obtained from the five Great Lakes and two seepage lakes in the upper Great Lakes basin. The first phase of the study reconstructed the historical and spatial trends of black carbon (BC) deposition in the Great Lakes as an indicator of past and current industrial and combustion-related emissions to the upper Great Lakes. The BC depositional flux ranged from 0.001-0.164 mg/cm^2/yr in Lake Michigan, 0.0003-0.114 mg/cm^2/yr in Lake Superior, and 0.004-0.289 mg/cm^2/yr in Lake Huron. Geographical information systems (GIS) modeling was used to quantify total BC loading over time in decadal increments during the past 100+ years. The maximum annual BC load to Lake Michigan during the last 100 years was 25.5 Gg (25,500 mt) during the 1940's. The loading of black carbon deposited to Lake Superior peaked in 1960 at 15.5 Gg/yr (15,500 mg/yr), and then declined steadily. However, BC loading to Lake Superior has started to increase again in the 2000s, and has reached a maximum again in 2010. The loading of BC to Lake Huron, excluding Saginaw Bay reached its maximum annual value of 18.9 Gg (18,900 mg) in 2000, and then has reduced by 25% by 2010. The average BC load to Saginaw Bay during the last 50 years is 8.5 ± 1.5 Gg (8500 ± 1500 mt). The total annual loading of BC to the upper Great Lakes (excluding Saginaw bay) during the last 100 years peaked in 1940 at 55.2 Gg (55,200 mt), and its temporal trend is consistent with the estimates of historic BC emission in the United States. Industrial activity during the build up and operation of World War II had the highest impact in loading of BC to the system, and improvements in the technology of combustion, along with Clean Air Act (CAA), has resulted in a dramatic reduction in BC deposition.

The second phase of the study was an investigation of the relationship between the depositional trends of BC and selected semi-volatile persistent bioaccumulative toxic (SV-PBTs) chemicals in the upper Great Lakes. Although direct water-phase discharges of pollutants to the Great Lakes have been greatly diminished over the last few decades, volatile and SV-PBTs primarily reach the lakes through air

transport and deposition onto the water surface with subsequent sedimentation to the bottom. BC, total organic carbon (TOC) and organic matter (OM) are well known to strongly sorb hydrophobic compounds like SV-PBTs in aqueous systems. What is comparatively less well studied is the potential for BC to sorb SV-PBTs in the atmosphere acting as a vector for SV-PBT loading to the lakes. In this study, I investigated the spatial and temporal correlations between four categories of SV-PBTs and BC, TOC, and OM. Highly statistically significant correlations between most SV-PBTs and BC were found, with the exception of hexachlorobenzene, alpha-hexachlorocyclohexane, Tetra-PCBs, and Penta-PCBs. In contrast, almost no correlation was observed between either OC and OM and the SV-PBTs, indicating that in-lake OM production does not significantly affect SV-PBT loading to the sediments. The results demonstrate that BC deposition has co-occurred with that of most SV-PBTs, even while BC fluxes have diminished in recent years.

The third phase of the study focused on the loading of OM, TOC and total nitrogen (TN) to the sediments as an indicator of eutrophication. The quantity and molecular composition of OM deposited to lake sediments have been used widely to measure anthropogenic impacts on local ecosystems and reconstruct historical environmental conditions. When the rate of oxidation of OM surpasses the ventilation rates of the lake due to the related extended transfer of OM, the dissolved oxygen (DO) can be depleted in the hypolimnion. The results of my analyses show that organic loading to the sediments in the lakes is primarily from in-lake (autochthonous) photosynthesis and not from terrestrial sources. Coincident increases in TOC with concomitant decreases in the TOC/TN ratio provide confirmatory evidence that eutrophication has been found in all five lakes.

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List of Acronyms

AEBL……..….Applied Environmental and Biotechnology Laboratory

AOC……..……..…..……Area of Concern

BBOT……..2,5-(Bis(5-tert-butyl-2-benzo-oxazol-2-yl) thiophene

BC……..…….Black carbon

CAA……..……..Clean Air Act

CWA……..……Clean Water Act

DDT……..……..……Dichloro-diphenyl-trichloroethane

DO……..…….Dissolved Oxygen

GB…….Georgian Bay

Gg……..…….....Giga-gram

GIS……Geographic Information System

GLSSP……..Great Lakes Sediment Surveillance Program

HAP……..…….Hazardous Air Pollutant

HCl……..……Hydrochloric Acid

H_2O_2……..……...……..Hydrogen Peroxide

IESP……..Institute for Environmental Science and Policy

MAR……..……...Mass Accumulation Rate

MC……..……..……Multi Core

mg……..……milligram

NC……North Channel

ng…...……..……nano-gram

NSOC……..……..Non-soot organic carbon

OC……..….Organic carbon

OCP……..……Organochlorine Pesticide

OM……..…….Organic Matter

ORP……..……..…….Oxidation reduction potential

PAH……..…….Polyaromatic hydrocarbon

PBDE……..…….….Polybrominated Diphenyl Ether

PBT……..……Persistent bio-accumulative toxic compounds

PCB……..……Polychlorinated biphenyl

PCDD…….……...Polychlorinated dibenzo-dioxin

PCDF…….…….....Polychlorinated dibenzo-furan

pg…...…….…….pico-gram

PG…….…….…….……Ponar Grab

RAP…….…….……Remedial Action Plan

SV-PBT…….……Semi-Volatile Persistent bioaccumulate and toxic

TC…….…….……Total carbon

TN…….Total Nitrogen

USDA…….…….United States Department of Agriculture

USEPA……United States Environmental Protection Agency

USGS…….United States Geological Services

WWTP…….……Wastewater treatment plant

Chapter 1 . Introduction and State of Science

The Great Lakes span 1,200 kilometers (750 miles) from west to east include lakes Superior, Michigan, Huron, Erie and Ontario. Their importance in the physical and cultural inheritance of North America is undeniable [1]. As essentially inland freshwater seas, they have supplied water for consumption, power, recreation, transportation and other uses [1]. The resources and waterways of the Great Lakes basin have had a major influence in the history and development of the United States and Canada [1]. The lakes and their side streams were the pathways for exploration of the mainland, transportation of natural resources like timber, agricultural products and minerals, and merchandise overseas for the early European explorers and settlers [1].

Currently the Great Lakes basin is home to one-quarter of the Canadian population and more than one-tenth of the population of the United States. Almost one-quarter of the total agricultural crop of Canada and 7 percent of the American crop are situated in their basin. Industrially, many of the world's most concentrated facilities are sited in the Great Lakes area. Thus, the Great Lakes region is a principal part of the Canadian industrial and financial system, and the United States deems the Great Lakes as the fourth seashore [1-3].

1.1. Characteristics

Holding approximately 18 percent of the world’s fresh surface water supply, the Great Lakes are the largest fresh water system on earth [1, 4]. Despite their large size; the Great Lakes are particularly susceptible to pollution by a broad variety of contaminants. Runoff of soils and agricultural chemicals from farm lands, city wastes, leachate from disposal sites and industrial region discharges are some of the main sources of contamination [1, 4]. In addition, they have a relatively high surface area that makes them susceptible to exposure by atmospheric deposition of pollutants in gas rain or snow, as well as dust on the lake surface. Their outflows are comparatively small to the total volume of water (less than 1 percent per year); thus, contaminants that enter the lakes, whether from the atmospheric deposition or by direct

discharge, are frequently accumulated in the system and become more concentrated over time. Re-suspension of previously contaminated sediment and then cycling of pollutants through biological food chains can also lead to contamination in the system [1, 2, 5].

The physical characteristics of the great lakes watershed such as soil type, topography and climate differ across the basin due to its vast size. A cold climate with coniferous forests and a granite dominated bedrock (named the Canadian or Laurentian Shield) beneath a normally thin layer of acidic soils are the characteristics of the northern basin [1, 4]. In the southern Great Lakes basin, soils consist primarily of a mixture of sand, silt and clays deposited as glacial moraines and drifts, and lake and river sediments [1, 4]. The productive, fertile lands can be readily exhausted agriculturally, and extensive urban development has replaced much of the original deciduous forests in the southern basin [1, 5, 6].

Table 1.1.Population distribution in the Great Lakes basin (2000-2001)[1, 7]

U.S. States	**Superior**	**Huron**	**Michigan**	**Erie**	**Ontario**	**Totals**
Illinois	--	--	2,849,460	--	--	2,849,460
Indiana	--	--	1,188,385	--	--	1,188,385
Michigan	141,767	2,651,045	3,430,358	3,699,653	--	9,922,823
Minnesota	254,714	--	--	--	--	254,714
New York	--	--	--	1,173,970	2,907,919	4,081,889
Ohio	--	--	--	2,889,100	--	2,889,100
Pennsylvania	--	--	--	371,209	--	371,209
Wisconsin	123,247	--	2,352,417	--	--	2,475,664
U.S. Total	**519,728**	**2,651,045**	**9,820,620**	**8,133,932**	**2,907,919**	**24,033,244**
CA Total						**10,000,000**
Lake Basin Total						**34,033,244**

While the Great Lakes are part of a single system, each lake has distinct characteristics [1, 4]. The largest, deepest, coldest of the five is Lake Superior, which could hold all the other Great Lakes plus three more Lake Eries within its volume [1, 4]. Due to poor soils and a cool weather, the Superior basin is mostly covered by forests with little commercial agriculture. Because of the sparse population and forests,

relatively fewer contaminants enter Lake Superior through land or water directly; thus, airborne transport is the dominant source of the deposition of pollutant to this lake [1, 2].

1.1.1. Lake Superior

Lake Superior is the largest of the Great Lakes and the largest freshwater lake by surface area (and the third by volume). The lake is bordered by the Canadian province of Ontario the US states of Minnesota, Wisconsin, and Michigan [7, 8].

It empties into Lake Huron through the St. Mary's River and the Soo Locks at Sault Ste. Marie, MI. Over two hundred rivers feed into the lake. Out of those, the St. Louis River, the Nipigon River, the Pic River, the Pigeon River, and the White River are the main rivers feeding the lake. There are rapids at the upper end of the St. Marys River. [8].

The maximum length of Lake Superior is 350 statute miles (560 km), and its surface area is 31,700 square miles (82,103 km^2). Its maximum depth is 222 fathoms (1,332 ft; 406 m), with an average depth of 80.5 fathoms (483 ft; 147 m). Lake Superior holds 2,900 cubic miles (12,100 km^3) of water that is enough to cover the Continent of North America with 30 centimetres (12 in) of water. The lake has 2,726 miles (4,387 km) shoreline including islands [4, 8].

Although the surface temperature of Lake Superior fluctuates seasonally, the temperature at a depth of 110 fathoms (660 ft; 200 m) is approximately stable at 39 °F (4 °C). This temperature deviation makes the lake seasonally stratigraphic. However, two times in a year, during spring and fall turnover, the water column attains a consistent temperature of 39 °F (4 °C) from top to bottom, and the lake is completely blended which makes the lake dimictic. Due to its large volume, and low inlet and outlet flow, Lake Superior has a long hydraulic retention time of 191 years [9] . Storms on the lake on a regular basis create wave heights of more than 20 feet (6 m). However, waves over 30 feet (9 m) have been recorded [8, 9].

More than eighty fish species are in Lake Superior [10]. Compared to the other Great Lakes, it has low levels of dissolved nutrients which make it less productive in terms of photosynthesis and higher trophic

levels, thus it is considered oligotrophic. On the other hand, the levels of nitrate in the lake have been increasing constantly in the past 100 years. Although, they are still much lower than hazardous levels to humans, this consistent, long-standing increase is testimony to increased environmental nitrogen usage and mobilization. It may be related to alterations of the local nitrogen cycle by anthropogenic activities, but more investigations are still needed to discover the reason of this change to the lake's natural balance [8, 11].

1.1.2. Lake Michigan

The only Great Lake that is completely inside the United States (and the second largest by volume) is Lake Michigan. Its northern area is less developed, colder, and is relatively sparsely populated, except for the Fox River Valley and Green Bay region. This river drains into Green Bay in one of the most fertile fisheries of the Great Lakes. However, the bay is influenced by the wastes of one of the world's highly industrialized paper and pulp region. Southern of the lake is more moderate in temperature, and has the most populated regions in the Great Lakes, comprised of the Milwaukee, Chicago and Northern Indiana metropolitan areas. About twenty percent of the total population of the Great Lakes basin (eight million person) reside in this region [1].

1.1.3. Lake Huron

The third largest lake by volume is Lake Huron (including Georgian Bay). Its sandy, shallow shores are used for low-density recreational lodging by both Canadians and Americans. The Flint and Saginaw Bay metropolitan areas are located in the Saginaw River basin, which is intensively farmed. Like Green Bay, Saginaw Bay holds a very productive fishery [1, 6, 12].

Lake Huron is bordered by province of Ontario, Canada, easterly, and by the state of Michigan, USA, westerly. Its name is derived from early French voyagers who named it for the Huron Native American people dwelling in the area [12]. The North Channel and Georgian Bay comprise the northern parts of the lake. St. Marys River and the St. Clair River are the main inlet and outlet of the lake, respectively [12].

Lake Huron is the second-largest of the Great Lakes by surface area. It is the world's third-largest fresh water lake by surface area of 23,000 mi^2 (59,600 km^2) [4]. However, it is the third largest of the Great Lakes by volume, since Lake Michigan and Superior are deeper and have larger volumes [13], with the volume of 850 mi^3 (3,540 km^3) [4, 12]. Its length is 206 miles (332 km), elevation is 577 ft (176 m) above sea level, and the average depth is 195 ft (59 m) [4, 12]. Georgian Bay is a large bay that projects northeast from Lake Huron into Ontario, Canada. Manitoulin Island is also an outstanding aspect of the lake which divides the North Channel and Georgian Bay from main body of Lake Huron [4, 12, 14].

The retention time of Lake Huron is only 22 years, only 1/9 that of Lake Superior due to its shallower depth and concomitantly smaller volume. Lake Huron's ecology has undergone significant changes in the last century. Originally, the native deepwater fish community was dominated by lake trout in the lake. In an attempt to rehabilitate the species, lake trout and nonnative Pacific salmon have been stored in the lake since the 1960s [4, 12]. Recently, the lake has suffered due the introduction of an assortment of new invasive species, such as quagga and zebra mussels, round gobies, and the spiny water flea [15]. In turn, numerous drastic changes have been observed in the lake's zooplankton community [16].

1.1.4. Lake Ontario

Lake Ontario is surrounded by the Canadian province of Ontario on the north and southwest, and by the American state of New York on the south and east. It was named as "Ontario" as Canada's most populous province [17]. Lake Ontario, the last in the Great Lakes chain empties into the Atlantic Ocean through the St. Lawrence River. It is also the only Great Lake that does not have border with the state of Michigan [17]. Lake Ontario is much deeper than Lake Erie, but slightly smaller in area, with an average depth of 86 m. (283 ft) and a six-year retention time. Toronto and Hamilton are the main municipal, industrial cores located on its coast. Except for a narrow band along the lake, the U.S. shore is not intensively farmed and less urbanized [4, 17].

Lake Ontario is the smallest Great Lake in surface area (7,340 sq mi, 18,960 km^2) and is the easternmost of the Great Lakes, but it is much larger than Lake Erie in volume (393 cu mi, 1,639 km^3) due to its

greater depth [4]. The 14th largest lake in the world, Lake Ontario's residence time is 6 years. The lake has a shoreline of 712 miles (1,146 km) with its islands included. The mean surface elevation of this lake is 243 ft (74 m) above sea level which is the lowest of the Great Lakes, and Lake Erie upstream is 326 feet (99 m) higher. The lake's maximum length is 193 mi (311 km), [4], and has an average depth of 283 ft (86 m) [4, 17].

The Don River, Humber River, Trent River, the Niagara River, the Cataraqui River, the Genesee River, the Oswego River, the Black River, and the Salmon River are major tributaries to Lake Ontario [17]. The Niagara River is the main inlet of this lake from Lake Erie, and the St. Lawrence River is its primary outlet to Atlantic Ocean. The drainage basin is 24,720 square miles (64,030 km^2) [4, 18]. The lake's water levels alter both seasonally and among years, due to longer trends of precipitation. These water level oscillations create and retain broad wetlands, and are an essential part of the lake ecosystem [19, 20]. It also has a large freshwater fishery. Although over-fishing, water pollution and invasive species have had negative impacts on angling [17, 21].

Hamilton Harbour, Irondequoit Bay, Presqu'ile Bay, and Sodus Bay are other well-known instances. Because these sand bars are often coupled with large wetlands, they support large numbers of plant and animal species, on top of providing important rest regions for migrant birds [17, 20, 22].

1.1.5. Lake Erie

The smallest of the Great Lakes in volume is Lake Erie. The watershed has intense agriculture, due to the fertile soils encompassing the lake. Runoff from the farmland areas of the southwestern Ontario and parts of Ohio, Indiana and Michigan enter to Lake Erie. Its basin contains seventeen metropolitan areas defines (with populations of over 50,000) as cities, and, as a result, the lake is greatly impacted by urbanization. Because of its shallow depth, it warms up rapidly in spring, and repeatedly freezes over in winter [1, 4, 23].

Lake Erie is the tenth largest worldwide by volume and twelfth largest in terms of surface area [14]. The Niagara River is the main natural outflow of the lake which supplies hydroelectric power to Canada and the U.S. by turbines near Niagara Falls at Lewiston, NY and Queenston, Ont. [23]. Some output occurs through the Welland Canal that connects the lakes for ship passage from Port Colborne, Ontario on Lake Erie, to St. Catharines on Lake Ontario with a height variation of 326 ft (99 m). Eutrophication and algal blooms, pollution, and overfishing are among the main environmental health issues in Lake Erie [23-25].

It surface area is 9,990 mi^2 (25,874 km^2), and a mean elevation is 571 feet (174 m) above sea level [4, 23]. The shallowest of the Great Lakes, has an average depth of only 62 ft. (19 m) [4]. It is also the warmest of the Great Lakes, since it is the shallowest. Interestingly, in 1999 lake temperatures reached 85 °F (29 °C), which was problematic for nuclear power plants which need cool lake water to keep their reactors cool [23, 26].

The Detroit River is the main inlet of Lake Erie from Lake Huron and Lake St. Clair. The lake drains into Lake Ontario through the Niagara River [23]. The Grand River, the Buffalo River, the Maumee River, the Sandusky River, the Huron River, and the Cuyahoga River are other major contributors to Lake Erie, with a drainage basin of 30,140 square miles (78,000 km^2) [23]. Numerous islands are found in the western end of the lake which are part of Ohio except for Pelee Island and eight neighboring islands which belong to Ontario [23]. Point Pelee National Park is also located on a peninsula extending into the lake in the southernmost point of the Canadian mainland. Buffalo, NY; Erie, PA; Toledo, OH; Port Stanley, ON; Monroe, MI; Sandusky, OH; and Cleveland, OH are major cities along Lake Erie. Lake Erie has the lowest retention time in the Great Lakes of 2.6 years [27]. The lake's surface area is 9,910 mi^2 (25,667 km^2) [4]. Seiches often cause short-term level variations. Onshore damage can be caused by storm-driven seiches [28]. Meanwhile, Toledo experienced a similar drop in water level at the western end of the lake. Pollution and maritime ship traffic are main anthropogenic impacting the ecological health of the lake [23].

Eutrophication due to excess nitrogen and phosphorus loading is an ongoing concern in the lake. This phenomenon is caused by high nutrient loading from fertilizers, human and animal waste [23, 24]. Because there are fewer wetlands (which can filter out nutrients) and greater levels of waterway channelization, nutrient loading to the lake is greatly increased, causing low-oxygen "dead zones" due to excessive organic matter loading to the sediments [24]. Fertilizer and runoff are the main source of the much of the phosphorus in the lake. Fertilizer from soybean and cornfields is washed into streams and subsequently into the lake by heavy rains. As the result, photosynthesis is stimulated to a level that results in oxygen levels being depleted [25]. Industrial and municipal sources of phosphorus have been greatly reduced by the control of point source outflows, as well as by reductions in farm contributions. In the 1970s, the voluntarily improved farming practices were pursued, and lead to notable recovery of the Lake [23, 25].

Periodically, there is a region of low dissolved oxygen (DO) in the lake [29]. Low DO can lead to eradicate fish and microscopic creatures of the lake's food web, and may cause further issues for sport and commercial fishing in subsequent years [23]. Instances of the development of low DO zones found in 1993 in its central, and they have became more prominent in the summer [30]. In spite of the implementation of new farming techniques intended to reduce fertilizer runoff, algae blooms continued in early 2013. Factors such as climate change, and alteration in Lake Erie's ecosystem could make phosphorus pollution more intractable [25].

1.1.6. Sampling Campaigns of the Great Lakes in this Study

Lake Superior sediment sampling was conducted in May 2011 as part of the USEPA-funded Great Lakes Sediment Surveillance Program (GLSSP), onboard the US Environmental Protection Agency's (USEPA) *R/V Lake Guardian*. A total of 24 locations were sampled. Among these locations, nine were sediment core sampling sites (red squares in figure 1.1). An additional fifteen sediment locations were sampled for surface grabs only (green circles in figure 1.1). At each location, a surface grab sample was collected using the Ponar sampler (figure 1.1-b). And at pre-selected coring locations the Spider Multicorer® (figure

1-c) was deployed twice to collect sediment core samples. Sectioning was performed at 0.5 cm intervals for the first 5 cm, then in 1 cm increments for the other 10 cm and 2 cm for the remainder of the core (from 15/cm to 25/cm segment depth), in the General Laboratory of the *R/V* Lake Guardian. For most cores, 25 segments were obtained. A summary of the Lake Superior sampling campaign is provided in appendix A.

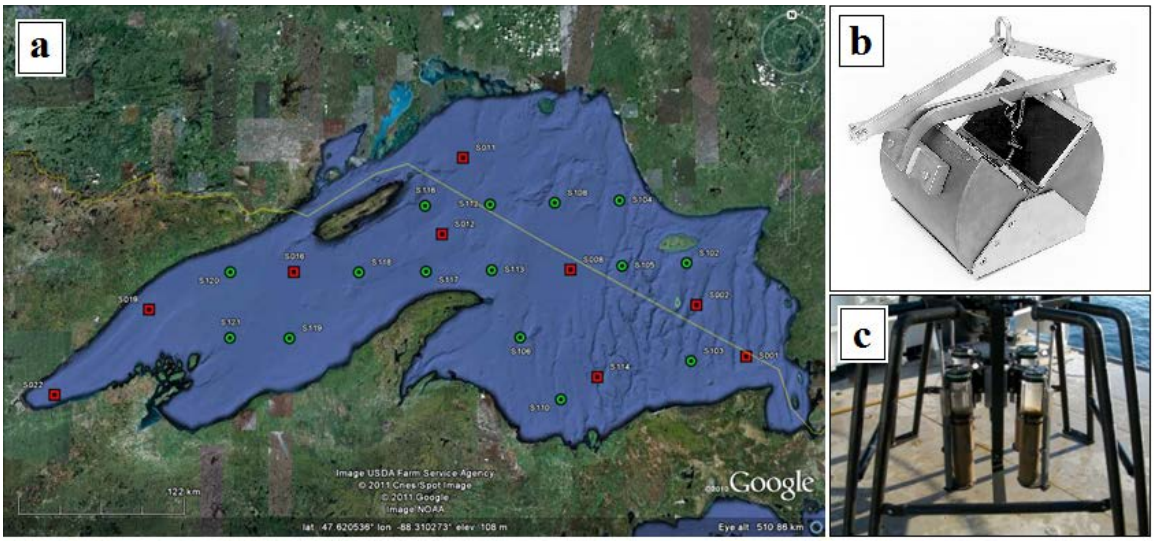


Figure 1.1.Lake Superior sampling sites and apparatuses.

The 2012-H Lake Huron sediment sampling trip as part of the GLSSP included two separate trips onboard the US-EPA *R/V Lake Guardian*. The main Lake Huron basin was sampled on September 14-19, 2012. A total of 30 locations were selected and approved before the trip. Three other locations (SOTXD, SOTXM, and SOTXS) were added while onboard as ponar grab sites. A total of 27 sites were sampled, including nine where both sediment core and surface grabs were collected (red stars in figure 1.2), and 18 sites for surface grab sediment only (green circles in figure 1.2). Six planned ponar grab stations (H105, H116, H117, H120, H121 and H122) were not sampled due to weather conditions.

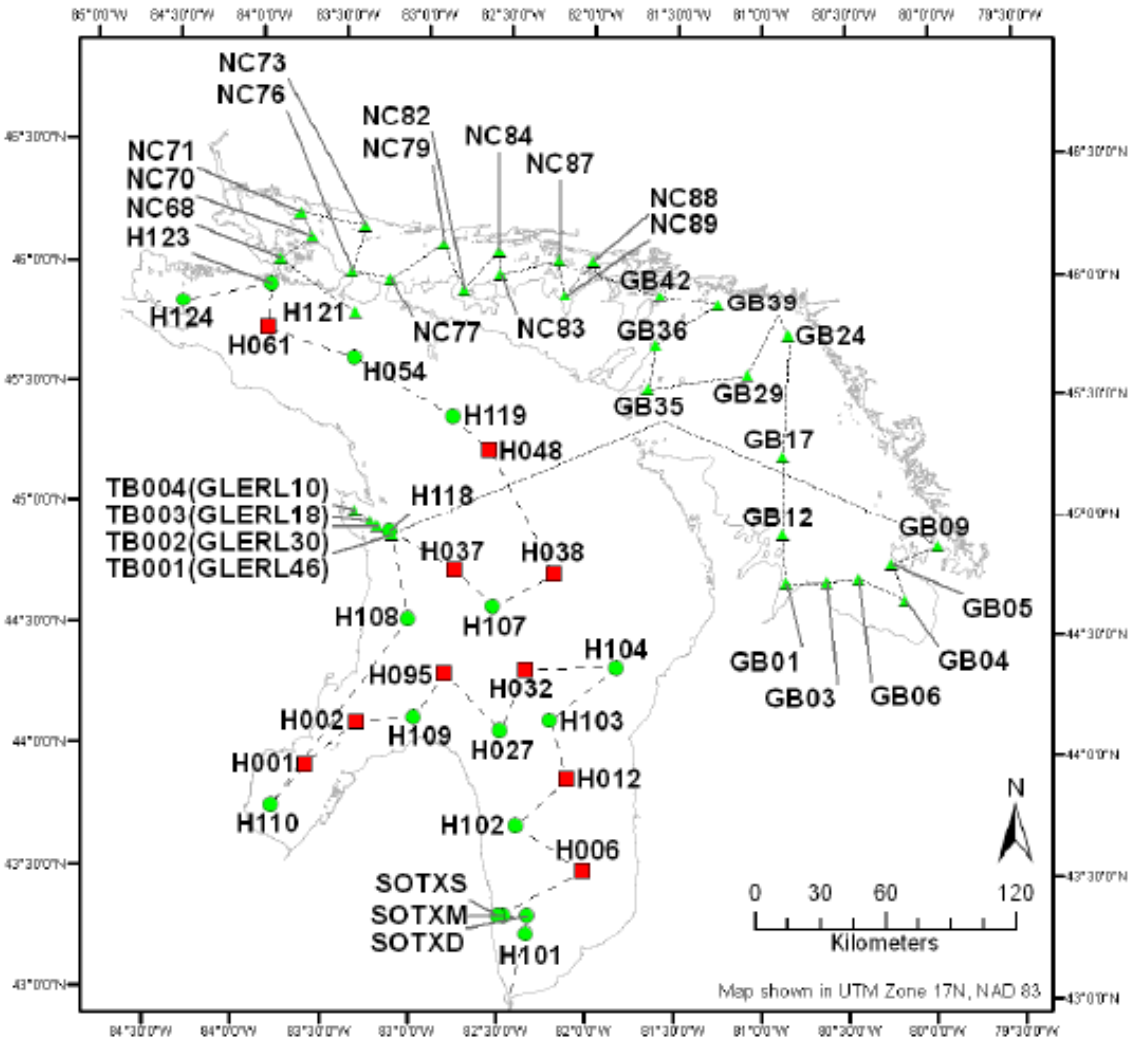


Figure 1.2.Lake Huron sampling sites.

Another trip was made October 4-7, 2012 to collect the surface sediment samples in Georgian Bay (GB) and the North Channel (NC). A total of 15 locations were selected and approved before the trip, including eight in GB and four in NC, as well as three sites missed in the September trip (H116, H117, and H121). With 23 sites being added during the trip and a few planned sites were dropped due to weather conditions, a total of 32 ponar grad samples were successfully collected at the locations marked in figure 1.2 (green triangles) and summarized in appendix A. Altogether, 10 cores from nine sites totaling 249 segments, plus 59 grab samples from 27 sites in trip 1 and 24 sites in trip 2 were obtained. The total number of

sediment samples in amber glass jars, vials and Falcon® tubes was 1,905; 1501 MC (all from trip 1) and 404 PG (180 from trip 1 and 224 from trip 2).

The 2013-ON Lake Ontario sediment sampling trip as part of GLSSP was conducted July 23-25, 2013, onboard the US-EPA *R/V Lake Guardian*. A total of 37 locations were sampled including seven coring sites and 37 grab only sites. The basic sampling information is summarized in appendix A.

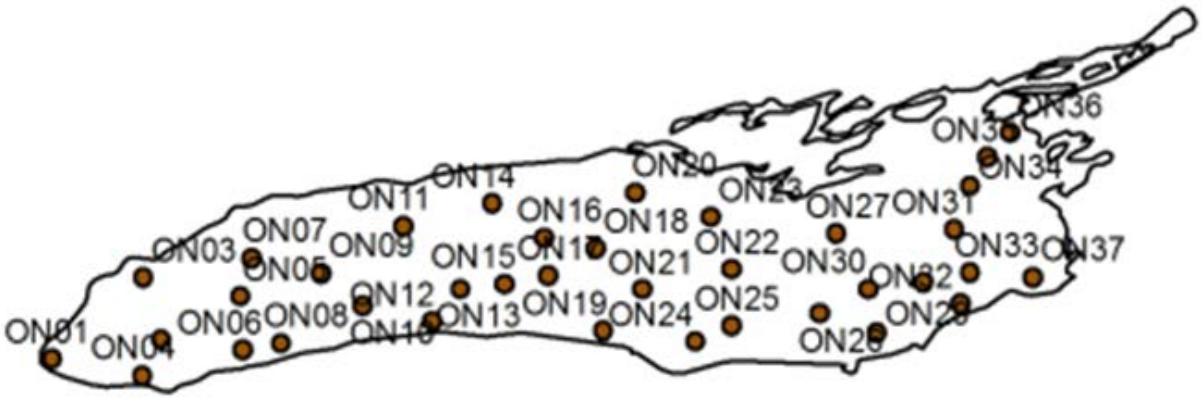


Figure 1.3.Lake Ontario sampling sites.

The 2014-ER Lake Erie sediment sampling trip as part of the GLSSP was conducted May 27-30, 2014, onboard the US-EPA *R/V Lake Guardian*. A total of 45 locations were sampled including 6 coring sites and 39 grab only sites (figure 1.4). Site ER01 was planned but not sampled due to access difficulties. Near-shore sites ER83, ER85 and ER86, which are at the mouths of the Grand River, the Welland Canal, and the Buffalo River, respectively, had only sand or rock, thus no sediment was collected for chemical analysis. Depth profiles for basic water quality parameters were obtained from Seabird at 10 stations. At 3 of these stations, water from Rosette at different depths was filtered for DNA analysis. A basic summary of the sampling information in Lake Erie is presented in.

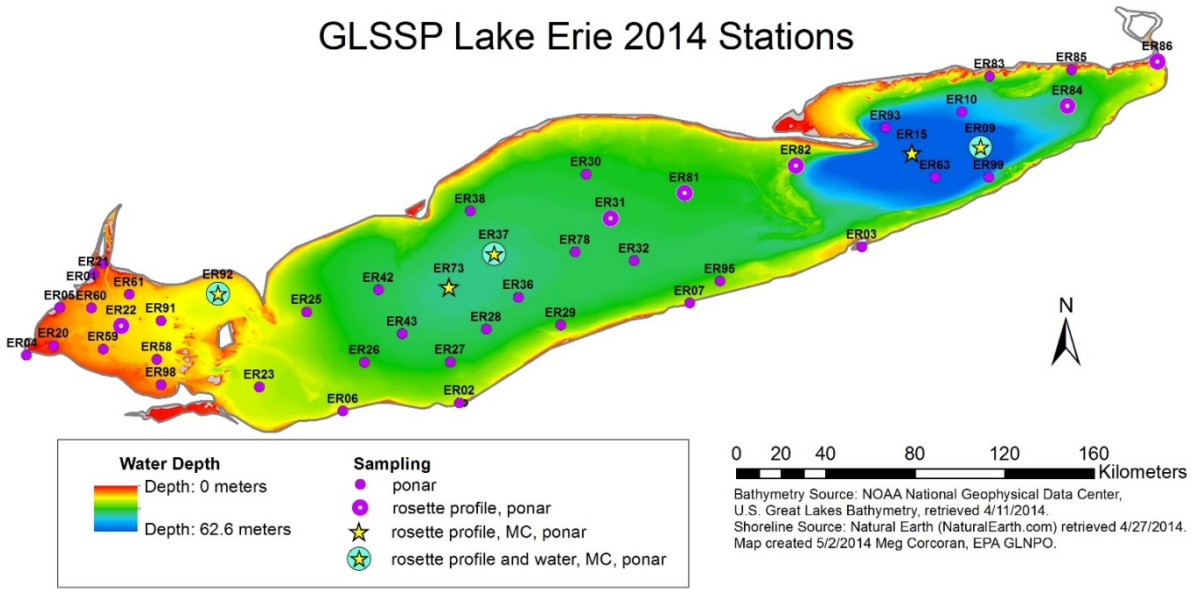


Figure 1.4.Lake Erie sampling sites.

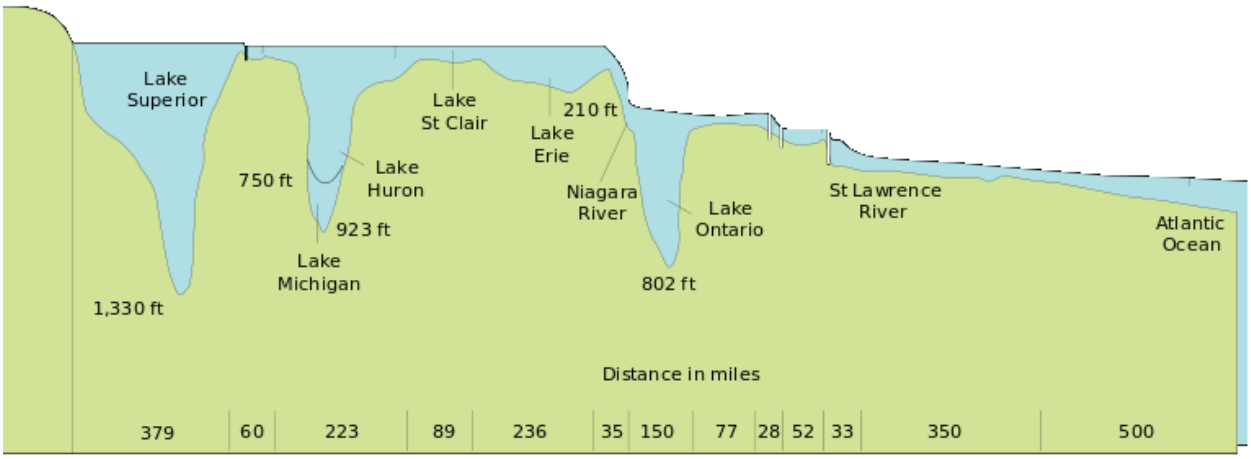


Figure 1.5.Elevation profile of the Great Lakes (Figure adapted from [31]).

1.2. Great Lakes Settlement

The current ecosystem of the Great Lakes has evolved throughout 10,000 years since the retreat of the last glacier. The first Europeans found this environment as a system that was only relatively devoted to agricultural and hunting by native peoples [1, 4]. Although exploitation of some fur-bearing animals was the partial impact of first European settlers, the subsequent waves of immigrants had deep ecological

alterations due to logging, farming and commercial fishery in the region. The clearing of mature forests, plowing soil, and over-harvesting of previously undisturbed fish populations led to drastic ecological disturbances in that era [1, 4, 32].

Portions of the ecosystem were severely changed because of increasing settlement and exploitation. Protective shade was removed from streams by logging, leading to their blockage by debris. Embayments were clogged with sawdust from sawmills [1, 4]. The uncovered soils washed away more readily from plowed farmlands, which caused the burial of valuable habitat in streams and river mouths. The ostensibly infinite abundance of fish was reduced due to exploitive fishing, and entire fish communities vanished [1, 6].

One river after another was degraded by discharge of untreated waste, agrarian settlement, and industrialization [1, 4]. Degradation of water quality lead to irritant water conditions such as putrescence and floating debris in rivers and near shore areas and bacterial contamination which had been created due to the mounting urbanization and industrial growth [1, 4]. Some cases of fatal human contagions of waterborne diseases such as *typhoid fever* had been recorded as the consequence of polluted potable water and contaminated beaches [1]. With the beginning of the 20th century, new chemical products such as PCBs (polychlorinated biphenyls) in the 1920s and DDT (dichloro-diphenyltrichloroethane) in the 1940s were released to environment due to farming and intensified industrialization [1, 4]. To enhance the agricultural production, soils were enriched by non-organic fertilizers. Eutrophication was stimulated by the use of synthetic fertilizers, together with existing sources of nutrient-rich organic contaminants, such as untreated urban human wastes, and phosphate detergents. Lake Erie showed the first indication of lake-wide eutrophication with concomitant oxygen depletion due to enormous algal blooms in the 1950s [1, 4, 33].

1.3. The History of Concerns in the Great Lakes

Rising public concerns of the water quality deterioration in the Great Lakes inspired much research in contamination, particularly in the fields of eutrophication and organic pollutants in the late 1960s [1].

Controlling and regulating contaminant discharges and supporting the construction of municipal wastewater treatment plants were the governments' response to the concern. In 1972 the first Great Lakes Water Quality Agreement between Canada and the U.S. was formalized. In the 1970s, major abetments were made in discharges of pollutants with evident consequences [1, 4]. By removal of oil slicks and floating debris, nuisance situations occurred less often. Odor issues were resolved due to the improvements in low DO levels. As a result of enhanced sewage control, several beaches reopened, and algal blooms decreased as nutrient levels diminished [34].

The initiatives of the 1970s demonstrated that ecological enhancement could be successfully practiced, and many essential lessons have been learned on how to further the cleanup of local nuisance environments [1, 4]. First, a lake-wide approach to quantify the nutrient mass balance on each lake is required. Other important lessons learned include necessity of research on the fate of toxic chemicals, including persistent organic chemicals and metals in each lake [1]. These substances can enter the lakes directly from discharges of industrial effluents, and indirectly through atmospheric deposition, diffusion from waste sites, and land runoff. Thus, toxic pollutants have been found to be a system-wide problem due to improved research, sampling and surveillance [1].

1.4. Toxic contaminants

Because humans are at the top of the food chain, toxic pollutants frequently cause harm to both aquatic wildlife, but also to humans as well. For some toxic chemicals, bioaccumulation or bio-magnification occurs throughout the food chain. Therefore, highly elevated levels of these toxins can be ingested by top predators such as fish-eating birds, lake trout, herring gulls, ospreys and cormorants [1]. Thus, the concentrations of toxic substances in these species can be millions of times higher than in water. Consequently, the probability of human exposure to these pollutants from consuming contaminated fish is much higher than that from drinking water. Acute and chronic effects including cross-bills and egg-shell thinning in birds, and tumors in fish due to exposure of such toxins to aquatic and wildlife species have been well documented [1]. Undoubtedly, the risk to human health will rise if toxic pollutants persist to

accumulate in the Great lakes ecosystem. Low-level, long-term exposures lead to subtle influences on reproduction, cancer growth, and disorders in immune system [35-38].

Since the 1940s, the exposure risk to humans has increased, owing to industrialization, the prevalent utilization of anthropogenic organic compounds, and heavy metals [1].

Heavy metals and synthetic organic compounds can have both chronic effects due to long-term exposure and acute toxicity due to higher level exposure over short duration. The low-dosage with long-term exposure of several environmental pollutants can lead to health issues, such as birth defects, genetic mutations, and boosted cancer risk [1].

Bioaccumulation of the toxic chemicals takes place in the aquatic ecosystem by their trophic exchange in the food chain. Bio-magnification of these persistent contaminants throughout the food chain can raise their levels up to six orders of magnitudes in predator fish such as salmon and large trout, while their concentrations in water may be very little or even approximately undetectable [1, 4]. Additional bioaccumulation can happen in other fish fed animals, like birds. Consumption of specific species of fish for human has been warned by environmental and public health organizations in the Province of Ontario and in the Great Lakes states. Due to mercury, high levels of PCBs or other organic pollutants, certain fish took away out of the commercial markets [1].

The highest potential source for humans exposure to organic pollutants in the Great lakes is the consumption of fish [1]. In contrast, researchers reported that human exposure to PCBs during a lifetime of drinking Lake Michigan water is less than having only one meal of the lake trout from the lake [1, 4]. Hence, higher exposure potential is anticipated for diets that include more wild animals and fish from the basin. Therefore, anglers, native peoples, and specific groups of immigrants who have a regular diet dependent on wildlife and fish, are categorized as ‘at-risk’ groups of concern. According to epidemiological findings, citizens of Michigan with routine fish consumption have greater PCBs levels in their bodies than others [1].

In addition to DDT, many other semi-volatile organic pollutants have impacted the Great Lakes. Four different categories of SV-PBTs were considered in this study, including PBDEs, PCBs, OCPs, and Polychlorinated Dibenzo-p-Dioxins and Dibenzofurans (PCDD/Fs).

1.4.1. Polybrominated Diphenyl Ethers (PBDEs)

PBDEs are the most common flame retardant worldwide [39]. Flame retardants inhibit the spread of fire during combustion of materials by bonding to flammable products such as plastics, polymers, textiles, and coatings. Among the four steps in the combustion process: preheating, volatilization and decomposition, combustion and propagation [40], halogenated flame retardants inhibit the flame propagation process by capturing highly oxidizing free radicals [41]. Although all halogens are successful at detaining free radicals, their stability and efficiency on trapping radicals are key features of their appropriateness as flame retardants [41]. Out of the halogens, iodide decomposes under very low temperature, and fluoride is highly stable resulting in late halogen delivery which is ineffective in impeding flame propagation [41]. Bromine and chlorine have the optimal stability and trapping efficiency, and both can serve as an appropriate flame retardant. Thus, more than 75 different aliphatic, aromatic, and cyclo-aromatic brominated and chlorinated compounds are currently synthesized as flame retardant chemicals [41].

Brominated compounds are usually produced adjacent to natural bromine sources due to their large hazardous waste spill risk [41]. Given the reactivity of bromide, it exists naturally as salts and alkali/alkaline earth metals [41]. Albermarle Corp. (formerly Ethyl Corp.) and Great Lakes Chemical Company are examples of such PBDE producers in the United States. They are both located in El Dorado, AR close to an Arkansas bromine brine which has 0.38 to 0.5% bromine concentration [42]. Generally, there are three technical mixtures (TMs) for PBDEs; the Saytex 102E TM comprised mostly of the deca-PBDE congener (BDE209), the DE-79 TM comprised mostly of octa-PBDE congeners, and the DE-71 TM comprised mostly of penta-PBDE congeners [43]. They are synthesized in a catalytic reaction from diphenyl ethers in brominated solvents such as dibromomethane in the presence of a Friedel-Craft catalyst

[41, 42]. The DE-71 TM is an exclusive additive of polyurethane foam found in beddings, furniture and vehicle upholstery [41, 42, 44-46], and the DE-79 TM is normally used in electrical system products [41, 42, 44]. The basic flame retardant mixture, Saytex 102E TM is incorporated into various polymers such as polycarbonate, polyester resins, polyolefins, polyamides, and polyvinyl chloride to be used in electronic devices [41, 42, 44, 45].

Emissions from PBDE manufacturing facilities and effluents are some of the main causes of PBDE environmental releases [47-49]. However, they are not the only sources of such contaminations because of the ubiquitous detection of PBDEs in various environmental [41, 44, 50]. PBDE technical products incorporated into polymers, textiles, and final consumer products in secondary manufacturing facilities. They can also be a significant source for PBDE release into the environment [44, 49]. Sellstrom et al. (1998) found PBDEs in sediment samples of the downstream of River Viskan where several textile manufacturers who use in PBDEs their final product are located [51].

Post-manufacture use of customer products is another source of PBDE release. A report shows that the level of PBDEs in mattress pads, pillows, sofas, and computer housings can be up to 14,600, 16,400, 19,400, and 109,000 ppm, respectively [46]. They can leach out from product surfaces, since PBDEs are additives [42] and can continue to be released during the whole life cycle of products [44, 49]. Either indoors [52], and, through the air advection, scattered into the environment [53]. PBDE concentrations in house dust reportedly ranged from non-detect to 10, 23, and 3 ug/g for BDE-47, 99, and 100, respectively [54, 55]. In another report in California, much higher levels were measured ranging from 2700 ng/g [112 to 10,700], 3800 ng/g [102 to 107,000], and 684 ng/g [non-detect to 30,900] for BDE-47, 99, and 100, respectively [54, 55]. The higher furniture flammability standard imposed by the state of California has thus led to the greater levels of this pollutant in that state [54, 55]. Although penta congeners are observed more frequently in U.S. home dust, BDE209 is dominant in U.K. house dust, which is likely due to the prohibition placed by the European Union on penta- and octa-PBDE TM since early 2004 [56].

Aqueous discharges and sludge from wastewater treatment plants (WWTPs) can also result in extensive PBDE release [44, 57-60]. PBDEs are bound to suspended particulate matter in the aqueous phase of WWTP influent and effluent because of their high partitioning trend to organics [60]. A report estimated the discharge of 0.9 kg/yr of PBDEs from the Palo Alto WWTP aqueous effluent to the San Francisco Estuary [58]. Oros et al. (2005) discovered the highest total PBDE concentration in the sediments of San Francisco Bay Estuary area near the WWTP discharges [61].

A study showed that Lake Ontario surface sediments had $\sum_{10}$PBDEs concentrations ranging from 216 to 248 ng/g; which was 4 to 40 times greater than those of the other Laurentian Great Lakes [62, 63]. The proximity to several urban areas such as Toronto, Hamilton, Buffalo, and Rochester on the Lake Ontario shoreline may have led to these high concentrations [64]. Samara et al. (2006) reported high levels of 148 ng/g of LMW PBDE congeners in the sediments of the Niagara River [65]. Therefore it is likely that municipal and industrial discharges into the Niagara River also contribute to the PBDE accumulation in Lake Ontario [65]. Thus, anthropogenic aqueous discharges can spread PBDEs in the aquatic environment. The second highest PBDE concentrations were reported in Lake Michigan surface sediments ranging from 48 to 98 ng/g of $\sum_{10}$PBDEs [66, 67]. Urbanization and industrialization have the main influence on PBDE content of Lake Michigan sampling sites, where two stations adjacent to the cities of Chicago, IL and Green Bay, WI had the highest PBDE surface concentrations [66]. In contrast, the lowest surface concentrations of $\sum_{10}$PBDEs were reported in the northern basin site located furthest away from Chicago and Green Bay [66]. High concentrations of $\sum_{10}$PBDEs in surface samples of Lake Erie which is surrounded by urbanized areas such as Toledo, OH, Detroit, MI, and Cleveland, OH are also recorded [64]. Whereas, Lake Huron and Lake Superior had the lowest concentrations PBDEs and have the least urban influence [64, 66, 67].

1.4.2. Polychlorinated biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) were extensively used as solvents, dielectric fluids, coolants, and lubricants in equipment such as transformers and capacitors. They were used owing the ability to resist

high heat and high thermal heat capacity in the USA from 1929 to 1970, when their use was banned [67, 68], although they were not banned elsewhere until much later. They have been found to be possibly carcinogenic and toxic to humans and wildlife [69]. Other adverse health impacts of PCBs include liver damage, thyroid gland injuries, compromised immunities, and impaired reproduction [69]. They have been categorized as a persistent organic pollutant (POP) due to their toxicity and environmental recalcitrance; thus, PCB production was banned in the U.S. in 1970, followed by a worldwide ban by the Stockholm Convention on Persistent Organic Pollutants in 2001 [67, 68].

Monsanto Corp. in St. Louis, MO was the primary PCB producer in North America [68, 70]. Approximately, 130 million kg of the total 570 million kg of PCBs that were sold in the U.S. until 1975 are estimated to be in landfills, while 68 million kg are estimated to be mobile in the environment [70]. Aroclor was a formulation trade-named of PCBs, and every PCB Aroclor mixture is identified by a series of four numbers. The initial two numbers denote the total number of carbon atoms in the Aroclor (12 carbons) and the last two denote the chlorine mass percent of the mixture [67, 71, 72].

There are 209 different congeners of both PBDEs and PCBs. Each congener was named based on convention stipulated by The International Union of Pure and Applied Chemistry (IUPAC) [71]. An ether or carbon linkages are connected to the phenyl rings in PBDEs and PCBs, respectively, and their physical and chemical properties are affected by the number of halogens on the molecule. The general structures of PBDEs and PCB are shown in figure 1.6.

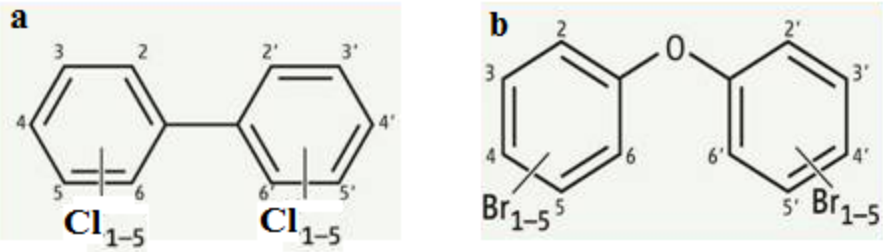


Figure 1.6: General structures of a) PCBs and b) PBDEs [60].

Gives that the majority PCBs still exist in the environment while their production has been banned, production facilities that use PCBs are thus no longer the source of their environmental emission, whereas usage of PCB-containing products can lead to subsequent transport to WWTPs which has been recognized as significant sources [67]. Emissions of PCB into the environment from PCB-containing merchandises are typically unintentional [73]. For instance, PCBs are estimated to be released by plasticizers in order of 1000 to 2000 tonnes/year [73].

PCB accumulation in the Laurentian Great Lakes sediments has been documented since the 1960s [74-77].They can still be detected at substantial levels in the Great Lakes sediments in more recent studies, four decades after the U.S. PCB ban [78]. This confirms the persistent nature of PCBs. Their concentrations in the Great Lakes surface sediments were relatively less than the archived PBDE concentrations in more recent studies [78]. Several investigations have revealed decreases in PCB levels in sediment and water due to air volatilization and in-situ degradation [78, 79].

1.4.3. Organochlorine pesticides (OCPs)

Organochlorine pesticides are chlorinated hydrocarbons applied broadly in agriculture and mosquito control from the 1940s through the 1960s [80, 81]. DDT, methoxychlor, dieldrin, chlordane, toxaphene, mirex, kepone, lindane, and benzene hexachloride are representative chemicals in this group [82]. Although a few of organochlorine pesticides are still registered for use in United States, many were prohibited in this country due to their neurotoxicity [83].

Pesticide applications, landfilling of the polluted wastes disposal, and emissions from manufacturing plants that produce these chemicals are the main sources for their environment release [84]. Organochlorine pesticides (OCPs) are persistent and accumulative chemicals, and can travel in extended remoteness in groundwater or surficial runoff [85]. Some of them are volatile, and some can attach to soil or particles in the air [86]. Aquatic sediments can also adsorb organochlorines, which can subsequently be bioaccumulated in fish and other aquatic biota. They are found at higher concentrations in fatty foods, since these compounds are fat soluble. Dairy products and fish are characterized as the main source of exposure to human, primarily through the ingestion of fatty foods in the general population [87, 88].Headache, convulsions, dizziness, nausea, vomiting, tremors, confusion, muscle weakness, slurred speech, salivation and sweating are probable effects of acute exposure to OCPs [89-94]. While, damage of the liver, kidney, central nervous system, thyroid and bladder are the results of a chronic exposure to such pollutants [95]. Elevated rates of liver or kidney cancer in animals have been linked to many of these pesticides, and there is some evidence demonstrating cancer in humans due to organochlorine pesticides exposure [96].

1.4.4. Polychlorinated dibenzo-para-dioxins/ dibenzofurans (PCDD/Fs)

The polychlorinated dibenzofurans (PCDFs) and polychlorinated dibenzo-para-dioxins (PCDDs) are two groups of relatively planar tricyclic aromatic chemicals with analogous specifications. The general structures are shown in figure 1.7. Based on the variation in the number of chlorine atoms, there are 75 PCDD and 135 PCDF positional congeners existing in total.

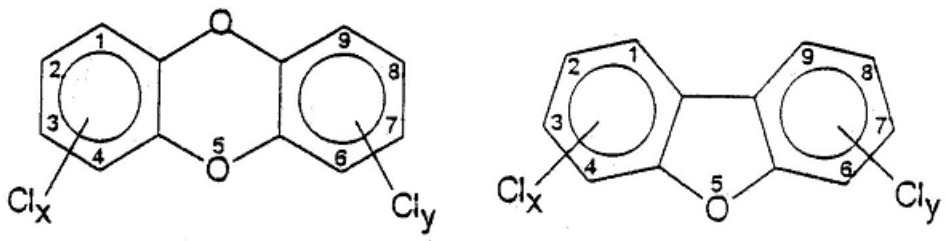


Figure 1.7: General structures of PCDDs (left) and PCDFs (right).

At room temperature, both groups are solids, and their volatility is rather low. Thus, their dispersion in the atmosphere is probable to occur chiefly in particulate aerosols.

PCDDs and PCDFs do not have any known technical application. Although there is no commercial production of PCDDs and PCDFs, they are formed as undesired impurities in trace quantities in the manufacturing of other compounds, such as polychlorinated biphenyls (PCBs), chlorinated phenols and their derivatives, and chlorinated diphenyl ethers [97]. In many industrialized countries, continuing or previous application of pentachlorophenol is considered to be a main source of PCDDs and PCDFs [97]. They can be produced during combustion processes such as incineration of wastes and in the iron and steel production [98]. Low concentrations of PCDDs and PCDFs have been originated in earlier paper products contributed to the chlorine bleaching of pulp and paper [97, 99]. Another possible point source has been identified in chlorine-alkali plants [100]. Car exhausts, specifically exhausts from leaded gasoline when chlorinated solvents utilized as “scavengers”, also yield these pollutants [101, 102]. Various sources of PCDDs and PCDFs have been recognized in which they are formed naturally in sewage sludge [103] and garden composts [104], yet there still may be a substantial fraction that pointed from unidentified bases [100].

PCDDs and PCDFs generally adsorb on combustion or aerosols [105, 106]. Congeners with 2,3,7,8-substitute (17 out of 210) have been revealed high degrees of toxicity, while the other polychlorinated dibenzo-p-dioxins were not classifiable as human carcinogens [107, 108]. Binding to the aryl hydrocarbon (Ah) receptor is the major toxic mode of their action [109, 110]. Discoloration of the skin, rashes, chloracne, liver damages, reproductive and developmental effects and cancer are probable health effects due to severe PCDD/F exposure [111]. Dermatological response of chloracne seems to be most typical human effect of high exposure to PCDDs and PCDFs. Their likely endocrinological influences have been observed in humans; however, their exact clinical significance needs more investigations [112, 113]. Recently, numerous epidemiological studies advocate the relationship between cancer and exposure to high levels of dioxin [114, 115].

1.5. Political Management of the Great Lakes

In 1978, an increased emphasis on reducing the level of toxic substances in the Great Lakes ecosystem-wide was formalized in the second Great lakes Water Quality Agreement. For the purpose of the control on critical pollutants that affect whole lakes or large portions of them, it also called for lake wide Management Plans [1, 4, 116]. Hence, collaboration is indispensable to deal with issues such as water consumption, diversions, lake levels and shoreline management which do not abide by political borders [1]. Thus, decisions on the management of resources in the Great lakes ecosystem requires cooperation of residents, private parties, industry and government. Local citizens have been authorized to contribute in the problem-solving procedure, encourage healthy sustainable setting and lessen their individual exposure to Great lakes toxic pollutants. As a consequence, a better understanding on progression of the past problems and sustained remediation to avert further damage are necessities of the lakes protection [1, 4, 117, 118].

1.6. Geology of the Great Lakes

The Great Lakes bedrock formation was laid down during the Precambrian Era about 3 billion years ago. This was an epoch of immense volcanic activity which shaped enormous mountain systems, and includes more than eighty percent of the Earth's history [1]. Complex structures were formed from folding and heating of the early volcanic and sedimentary rocks. Most of central North America was flooded repeatedly by marine seas in the early Paleozoic Era [1, 4]. Those seas were the habitat of a large number of life forms, such as corals, crinoids, brachiopods and mollusks. Therefore, limestone, shales, sandstone, halite and gypsum are the result of the consolidation of lime, silts, clays, sand and salts which were deposited by those seas [1]. The continental glaciers continually developed over the Great Lakes area from the north in the period of the Pleistocene [1, 119].

The first glaciers started to advance over the region more than a million years ago. The glaciers with up to 2,000 m (6,500 ft.) thick glaciers polished the soil as they advanced, and changed the prior ecosystem [1, 4]. The basins of the Great Lakes were created by deepening and enlargement of valleys of the river systems of the previous epoch. The climate started to warm up which lead to melting and slowly shrinking the glacier thousands of years later [1]. Vegetation and wildlife returned in the interglacial period which followed, and the whole cycle was reiterated numerous times. Glaciers deposited sand, silt, clay and boulders in diverse shapes and combinations. Huge volumes of meltwater arise along the front of the ice by the retreating of the glacier. Large glacial lakes formed due to the depression of the land under the weight of the glacier [1, 4]. And they were much bigger than the current Great Lakes. Beach ridges, eroded bluffs and flat plains located hundreds of meters above present lake levels are all that remain; an example of which is Saginaw Bay and the west and north end of Lake Erie which are surrounded by glacial lake plains known as 'lacustrine plains' [1, 4, 119, 120].

The land surface began to rebound as the glacier drew away. Remarkable alteration in the depth, size and drainage patterns of the glacial lakes was made by this relatively rapid uplift and the shifting ice fronts. Uplift is still occurring in the northern part of the basin, yet it has slowed significantly. As a result,

variation of long-term climate patterns along with this changes, proposes that the lakes are dynamics and will evolve continuously [1, 4, 119, 120].

1.7. Weather of the Great Lakes

The three most influential factors on the weather of the Great Lakes basin are the position of the basin relative to the surrounding continental landmass, the moderating control of the lakes themselves, and air movement from other areas [1, 4]. The air movement from the west is the most important current through the lakes. Changing the air flows to the region from Gulf of Mexico with hot, moist air and from the Arctic with chilly, dry air leads to alternating characteristics of the lakes weather [1]. In general, the northern area of Lake Superior takes delivery of cold, dry weather from Canada in summer, while hot air derived from the Gulf of Mexico are mainly dominant in the southern area of the lakes. Although the top layers of the lakes are warmed by Gulf air blowing the lakes, the underneath layers stay cold. Seldom, moisture and airborne pollutants could be trapped by the upper layer which catches the colder air beneath, and prevents them from dispersion and scattering. This phenomenon is known as temperature inversion that can be a reason for smog in low-lying industrialized parts, as well as in regions in the middle of the basin, such as Southern Ontario and Michigan [1, 121, 122].

During the summer, top layers of water are less dense than the cooler bottom layers due to the solar warming. Release of the thermal energy stored in the lakes during the fall and winter moderates the weather near the lakes. Unstable, variable weather conditions, due to the irregular collision of cold and hot air loads, and rapid movement of air currents through the region are prevailing in autumn and spring. This creates powerful winds, storms and much rainfall which makes the condition for shipping and navigation on the lakes the most perilous [122].

The winter climate is affected by two major air masses of Arctic and Pacific. Northwestern, arctic cold and dry air absorbs the heat and moisture when crosses the lakes, and delivers the trapped moist as condensed heavy snowfall to the land referred to as snow belts. Pacific air currents have lost much of their humidity in the western mountains before reaching the Great Lakes [1, 4]. Lake Erie is often covered by ice, but the other lakes are infrequently fully ice covered in winters. Thermal layering of the lakes

takes place in autumns and springs when the water starts to warm up or cool down. Because of the higher specific heat capacity of the water than that of the land, the lakes warm up slower than the nearby land, and lean to maintain vicinities colder; thus, extended chilly climates sometimes continue until April [1, 4]. Much of the humidity in the area of the Great Lakes basin originates from lake surface evaporation. Water exerted by plants, moisture on the land mass and the surface of small lakes provide the other sources of moisture. In addition, the global air movements, tropical currents in particular, convey moisture into the basin [1, 4, 122].

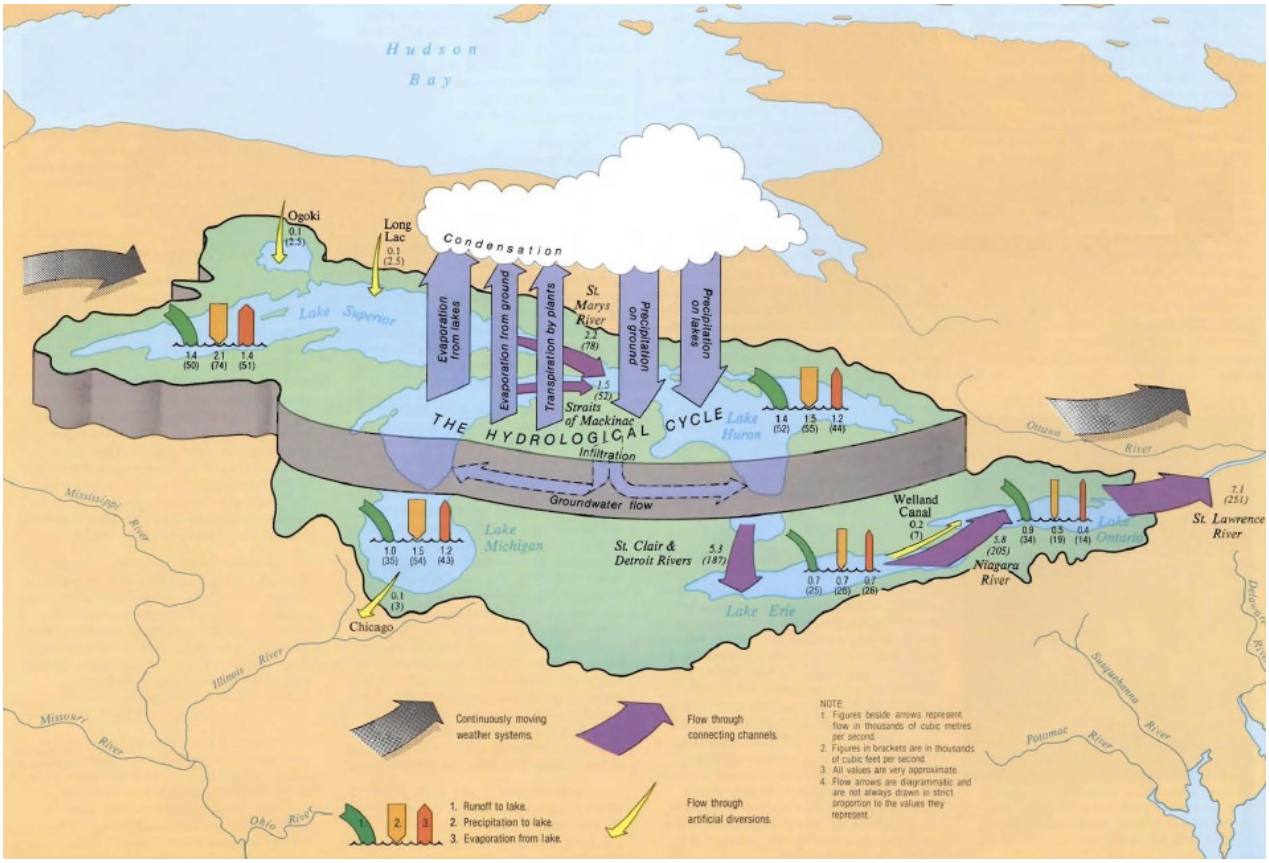


Figure 1.8.Prevalent wind in the Great Lakes (Figure from [1]).

1.8. Climate Change and Great Lakes

The greenhouse effect is a natural phenomenon by which carbon dioxide and water vapor in the atmosphere trap heat from solar radiation, and emit it back to the land. Given that the average world temperature would be -18°C without this effect, it has made the earth habitable and warm with average temperature of 16°C. On the other hand, the carbon dioxide concentration of the atmosphere has raised

from 280 parts per million (ppm) in pre-industrial times to the present 400 ppm since the industrial revolution, and various forecasts suggest that by the middle of 21th century the concentration will boost to twice its pre-industrial levels [1, 4]. Thus, the weather in the basin will be warmer by 2-4°C, and leads to declines in average lake levels by 0.5-2 meters. These great drops in lake levels would produce huge financial concern in this system for its commercial users [1, 123, 124].

1.9. Stratification of the water column

The Great lakes are dynamic systems with complex circulation, and are not merely reservoirs of consistently mixed water. They also include various subsystems which have seasonal alternations [1, 4]. Variation in temperature leads to the layering of water in the lakes, or stratification, as a result of density alterations. The density of water increases with decreasing temperature to 4 °C (39 °F) at which its density is maximum. This is the reason for the inclination of higher depths of the lakes to form discrete layers in the summer months called as thermal stratification [1, 4]. Solar energy cannot reach deeper depths; therefore, deep water becomes colder and denser, and forms layer known as the 'hypolimnion'. The sun warms up the surface and nearshore waters, and makes them less dense in the surface layer. This surface layer is called the 'epilimnion'. With the progression of the summer, temperature variation between the layers escalates. Thus, a thin middle layer grows in which a quick alteration in temperature takes place as 'thermocline' [1, 4]. Most of the ecological life in the lake occurs in the warm epilimnion. The solar energy readily heats the surface layer which is also rich in DO from the atmosphere, resulting from the greatest algal production. The next region of high productivity is immediately on top of the hypolimnion where upward diffusion of nutrients is maximum. Because less sunlight is delivered to the hypolimnion, this layer is normally less productive, and even in some regions, for instance the middle basin of Lake Erie, it may be anoxic as a result of organic matter decomposition [1, 4].

In late fall, surface waters descend, as it becomes cool and denser, moving water from the depths which causes a whole lake turnover or mixing. In the next season, the temperature of the lower parts of the lake approaches to 4 °C (39 °F) in winter, whereas surface waters may freeze to form ice cover. However, most of the times, the lakes continue to be mixed during the winter. With the spring warming effects,

another mixing may take place when temperatures and densities of deep and shallow water layers change again [1, 119, 125].

Water quality is highly affected by the annual turnover and layering of the lake. Water from higher depths with low oxygen content can be mixed with water from the surface with higher dissolved oxygen through the main way of mixing and turnover of the lake. This phenomenon has a great importance on inhibiting complete DO depletion (so called anoxia) of the deep water of most of the lakes [1, 4]. Conversely, in the summer time, stratification process has negative effects on water quality, because it confines the dilution of contaminants from land runoff and sewage [1]. Within the warming stage of spring, the temperature in nearshore waters increases quickly, and a sharp temperature gradient hinders the movement of those waters to the open lake. This temperature gradient is called a 'thermal bar' that hinders the mixing of the hot and cold waters, until the lake surface is warmed up by the sun or mixed by storms. Hence, contaminants are being held in nearshore by thermal bar, not spread to the open lakes, and their concentration in the nearshore regions can ascend [1, 125, 126].

1.10. Resources of the Great Lakes

Approximately 400 years ago, the first Europeans reached the basin which had a rich, densely vegetated zone [1, 127]. In the southern parts, hardwood such as oaks and maples provided immense timber stands, and lush grasslands as high as 2 - 3 meters (7 - 10 feet) were located among the wooded areas. However, just a limited remnant of the original forest currently remains. Coniferous forests had occupied the sandy, shallow lands of the northern parts, with scattered swamps and other wetlands. The forests and grasslands had supported an extensive diversity of life, such as coniferous woods, moose in the wetlands, and deer in the grasslands [1]. In the last 200 years, anthropological actions altered the species composition of the Great Lakes basin [127]. Overfishing, habitat devastation, or the advent of exotic or non-indigenous species, such as the alewife and the lamprey, deteriorated many indigenous fish species. Toxic pollutants and nutrient loading also had appointed further stresses on fish populations [127].

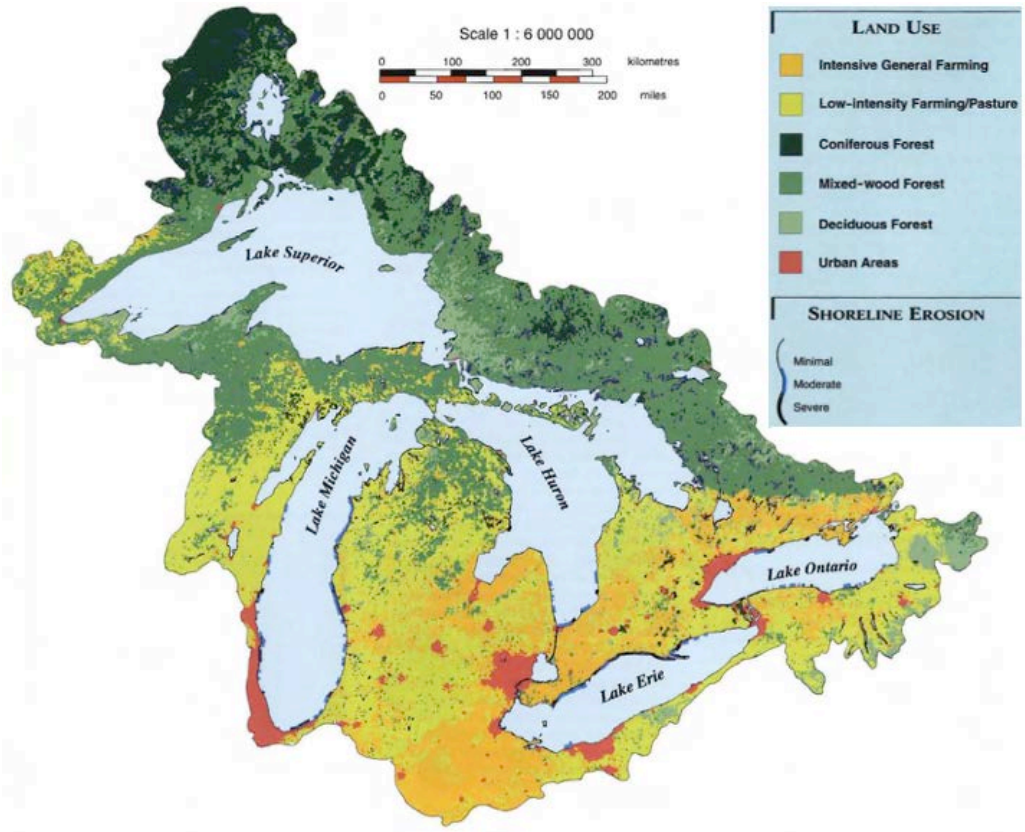


Figure 1.9.Land usage for farming and urban areas in the Great Lakes basin (Re-printed from[1]).

1.11. Early Human Development in the Great Lakes basin

Almost 10,000 years ago, the first residents of the Great Lakes basin reached to the region by passing the land bridge from Asia. There are evidence that copper was being used by descendants of the first settlers in the south shore of Lake Superior for fishing and hunting 6000 yr ago. In the 16th century, when Europeans initiated their investigation for a passage to the Orient throughout the Great Lakes, the population of the Great Lakes region was estimated to be between 60,000 and 117,000 residents. Tobacco, corn, beans and squash were their agricultural products, and they lived in broadly dispersed villages. By depleting the resources in one area, they had to move once or twice in a generation [1, 128].

Forests of the St. Lawrence Valley were exploited for furs by the French in the early 1600s. Georgian Bay was the first region of the lakes to be visited by Europeans. In 1615, they arrived to this area via the Ottawa River and Lake Nipissing. The English and Dutch started to inhabit on the southern and eastern coastline [1, 128]. Despite European settlement to the eastern area of the Appalachians was restricted by a

union of five Indian nations, the French were capable of setting up their foundation in the lower St. Lawrence Valley. Thus, they could advance to the heart of the continent via the Ottawa River [1, 4].

Many forts had been built up to support the fur trade by the French in 1670 and 1673, and valuable furs were being traded on the Great Lakes routes during the 17th century. In 1727, the British started their settlement by establishing the Fort Oswego on the south shore of Lake Ontario. During the American Revolution, the control of the Great Lakes was kept by the British. During the 18th and 19th centuries, many competitions, conflicts, and even wars took place between the British, new U.S. republic, and Canada for the wealth of the Great Lakes region [1, 13, 129].

Throughout the next 150 years, a more rapid development progressed in the Great Lakes basin. Industrialization, city building, and nation building are the results of the contests for territorial land during the epoch of colonies and empires. Many advantages in resources within the basin lead to the raphid development of the region, such as waterways as a major trade freeway, abundance of exploited fish, and the fertile land as the basement for means of furs and agricultural crops. Industrialization in the region also thrived by transportation of the vital manufacturing ingredients such as coal and iron ore through Great lakes ports [1, 13].

1.12. Agricultural Development in the Great Lakes basin

In the 19th century, agriculture was the main reason of the settlement of immigrants to the Great lakes area. The settlement in almost everywhere, with the farming, led to a rapid growth in population of the basin by the mid-1800s. Rapid alterations in the ecosystem were executed by the large-scale and hasty clearing of land for agricultural purposes. Flow of the rivers had been changed, and deltas were clogged due to washing away the bare soils to the lakes. Spawning zones and habitats of fish were ruined. Because of the larger surface runoff after sweeping the vegetation, more frequent oscillation in water levels took place seasonally; this directed to the formation of more flood-prone lands alongside the waterway [1, 130, 131].

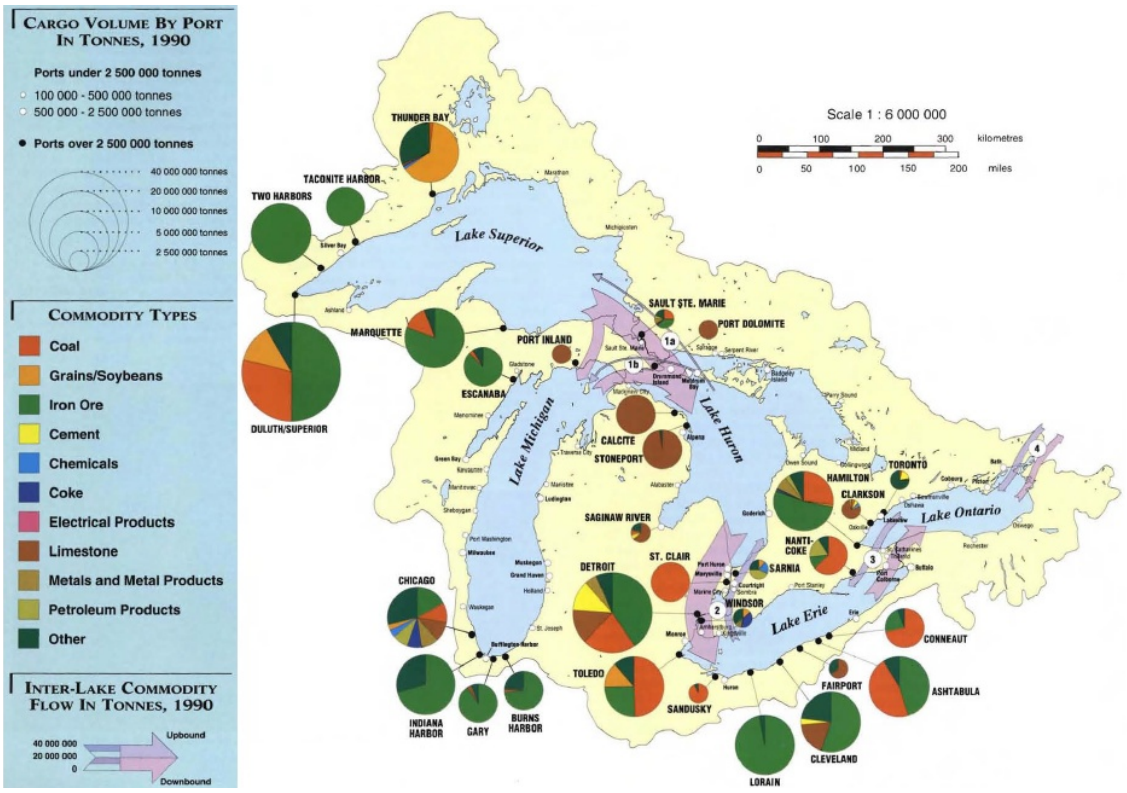


Figure 1.10.Cargo volume by port in 1990 in the Great Lakes basin (Re-printed from[1]).

Eutrophication is one of the main impacts of pollution related to agricultural development in the Great lakes. It contributes to an increased growth of algae and other aqueous plants due to the excess loading of nutrients from fertilizers that get to waterways and runoffs. After the plankton die, they decompose which leads to the DO depletion in the aqueous phase. Deficiency of DO will cause fish kills and alternations in the nature of the ecosystem, while the more contamination-tolerant species become dominant in replace of original plants and animals [1, 130, 131].

1.13. Industrial Growth and Urbanization

Waterways that conveyed raw materials, merchandise and people were the main reason for the settlement of the Great Lakes basin. Owing to transportation benefits and the virtually limitless fresh water supply for domestic and industrial use, the mouths of waterways become the host of the development of the principal municipal districts. Traditionally, steel, paper, chemicals, automobiles and other manufactured supplies are the principal industrial products of the Great Lakes area [1, 132].

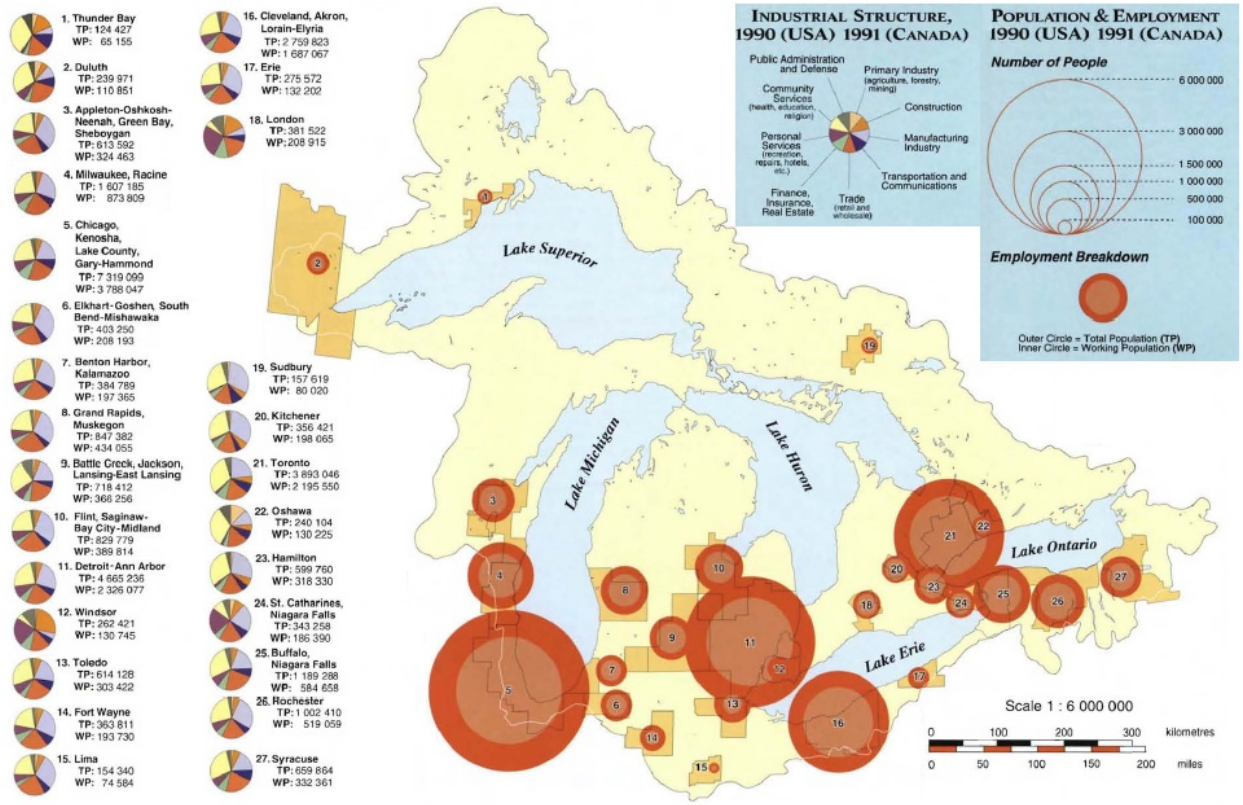


Figure 1.11.Industrial structure of the Great Lakes basin (Re-printed from[1]).

As coal, limestone and iron ore were conveyed from mines and quarries to steel mills on the lakes, the Great Lakes basin contains many American and Canadian steel industries. Iron ore is transported to steel manufacturers at the south end of Lake Michigan and at Detroit, Cleveland, and Lorain in the Lake Erie basin, from mines in the vicinity of Lake Superior in the United States. Steel mills at Sault Ste. Marie, Hamilton and Nanticoke in Canada utilize the iron ore of the upper lakes section [1, 132, 133].

The American paper industry also relies on the upper lakes where the main concentration of factories are located, next to the Fox River. This river empties to Lake Michigan via Green Bay. Canadian paper mills next to the great lakes are situated by the Welland Canal. Owing to the accessibility to the inexpensive electricity on both sides of the Niagara River, numerous chemical companies grew in this region. In Saginaw Bay of Lake Huron and Sarnia, Ontario, on the St. Clair River, other most important chemical

industries are concentrated due to the abundance of salt deposits and water [1, 134].

Large quantities of waste were generated by all of these industrial actions. Industrial wastes used to be diluted and dumped into the tributaries during the majority of the 19th century. Ultimately, the discharge of urban and industrial sewage contaminated the metropolitan water supplies. Historic documents indicate that Chicago had a epidemic in 1854 that resulted in the death of 5% of the population, and another death rate of 124 per 100,000 population due to typhoid fever in 1891 [1, 135]. Hence, Chicagoans had to reverse the direction of the flow in the Chicago River, away from Lake Michigan, to be able to shield the drinking water supply from wastewater effluent. To change the direction of sewage away from Lake Michigan into the Illinois and Mississippi River system, a diversion channel was dug [1, 135].

Because the detection of toxic, bio-accumulate contaminants was impossible in the middle of the past century, various health hazards of such industrial contaminations to the Great Lakes ecosystem were not well recognized until recently. Although utilization of the resources of the area made the region wealthier, the full price of the concentrated industrial population has only been revealed, relatively recently. Collaborations between, states, provincial and federal agencies, local governments and industry are essential for remedial activities of the Great Lakes region. Since the 1970s, pollution in the Great Lakes has diminished considerably through this teamwork [1, 136].

Though the Great lakes ecosystem has been altered to better deal with societal needs, the unforeseen price for this has become evident only recently. Pollution, habitat loss and invasive exotic species are some of the major impacts that have been noticed since the 1960s [1, 136]. Modern settlement was interconnected with water quality and habitat deterioration. Due to urbanization and agricultural development shoreline marshes and streams were silted up, and port districts became septic. Some parts of watercourses are inappropriate for water supply and recreation, as a consequence of oil and chemical spills, industrial and domestic waste discharges, and the influences of mining. Waste treatment strategies were implemented to deal with biological pollutants that endangered the instantaneous human health. Rules were also passed to

avert erratic dumping in the waterways by authorities; yet, it took a major menace to the entire Great Lakes basin to arouse authorities' concern to the truth that the damage was being developed to the whole Great Lakes environment [1, 137].

1.14. Oxygen Depletion and Eutrophication

From the biological productivity point of view, Lakes can be categorized by their quantity of organic material predominantly in the form of algae. Oligotrophic, mesotrophic, and eutrophic lakes are categories to describe those with lowest, intermediate, and the highest productivity, respectively. The amount of nutrients received from the environment, temperature, light, depth and volume are all factors that control organic matter production in a lake system [1, 33, 131, 138-140].

Before industrialization and European settlement, the Great lakes were oligotrophic because of their size, depth and climate, excluding shoreline marshes, swamps, and shallow bays. Small quantities of fertilizers such as phosphorus and nitrogen from decomposition of organic material in runoff from forested lands were received by the lakes. The atmospheric deposition of nitrogen and phosphorus to the lakes were insignificant, too [1, 138-140].

Introduction of some thermal pollutions, as well as elimination of vegetative shade cover have led to an escalation in temperature of many water streams. Simultaneously, agricultural development and urbanization directed to transport of the much higher quantities of nutrients and organic material entering the lakes. The use of inorganic fertilizers and phosphate detergents amplified the loading of nutrient to the lakes. While most authorities tried to restrict the nutrient loading in bordering of the Great Lakes, phosphates, particularly in detergents, remained to be problematic in non-regulated districts [1, 138-140].

Augmented nutrient levels in the lakes arouse the growth of green plants, such as algae. In the same way of applying lawn fertilizers, including nitrogen, phosphorus and potassium, the volume of plant growth surges quickly. Ultimately, algae die in the aquatic system, and start to decompose. The biodegradation of organic matter by bacteria consumes DO in the aqueous phase near the bottom. More oxygen

consumption happens due to the increased decomposition of the higher quantities of organic material. Under low nutrient loadings of normal conditions, the oxygen diffusion into water column, mixing by currents and waves, and the oxygen generation through photosynthesis are factors that preserve DO levels in a lake ecosystem [1, 138-140].

Biochemical oxygen demand (BOD) is related to oxygen depletion during the breakdown of organic material. It usually results from two distinctive bases of decaying algae and by organic matter from the treatment plants discharged to rivers and ports. Algal BOD is the principal problem in open lake and huge bay regions, such as the central basin of Lake Erie [1, 33, 131, 138-140].

When the DO concentration falls due to BOD loading, less vulnerable and more contamination-tolerant species that demand less oxygen, such as carp and sludge worms, can be substituted by indigenous fish species. Hence, changes in species of algae, fish and benthos (inhabitants of the bottom lake) are biological signs of DO depletion. Rises in chlorophyll, as well as turbidity of water, can also be related to an enhanced growing of algae and amplified eutrophication [1, 138-140].

The first of the Great Lakes that revealed a considerable eutrophication issue was Lake Erie. This lake is inherently most productive due to its warm and shallow water, and besides, its basin faced intensive and prompt utilization of its terrestrial for urban and agricultural practices. Lake Erie exceeds all other lakes in effluent loading from wastewater treatment plants, and its drainage zone is the host of about thirty four percent of the total population of the Great Lakes basin [1, 33, 131, 138-140]. In the late 1950s, the first evidence of DO depletion in the central basin of Lake Erie was documented. Despite differing from year to year depending on weather conditions, researches disclosed that the extent of oxygen depletion developed continually, owing to the believed eutrophication. At the beginning, it was necessary to first investigate which nutrients were the most critical in triggering eutrophication in formerly oligotrophic or mesotrophic lakes to overcome this situation. There was a scientific agreement that phosphorus input as a key player in controlling and reducing the eutrophication in the Great Lakes by the late 1960s [1, 33, 131,

138-140].

Due to stratification in summer which forms a relatively cold and thin hypolimnion that separates the deep waters from oxygen-rich surface waters, bottom layers of the central basin of Lake Erie are particularly prone to oxygen depletion. Because of the decomposition of organic matter, oxygen is quickly depleted from hypolimnion layer, and anoxic condition can take place by reaching the concentration of the dissolved oxygen to zero. Various chemical processes alter under anoxia, for instance previously oxidized contaminants may be transformed to more eagerly accessible forms to be dissolved in water. However, wind retains the shallow western basin of this lake well mixed, and prevents anoxia by inhibiting the stratification. The eastern basin of Lake Erie has higher depth, and formation of the thick hypolimnion that holds enough oxygen averts anoxic conditions [1, 33, 131, 138-140].

Claims in the press that Lake Erie was ‘dying’ led to public alarm in both the United States and Canada about nutrient contamination in this lake. In nearshore, a filamentous alga of *Cladophora* became the dominant species under eutrophic conditions, covered beaches by smarmy, green, and putrid loads, and escalated the turbidity of the lake by its dark greenish-brown color [1, 33, 131, 138-140].

The United States and Canada legislated new rules to regulate contaminations, such as phosphorus loading, to cope with water quality issues in response to public concerns about the lakes. To initiate a binational Great Lakes cleanup, the Great Lakes Water Quality Agreement was signed by both countries with emphasis on phosphorus loading diminution of inflowing to the lakes in 1972. Subsequently, a progress review performed over detergent phosphate and waste treatment controls in 1983, and the necessity of the phosphorus control from land runoff was unearthed. In 1993, regulations had accomplished in control of point sources in a high degree; however, it was agreed that supplementary movement in voluntary controls of nonpoint sources was needed to meet the target levels [1, 33, 131, 138-140].

Due to an international collaboration on phosphorus control in the Great Lakes, progress in restricting the

problematic situation had been made. The input loadings of phosphorus to the lakes have been cut to almost maximum values called for in the Agreement for Lakes Erie and Ontario, and are at or below the maximum amounts for Lakes Superior, Huron and Michigan. Correspondingly, the concentration of phosphorus in Lakes Erie and Ontario is at or below maximum allowed levels, and less than maximum in the upper lakes. Because of the resuspension of sediments and inconstant climate in the western part of Lake Erie, phosphorus concentrations are highly fluctuating, but, during calm weather conditions, are within the maximum margins. There are evidences that documented the reduction in excess growth of algae and alternations in algal population composition due to the actions after the Agreement [1, 33, 131, 138-140].

1.15. The Fate of Contaminants

Direct discharge, surface runoff, groundwater movement, and atmospheric deposition are various pathways for introduction of pollutants to the Great Lakes boundary system. Within the system itself, release of previously deposited contaminants from sediments to water column is also prevalent. This phenomenon has been reported in tributaries such as the Ashtabula, Buffalo and Black Rivers, in harbors such as Hamilton, Toronto and the Grand Calumet, and in connecting channels such as the Niagara, St. Clair and St. Mary's Rivers [1, 132, 141-143].

Although many actions have been implemented to diminish the point sources of contamination, it was revealed that atmospheric deposition has a drastic role in introduction of many toxic chemicals to the Great Lakes. Through this, the source of toxic contaminants and nutrients deposited, in wet and dry forms, to the lakes can be far away from where the damage takes place. Phosphorus was the first recognizable contaminant that deposited to the Great Lakes basin from atmospheric deposition. Owing to the dust fall and precipitation measurements, it was cleared that atmospheric deposition is taking account for almost one fifth of the total loading of phosphorus to Lake Michigan. Thus, decreasing phosphorus content in wastewater treatment plans, fertilizer runoffs, and detergents were fortified, since atmospheric source could not be restricted easily. In 1971, after the first evidence of PCBs in fish from the Great

Lakes, the deposition of these toxic chemicals was recognized by measurements of such pollutants in rain and snow. Through the discovery of the toxaphene and PCBs in fish from a lake on Isle Royale, the long-distance transportation of chemicals to the lakes was verified, because this is an isolated island from any identified direct sources of the contaminants located in Lake Superior [1, 132, 141-143].

In this thesis, I studied the spatial and temporal impacts of human activities on the Great Lakes through the analysis of the sediments of the lakes. In the next chapter, I will discuss the historical and spatial trends of black carbon (BC) deposition, as an indicator of the airborne emissions to the upper Great Lakes. In the third chapter, I investigate the relationship between the depositional trends of BC and selected semi-volatile persistent bioaccumulate toxic (SV-PBTs) chemicals in the upper Great Lakes. The fourth chapter of this study is focused on the loading of organic matter (OM) and eutrophication in Lake Superior and Lake Huron. Finally, in the last chapter, I investigate the depositional concentrations of BC, OM, organic carbon (OC), and total nitrogen (TN) in Lake Ontario, Lake Erie, and Inland Lakes.

Chapter 2 . The Spatial and Temporal Deposition of Black Carbon to the Upper Great Lakes in the Last 100 Years

Abstract:

This paper addresses the historical and spatial deposition of black carbon (BC) to the upper Great Lake of Lakes Michigan, Superior, and Huron. The rate of sediment deposition ranged from 0.0183-0.0653 g/cm^2/yr for Lake Michigan, 0.0068-0.0249 g/cm^2/yr for Superior, and 0.0063-0.1554 g/cm^2/yr for Huron. The BC concentration in Lake Michigan, Lake Superior, and Lake Huron ranged from 0.12-7.12 mg/g, 0.04-5.67 mg/g, and 0.36-6.04 mg/g, respectively. The depositional BC flux ranged from 0.001-0.164 mg/cm^2/yr in Lake Michigan, 0.0003-0.114 mg/cm^2/yr in Lake Superior, and 0.004-0.289 mg/cm^2/yr in Lake Huron. The BC/TOC ratio ranged from1-55% in Lake Michigan, 0.8-14% in Lake Superior, and 3-32% in Lake Huron. Based on the decadal modeling of temporal deposition, the maximum amount of BC loaded to Lake Michigan during the last 100 years was 25.5 Gg during the 1940's. The loading of black carbon deposited to Lake Superior peaked in 1960, with the quantity of 15.5 Gg, and then declined steadily; however, it started to increase again in 2000, and has reached a maximum again in 2010. The loading of BC to Lake Huron, excluding Saginaw Bay reached its maximum value of 18.9 Gg in 2000, and then has reduced by 25% in 2010. The average amount of BC deposited to Saginaw Bay during the last 50 years is 8.5 ± 1.5 Gg. The total loading of black carbon to the upper Great Lakes (excluding Saginaw bay) during the last 100 years peaked in 1940 with the quantity of 55.2 Gg, and its temporal trend is consistent with the estimates of historic BC emission in the United States. Industrial activity during the build up and operations of World War II had the highest impact in loading of BC to the system, and improvements in the technology of combustion, along with Clean Air Act (CAA), has had drastic effects in the reduction of BC deposition.

Keywords: Air pollution; Black carbon; Temporal loading; Spatial distribution; Lake Michigan; Lake Superior; Lake Huron; ArcGIS

2.1. Introduction:

Black carbon (BC) is a form of relatively inert condensed graphitic carbon resulting from incomplete combustion [144]. It includes a range of materials from highly poly-aromatic to elemental or graphitic carbon [145], and has been released into the atmosphere in high quantities since the start of the industrial revolution [146]. Conventionally, heterogeneous carbonaceous aromatics are its primary constituent [147]. However, a wide variety of carbon-rich particles also comprise BC, ranging from fine particles of soot BC produced in the gas phase by condensation reactions, to larger particles of char BC as the result of the pyrolytic reactions occurring vegetation fires and other similar processes [148, 149].

The incomplete combustion of organic material occurs during internal combustion, incineration processes, domestic, industrial sources, and natural sources such as forest fires when the molar ratio of oxygen (O_2) to carbon (C) is less than one. Incomplete combustion is one of the major producers of hazardous air pollutants (HAPs) to the environment [150-152]. In addition to gaseous toxic compounds, such as carbon monoxide (CO) and polycyclic aromatic hydrocarbons (PAHs), BC is another important component of HAPs that encompasses the bulk of the carbonaceous portion of airborne pollutants (up to 97% of the particulate matter reported in some regions) [151, 153-155]. Due to its chemical and microbial inertness [156], BC persists over long periods of time in soils [147, 157], marine and lacustrine sediments [147], [158-160] and ice [147, 161]. It is the primary constituent in the atmosphere that absorbs solar radiation and, therefore, influences the Earth's radiative heat balance [162].

Given its relative inertness, BC has the potential to be a valuable proxy for reconstructing historical anthropogenic and natural combustion processes [163, 164]. While some green house gases, such as CH_4 and N_2O, have a narrow absoption band, BC can absorb solar radiation in both the infrared and visible wavelengths [165]. Hopper et al. (1994) revealed that BC is an essential component of any trial of baseline monitoring, and also found statistically significant correlations between atmospheric BC and CO_2 concentrations, since both of them are products of combustion processes [166].

Because soot BC has finer particle size, it can be transported long-distances prior to deposition from the atmosphere to aquatic systems. Thus, it is has a high propensity to be transported long distances to the marine systems and lakes far from its source, while heavier and larger particles of char BC are more likely to be conserved near the source [148, 167]. Masiello et al. (1998) revealed that these finer soot BC particles could persist for about a week in the atmosphere as airborne pollutants due to their minute size of (less than 2.5 μm). This residence time in the atmosphere is sufficient to disperse to remote locations through long-distance transport [168].

BC has been widely studied in marine sediments [160, 167, 169-177]. Owing to its role in numerous environmental processes, scientists from many diverse fields have intensified research on BC and its fate in recent years [147, 178, 179]. BC is an aerosol that has both direct and indirect influences on albedo and Earth's radiation balance; hence, its significant impact on climate change is clear [180-182]. Moreover, previously stored and accumulated BC in sediments and soils may end up as a significant carbon sink that has only recently been understood [167, 183], as BC can persist for several million years in sediments [168]. Consequently, it is necessary to have an accurate evaluation and inventory of the deposited BC and its burial flux in marine sediments in order to more completely characterize the carbon cycle [170].

BC, CO_2, and various other constituents are released in burning of fossil fuel and biomass. BC-aerosols are generally the principal fragment of anthropogenic atmospheric particulate matter, which can modify the Earth's climate through its effects on solar radiation reaching the surface [182, 184, 185]. Furthermore, BC impacts cloud lifetime and precipitation, thus altering hydrologic cycles, large-scale atmospheric circulation, and local weather [181]. BC also alters radiative forcing when it lands on snow [185-187].

On global scale, BC can affect global warming by absorbing solar radiation, which leads to warming the atmosphere. It can also change the albedo equilibrium, change the lifetime and reflectivity properties of clouds and precipitation, and hasten melting of ice cover due to deposition on snow [182, 188, 189].

BC in sediments deposited prior to industrialization have been used to reconstruct wildfires at the cretaceous-tertiary boundary [190], and as a marker of oxygen levels in the atmosphere of prehistoric eras [191]. Therefore, lake sediment can be an excellent archive for investigating the past environmental and climatic changes [192]. Thevenon, et al. (2010) estimated that pyrogenic carbon emissions have increased three fold from anthropogenic activities, such as agriculture, metallurgy and settlement, and their consequences [185].

In previous instances of human colonization, an escalation in biomass fires is relatively ubiquitous, and one of the typical characteristics of social change is the alteration in the regimes of fires in that region [193]. Anthropogenic fires typically utilize biomass with substantial moisture content, whereas naturally occurring fires are normally dry. Thus, byproducts of incomplete combustion can increase two to three fold in anthropogenic fires compared to natural fires [194].

The Laurentian Great Lakes have both strategic and economic importance as a major source of drinking water, food, recreation, employment, and transportation to the USA and canada [13]. Industrialization and urbanization through the growth of large metropolitan areas in the Great Lakes basin greatly increase pollution to the environment [1, 174], and the very large surface area to volume ratio of these lakes (nearly two orders of magnitude higher than that of the oceans) makes them particularly sensitive to airborne pollution [195, 196]. Deposition of BC is also a direct indicator of urbanization and industrialization influences to the lakes ecosystem.

In this study, we investigated the temporal and spatial loading of BC to the upper Great Lakes, including Lakes Superior, Michigan, and Huron. We measured the concentration of BC and organic carbon (OC) in the sediments of these lakes, and performed the radio dating of the sediment samples to reproduce the depositional history of BC. Based on our experimental results, we modeled the temporal loading of BC to the upper Great Lakes, using ArcGIS. Most BC emissions in North America originate in the eastern part of the United States, and specifically Great Lakes basin [169]. Results are compared to previous studies of

BC emissions from various sources in North America [169], and from fossil-fuel in the United States for validation [197].

2.2. Materials and Methods:

2.2.1. Sampling:

The sampling of the all three upper Great Lakes was performed in three different years onboard the US Environmental Protection Agency's (USEPA's) *R/V Lake Guardian* as part of the USEPA-funded Great Lakes Sediment Surveillance Program (GLSSP). Lake Michigan sediment sampling was conducted from September 16 to 20, 2010, using a Box Corer. Four 10 cm diameter subcores were extruded and sectioned in the General Laboratory of the *R/V* Lake Guardian, using two hydraulic extruders made at Cambron Engineering (Bay City, MI). Sectioning was performed at 1.0 cm intervals for the first 10 cm, then in 2 cm increments for the remainder of the core. For most cores, 20 segments were obtained, with the exception of core M050 which has 19 segments.

Lake Superior and the remaining part of Lake Michigan sediment sampling was conducted in May 2011. At pre-selected coring locations the Spider Multicorer was deployed twice to collect sediment core samples. Sectioning was performed at 0.5 cm intervals for the first 5 cm, then in 1 cm increments for the other 10 cm and 2 cm for the remainder of the core (from 15cm to 25cm segment depth), in the General Laboratory of the *R/V* Lake Guardian. For most cores, 25 segments were obtained.

Core collection in the main basin of Lake Huron was performed on September 14-19, 2012. Two different core section schemes were used for this lake, based on expected sedimentation rates and both produced 25 sections for each core. For most cores, the section thickness was 1 cm for depth 0 – 15 cm followed by 2 cm for depth 15 – 35 cm. This section scheme was designed for sampling locations of relatively high sedimentation rates. Based on our previous experience with sediment of Lake Huron, this sectioning scheme should ensure that the sediments deposited in the early 20th century are collected. A different sectioning scheme was designed for two north basin locations where sedimentation rates were expected to be low. For cores H038 and H061, 0.5 cm segments were obtained for depth 0 – 5 cm, then 1 cm for

depth 5 – 15 cm, followed by 2 cm for depth 15 – 25 cm. About 1/3 of the cores was below 25 cm and discarded.

In total, 647 sections from 28 coring sites were collected from the upper Great Lakes. Figure 2.1 shows a map of all coring locations in our sampling. A summary of the core sampling data, including sampling date, time, coordination, depth, and number of sections in the collected cores, is provided in table B1.

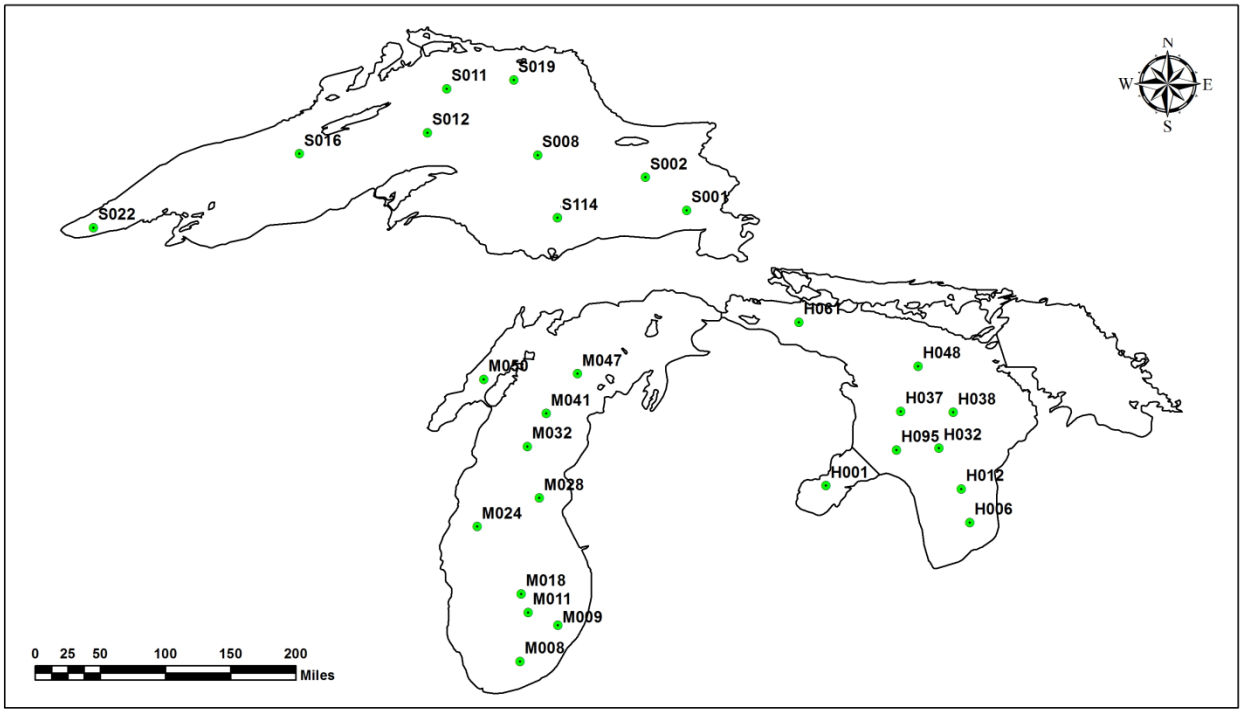


Figure 2.1. Sampling locations of cores collected in the upper Great Lakes.

2.2.2. Dating and Modeling:

For dating of the cores, our group had developed laboratory protocols for ^{210}Pb measurement based on alpha spectrometry of ^{210}Po [198, 199]. However, in this work, we determined the activities of ^{210}Pb, ^{226}Ra, ^{7}Be, and ^{137}Cs simultaneously using gamma spectrometry, which required much less laboratory pretreatment procedures. The ^{210}Pb/^{226}Ra ratio was used to evaluate excess ^{210}Pb. ^{137}Cs has been used to check the accuracy of deposition years determined from ^{210}Pb data, through comparison with the known ^{137}Cs deposition history from above ground nuclear weapons testing. ^{210}Pb, ^{226}Ra, ^{7}Be, and ^{137}Cs were measured at energy channels 46.5, 186.2, 477.6, and 661.7 keV, respectively [200, 201]. The

sedimentation rate was calculated from the slope of the regressions of corrected ^{210}Pb concentration versus the cumulative mass of the sediments at each depth. The focusing factor (FF) for each sampling location was calculated as the ratio of the unsupported ^{210}Pb inventory to that expected from the regional atmospheric input, which was reported as 15.5 pCi cm^{-2} or 34.4 dpm cm^{-2} for the Great Lakes region [202]. The depositional flux of each component was calculated from sediment concentration, sediment deposition rate and focus factor as described in previous publication [200, 201]. The following equation was used to calculate the depositional flux of black carbon in core samples.

$$(\boldsymbol{BC})\boldsymbol{flux} = \frac{(\boldsymbol{BC})\boldsymbol{concentration} \times \boldsymbol{Sedimentation\ Rate}}{\boldsymbol{Focus\ Factor}} \qquad \textbf{(2.1)}$$

The modeling of the temporal depositional loading of BC to the surface of the upper Great Lakes was accomplished by geo-statistical analysis of our experimental results, using the inverse distance weighted (IDW) method by ArcGIS v.10.3 (ESRI, Redlands, CA) [203].

2.2.3. Elemental analysis of Black Carbon and Organic Carbon:

Sediment samples were characterized for physicochemical properties including solid content, bulk density, in situ density, solid density, porosity, and the contents of organic matter, organic carbon, and black carbon, all according to the standard methods [204, 205] and procedures established in our previous publications [151, 174, 206]. These data were used to determine the sedimentation rate, focus factor, chemical inventory, depositional fluxes and annual input rate from radionuclide data.

Using an open-ended 1 or 3 cc syringe, sediment samples were volumetrically sampled from mixed core sections [174]. Each sample was weighed on tared aluminum trays and dried to constant weight (105º C, 48 hr). Wet bulk density was determined from the ratio of the wet weight to the sample volume. Samples were re-weighed after drying, and the dry sediment mass, percent moisture and percent solids were calculated as described [174, 207]. Following drying, sub-sets of the samples for OM analysis were placed in a muffle furnace and combusted (375 ºC, 24 hr). OM was operationally defined as the mass loss

upon this low temperature combustion normalized to the original dry mass using the method of Rockne et al. [207].

Dried and combusted samples were pulverized using a clean mortar and pestle. Using a multistage acidification procedure, the inorganic carbonate in all of the sediment samples was removed for measurement of OC and BC. Organic carbon (OC) was obtained from the total carbon (TC) measurement after complete acidification. Black carbon (BC), which is operationally defined as the organic carbon remaining after low temperature oxidation, is obtained from the TC in completely acidified samples following low temperature combustion. In the acidification stage, pulverized sediment samples were exposed to HCl solution of 50%, 6 N for 48 hours to remove inorganic carbonates from the organic carbon measurement.

For determination of TC, OC, and BC, the elemental analyzer was run three times for each sample for different carbon types. Samples (10-20 mg) were then placed in pre-tared tin combustion boats (CE Elantech Inc., Lakewood, NJ, USA), sealed and weighed. Elemental analysis was conducted using automated combustion/reduction (950 ºC for C and N) followed by molecular sieve gas chromatography and thermal conductivity detection using a Carlo Erba Flash EA1112 (ThermoQuest/CE Elantech, Lakewood, NJ, USA). Peak areas for C, and N were compared to peak areas using desiccated BBOT standard and integrated using EAGER v5 peak integration software.

2.3. Results and Discussion:

2.3.1. Sediment Chronology

Sedimentation rates, focus factors, and model results for radio-dating for all selected sites in the upper Great Lakes are shown in (Table 1). The cores collected at sites M008 and M028 in Lake Michigan, S001 and S114 in Lake Superior, and H037 in Lake Huron cannot produce a statistically valid regression model; hence, they could not be dated [200, 201].

For almost all sites in Lake Michigan, the CRS model has been used for determination of the depositional date and the sedimentation rate [201]. Sediment cores collected from the southern part of Lake Michigan, at sites M009 and M011, cover almost 180 years of depositional history (Table 1). With the sedimentation rates of 0.0653 and 0.0406 ($g/cm^2/yr$), respectively, these two sites have the highest sedimentation rate in Lake Michigan. The lowest sedimentation rate occurred in sites M018, M024, and M032; 0.0183, 0.0192, and 0.0184 ($g/cm^2/yr$), respectively. Due to the low sedimentation rates, the core samples collected from these sites represent 400 years of BC deposition (Table 1).

The sedimentation rate for site M018 in this study is consistent with the previously reported value of 0.018 ($g/cm^2/yr$) by Pearson et al. (1997) at the same location in Lake Michigan [208]. The deepest part of Lake Michigan is in the northern basin, where sites M041 and M047 are located. These deeper sites have lower sedimentation rates than those the southern basin, while they are higher than those the middle basin. North basin cores thus depict the depositional history of the last three centuries (Table 1). The sedimentation rate in M047 calculated in this study is also consistent with previous reports [208]. Based on the analysis of the ^{210}Pb and ^{137}Cs peaks, the best model fit for site M50 in Green Bay was observed from the average of the CRS and CIC models with the 2-slope sedimentation rates of 0.0314 in the top and 0.0221 ($g/cm^2/yr$) in the bottom of the core [201].

Nearly every site in Lake Superior had sedimentation rates an order of magnitude lower than those in Lake Michigan (Table 1). Therefore, the amount of sediment flux in this lake is much lower. The CRS model was used for determination of the age and the sedimentation flux in all locations in this lake. The highest sedimentation was observed at site S022 adjacent to Duluth, MN. Although this city is the second-largest city on Lake Superior (after Thunder Bay, Ontario), it has the largest metropolitan area in the Lake Superior basin [209, 210]. Duluth is the most important transportation center in Lake Superior for the shipment of minerals, such as coal, taconite, and limestone, and other merchandises ,as well as cement, steel, and agricultural products [1], and thus has a major influence on the anthropogenic impact to the lake [200].

Table 2.1. Sedimentation rates, focus factors, selected sedimentation model, and range of dating for cores used in this study.

SITE ID	Radio-dating Analysis Results				
	Sedimentation Rate (g/cm2/yr)	Focus Factor: Pb-210	Selected model	Maximum date	Minimum date
M008*	---	0.49	Not datable	---	---
M009	0.0653	2.2	CRS 1-slope	2009	1830
M011	0.0406	2.99	CRS 1-slope	2009	1825
M018	0.0183	1.52	CRS 1-slope	2007	1591
M024	0.0192	1.98	CRS 1-slope	2007	1635
M028*	---	0.3	Not datable	---	---
M032	0.0184	2.09	CRS 1-slope	2008	1644
M041	0.0221	2.11	CRS 1-slope	2009	1699
M047	0.0311	2.64	CRS 1-slope	2009	1763
M050 (1)	0.0314, 0.0221	2.85	CRS/CIC 2-slope	2010	1841
S001*	---	0.09	Not datable	---	---
S002	0.0068	0.82	CRS 1-slope	2007	37
S008	0.00674	0.76	CRS 1-slope	2006	213
S011	0.0152	2.45	CRS 1-slope	2007	1400
S012	0.0098	1.84	CRS 1-slope	2006	1084
S016	0.0074	1.01	CRS 1-slope	2007	333
S019	0.00877	0.62	CRS 1-slope	2007	562
S022 (2)	0.0175, 0.02489	0.6	CRS 2-slope	2010	1693
S114*	---	0.63	Not datable	---	---
H001	0.155	3.24	CIC 1-slope	2012	1964
H006 (3)	0.03227, 0.00831	2.17	CRS 2-slope	2011	1028
H012	0.0569	3.49	CIC 1-slope	2012	1909
H032	0.0441	3.16	CRS 1-slope	2012	1833
H037*	---	0.87	Not datable	---	---
H038	0.0087	0.89	CRS 1-slope	2010	1227
H048	0.0166	1.6	CRS 1-slope	2009	1602
H061	0.0063	0.6	CRS 1-slope	2010	1153
H095	0.0139	1.13	CRS 1-slope	2009	1590

1. Best fit was CRS/CIC average with 0.0314 in the top and 0.0221 in the bottom.

2. Best fit was CRS 2-slope with 0.0175 in the top and 0.02489 in the bottom.

3. Best fit was CRS 2-slope with 0.03227 in the top and 0.00831 in the bottom.

* Cannot produce a statistically valid regression model; thus, cannot produce a valid sedimentation rate and/or dating.

The best model fit for determination of the sedimentation rate and dating for this site was a two-slope CRS with the rate of 0.0175 ($g/cm^2/yr$) in the top portion and 0.02489 ($g/cm^2/yr$) in the bottom; thus representing a 300 yr record of BC deposition (Table 1). The second highest sedimentation flux in Lake Superior was found in site S011, with the value of 0.0152 ($g/cm^2/yr$), in the vicinity of Thunder Bay, Ontario. The other Lake Superior sites, except for S008, had much lower sedimentation rates, and thus do not have as much influence on BC loading. Due to their very low sedimentation rates, the history of BC deposition can exceed 1000 yr in some of these cores (Table 1).

Sedimentation rates in Lake Huron are more comparable to those in Lake Michigan. The CRS model was used for the dating for all sites, except H001 and H012, which used the CIC model. Except for site H001, the sedimentation rates in Lake Huron were similar to those in Lake Michigan. In contrast, the sedimentation rate in H001 was 0.1554 ($g/cm^2/yr$); highest rate in the upper Great Lakes. This site is located in shallowest part of the lake, in Saginaw Bay, in which the highest concentration of chemical companies in the upper Great Lakes basin is located [1]. Owing to its comparatively high sedimentation rate, the core collected from this site records a depositional history of only 50 years. Therefore, we excluded Saginaw Bay from our 100-year calculations due to its high loading, but short depositional history. However, we performed the same modeling procedure for this part of Lake Huron during the past 50 years, and compared the results with other parts of the system, without Saginaw Bay. Altogether, sediment core samples collected from Lake Huron in this study, excluding H001, record a depositional history ranging from 50 yr in H001 to 1000 years in H006 (Table 1).

2.3.2. Black Carbon Concentrations

The highest BC concentrations in Lake Michigan were at sites M008, M009, M011, and M018 in the southern part of the lake (Table 2.2 and Figure 2.2.a). Taking into consideration that the most prevalent wind direction through the Great Lakes is from west to east [1]; it is likely that this BC results from atmospheric deposition from the Chicago, IL and Milwaukee, WI metropolitan areas, as well as the highly concentrated industrial region of northern IN [1],[169, 192]. These BC values are in the range of previous

studies by different researchers in various regions, such (3.6-9.2 mg/g) measured in subalpine Lake Bled and Ledvica, in Slovenia [211], (0.52-4.90 mg/g) in Lake Daihai, in North China [212], (0.6-8 mg/g) in West Pine Pond, in New York, USA [213], and (1.5-3.3 mg/g) in Lake Engstlen, in Switzerland [214]. The lowest concentrations of BC in Lake Michigan were found in sites M024, in the middle of the lake, and M050, in Green Bay (Table 2.2 and Figure 2.2.a). In the northern and deepest part of the lake, in sites M032, M041, and M047, BC levels are higher than the former two sites, but are less than those in the southern basin (Table 2.2 and Figure 2.2.a).

Table 2.2.BC concentrations and fluxes in the upper Great Lakes.

	BC Concentration (mg/g)			BC Flux (mg/cm^2/yr)		
Site	MAX	MIN	AVE ± STDEV	MAX	MIN	AVE
M008	7.12	1.50	3.59 ± 1.79	---*	---	---
M009	5.52	1.05	3.10 ± 1.20	0.164	0.031	0.092
M011	3.21	1.31	2.05 ± 0.59	0.044	0.018	0.028
M018	7.48	0.47	1.68 ± 1.77	0.090	0.006	0.020
M024	1.93	0.38	0.70 ± 0.19	0.017	0.003	0.006
M032	4.46	0.12	1.92 ± 1.44	0.039	0.001	0.017
M041	3.83	0.82	2.36 ± 0.98	0.040	0.009	0.025
M047	4.49	1.46	2.53 ± 0.90	0.053	0.017	0.030
M050	1.57	0.56	1.03 ± 0.29	0.015	0.004	0.008
S001	0.23	0.07	0.13 ± 0.03	---	---	---
S002	0.34	0.12	0.22 ± 0.05	0.003	0.001	0.002
S008	5.67	0.27	1.54 ± 1.75	0.050	0.002	0.014
S011	2.09	0.42	0.75 ± 0.40	0.013	0.003	0.005
S012	0.55	0.26	0.40 ± 0.09	0.003	0.001	0.002
S016	1.48	0.04	0.60 ± 0.38	0.011	0.0003	0.004
S019	0.90	0.29	0.48 ± 0.16	0.013	0.004	0.007
S022	2.64	0.61	1.41 ± 0.56	0.114	0.026	0.061
S114	0.53	0.21	0.28 ± 0.06	---	---	---
H001	6.04	2.97	4.47 ± 0.80	0.289	0.142	0.214
H006	3.29	1.50	2.59 ± 0.46	0.049	0.007	0.022
H012	5.48	1.33	2.78 ± 1.01	0.089	0.022	0.047
H032	5.08	1.84	2.87 ± 0.82	0.071	0.026	0.040
H037	2.93	0.64	1.73 ± 0.67	---	---	---
H038	2.84	1.19	1.73 ± 0.49	0.028	0.012	0.017
H048	5.24	1.31	2.93 ± 1.09	0.054	0.014	0.030
H061	3.00	0.75	1.48 ± 0.52	0.032	0.008	0.016
H095	1.36	0.36	0.86 ± 0.31	0.017	0.004	0.010

* Flux could not be calculated due to the lack of dating.

The highest levels of BC in Lake Superior were found in sites S008, S011, and S022 (Table 2.2 and Figure 2.2.b). Site S022 is adjacent to Duluth, MN and S011 is close to Thunder Bay, Ontario.

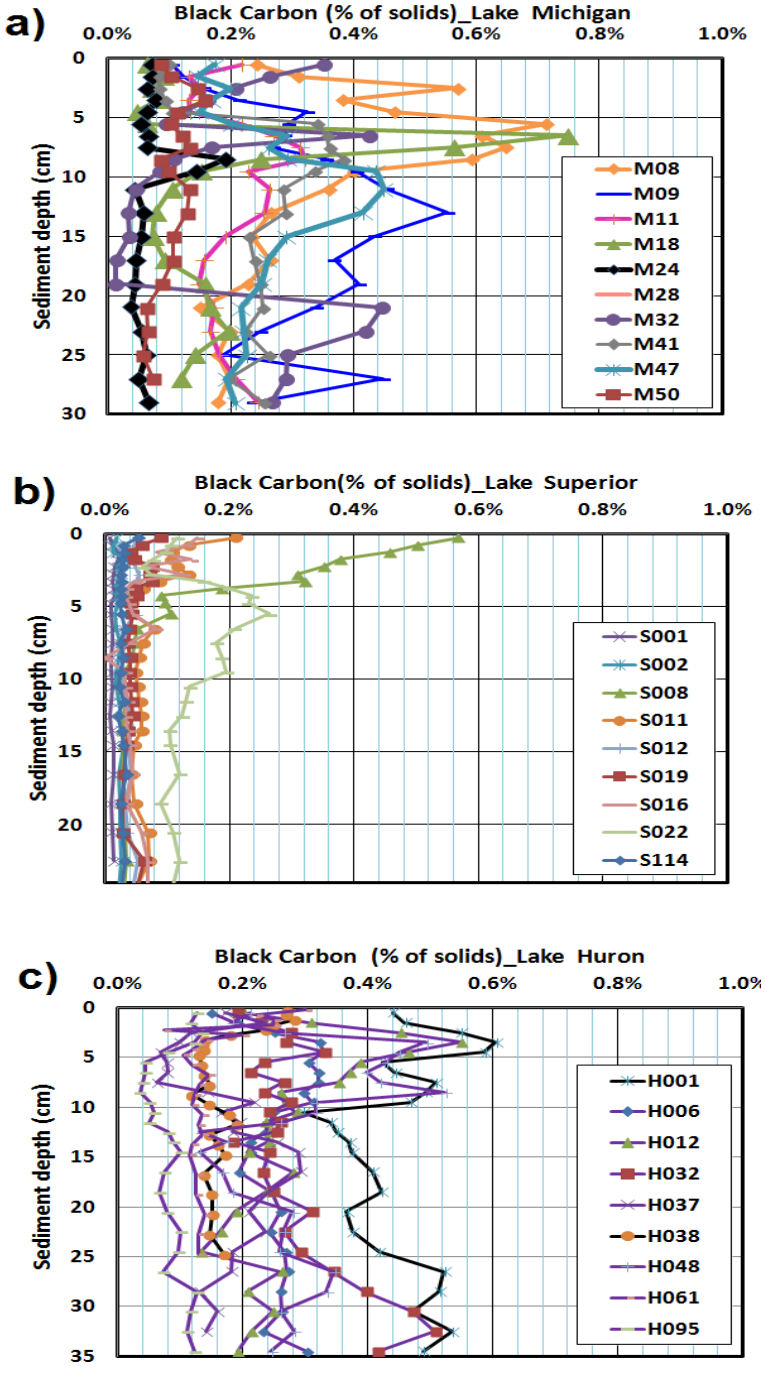


Figure 2.2. Black Carbon as a function of sediment depth in cores from: a) Lake Michigan, b) Lake Superior, and c) Lake Huron.

Given that prevailing wind direction in Lake Superior is from west to east, it is likely that these sites receive BC from their respective metropolitan areas. It is less clear where the high levels of BC observed at site S008 originate from. The results of the present study are consistent with those reported in Buckley et al. (2004) at the same location [174]. James et al. (2001) utilized an air mass trajectory model of some organic pollutant transport that identified the Chicago metropolitan area as a source [215], suggesting a possible reason for the high BC flux observed at this site. Except for the previous three sites, BC levels in Lake Superior is in general much less than the other two upper Great Lakes (Table 2), and is in the range of the previous studies in remote and less populated areas, such as Nam Co Lake, in Tibetan Plateau (0.49-1.09 mg/g) by Cong et al. [192], and Lake Krn, Slovenia (0.59-1.71 mg/g) by Muri et al. [211].

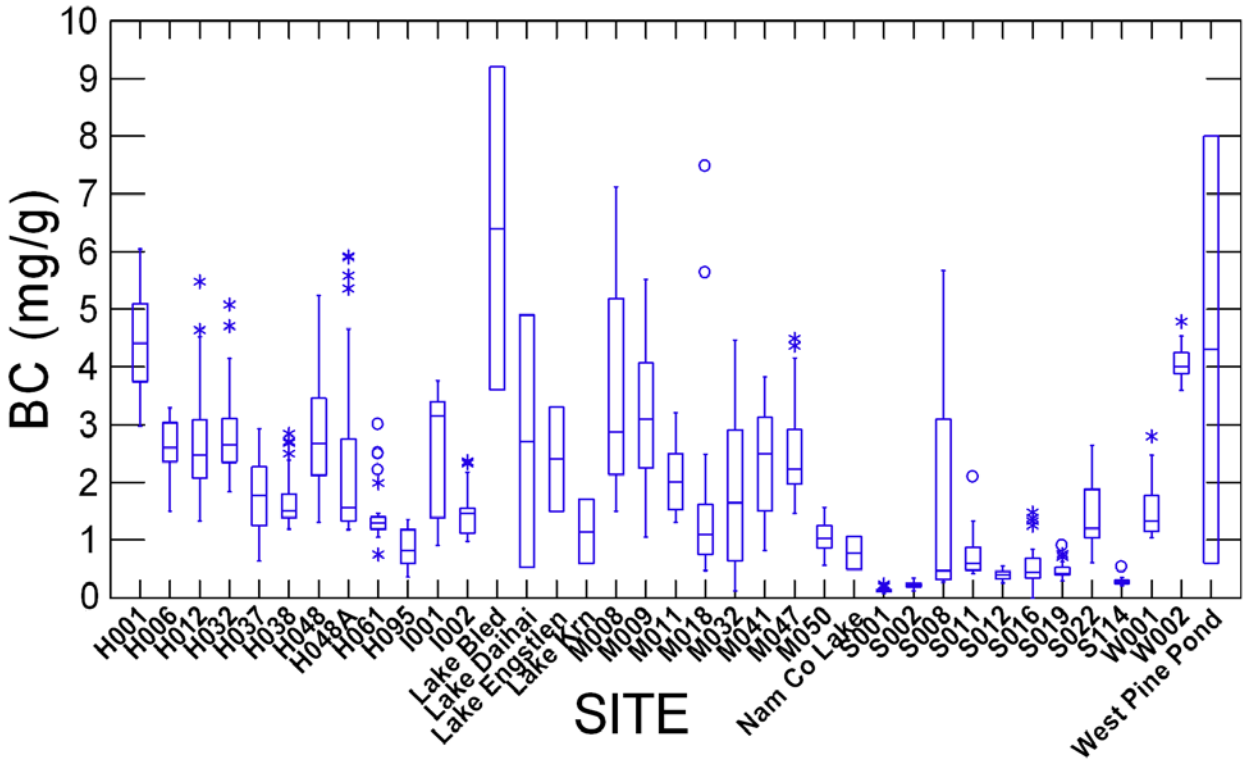


Figure 2.3.Comparision between the range of BC concentrations in this study and previous reports [192, 211, 213, 214].

The concentrations of BC in Lake Huron are similar to those in Lake Michigan (Table 2.2 and Figure 2.2). The highest BC levels were at site H001 which is located in the highly industrialized region of Saginaw Bay, which were also the highest average values (4.47 ± 0.80 mg/g) among all sites in the upper

Great Lakes. The BC levels at southern Lake Huron sites of H006, H012, and H032, were also relatively high and likely influenced by the Detroit and Ann Arbor, MI metropolitan areas [174]. The northern part of this lake is comparatively deeper than the southern part, and BC levels found in the deepest site of Lake Huron, i.e., H048 are higher than the other sites (H037, H038, and H061) located in the northern part.

2.3.3. Black Carbon Historical Trend and Depositional Flux

The 400-year BC depositional history in the upper Great Lakes have been shown in Figure 2.3. The highest BC flux in Lake Michigan occurred at site M009 in the southern basin. As noted above, this site is influenced by the Chicago, Milwaukee, and northern Indiana metropolitan areas. Bond et al. (2007) had quantified historical emissions of aerosol BC from combustion and energy-related sources from 1850 to 2000 [169]. The reported trend of BC emissions in North America are consistent with the depositional flux of BC in the present study, peaking around 1925. Depositional fluxes of BC in remaining sites in Lake Michigan are consistent with those of previous studies, in West Pine Pond, New York, USA (0.0026-0.08 mg/cm^2/yr) [213] and Lake Ledvica, Slovenia (0.03-0.1 mg/cm^2/yr) [211]. The peaks in BC emission in the 1930's are also observable in both northern and southern Lake Huron [169].

Lake Superior is less impacted by urban activities than the other two lakes. Therefore, it is anticipated to have the lowest BC flux in this study. The results demonstrate that is indeed the case, as BC flux is lowest at almost every site in Lake Superior, with the exception of S008 and S022. As noted above, S022 is located next to Duluth, MN. The population of Duluth peaked in 1960 [216], at exactly the same time as the BC flux was at its maximum (Figure 2.4.b). As noted above, researches suggest that site S008 is influenced by Chicago and Milwaukee [174, 215]. The low BC fluxes, in the other locations in Lake Superior, are in the range of some other studies in the secluded lakes, such as Lake Stora Frillingen, Sweden (0.005-0.04 mg/cm^2/yr) [217] and Nam Co Lake, in Tibetan Plateau (0.01-0.04 mg/cm^2/yr[192].

BC fluxes in Lake Huron were similar to those in Lake Michigan; again with the exception of Saginaw Bay which had the highest BC flux in the upper Great Lakes during the last fifty years. The second

highest BC fluxes occurred in sites H006, H012, and H032 in the southern part of the lake; potentially influenced by Detroit and Ann Arbor, MI. BC flux in the deepest part of Lake Huron reached to its maximum value by the beginning of the twentieth century, during the period of rapid industrialization, where it stayed at this high amount until the 1970's, before of the Clean Air Act (CAA).

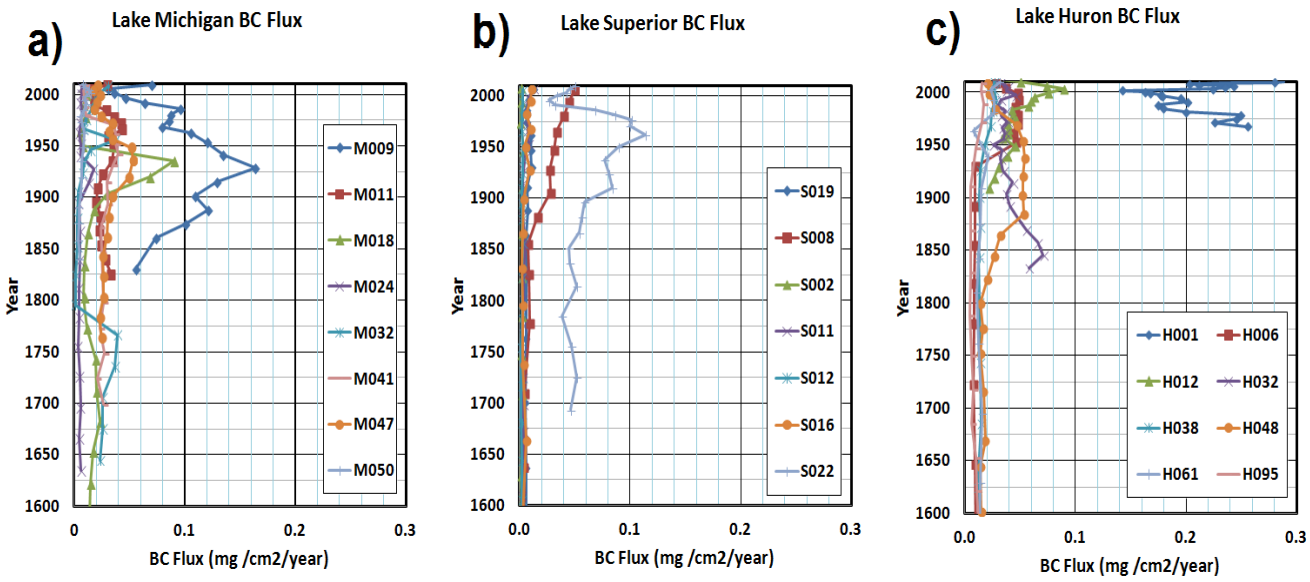


Figure 2.4. Black Carbon fluxes in a) Lake Michigan, b) Lake Superior, and c) Lake Huron.

2.3.4. Source of Black Carbon

The ratio of BC to TOC (BC/TOC) has been widely used as a measure of the relative influence of BC emissions [170, 211, 218-220]. Generally, BC/TOC ratios higher than 10% are found in urban regions, while lower values of 4-8% are found in remote areas, such as alpine lakes [211, 218]. Figure 2.5 shows the BC/TOC ratios for all samples in each lake.

In Lake Michigan, almost 50% of samples have BC/TOC ratios exceeding 10% (Figure 2.5.a). Excluding H032 before industrialization, the highest BC/TOC ratio of 10-24% in a core was observed in site M008. This site is close to the industrialized region northern Indiana and the metropolitan areas of Chicago, IL and Milwaukee, WI. High BC/TOC ratios were also observed in southern Michigan sites of M009 and M011, have BC/TOC of more than 10%, specifically for sediments deposited during the last century.

These high ratios of BC/TOC supports that emissions from anthropogenic sources are the main reason of BC deposition in the southern basin of Lake Michigan. Ren et al. demonstrated that BC/ TOC ratios of less than 0.11 and higher than 0.5 are contributed to incomplete combustion of biomass and fossil fuel, respectively [219]. Therefore, the black carbon deposited to this lake is coming from the mixed sources of fossil fuel and biomass burning. With the exception of M032, all samples in Lake Michigan have BC/TOC ratios of < 26%, comparable to previous studies in the East and South China Sea (5-14%) [221], the Gulf of Cadiz, Spain (3-16.5%), and the Atlantic Ocean (3-34%) [222].

BC/TOC ratios in Lake Superior sediment samples range from 0.2% to 14%; almost all of which were below 10%, except at sites S008 and S022 (Figure 2.5.b). Hence, the anthropogenic emissions are the main source of BC deposition in these two sites. In general, almost 65% of the samples had the BC/TOC ratios less than 5%, which is similar to those observed in remote lakes that receive fewer influences from urban cities. These results in this lake are analogous to pristine areas, such as Lake Planina, Alps (3-5.5%) by Muri et al. [211], and Arctic Ocean (0.9-17%) by Elmquist et al. [173].

BC/TOC ratios in Lake Huron sediments are similar to those in Lake Michigan (Figure 2.5.c). BC/TOC ratios ranged from 3%, in older sediments, to 30%, in sediments deposited during the twentieth century. The high BC/TOC ratios observed at site H048 is consistent with our previous finding of magnified fluxes of BC during the last century until implementation of CAA. Overall, the data are consistent with BC sources changing in the early 20^{th} century when BC/TOC ratios were < 5% to ratios of > 10% after 1900. This can reveal the importance of BC emission from anthropogenic sources in recent years. We can thus conclude from the values of BC/TOC in the upper Great Lakes that the anthropogenic influx of BC changed due to increasing fossil fuel combustion; particularly in Lake Michigan and Hurn.

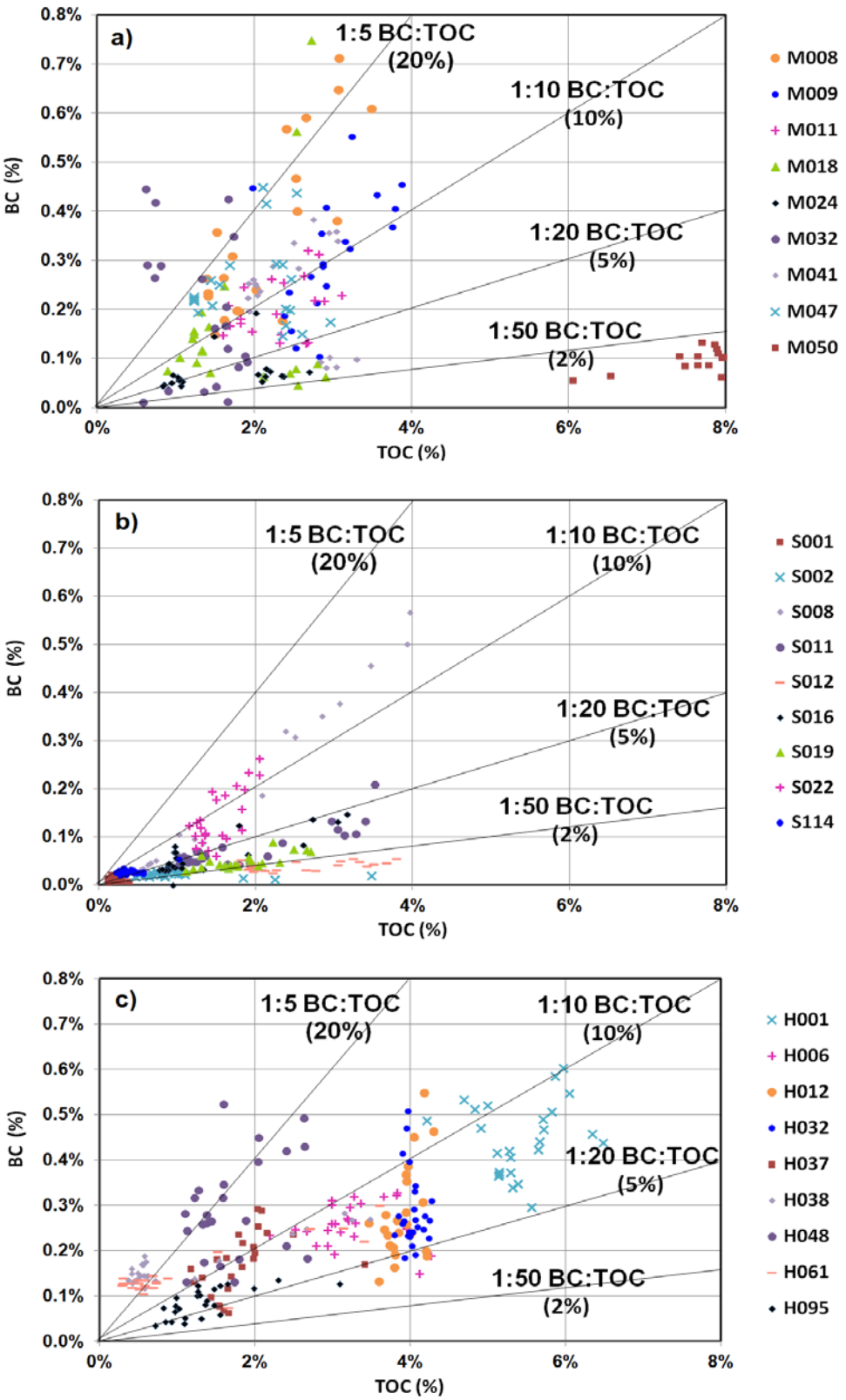


Figure 2.5. BC/TOC ratios in a) Lake Michigan, b) Lake Superior, and c) Lake Huron.

2.3.5. Temporal Loading of Black Carbon

The spatial distribution of BC depositional flux through the upper Great Lakes in 2010 reveals interesting pattern (Figure 2.6). As discussed previously, we excluded Saginaw Bay from the analysis as these data only go back 50 years and would thus obfuscate loading patterns prior to ca. 1960. To have a better visualize influence of anthropogenic BC emissions, we added a layer of population density (2010) in the region to our map in ArcGIS (Figure 2. 6) [203, 223]. It is evident that Lake Superior has the lowest BC flux, as expected, except in two sites of S022 and S008. High BC deposition in S022, is caused by the urban influence of Duluth, MN [1, 224].

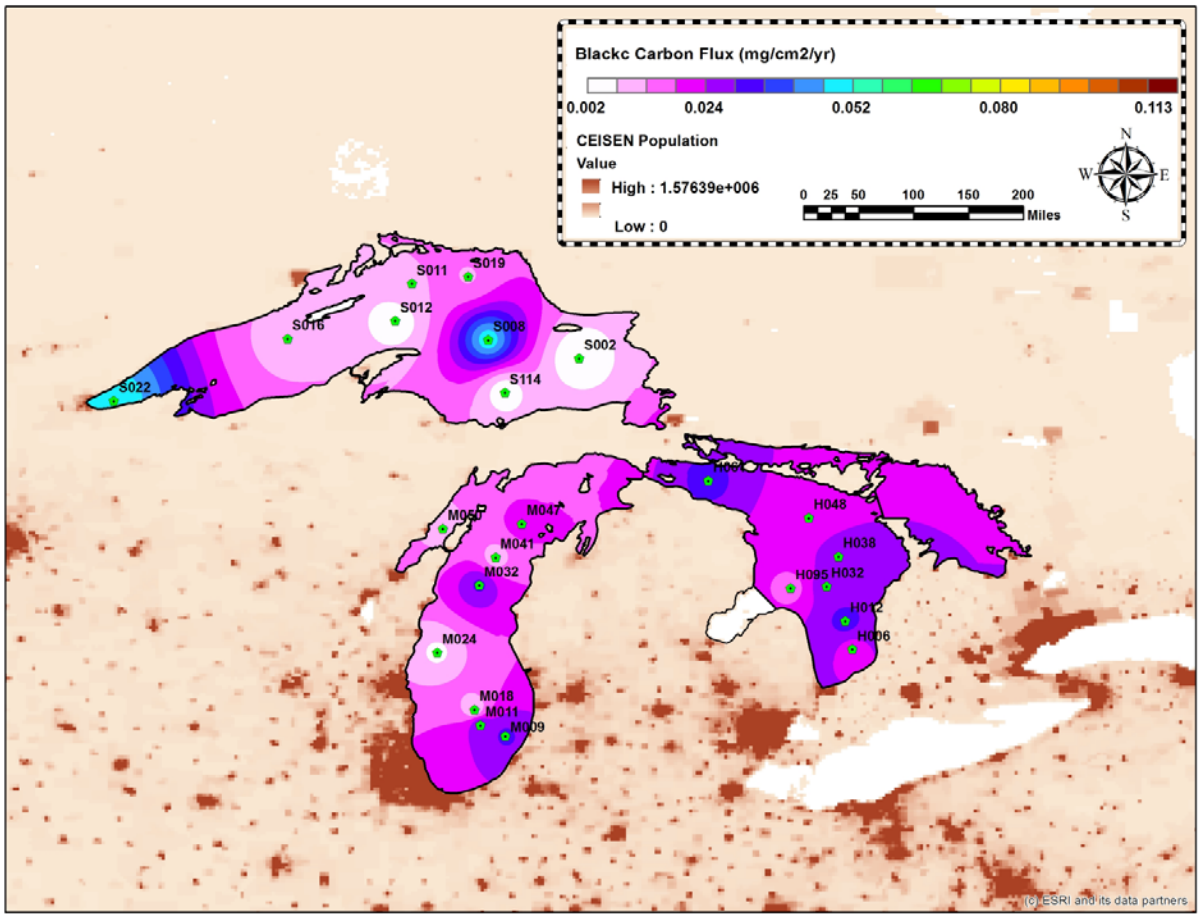


Figure 2.6. Spatial distribution of Black Carbon Flux and population density in the upper Great Lakes basin in 2010 [203].

S008 is located in the deepest part of the upper Great Lakes, where the depth at this site is 300 meters, and accumulation of the more recalcitrant compounds, such as BC and persistent organic chemical, from

the other part of the lake to this deep area may be another explanation for high BC deposition in this site. In general, both Lakes Michigan and Huron have higher BC fluxes compared to Lake Superior. The average BC deposition in the southern parts of these two lakes is higher than their other regions, due to the influences from Chicago, IL and northern Indiana for Lake Michigan, and Detroit, MI, and Ann Arbor, MI for Lake Huron.

Maps of BC flux to the upper Great Lakes for 1910, 1940, 1970, and 2000 are exhibited in Figure 2.7.a-d. (All decadal BC depositional maps during the period 1910-2010 can be found in the supporting documents in the Appendix B).

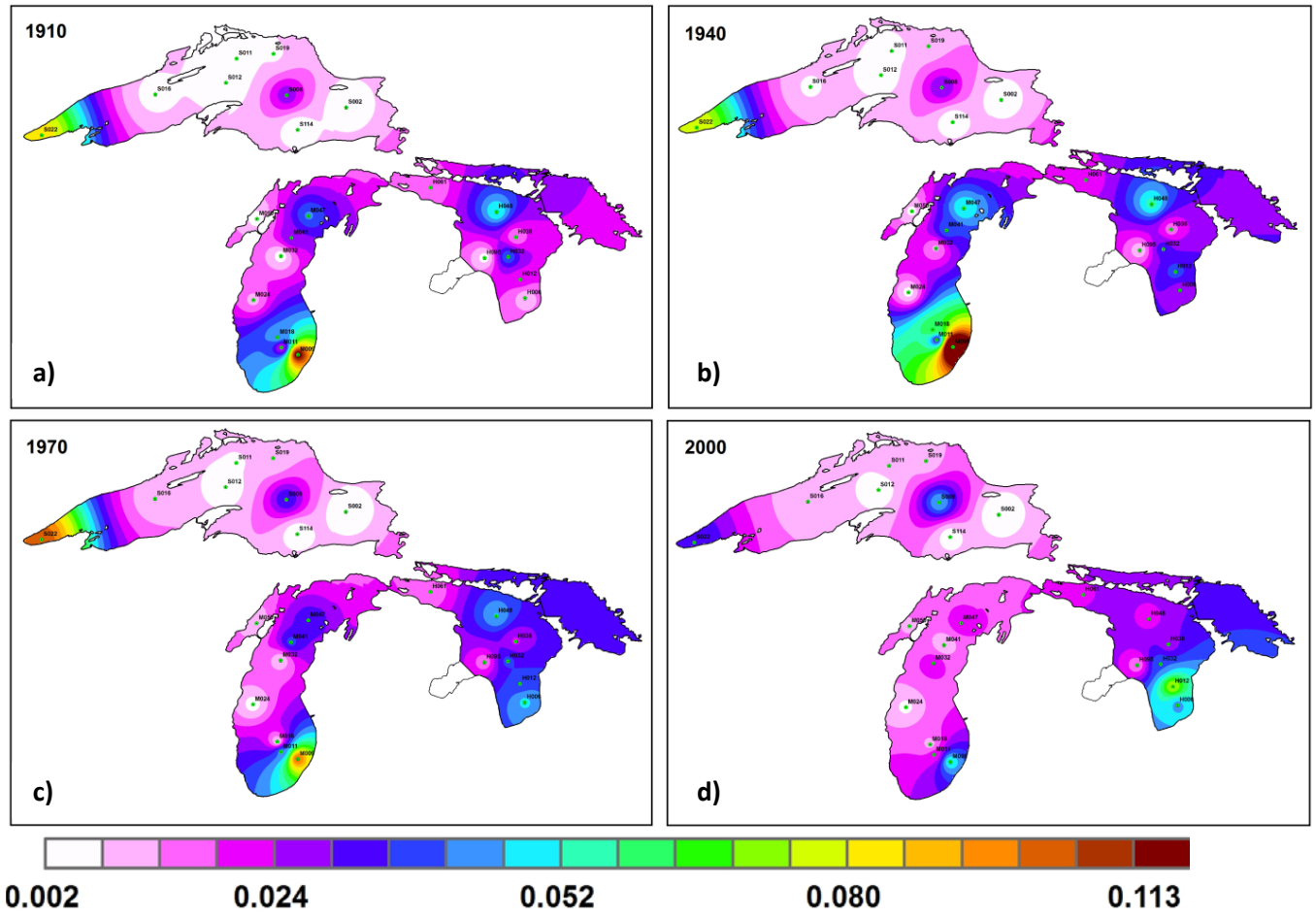


Figure 2.7. Temporal Depositional Trend of BC to the upper Great Lakes (mg/cm^2/yr)

The BC depositional flux was significantly lower in the early 20th century in all parts of Lakes Superior and Huron, compared to more recent times (Figure 2.7.a). In 1910, the highest BC flux occurred in the southern basin of Lake Michigan.

In general, we observe that BC fluxes increased rapidly between 1910 and 1940, particularly in Lakes Michigan and Huron. More recently, a pattern of decreasing BC fluxes in Lakes Michigan and Huron is observed since 1970, while BC fluxes appear to have increased during this time in Lake Superior. To better understand the spatial trends, we integrated the entire lake loading from the decadal model to quantify these changes on the whole-lake level. The results show that maximum BC loading to the upper Great Lakes occurred in the 1940's (Figure 2.7.b and Figure 2.8.a). The largest component of the total BC load comes from Southern Lake Michigan. The maximum deposition occurred in the 1940's during a period in which industrial output for the World War II effort was at maximum. Hansen et al. (2004) documented that US contributions to green house gas emissions peaked during the period of the second World War [225].

BC loading was still high by the 1970's, but had decreased since the World War II peak (Figure 2.7.c and Figure 2.8.a). in contrast to Lakes Michigan and Huron, BC loading to Lake Superior peaked in the 1960's, coincident with the peak population of Duluth, MN [216](Figure 2.8.a). More recently, BC fluxes to the upper Great Lakes have been greatly reduced since enactment of the CAA in 1963 [226]. This decrease is particularly evident in Lake Michigan and the northern part of Lake Huron. However, southern Lake Huron continued to receive high quantities of BC (Figure 2.7.d). Moreover, due to the effects of increased BC fluxes at site S008, the total loading of BC to this lake has started to increase again.

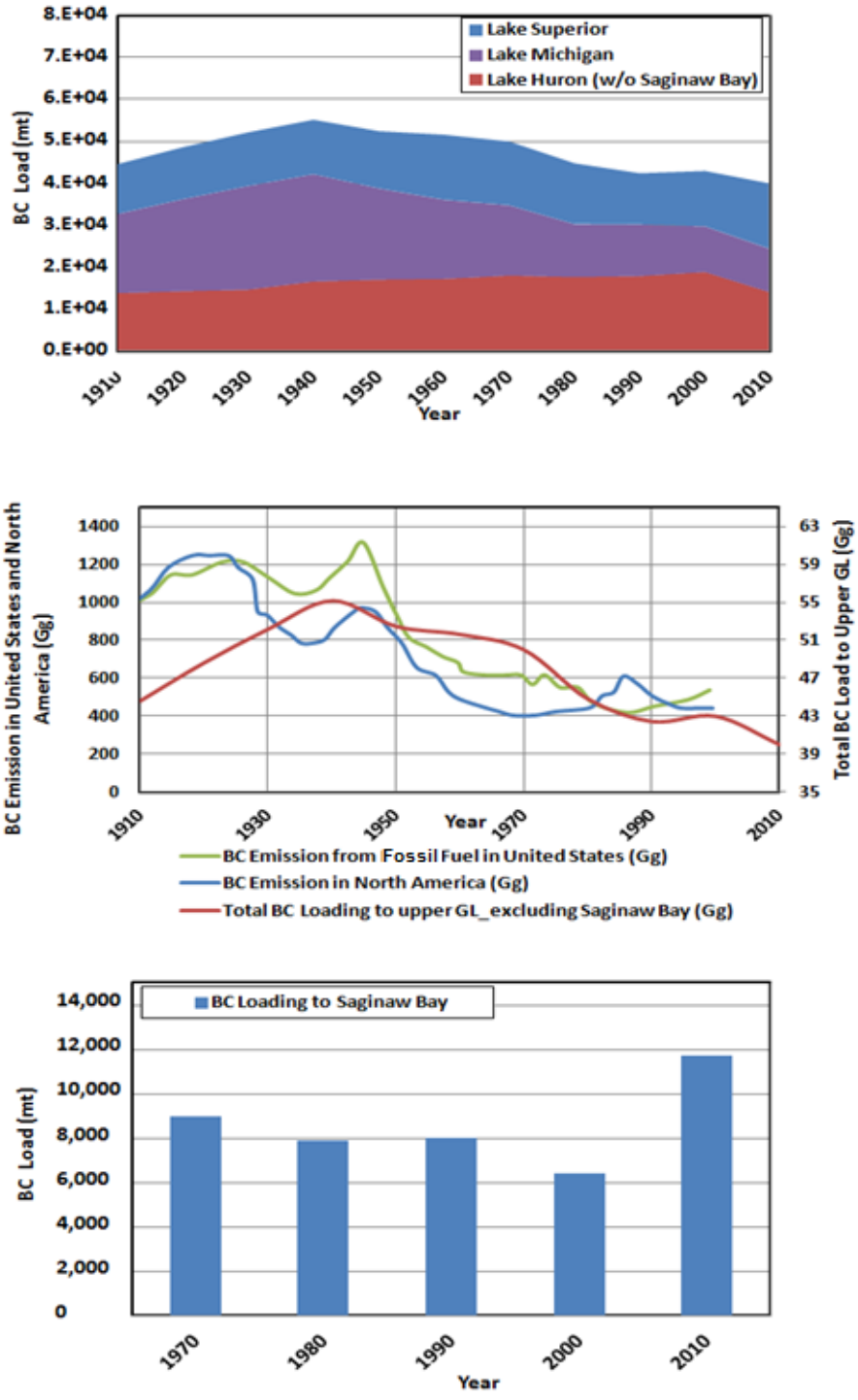


Figure 2.8. a) Cumulative total BC load to the Three Upper Great Lakes (excluding Saginaw Bay) in the period 1910-2010, b) comparison of BC emissions in United States [197], North America [169] and cumulative loading to the upper Great Lakes (excluding Saginaw Bay), c) BC load to Saginaw Bay during the period 1970-2010. Note : 1 Gg = 1000 metric ton (mt).

While the current average temporal BC flux to Lake Superior is much lower than the other two lakes, its much larger surface area results in a comparable BC loading to those in Lakes Michigan and Huron. However, that was clearly not the case in the past when higher industrial output led to much higher whole-lake loading to Michigan and Huron [225, 227]. After enactment of the Air Pollution Control Act in 1955 and CAA in 1963, we see an obvious decrease in the total BC load of to the system [226, 228]. Novak et al. (2003) quantified the decrease in BC emissions in the United States between 1965 and 1985 due to improvements in combustion technology [197]. Thus, it is likely that governmental actions along with improvements in combustion technology and possibly decrease in the industrial output in the region all combined to result in the nearly 50% decrease in BC loading to the Upper Great Lakes since the 1940's.

This is further supported by a comparison between BC emissions from fossil-fuel in the United Sates [197], North America [169] to the BC loading to the upper Great Lakes reported in the present study (Figure 2.8.b). It is evident that BC depositional are highly correlated (P-value < 0.05) with the peak in emission estimates from previous studies during 1940-1950. In addition, the decreasing trend of BC deposition found in this study is consistent with emission trends in both the United Sates and North America studies [169, 197].

The BC loading to Saginaw Bay since 1970 is shown in Figure 2.8.c. The amount of BC loading to this bay declined substantially from 1970 to 2000, but we observed a relatively significant (80%) increase in BC loading in recent years (Figure 2.8.c). While this bay comprises only 5% of the total surface area of Lake Huron, the BC load is almost 40% of the total BC load to the entire Lake Huron in recent years. Hence, the impact of Saginaw Bay industry (which has apparent increased BC emissions), coupled with decreasing loading to the rest of the lake demonstrates the impact of local emissions **[1]**.

2.4. Summary and Conclusions:

While the sedimentation rates of Lakes Huron and Michigan are comparable, sedimentation rates in Lake Superior are much. Typically the highest sedimentation rates were found in closer to large metropolitan

areas. BC concentrations in Lake Superior sediment were much less than those observed in Lakes Michigan and Huron. The combined low levels of BC coupled with the low sedimentation rate in Lake Superior result in very low BC fluxes, less than half that in Lakes Michigan and Huron. BC loading to Lake Superior is greatly influenced by Duluth, MN, as the whole-lake loading of BC coincides with the population peak in the city. Similarly, we see a clear evidence of industrial activity in Chicago, IL and Northern IN on BC loading to Lake Michigan. The highest BC fluxes in the entire system were found in Saginaw Bay in Lake Huron in recent years; demonstrating importance of this bay to the total loading of BC to the upper Great Lakes. Moreover, BC loading in southern Lake Huron can likely reflects emissions from the Ann Arbor, MI and Detroit, MI metropolitan areas. Clear peaks in BC loading occurred in the 1930's/1940's coincident with World War II. Comparisons between our BC loading data with the estimated emissions of BC both in the United States and in North America demonstrate a strong correlation in time. These findings reveal the effects of improvements in combustion technology, as well as governmental action and possibly decreasing industrial activity in significant reduction of BC loading to the Upper Great Lakes.

Chapter 3 . The relationship between semi-volatile persistent bio-accumulative toxic chemicals (SV-PBTs) and Carbonaceous Materials in Upper Great Lakes

Abstract

The Great Lakes have a very large surface area to volume ratio (nearly two orders of magnitude higher than that of the oceans) which makes them particularly sensitive to airborne pollution. Because water outflows in the system are relatively small compared to their total volume (<1% per year), persistent pollutants (those that do not degrade) that enter the system at rates exceeding the dilution rate will tend to accumulate in the lake. In the case of hydrophobic persistent, bioaccumulative toxic compounds (PBTs), we thus expect that sorption and sedimentation of particulates in the lake will result in the sediments of final reservoir in the system. Although direct water-phase discharges of pollutants to the Great Lakes have been greatly diminished over the last few decades, volatile and semi-volatile PBTs (SV-PBTs) also reach the lakes through air transport and deposition onto the water surface, with subsequent sedimentation to the bottom. Black carbon (BC), organic carbon (OC) and organic matter (OM) are well known to strongly sorb hydrophobic compounds like SV-PBTs in aqueous systems. What is comparatively less well studied is the potential for BC to sorb SV-PBTs in the atmosphere acting as a vector for SV-PBT loading to the lakes. In this study, we investigated the spatial and temporal correlations between four categories of SV-PBTs and BC, OC, and OM. We found significant correlations between selected SV-PBTs and BC, resulting in an increased probability of BC acting as a sorbent for SV-PBTs. In contrast, almost no correlation was observed between either OC and OM and the SV-PBTs, indicating that in-lake OM production does not significantly affect SV-PBT loading to the sediments.

3.1. Introduction

Hydrophobic organic contaminants (HOCs) have low solubility in the aqueous phase and a tendency to absorb to organic-rich suspended particles. Persistent bio-accumulative toxic compounds (PBTs) include several HOCs including the polychlorinated dibenzo-p-dioxins and -furans (PCDD/Fs), polybrominated

diphenyl ethers (PBDEs), polycyclic aromatic hydrocarbons (PAHs) and some organochlorine pesticides [229]. Although many of these compounds have been or will be phased out of use in the USA, many continue to be used in developing countries because of their price and versatility [230-232]. In addition to their persistence, many PBTs also exhibit acute and chronic toxicity on aquatic life [233, 234]. These toxic contaminants have been used in large quantities for industrial and agricultural activities over the last century [235].

As a consequence of their hydrophobicity, low aquatic solubility and sorption to particulate matter, substantial quantities of HOCs accumulate in the sediments [236]. Several factors influence in the levels and distribution of HOCs in the benthic system. These factors include the distance from the possible source, sediment physico–chemical properties which regulate its sorptive capacity, and the sorptive properties of HOCs. These in turn affect the toxicity, bioavailability and environmental persistence of HOCs in the system [237].

In theory, the mobility of HOCs in organic-rich sediments would be reduced. Yet, the sediment phase does not act as a stable reservoir for HOCs. Desorption can result in the release of HOCs to the overlying water column. Because benthic organisms are continuously exposed to HOCs accumulated in sediment, they can act as a vector for transferring the HOCs up the food chain [238, 239]. Therefore, sediment is considered the best environmental compartment for long term monitoring of HOCs as the terminal sink for persistent organic contaminants [240, 241].

The key factor affecting the fate and behavior of HOCs in the sediments is sorption to organic matter (OM). Amorphous OM is relatively homogenous, lipophilic and gel-like matrix [242] [243]. Above all, black carbon (BC) is an important type of carbonaceous geosorbents elaborated in influencing the general fate of PBTs in sediments, to some extent thanks to its porous medium [244]. [245].

Black carbon (BC) is a relatively inert condensed graphitic carbon resulting from incomplete combustion. BC includes a range of materials from extremely poly-aromatic to elemental or graphitic carbon [145].

BC has been released into the atmosphere in high quantities since the start of the industrial revolution [146]. Due to its chemical and microbial inertness [156], BC persists over long periods of time in soils [147, 157], lacustrine and aquatic sediments [147],[158-160] and ice [147, 161]. It is the primary constituent in the atmosphere which significantly absorbs solar radiation and, therefore, influences the Earth's radiative heat balance [162]. In the sediment system, robust bonding between contaminants and BC may restrict the transport of HOCs into the water column, and consequently may reduce the risk of a subsequent release of these pollutants into the environment and decrease their bioavailability [142, 246-250]. Conversely, BC may be influential as a vector for co-deposition of SV-PBTs, if BC sorbs the pollutant in a gaseous phase before settling to sediment [249]. Thus, understanding of the relationship between BC and SV-PBTs in sediments is vital to determining the fate and behavior of SV-PBTs in benthic ecosystems. In this study, we investigated these correlations through a two-pronged using multiple approaches. First, we investigated relationships between SV-PBT and BC, OC, and OM concentrations in surficial grab samples. Second, we investigated the correlations in temporal concentrations and fluxes between the four classes of SV-PBTs and BC.

3.2. Methods

3. 2.1. Collection and archival of sediment core and grab samples:

Sediment sampling was conducted in Lake Superior in May 2011 onboard the USEPA EPA *R/V Lake Guardian*. A total of 24 locations were sampled. Among these locations, nine were sediment core sampling sites. The other fifteen locations were sampled for surface sediment only. At each location, a surface grab sample was collected using the Ponar sampler. At pre-selected coring locations the Spider Corer was deployed twice to collect two sets of sediment cores. Sectioning was performed at 0.5 cm intervals for the first 5 cm, then in 1 cm increments for next 10 cm followed by 2 cm intervals for the remainder of the core (from 15cm to 25cm segment depth), in the general laboratory of the *R/V* Lake

Guardian. For most cores, 25 segments were obtained. A summary of sampling locations can be found in table C1in the appendix C.

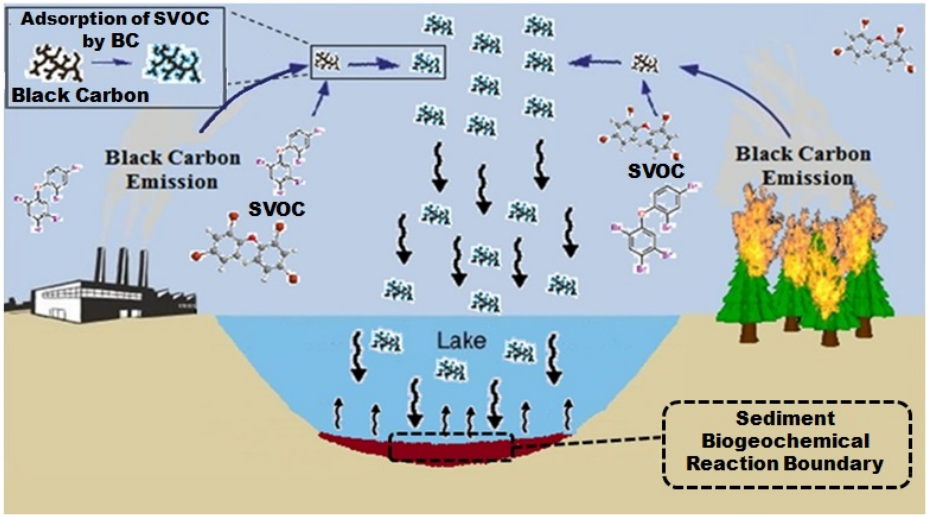


Figure 3.1. Schematic demonstrating the scavenging of SV-PBTs from the atmosphere and subsequent deposition to lake sediment.

3.2.2. Sample physicochemical characterization and age-dating of the cores:

Sediment samples were characterized for physicochemical properties including the solid content, bulk density, *in situ* density, solid density, porosity, and organic matter (OM), organic carbon (OC), and black carbon (BC), according to the standard methods [204, 205] and procedures established in our previous sediment related projects [151, 174, 206]. These data are needed to determine sedimentation rate, focus factor, chemical inventory, depositional fluxes and annual input rate from radionuclide data. The particle size distributions (PSD) of H_2O_2-treated sediments were determined by laser diffraction using a Mastersizer 2000 (Malvern Instruments, Worchestershrine, UK) [251, 252]. For age dating of the cores, our group developed laboratory protocols for ^{210}Pb measurement based on alpha spectrometry of ^{210}Po [198, 199]. However, in this work, we determined the activities of ^{210}Pb, ^{226}Ra, ^{7}Be, and ^{137}Cs simultaneously using gamma spectrometry, which required less laboratory pretreatment procedures. The ^{210}Pb/^{226}Ra ratio was used to evaluate excess ^{210}Pb. ^{137}Cs has been used to check the accuracy of deposition years determined from ^{210}Pb data, through comparison with the known ^{137}Cs deposition history

from above ground nuclear weapons testing. ^{210}Pb, ^{226}Ra, ^{7}Be, and ^{137}Cs were measured at energy channels 46.5, 186.2, 477.6, and 661.7 keV, respectively [200, 201]. The sedimentation rate was calculated from the slope of the regressions of corrected ^{210}Pb concentration versus the cumulative mass of the sediments at each depth. The sediment focusing factor (FF) for each sampling location was calculated as the ratio of the unsupported ^{210}Pb inventory to that expected from the regional atmospheric input, which was reported as 15.5 pCi cm^{-2} or 34.4 dpm cm^{-2} for the Great Lakes region [202]. The depositional flux of each component was calculated from sediment concentration, sediment deposition rate and focus factor as described above. The sedimentation rate data were used to determine the flux of all chemical constituents using the following equation:

$$\vec{F} = \frac{C\theta}{\gamma} \qquad (3.1)$$

Where $\vec{F}$ is the depositional flux BC in (mg/cm^2 /y) or for SV-PBTs in (ng/cm^2 /y), C is the concentration of the analyte (mg BC /g) or (ng SV-PBTs /g), θ is the sedimentation rate in (g / cm^2 /y), and γ is the ^{210}Pb focus factor (unitless).

Depositional loading of BC and PBTs to the surface of the Lake Superior was modeled using geo-statistical analysis of experimental results using the inverse distance weighted (IDW) method by ArcGIS v.10.3 [203].

3.2.3. Chemical analyses for selected PBTs:

Four different categories of SV-PBTs were considered in this study: PBDEs, PCBs, OCPs, and PCDD/Fs. Concentrations of 58 PCB congeners were measured using GC/EI-MS/MS (separation using a RESTEK 1614, 30 m x 250 µm x 0.1 µm column with chromatography on an Agilent 7890 GC coupled with 7000 MS in EI mode). PCBs chosen for analysis include the representative “emerging” congeners [253] and six others (28, 52, 101, 138, 153, and 180) which are usually the most abundant. Similarly, the selected nine

PBDE congeners (28, 47, 49, 99, 100, 153, 154, 183, and 209) are those most frequently found in sediments. PBDEs and OCPs were measured by GC/EI-MS/MS (column, need GC/MS RESTEK 1614, 30 m x 250 µm x 0.1 µm) except for BDE 209 which was measured by GC/ECNI-MS. In total, twelve different OCPs were measured, but only three were detected more than 40% of the time and these three were used for statistical analyses correlation. Finally, 16 congeners of PCDDs and PCDFs were measured in Lake Superior sediments using both GC/ECNI-MS and GC/EI-MS/MS (DB-5MS, 30 m x 250 µm x 0.25 µm, Agilent 6890 GC coupled with a 5973 MS in ECNI mode using methane as reagent gas) [254].

3.3. Results and discussion

3.3.1. The spatial distribution of BC content of Ponar grabs in Lake Superior

The spatial distribution of black carbon in surficial sediments in Lake Superior is shown in figure 3.2. The BC concentration ranged from 0.16 to 0.89 mg /g. Generally, higher levels of BC were found at sites close to the metropolitan areas of Duluth, MN (site S022) and Thunder Bay, ON, Canada (sites S011 and S016), as well as in the eastern half of the lake. The highest levels of BC were found at site S106 adjacent to the deepest part of the central basin. The annual average wind direction in both populated areas is from west to east which suggests that deposition of BC in eastern Lake Superior [1]. Buckley et al. (2004) and Hites et al. (2001) reported that this region may be affected by deposition of soot resulting from emissions in the Chicago, IL, metropolitan area [174, 215].

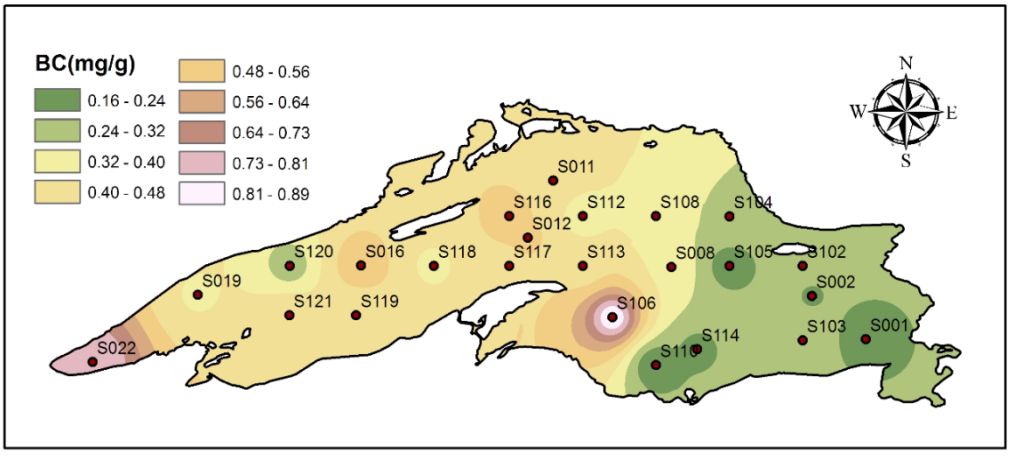


Figure 3.2.Spatial distribution of Black Carbon in surface sediments of Lake Superior (mg g-1 dw)

We investigate whether correlations exist between SVOCs and BC and other organic carbon forms to test the hypothesis that BC deposition can act as a vector for VOCs. Past studies have revealed that the adsorption capacity of BC for SVOCs like PAHs may be up to two orders of magnitude higher than that of OC [218, 255]. There were no statistically significant correlations between PBDEs and either OC or OM concentrations in Lake Superior sediments (Table 3.1). In marked contrast, there were highly statistically significant correlations between BC and all PBDEs ($P < 0.05$) except BDE 209. These results are consistent with our hypothesis that BC act as scavenger for SVOCs, however, an alternative explanation that BC and BDEs are co-deposited is also consistent with these results to understanding SVOCs fate than OM or OC.

Table 3.1. Correlation between PBDE congeners vs. BC, OC, and OM in Lake Superior, sediment shown are P-values of correlation significance.

SVOC	BC	OC	OM	SVOC	BC	OC	OM
BDE-28	**1.7E-03**	2.0E-01	3.0E-01	BDE-154	**7.3E-03**	1.8E-01	2.5E-01
BDE-47	**3.4E-03**	4.1E-01	7.2E-01	BDE-183	**2.2E-02**	7.3E-01	6.3E-01
BDE-49	**1.2E-02**	6.6E-01	9.1E-01	BDE-209	3.9E-01	1.3E-01	2.8E-01
BDE-99	**7.0E-03**	4.1E-01	8.3E-01				
BDE-100	**1.3E-02**	6.0E-01	9.9E-01	$\sum_8$ PBDEs	**3.4E-03**	4.5E-01	6.9E-01
BDE-153	**2.4E-02**	6.0E-01	7.9E-01	Total PBDEs	2.0E-01	1.0E-01	2.7E-01

Significant values in bold

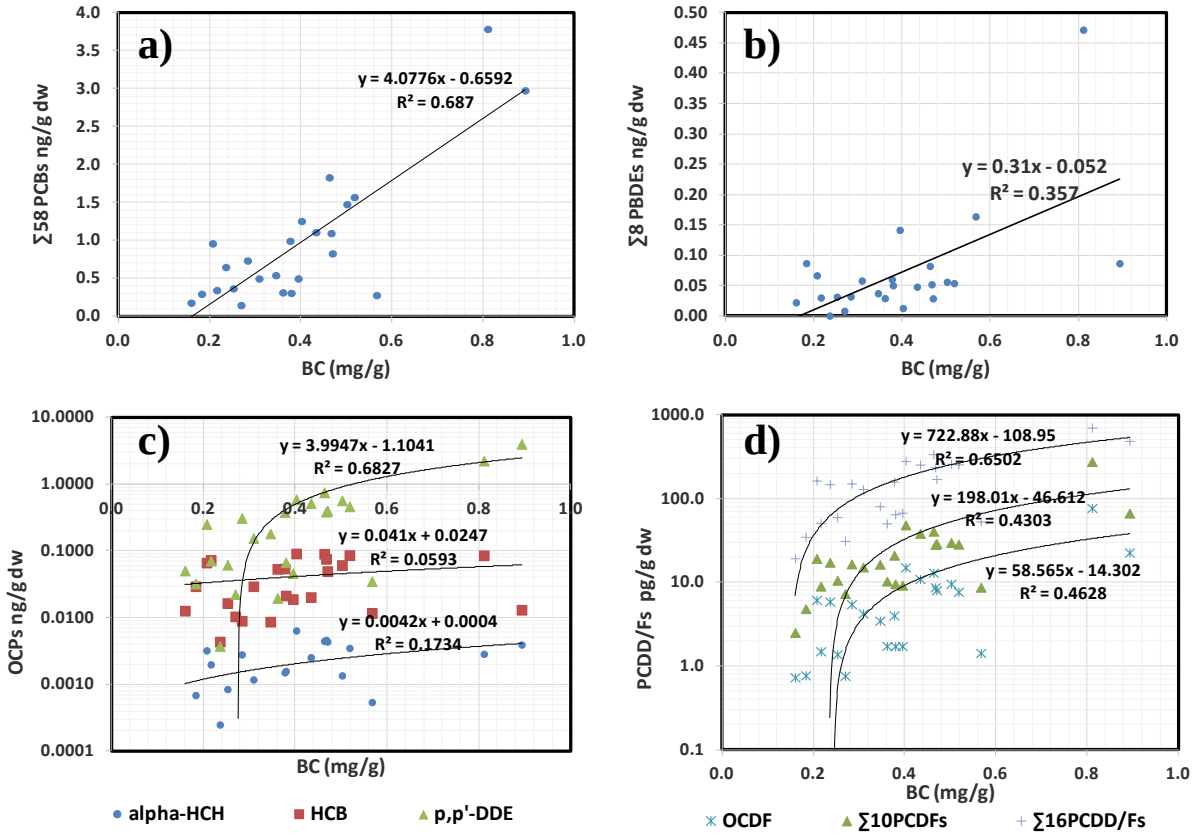
Similar results were also observed for regression analysis between OCPs, BC, and other organic forms. Except for HCB, all other selected SVOCs are significantly correlated with BC. Nam et al. (2008) had previously reported that HCB may have relatively unique sorption behavior amongst the other SVOCs studied [229]. Its primary sources are not BC-related, and the combustion processes may not be a major source for atmospheric HCB as other SVOCs [256].

Table 3.2 Regression analysis between various SVOCs and BC in Lake Superior sediments.

SVOC	P-value	Slope	SVOC	P-value	Slope	SVOC	P-value	Slope
di-PCBs	**1.3E-06**	3.2E-01	Octa-PCBs	**2.6E-06**	3.4E-01	p,p'-DDE	**6.6E-07**	4.0E+00
Tri-PCBs	**8.6E-07**	2.2E-01	Nona-PCBs	**6.3E-06**	2.5E-01	PnCDD	**2.5E-02**	7.0E+00
Tetra-PCBs	**2.3E-07**	2.4E-01	Deca-PCBs	**1.6E-04**	2.6E-01	OCDF	**2.5E-04**	5.9E+01
Penta-PCBs	**1.2E-06**	8.1E-01	$\sum_{58}$ PCBs	**5.6E-07**	4.1E+00	TCDF	**3.2E-04**	3.0E+00
Hexa-PCBs	**2.4E-06**	1.0E+00	alpha-HCH	**4.3E-02**	4.2E-03	$\sum_{10}$PCDFs	**5.0E-04**	2.0E-01
Hepta-PCBs	**3.8E-06**	5.8E-01	HCB	2.5E-01	4.1E-02	$\sum_{16}$PCDD/Fs	**2.0E-06**	7.2E-01

Significant values in bold, and slope is in (ng SVOC/ mg BC) for all except for PnCDD, OCDF, and TCDF which are in (pg SVOC/ mg BC)

Figure 3.3 (a-d) depicts the relationship between four categories of PBTs and BC in Lake Superior surficial sediment samples. The results indicate that combustion may be an important for deposition of PBDEs and PCDD/Fs (Fig.3 b and d). Their source areas are predominantly urban, while HCB may be rural/urban [218]; and may be retained more effectively by sediment closer to their source. The correlation analysis also illustrate significant relationships of BC with alpha-HCH and p,p'-DDE, but no significant correlation of BC and HCB (Fig. 3.3 c and Table 3.2). The total PCBs concentration is one order of magnitude higher than $\sum_8$ PBDEs, and they were more highly correlated with BC (figure 3.3 a, b and table 3.2).



3.3.Linear regression between SVOCs and BC in Lake Superior surficial sediment samples in Lake Superior. Shown are results for a) PCBs, b) PBDEs, c) OCPs, and d) PCDD/Fs.

3.3.2. Temporal flux and loading of BC in Lake Superior

BC deposition in Lake Superior for the decades of 1910, 1940, 1970, and 2000 are shown in figure 3. 4 (all decadal BC deposition maps of for 1850-2010 can be found in figures C1 and C2 in Appendix C). Lake Superior had the lowest BC deposition flux of all the Great Lakes, except at sites S022 and S008. Site S022, was greatly impacted by shipping and industry in the adjacent city of Duluth, MN [1, 224]. High levels of BC and other organic pollutants observed at this site S008 in the middle of Lake Superior have been found by others at this site [174] , [215]. S008 is located in the deepest part of the upper Great Lakes at a depth of 300 m., and this site has the lowest sedimentation rate in our study (0.0067 g/cm^2/y). According to Lohmann et al. (2009) and Huang et al., (2015) persistent chemicals can become enriched in

the sediments, when the rate of deposition is very low [167, 170]. Hence, accumulation of the more recalcitrant compounds such as BC and SVOCs is likely in this site (focus factor = 0.76).

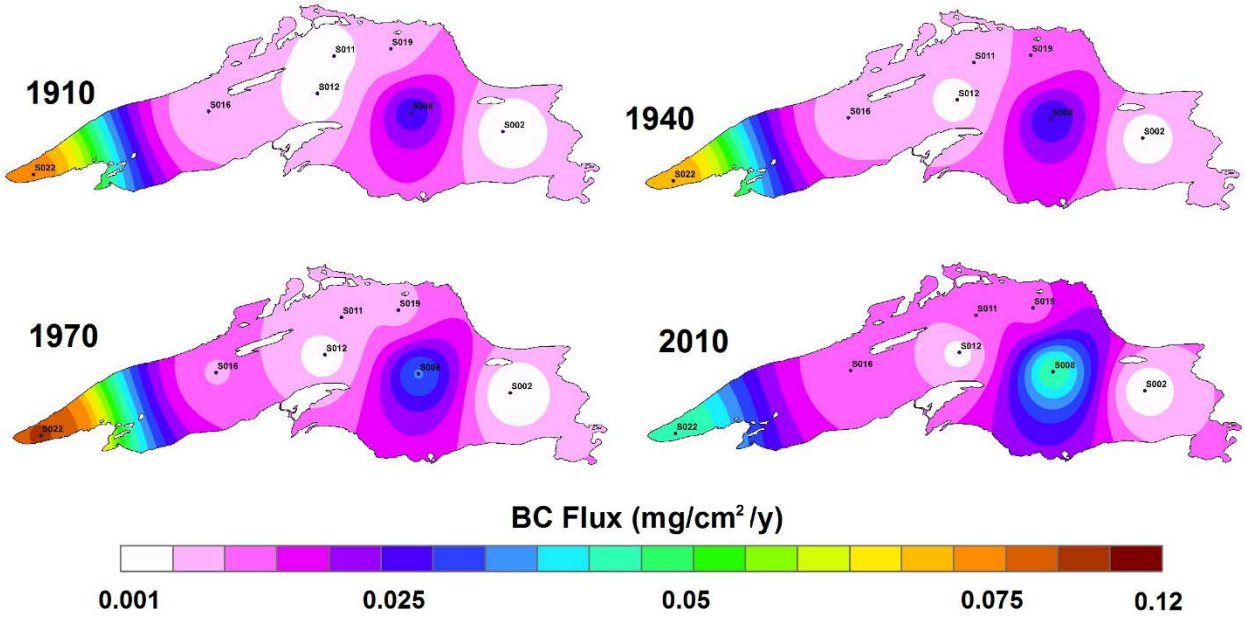


Figure 3.4. Spatial flux of BC to Lake Superior in selected decades over last 100 years.

From 1850 to 1880, the total load of BC load to Lake Superior fluctuated between 6200-7800 mt (Figure 3.5). After the 1890's, BC loading increased 15%. In the first half of the 20th century, increased BC loading is evident, until reaching maximum values in the 1960's. The highest BC loading to Lake Superior coincided with the peak population of the Duluth, MN metropolitan area [216](figure 3.4 and 3.5). BC loading to Lake Superior dropped by > 20% from 1960 to 1990, possibly due to improvements in combustion technology [197], changes in governmental regulations like the Air Pollution Control Act in 1955 [228] and Clean Air Act (CAA) in 1963 [226], and possibly changes in industrial output in the Lake Superior airshed. Intensively, BC loading to Lake Superior has increased recently from 2000 to 2010. According to the US Energy Information Administration, energy consumption in the United States from coal, petroleum, natural gas, and other sources has been increased from 1990 to 2007 [257]. Possibly resulting in increased emissions of BC.

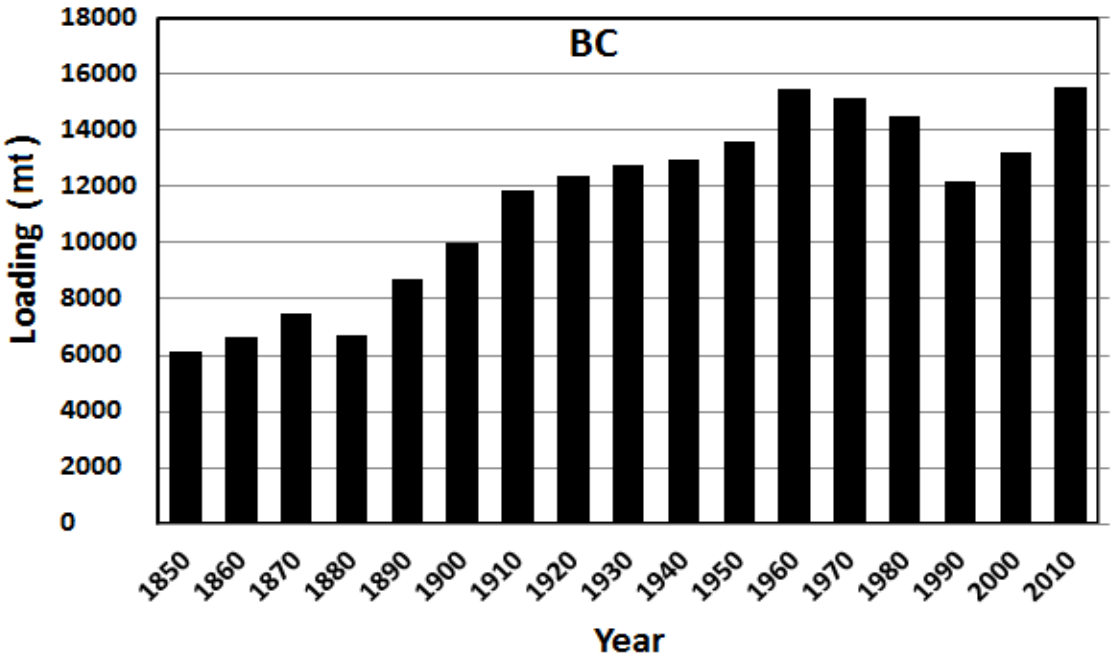


Figure 3.5.Decadal and temporal loading of BC to Lake Superior from 1850 to 2010

3.3.3. Spatial and temporal distribution of SV-PBTs during the last 100 years to Lake Superior

The depositional of BDE209 to Lake Superior for 1900, 1940, 1980, and 2010 are displayed in figure 3.6 (detailed maps of BDE209 deposition to this lake for 1900-2010 can be found in the supporting documents in figure C.3 in Appendix C). The flux of BDE209 ranged from 0.00038-0.164 (ng /cm^2/y) during the last 110 yr. In the beginning of the 20th century, the average flux of BDE209 to Lake Superior was 0.0018 ng /cm^2/y. The highest fluxes were in the eastern part of the lake at site S002 and at site S011 near Thunder Bay, Ontario. In the 1940's, the average flux of BDE209 to this lake was 0.011ng /cm^2/y, and the highest flux value was found in site S016. The flux of BDE209 continued to increase, and averaged 0.059 ng /cm^2/y in the 1980's, with the highest values found at S011 and S008. During the past decade, the average flux of BDE209 has reached its maximum amount of 0.11 ng /cm^2/y. The highest flux was 0.16 ng /cm^2/y at sites S022, S019, and in S008.

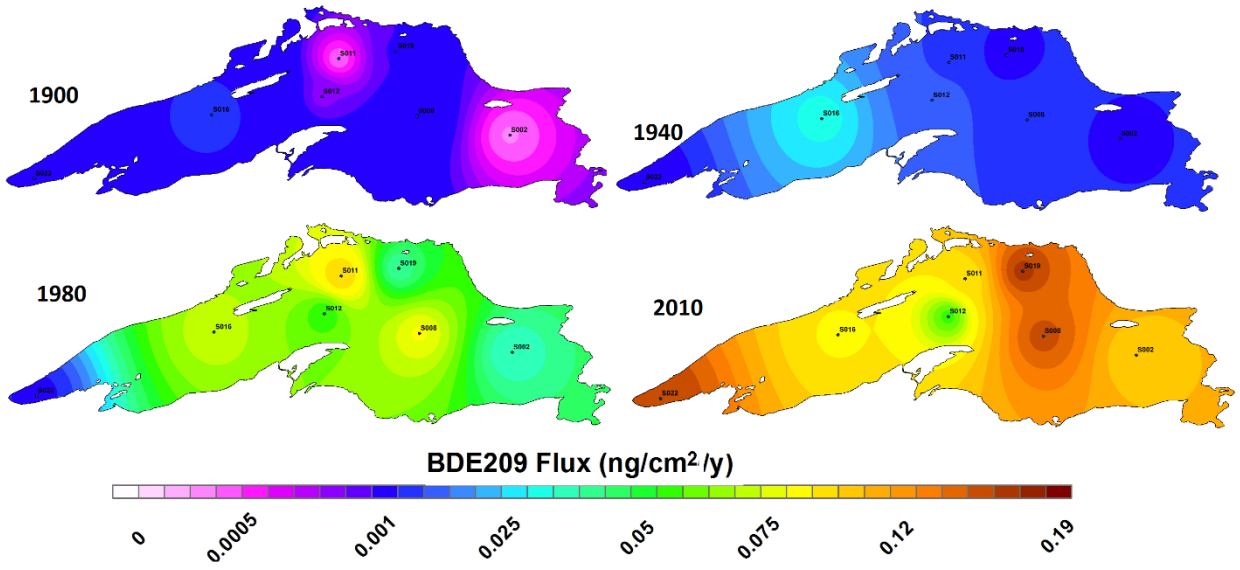


Figure 3.6.Map of depositional flux of BDE209 to Lake Superior sediment in 1900, 1940, 1980, and 2010.

Generally, whole-lake BDE209 loading was two orders of magnitude higher than that of $\sum_8$ BDEs (Figure 3.7). BDE209 increased by > 600% from 1910 to 1950; while$\sum_8$ PBDEs loading increased by 400%, over the same timeframe (Figure 3.7). An exponential increase in whole-lake loading was observed for both BDE209 and $\sum_8$ PBDEs over the last half century. During this time, whole-lake BDE209 and $\sum_8$ PBDEs loading increased by nearly three-fold and five-fold, respectively.

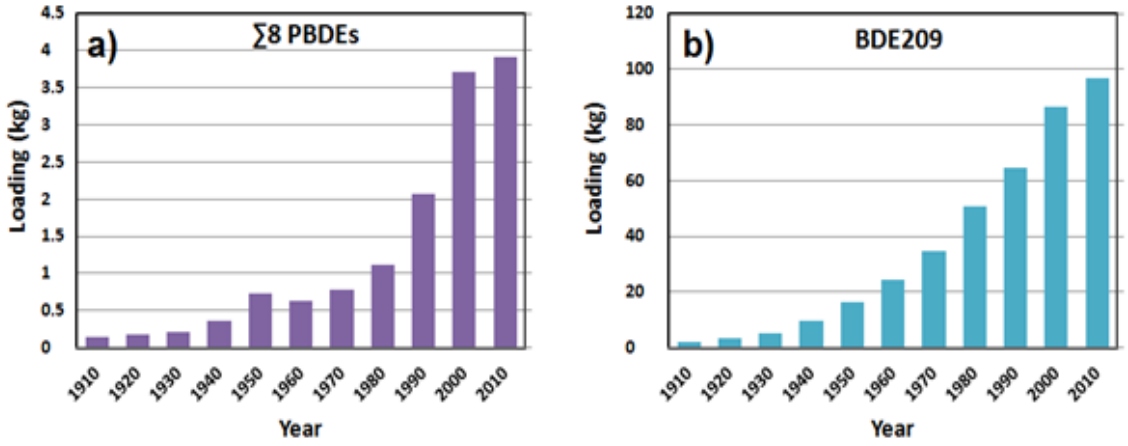


Figure 3.7.Wole-lake loading of a) $\sum_8$ PBDEs and b) BDE209 to Lake Superior from 1910 to 2010

The depositional flux of $\sum_8$ PBDEs to Lake Superior for 1900, 1940, 1970, and 2010 is exhibited in figure 3.8 (detailed maps of $\sum_8$ PBDEs deposition to this lake during 1900-2010 can be found in the supporting documents in figure C4 in Appendix C). During the last 110 years $\sum_8$ PBDEs flux increased ~1000 times from 0.000059-0.019 ng /cm^2/y. The average flux of $\sum_8$ PBDEs to Lake Superior was 0.000264 ng /cm^2/y in the beginning of the 20th century, and the minimum of the average flux occurred in 1910 at 0.000166 ng /cm^2/y. In 1900, the highest fluxes were in the western part of the lake at site S022. By the 1940's, the average flux of $\sum_8$ PBDEs increased to 0.00042 ng /cm^2/y, while the highest flux was found again at site S022. Most recently, in 2010, the average flux of $\sum_8$ PBDEs has reached its maximum value of 0.00453 ng /cm^2/y, with peak fluxes of 0.019 ng /cm^2/y at site S022.

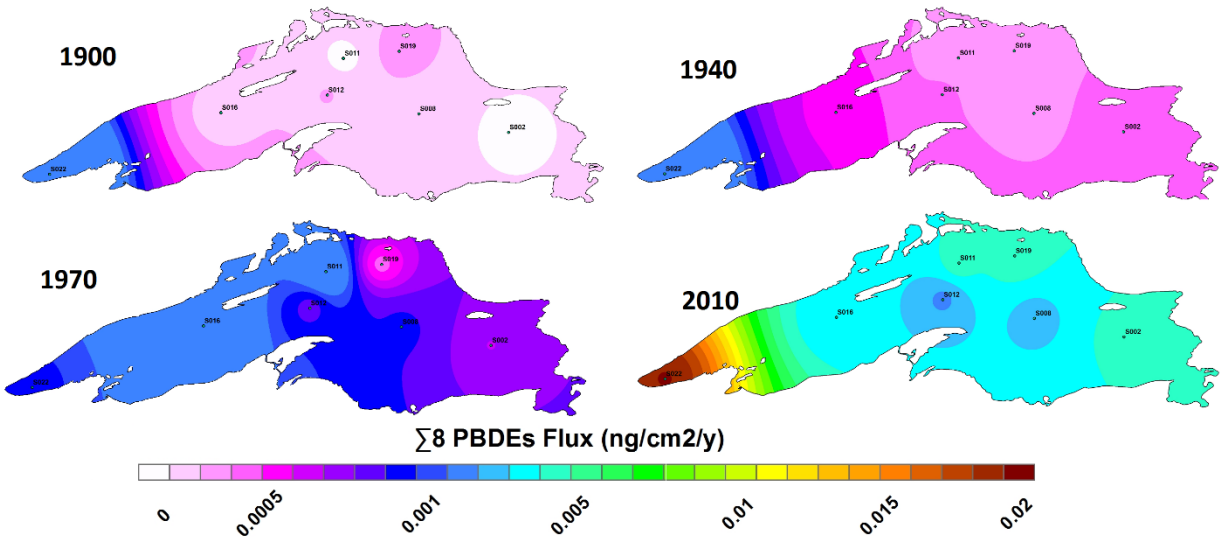


Figure 3.8. Map of flux of $\sum_8$ PBDEs to Lake Superior in sediment in 1900, 1940, 1970, and 2010.

Figure 3.9 displays a summary of the depositional flux of $\sum_{58}$ PCBs to Lake Superior for 1910, 1940, 1970, and 2000 (figure C5 in Appendix C in the supporting documents shows detailed temporal decadal maps of $\sum_{58}$ PCBs deposition to this lake during 1900-2010). The flux of $\sum_{58}$ PCBs ranged from 0.00014-

0.31 ng /cm^2/y over the last 110 years. In 1910, $\sum_{58}$ PCBs fluxes were relatively higher in the middle of the lake. By the 1940's, the average flux of $\sum_{58}$ PCBs increased to 0.023 ng /cm^2/y, with highest fluxes at site S008 in the deepest part of Lake Superior. Depositional fluxes increased further to 0.043 ng /cm^2/y in the 1970's, and again to 0.061ng /cm^2/y, in the 2000's. As can be seen by comparing figures 3.4 and 3.9, the spatial trend in BC deposition is quite similar to that of $\sum_{58}$ PCBs.

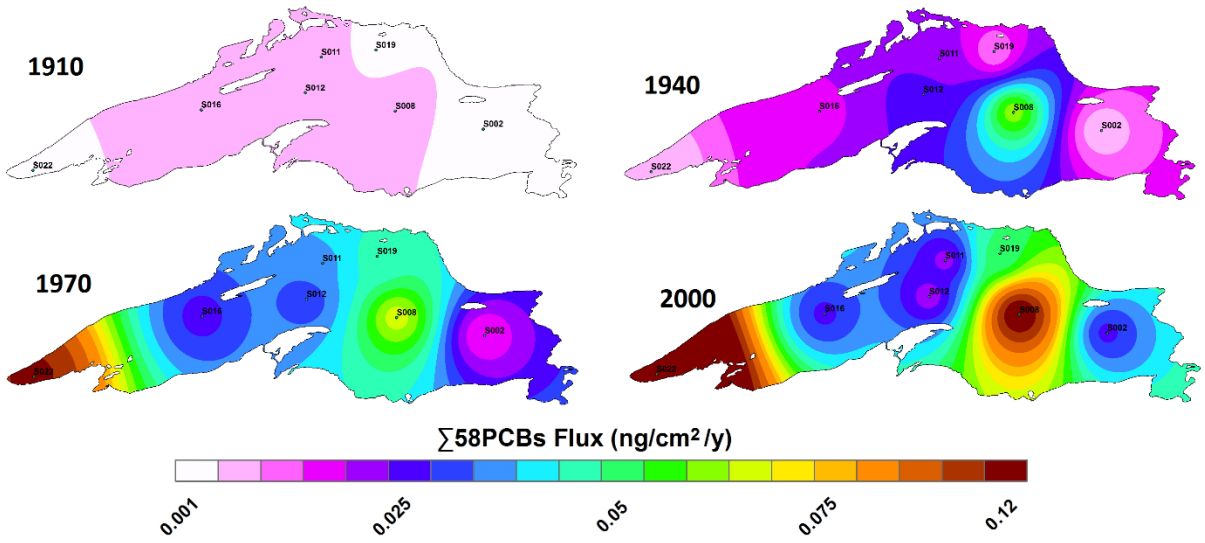


Figure 3.9. Map of flux of $\sum_{58}$ PCBs to Lake Superior in sediment in 1900, 1940, 1970, and 2010.

Figure 3.10 illustrates the temporal decadal loading of $\sum_{58}$ PCBs and other $\sum_{7}$ OCPs to Lake Superior from 1910 to 2010. Whole-lake loading of $\sum_{58}$ PCBs is typically two to three times higher than that of $\sum_{7}$ OCPs. In the first half the 20th century, the loading for both groups of compounds continued to increase by 480% and 340% for $\sum_{58}$ PCBs and $\sum_{7}$ OCPs, respectively. In the second half of the past century, $\sum_{58}$ PCB loading reached its peak in the 1990's, while $\sum_{7}$ OCP loading peaked in the 1980's. After the 1990's, $\sum_{58}$ PCB loading decreased 25% from 1990 to 2010, while $\sum_{7}$ OCP loading has been decreased 32% over the same timeframe (figure 3.10a and 3.10b). The manufacturing and use of PCBs was banned in the United States, in 1976. However, $\sum_{58}$ PCBs loading to Lake Superior peaked, nearly 20 years after

their ban [258]. The USEPA limited or prohibited the use of OCPs in crops in the 1980's [259], which likely accounts for their decreasing levels in the sediments of Lake Superior.

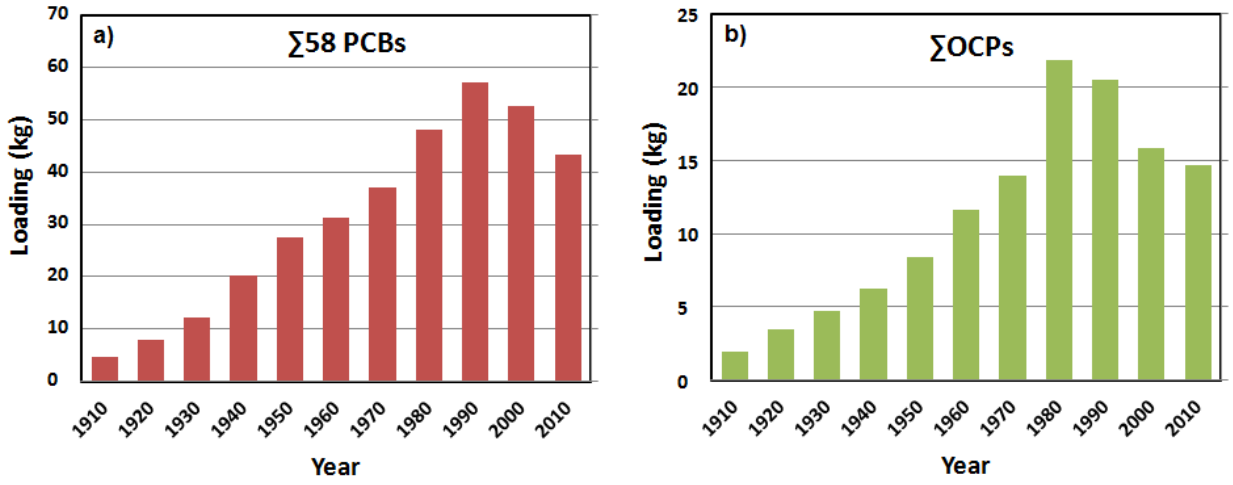


Figure 3.10.Whole-lake loading of a) $\sum_{58}$ PCBs and b) $\sum_{7}$ OCPs to Lake Superior from 1910 to 2010.

Figure 3.11 shows depositional fluxes of $\sum_{7}$ OCPs to Lake Superior for 1900, 1940, 1980, and 2010 (detailed temporal decadal maps of $\sum_{7}$ OCPs deposition to this lake during 1900-2010 can be found in the supporting documents in figure C6 in Appendix C). The flux of $\sum_{7}$ OCPs range over four orders of magnitude from 0.000027-0.15 ng /cm^2/y during the previous 110 yr (Figure 3.11). In the beginning of the 20th century, the average flux of $\sum_{7}$ OCPs to Lake Superior was 0.0015 ng /cm^2/y and fluxes were relatively lower at site S022, in the western part of the lake, and at site S002, in the eastern area. By the 1940's, the average flux of $\sum_{7}$ OCPs increased to 0.00718 ng /cm^2/y, and the highest flux value was found at site S008, in the deepest part in the middle of Lake Superior. Fluxes continued to increase to the 1980's, reaching its maximum average of 0.0253 ng /cm^2/y (Figure 3.10.b). Fluxes started to decrease from the 1980's to present, and the average $\sum_{7}$ OCPs flux is now 0.017 ng /cm^2/y in 2010. The highest value of the flux for these PBTs in recent years is 0.02 ng /cm^2/y at in site S022, site S019, and site S008.

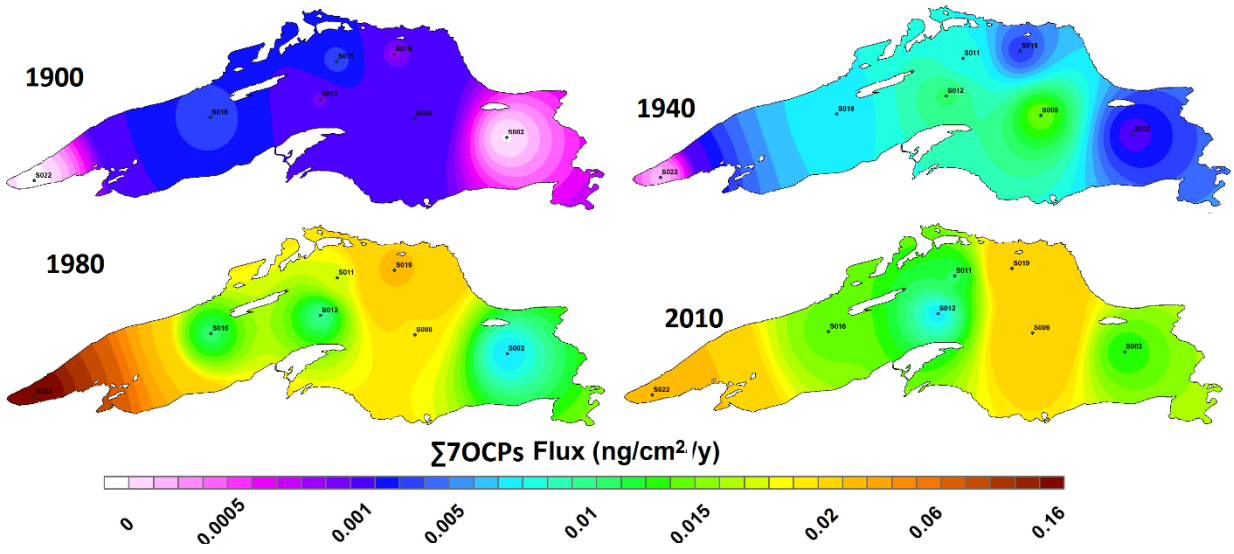


Figure 3.11.Map of depositional flux of $\sum_7$ OCPs to Lake Superior in sediment in 1900, 1940, 1980, and 2010.

The depositional fluxes of $\sum_6$ PCDDs to Lake Superior for 1900, 1950, 1990, and 2010 are displayed in Figure 3.12 (all temporal decadal maps of $\sum_6$ PCDDs deposition to this lake during 1900-2010 can be found in the supporting documents in figure C7 in Appendix C). The depositional flux of $\sum_6$ PCDDs ranged from 0.00016-0.08 ng /cm^2/y over the last 110 years (Figure 3.12) from a low of 0.0015 ng /cm^2/y to a maximum of 0.0113 ng /cm^2/y in 1990. After that, the fluxes of $\sum_6$ PCDDs declined markedly from the 1990's to the 2010's, with an average flux of 0.0079 ng /cm^2/y in 2010. The highest fluxes were found at sites S022, adjacent to Duluth, MN.

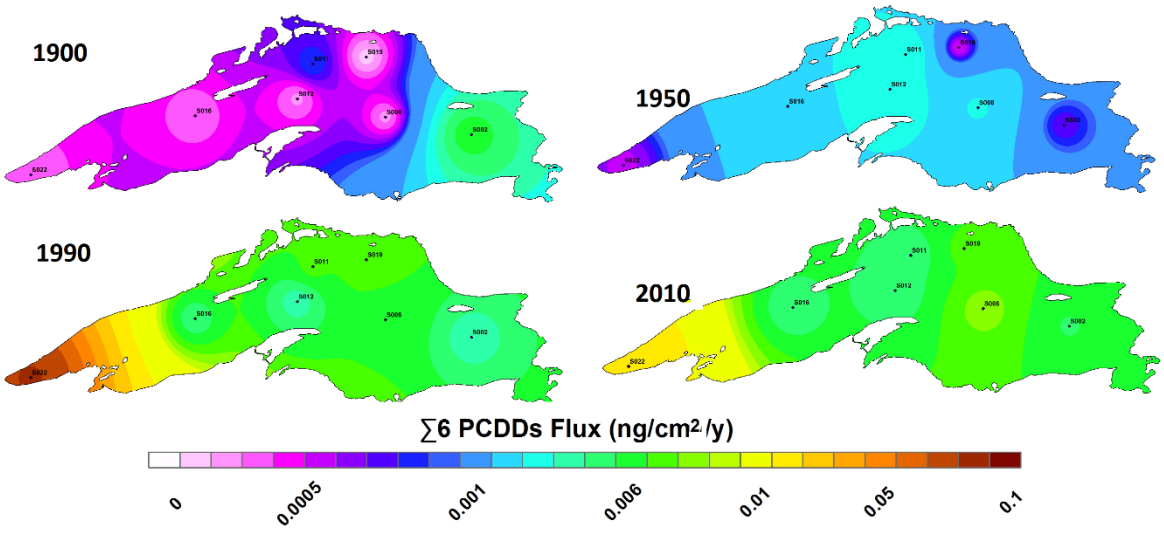


Figure 3.12. Map of depositional flux of $\sum_6$ PCDDs to Lake Superior in sediment in 1900, 1940, 1980, and 2010.

The temporal decadal loadings of $\sum_6$ PCDDs and $\sum_{10}$ PCFDs to Lake Superior from 1910 to 2010 are illustrated in figure 3.13. Whole-lake $\sum_6$ PCDDs loading is higher than that of $\sum_{10}$ PCFDs. In the first half the 20th century, the highest loading for both groups were in the 1950's. From 1910 to 1940, the loading of $\sum_6$ PCDDs was almost constant, and it increased only 10%; similarly, the levels of $\sum_{10}$ PCFDs were increased 50%, at the same time. Over the last 50 years, $\sum_6$ PCDD loading continued to increase until reaching a maximum in the 1990's, and the levels of $\sum_{10}$ PCFDs rose to their maximum in the 1980's. These represent >300% increase in $\sum_6$ PCDD loading and nearly a 250% increase in $\sum_{10}$ PCFDs loading since the 1960's. After their peak, loading of $\sum_6$ PCDD decreased by 30% from 1990 to 2010. A more significant downward trend in the loading of $\sum_{10}$ PCFD to Lake Superior has been observed from 1980 to 2010, with the reduction of 85% (figure 3.13a and 3.13b).

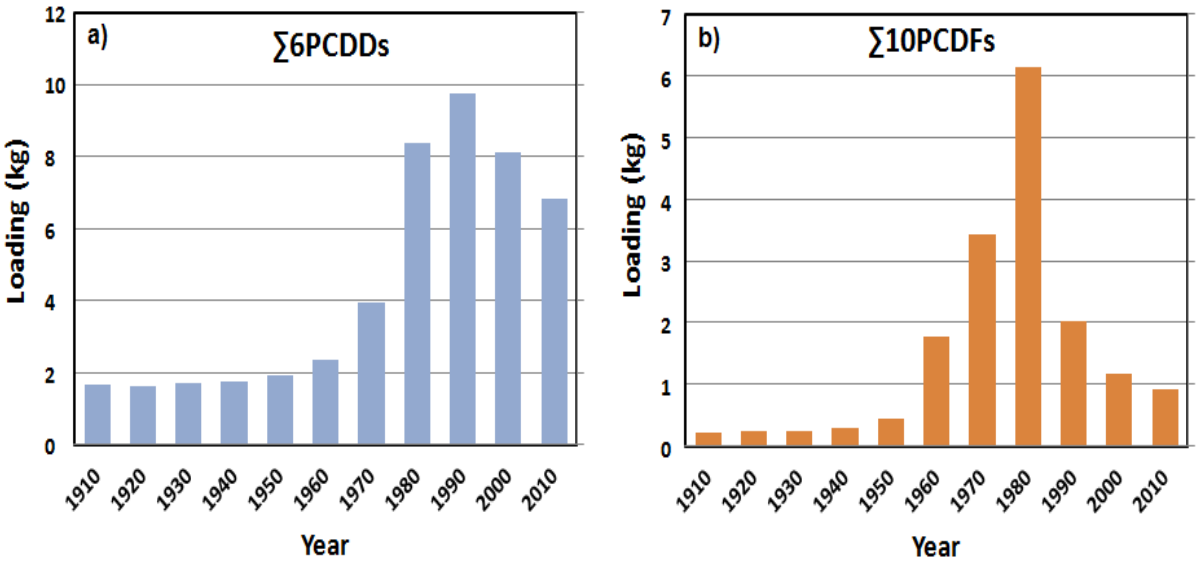


Figure 3.13.Whole-lake loading of a) $\sum_6$ PCDDs and b) $\sum_{10}$ PCDFs to Lake Superior from 1910 to 2010.

Selected maps of the fluxes of $\sum_{10}$ PCFDs to Lake Superior for 1910, 1950, 1980, and 2010 are presented in figure 3.14 (all other temporal decadal maps of $\sum_{10}$ PCFDs deposition to Lake Superior during 1910-2010 are exhibited in the supporting documents in figure C8 in Appendix C). The depositional flux of $\sum_{10}$ PCFDs ranged from 6.E-07-0.087 ng /cm^2/y over the last 110 years, and average flux increased from 0.000256 ng /cm^2/y in 1910 to 0.00711 ng /cm^2/y in the 1980's with highest values found at S022, in the vicinity of Duluth, MN. After that, the flux began to decrease from the 1980's to the 2010's, and, in 2010, the average flux of $\sum_{10}$ PCFDs was 0.00106 ng /cm^2/y. In recent years, the highest value of the flux for these contaminants is 0.005 ng /cm^2/y that is measured at sites S022, adjacent to Duluth, MN. This trend is relatively similar to that of PCDDs, and, once again, demonstrates the importance of the Duluth, MN in introduction of persistent pollutants to Lake Superior.

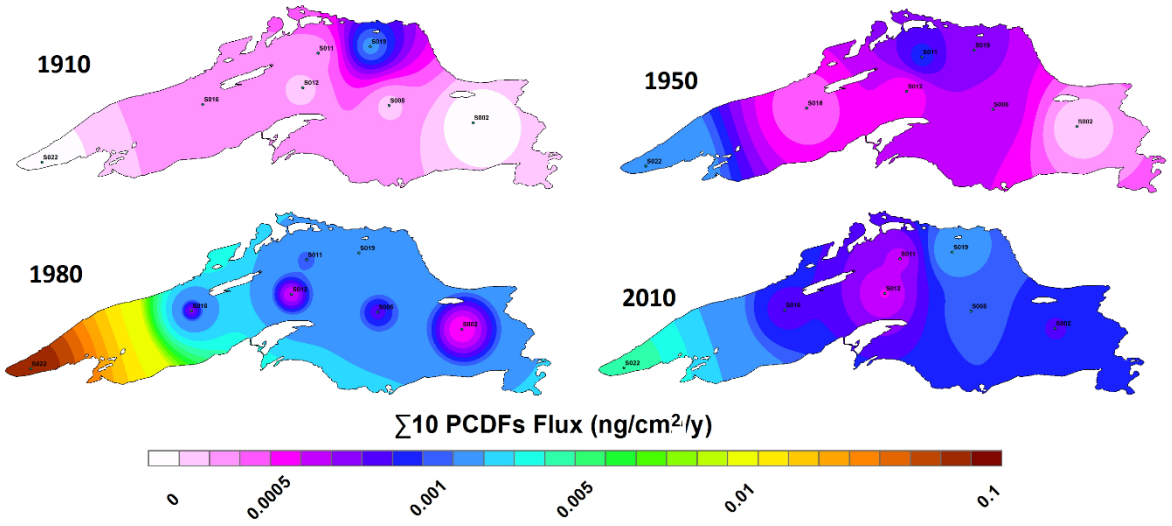


Figure 3.14. Map of depositional flux of $\sum_{10}$ PCDFs to Lake Superior in sediment in 1900, 1940, 1980, and 2010.

A cumulative decadal and temporal loading of selected PBTs to Lake Superior from 1910 to 2010 has been displayed in Figure 3.15. $\sum_{58}$ PCBs, BDE209, and $\sum_{7}$ OCPs comprise the largest share of the total loading of the selected SV-PBTs in our study. In the first half the 20th century, the aggregated loadings were much lower than in the second half, as the average total loading from 1960 to 2000 is 4.3 times than during the period from 1910 to 1950. The total loading for all selected PBTs increased approximately 630% in the first half; whereas, this parameter increased >130% from 1960 to 2000. The rate of increase in whole-lake loading of these persistent pollutants in sediments of this lake decreased in the second half of the past century. Based on our results, peak of the total cumulative loading of these SV-PBTs to Lake Superior took place in the 2000's, and has decreased slightly from 2000 to 2010. The group $\sum_{58}$ PCBs was the largest portion of the aggregate loading in the first half the previous century, while BDE209 was the largest in the second half of the 20th century. While the manufacture of BDE209 had been banned in many European countries, its use was permitted in the United States, and merely some states decided to phase out this chemical in recent years [260, 261]; hence, this can explain the reason of increasing in the quantities of deposited BDE209 to Lake Superior.

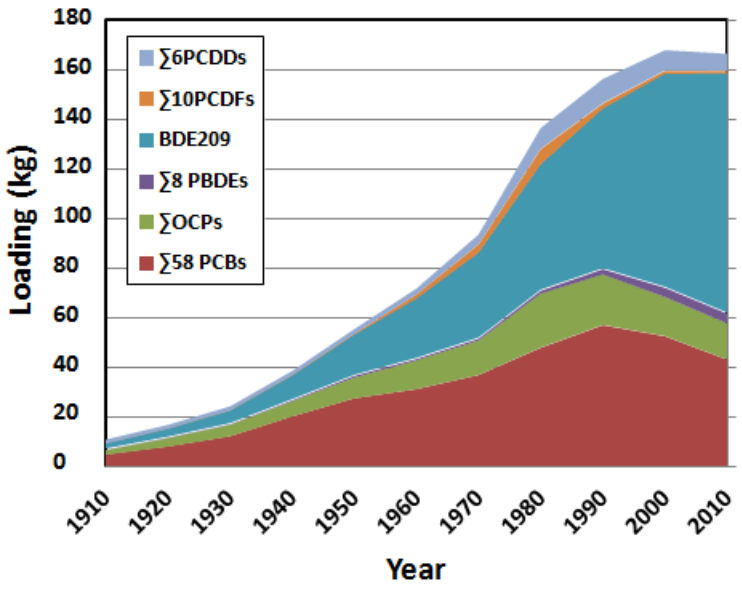


Figure 3.15.Cumulative annual whole-lake loading of selected SV-PBTs to Lake Superior from 1910 to 2010.

3.3.4. Particle size distributions (PSD) and BC

Figure 3.16 shows the relationship between the BC concentration and silt and clay content of in sediments in Lake Superior (excluding S008), (detailed data of the average contributions of sand, silt, and clay in all sites of Lake Superior is displayed in Figure C13 in the Appendix C). In site S008, the dominant particle was clay, and this site has the highest clay content, as well as the lowest sand content in Lake Superior. BC in Lake Superior sediment was statistically significantly correlated with silt (P-value = 2E-17) and sand (P-value = 5E-9), but was not significantly correlated with clay (P-value = 0.10). Generally, the concentration of BC increased with increasing silt content of the sediments in this lake; while, the level of BC showed the opposite correlation with the sand content, as it decreased in more sandy sediments (Figure 3.16).

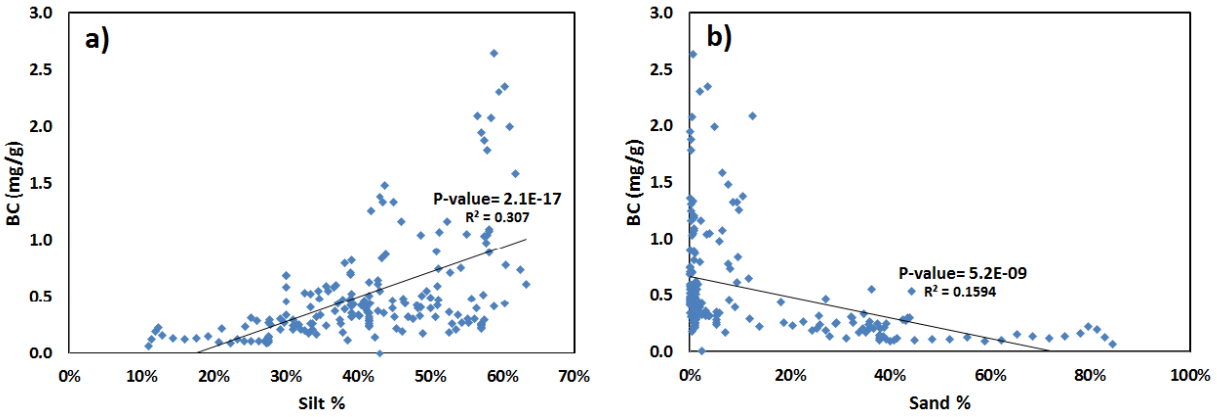


Figure 3.16.Regression relationship between BC and a) silt and b) clay in Lake Superior. Note that site S008 was excluded due to very high clay content.

3.3.5. Depositional flux of PBTS and BC in Lake Superior

To observe the relationship between SVOC flux and BC deposition in Lake Superior sediments, we performed regression analyses of all depositional fluxes of all focused compounds (table 3.3).

Table 3.3 Regression analysis of SVOC fluxes versus BC flux in Lake Superior sediment.

SVOC	P-value	Slope	SVOC	P-value	Slope	SVOC	P-value	Slope
di-PCBs	**1.20E-02**	4.50E-02	alpha-HCH	8.30E-01	2.40E-04	BDE-49	**2.60E-04**	9.40E-03
Tri-PCBs	**1.40E-02**	3.40E-02	HCB	8.70E-02	2.90E-02	BDE99	**8.90E-04**	3.70E-02
Tetra-PCBs	**4.40E-02**	8.20E-02	p,p'-DDE	**5.30E-03**	4.90E-01	BDE100	**1.00E-03**	4.10E-02
Penta-PCBs	5.20E-02	3.70E-01	PnCDD	**7.30E-06**	3.20E-02	BDE-153	**1.10E-02**	1.30E-02
Hexa-PCBs	7.40E-02	4.90E-01	OCDF	**3.30E-07**	7.70E-02	BDE-154	**1.30E-02**	1.20E-02
Hepta-PCBs	**2.60E-02**	3.10E-01	TCDF	**2.30E-04**	9.50E-01	BDE183	8.20E-01	3.30E-03
Octa-PCBs	**6.70E-04**	2.10E-01	$\sum_{10}$PCDFs	**2.90E-07**	3.20E-01	$\sum_{8}$ PBDEs	**1.10E-03**	2.50E-01
Nona-PCBs	**4.40E-09**	2.20E-01	$_{\sum 16}$PCDD/Fs	**7.60E-06**	5.00E-01	BDE209	**7.50E-04**	2.20E+00
Deca-PCBs	**3.80E-08**	2.10E-01	BDE28	**3.40E-04**	4.10E-03	Total PBDEs	**6.50E-04**	2.40E+00
$\sum_{58}$ PCBs	**9.20E-03**	2.00E+00	BDE-47	**2.60E-04**	1.30E-01			

Significant values in bold, and slope is in (ng SVOC/cm^2/yr/ mg BC/cm^2/yr) for all except for PnCDD, OCDF, and TCDF which are in (pg SVOC/cm^2/yr / mg BC/cm^2/yr)

In the temporal depositional trends, the most highly statistically significant correlations were found between BC and PCDD/Fs. Conversly, most OCPs were not strongly correlated with BC flux, with the exception of p,p'-DDE (Table 3.3 and figure 3.17). For most of the selected SV-PBTs, BC correlations were observed in both spatial and temporal analyses.

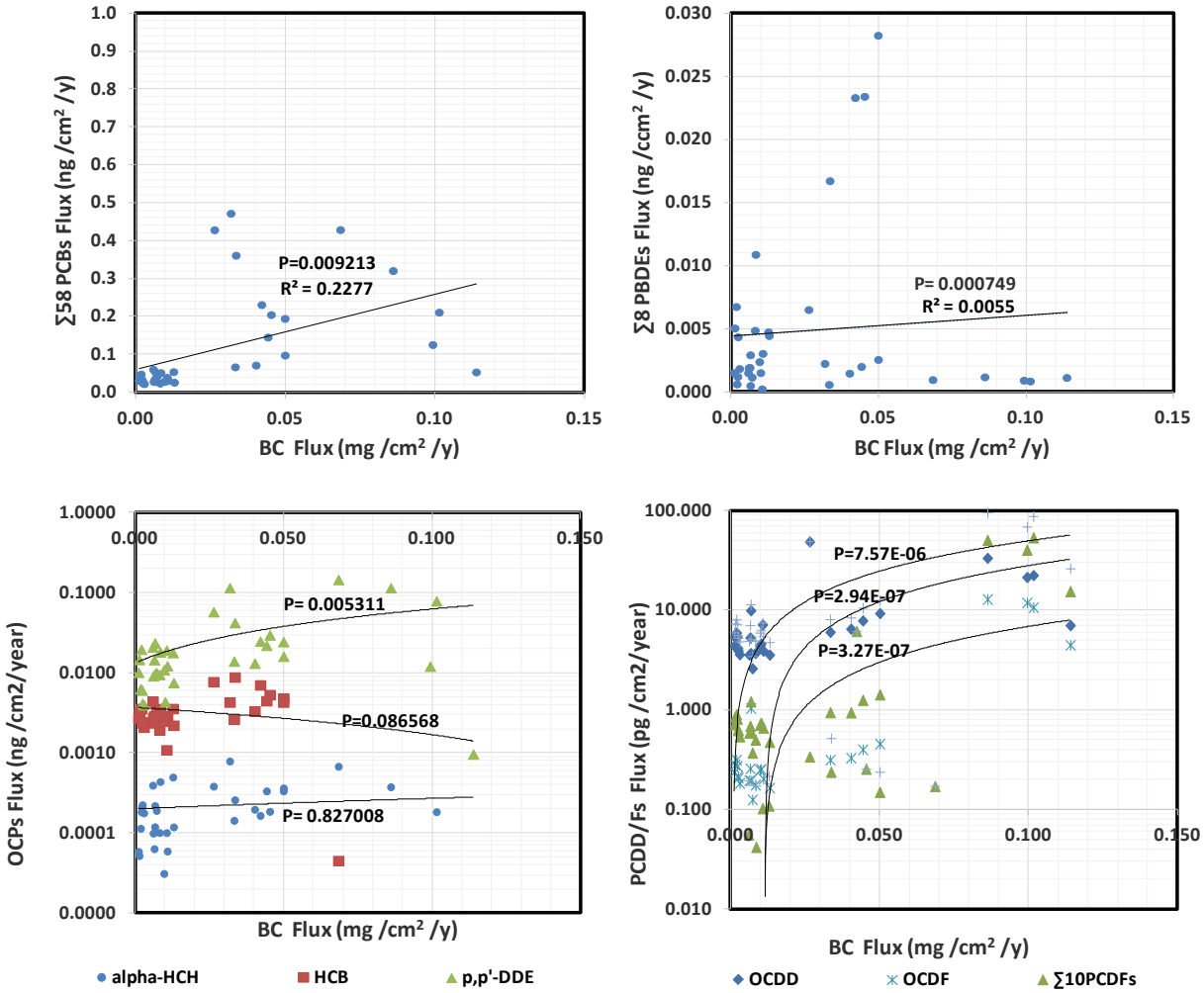


Figure 3.17. Regression relationships between four categories of SVOC fluxes and BC flux in core samples in Lake Superior.

Interestingly, in the concentration correlations of PCBs, lighter PCBs (i.e. planar-PCBs) correlated better with BC, whereas highly chlorinated PCBs (i.e. non-planar) showed weak or no correlation with BC. Planar PCBs have a higher potential for diffusion into the micropores of BC because they interact by π-π forces with the aromatic pore walls, and may explain the stronger association between BC and planar-PCBs [151, 218]. Conversely, larger non-planar PCBs may undergo electronic contacts with the exterior surface and tiny-pore walls of BC due to steric obstruction [244], [237, 262].

3.3.6. Spatial and temporal distribution of PBTs during the last 100 years to Lake Huron and Lake Michigan

Figure 3.18 shows heat map of the depositional flux of BDE209 to Lakes Michigan and Huron (excluding Saginaw Bay) for 1910, 1940, 1980, and 2010 (detailed heat maps of BDE209 deposition to this system during the last 100 years (1910-2010) can be found in the supporting documents in figure C9 in Appendix C). BDE209 fluxes ranged from 0.0005-1.06 ng /cm^2/y for Lake Michigan, and 0.002-0.93 ng /cm^2/y for Lake Huron (excluding Saginaw Bay). In the beginning of the 20^{th} century, the BDE209 fluxes in Lake Huron were higher than those in Lake Michigan, and the average flux of BDE209 to this system was 0.0085 ng /cm^2/y. The highest BDE209 fluxes were found at site H038 in the middle of Lake Huron, which is located in the deepest part of the lake with relatively low sedimentation rate. Hence, enrichment of this pollutant may be the reason of its high level in this site. By the 1940's, the average flux of BDE209 to the system was 0.0427 ng /cm^2/y, and the highest fluxes were found at sites H038 and H095, in the middle of Lake Huron, and at site M011, in the southern basin of Lake Michigan. BDE209 fluxes increased over time to an average of 0.477 ng /cm^2/y in the 1980's, with the highest values found in the southern basin of Lake Michigan. This region is clearly influenced by the metropolitan areas of Chicago and northern Indiana. In recent years, the average flux of BDE209 has reached to its maximum of 0.59 ng /cm^2/y. During the past decade, peak fluxes were found at H006, in the southern basin of Lake Huron, M011 in the southern part of Lake Michigan, and M047 in the northern basin of Lake Michigan. Overall (if we exclude Saginaw Bay) Lake Huron had higher BDE209 fluxes than Lake Michigan in the first half of the past century; while, from 1950 to 2010 the reverse occurred as BDE209 fluxes in Lake Michigan greatly exceeded those in Lake Huron.

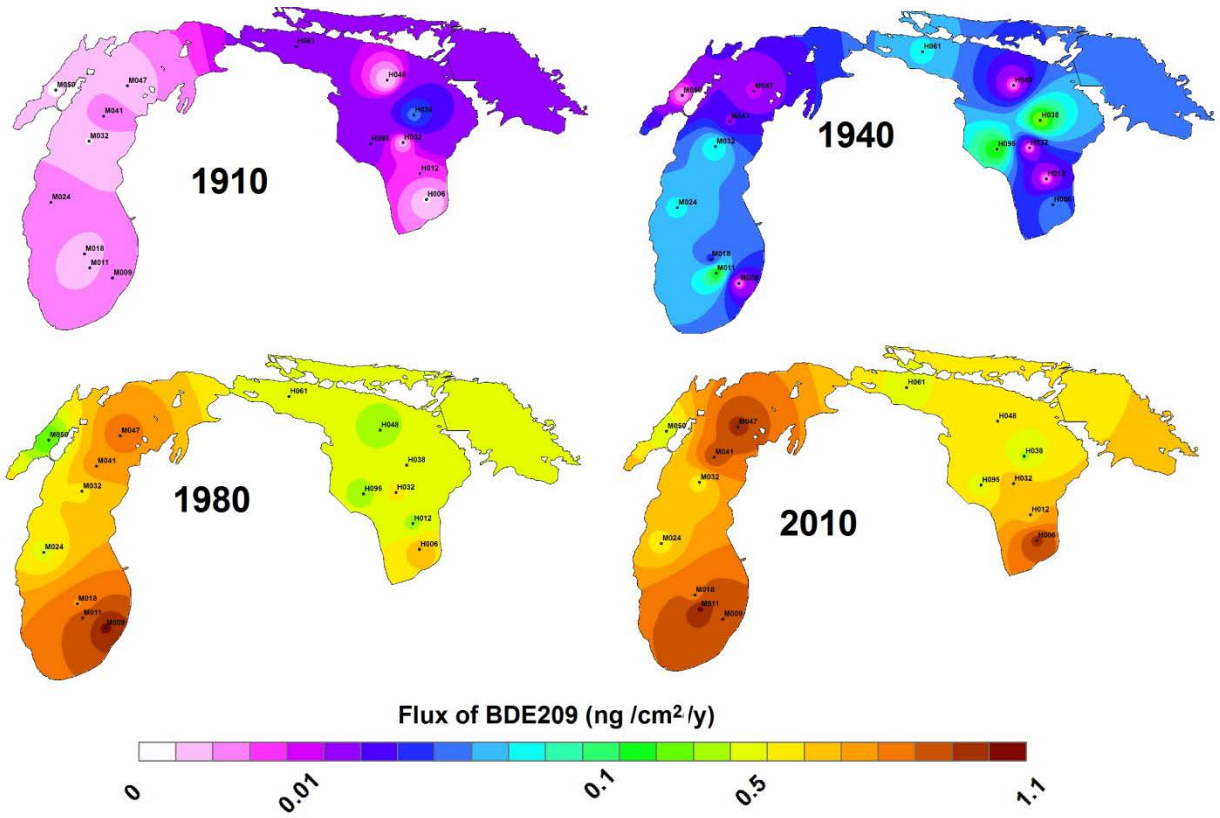


Figure 3.18. Map of depositional flux of BDE209 to Lake Michigan and Lake Huron (excluding Saginaw Bay) in sediment in 1910, 1940, 1980, and 2010.

Figure 3.19 illustrates the whole-lake loading of BDE209 and $\sum_8$ PBDEs to Lakes Michigan and Huron (excluding Saginaw Bay) from 1910 to 2010. As is clearly seen, BDE209 loading to this system greatly exceeds that of $\sum_8$ PBDEs. In the first half the 20th century, the highest values of the loading for both groups ware found in the 1950's. In the first half of the past century, the slope of the rise in the levels of $\sum_8$ PBDEs in the sediments of this system was much less than that of the second half of the 20th century. The whole-lake loading of $\sum_8$ PBDEs increased three-fold from 1910 to 1950; while BDE209 loading increased almost nine times over the same period. Both BDE209 and $\sum_8$ PBDEs loading continued to increase from 1960 to 2000, but with important differences in behavior. Loading of $\sum_8$ PBDEs continues to increase in a near exponential fashion, while BDE209 loading has a clear change in slope as the rate of increase slowed from 1990 to 2010 (figure 3.19a and 3.19b).

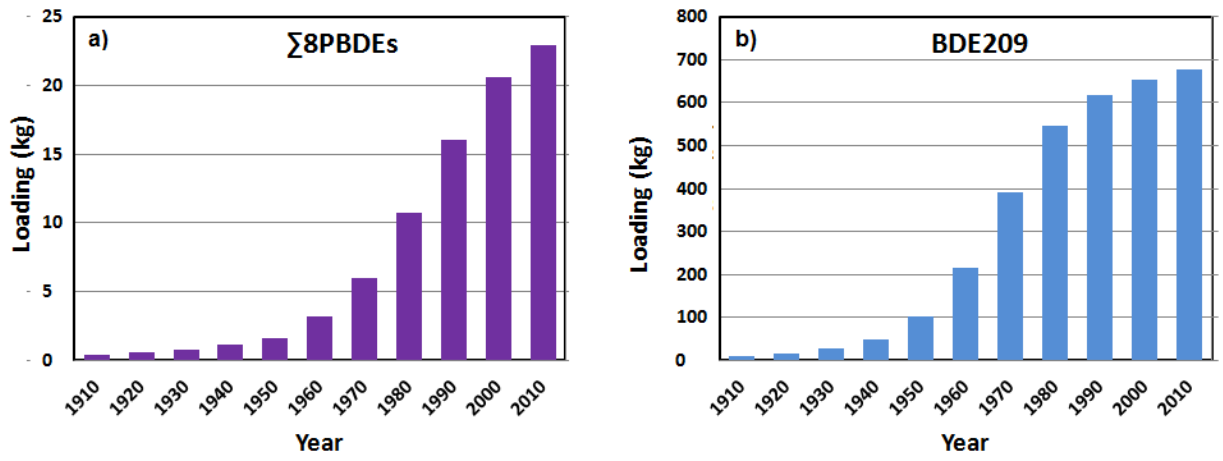


Figure 3.19. Whole-lakes loading of a) $\sum_8$ PBDEs and b) BDE209 to Lake Michigan and Lake Huron (excluding Saginaw Bay) from 1910 to 2010.

A heat map of the depositional flux of $\sum_8$ PBDEs to Lakes Michigan and Huron (excluding Saginaw Bay) in 1910, 1950, 1990, and 2010 is exhibited in figure 3.20 (detailed heat maps of $\sum_8$ PBDEs deposition to this lake during the last 100 years (1910-2010) can be found in the supporting documents in figure C10 in Appendix C). $\sum_8$ PBDEs fluxes ranged from 0.0001-0.08 ng /cm^2/y, in Lake Michigan, and 0.00009-0.02 ng /cm^2/y in Lake Huron (excluding Saginaw Bay) during this period. In general, $\sum_8$ PBDE fluxes in Lake Huron were lower than those in Lake Michigan in the beginning of the 20th century, and the average flux of $\sum_8$ PBDEs was 0.00035 ng /cm^2/y in 1910. Highest fluxes were found at site M050 in Green Bay, Lake Michigan. By the 1950's, the average flux increased four-fold to 0.0014 ng /cm^2/y, and highest fluxes were found at sites M024 in Lake Michigan adjacent to Milwaukee, WI, and at site H095 in the middle of Lake Huron. $\sum_8$ PBDE fluxes increased by a factor ten to 0.014 ng /cm^2/y by the 1990's, with the highest fluxes at site M009 of the southern basin of Lake Michigan. The average flux of $\sum_8$ PBDEs to this system has reached a maximum of 0.02 ng /cm^2/y, in 2010. During the past decade, peak fluxes were observed at site M009 in the southern of Lake Michigan. Excluding Saginaw Bay, $\sum_8$ PBDEs fluxes were lower in

Lake Michigan than in Lake Huron, during the period 1910 to 1950, and loading switched to higher fluxes in Lake Michigan after 1950, analogous to the case with BDE209 (figures 3.18 and 3.20).

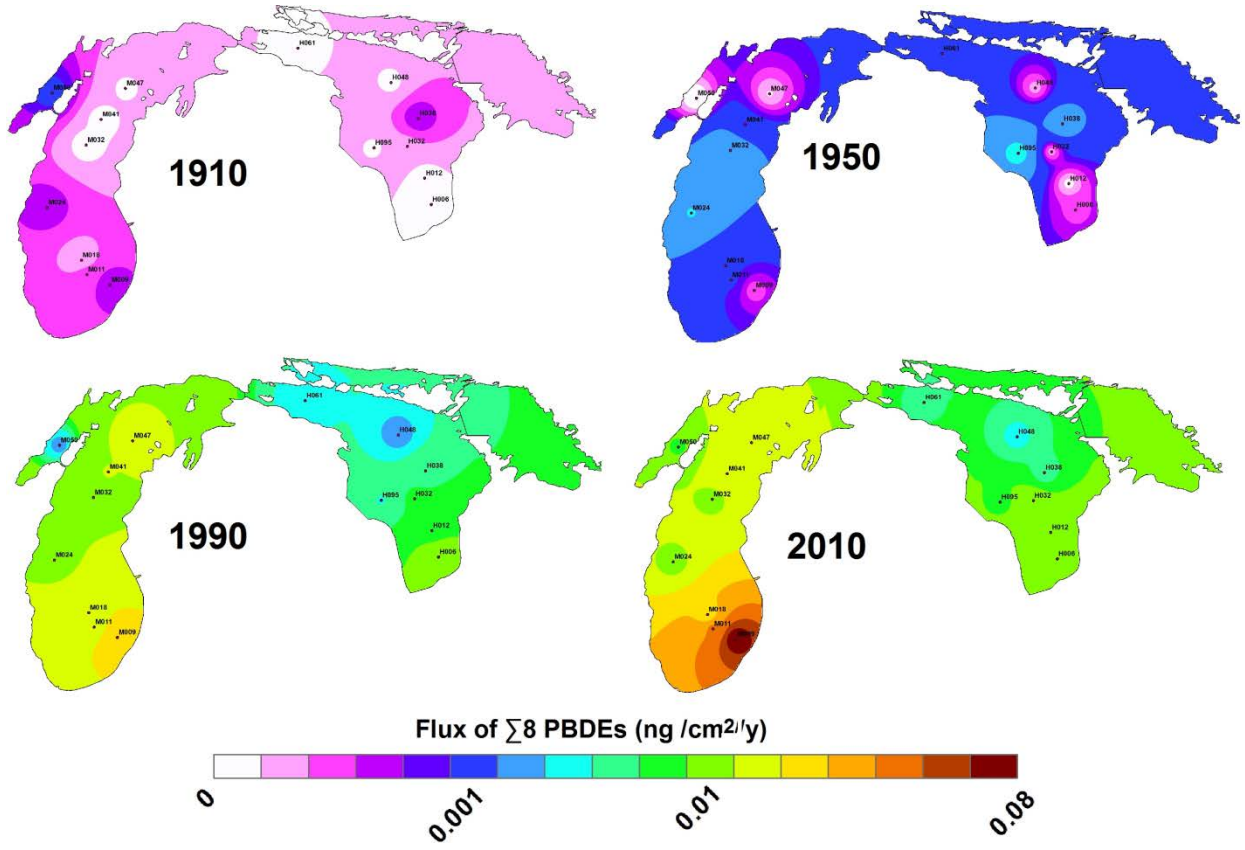


Figure 3.20. Map of depositional flux of $\sum_8$ PBDEs to Lake Michigan and Lake Huron (excluding Saginaw Bay) in sediment in 1910, 1950, 1990, and 2010.

A heat map of $\sum_6$ PCDD depositional flux to Lakes Michigan and Huron (excluding Saginaw Bay) for 1910, 1940, 1970, and 2010 is shown in figure 3.21(detailed temporal decadal maps of $\sum_8$ PBDEs deposition to this lake during 1910-2010 can be found in the supporting documents in figure C11 in Appendix C). $\sum_6$ PCDD fluxes ranged from 0.0004-0.023 ng /cm^2/y in Lake Huron (excluding Saginaw Bay), and 0.0002-0.05 ng /cm^2/y in Lake Michigan during this period. In the beginning of the 20th century, overall fluxes of $\sum_6$ PCDDs were higher in Lake Michigan than in Lake Huron, and the average flux was 0.0019 ng /cm^2/y. In 1910, the highest $\sum_6$ PCDD fluxes were found at sites M024 adjacent to Milwaukee, M047 in the northern basin of Lake Michigan, and site H032 in the middle of Lake Huron.

By the 1940's, the average flux of $\sum_6$ PCDDs to this system was 0.0088 ng /cm^2/y, and maximum fluxes were observed at sites H006 in the southern basin of Lake Huron, H048 in the deepest region of Lake Huron, M009 in the southern basin of Lake Michigan, and M50, in Green Bay, Lake Michigan. $\sum_6$ PCDD fluxes increased to its maximum in the 1970's; averaging 0.0155 ng /cm^2/y, with the highest values in Green Bay, Lake Michigan and in the southern basin of Lake Huron. Average fluxes of $\sum_6$ PCDDs have decreased from this peak to 0.012 ng /cm^2/y in 2010. During the past decade, the highest fluxes were found in Green Bay, Lake Michigan. In general, (excluding Saginaw Bay) Lake Huron had higher $\sum_6$ PCDD fluxes than Lake Michigan, in the early 20th century; while fluxes have significantly higher in Lake Michigan since the 1930's.

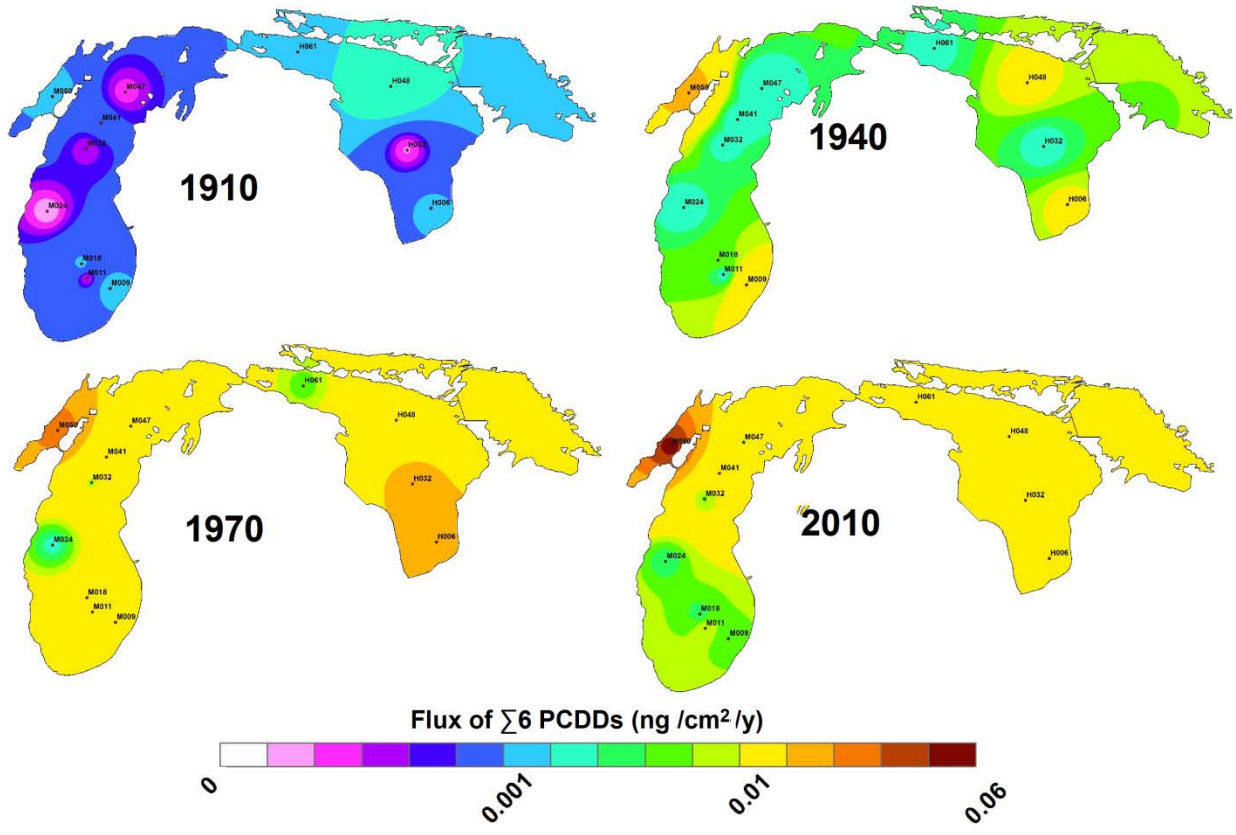


Figure 3.21. Map of depositional flux of $\sum_6$ PCDDs to Lake Michigan and Lake Huron (excluding Saginaw Bay) in sediment in 1910, 1940, 1970, and 2010.

Whole-lake loading of $\sum_6$ PCDDs and $\sum_{10}$ PCDFs to Lakes Michigan and Huron (excluding Saginaw Bay) has receded substantially from highs observed in the 1960's (Figure 3.22). $\sum_6$ PCDD loading is higher than that of $\sum_{10}$ PCDFs. From 1910 to 1950, whole-lake loading of $\sum_6$ PCDDs increased almost six-fold from 1910 to mid-20th century; while, the $\sum_{10}$ PCDF loading increased five-fold over the same time frame. In the second half of the past century, the level of $\sum_6$ PCDDs continued its increase until the 1970's, when it reaches to its maximum. Similarly, the total level of $\sum_{10}$ PCDFs in the sediments of this system peaks in the 1960's. Since their peak, whole-lake loading has decreased by > 20% and > 33% for $\sum_6$ PCDDs and $\sum_{10}$ PCDFs, respectively (figure 3.22a and 3.22b).

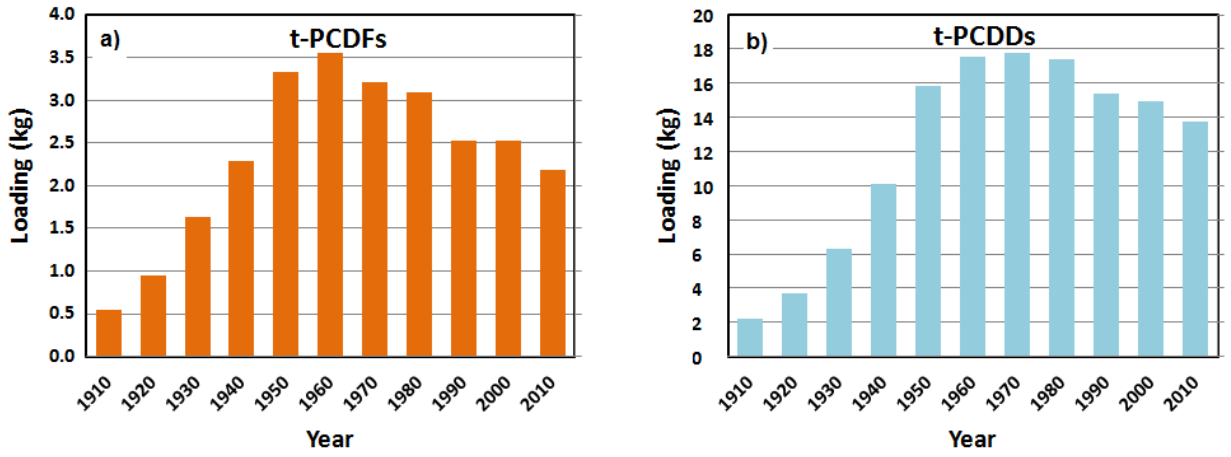


Figure 3.22.Whole-lake loadings of a) $\sum_6$ PCDDs and b) $\sum_{10}$ PCDFs to Lakes Michigan and Huron (excluding Saginaw Bay) from 1910 to 2010.

A heat map of the depositional flux of $\sum_{10}$ PCDFs to Lakes Michigan and Huron (excluding Saginaw Bay) in 1910, 1950, 1980, and 2010 is shown in Figure 3.23 (complete heat maps of $\sum_{10}$ PCDF deposition during 1910-2010 can be found in the supporting documents in figure C12 in Appendix C). The flux of $\sum_{10}$ PCDFs ranged from 0.0004-0.006 ng /cm^2/y in Lake Huron (excluding Saginaw Bay) and 0.00006-0.011 ng /cm^2/y in Lake Michigan over the last 100 years. In 1910, the average flux of $\sum_{10}$ PCDFs to the system was 0.00048 ng /cm^2/y, and fluxes were higher in Lake Michigan than in Lake Huron. In the

beginning of the 20th century, highest $\sum_{10}$ PCDF fluxes were found at sites M009, in the southern basin of Lake Michigan, and H048 in the deepest region of Lake Huron. Average fluxes of $\sum_{10}$ PCDFs increased to 0.0029 ng /cm^2/y by mid-century and maximal fluxes at sites M009, in the southern basin of Lake Michigan, and H006, in southern basin of Lake Huron. Fluxes increased to their maximal value in the 1960's (0.0031 ng /cm^2/y), with the highest fluxes again found at M009 and H006. Fluxes have decreased by 2010 to 0.0019 ng /cm^2/y, and the highest fluxes are now found in site M050, in Green Bay, Lake Michigan. Fluxes in Lake Michigan were always higher than in Lake Huron during the past century.

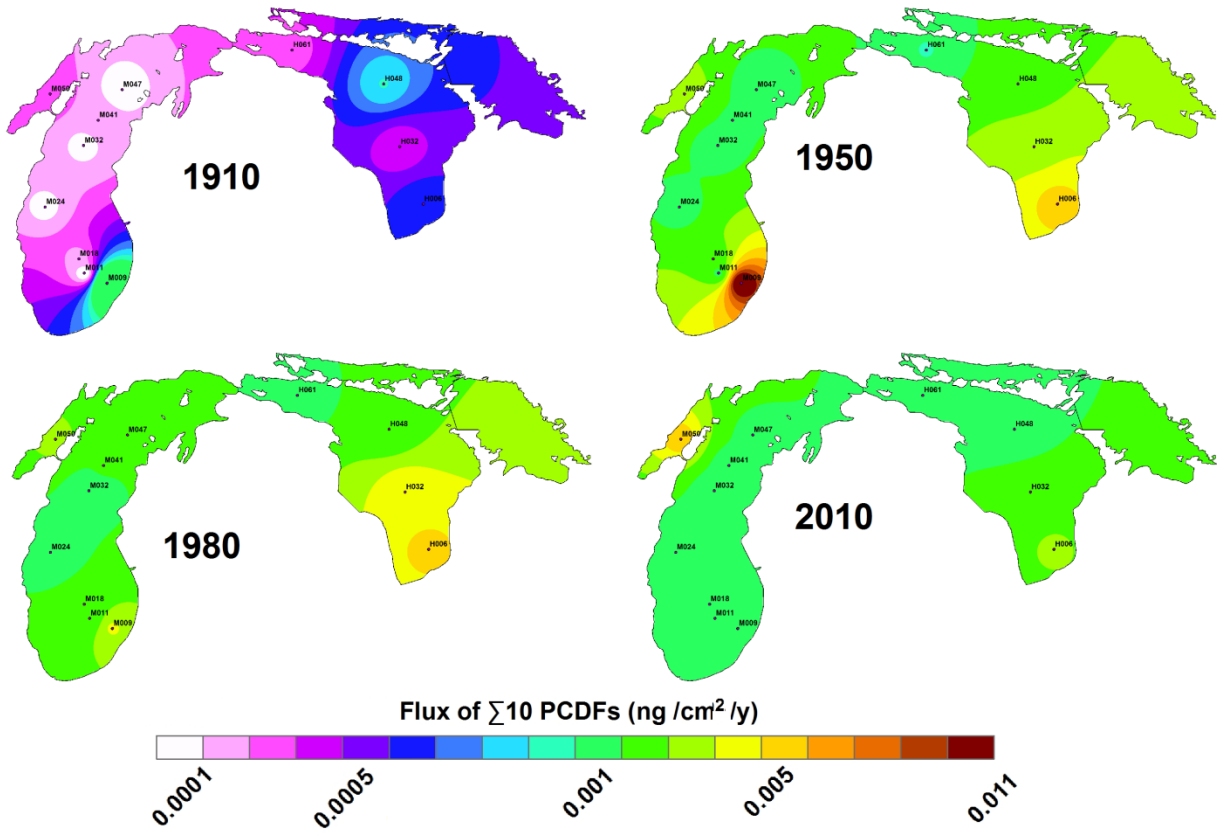


Figure 3.23. Heat map of $\sum_{10}$ PCDF flux to Lakes Michigan and Huron (excluding Saginaw Bay) in sediment in 1910, 1950, 1980, and 2010.

The whole-bay BDE209, $\sum_8$ PBDEs, $\sum_6$ PCDDs, and $\sum_{10}$ PCDFs to Saginaw Bay from 1970 to 2010 is shown in Figure 3.24. This bay was designated as an Area of Concern (AOC), under the 1987 Great Lakes Water Quality Agreement. Municipal, industrial and storm water discharges, industrial waste discharges, combined sewer overflows, and agricultural and urban runoff are the sources of various pollutants in the Saginaw River and Bay [1, 263, 264]. Although the surface area of this bay comprises only 3% of total Lake Michigan and Lake Huron (excluding Saginaw Bay), the proportional BDE209, $\sum_8$ PBDEs, $\sum_6$ PCDDs, and $\sum_{10}$ PCDFs in this bay are much higher (Figures 3.19, 3.22, and 2.24). Therefore, it is likely that other higher discharge has a major impact on the loading of contaminants to Saginaw Bay compared to the rest of the upper Great Lakes [263].

Table 3.4.Proportional values of each parameter in Saginaw Bay to that in Lake Michigan and Lake Huron (excluding Saginaw Bay)

Year	BDE209	$\sum_8$ PBDEs	$\sum_6$ PCDDs	$\sum_{10}$ PCDFs	Area
2010	8%	7%	81%	229%	3%
2000	15%	12%	110%	224%	3%
1990	15%	8%	100%	271%	3%
1980	14%	4%	90%	239%	3%
1970	16%	8%	97%	235%	3%

As was observed elsewhere in the upper Great Lakes, BDE209 loading to Saginaw Bay was much higher than that of $\sum_8$ PBDEs (Figures 3.24 a, b). Loading of BDE209 and $\sum_8$ PBDE peaked in the 2000's, and decreased in the last decade (Figures 3.24 a, b). From 1970 to 2000, BDE209 and $\sum_8$ PBDE loading to Saginaw Bay increased almost 0.5 and 4 times, respectively; whereas, after 2000, the decrease in the loading of BDE209 and $\sum_8$ PBDEs was 40% and 30%, respectively. $\sum_6$ PCDD loading to Saginaw Bay was higher than $\sum_{10}$ PCDFs, and both have been decreasing since the 1970's (Figures 3.24 c, d). The amount of $\sum_6$ PCDDs loaded to this bay is almost always equal to total amount of loading of this group to Lake Michigan and Lake Huron, excluding Saginaw Bay. However, the quantity of the loading of $\sum_{10}$ PCDFs to Saginaw Bay is double that of Lake Michigan and Lake Huron, excluding Saginaw Bay (Table 3.4). Therefore, it is clear that this bay is the major source of $\sum_{16}$ PCDD/Fs loading to the upper Great

Lakes. From 1970 to 2010, total loading of $\sum_6$ PCDDs and $\sum_{10}$ PCDFs to Saginaw Bay has decreased by 40% and 30%, respectively (figure 3.24c and 3.24d).

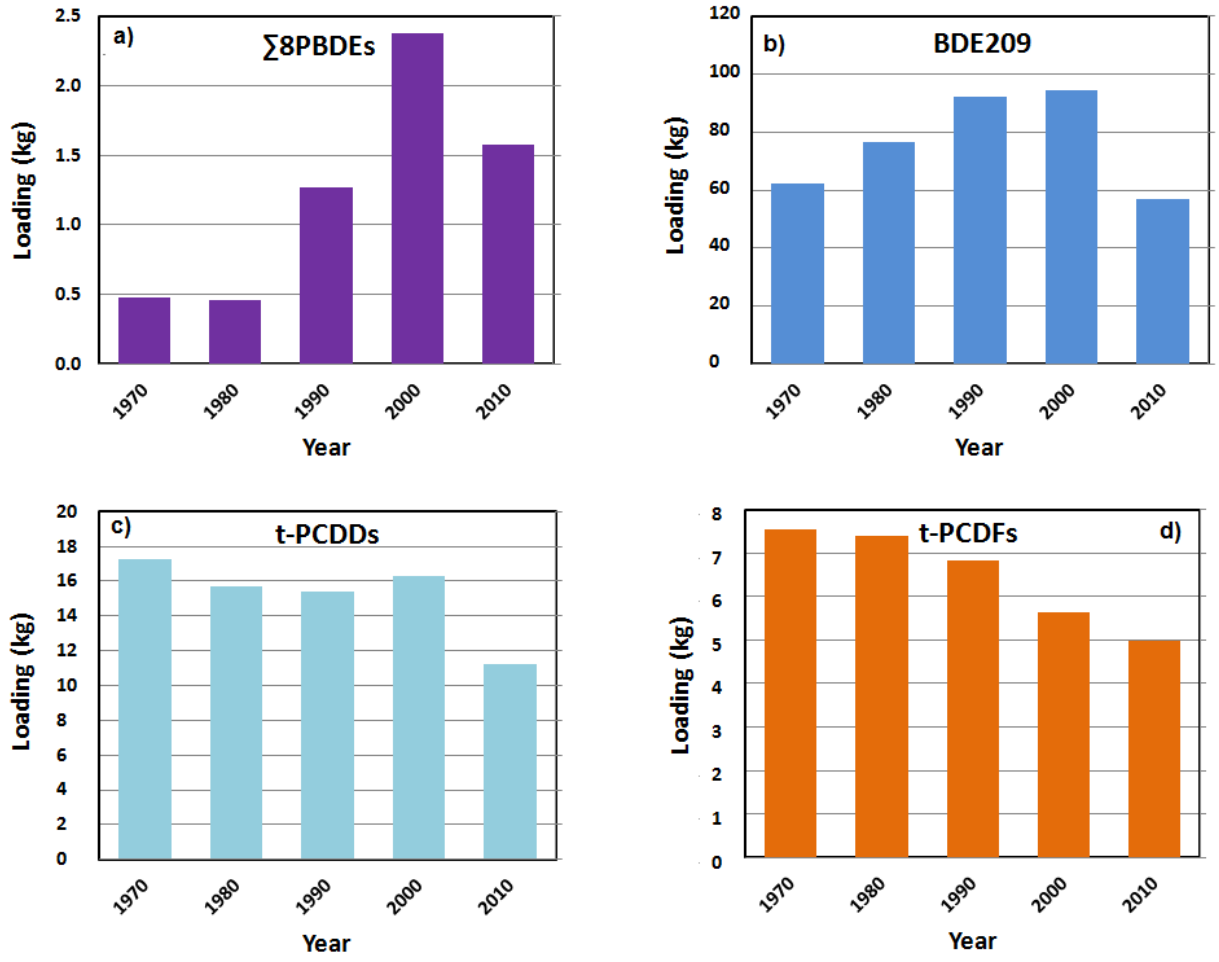


Figure 3.24.Whole-bay loadings of a) $\sum_8$ PBDEs, b) BDE209, c) $\sum_6$ PCDDs, and d) $\sum_{10}$ PCDFs to Saginaw Bay from 1970 to 2010.

Regression analysis was performed to identify relatedness of loading for the SVOCs in this study (Figure 3.25a-d). BDE 209 fluxes were statistically significantly correlated with the flux of BC (P = 1.47E-11, 8.78 ng BDE209/mg BC). In contrast, the flux of $\sum_6$ PCDDs was not significantly correlated with BC flux (P-value =0.28). Statistically significant correlations were also observed between the flux of BC and the depositional fluxes of $\sum_8$ PBDEs and $\sum_{10}$ PCDFs in Lake Michigan (P = 1.26E-5 and 2.03E-5, respectively), with slopes of 0.177 ng $\sum_8$ PBDEs /mg BC and 0.0137 ng $\sum_{10}$ PCDFs /mg BC, respectively.

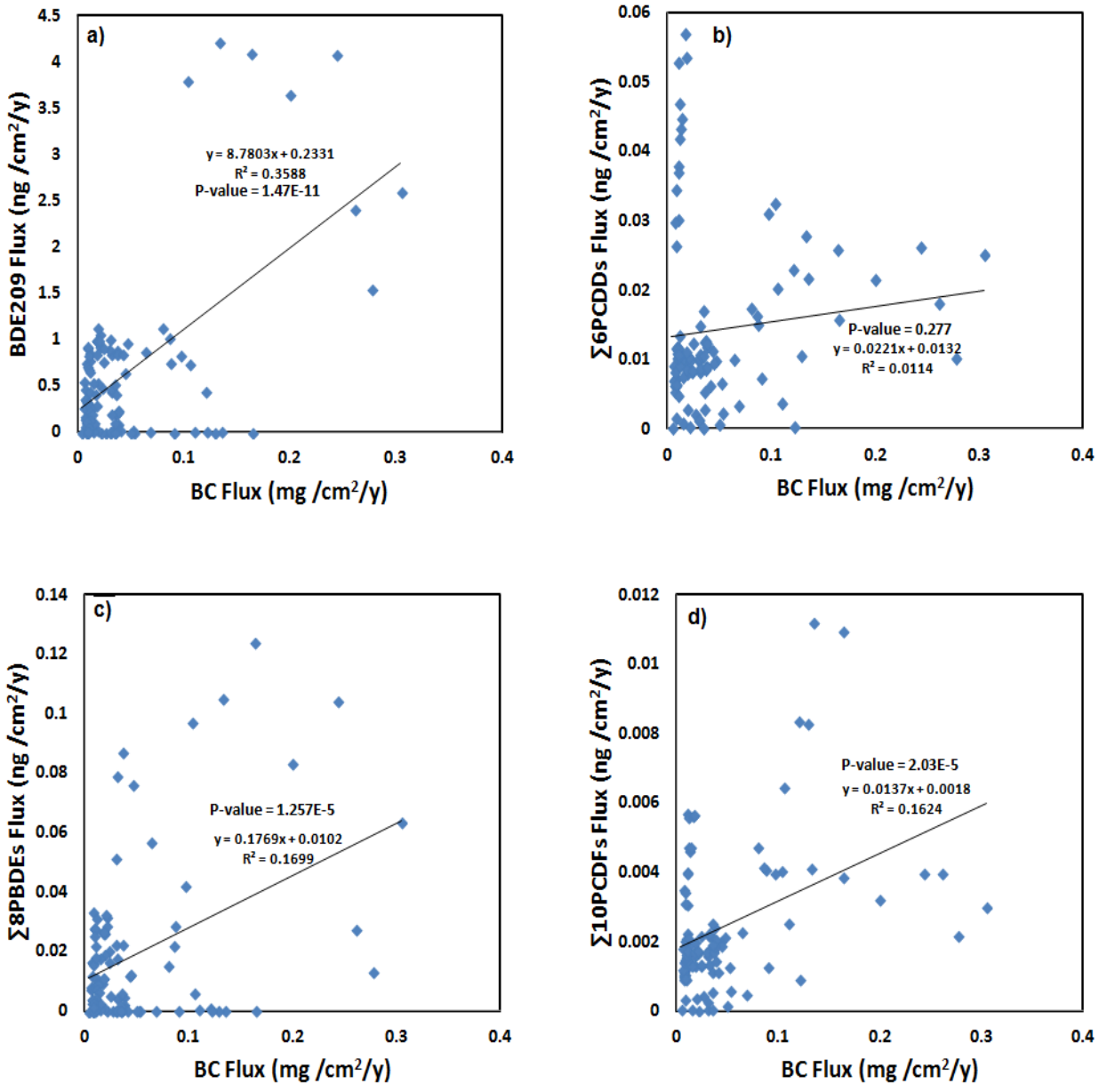


Figure 3.25.Comparision of fluxes of a) BDE209, b) $\sum_6$ PCDDs, c) ∑8 PBDEs, and d) $\sum_{10}$ PCDFs to BC fluxes in Lake Michigan.

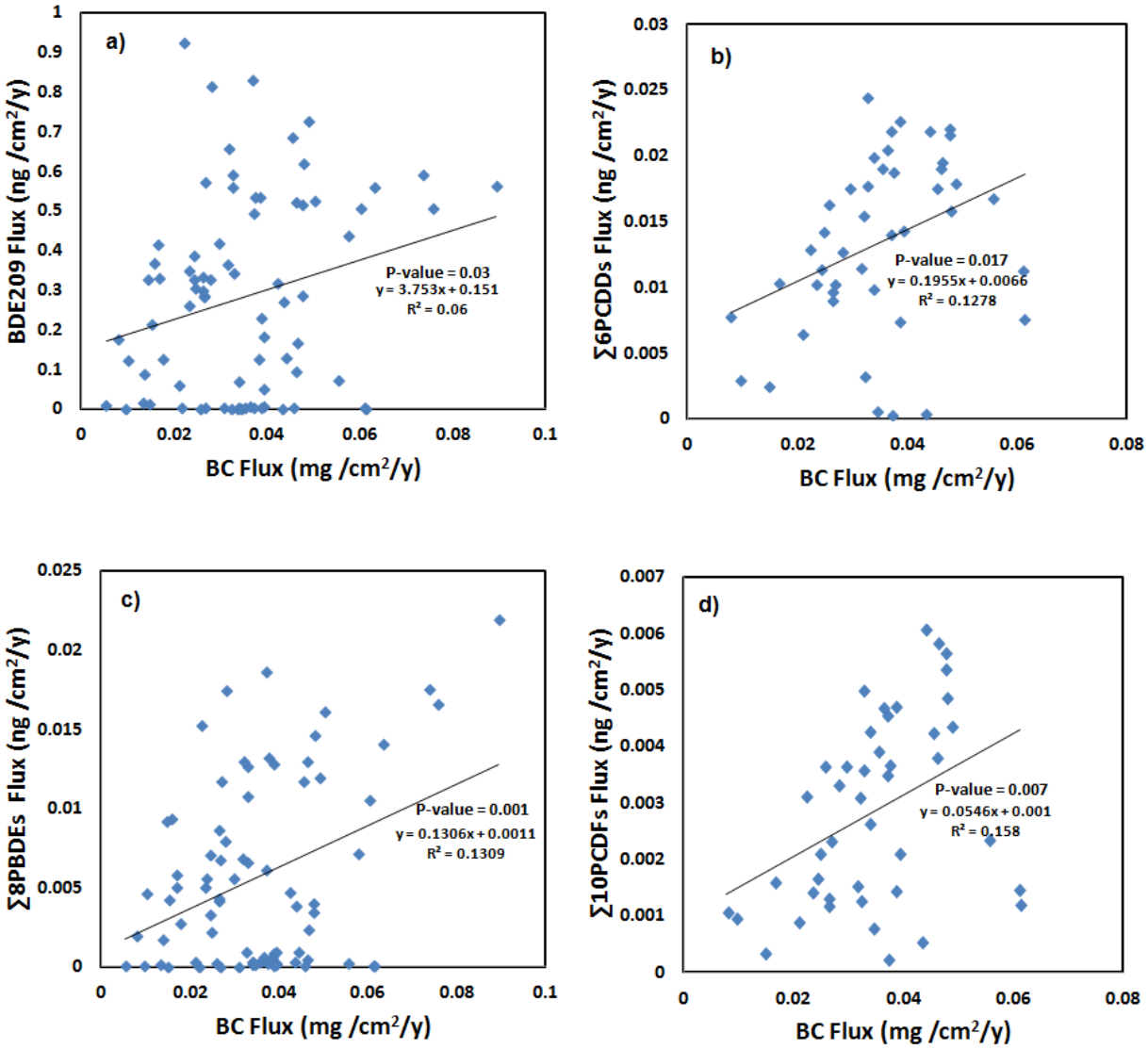


Figure 3.26.Comparison of the fluxes of a) BDE209, b) $\sum_6$ PCDDs, c) ∑8 PBDEs, and d) $\sum_{10}$ PCDFs to BC fluxes in Lake Huron (excluding Saginaw Bay).

Scatter plots of the fluxes of BC and BDE209, $\sum_6$ PCDDs, $\sum_8$ PBDEs, and $\sum_{10}$ PCDFs fluxes in Lake Huron (excluding Saginaw Bay) are presented in Figure 3.26. There are statistically significant correlations between the fluxes of BC and fluxes of BDE209 (P = 0.03), $\sum_6$ PCDDs (P = 0.017), $\sum_8$ PBDEs (P = 0.001), and $\sum_{10}$ PCDFs (P = 0.007), respectively, with slopes of 3.75 ng BDE209/mg BC, 0.2 ng $\sum_6$ PCDDs /mg BC, 0.13 ng $\sum_8$ PBDEs /mg BC, and 0.055 ng $\sum_{10}$ PCDFs /mg BC. In Saginaw Bay,

only the flux of BDE209 was correlated with BC flux of -11.9 ng BDE209/mg BC. None of the fluxes of the SVOCs have correlated with BC flux in Saginaw Bay. This is greatly supports that direct discharge of SVOCs from the Saginaw River into the bay is the main source of pollution in Saginaw Bay [1, 263, 264].

3.4. Summary and Conclusions

This study investigated the temporal and spatial and distribution of BC and SVOCs in the sediments of the upper Great Lakes. In Lake Superior, the highest BC concentrations were found in area adjacent to the deepest part of the central and eastern basins of the lake as well as in the western region nearest the cities Duluth, MN and Thunder Bay, ON, due to increasing industrial and anthropogenic impacts. Southern Lake Michigan had the highest levels of BC, demonstrating the impact of highly populated and industrialized regions of Chicago and northern Indiana. Saginaw Bay, in Lake Huron received the highest loading of BC and SVOCs in the upper Great Lakes. The role BC plays in the distribution and transport of SVOCs was also illuminated in the current study, where these SVOCs were clearly co-deposited with BC in all sited without significant fluvial discharge. Regression analysis confirmed this finding as BC was highly correlated with all SVOCs of industrial origin. These results demonstrate that BC is a better geosorbent as compared to OC and OM in the upper Great Lakes, as neither OM nor OC were correlated with the SVOCs in this study. These results have significant implications on the persistence of the SVOCs in this system, as BC is well preserved (unlike amorphous OM), thus presenting a high capacity sorbent in the sediment. Further study of the sorption behavior of SVOCs in mid-lake sediments compared to those in Saginaw Bay could help confirm this hypothesis.

Chapter 4 . Organic Matter Deposition and Eutrophication in Lake Superior and Lake Huron

4.1. Introduction

4.1.1. Organic Matter (OM) in the Great Lakes

Organic matter (OM) structure, levels and its molecular composition in lake sediments has been used widely to better understand anthropogenic impacts [139]. Following the construction of the Erie Canal in 1825, the Great Lakes underwent a progression of anthropogenic environmental alterations [139]. In the mid-nineteenth century, soil nutrients were released to waterways due to agricultural deforestation, which led to increased algal production, as well as a concomitant rise in algal biomarkers in the sediment. Owing to the increased transport of nutrients from metropolitan areas to the lakes, of eutrophication of the Great Lakes in the 1960s and 1970s has been documented through the sedimentary record of organic carbon mass accumulation rates (MAR) and other proxies, such as isotopic and molecular composition of OM [139].

The Glossary of Geology defines eutrophication as “the artificial or natural enrichment of a lake by influx of nutrients required for the growth of aquatic plants [139].” In such a situation, a lake becomes more enriched in bioavailable phosphorus and nitrogen that leads to a surge in primary production rates of organic matter. When the rate of oxidation of organic matter (OM) surpasses the OM oxidation rate of the lake, the dissolved oxygen (DO) concentration can decrease in the hypolimnion. Since the middle of the twentieth century, human related activities including urban sewage discharges, use of synthetic fertilizers and phosphate detergents has led to eutrophication of the Great Lakes; thus, the term ‘eutrophication’, in this context, has come to imply an anthropogenic alteration of the previously existing state [131, 138-140].

To reconstruct the previous rates of productivity in a lake ecosystem, the quantity of OM and its isotopic composition in sediments are principal proxies. Increases in the mass accumulation rates (MARs) of total organic carbon (TOC), $^{13}C/^{12}C$ ratio, and decreases in C/N ratio have been used extensively to an

increased productivity in aquatic ecosystems [265-270].

4.1.2. The ratio of total organic carbon to total nitrogen (TOC/TN)

To differentiate terrestrial versus lacustrine (algal) sources of OM, many researchers have used the ratio of carbon to nitrogen (C/N) [271-275]. Vascular land plants and related OM is more cellulose-rich than lacustrine OM and has C/N ratios greater than 20, while the algal OM is more protein-rich as has C/N ratios of 4 to 10 [274]. During the early diagenesis of OM in sediments, there is a potential modification in C/N ratios due to the selective decomposition of constituents of OM. Sollins et al. (1984) have measured decreased C/N ratios in soil samples due to the mineralization of carbon along with the microbial immobilization of nitrogenous components [276]. However, this proxy of the OM source seems to be well conserved in sub-aqueous sediments [274].

Hamilton et al. (1984), Jonsson et al.(1997), and Teranes et al. (200) reported the loss rates 25–45% and of 40–70% for carbon and nitrogen, respectively, during the periods of 1– 3 years in different lake sediments [277-279]. Lehmann et al. (2002) studied a seasonally anoxic Lake Lugano and found the 15–20% of organic carbon was lost during early diagenesis [280]. Comparing two sediment cores taken from the same location in Lake Ontario six years apart, , Hodell et al. (1998) estimated that the rate of loss in carbon was limited to 20–30% from the sediment [266]. Normally, with increasing age of the sediment, the C/N ratio increases, as nitrogen is more susceptible to loss than carbon [281].

Galman et al. (2008) had studied the *in situ* loss of carbon and nitrogen in the sediment phase during a longer period of 27 years. They observed concentration decrease of carbon and nitrogen within the first five years after the sediment deposition of 20% and 30%, respectively. After 27 years, the total loss of carbon and nitrogen was 23% and 35%, respectively [281]. Therefore, 95% of the early diagenesis took place in the first five years, and after that, the decomposition rate of C and N in the sediment was negligible. Thus we see that the rate of diagenesis diminishes greatly after the early years of deposition, supporting the use of OM as a valuable measure of paleoproductivity [281], and OM depositional flux and the C/N ratio have proved to be useful tools to evaluate past anthropogenic eutrophication of lakes

[33, 131, 138-140, 268].

4.1.3. Human Impacts on the Laurentian Great Lakes

Environmental alterations of the Great Lakes region initiated on a large scale around 1700 during European settlement, and accelerated after completion of the Erie Canal in 1825. Some parts of the Great Lakes changed from oligotrophy to eutrophy, when the loading of nutrients was increased due to metropolitan growth, establishment of concentrated industrial activity, and clear-cutting of forests for farmland. In the paleoenvironmental memories of the lakes, many indications of these alterations are verified in the quantity and composition of the buried OM in sediments over time [1, 139]. These records have been aided by the bathymetry of the system. In the most of the Great Lakes (except in Lakes Erie and Saint Clair) the water depths range from 100 m to more than 200 m; therefore, sediment disturbance in the lake floor is relatively minor, owing to combination of the minimized water turbulence at deep levels and the absence of large benthic fauna [1, 139, 140].

Starting in the early 19th century, soil erosion was increased by the transformation of previously forested regions to farmlands, which released soil nutrients and amplified algal OM production in the Great Lakes [140]. Until introduction of phosphate-based detergents in1950, the rise in primary productivity was relatively slow. However, after that time, due to the expanded delivery of bioavailable phosphorus to the lakes, the primary production of algal biomass increased rapidly.

Meyers et al. (2006) collected a sediment core from Saginaw Bay in Lake Huron in 1975. They found clear signals of the opening of the Erie Canal that contributed to the gradual increase in algal OM production [282]. Schelske et al. (1991, 1998) utilized a 150-year resolution sediment core collected in Lake Ontario to find evidence of nutrient enrichment and the results of nutrient reduction efforts in the lake. Deforestation of the basin coupled with amplified soil-derived phosphorus delivery to the lake from 1820 to 1850 greatly increased algae production [140]. Robbins et al. (1998) reported that increasing phytoplankton abundance coincided with the increases in organic carbon concentrations in Lake Ontario as anticipated due to phosphorus enrichment [283]. They also concluded that the ecological state of a lake

does not easily return to pre-eutrophic conditions following nutrient reduction. This was seen in Lakes Erie and Ontario where algal populations have been “silica-limited” linked to the eutrophy of deforestation in the nineteenth century [140]. These findings were elucidated from the characteristics of long-term lags in biochemical reactions in response to nutrients abatement in the lake ecosystem.

Hodell and Schelske (1998) documented an additional remarkable feature of the sedimentary record from Lake Ontario. They compared the paleoproductivity record of two cores collected six years apart at the same location in Lake Ontario [266]. They found a 20% loss of organic carbon in the sediment owing to post-depositional mineralization of lacustrine-derived organic matter. Matching the TOC MARs of the two cores in deeper segments demonstrated that the mineralization was largely restricted to the upper layers of the sediment cores [266].

Ekdahl et al. (2004) described two epochs of eutrophication in the Great Lakes caused by human activities using a sediment core with a resolution of thousand years collected from a Lake Ontario drainage basin in Crawford Lake, Ontario [138]. They found the first evidence of eutrophication from 1270 to 1485; long before settlement by Europeans in this part of North America. In creased MARs of organic carbon and authigenic calcite, reduced C/N ratios of OM, significant productivity-related changes in the algal assemblages, and higher calcite $\delta^{13}C$ over the span of two hundred years of eutrophicationin was observed during that era [138]. The reduction in C/N ratios implies increased contribution of algal-derived OM to the sediment [274, 284]. Archeological findings demonstrated that Iroquian Indians (Native Americans) settled in vast areas of the shores of Crawford Lake two times throughout the two-century period of eutrophication, causing the release of human waste and soil nutrients on account of farming to the lake, and resultant eutrophication centuries before industrialization [139]. In the early nineteenth century, shortly after extensive European settlement of the Great Lakes basin, the next phase of eutrophication in Crawford Lake initiated, which was evident by increased MARs of organic carbon and calcite, and decreased C/N ratios [139, 284].

In the study of eutrophication in Crawford Lake, two valuable points are noteworthy. First, pre-industrial humans also had the ability to disturb the natural nutrient cycle of lakes, and thus anthropogenic eutrophication is not just a contemporary occurrence. Second, the lake may not return to its pre-perturbed state immediately after removal of factors that caused the disturbance of the nutrient cycle of a lake ecosystem, due to irreversible changes in the assembly of diatoms and reduced C/N ratios after 1500, as found in the lake sediment record [138, 139].

4.2. Results and Discussion

4.2.1. Levels of OM and TN in Lake Superior

Organic matter (OM) and total nitrogen (TN) levels are typically enriched in the surface sediments from collected cores in Lake Superior (Figure 4.1). The lowest concentrations of OM were found at sites S001 (range 6.5-14.0 mg/g), in the south eastern basin, and S114 (range 8.8-21.6 mg/g), in the southern part of this lake. These two sites have the highest sand content among the all sites in Lake Superior, with 57% and 27% of sand in S001 and S114, respectively. Site S002 in the eastern section of Lake Superior had OM levels ranging from 17-75 mg/g, with four times higher levels in the surface of the core. OM at site S008 in the middle part of lake ranged from 19-81 mg/g. Site S012, in the middle of the Lake Superior and close to Thunder Bay, ON, has the highest OM concentrations in this lake; ranging from of 47-78 mg/g. Site S022 in the western section of the lake (adjacent to Duluth, MN) had lower OM levels from 29-48 mg/g, possibly due to higher sedimentation rate at this location.

TN concentrations ranged from 0.2-5.0 mg/g in Lake Superior (Figure 4.1). The lowest TN contents in the lake were at site S001 (range 0.22-0.56 mg/g), which also has the highest sand content in this lake. The highest concentrations of TN were found in site S012, analogous to the case with OM ranging from 2.15-5.02 mg/g. The trend of increasing TN levels was nearly identical to that observed for OM. Except for S001, the TN concentration decreases rapidly in the first 5 cm of the core; then becoming relatively constant.

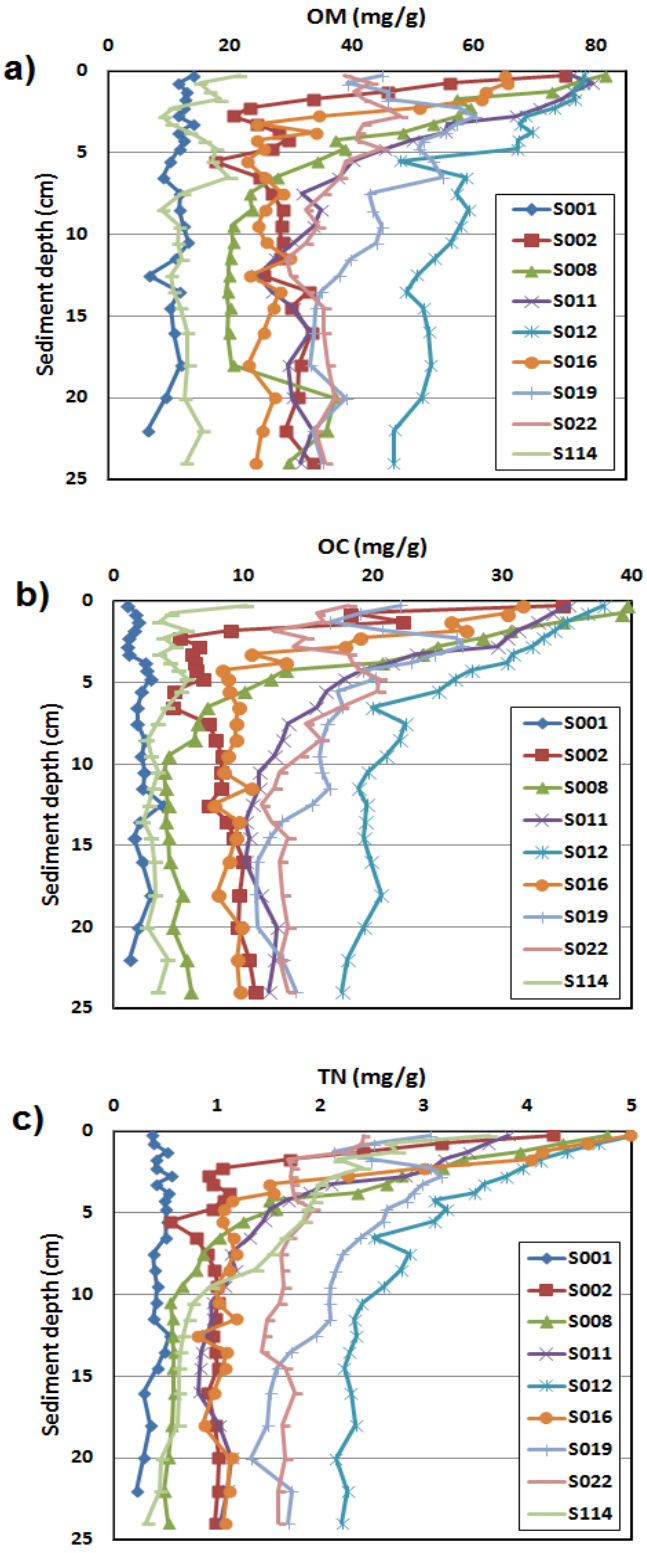


Figure 4.1.Concentrations of a) OM, b) OC, and c) TN as a function of depth in core samples from Lake Superior.

4.2.2. Temporal flux and loading of OM, OC and TN to Lake Superior

The depositional fluxes of OC and TN to Lake Superior from 1500 to 2010 were reconstructed from radio-dating described in chapter 2 (Figure 4.2). The highest fluxes of OC in the lake occurred from 1950 to 2010 at sites S022, next to Duluth, MN, S019 in the western part of the lake, and S008 in the middle of Lake Superior (Figure 4.2.a). A of TN deposition with peak levels around 1960 similar trend at site S022 demonstrates the likely impact of the Duluth metropolitan area in OM loading through nutrient enrichment and/or terrestrial loading. From 1960 to 1990, the flux of OC and TN deceased at both sites S019 and S022, suggesting impact of nutrient reduction strategies (such as the implementation of clean water act (CWA) in the 1970's) or OM diagenesis can be reasons of this decrease in organic carbon flux in the western part of this lake. However, fluxes increase at the very top of the core through 2010. In the other sites, the fluxes of OC and TN increased continually from 1850 to 2010, with the higher rates in S008, S016, and S002, and lower slopes of raise for S011 and S012.

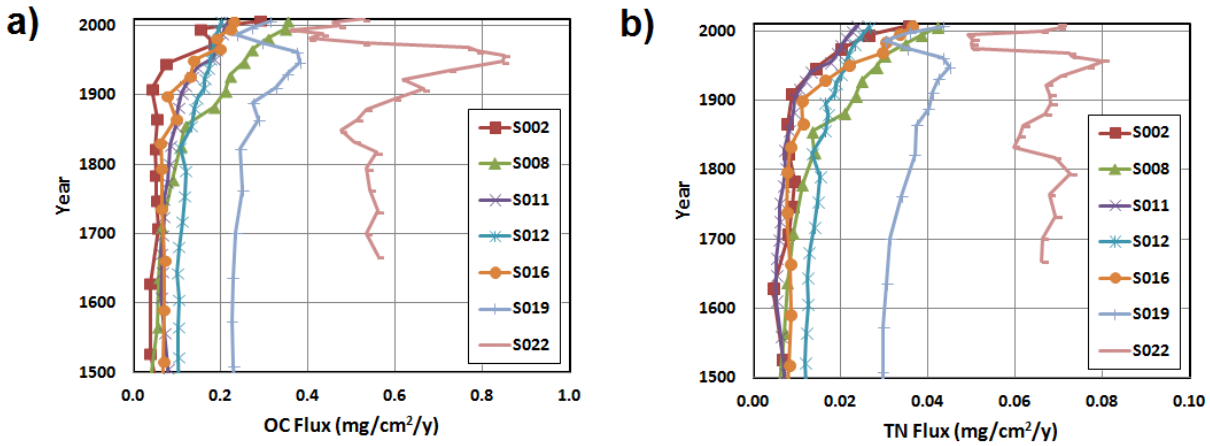


Figure 4.2.Depositional fluxes of a) OC and b) TN in Lake Superior as a function of time 1500-2010.

From 1960 to 2010, the C/N ratio decreased slightly in sites closest to Duluth (S022 and S019), while the OM concentration fluctuated with substantial decrease from mid-29th century peaks observed at the top of the core (Figure 4.3). The consistent decrease in C/N ratio indicates that moderate eutrophication has occurred in these two sites in the western part of Lake Superior (figure 4.3a,b).

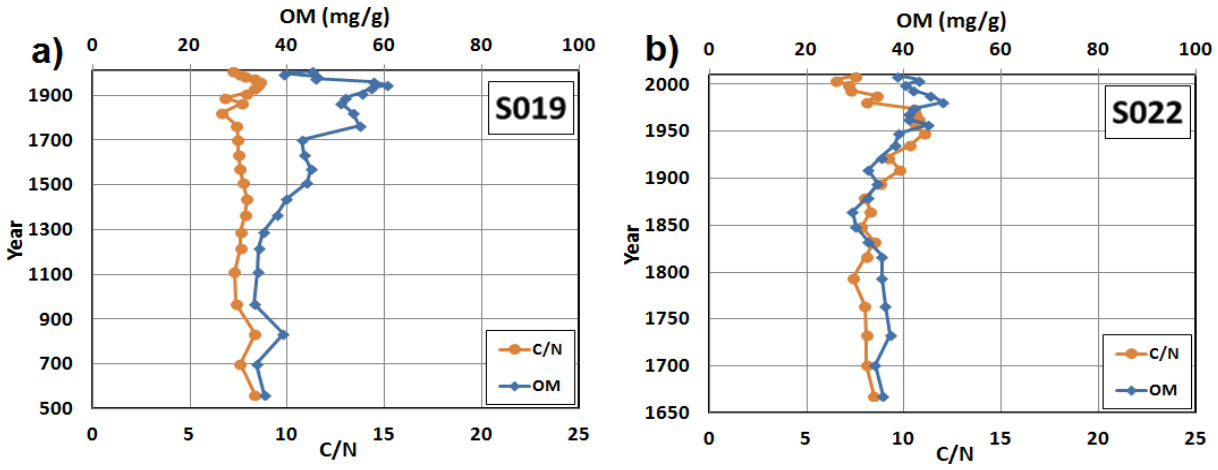


Figure 4.3.The trends of temporal changes in C/N ratio and OM concentration in a) S019 and b) S022

Figure 4.4 shows temporal changes in C/N ratio and OM concentration at sites S011 and S012 in the vicinity of Thunder Bay, ON. From 1900 to 2010, the level of organic matter in sites S011 and S012 increased by 67% and 25%, respectively, while the C/N ratios decreased by 22% and 15%, respectively. Intrestingly, C/N ratios were higher at site S011 compared to those at sites S012, S019, and S022 (Figure 4.3a,b, Figure 4.4 b). These levels are more suggestive of terrestrial OM, although this site is not close the shore and thus would be expected to be primarily lacustrine OM. These two sites are located in a relatively deeper region of the lake, with depths of 230 m (S011) and 240 m (S012) [139]. Hence, the evidences of likely moderate eutrophication are found again in sites close to Thunder Bay (figure 4.4a,b).

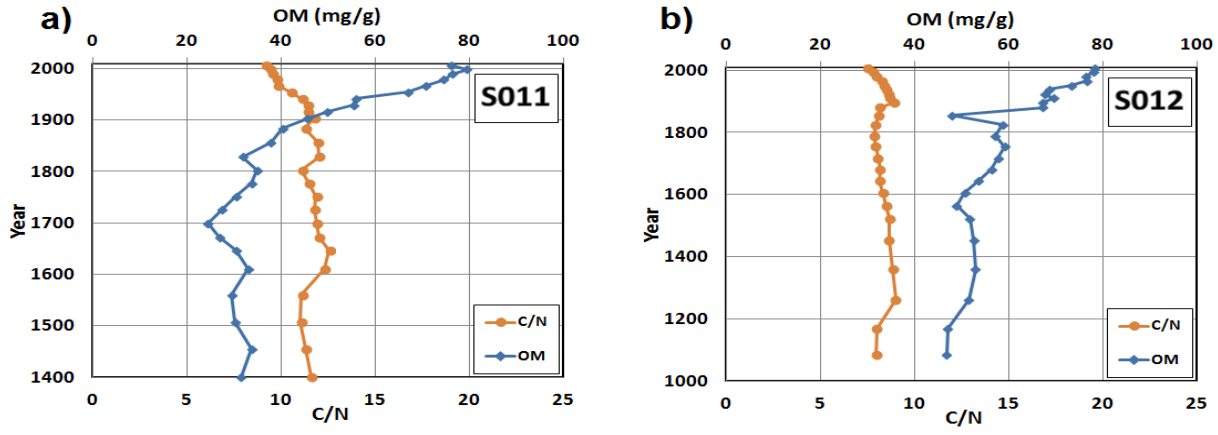


Figure 4.4.The trends of temporal changes in C/N ratio and OM concentration in a) S011 and b) S012

The C/N ratio of all sediment samples collected in Lake Superior is shown in figure 4.5. Only sites with values > 10 are the above mentioned S011 and some of S022, and more than 80% of the samples have C/N ratio of less than 10, which reveals that the majority of OM deposition in this system result from lacustrine (autochthonous) source [139, 274, 284-286].

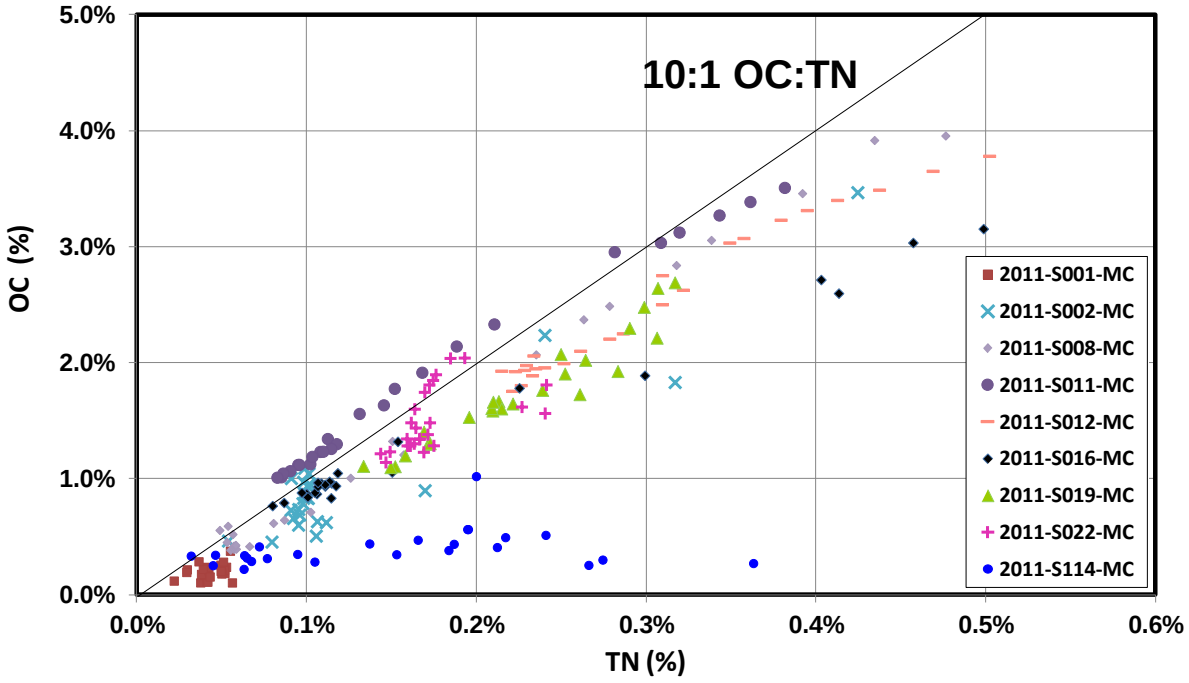


Figure 4.5.The overview of the whole Lake Superior C/N

Heat maps of the OC depositional flux to Lake Superior in 1850, 1900, 1950, and 2010 Figure 4.6 (complete heat maps of OC deposition to this lake from 1850 to 2010, can be found in the Appendix D). In 1850, higher fluxes were measured in S022, adjacent to Duluth, and in S019. In the 1900's, OC depositional fluxes were unchanged in the eastern and western part of the lake, while OC fluxes in the middle basin increased moderately. By the middle of the 20th century, in the 1950's, OC fluxes had increased in both the western and central parts of Lake Superior. In recent years, OC fluxes in nearly all locations have increased, and the rate of increase was highest in the central and the eastern sections of the

lake. Although current levels of OC deposition in the western arm of the lake were less than in the 1950's, these levels are higher than those of the 1900's (Figure 4.6).

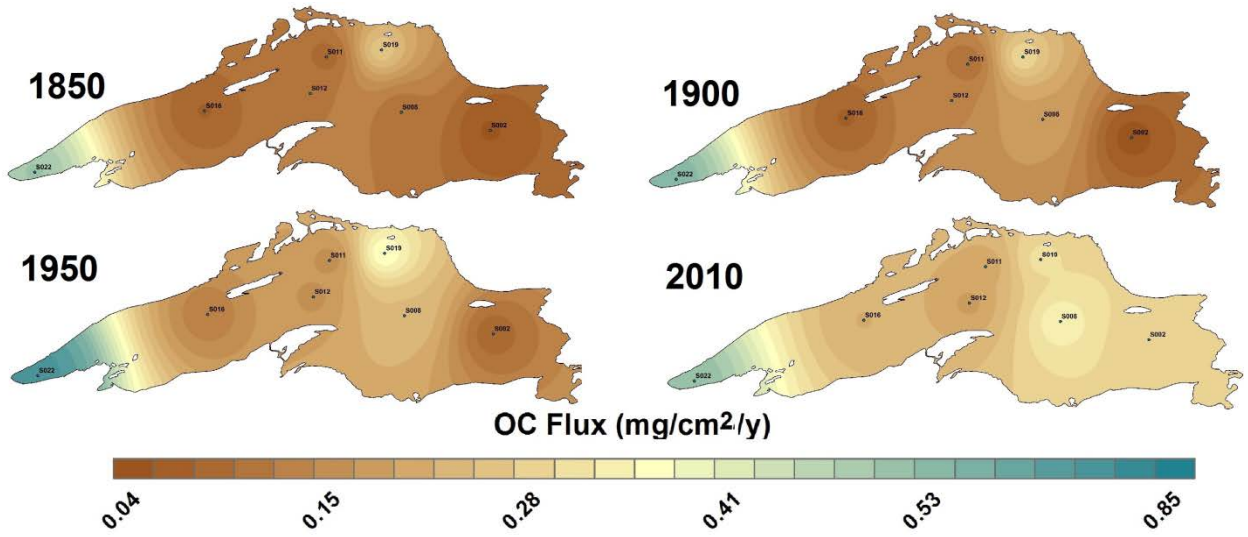


Figure 4.6.Heat maps of the OC depositional flux in Lake Superior in 1850, 1900, 1950, and 2010.

Heat maps of TN depositional flux in Lake Superior for 1850, 1900, 1950, and 2010 are displayed in figure 4.7 (detailed decadal and temporal maps of TN deposition to this lake, from 1850 to 2010, can be found in the Appendix D). Similar to OC depositional flux in 1850, S022 had the highest TN flux (0.061 mg/cm^2/y), and S019, located in the eastern of Thunder Bay, had the second highest TN flux (0.037 mg/cm^2/y). Lower TN fluxes were observed in site S002 (0.0081 mg/cm^2/y) in the eastern arm of the lake and in site S011 (0.0085 mg/cm^2/y) in 1850. By 1900, TN fluxes at S011 (0.0090 mg/cm^2/y) and S016 (0.011 mg/cm^2/y) were largely unchanged compared to1850; in contrast, TN flux in the central basin at site S008 (0.023 mg/cm^2/y), and in the western arm at site S022 (0.068 mg/cm^2/y), increased moderately. By the 1950's, TN flux had increased in both eastern, S002 (0.014 mg/cm^2/y), and central basins of the lake, S019 (0.045 mg/cm^2/y), and the rate of that increase in the middle was higher than that of the eastern basin. In 2010, TN fluxes increased in all sites with fluxes raging from 0.035- 0.07 mg/cm^2/y, respectively. Recent TN deposition in the western arm is higher than it was in the 1990's and the 1950's.

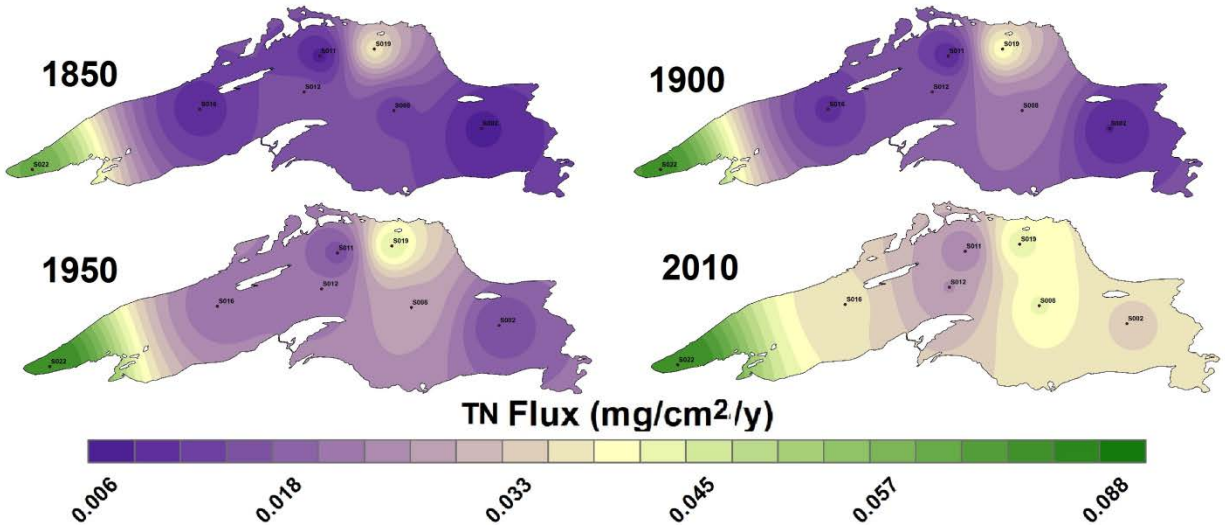


Figure 4.7.Heat maps of the depositional flux of total nitrogen (TN) in Lake Superior in 1850, 1900, 1950, and 2010.

Figure 4.8 shows the heat maps of the OM depositional in Lake Superior in 1850, 1900, 1950, and 2010 (complete decadal and temporal maps of OM deposition to this lake from 1850 to 2010 can be found in the Appendix D). Similar to OC and TN depositional flux in 1850, S022 received the highest amount of organic matter (1.25 mg/cm^2/y), and S019, located in the eastern of Thunder Bay, had the second highest flux of organic matter (0.72 mg/cm^2/y). In the 1850's, the lowest flux of TN also had been received by S002 (0.17 mg/cm^2/y), in the eastern part, and S016 (0.25 mg/cm^2/y). In the 1900's, the amount of OM flux in eastern and western parts did not have a drastic alternation, while in the central part in S012 (0.36 mg/cm^2/y) and S008 (0.47 mg/cm^2/y), a moderate increased was discovered (comparing to1850). In the middle of the 20th century, the flux of OM had increased in every location of this lake, such as S022 (1.62 mg/cm^2/y), S019 (0.85 mg/cm^2/y), and S002 (0.28 mg/cm^2/y). However, the rate of that amplification in the western and eastern of the lake was less than that of the central part. In 2010, the levels of OM in all sites showed an increase, except for S022 and S019, where the amount of organic matter flux in S016, S008, and S002 were 0.48, .0.72, and 0.62 mg/cm^2/y, respectively. The rate of this increase in the eastern section was higher than that of the central part of Lake Superior. In recent years, the flux of OM

deposition in the eastern of this lake was much higher than those of 1850, 1990, and 1950. Trends in OM flux largely corresponded to those of OC (Figure 4.6) and TN (Figure 4.7). Site s022 typically has the highest flux, and the ratio of OM/OC fluxes was in the range of 3:1 (Figure 4.7). Om fluxes increased rapidly between 1900 and 1950, and fluxes were highest in the western and mid-lake basins at sites S022 and S019, respectively.

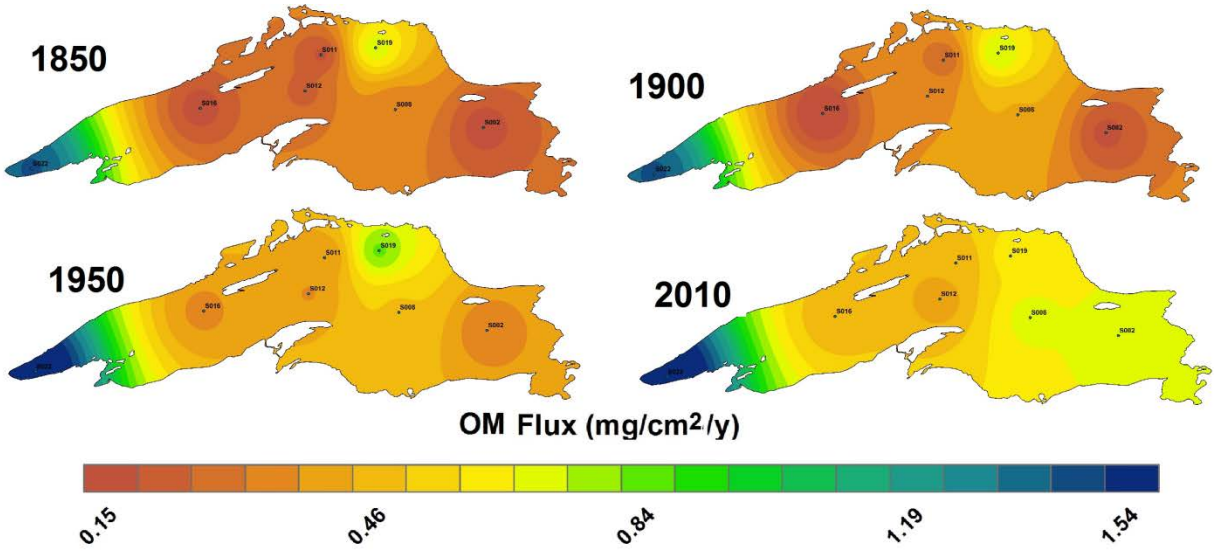


Figure 4.8.Heat maps of the OM depositional flux in Lake Superior in 1850, 1900, 1950, and 2010.

Whole-lake loadings of OM, OC, and TN to Lake Superior from 1850 to 2010 are shown in Figure 4.9. Whole-lake loadings for all three constituents were largely unchanged between 1850-1900. However, OM/OC/TN started to increase substantially between 1900-1950 by 25%. While the overall loading continued to increase, the rate of increase slowed and actually started to decrease between 1970 and 2000. This reveals the influence of nutrient reduction to the lakes by implementation of governmental action, such as enactment of the CWA that restricted eutrophication. OC loading increased by 13% from 1850 to 1890, and from 1900 to 1970 increased an additional 57% (Figure 4.9c). Then, from1970 to 1990, it decreased by 10%. However, unlike OM, OC loading has started to increase again by 21%. TN loading in the second half of the 19th century had shown a relatively low increase rate of 15%, analogous to OC and

OM. From 1900 to 1970, the amount of total nitrogen loaded to Lake Superior increased by 45%, and this increase rate dropped drastically during the period of 1970-1990, with the rate of 0.3%. However, after the 1990's to recent years, the rise in the loading of TN happened again by 24%.

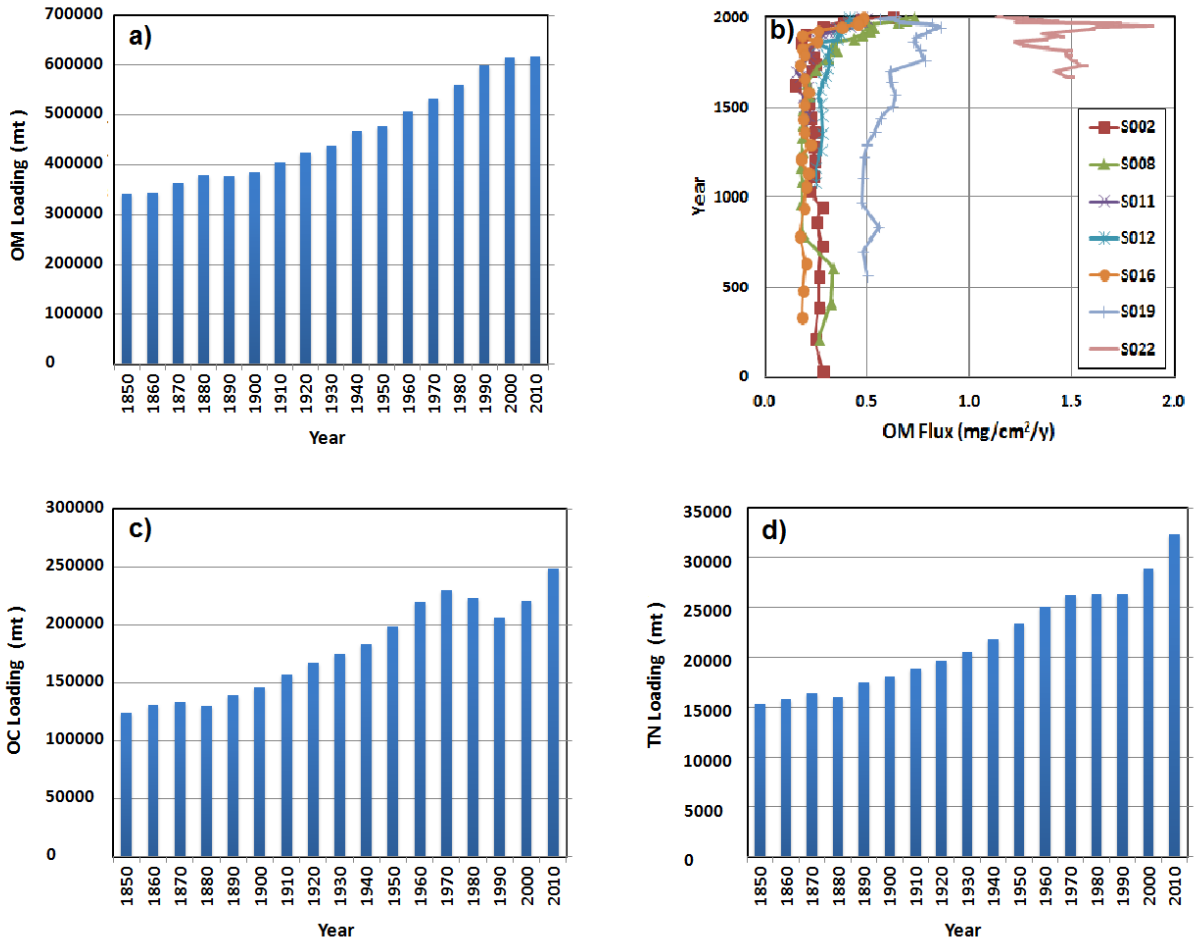


Figure 4.9.Temporal loadings of OM, OC, and TN to Lake Superior (1850-2010).

4.2.3. Levels of OM and TN in Lake Huron

The concentrations of OM and TN in Lake Huron sediment are shown in Figure 4.10. The lowest concentrations of OM were found in deep part of the core collected in sites H095, in the middle of the lake, H061, in the southern part of this lake, H037, H038, and H048, in the central part. Sites H095, H061, and H038 have the highest sand content among the all sites in Lake Huron ranging from 15-40%.

Site H001 in Saginaw Bay was comprised of 60% silt and 38% clay, and OM levels ranging from 75-106 mg/g; the highest concentrations found in Lake Huron. OM was also high in sites H006 in southern basin, with 60% of silt and 33% of clay content; ranging from 55-101 mg/g. Concentrations of OM at site H012, which is located in the southern basin, was relatively higher than in H006 in top layers of the sediment cores, and ranged from 67-83 mg/g. Site H032, in the middle of the Lake Huron and close to the southern basin, has relatively high OM with the range of 76-85 mg/g. OM in mid-lake sites H037, H038, H048, and H095 and north basin site G061 ranged from 15-98 mg/g (figure 4.10a).

The range of TN concentrations in Lake Huron was from 0.15-8 mg/g. The lowest TN was in deep segments from cores at sites H061, H048, and H038, in the middle of the Lake Huron, while the highest were found in Saginaw Bay in site H001, analogous to OM, with the range of 5-8 mg/g. The decreasing trend of TN concentration is almost similar to the decrease in the OM content. In sites H061, H038, H037, and H095 the TN concentration rapidly from the top 5 cm of the core, becoming relatively constant after the first 10 cm to the bottom of the core.

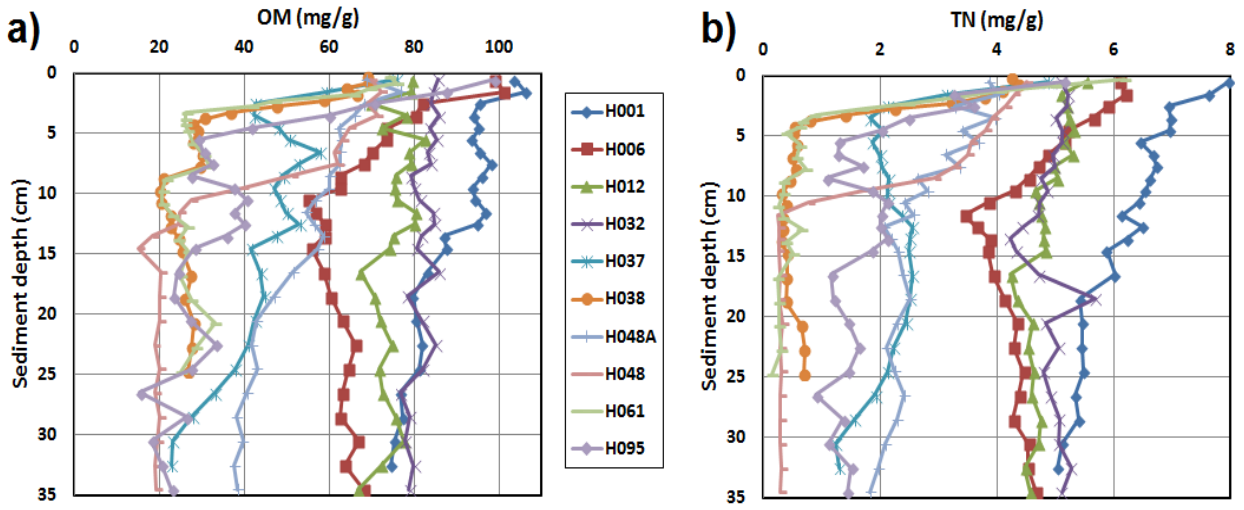


Figure 4.10.Concentrations of a) OM and b) TN as a function of depth in sediment core samples of Lake Huron.

4.2.4. Temporal flux and loading of OM, OC and TN to Lake Huron

Depositional fluxes of OC and TN to Lake Huron from 1800 to 2010 show high spatial and temporal variability (Figure 4.11). The highest fluxes of OC were from 1970 to 2010 in Saginaw Bay site H001. Fluxes were also high in sites H006, H012, and H032 in the southern basin of the lake. During the period 1970-2010, OC fluxes in H001 were 4-5 times of those of H006, H012, and H032, and 5-7 times of those of H038, H048, H061 and H095. Therefore, Saginaw Bay plays an important role on introduction of organic matter to Lake Huron. In all sites, the flux of OC and TN increased continually from 1800 to 2010, with the higher rate in H001, and lower rates in H032, H048, and H012 (figure 4.11).

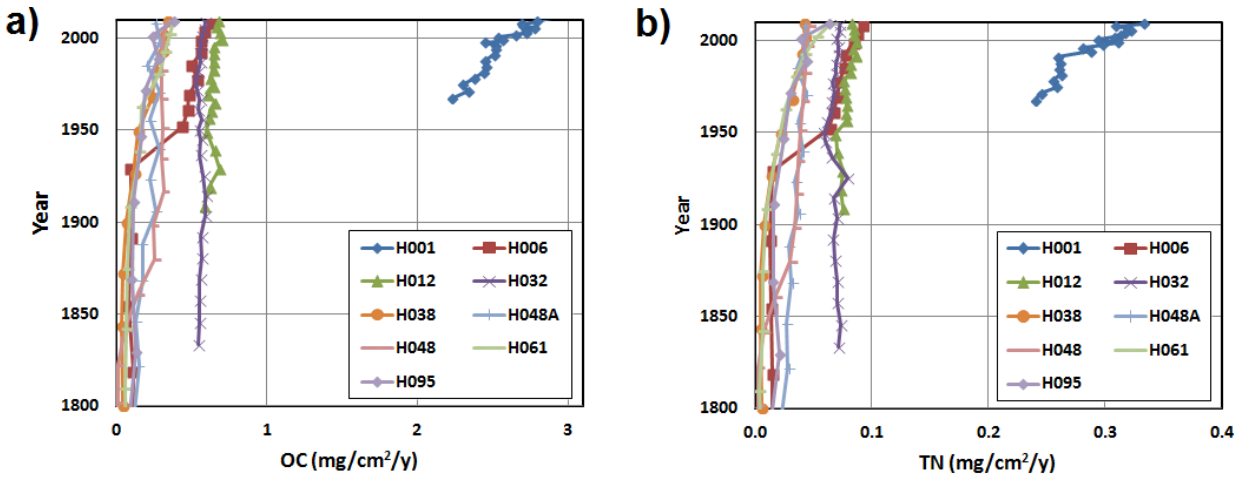


Figure 4.11.Depositional fluxes of a) OC and b) TN as a function of time to Lake Huron (1800-2010).

From 1550 to 2010, the C/N ratio decreased with concomitant increase in OM at sites H061 and H038 (Figure 4.12a, b). These results suggest that the source of OM has changed over time. High C/N ratios prior to 1700 suggest a terrestrial OM source, while C/N ratios decreased greatly and now are consistent with lacustrine OM. This shift was coincident with large increase in OM flux, suggestive of eutrophication impact, particularly in the 1900's (Figure 4.12a). From 1910 to 2010, OM levels amplified almost 3-4 times, in both sites of H061 and H038, which cannot be merely due to sediment diagenesis over the period of 100 years, and in depths of more than 100 meters of those two sites.

In H061 of the northern part of the lake, a simultaneous decrease in C/N ration and increase in OM levels,

once again, approves the probable eutrophication in these two sites.

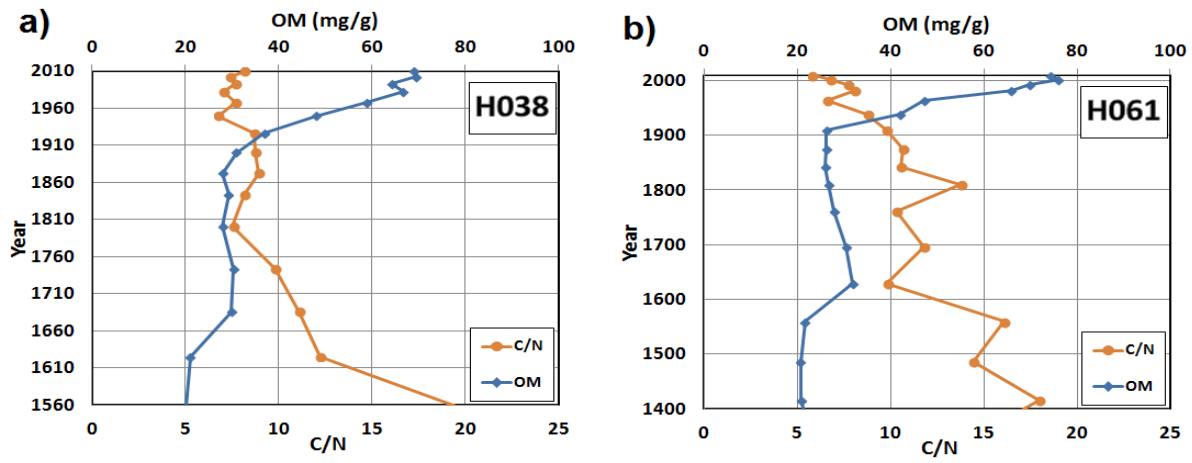


Figure 4.12.Comparision of C/N ratio and OM concentration in sediment cores from a) H038 and b) H061 in Lake Huron.

The OM concentration in site H037 increased nearly four-fold in the first 30 cm of the core, while the C/N ratio decreased from 10 to 7. C/N ratios also decreased with a corresponding increase in OM in H001 (Figure 4.13a); thus, both sites have results eutrophication in the last 40 years. However, to confirm the probable eutrophication, more evidence such as carbon stabel isotope is needed due to the low increase in OM (25%) in shallow site of H001 (12.7 m) [139].

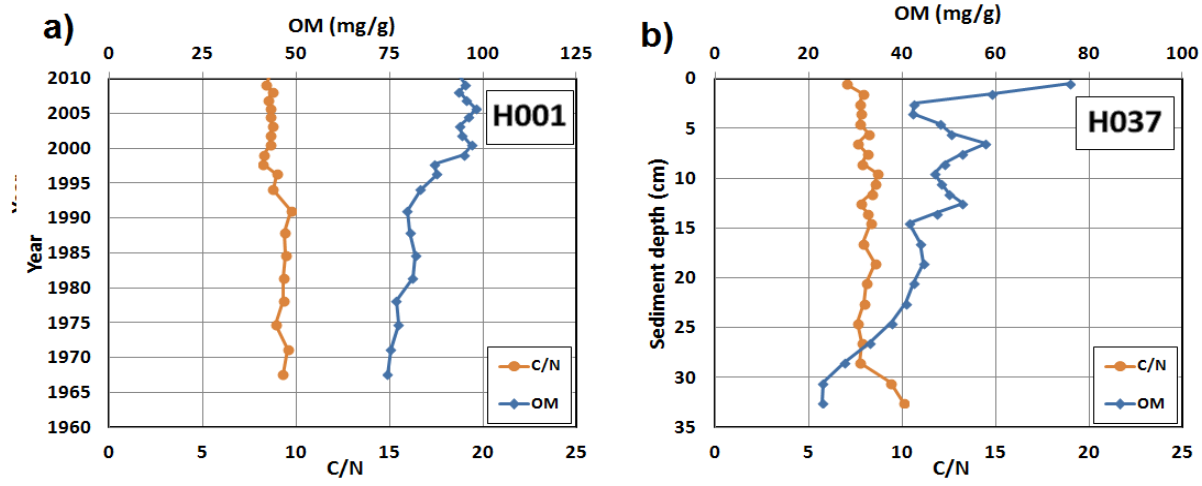


Figure 4.13.Comparison of C/N ratio and OM concentration in sediment cores from a) H001 and b) H037.

The C/N ratios of all sediment samples for cores collected in Lake Huron are shown in Figure 4.14. With the exception of a few low TN samples, all have C/N ratios <10, which is consistent with OM deposition in this system being primarily lacustrine [139, 274, 284-286].

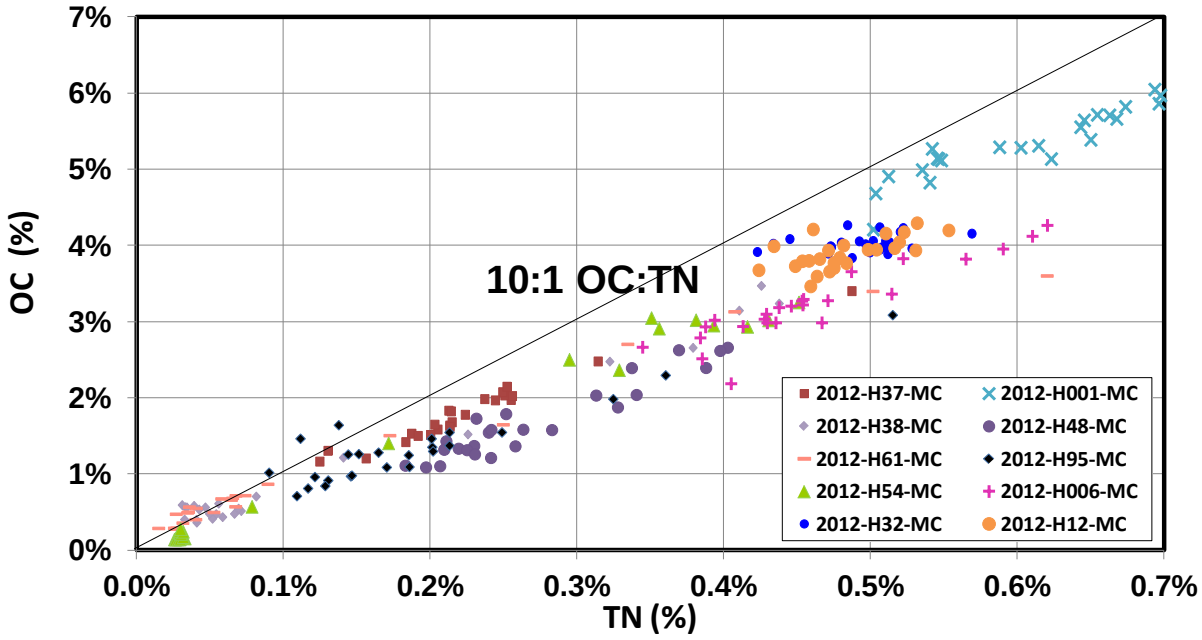


Figure 4.14.The overview of the whole Lake Superior C/N.

Heat maps of the OC depositional flux to Lake Huron (excluding Saginaw Bay) in 1910, 1940, 1970, and 2010 are shown in Figure 4.15.(detailed decadal and temporal maps of OC deposition to this lake from 1910 to 2010 can be found in the Appendix D). In 1910, the highest fluxes were in the central and southern basins of the lake. By the 1940's, OC flux in northern part of the lake largely unchanged from, while OC flux in the southern basin increased moderately. In the 1970's, OC flux had increased in both the southern and central parts of Lake Huron. In recent years, the levels of OC in all locations (except for H048) increased, and the rate of increase was higher in the southern basin of the lake. OC deposition at site H038, was lower in 1970 compared to 1940, and fluxes continue to decrease as they are lower now (Figure 4.15).

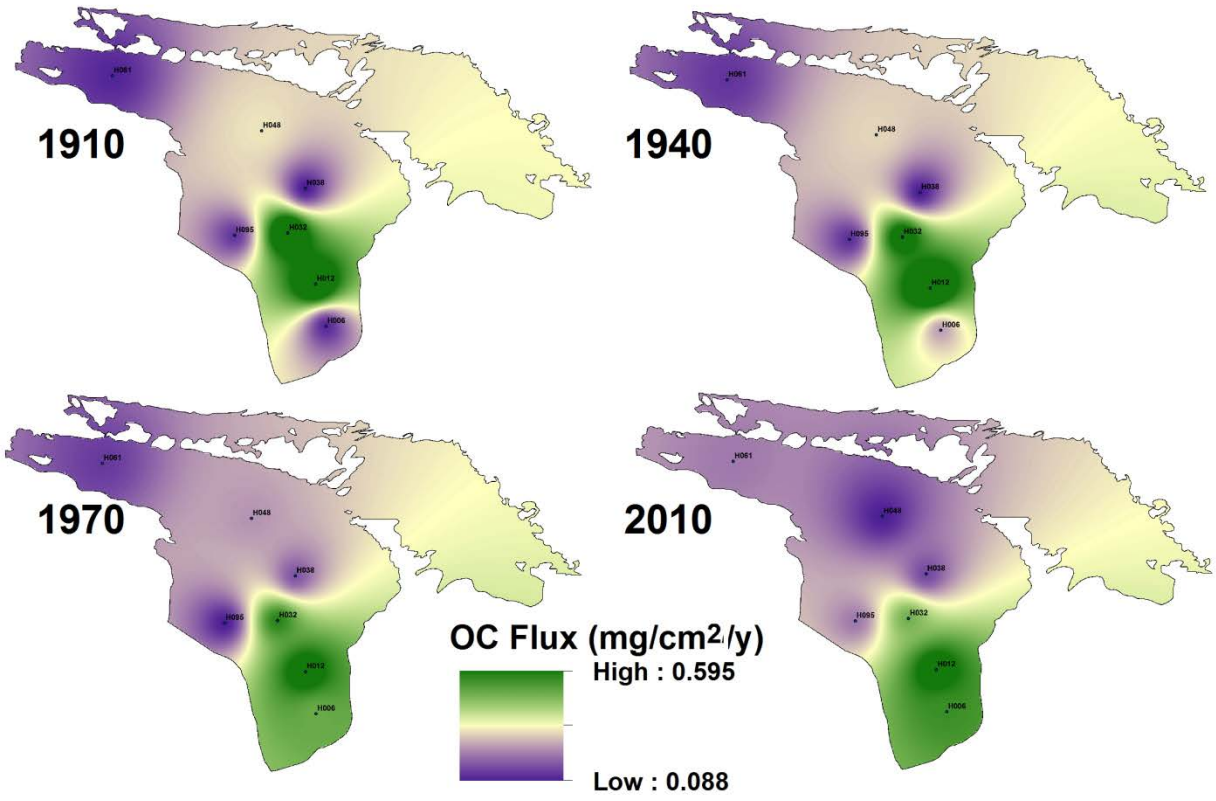


Figure 4.15.Heat maps of OC depositional flux to Lake Huron (excluding Saginaw Bay) in 1910, 1940, 1970, and 2010.

Heat maps of TN depositional flux in Lake Huron (excluding Saginaw Bay) in 1910, 1940, 1970, and 2010 are displayed in Figure 4.16 (detailed decadal and temporal maps of TN deposition to this lake, from 1910 to 2010, can be found in the Appendix D). Similar to the case for OC depositional flux, H012 had the highest TN depositional flux (0.076 mg/cm^2/y) in 1910. H032 located in the middle of Lake Huron, had the second highest TN flux (0.068 mg/cm^2/y), while lower were observed in northern basin in H061 (0.009 mg/cm^2/y) and H038 (0.008 mg/cm^2/y). By the 1940's, TN fluxes were largely unchanged in sites H061, H095, H012, H032, and H038 compared to1910, while TN depositional flux at H006 (0.064 mg/cm^2/y) in the southern basin and at H048 (0.041 mg/cm^2/y) increased moderately. By the1970's, TN fluxes were higher in the southern basin (H006: 0.070 mg/cm^2/y), and the rate of that increase was higher than that of the central lake. In 2010, TN fluxes at every site increased with fluxes ranging from 0.063-

0.09 mg/cm^2/y; however, the rate of this grow in the northern section was higher than that of the southern part of Lake Huron (excluding Saginaw Bay). The levels of TN deposition in the northern part in recent years are higher than those of the 1970's and the 1940's.

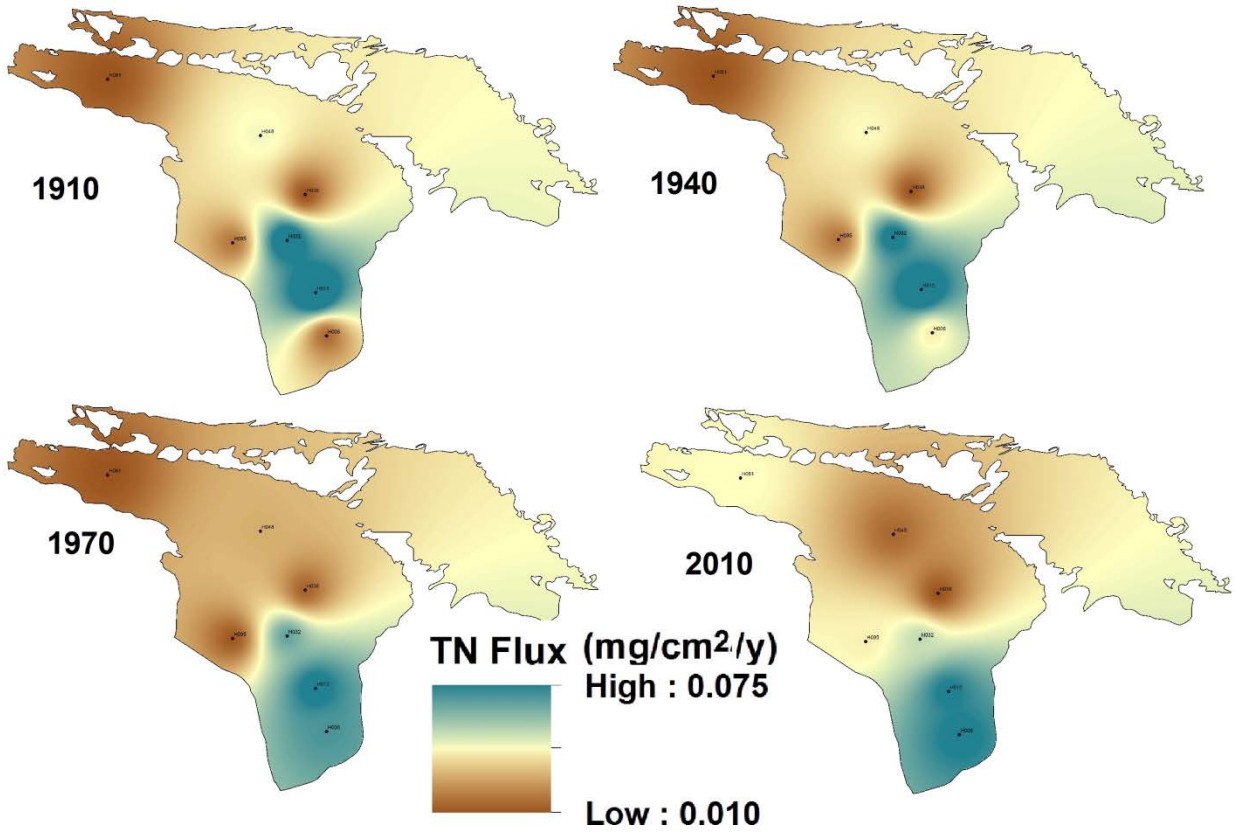


Figure 4.16.Heat maps of the TN depositional flux to Lake Huron (excluding Saginaw Bay) in 1910, 1940, 1970, and 2010.

Heat maps of OM depositional flux to Lake Huron (excluding Saginaw Bay) in 1910, 1940, 1970, and 2010 are shown in Figure 4.17 (complete decadal and temporal maps of OM deposition to this lake from 1910 to 2010 can be found in the Appendix D). As before, H012 had the highest OM flux (1.17 mg/cm^2/y) in 1910, and H032, located in the central basin, had the second highest OM flux (1.14 mg/cm^2/y). In the1910's, the lowest flux of TN was observed in site H006 (0.22 mg/cm^2/y), in the southern part, and in site H061 (0.44 mg/cm^2/y). In the 1940's, the amount of OM flux in northern part

did not have a drastic alternation, while a moderate increase in the southern part in H006 (0.36 mg/cm^2/y) was discovered (comparing to1910). In the last decade of the 20th century, the flux of OM had increased in almost every location of this lake, such as H006 (1.09 mg/cm^2/y), H095 (0.87 mg/cm^2/y), and H048 (0.75 mg/cm^2/y), but decreased in H032 (1.16 mg/cm^2/y). However, the rate of that amplification in the northern of the lake was less than that of the southern part. In 2010, the levels of OM in all sites showed an increase, except for H012, where the amount of organic matter flux in H006, H061, and H095 were 1.47, .0.78, and 1.22 mg/cm^2/y, respectively. The rate of this increase in the southern basin was higher than in the central basin of Lake Huron (excluding Saginaw Bay). In recent years, the flux of OM deposition in the southern of this lake was much higher than those of 1910, 1940 and 1990.

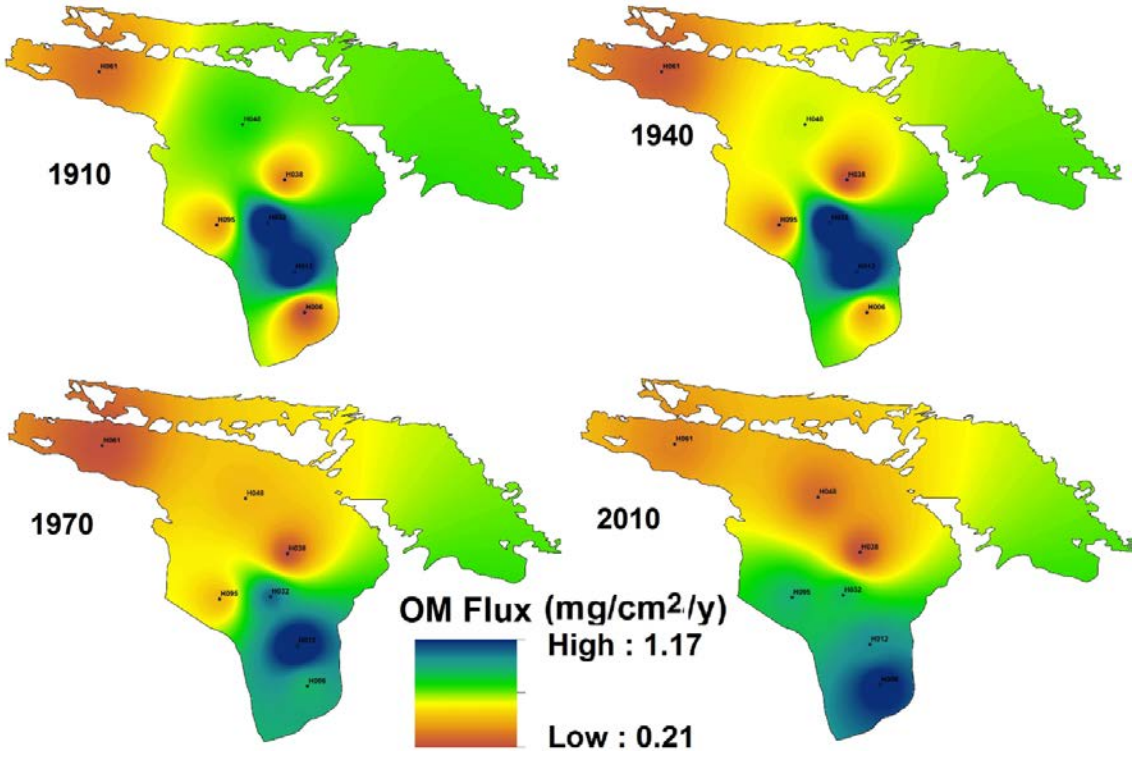


Figure 4.17.Heat maps of the OM flux to Lake Huron (excluding Saginaw Bay) in 1910, 1940, 1970, and 2010.

Whole-lake loading of OM, OC, and TN to Lake Huron (excluding Saginaw Bay) from 1910 to 2010 is shown in Figure 4.18. In the beginning of the 20th century, from 1910 to 1930, the amount of increase in the loading of OM, OC, and TN to this system was relatively low (Figure 4.18a, c, d).

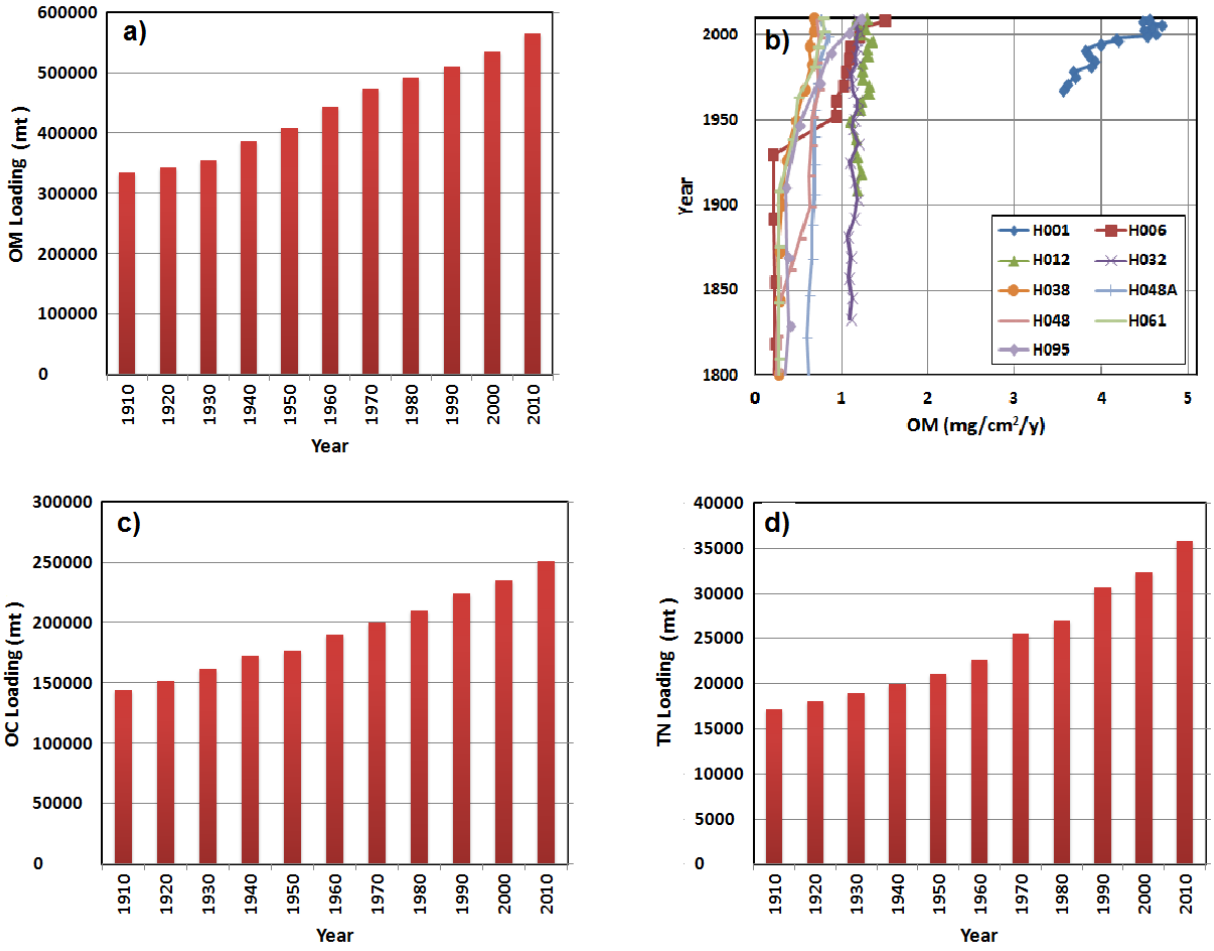


Figure 4.18.Whole-lake loading of OM, OC, and TN to Lake Huron (excluding Saginaw Bay) from 1910-2010.

OM loading increased rapidly from 1940 to 1970, by over 20%. This increase in the loading of OM continued in the last quarter of the 20th century; however, the rate of increase slowed, particularly after 1990 (Figure 4.18a). Hence, the rate of increase in the loading of OM to Lake Huron (excluding Saginaw Bay) has been decreased during the past 50 years, which suggests that nutrient reduction strategies

implemented as part of the CWA and other lake management strategies have had an impact in reducing the rate of eutrophication. The loading of organic carbon increased by 12% from 1910 to 1940, and from 1940 to 1970 had the highest growth rate of 16%. Then, from1970 to 1990, it increased by 12%, and after 1990 to 2010, raised again by 12%. TN loading in the first quarter of 20th century had shown a relatively low increase rate of 10%, analogous to those of OC and OM. From 1940 to 1970, the amount of total nitrogen loaded to Lake Huron (excluding Saginaw Bay) increased by 28%, and this increase rate dropped during the period of 1970 to 1990, with the rate of 20%. After the 1990's to recent years, the rise in the loading of TN happened again by 17%.

Table 4.1.Comparisons of the loading of OM, OC, and TN to Saginaw Bay to that of the Lake Huron (Saginaw Bay/Lake Huron).

Year	OM	OC	TN	Area
2010	19%	25%	22%	5%
2000	20%	24%	21%	5%
1990	18%	25%	20%	5%
1980	19%	26%	22%	5%
1970	18%	26%	22%	5%

The total loading of OM and TN to Saginaw Bay from 1970 to 2010 is shown in Figure 4.19. This bay was designated as an Area of Concern (AOC), under the 1987 Great Lakes Water Quality Agreement. Contaminants in the AOC include excessive nutrients, such as nitrogen and phosphorus, and dioxins, furans, PCBs, chloride, metals, and acids. Municipal, industrial and storm water discharges, industrial waste discharges, combined sewer overflows, and agricultural and urban runoff are the sources of various pollutants in Saginaw River and Bay [1, 263, 264]. Although the ratio of the surface of this bay to the surface of Lake Huron is only 5%, the ratios of the loadings of OM, OC and TN in this bay to that of Lake Huron were in the range of 18-26% (Table 4.1). Therefore, this area plays an oversized role in the total loading to Lake Huron [263].

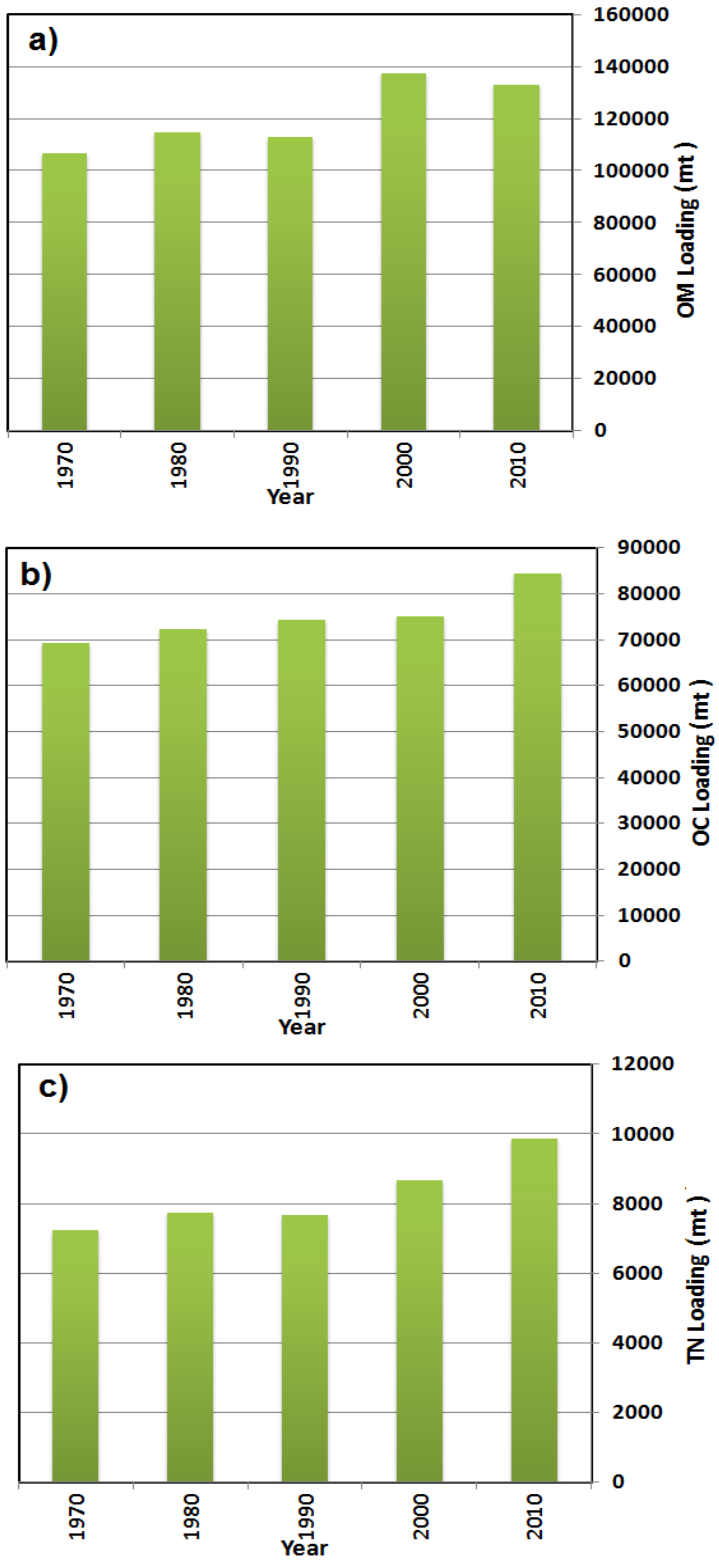


Figure 4.19.Whole-bay loadings of a) OM, b) OC, and c) TN to Saginaw Bay from 1970 to 2010.

4.3. Summary and conclusions

The loading of organic matter to Saginaw Bay increased by 8% from 1970 to 1980, and from 1980 to 1990 had been decreased by of 2%. Then, from1990 to 2000, it raised again by 22%, and after 2000 to 2010, dropped again by 3%. Hence, the controls in reduction of nutrient loadings to restrict the eutrophication in this bay were influential. From 1970 to 1980, the loading of TN to this bay amplified by 7%, and then decreased by of 1%from 1980 to 1990. The loading of total nitrogen to the sediments of Saginaw Bay increased from1990 to 2000 by 13%, and continued its rise again by 14%, after 2000 to 2010.

OM and its molecular compositions that deposited in lake sediments has been used widely to measure anthropogenic impacts on local ecosystems and reconstruct historical environmental conditions [139]. In Lake Superior, the similar trends of OC and TN depositions for S019 and S022, as well as the consistency of the peaks in 1960 for both sites with the peak in the population of Duluth, show the probable influence of this city in the deposition of OC and TN to Lake Superior. From 1960 to 1990, the flux of OC and TN dropped in both of S019 and S022, where the implementation of clean water act (CWA) in the 1970's or OM diagenesis can be reasons of this decrease in organic carbon flux in the western part of this lake. From 1860 to 2010, the ratio of C/N decreased in both of the closest sites to Duluth (S022 and S019), while the OM concentration fluctuated. Therefore, if the oscillations in OM levels were due to the diagenesis, because of the consistent decrease in C/N ratio, moderate eutrophication is likely in these two sites in the western part of Lake Superior.

From 1900 to 2010, the level of organic matter in sites S011 and S012 raised by 67% and 25%, while, in the same period of time, the C/N ratios dropped consistently by 22% and 15%, respectively. These two sites are also located in a relatively deep part of the lake, with the depth of 230 m (S011) and 240 m (S012), which reduces the probability of sediment bio-turbation and decomposition [139]. Hence, the evidences of probabale eutrophication are found again in sites close to Thunder Bay. More than 80% of

the samples have C/N ratio of less than 10, which reveals that the majority of organic matter deposition in this system has lacustrine source [139, 274, 284-286].

In Lake Huron, from 1550 to 2010, the ratio of C/N decreased in both sites of H061 and H038, while the OM concentration increased continually. In H038 of the central part of Lake Huron, the source of organic matter was less inland derived before 1700. However, after that time, the regime of OM deposition changed, where C/N ratio dropped extremely. From 1910 to 2010, OM levels amplified almost 3-4 times, in both sites of H061 and H038, which cannot be merely due to sediment diagenesis over the period of 100 years, and in depths of more than 100 meters of those two sites. In H061 of the northern part of the lake, a simultaneous decrease in C/N ration and increase in OM levels, once again, approves the probable eutrophication in these two sites. In H037, the OM concentration, in the first 30 cm of the collected core, increased 3.6 times, while C/N ratio dropped from the value of more than 10 to 7; thus, the evidence of eutrophication is found in this site, again. In H001, although the simultaneous increase in OM and decrease in C/N is evident, for concluding the probable eutrophication we need to have more evidences, such as carbon stable isotope, because OM level increased by 25% during the period of 40 years, and this site is located in a shallow part of the lake with the depth of 12.7 m [139]. The rate of increase in the loading of OM to Lake Huron (excluding Saginaw Bay) has been decreased during the past 50 years, which discloses the power of implementation of governmental actions, such as CWA, in restricting the probable eutrophication by reducing the nutrient loadings to the lakes. The loading of organic matter to Saginaw Bay increased by 8% from 1970 to 1980, and from 1980 to 1990 had been decreased by of 2%. Then, from1990 to 2000, it rose again by 22%, and after 2000 to 2010, dropped again by 3%. Hence, the controls in reduction of nutrient loadings to restrict the eutrophication in this bay were influential.

Chapter 5 . The spatial distribution of OM, OC, TN, and BC in sediments of the Great Lakes

In this chapter we discuss the spatial distribution of OM, OC, TN, and BC in the entire Great Lakes system, based on the concentrations in the ponar grabs (PGs). Then, we investigate changes in the concentrations of OM, OC, TN, and BC in core samples collected in Lake Ontario, Lake Erie, and the inland lakes of Lake Siskiwet and Forest Lake.

5.1. Spatial distribution of OM, OC, TN, and BC in the Great Lakes

Figure 5.1 displays the spatial distribution of OM in the surface sediments of the Great Lakes. The highest concentration of OM in the Great Lakes (excluding Inland Lakes) was found in site M50 (144 mg/g), which is located in Green Bay, Lake Michigan. OM concentrations were higher in the northern basin of lake were higher than that of the southern part. The OM concentrations were also high in the eastern part of Lake Ontario, in sites ON31, ON35, and ON36, with 80, 88, and 89 mg/g of OM, respectively. OM concentrations were typically lower in the western half of Lake Ontario. In Lake Huron, the highest OM concentration was in Saginaw Bay (80 mg/g), and OM concentration was higher in the southern basin of the compared to the northern sector. Concentrations of OM in the mid-western part of Lake Erie were higher than those of the other locations in this lake.

The average concentrations of OM in surface sediments from Lakes Michigan, Superior, Huron, Lake Ontario, and Erie were 47, 35, 30, 47, and 42 mg/g, respectively. Although the average OM concentration in Lake Superior was higher than that of Lake Huron, OM fluxes in Lake Huron were higher than in Lake Superior, due to higher sedimentation rates in Lake Huron. Although we do not have dating for Lake Erie, we expect it to have the highest sedimentation rates and thus the OM flux in this lake will likely be the highest in the Great Lakes.

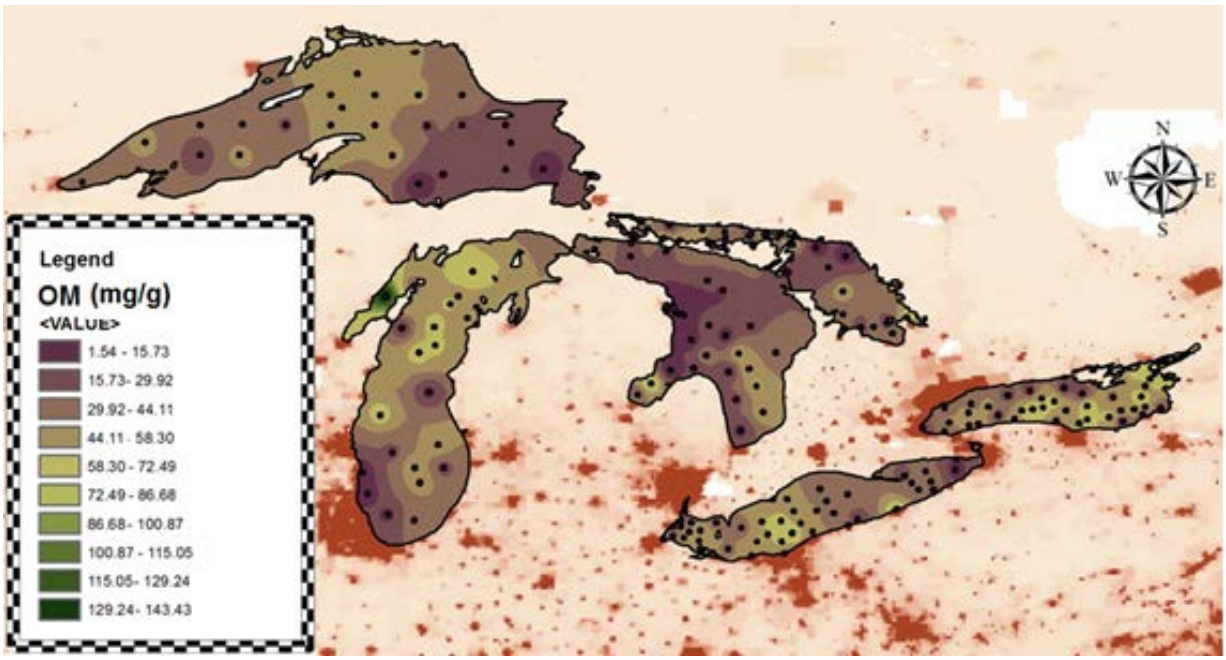


Figure 5.1.The spatial distribution of OM in surfacial sediments the Great Lakes. Dots represent sample locations. Also shown are metropolitan areas in brown.

The spatial distribution of OC in the surface sediments of Great Lakes is shown in Figure 5.2. Excluding Inland Lakes, the maximum OC concentration in the Great Lakes was found at Saginaw Bay of Lake Huron (52 mg/g). The second and third high OC levels were also found in the eastern part of Lake Ontario, in ON36 (51 mg/g) and in Green Bay, Lake Michigan (49 mg/g), respectively. As with OM, OC was high in the northern basin of Lake Michigan. The eastern arm of Lake Ontario had higher concentrations of OC compared to its western arm, and the southern basin of Lake Huron had higher OC concentrations than northern basin. In the mid-western part of Lake Erie, concentrations of OC were higher than those of the other locations in this lake. In Lake Superior, the central region had relatively higher concentrations of OC than those of the western and eastern arms of the lake.

The overall average concentrations of OC in Lake Michigan, Lake Superior, Lake Huron, Lake Ontario, and Lake Erie were 20.5, 12.6, 13.0, 23.0, and 21.0 mg/g, respectively. Lake Superior had the lowest average OC as well as the lowest sedimentation rates among the Great Lakes; hence, OC fluxes in Lake

Superior were comparatively lower than the other Great Lakes. Although the average of OC concentrations in Lake Ontario was higher than in Lake Erie, it is more likely that Lake Erie has the highest depositional fluxes of OC, same as OM, among the all Great Lakes, owing to its higher expected sedimentation rates.

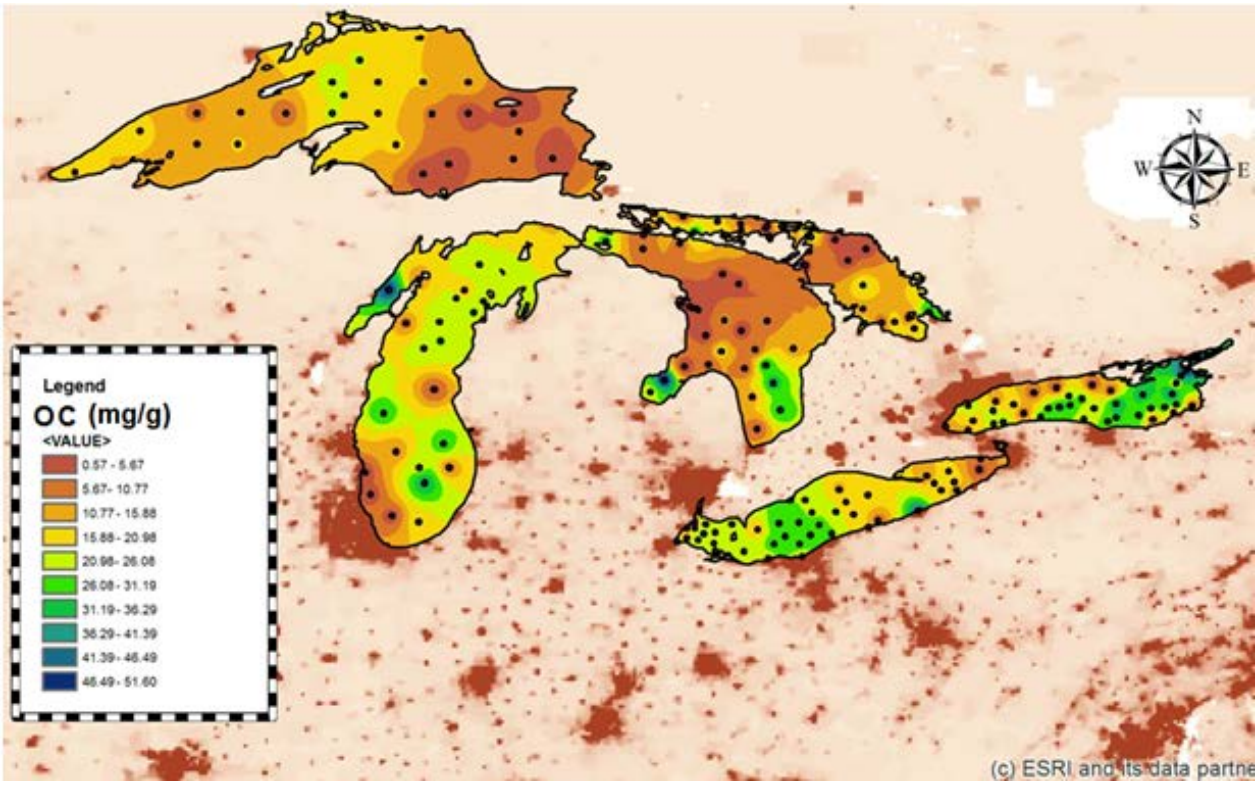


Figure 5.2.The spatial distribution of organic carbon (OC) in surfacial sediment samples from the Great Lakes. Dots represent sample locations. Also shown are metropolitan areas in brown.

Figure 5.3 shows the spatial distribution of TN in the surfacial sediments from Great Lakes. Highest concentrations of TN in the Great Lakes were found in eastern Lake Ontario, in site ON35 (6.2 mg/g). The second and third highest TN concentrations were found in Green Bay of Lake Michigan (5.7 mg/g) and in Saginaw Bay, Lake Huron, in H001 (5.5 mg/g), respectively. Analogous to OC, the northern basin of Lake Michigan had higher TN concentrations than the southern basin. Eastern part of Lake Ontario had higher TN concentrations than the western arm of the lake, and the northern basin of Lake Huron had lower TN concentrations than the southern basin. In Lake Erie, TN concentrations were higher in the mid-

western arm than the other locations in the lake. The western and eastern regions of Lake Superior had lower concentrations of TN than those of central area of this lake.

The average concentrations of TN in Lake Michigan, Lake Superior, Lake Huron, Lake Ontario, and Lake Erie were 2.5, 2.1, 1.6, 2.6, and 2.5 mg/g, respectively. While the average TN concentration in Lake Huron was less than that of Lake Superior, the amount of OM flux received by Lake Superior was lower than in Lake Huron, owing to lower sedimentation rates in Lake Superior; consequently, similar to OC, the amount of TN fluxes in Lake Superior were relatively lower than in the other regions in the Great Lakes. While the average of TN concentrations in Lake Erie was lower than that of Lake Ontario, on account of higher expected sedimentation rates IN Lake Erie, it is more probable that Lake Erie has the highest depositional fluxes of TN among the all Great Lakes.

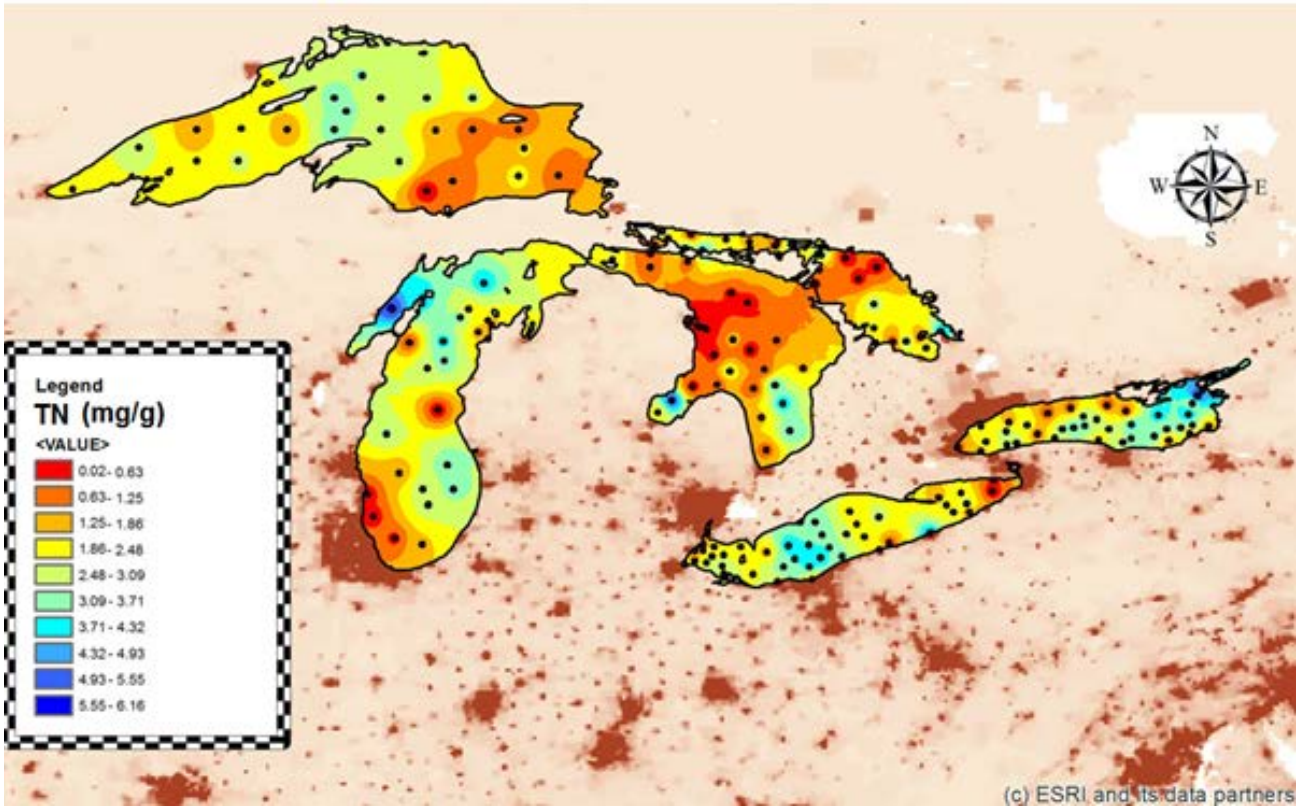


Figure 5.3.The spatial distribution of total nitrogen (TN) in surfacial sediment samples from the Great Lakes. Dots represent sample locations. Also shown are metropolitan areas in brown.

The spatial distribution of BC in surface sediments of the Great Lakes is depicted in Figure 5.4. Western Lake Erie has the maximum concentration of BC in the Great Lakes, in site ER59 (10.2 mg/g). High concentrations of BC were found in Saginaw Bay (7.4 mg/g) and in southern Lake Huron (6.1 mg/g). Unlike OC and TN, concentrations of BC were higher in the southern basin of Lake Michigan than northern basin. In Lake Ontario, sites adjacent to Rochester, NY have higher concentrations of BC than other regions of this lake. In Lake Huron, the southern basin had higher BC levels than in the north, although high concentrations of BC were also found in H124 (4.9 mg/g). In the western part of Lake Erie, concentrations of BC were much higher than those of the other locations in the lake. In Lake Superior, the western region has relatively higher concentrations of BC than those of the central and eastern parts.

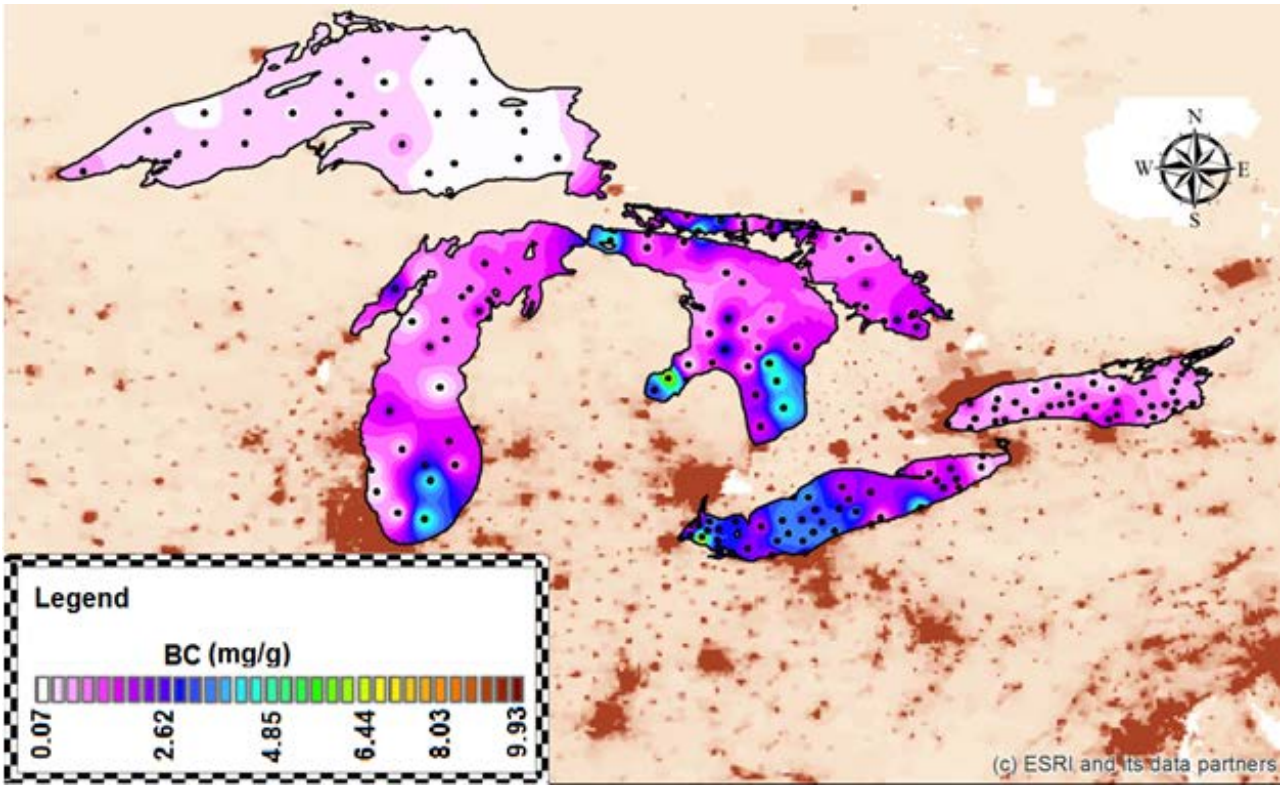


Figure 5.4.The spatial distribution of black carbon (BC) in surfacial sediment samples from the Great Lakes. Dots represent sample locations. Also shown are metropolitan areas in brown.

The average concentrations of BC in Lake Michigan, Lake Superior, Lake Huron, Lake Ontario, and Lake Erie were 1.62 ± 1.41, 0.40 ± 0.18 , 1.99 ± 1.31, 1.08 ± 0.51, and 2.82 ± 1.67 mg/g, respectively. Lake Superior has the lowest average concentrations of BC as well as the lowest sedimentation rates among the

five Great Lakes; therefore, BC fluxes are much lower in Lake Superior. Lake Erie is expected to have high depositional fluxes of BC, as a consequence of its higher BC concentrations and higher expected sedimentation rates.

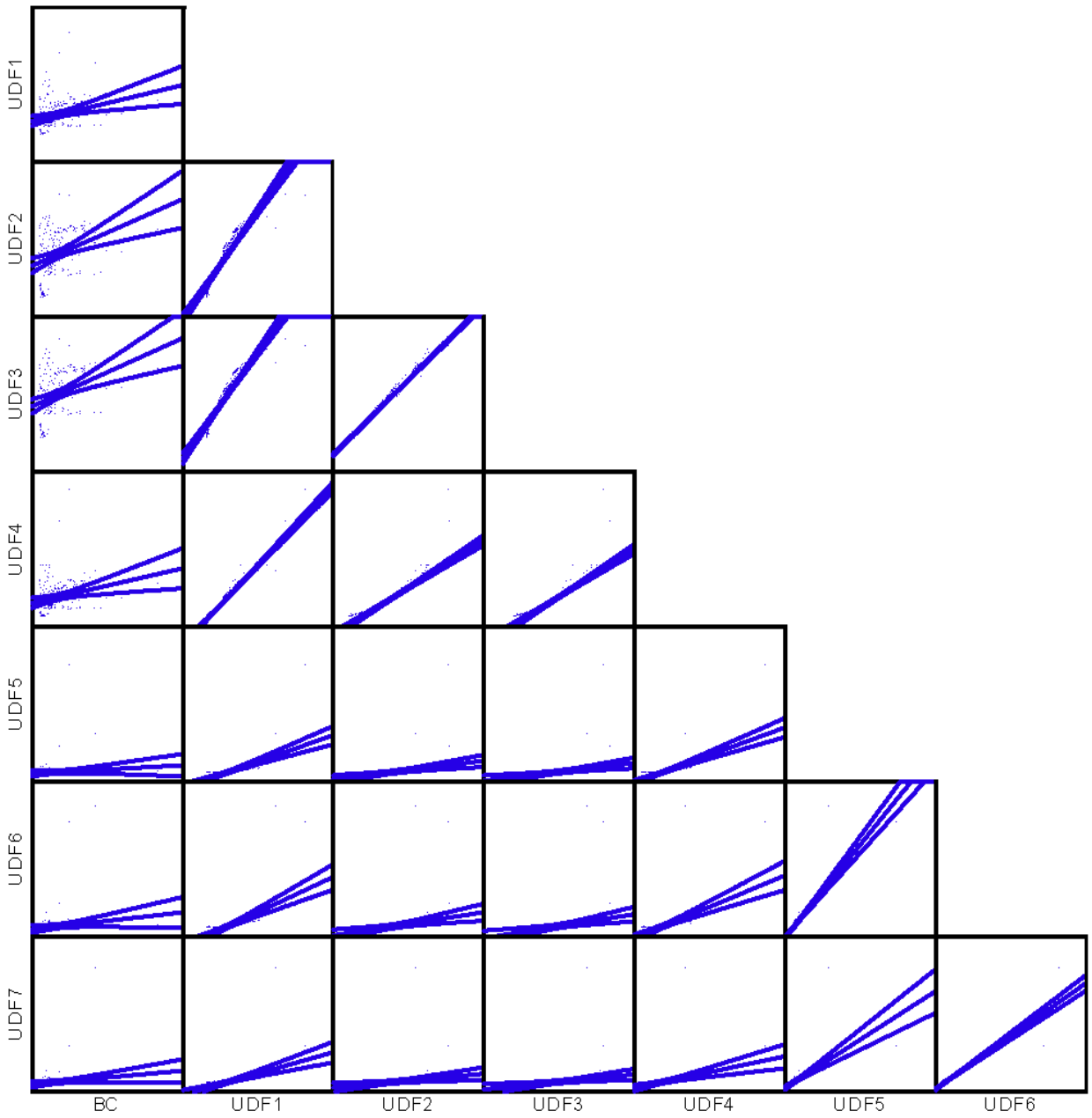


Figure 5.5.Scatter plot matrix with 95% confidence index of BC and seven UDFs.

To better understand the impact of the urbanization on deposition of BC to the Great Lakes, we implemented a statistical correlation analysis between the BC concentration in all grab samples (184 sampling sites) and several urban distance factors (UDF). Table 5.1 summarizes the results of correlation analyses between BC concentrations in PGs and seven different UDFs (ANOVA), where P represents the population, and D stands for distance between the sample site and each metropolitan area of influence. The list of metropolitan areas (n=103) included in our study, as well as the overall calculated UDFs, can be found in appendix E. the seven different UDF models all include P and D, but with different power laws (e.g. UDF5 = P/D^2 as an inverse square of the distance).

Table 5.1.The summary of the results of correlation analysis between BC concentrations in PGs and different UDFs (ANOVA)

Parameter	UDF1 $P^{-1/2}/D$	UDF2 $P/D^{-1/2}$	UDF3 $P^{-1/2}/D^{-1/2}$	UDF4 P/D	UDF5 P/D^2	UDF6 $P^{-1/2}/D^2$	UDF7 lnP/D^2
P-value(BC,UDF)	1.52E-04	4.06E-06	1.12E-06	5.20E-04	1.37E-01	2.79E-02	1.67E-02
Slope (BC/UDF)	5.61E-03	7.73E-03	1.11E-03	3.83E-06	1.38E-05	2.45E-05	1.42E-04
R^2 (BC,UDF)	0.08	0.11	0.12	0.06	0.01	0.03	0.03
R^2 (Lat)	0.60	0.87	0.84	0.58	0.04	0.04	0.03
R^2 (Long)	0.24	0.38	0.35	0.19	0.01	0.01	0.01

Except for UDF5 (P/D^2), highly statistically significant correlations have been found between the UDFs and BC concentrations. The correlations between BC concentrations in all PGs and UDF2 and UDF3 are presented in Figure 5.6. UDF2 ($P = 4.06\times10^{-6}$) and UDF3 ($P = 1.12\times10^{-6}$) have the highest statistically significant correlations (n=184) among the various UDFs used in this study.

Although the consequences of the temperature gradient and prevailing wind direction, as well as some possible bias in decisions on city selection were not considered in the calculation of UDFs, this approach can be an appropriate way of exploring the influence of metropolitan areas to all the study locations in large systems such as the Great Lakes [287].

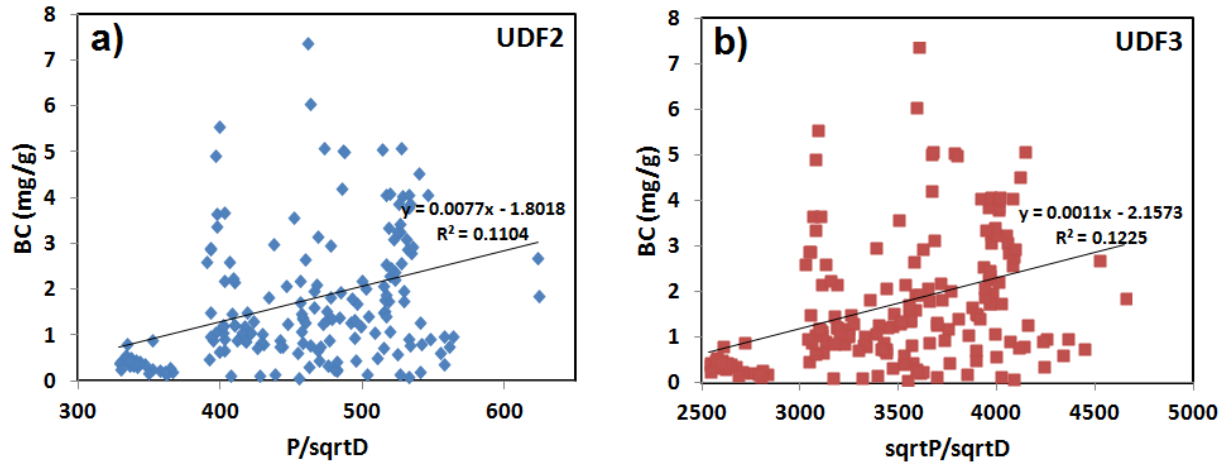


Figure 5.6.Linear regression correlations between BC and a) UDF2 and b) UDF3.

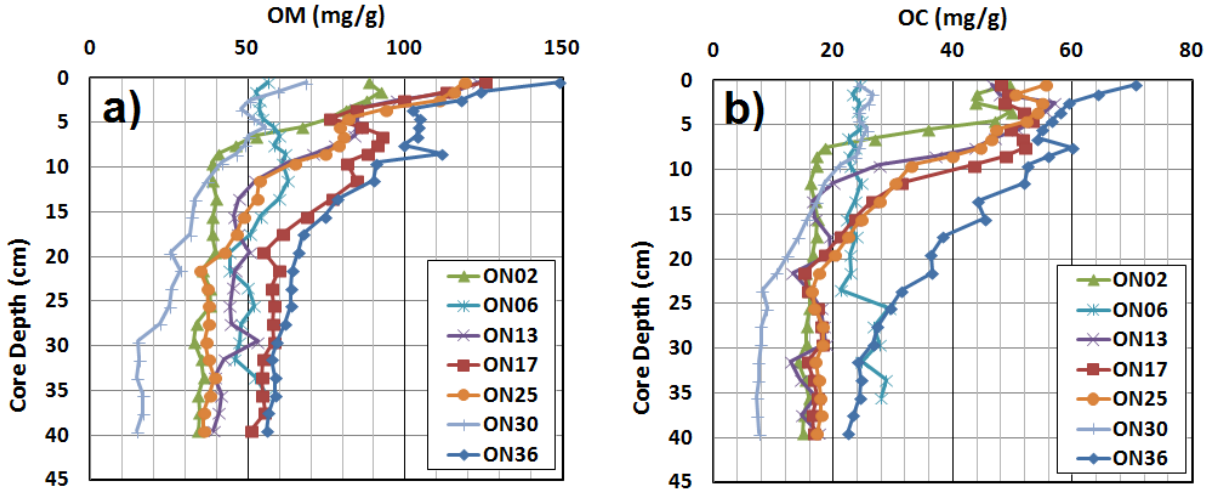


Figure 5.7.Concentrations of a) OM and b) OC in different sections of all cores collected in Lake Ontario.

5.2. Concentrations of OM, OC, TN, and BC in sediment cores from Lake Ontario

Figure 5.7 depicts the concentrations of OM and OC in different depth of all cores collected from Lake Ontario. OM concentrations in all sections of all cores ranged from 14.7-149 mg/g. In site ON02 in the western part of the lake, the range of OM concentration was 33-92 mg/g, and after the first 10 cm of the core depth, this concentration dropped by 56%. In site ON06, OM concentrations ranged from 42-63 mg/g, with comparatively moderate decrease through the depth of the core. The range of organic matter in

site ON13 in the mid-western part of the lake was 39-123 mg/g and after the first 15 cm of the core depth, this concentration decreased by 63%. ON17 in the central lake has an OM range of 51-125 mg/g, which is the second highest in the lake. OM concentrations at site ON25 in mid-eastern Lake Ontario ranged from 34-118 mg/g, with a significant 70% reduction between the surface and 20 cm depth.

ON30 is also located in the mid-eastern part of this lake, and the range of OM in this site was from 15-69 mg/g, and after the first 20 cm of the core depth, the OM concentration decreased by 58%. The highest concentrations of OM in Lake Ontario were found at site ON36 in the eastern arm, with a range of 56-159 mg/g, and the decrease of 57% in the first 20 cm of the core depth.

OC concentrations ranged from 7.2-70.6 mg/g in Lake Ontario sediment cores. In western Lake Ontario sites ON02 and ON06, OC concentrations ranged from 14-50 and 21-29 mg/g, respectively. OC in sites ON13 and ON17 were similar to ON02; 13-57 and 15-53 mg/g, respectively. After the first 20 cm of the core depths of ON13 and ON17, OC concentration dropped by 72% and 69%, respectively. OC concentrations in sites ON25 and ON30 of the mid-eastern part of Lake Ontario ranged from16-56 and 7-27 mg/g, which reduced by 68% and 56%, respectively, in the first 20 cm of the cores. Analogous to OM, the maximum OC concentrations in Lake Ontario were found in the eastern arm at site ON36, with a range of 23-71mg/g and a 48% decrease in the first 20 cm of the core depth.

The concentrations of TN and BC from all core segments collected from Lake Ontario are shown in figure 5.8. BC concentrations in all sections of all cores ranged from 0.7- 6.4 mg/g. In site ON02 in the western Lake Ontario, the range of BC concentration was 0.9-2.6 mg/g, and after the first 10 cm of the core depth, this concentration dropped by 23%. In site ON06 in the eastern basin, BC concentration ranged from 0.7-2.1 mg/g. The range of BC in site ON13 in the mid-western part of the lake was from 1.0-1.9 mg/g, and after the first 20 cm of the core depth this concentration increased by 40%. In the central area of the lake, site ON17 has the range of BC of 0.9-4.7 mg/g, which is the second highest in Lake Ontario, and has a peak in the first 5 cm of the core depth. BC concentrations in site ON25 in the

mid-eastern part of Lake Ontario have a range of 0.9-2.1 mg/g. The highest concentrations of BC in Lake Ontario were found in site ON36 of the eastern sector, with the range of 2.7-6.4 mg/g, and the maximum value at the average depth of 7.5 cm from the sediment-water interface.

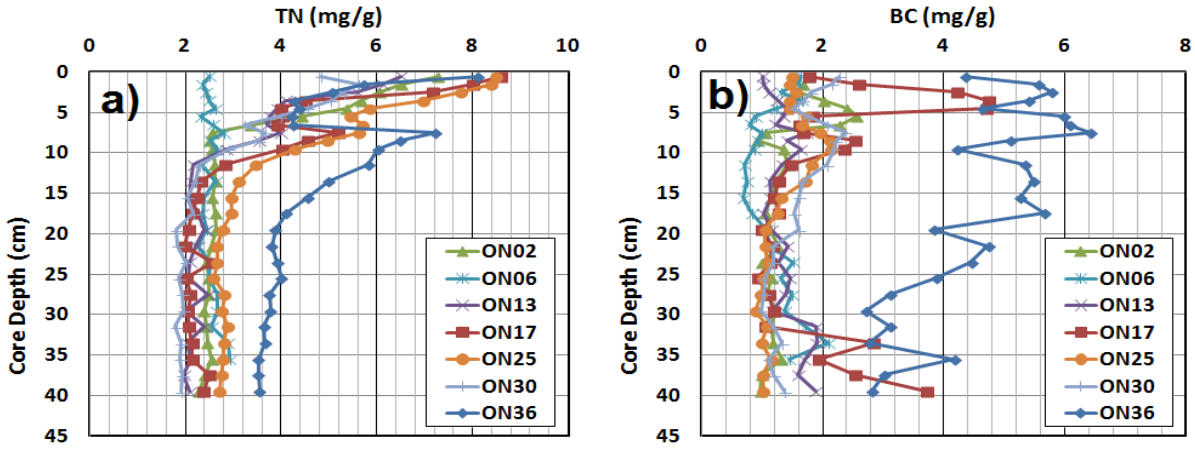


Figure 5.8.The concentrations of a) TN and b) BC in different sections of all cores collected in Lake Ontario.

The range of TN concentration in all sections of all cores from Lake Ontario was from 1.8-8.6 mg/g. In sites ON02 and ON06 in the western Lake Ontario, TN concentration ranged from 2.3-7.3 and 2.3-2.9 mg/g, respectively. The range of TN in sites ON13 and ON17 were from 2.0-6.5 and 2.0-8.6 mg/g, respectively. After the first 20 cm of core depths, TN concentration decreased by 66% and 77%, respectively. TN concentrations in sites ON25 and ON30 ranged from 2.6-8.5 and 1.8-5.6 mg/g. as was the case for OM and OC, the maximum TN concentrations in Lake Ontario were found in eastern lake site ON36, with the range of 3.5-8.1mg/g.

To investigate the possible signals of eutrophication in Lake Ontario, we compared the OM concentrations of each core to C/N ratios simultaneously.

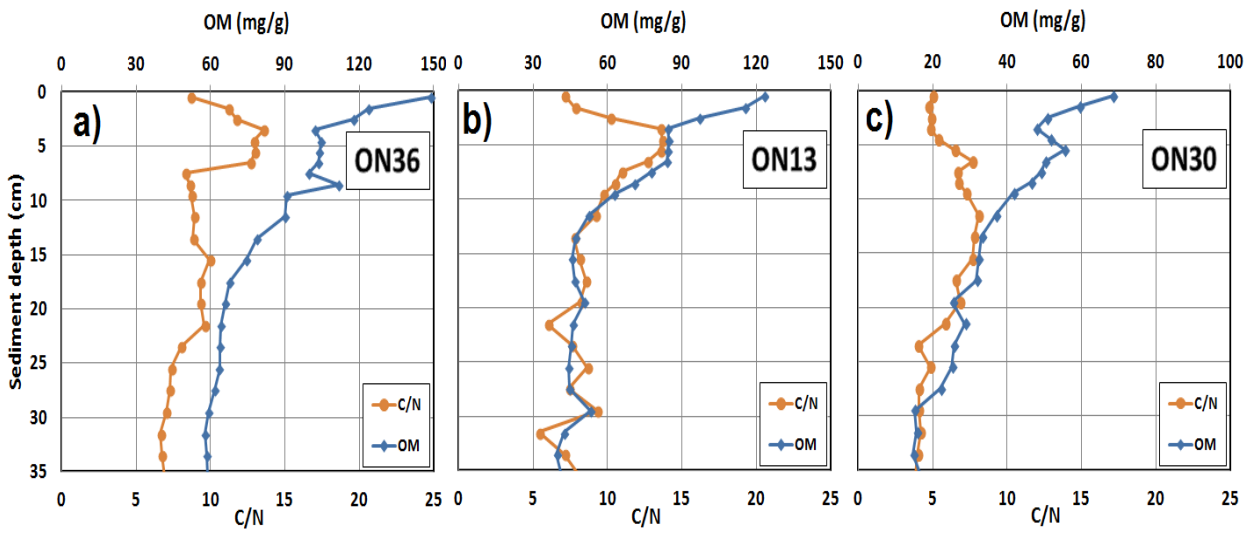


Figure 5.9. C/N ratio and OM in cores a) ON36, b) ON13, and c) ON30 in Lake Ontario.

Figure 5.9 displays the changes in C/N ratio and OM in cores ON36, ON13, and ON30. In ON36 and ON13, the C/N ratio in recent sediments (top 5 cm) decreased from values of more than 10 to below 10, and simultaneously, OM concentration increased by 45% and 46%, respectively. In the first 10 cm of core ON30, OM increased by 64%, when the C/N ratio was decreasing.

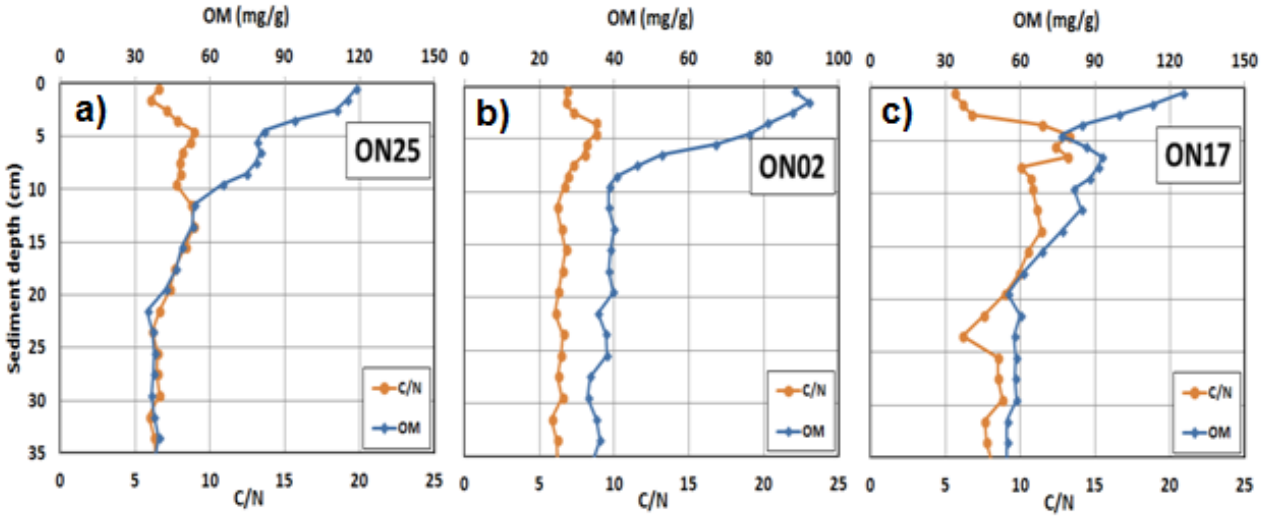


Figure 5.10.C/N ratio and OM in cores ON25, ON02, and ON17 in Lake Ontario.

The changes in C/N ratio and OM in cores ON25, ON02, and ON17 are shown in Figure 5.10. The C/N ratio in the recent sediments (top 5 cm) of ON25 and ON02 decreased as OM concentration increased by 32% and 50%, respectively. In ON17, OM increased by 64%, while the C/N ratio dropped from 14 to 6. Despite the fact that to have better interpretation in eutrophication other additional approaches, such as stable carbon isotope data, these results are aid in understanding due to the coincident increase in OM concentrations and decrease in C/N ratios, increase in autochthonous OM in recently deposited sediment of sites ON36, ON13, ON30, ON02, and ON17 are more likely. Therefore, eutrophication is probable in these locations of Lake Ontario.

Almost 30% of the sediment from Lake Ontario have BC/OC ratios higher than 10% (Figure 5.11). The highest overall BC/OC ratios were found in sites ON36 and ON30 which are located in the eastern and mid-eastern parts of this lake, respectively. Some sections of the cores collected at site ON17 also have BC/OC ratios more than 10%. These very high ratios of BC/OC indicate that combustion-derived emissions from anthropogenic sources greatly impact the eastern Lake Ontario.

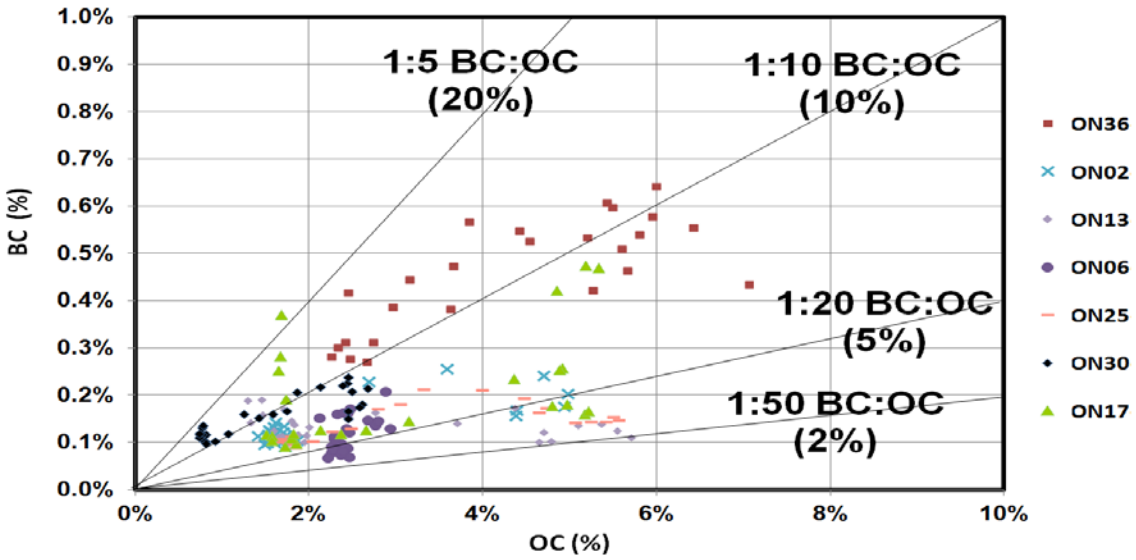


Figure 5.11.The ratio of black carbon to total organic carbon (BC/OC) in Lake Ontario.

Ren et al. (2009) demonstrated that BC/OC ratios of less than 0.11 and higher than 0.5 are consistent with incomplete combustion of biomass and fossil fuel, respectively [219]. While these results suggest BC in Lake Ontario comes from mixed fossil fuel and biomass burning, changes in OM loading make it different to conclude this without additional data. Sediments down core in eastern basin sites have higher BC/OC ratios than those of deposited recently; suggesting that improvements in the combustion technology may have led to the reduction of BC from airborne emission sources to the lake.

Figure 5.12 depicts the OC/TN ratios for all samples collected in Lake Ontario. More than 80% of the samples have C/N ratio of less than 10, consistent with the majority of OM in the sediment coming from autochthonous-derived sources [139, 274, 284-286]. Thus, a clear signal of eutrophication can be seen in Lake Ontario sediments similar to what we have observed in the upper Great Lakes.

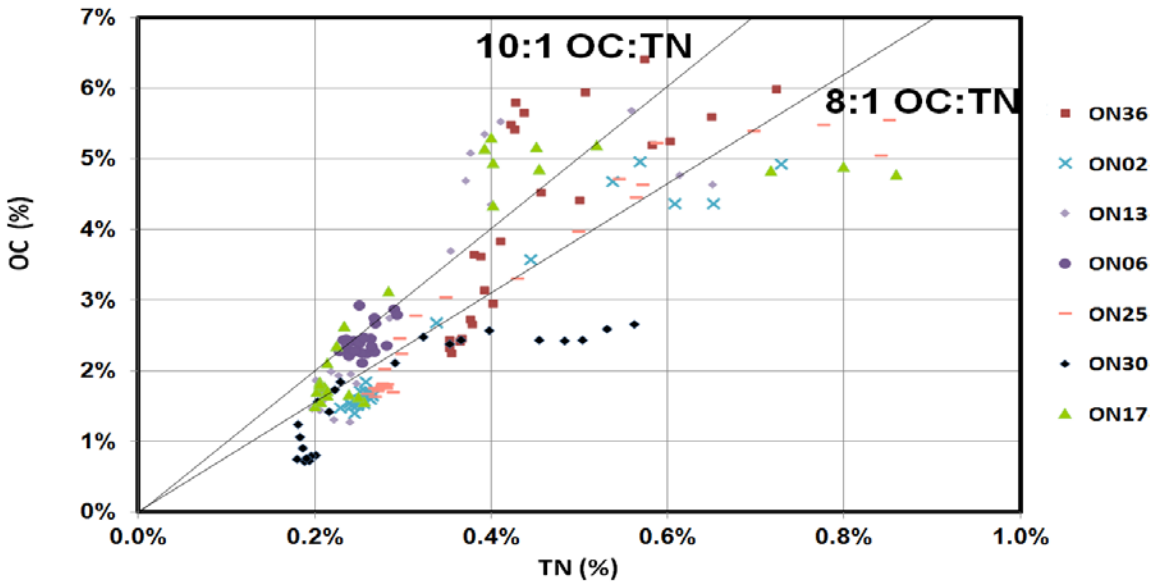


Figure 5.12.OC/TN ratios for all samples from Lake Ontario.

5.3. Concentrations of OM, OC, TN, and BC in the cores of Lake Erie

Figure 5.14 illustrates the concentrations of OM and OC as a function of depth in sediment cores collected from Lake Erie. OM concentrations in all sections of all cores ranged from 17-77 mg/g. In site ER09, which is located in the deepest part of the eastern basin of the lake, the range of OM concentration was 46-63 mg/g, and after the first 11 cm of the core depth, this concentration dropped by 17%. OM concentrations ranged from 17-35 mg/g, with irregular increase through the depth of the core at nearby the site ER15. A high abundance of mussels was found in this location at the time of sampling that may lead to magnified decomposition of OM and accelerated diagenesis in the surface of the sediment core. The range of OM in site ER37 in central Lake Erie was from 38-65 mg/g, and after the first 9 cm of the core depth, this concentration decreased by 28%.

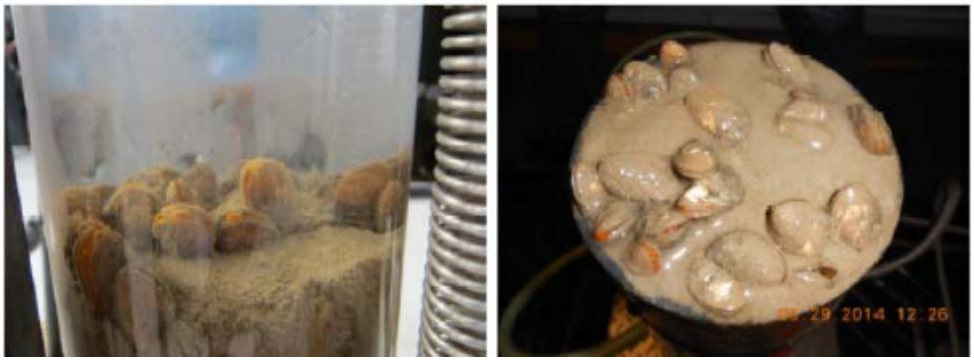


Figure 5.13.Photograph of intact sediment core showing live mussels on top of sediment surface at ER15.

ER73 in central Lake Erie has a range of OM of 32-76 mg/g, the highest range in Lake Erie, and dropped by 32% in the first 9 cm of the core depth. OM concentrations in site ER92 in western Lake Erie ranged from 28-63 mg/g, which reduced by 35% in the first 20 cm of the core depth.

OC concentrations as a function of depth in all cores ranged from 5.9-34.9 mg/g (Figure 5.14b). In sites ER09 and ER15 in eastern Lake Erie, OC concentrations ranged from 17-25 and 6-20 mg/g, respectively. The ranges of OC in sites ER37 and ER73 located in the central part of the lake were from 18-31 and 18-

35 mg/g, respectively. After the first 15 cm of the core depths of ER37 and ER73, OC concentration dropped by 24% and 18%, respectively. OC concentrations in site ER92 of the western part of Lake Erie ranged from 10-29mg/g, with a reduction of 11%, in the first 20 cm of the core.

Figure 5.15 displays concentrations of TN and BC as a function of depth in all cores collected in Lake Erie. BC concentrations ranged from 0.4- 4.8 mg/g. In site ER92 in western Lake Erie, BC concentrations ranged from 0.4-1.9 mg/g, and after the first 20 cm of the core depth, this concentration increased by 25% to its maximum. In site ER73, which is located in the central basin, BC concentration ranged from 2.0-3.9 mg/g. The range of BC in site ER37 in central Lake Erie was 1.8-4.8 mg/g, and after the first 15 cm of the core depth, this concentration increased by 13%.

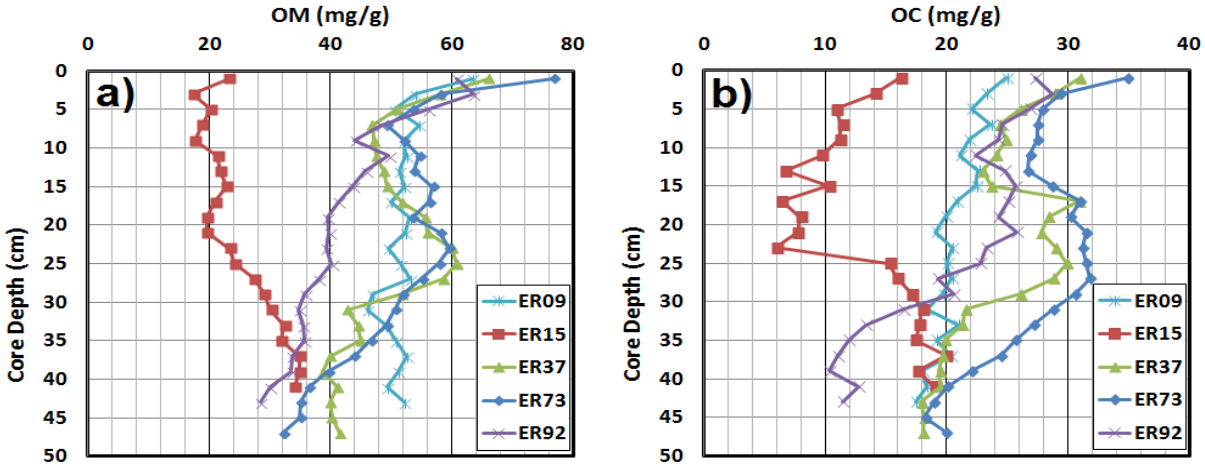


Figure 5.14.Concentrations of a) OM and b) OC in different sections of all cores collected in Lake Erie.

In the eastern area of the lake, site ER15 has the range of BC of 1.1-3.1 mg/g, which reduced by 11%, in the first 15 cm of the core. BC concentrations in site ER09 that is located in the eastern part of Lake Erie have the range of 2.1-3.7 mg/g, which increased by 17% in the first 10 cm of the core depth.

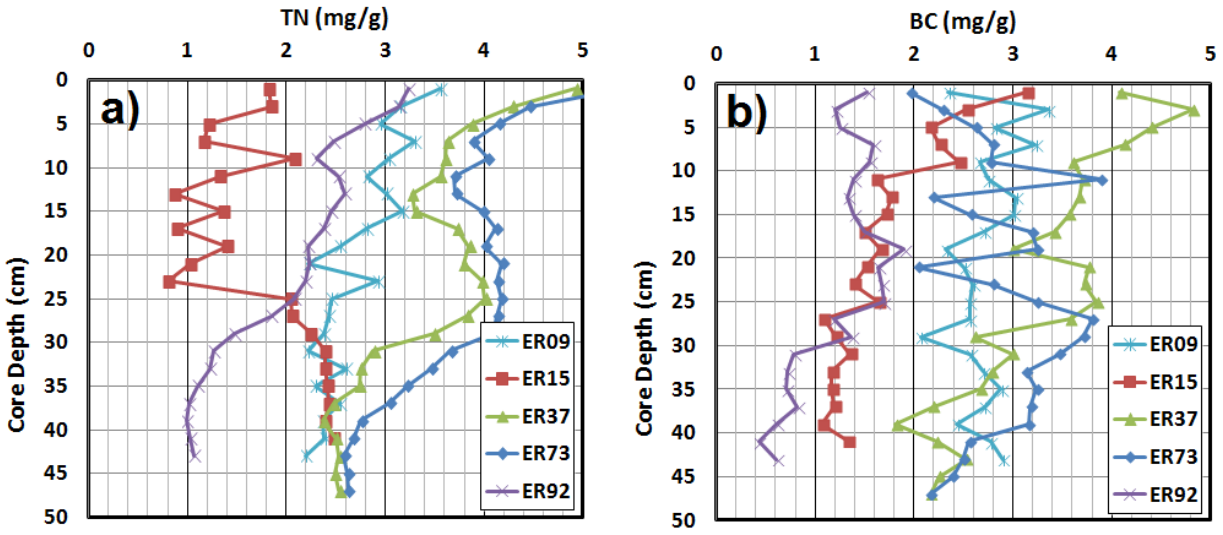


Figure 5.15.Concentrations of a) TN and b) BC as a function of depth in cores collected from Lake Erie.

TN concentrations as a function of depth in all cores ranged from 0.8-5.4 mg/g (Figure 5.15a). In sites ER09 and ER15 of the eastern part of the lake, TN concentrations ranged from 2.2-3.6 and 0.8-2.5 mg/g, respectively. In sites ER37 and ER73 in the central basin of the lake, TN ranged from 2.4-4.9 and 2.6-5.4 mg/g, respectively. After the first 15 cm of the core depths of ER37 and ER73, TN concentration dropped by 33% and 27%, respectively. TN concentrations at sites ER92 in western Lake Ontario ranged from 1.0-3.2 mg/g, with a decrease of 32% in the first 20 cm of the core.

We compared the C/N ratios and OM concentrations of each core simultaneously in one figure to observe signals of eutrophication in Lake Erie (Figure 5.16a-c). The C/N ratio decreased in recent sediments (top 5 cm) in cores ER73 and ER37, as the OM concentration increased by 40% and 38%, respectively. In ER92, OM increased by 70%, while the C/N ratio decreased from 14 to 9. These data are consistent with autochthonous OM source, with higher levels of OM deposition throughout the core.

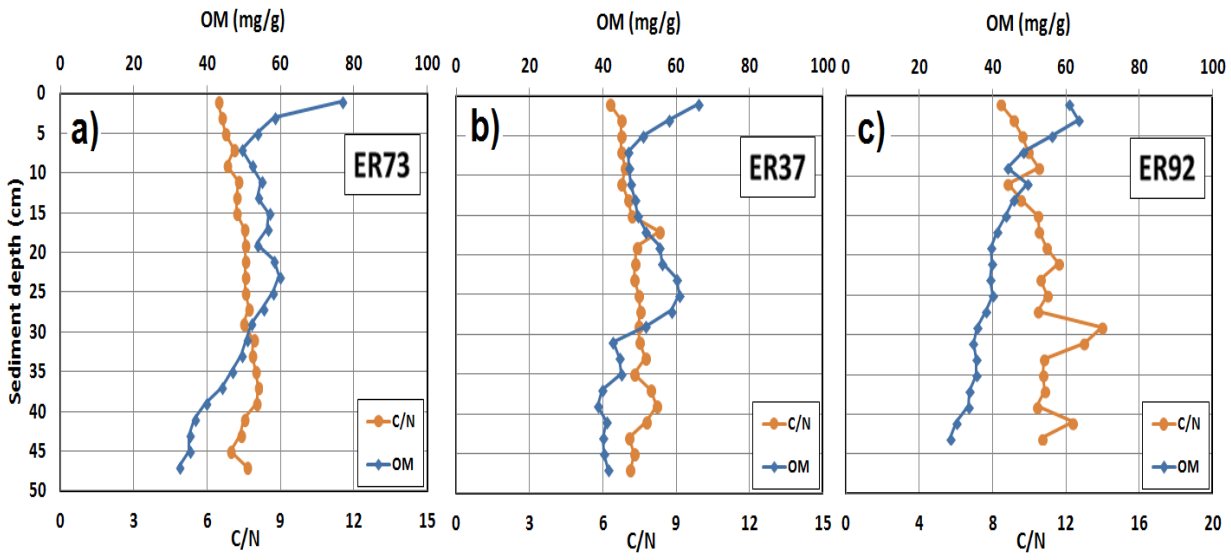


Figure 5.16.C/N ratio and OM as a function of depth in cores ER73, ER37, and ER92 in Lake Erie.

Almost 60% of samples from Lake Ontario had BC/OC ratios higher than 10% (Figure 5.17). The highest BC/OC ratios were found in deeper sediments in core ER15, which is located in eastern Lake Erie. Most of the sections of the cores collected in ER73, ER09, and ER37 have BC/OC > 10. These high BC/OC ratios suggest that combustion-derived emissions from anthropogenic sources are a major influence on Lake Erie. Using the Ren et al. (2009) criterion, we would expect that incomplete combustion of biomass and fossil fuel contributes to the BC in Lake Erie [219].

The range in OC concentrations for all cores was 5.9-34.9 mg/g. In sites ER09 and ER15 in eastern Lake Erie, OC ranged from 17-25 and 6-20 mg/g, respectively. The ranges of OC in sites ER37 and ER73 that are located in the central basin of the lake were 18-31 and 18-35 mg/g, respectively. After the first 15 cm of core ER37 and ER73, OC dropped by 24% and 18%, respectively. OC concentrations at site ER92 in western Lake Erie ranged of 10-29 mg/g, which reduced by 11%, in the first 20 cm of the core.

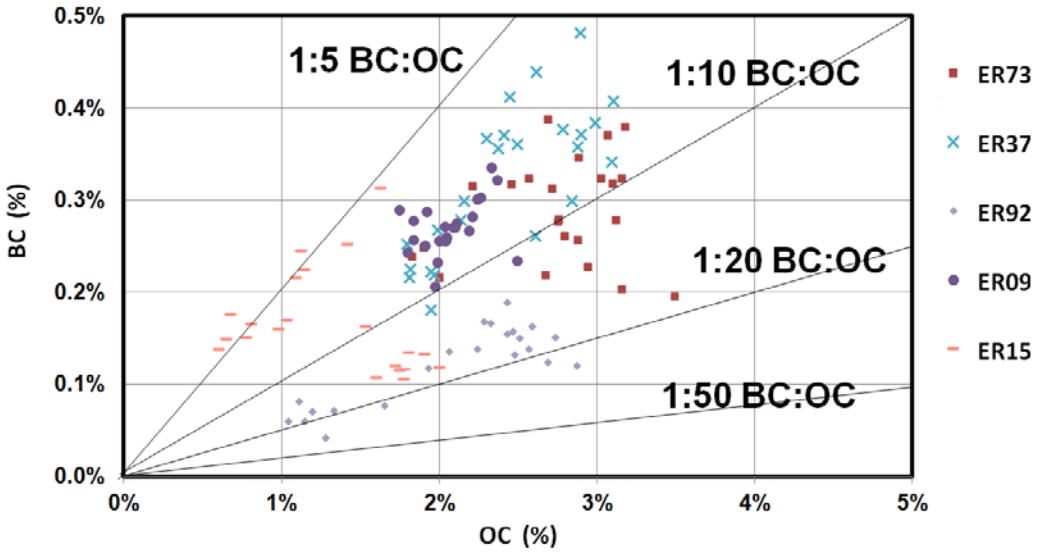


Figure 5.17.The ratio of BC to OC for all sediment in Lake Erie.

Figure 5.18 depicts the OC/TN ratios for all sediment cores collected in Lake Erie. More than 80% of the samples have C/N ratios less than 10, which indicate that the majority of OM deposition in this system is autochthonous [139, 274, 284-286]. Thus, similar to Lake Ontario, this lake can also be susceptible to eutrophication as described before.

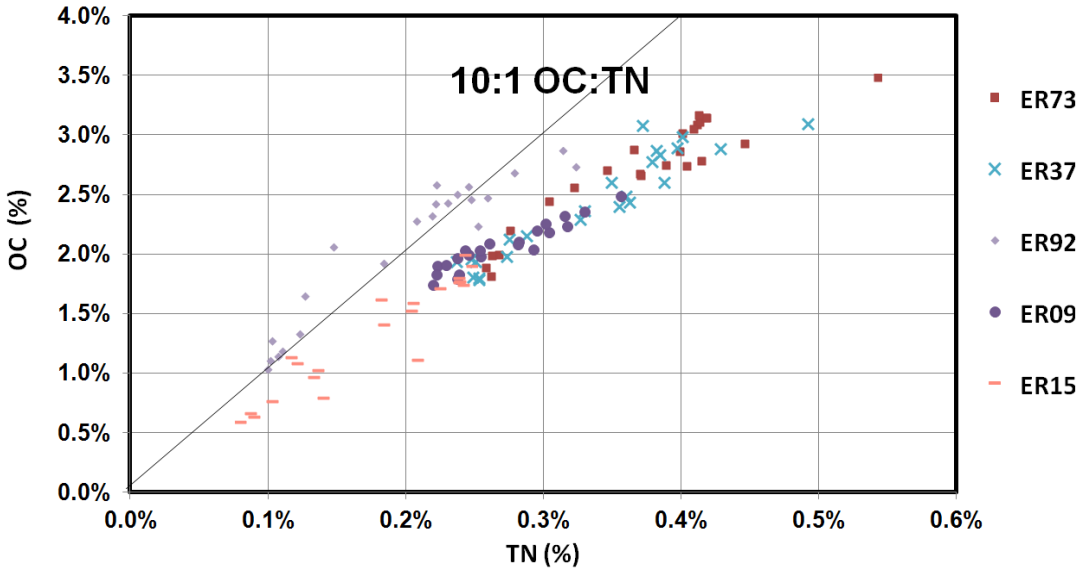


Figure 5.18.Ratio of OC to TN for all sediments in Lake Erie.

5.4. Concentrations of OM, OC, TN, and BC in sediment cores of Inland Lakes

Figure 5.19 shows the OM and OC levels as a function of depth in all cores collected from Lake Siskiwit (I1, I2) and Forest Lake (W1, W2). OM concentrations ranged from 124-562 mg/g. In site I1, which is located in the central basin of Lake Siskiwit, OM ranged from 124-157 mg/g, and was relatively unchanged throughout the depth. Similar results were observed at I2, in relatively close proximity to I1 (Figure 5.19). OC and OM were much higher in Forest Lake, ranging from 250-300 mg/g and 450-545 mg/g, respectively, and these were the highest of all sediments from all lakes in the study.

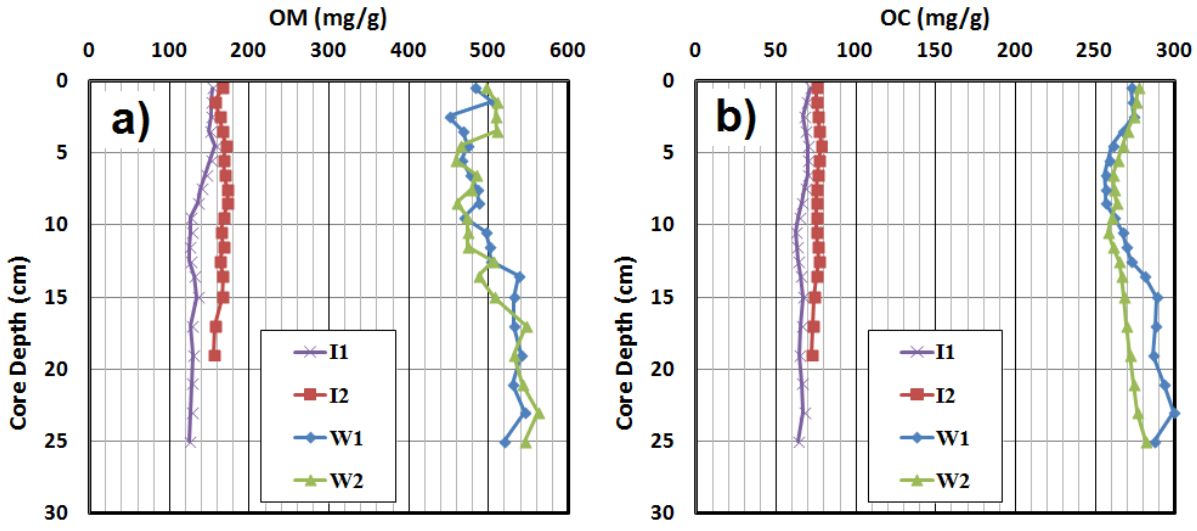


Figure 5.19.Concentrations of a) OM and b) OC as a function of depth in cores collected from Lake Siskiwit on Isle Royale (I1, I2) and Forest Lake, WI (W1, W2).

The range OC concentration in the all sections of all cores was from 62-299 mg/g. In sites I1 and I2 of the central part of Lake Siskiwit, OC concentration ranged from 62-71 and 72-78 mg/g, respectively. The ranges of organic carbon in sites W1 and W2 that are located in the middle of Forest Lake were from 256-299 and 258-282 mg/g, respectively. After the first 10 cm of the core depths of W1 and W2, OC concentration dropped by 2% and 7%, respectively.

The concentrations of TN and BC in different sections of all cores collected in Lake Siskiwit (I1, I2) and Forest Lake (W1, W2) are shown in Figure 5.20. BC ranged from 0.9- 4.8 mg/g in all sites. In site I1 of the central part of Lake Siskiwit, the range of BC concentration was 0.9-3.8 mg/g, and after the first 10 cm of the core depth, this concentration increased by 300%. In site I2, which is also located in the middle of Lake Siskiwit, BC concentration ranged from 1.0-2.4 mg/g, and these concentrations increased through the depth of the sediment; therefore, the level of BC in recent sediments of Lake Siskiwit are less than that of earlier deposited sediments. The range of black carbon in site W1 of the central part of Forest Lake was from 1.0-2.8 mg/g, and after the first 10 cm of the core depth, this concentration increased by 32%. In the central area of Forest Lake, site W2 has the range of BC of 3.6-4.8 mg/g, which is the highest range in this lake.

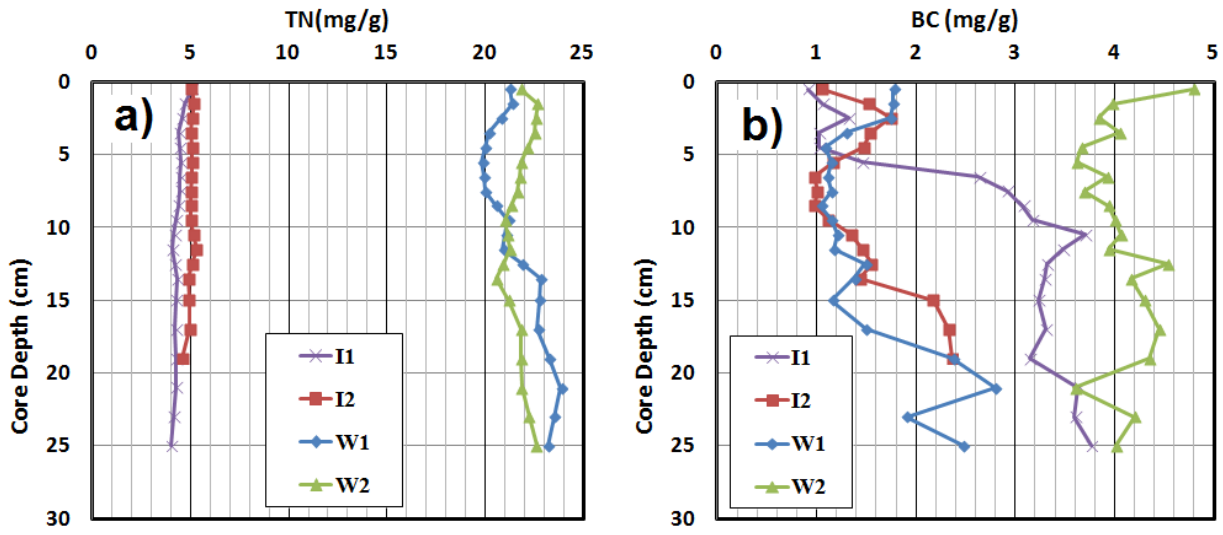


Figure 5.20.Concentrations of a) TN and b) BC as a function of depth in cores collected from Lake Siskiwit on Isle Royale (I1, I2) and Forest Lake, WI (W1, W2).

The range of TN concentrations for all core samples was 4.0-23.9 mg/g. In sites I1 and I2 of the middle of Lake Siskiwit, TN ranged from 4.0-5.1 and 4.5-5.3 mg/g, respectively. The ranges of total nitrogen in sites W1 and W2 in central basin of Forest Lake were from 19.8-23.9 and 20.5-22.7 mg/g, respectively.

After the first 10 cm of the core depths of W1 and W2, TN concentration dropped by 1% and 3%, respectively.

The ratios of BC/OC in all Inland Lakes are less than 10% (Figure 5.21a). The highest overall BC/OC ratios were found in sites I1 that is located in the middle of Lake Siskiwit. Ren et al. demonstrated that BC/ TOC ratios of less than 0.11 and higher than 0.5 are contributed to incomplete combustion of biomass and fossil fuel, respectively [219]. Overall, BC is relatively insignificant compared to the high levels of OM due to terrestrial and lacustrine OM production in these lakes.

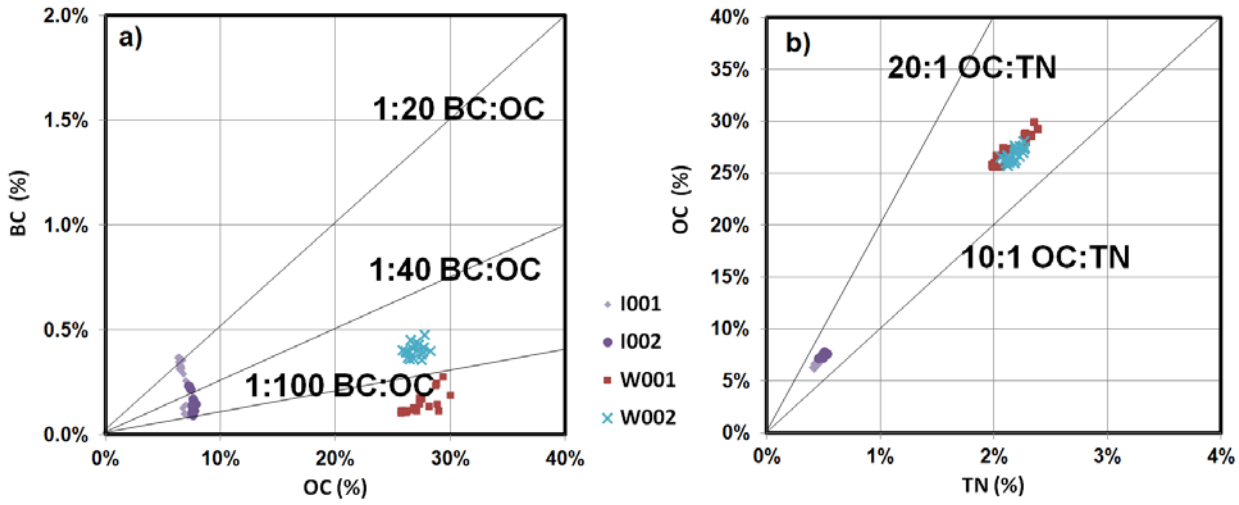


Figure 5.21.The ratio of a) (BC/OC) and b) C/N in Lake Siskiwit (I1, I2) and Forest Lake (W1, W2).

Figure 5.21b depicts the overall view of the OC/TN ratios for all cores collected in Inland Lakes. All of the samples have C/N ratio of more than 10, which suggests much of the OM deposition is from allochthonous sources, which is not surprising given the small lake size relative to watershed area [139, 274, 284-286].

5.5. Summary and conclusions

The highest concentration of OM in the system of the Great Lakes, excluding Inland Lakes, was found in site M50 (144 mg/g), which is located in Green Bay of Lake Michigan. In Lake Michigan, concentrations of OM in the northern part of the lake were higher than that of the southern part. The second highest levels of OM concentrations were found in the eastern part of Lake Ontario. Also, in Lake Huron, a relatively high concentration of organic matter has been measured in a grab sample collected in Saginaw Bay (80 mg/g), and the southern part of this lake has higher concentrations of OM that those of the northern sector. Although the average of OM concentrations in Lake Superior was higher than that of Lake Huron, the amount of OM flux received by Lake Huron was higher than that of Lake Superior, due to higher sedimentation rates in Lake Huron. Since we are expecting the highest sedimentation rates to happen in Lake Erie, the flux of OM in this lake will be the highest measured in the Great Lakes ecosystem.

Western part of Lake Erie has the maximum concentration of BC in the Great Lakes, in site ER59 (10.2 mg/g). The second and third highest concentrations of BC were found in Saginaw Bay of Lake Huron, in H001 (7.4 mg/g), and the southern part of Lake Huron, in H103 (6.1 mg/g), respectively. Unlike OC and TN, concentrations of BC in the southern part of Lake Michigan were higher than that of the northern part. In Lake Ontario, sites adjacent to Rochester, NY have higher concentrations of BC than those of the other regions of this lake. In Lake Huron, the southern part has higher concentrations of BC that those of the northern sector. However, high concentration of BC has been found in H124 (4.9 mg/g). In the western part of Lake Erie, concentrations of BC were much higher than those of the other locations in this lake. In Lake Superior, the western region has relatively higher concentrations of BC than those of the central and eastern parts.

For determination of the impact of urbanization on deposition of black carbon to the Great Lakes, we implemented the statistical correlation analysis between the concentration of BC in all grab samples (184 sampling sites) and various urban distance factors (UDF). Except for UDF5 (P/D^2), highly statistically

significant correlations have been found between all other UDFs and BC concentrations. UDF2 ($p= 4.06\times10^{-6}$) and UDF3 ($p= 1.12\times10^{-6}$) have the highest statistically significant correlations (n=184) among the various UDFs used in this study.

Despite the fact that to have better interpretation in eutrophication other additional approaches, such as carbon stable isotope, may be helpful, due to the coincident increase in OM concentrations and decrease in C/N ratios, magnification in in-lake derived organic matter in recently deposited sediment of sites ON36, ON13, ON30, ON02, and ON17 are more likely. Therefore, eutrophication is probable in these locations of Lake Ontario. More than 80% of the samples have C/N ratio of less than 10, which reveals that the majority of organic matter deposition in this system has an in-lake derived source [139, 274, 284-286]. Thus, this lake can be susceptible to eutrophication as described before.

Black carbon deposited to Lake Ontario is coming from mixed sources of fossil fuel and biomass burning. Sediments deposited earlier in the eastern basin have higher BC/OC ratios than those of deposited recently; hence, improvements in the technology of fuel burning led to the reduction of BC from airborne emission sources to this lake.

Due to the coincident increase in OM concentrations and decrease in C/N ratios in Lake Erie, magnification in in-lake derived organic matter in recently deposited sediment of sites ER73, ER37, and ER92are more likely. Therefore, eutrophication is probable in these locations of Lake Erie. More than 80% of the samples have C/N ratio of less than 10, which reveals that the majority of organic matter deposition in this system has an in-lake derived source [139, 274, 284-286]. Thus, similar to Lake Ontario, this lake can also be vulnerable to eutrophication as described before.

Almost 60% of the overall ratios of BC/OC in Lake Ontario are higher than 10%. The highest overall BC/OC ratios were found in old sediments of ER15, which is located in the eastern part of this lake. Most of the sections of the cores collected in ER73, ER09, and ER37 also have BC/OC of more than 10%.

These high ratios of BC/OC supports that emissions from anthropogenic sources are the main reason of BC deposition in Lake Erie.

All of the overall ratios of BC/OC in Inland Lakes are less than 10%. The highest overall BC/OC ratios were found in sites I1 that is located in the middle of Lake Siskiwit. Ren et al. demonstrated that BC/ TOC ratios of less than 0.11 and higher than 0.5 are contributed to incomplete combustion of biomass and fossil fuel, respectively [219]. Therefore, the black carbon deposited to Inland Lakes is coming from the biomass burning. All of the samples have C/N ratio of more than 10, which reveals that the majority of organic matter deposition in them does not have an algal derived source [139, 274, 284-286].

This study has provided a comprehensive view in the history of BC, OC, TN, and OM deposition, relationships of selected SV-PBTs and BC, and signals of eutrophication in the Great Lakes. Further research in study of more specific sources of OM deposition using other analytical methods such as stable isotope analysis, sterol composition determination, lignin derivatives measurement, and biogenic silica analysis in sediments of the Great Lakes are suggestive to increase the possibility of likely eutrophication, which was described above.

Chapter 6 . Summary and Conclusion

The Laurentian Great Lakes are a collection of five of the largest lakes in the world (Lakes Superior, Michigan, Huron, Erie and Ontario from west to east). The lakes are by far the largest freshwater ecosystem on earth; comprising over one-fifth of the world's surface freshwater. The Great Lakes are also important economically as a major source of drinking water, food, recreation, employment, and transportation to more than 35 million people (one-third of the Canadian population and one-tenth of the U.S. population). The very large surface area to volume ratio of the Great Lakes (nearly two orders of magnitude higher than that of the oceans) makes them particularly sensitive to airborne pollution. Because water outflows from the Great Lakes are relatively small compared to the total volume (<1% per year), persistent pollutants (those that do not degrade) that enter the lakes tend to accumulate in the system. Sediment often acts as the final reservoir for hydrophobic contaminants, particularly for the class of compounds designated by the USEPA as persistent, bioaccumulative toxic compounds (PBTs).

Black carbon (BC) is defined as a form of relatively inert condensed graphitic carbon resulting from incomplete combustion [144]. It includes a range of materials from extremely poly-aromatic to elemental or graphitic carbon [145], and has been released into the atmosphere in high quantities since the start of the industrial revolution [146]. BC is a valuable proxy for reconstructing of the past anthropogenic and natural combustion processes. Most portion of black carbon emission in the North America is originated in the eastern part of the United States, and specifically Great Lakes basin [169]. Therefore, we compared the results of temporal loading trends of BC to our system with the previous studies in emission of black carbon from various sources in North America [169], and from fossil-fuel in the United States [197].

We investigated the temporal and spatial loading of BC into the upper Great Lakes, including Lakes Superior, Michigan, and Huron, during the last 100 years. In total, 647 sections from 28 coring sites were collected from the upper Great Lakes. In Lake Michigan, the highest BC concentrations have been found in sites M008, M009, M011, and M018 in the southern part of the lake; while, In Lake Superior, the highest levels of black carbon were found in sites S008, S011, and S022. The concentrations of BC in

Lake Huron are in the range of what we found in Lake Michigan. The highest BC levels in this lake are found in H001 which is located in the highly industrialized region of Saginaw Bay. Having received influences from Saginaw Bay, this site has the highest average of BC concentration (4.47 mg/g) among all sites in the upper Great Lakes.

In Lake Michigan, the highest values of BC flux were measured in site M009 in the southern part, owing to influences from populated, industrial regions of northern Indiana and Chicago. The trend of BC emission in North America shows a consistency with the depositional fashion of black carbon M009, where both are peaking around 1925. Lake Superior is surrounded by much less population and industrial activities than the other two lakes; therefore, it is anticipated to gain the least flux of black carbon among the upper Great Lakes. The results of our study are consistent with this hypothesis, and have been exhibited that the flux of BC through Lake Superior, in almost every site, is less than the other two lakes of this study, excluding S008 and S022.

Lake Huron BC fluxes are in the similar order of Lake Michigan, except for Saginaw Bay. Based on our study, the site H001 in this bay is receiving the highest quantities of black carbon in the upper Great Lakes during the last fifty years. The second highest BC deposition, in recent years, took place in sites H006, H012, and H032 that are located in the southern part of the lake, and are more prone to receive the BC aerosols from industrialized, populated districts of Detroit and Ann Arbor.

The ratio of black carbon to total organic carbon (BC/TOC) has been widely used as a proxy of the emission source of black carbon [170, 211, 218-220]. Generally, the BC/TOC ratios of higher than 10% are discovered in urban regions, while the lower ratios of 4-8% are found in remote areas, such as alpine lakes [211, 218]. In Lake Michigan, almost 50% of the overall ratios of BC/TOC are higher than 10%. Excluding the irregular depositional trend of BC in H032 before industrialization, the highest overall BC/TOC ratio of 10-24% in a core was found in site M008 which is the closest location to the extremely industrial district of the northern Indiana and metropolitan area of Chicago. These high ratios of BC/TOC supports that emissions from anthropogenic sources are the main reason of BC deposition in the southern

basin of Lake Michigan. BC/TOC in Lake Superior samples are ranging from 0.2% to 14%, and almost all of the samples are located below the BC/TOC ratio of 10%, except sediment deposited during the last 100 years in sites S008 and S022. Hence, the anthropogenic emissions are the main source of black carbon deposition in these two sites, likely from Duluth and Chicago. In general, almost 65% of the samples have the BC/TOC ratio of less than 5%, which is the nature of remote lakes that receive fewer influences from human actions. The amount of human contribution to deposition of BC to Lake Huron is relatively similar to Lake Michigan. The range of BC/TOC ratio in this lake is from 3%, in ancient sediments, to 30%, in sediments deposited during the twentieth century and in sites H048, H038, and H061. The high values of the ratio in site H048 is consistent with our previous finding of magnified fluxes of black carbon during the last century until implementation of CAA.

Although the average temporal BC flux to Lake Superior is much less than the other two lakes, owing to its large area, the loading of black carbon to this lake is comparable to Lake Michigan and Lake Huron. However, the former two lakes have the larger involvement to the total loading of BC to the system. The overall loading peaks in World War II period, which can support the enhanced industrial activities to maintain war efforts during that epoch [225, 227]. After that time with the legislation and initiation of Air Pollution Control Act in 1955, and CAA in 1963, the obvious incline in the total loading of BC to the system is observable [226, 228]. Novak et al. also estimated the declining trend in BC emission in the United States between 1965 and 1985, due to improvements in technology of combustion [197]. Thus, it can be concluded that such governmental actions, along with improvements in the technology of combustion processes, in controlling the emissions of BC were effective in decreasing of its deposition to the upper Great Lakes. It is evident that the results of the depositional trends of this study recorded the signal of the peak in emission estimates from previous studies during 1940-1950. In addition, the decreasing trend of BC deposition in this study is consistent with its fashion of emission in both of the United Sates and North America [169, 197].

Although direct water-phase discharges of pollutants to the Great Lakes have been greatly diminished over the last few decades, volatile and semi-volatile PBTs (SV-PBTs) also reach the lakes through air transport and deposition onto the water surface, with subsequent sedimentation to the bottom. Black carbon (BC), organic carbon (OC) and organic matter (OM) are well known to strongly sorb hydrophobic compounds like SV-PBTs in aqueous systems. One of the key factors that affects the fate and behavior of contaminants in the sediments is sorption. An accountable proxy for the absorption of contaminants in sediments is amorphous organic matter relatively homogenous, lipophilic and gel-like matrix [242] [243]. Above all, black carbon (BC) is an important type of carbonaceous geosorbents elaborated in influencing the general fate of PBTs in sediments, to some extent thanks to its porous medium [244]. [245].In the sediment system, robust bonding between contaminants and BC may restrict the transport of HOCs into the water column, and consequently may reduce the risk of a subsequent release of these pollutants into the environment and decrease their bioavailability [142, 246-250]. Conversely, BC may be influential as a vector for co-deposition of SV-PBTs, if BC sorbs the pollutant in a gaseous phase before settling to sediment [249]. We found more significant correlations between those selected organic pollutants and BC which increases the probability of the potential for BC to sorb SV-PBTs in gaseous systems. In contrast, almost no correlation was observed between OC and OM and the SV-PBTs indicating that in-lake OM production does not affect SV-PBT loading.

In general, Lake Superior is receiving less black carbon than the other Great Lakes, except in two sites of S022 and S008. High BC deposition in S022, adjacent to Duluth, can be triggered by human-related activities in this city, specifically large volume of merchandise shipping that is known as a highly polluting industry [1, 224]. The high amount of BC and some other organic pollutants received in S008 in the middle of the Lake Superior has been found before by Buckley et al. [174] and James et al. [215]. S008 is located in the deepest part of the upper Great Lakes, where the depth at this site is 300 meters, and has the lowest sedimentation rate found in our study (0.0067 $g/cm^2/y$). According to Lohmann et al. and Huang et al., persistent and stubborn materials can be enriched in the sediments of the lake, when the

rate of deposition is very low [167, 170]. Hence, accumulation of the more recalcitrant compounds, such as BC and persistent organic chemical, from the other part of the lake to this deep area may be another explanation for high BC deposition in this site.

In the first half of the 20th century, the consistent increase in the quantity of deposited black carbon to this lake is evident, until it touched its maximum value in the 1960's. This highest loading of BC to Lake Superior coincides with the peak of population in Duluth [216], which can unearth the role of BC emissions from this city in total loading of black carbon to Lake Superior. In the second half of the previous century, the loading of black carbon to this system dropped gradually by 23%, from 1960 to 1990. This can reveal the influences of BC emission reduction practices, such as improvements in the technology of combustion during 1965-1985 [197], Air Pollution Control Act in 1955 [228], and Clean Air Act (CAA) in 1963 [226]. The loading of BC to Lake Superior started to rise again from 2000 to 2010. According to the US Energy Information Administration, energy consumption in the United States from all sources, such as coal, petroleum, and natural gas, has been increased from 1990 to 2007 [257]. This may affect the emission of black carbon and its loading to Lake Superior.

Generally, the quantity of the deposited BDE209 to Lake Superior is almost two orders of magnitude higher than that of the other $\sum_8$ PBDEs. While the application of BDE209 had been banned in many European countries, its use was permitted in the United States, and merely some states decided to phase out this chemical in recent years [260, 261]; hence, this can explain the reason of increasing in the quantities of deposited BDE209 to Lake Superior. Normally, the amount of the $\sum_{58}$ PCBs loaded to this lake is almost two to three times higher than that of the selected $\sum_7$ OCPs. In the second half of the past century, $\sum_{58}$ PCBs reached to its peak in the 1990's, while the utmost loading value of $\sum_7$ OCPs found in the 1980's. The application of the PCBs has been banned in the United States, since 1976. However, the average value of this group peaked in the 1990's in the sediments of Lake Superior [258], which approves the persistent nature of such compounds. The U.S. Environmental Protection Agency limited or prohibited the use of OCPs in crops around 1980's [259], and this can be influential in the decreasing

trend of these compounds in the sediments of Lake Superior. The amount of the loading for $\sum_6$ PCDDs (peaked in the 1980's) to this lake is relatively higher than that of the other $\sum_{10}$ PCFDs (peaked in the 1990's).

In the temporal depositional trends, the most statistically significant correlations were found with the PCDD/Fs category. Conversly, most OCPs were not strongly correlated with BC flux, with the exception of p,p'-DDE. For most of the selected SV-PBTs, BC correlations were observed in both spatial and temporal analyses in Lake Superior.

The amount of the loading for BDE209 to Lakes Michigan and Huron (excluding Saginaw Bay) is quite higher than that of the other $\sum_8$ PBDEs. The slope of the increasing trend of loading for BDE209 and $\sum_8$ PBDEs declined in 1980 and 2000, respectively. The amount of the loading for $\sum_6$ PCDDs (peaked in the 1970's) to this system is comparatively higher than that of $\sum_{10}$ PCDFs (peaked in the 1960's).

Under the 1987 Great Lakes Water Quality Agreement, Saginaw Bay was designated as an Area of Concern (AOC). Municipal, industrial and storm water discharges, industrial waste discharges, combined sewer overflows, and agricultural and urban runoff are the sources of various pollutants in Saginaw River and Bay [1, 263, 264]. Although the ratio of the surface of this bay to the surface of the previous system (Lake Michigan and Lake Huron excluding Saginaw Bay) is 3%, the ratios of the loadings of BDE209, $\sum_8$ PBDEs, $\sum_6$ PCDDs, and $\sum_{10}$ PCDFs in this bay to those of previous system was always higher than the surface ratios. Therefore, in addition to airborne emissions, other sources of discharges have drastic effects on loading of contaminants to this [263], and this area plays a key role in total loading of pollutants to the upper Great Lakes.

The fluxes of BDE 209, $\sum_8$ PBDEs, and $\sum_{10}$ PCDFs showed a statistically significant correlation with the flux of black carbon in Lake Michigan. However, the flux of $\sum_6$ PCDDs does not have significant correlation with the BC flux in this lake (P-value =0.28). The fluxes of BDE209, $\sum_6$ PCDDs, $\sum_8$ PBDEs, and $\sum_{10}$ PCDFs revealed a statistically significant correlation with the flux of black carbon in Lake Huron

(excluding Saginaw Bay). In Saginaw Bay, only the flux of BDE209 was correlated with the flux of BC; however, it has reverse relationship with the flux of BC, where the slope of the correlation was -11.9 (ng BDE209/mg BC). The other categories did not have statistically significant correlation with the flux of BC in Saginaw Bay. Taking to consideration that direct discharge from Saginaw River was the main source of pollution in this bay [1, 263, 264], the lack of significant correlations with flux of PBTs and BC, as a representative of airborne emissions, was anticipated in Saginaw Bay.

To measure anthropogenic impacts on local ecosystems and reconstruct historical environmental conditions, organic matter (OM) and its molecular compositions that deposited in lake sediments has been used widely [139]. The progression of environmental alterations in the Great Lakes region was initiated around 1700 by the settlement of European, and accelerated after completion of the Erie Canal in 1825. Some parts of the Great Lakes changed from oligotrophy to eutrophy, when the loading of nutrients was boosted due to anthropogenic activities, such as growing metropolitan areas, establishing heavily concentrated industrial sites in their basins, and clear-cutting of forests to make more farmland. Upsurges in the mass accumulation rates (MARs) of total organic carbon (TOC), $^{13}C/^{12}C$ ratio, and decrease in C/N ratio have been extensively directed to an augmented productivity in aquatic ecosystems [265-270].

The similar trends of OC and TN depositions for S019 and S022, as well as the consistency of the peaks in 1960 for both sites with the peak in the population of Duluth, show the probable influence of this city in the deposition of OC and TN to Lake Superior. From 1960 to 1990, the flux of OC and TN dropped in both of S019 and S022, where the implementation of clean water act (CWA) in the 1970's or OM diagenesis can be reasons of this decrease in organic carbon flux in the western part of this lake. From 1860 to 2010, the ratio of C/N decreased in both of the closest sites to Duluth (S022 and S019), while the OM concentration fluctuated. Therefore, if the oscillations in OM levels were due to the diagenesis, because of the consistent decrease in C/N ratio, moderate eutrophication is likely in these two sites in the western part of Lake Superior.

From 1900 to 2010, the level of organic matter in sites S011 and S012 raised by 67% and 25%, while, in the same period of time, the C/N ratios dropped consistently by 22% and 15%, respectively. These two sites are also located in a relatively deep part of the lake, with the depth of 230 m (S011) and 240 m (S012), which reduces the probability of sediment bio-turbation and decomposition [139]. Hence, the evidences of probabale eutrophication are found again in sites close to Thunder Bay. More than 80% of the samples have C/N ratio of less than 10, which reveals that the majority of organic matter deposition in this system has an in-lake derived source [139, 274, 284-286].

From 1550 to 2010, the ratio of C/N decreased in both sites of H061 and H038, while the OM concentration increased continually. In H038 of the central part of Lake Huron, the source of organic matter was less inland derived before 1700; whereas, after that time, the regime of OM deposition changed, where C/N ratio dropped extremely. From 1910 to 2010, OM levels amplified almost 3-4 times, in both sites of H061 and H038, which cannot be merely due to sediment diagenesis over the period of 100 years, and in depths of more than 100 meters of those two sites. In H061 of the northern part of the lake, a simultaneous decrease in C/N ration and increase in OM levels, once again, approves the probable eutrophication in these two sites. In H037, the OM concentration, in the first 30 cm of the collected core, increased 3.6 times, while C/N ratio dropped from the value of more than 10 to 7; thus, the evidence of eutrophication is found in this site, again. In H001, although the simultaneous increase in OM and decrease in C/N is evident, for concluding the probable eutrophication we need to have more evidences, such as carbon stable isotope, because OM level increased by 25% during the period of 40 years, and this site is located in a shallow part of the lake with the depth of 12.7 m [139]. The rate of increase in the loading of OM to Lake Huron (excluding Saginaw Bay) has been decreased during the past 50 years, which discloses the power of implementation of governmental actions, such as CWA, in restricting the probable eutrophication by reducing the nutrient loadings to the lakes. The loading of organic matter to Saginaw Bay increased by 8% from 1970 to 1980, and from 1980 to 1990 had been decreased by of 2%.

Then, from1990 to 2000, it raised again by 22%, and after 2000 to 2010, dropped again by 3%. Hence, the controls in reduction of nutrient loadings to restrict the eutrophication in this bay were influential.

The highest concentration of OM in the system of the Great Lakes, excluding Inland Lakes, was found in site M50 (144 mg/g), which is located in Green Bay of Lake Michigan. In Lake Michigan, concentrations of OM in the northern part of the lake were higher than that of the southern part. The second highest levels of OM concentrations were found in the eastern part of Lake Ontario. Also, in Lake Huron, a relatively high concentration of organic matter has been measured in a grab sample collected in Saginaw Bay (80 mg/g), and the southern part of this lake has higher concentrations of OM that those of the northern sector. Although the average of OM concentrations in Lake Superior was higher than that of Lake Huron, the amount of OM flux received by Lake Huron was higher than that of Lake Superior, due to higher sedimentation rates in Lake Huron. Since we are expecting the highest sedimentation rates to happen in Lake Erie, the flux of OM in this lake will be the highest measured in the Great Lakes ecosystem.

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Due to the coincident increase in OM concentrations and decrease in C/N ratios in Lake Erie, magnification in in-lake derived organic matter in recently deposited sediment of sites ER73, ER37, and ER92are more likely. Therefore, eutrophication is probable in these locations of Lake Erie. More than 80% of the samples have C/N ratio of less than 10, which reveals that the majority of organic matter deposition in this system has an in-lake derived source [139, 274, 284-286]. Thus, similar to Lake Ontario, this lake can also be vulnerable to eutrophication as described before.

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All of the overall ratios of BC/OC in Inland Lakes are less than 10%. The highest overall BC/OC ratios were found in sites I1 that is located in the middle of Lake Siskiwit. Ren et al. demonstrated that BC/TOC ratios of less than 0.11 and higher than 0.5 are contributed to incomplete combustion of biomass and fossil fuel, respectively [219]. Therefore, the black carbon deposited to Inland Lakes is coming from the biomass burning. All of the samples have C/N ratio of more than 10, which reveals that the majority of organic matter deposition in them does not have an algal derived source [139, 274, 284-286].

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Appendix A

Table A.1. Sampling Locations and Relevant Information in Lake Michigan

Location	Sample	Date	Time CDT [1]	Latitude (D)	Longitude (D)	Depth (m) [2]	Grab	Core Seg't
M028	MC,PG,WPF	5/23/2011	18:16	43.8000	-86.8005	133.3	1	17
M041	MC,PG,WPF	5/24/2011	0:51	44.7367	-86.7213	265.6	1	20
M116	PG	5/24/2011	9:25	45.4008	-85.4995	36.0	1	0
M125	PG	5/24/2011	11:40	45.7225	-85.3317	16.4	1	0
S001	MC,PG,WPF	5/25/2011	4:49	46.9930	-85.1612	95.4	1	25
S002	MC, PG	5/25/2011	8:31	47.3603	-85.6208	153.7	1	25
S102	PG	5/25/2011	10:58	47.6173	-85.6973	92.4	1	0
S105	PG	5/25/2011	13:51	47.6177	-86.3217	80.8	1	0
S008	MC, P, WPF	5/25/2011	16:08	47.6058	-86.8177	300.7	1	25
S104	PG	5/25/2011	20:47	48.0382	-86.3217	188.8	1	0
S108	PG	5/25/2011	23:07	48.0392	-86.9493	226.7	1	0
S009*	MC,PG	5/26/2011	2:21	48.4392	-87.0823	-	-	-
S120	PG	5/26/2011	14:12	47.6185	-90.0712	178.1	1	0
S019	MC,PG,WPF	5/26/2011	17:47	47.3703	-90.8535	187.8	1	25
S022	MC, PG	5/26/2011	23:43	46.8002	-91.7508	54.5	1	25
S121	PG	5/27/2011	7:27	47.1955	-90.0727	146.0	1	0
S119	PG	5/27/2011	10:04	47.1955	-89.5048	196.5	1	0
S016	MC, PG	5/27/2011	12:58	47.6212	-89.4633	180.0	1	25
S118	PG	5/27/2011	16:37	47.6175	-88.8420	188.8	1	0
S117	PG	5/27/2011	19:44	47.6175	-88.2007	269.5	1	0
S012	MC, PG	5/27/2011	21:52	47.8553	-88.0418	238.4	1	26
S116	PG	5/28/2011	0:52	48.0392	-88.2007	254.0	1	0
S011	MC, PG	5/28/2011	3:38	48.3438	-87.8250	229.6	1	25
S112	PG	5/28/2011	6:42	48.0393	-87.5733	216.0	1	0
S113	PG	5/28/2011	9:35	47.6177	-87.5730	171.2	1	0
S106	PG	5/28/2011	12:44	47.1807	-87.3183	218.9	1	0
S110	PG	5/28/2011	15:57	46.7735	-86.9495	138.2	1	0
S114**	MC,PG,WPF	5/29/2011	17:56	46.9095	-86.5980	398.0	1	26
S103	PG	5/29/2011	0:41	46.9838	-85.6972	164.4	1	0
Total							**28**	**264**

Notes:

(1) Arrival Time CDT is (Arrival Time GMT – 5 hours).

(2) Latitude and Longitude data were obtained directly from the R/V Lake Guardian ship log at the moment the spider sampler or surface grab was deployed.

(3) Adjusted depth is (Measured Depth × 0.973), according to Captain's instructions.

* Originally planned coring station, aborted due to weather. ** Added station.

Table A.2. Sampling Information for the main basin of Lake Huron (trip 1 on September 14-19, 2012)

Location	Sample	Date Time CDT [1]	Latitude[2]	Longitude[2]	Depth (m) [3]	Grab	Core Seg't
H101	PG	9/15/2012 14:14	43.2690	82.3349	31	1	-
SOTXD	PG	9/15/2012 14:45	43.3399	82.3335	37	1	-
SOTXM	PG	9/15/2012 16:09	43.3398	82.4668	19.6	1	-
SOTXS	PG	9/15/2012 16:57	43.3397	82.4991	12.1	1	-
H006	PG, MC	9/15/2012 19:40	43.5265	82.0185	62	1	25
H102	PG	9/15/2012 22:59	43.7059	82.4039	53	1	-
H012	PG, MC	9/16/2012 0:40	43.9007	82.1130	99	1	25
H103	PG	9/16/2012 3:03	44.1449	82.2209	99	1	-
H104	PG	9/16/2012 5:06	44.3720	81.8380	132	1	-
H032	PG, MC	9/16/2012 7:17	44.3542	82.3596	94	1	25
H027	PG	9/16/2012 9:42	44.0999	82.5025	65	1	-
H095	PG, MC	9/16/2012 11:43	44.3328	82.8326	70	1	25
H109	PG	9/16/2012 13:53	44.1502	83.0000	35	1	-
H002*	PG, MC	9/16/2012 15:17	44.1249	83.3324	18.8	1	-
H001	PG, MC	9/16/2012 17:29	43.9374	83.6142	12.7	1	25
H110	PG	9/16/2012 19:18	43.7723	83.8037	6.72	1	-
H108	PG	9/17/2012 0:42	44.5574	83.0502	55	1	-
H118	PG	9/17/2012 2:48	44.9168	83.1660	46	1	-
H037	PG, MC	9/17/2012 4:37	44.7619	82.7836	76	1	24
H107	PG	9/17/2012 7:12	44.6154	82.5541	66	1	-
H038	PG, MC	9/17/2012 8:49	44.7507	82.2024	166	1	25
H048cast2	PG, MC	9/17/2012 13:47	45.2614	82.5912	183	1	25
H048cast1#	PG, MC	9/17/2012 13:47	45.2614	82.5912	183		25
H119.5	PG	9/17/2012 16:49	45.3977	82.8107	135	1	-
H054*	PG, MC	9/17/2012 19:31	45.6338	83.4028	142	1	-
H061	PG, MC	9/18/2012 0:58	45.7498	83.9164	122	1	25
H123	PG	9/18/2012 3:02	45.9365	83.9059	30	1	-
H124	PG	9/18/2012 5:13	45.8512	84.4216	57	1	-
Total						**27**	**249**

Notes :

(1) Date Time CDT = "On Station" Date Time GMT (from R/V Lake Guardian's bridge record) minus 5 hours.

(2) Latitude and Longitude data are calculated from the "On Station" entries of the R/V Lake Guardian's bridge record. Reading in degree and minute was converted to degree.

(3) Water depth data are from the "On Station" entries of the R/V Lake Guardian's bridge record.

* H002 and H054 were planned for coring. However, H002 was all sand thus no core was collected. H054 was abandoned after nine failed MC deployments for unknown reasons.

Core samples were placed in jars and tubes labeled for H054.

Table A.3. Sampling Information for the Georgian Bay (GB), North Channel (NC) and Thunder Bay (TB) of Lake Huron (trip 2 from October 4-7, 2012)

Location	Sample	Date Time CDT [1]	Latitude[2]	Longitude[2]	Depth (m) [3]	Grab
H121	PG	10/4/2012 13:49	45.8189	83.4039	45	1
NC68	PG	10/4/2012 16:23	46.0413	83.8536	16.4	1
NC70	PG	10/4/2012 17:38	46.1365	83.6720	21.7	1
NC71	PG	10/4/2012 18:39	46.2335	83.7462	36	1
NC73	PG	10/4/2012 20:25	46.1869	83.3552	19.2	1
NC76	PG	10/4/2012 21:44	46.0003	83.4329	60	1
NC77	PG	10/4/2012 22:55	45.9704	83.1977	80	1
NC79	PG	10/5/2012 0:50	46.1230	82.8867	26.2	1
NC82	PG	10/5/2012 2:17	45.9369	82.7588	28.4	1
NC84	PG	10/5/2012 3:40	46.0917	82.5564	36	1
NC83	PG	10/5/2012 4:52	46.0000	82.5497	31	1
NC87	PG	10/5/2012 6:28	46.0611	82.1971	41	1
NC89	PG	10/5/2012 7:36	45.9165	82.1617	39	1
NC88	PG	10/5/2012 8:57	46.0553	81.9998	37	1
GB42	PG	10/5/2012 11:32	45.9125	81.5954	26	1
GB39	PG	10/5/2012 13:09	45.8729	81.2584	26.9	1
GB36	PG	10/5/2012 15:04	45.7082	81.6201	54	1
GB35	PG	10/5/2012 16:22	45.5257	81.6705	37	1
GB29	PG	10/5/2012 18:55	45.5836	81.0830	44	1
GB26*	PG	10/5/2012 20:41	45.8335	80.9000	21.3	0
GB24	PG	10/5/2012 21:22	45.7457	80.8394	31	1
GB17	PG	10/6/2012 0:11	45.2449	80.8742	80	1
GB12	PG	10/6/2012 2:36	44.9202	80.8748	91	1
GB01	PG	10/6/2012 4:03	44.7178	80.8564	93	1
GB03	PG	10/6/2012 5:29	44.7253	80.6170	34	1
GB06	PG	10/6/2012 6:34	44.7382	80.4360	88	1
GB04	PG	10/6/2012 8:08	44.6457	80.1673	59	1
GB05	PG	10/6/2012 9:20	44.7969	80.2431	60	1
GB09	PG	10/6/2012 11:53	44.8716	79.9675	29.9	1
GB08*	PG	10/6/2012 13:08	44.9527	80.1484	52	0
TB01	PG	10/7/2012 3:38	44.8996	83.1496	50	1
TB02	PG	10/7/2012 4:28	44.9387	83.2405	31	1
TB03	PG	10/7/2012 5:07	44.9552	83.2770	18.6	1
TB04	PG	10/7/2012 5:46	44.9997	83.3742	10.3	1
Total						**32**

Notes: **Bold** font indicates planned stations for laboratory work. Samples from other stations were collected for archive purpose.

(1)-(3): See footnotes of Table A2.

* GB26: no sediment was collected due most likely to the hard rock. GB08: no sediment was collected after 3 tries with bad weather conditions. Planned sites GB11, GB20, H116, and H117 were skipped due to bad weather.

Table A.4. Sampling Information for Lake Ontario (July 23-25, 2013)

Location	Sample	Date Time EST (1)	Latitude(2)	Longitude(2)	Depth (m) (3)	Grab	Core Seg't
ON24	PG	7/23/2013 9:30	43.36184	-77.50046	124	1	
ON25	PG/MC	7/23/2013 10:30	43.41779	-77.37624	206	1	25
ON22	PG	7/23/2013 13:00	43.61037	-77.37583	153	1	
ON21	PG	7/23/2013 14:30	43.54190	-77.68553	178	1	
ON19	PG	7/23/2013 15:32	43.39979	-77.81943	75	1	
ON17	PG/MC	7/23/2013 17:01	43.58970	-78.01394	188	1	25
ON15	PG	7/23/2013 19:35	43.56001	-78.16581	191	1	
ON13	PG/MC	7/23/2013 20:20	43.54177	-78.31532	186	1	25
ON12	PG	7/23/2013 21:10	43.42996	-78.41490	88	1	
ON10	PG	7/23/2013 23:35	43.48528	-78.65563	159	1	
ON08	PG	7/24/2013 1:00	43.35657	-78.93906	81	1	
ON06	PG/MC	7/24/2013 1:45	43.33537	-79.07048	71	1	23
ON04	PG	7/24/2013 4:05	43.24693	-79.42001		1	
ON01	PG	7/24/2013 5:30	43.30384	-79.73377	25.4	1	
ON03	PG	7/24/2013 7:30	43.58201	-79.41491	53	1	
ON02	PG/MC	7/24/2013 8:50	43.37063	-79.35325	104	1	25
ON05	PG	7/24/2013 11:10	43.51749	-79.07975	140	1	
ON07	PG	7/24/2013 12:00	43.64909	-79.04070	117	1	
ON09	PG	7/24/2013 13:05	43.59795	-78.80092	141	1	
ON11	PG	7/24/2013 14:40	43.75871	-78.51475	86	1	
ON14	PG	7/24/2013 16:00	43.83543	-78.20456	84	1	
ON16	PG	7/24/2013 17:05	43.71820	-78.02556	132	1	
ON18	PG	7/24/2013 18:00	43.68174	-77.84817	150	1	
ON20	PG	7/24/2013 19:21	43.87267	-77.71173	53	1	
ON23	PG	7/24/2013 20:30	43.78730	-77.44974	59	1	
ON27	PG	7/24/2013 22:20	43.73275	-77.01319	90	1	
ON34	PG	7/25/2013 0:30	43.89586	-76.54845	58	1	
ON35	PG	7/25/2013 1:15	43.99425	-76.48833	50	1	
ON36	PG/MC	7/25/2013 1:55	44.07721	-76.41123	26.6	1	25
ON31	PG	7/25/2013 4:30	43.74726	-76.60203	82	1	
ON37	PG	7/25/2013 6:02	43.58327	-76.33246	47	1	
ON33	PG	7/25/2013 7:05	43.59881	-76.54770	160	1	
ON32	PG	7/25/2013 7:47	43.49209	-76.58170	63	1	
ON28	PG	7/25/2013 8:32	43.56446	-76.71115	214	1	
ON30	PG/MC	7/25/2013 9:30	43.54201	-76.90134	226	1	25
ON29	PG	7/25/2013 14:14	43.39509	-76.87082	75	1	
ON26	PG	7/25/2013 15:10	43.45830	-77.07130	236	1	
Total						**37**	**173**

(1) Date Time EST = "On Station" GMT (from *R/V Lake Guardian*'s bridge record) minus 6 hours.

(2) Latitude and Longitude data are calculated from the "On Station" entries of the *R/V Lake Guardian*'s bridge record. Reading in degree and minute was converted to degree.

(3) Water depth data are from the "On Station" entries of the *R/V Lake Guardian*'s bridge record.

Table A.5. Sampling Information for Lake Erie (May 27-30, 2014)

Stations	Sample	Date Time EST[1]	Latitude[2]	Longitude[2]	Depth[3] (m)	Grab	Core tubes	Core[4] length	Core Seg
ER26	PG	5/27/2014 19:25	41.6729	-82.1004	20	1			
ER06	PG	5/27/2014 20:45	41.4762	-82.1842	7.15	1			
ER23	PG	5/27/2014 22:23	41.5746	-82.5184	13.9	1			
ER98	PG	5/28/2014 0:18	41.5833	-82.9163	7.54	1			
ER58	PG	5/28/2014 0:57	41.6847	-82.9335	9.83	1			
ER59	PG	5/28/2014 2:00	41.7269	-83.1494	8.43	1			
ER20	PG	5/28/2014 2:43	41.7604	-83.3065	6.69	1			
ER04	PG	5/28/2014 3:27	41.7019	-83.4488	10.3	1			
ER05	PG	5/28/2014 5:10	41.8915	-83.3074	5.62	1			
ER60	PG	5/28/2014 5:52	41.8922	-83.1959	8.76	1			
ER21	PG	5/28/2014 6:40	41.9783	-83.1879	5.9	1			
ER61	PG	5/28/2014 7:40	41.9466	-83.0454	9.49	1			
ER22	PG	5/28/2014 8:45	41.8210	-83.0769	10.1	1			
ER91	PG	5/28/2014 9:30	41.8418	-82.9163	10.8	1			
ER92	PG, MC	5/28/2014 11:14	41.9506	-82.6867	11.6	1	8	48.6	23
ER25	PG	5/28/2014 13:46	41.8760	-82.3292	16.9	1			
ER42	PG	5/28/2014 15:11	41.9654	-82.0410	23.3	1			
ER43	PG	5/28/2014 16:30	41.7885	-81.9461	23.2	1			
ER73	PG, MC	5/28/2014 18:10	41.9778	-81.7571	25.3	1	7	51.3	24
ER36	PG	5/28/2014 20:18	41.9353	-81.4779	24.3	1			
ER37	PG, MC	5/28/2014 21:55	42.1097	-81.5748	25.2	1	8	49.4	24
ER38	PG	5/28/2014 23:22	42.2820	-81.6717	23	1			
ER30	PG	5/29/2014 1:31	42.4298	-81.2055	21.9	1			
ER31	PG	5/29/2014 2:40	42.2536	-81.1075	23	1			
ER81	PG	5/29/2014 4:50	42.3542	-80.8079	21.8	1			
ER82	PG	5/29/2014 7:05	42.4648	-80.3604	19.5	1			
ER15	PG, MC	5/29/2014 9:50	42.5171	-79.8930	65	1	11	47.5	21
ER93	PG	5/29/2014 11:52	42.6164	-80.0002	43	1			
ER10	PG	5/29/2014 13:11	42.6803	-79.6922	34	1			
ER83	PG	5/29/2014 14:10	42.8236	-79.5808	16.7	0			
ER85	PG	5/29/2014 15:31	42.8499	-79.2503	16	0			
ER86	PG	5/29/2014 17:03	42.8787	-78.9037	6.96	0			
ER84	PG	5/29/2014 19:16	42.7052	-79.2665	23.2	1			
ER09	PG, MC	5/29/2014 21:45	42.5387	-79.6163	51	1	4	48.2	22
ER99	PG	5/29/2014 22:54	42.4170	-79.5834	33	1			
ER63	PG	5/30/2014 0:01	42.4173	-79.7991	49	1			
ER03	PG	5/30/2014 1:54	42.1357	-80.1106	7.57	1			
ER95	PG	5/30/2014 5:25	42.0000	-80.6666	17.5	1			
ER07	PG	5/30/2014 6:22	41.9126	-80.7964	8.24	1			
ER32	PG	5/30/2014 7:42	42.0817	-81.0113	23.4	1			
ER78	PG, MC	5/30/2014 9:13	42.1168	-81.2501	24	1	8	47.5	20
ER29	PG	5/30/2014 11:08	41.8237	-81.3076	19.1	1			
ER28	PG	5/30/2014 12:22	41.8061	-81.6075	23.1	1			
ER27	PG	5/30/2014 13:22	41.6756	-81.7518	21.1	1			
ER02	PG	5/30/2014 14:25	41.5091	-81.7135	7.51	1			

(1) Date Time EDT = "On Station" GMT (from *R/V Lake Guardian*'s bridge record) minus 4 hours.

(2) Latitude and Longitude data are calculated from the "On Station" entries of the *R/V Lake Guardian*'s bridge record. Reading in degree and minute was converted to degree.

(3) Water depth data are from the "On Station" entries of the *R/V Lake Guardian*'s bridge record.

(4) Average length of subcores measured before sectioning.

Appendix B

Table B.1. Sampling date, time, coordination, depth, and number of sections in the collected cores

Location	Date	Time CDT [1]	Latitude (D) [2]	Longitude (D) [2]	Depth (m) [3]	Core Seg't
M024	9/17/2010	11:22:54 PM	43.483003	-87.488167	150	20
M032	9/18/2010	6:09:56 AM	44.371502	-86.933337	257	20
M050	9/18/2010	12:57:59 PM	45.1165	-87.416503	33	19
M047	9/18/2010	10:27:54 PM	45.178333	-86.374503	200	20
M018	9/20/2010	3:35:39 AM	42.733833	-86.9995	165	20
M011	9/20/2010	5:36:08 AM	42.528333	-86.922005	164	20
M009	9/20/2010	8:56:18 AM	42.385002	-86.591498	62	20
M008	9/20/2010	12:25:04 PM	41.984168	-87.014172	66	20
M028	5/23/2011	6:16:00 PM	43.8	-86.8005	133.3	17
M041	5/24/2011	12:51:00 AM	44.7367	-86.7213	265.6	20
S001	5/25/2011	4:49:00 AM	46.993	-85.1612	95.4	25
S002	5/25/2011	8:31:00 AM	47.3603	-85.6208	153.7	25
S008	5/25/2011	4:08:00 PM	47.6058	-86.8177	300.7	25
S019	5/26/2011	5:47:00 PM	47.3703	-90.8535	187.8	25
S022	5/26/2011	11:43:00 PM	46.8002	-91.7508	54.5	25
S016	5/27/2011	12:58:00 PM	47.6212	-89.4633	180	25
S012	5/27/2011	9:52:00 PM	47.8553	-88.0418	238.4	26
S011	5/28/2011	3:38:00 AM	48.3438	-87.825	229.6	25
S114	5/29/2011	5:56:00 PM	46.9095	-86.598	398	26
H006	9/15/2012	7:40:00 PM	43.5265	-82.0185	62	25
H012	9/16/2012	12:40:00 AM	43.9007	-82.113	99	25
H032	9/16/2012	7:17:00 AM	44.3542	-82.3596	94	25
H095	9/16/2012	11:43:00 AM	44.3328	-82.8326	70	25
H001	9/16/2012	5:29:00 PM	43.9374	-83.6142	12.7	25
H037	9/17/2012	4:37:00 AM	44.7619	-82.7836	76	24
H038	9/17/2012	8:49:00 AM	44.7507	-82.2024	166	25
H048	9/17/2012	1:47:00 PM	45.2614	-82.5912	183	25
H061	9/18/2012	12:58:00 AM	45.7498	-83.9164	122	25
Total						**647**

Notes :

1. Date Time CDT = "On Station" Date Time GMT (from R/V Lake Guardian's bridge record) minus 5 hours.
2. Latitude and Longitude data are calculated from the "On Station" entries of the R/V Lake Guardian's bridge record. Reading in degree and minute was converted to degree.
3. Water depth data are from the "On Station" entries of the R/V Lake Guardian's bridge record.

Table B. 2. Black carbon concentrations in Lake Michigan

	BC (mg/g)								
Section #	**M008**	**M009**	**M011**	**M018**	**M024**	**M032**	**M041**	**M047**	**M050**
# 1	2.42	1.05	2.19	0.63	1.05	3.50	0.99	1.75	0.86
# 2	3.10	1.22	1.31	0.90	1.22	2.63	0.82	1.46	1.03
# 3	5.69	1.57	1.50	0.71	1.57	2.07	0.84	2.00	1.45
# 4	3.82	2.14	1.33	0.80	2.14	1.62	0.93	1.69	1.57
# 5	4.68	3.24	1.34	0.47	3.24	1.21	1.04	1.50	1.12
# 6	7.12	2.94	2.18	0.64	2.94	0.94	3.41	2.01	1.02
# 7	6.09	2.88	2.69	7.48	2.88	4.26	3.57	2.92	1.20
# 8	6.48	2.68	3.13	5.63	2.68	1.68	3.60	2.62	1.34
# 9	5.92	3.55	3.21	2.49	3.55	1.07	3.83	2.93	0.87
# 10	4.01	4.05	2.29	1.50	4.05	0.85	3.36	4.37	0.98
# 11	3.59	4.54	2.63	1.03	4.54	0.44	2.85	4.49	1.33
# 12	2.65	5.52	2.54	0.76	5.52	0.34	2.89	4.16	1.30
# 13	2.34	4.34	1.92	0.73	4.34	0.35	2.29	2.91	1.05
# 14	2.64	3.69	1.56	0.93	3.69	0.14	2.39	2.60	1.06
# 15	2.28	4.09	1.48	1.58	4.09	0.12	2.48	2.51	0.88
# 16	1.50	3.38	1.73	1.66	3.38	4.46	2.52	2.17	0.62
# 17	1.98	2.49	1.68	1.96	2.49	4.19	2.24	2.21	0.65
# 18	1.79	1.88	1.81	1.41	1.88	2.92	2.62	2.26	0.56
# 19	1.98	4.48	2.09	1.19	4.48	2.90	1.97	1.94	0.73
# 20	1.78	2.36	2.46	1.16	2.36	2.66	2.54	2.08	

Table B. 3. Organic carbon concentrations in Lake Michigan

OC (mg/g)									
Section #	**M008**	**M009**	**M011**	**M018**	**M024**	**M032**	**M041**	**M047**	**M050**
# 1	20.26	28.27	27.62	28.99	26.97	17.39	33.04	29.66	74.78
# 2	17.20	25.27	26.51	27.96	21.97	13.36	29.14	23.55	79.68
# 3	24.09	24.67	23.37	24.50	23.69	16.45	30.44	24.55	82.62
# 4	30.57	27.98	23.19	25.28	21.42	14.94	28.48	23.96	83.23
# 5	25.27	32.22	26.82	25.51	23.49	16.65	29.53	26.02	78.96
# 6	30.79	28.73	28.89	21.11	20.95	19.08	30.56	24.01	79.51
# 7	34.91	28.75	26.29	27.25	20.45	16.71	29.49	23.55	78.80
# 8	30.74	27.22	28.14	25.38	21.39	16.34	30.42	24.65	80.41
# 9	26.57	28.60	26.78	16.12	20.22	18.82	27.54	22.79	76.40
# 10	25.44	37.94	31.07	12.27	14.81	7.97	25.02	25.41	80.16
# 11	15.22	38.76	22.12	10.48	10.66	15.14	25.59	21.05	76.91
# 12	16.07	32.40	23.70	8.91	10.49	13.58	22.34	21.54	78.53
# 13	14.16	35.59	22.74	14.35	10.80	9.07	20.36	16.89	74.08
# 14	13.95	37.62	19.66	12.62	8.49	16.65	20.70	14.48	76.42
# 15	14.11	29.18	16.01	12.23	8.36	5.87	20.23	15.55	77.76
# 16	14.98	31.58	18.22	14.20	9.01	6.20	20.12	12.27	79.39
# 17	17.82	29.16	16.82	13.22	10.35	7.40	19.16	12.33	65.34
# 18	16.20	23.80	18.22	12.09	10.21	6.42	19.85	12.27	60.50
# 19	18.09	19.80	16.62	13.31	9.40	8.14	19.37	12.83	57.53
# 20	23.58	24.44	18.62	13.34	9.59	7.32	19.20	14.61	

Table B. 4. Black carbon concentrations in Lake Superior

	BC (mg/g)								
Section #	**S001**	**S002**	**S008**	**S022**	**S019**	**S016**	**S011**	**S012**	**S114**
# 1	0.07	0.19	5.67	1.16	0.90	1.48	2.09	0.55	0.53
# 2	0.13	0.14	5.02	1.05	0.60	1.33	1.33	0.46	0.30
# 3	0.20	0.12	4.57	0.98	0.42	0.84	1.07	0.44	0.30
# 4	0.23	0.34	3.78	0.78	0.47	1.38	1.04	0.40	0.27
# 5	0.16	0.21	3.52	0.61	0.75	0.65	1.16	0.49	0.29
# 6	0.14	0.25	3.09	0.74	0.71	1.25	1.33	0.55	0.25
# 7	0.12	0.21	3.20	1.59	0.76	0.46	0.88	0.51	0.27
# 8	0.14	0.20	1.88	2.00	0.48	0.34	0.61	0.42	0.26
# 9	0.15	0.17	0.89	2.35	0.52	0.32	0.44	0.31	0.26
# 10	0.10	0.21	0.96	2.30	0.41	0.39	0.42	0.32	0.24
# 11	0.09	0.17	1.06	2.64	0.44	0.44	0.43	0.49	0.27
# 12	0.13	0.19	0.52	2.08	0.40	0.82	0.80	0.33	0.32
# 13	0.11	0.23	0.47	1.79	0.36	0.40	0.60	0.32	0.25
# 14	0.11	0.22	0.44	1.88	0.40	0.00	0.55	0.26	0.30
# 15	0.11	0.17	0.32	1.95	0.40	0.32	0.49	0.30	0.24
# 16	0.12	0.18	0.27	1.36	0.40	0.32	0.52	0.30	0.22
# 17	0.10	0.22	0.35	1.31	0.42	0.36	0.55	0.34	0.31
# 18	0.09	0.27	0.30	1.24	0.45	0.33	0.59	0.40	0.21
# 19	0.11	0.27	0.28	1.03	0.37	0.37	0.58	0.45	0.26
# 20	0.14	0.31	0.30	1.04	0.35	0.41	0.47	0.37	0.30
# 21	0.14	0.23	0.28	1.20	0.31	0.46	0.42	0.42	0.35
# 22	0.10	0.25	0.32	0.89	0.29	0.34	0.47	0.33	0.24
# 23	0.12	0.25	0.31	1.09	0.29	0.58	0.70	0.36	0.28
# 24	0.15	0.26	0.35	1.19	0.63	0.69	0.71	0.53	0.32
# 25		0.22	0.31	1.07	0.51	0.69	0.48	0.45	0.26

Table B. 5.Organic carbon concentrations in Lake Superior

OC (mg/g)									
Section #	**S001**	**S002**	**S008**	**S022**	**S019**	**S016**	**S011**	**S012**	**S114**
# 1	1.09	34.68	39.60	18.11	22.18	31.57	35.13	37.85	10.24
# 2	1.72	18.32	39.21	15.65	19.09	30.38	33.91	36.55	4.44
# 3	1.89	22.38	34.63	16.21	16.71	26.02	32.75	34.93	3.51
# 4	1.58	9.00	30.60	12.31	20.76	27.19	31.28	34.05	5.68
# 5	1.17	5.08	28.44	14.85	26.46	18.94	30.39	33.17	3.87
# 6	1.08	6.60	24.92	13.83	26.95	17.85	29.59	32.34	4.76
# 7	1.15	6.03	23.76	18.11	24.83	10.60	23.36	30.77	3.53
# 8	2.43	6.24	20.74	18.50	23.02	13.24	21.46	30.37	4.41
# 9	2.61	6.33	13.28	18.99	19.30	8.37	19.20	27.56	4.98
# 10	2.87	6.90	12.11	20.43	20.27	8.74	17.81	26.30	5.68
# 11	2.16	4.65	10.10	20.40	17.30	8.85	16.39	25.05	5.18
# 12	1.85	4.57	7.17	17.47	17.68	9.66	15.65	19.98	4.13
# 13	1.81	7.31	6.49	14.85	16.50	9.42	13.48	22.55	3.39
# 14	2.42	7.89	6.21	16.02	16.08	9.39	13.04	22.09	2.59
# 15	2.16	8.39	4.21	14.40	15.90	8.74	12.37	21.05	2.88
# 16	2.39	8.32	3.90	12.85	16.11	8.45	11.25	19.62	3.46
# 17	2.25	8.34	3.96	12.35	16.66	10.52	11.25	18.93	3.05
# 18	3.82	7.37	4.25	11.43	15.34	7.70	10.71	19.53	2.75
# 19	2.08	8.75	3.98	12.18	13.03	9.64	10.18	19.40	2.25
# 20	1.59	9.26	4.25	13.41	12.03	9.36	10.50	19.29	2.93
# 21	2.21	10.04	4.32	12.87	11.10	8.84	10.15	19.82	3.17
# 22	2.90	9.72	5.26	13.04	11.01	7.97	11.31	20.64	3.22
# 23	1.98	9.58	4.56	13.47	11.13	9.80	12.63	19.33	2.57
# 24	1.24	10.45	5.60	12.86	13.08	9.54	12.39	18.08	4.19
# 25		10.92	5.96	13.46	14.08	9.71	11.94	17.60	3.43

Table B. 6. Black carbon concentrations in Lake Huron

BC (mg/g)									
Section #	**H001**	**H006**	**H012**	**H032**	**H037**	**H038**	**H048**	**H061**	**H095**
# 1	4.40	1.50	2.00	1.91	1.71	2.71	2.12	3.00	1.28
# 2	4.59	1.89	3.08	2.28	2.36	2.68	1.83	2.21	1.18
# 3	5.49	2.49	4.52	2.76	1.18	2.84	2.67	2.50	1.36
# 4	6.04	3.23	5.48	2.69	0.98	2.50	4.94	2.49	1.23
# 5	5.86	3.29	4.64	3.30	0.70	2.38	4.50	0.75	0.82
# 6	4.24	3.05	3.87	2.33	0.79	1.80	4.30	1.99	0.44
# 7	4.43	3.20	3.69	2.12	0.80	1.39	3.97	1.40	0.44
# 8	5.08	3.21	3.53	2.65	0.64	1.35	4.20	1.29	0.40
# 9	4.92	2.97	2.59	2.35	1.44	1.38	5.24	1.19	0.36
# 10	4.68	3.11	2.67	2.77	2.18	1.29	3.17	1.05	0.52
# 11	2.97	2.48	2.85	2.42	1.66	1.34	3.17	1.19	0.59
# 12	3.41	2.44	2.35	2.60	1.96	1.39	2.61	1.46	0.51
# 13	3.50	2.36	2.41	2.53	1.84	1.47	1.32	1.32	0.81
# 14	3.70	2.12	2.41	1.84	2.55	1.19	1.75	1.23	0.90
# 15	3.74	2.11	2.08	2.42	2.90	1.46	1.31	1.18	1.01
# 16	4.08	1.94	2.80	2.32	2.93	1.78	1.67	1.36	0.75
# 17	4.21	2.47	2.37	2.47	2.40	1.90	1.82	1.28	0.67
# 18	3.66	2.60	1.88	3.10	2.10	1.47	2.80	1.36	0.79
# 19	3.75	2.43	1.64	2.67	2.37	1.61	2.65	1.19	1.02
# 20	4.18	2.67	1.33	2.91	1.85	1.71	2.58	1.16	0.97
# 21	5.22	2.72	2.61	3.44	1.83	1.37	3.46	1.26	0.74
# 22	5.13	2.61	2.07	3.96	1.31	1.51	3.34	1.25	1.28
# 23	4.72	2.62	2.48	4.71	1.61	1.52	2.60	1.40	1.18
# 24	5.34	2.32	2.13	5.08	1.41	1.47	2.82	1.30	1.11
# 25		3.03	1.91	4.15		1.70	2.45	1.30	1.24

Table B. 7. Organic carbon concentrations in Lake Huron

OC (mg/g)									
Section #	**H001**	**H006**	**H012**	**H032**	**H037**	**H038**	**H048**	**H061**	**H095**
# 1	64.73	41.18	42.00	40.62	34.04	34.73	23.95	36.03	30.88
# 2	63.34	42.61	41.59	42.31	24.81	32.40	26.61	34.00	19.86
# 3	60.43	39.51	40.44	41.81	16.40	31.48	18.77	31.32	22.98
# 4	59.65	38.19	41.77	40.62	14.22	26.60	26.19	27.05	15.50
# 5	58.58	38.24	42.95	40.46	15.88	24.79	20.41	16.50	13.55
# 6	56.40	33.60	39.67	39.66	15.33	15.24	26.28	15.07	9.18
# 7	56.58	36.54	39.37	40.19	15.17	12.18	20.33	8.69	8.46
# 8	58.17	32.73	39.46	39.12	16.52	7.08	23.93	7.16	10.91
# 9	57.05	32.17	39.47	37.93	16.83	4.78	15.85	6.85	7.13
# 10	57.12	29.83	38.24	38.39	18.35	4.17	15.80	5.52	10.96
# 11	55.49	25.11	39.37	39.80	18.26	4.38	12.14	6.61	15.48
# 12	53.06	26.62	37.07	38.96	19.87	4.81	13.67	6.77	13.01
# 13	53.84	21.84	40.02	40.87	19.76	6.15	11.06	7.20	14.66
# 14	51.32	29.30	38.40	39.17	20.35	5.66	13.36	5.70	13.76
# 15	52.86	27.85	37.70	40.26	20.78	5.96	17.30	5.04	12.49
# 16	52.80	30.17	36.77	39.92	20.27	5.86	15.47	4.76	8.14
# 17	52.65	29.35	39.92	41.58	21.49	5.68	17.90	4.94	9.64
# 18	51.31	29.83	42.12	42.68	19.70	5.66	13.71	5.74	9.73
# 19	51.39	30.96	37.96	42.41	17.82	4.07	14.33	4.05	12.84
# 20	51.13	32.02	35.95	40.41	16.22	5.38	13.16	4.99	9.83
# 21	49.88	31.82	34.65	40.57	15.04	3.66	15.82	2.92	10.21
# 22	48.22	30.30	37.73	39.80	12.08	4.02	12.61	2.80	16.44
# 23	49.03	32.90	36.59	39.47	11.67	4.81	13.22	2.93	14.66
# 24	46.80	32.68	37.31	39.64	13.09	5.18	10.90	3.60	12.65
# 25		29.83	38.01	38.89		5.50	11.13	2.90	12.60

Table B. 8. Dating summary of each section of the cores collected from Lake Michigan

	Dating							
Section #	**M009**	**M011**	**M018**	**M024**	**M032**	**M041**	**M047**	**M050**
# 1	2009	2009	2007	2007	2008	2009	2009	2010
# 2	2006	2005	2000	2000	2002	2003	2004	2008
# 3	2001	2000	1990	1992	1994	1996	1999	2005
# 4	1997	1995	1978	1983	1985	1988	1993	2002
# 5	1991	1990	1965	1972	1976	1979	1986	1998
# 6	1986	1984	1950	1962	1966	1971	1979	1995
# 7	1980	1978	1935	1951	1956	1961	1972	1990
# 8	1974	1972	1919	1940	1946	1952	1964	1985
# 9	1968	1966	1903	1927	1935	1942	1956	1980
# 10	1963	1959	1888	1914	1923	1931	1948	1973
# 11	1953	1949	1865	1894	1905	1915	1936	1963
# 12	1941	1935	1834	1867	1879	1893	1919	1949
# 13	1928	1922	1803	1839	1852	1870	1901	1935
# 14	1915	1909	1773	1811	1824	1846	1881	1920
# 15	1901	1895	1743	1783	1796	1822	1861	1905
# 16	1888	1882	1712	1755	1766	1798	1842	1891
# 17	1874	1868	1682	1726	1736	1773	1823	1875
# 18	1860	1854	1653	1696	1706	1748	1803	1859
# 19	1845	1839	1622	1666	1675	1724	1783	1841
# 20	1830	1825	1591	1635	1644	1699	1763	

Table B. 9. Dating summary of each section of the cores collected from Lake Superior

	Dating						
Section #	**S002**	**S008**	**S022**	**S019**	**S016**	**S011**	**S012**
# 1	2007	2006	2010	2007	2007	2007	2006
# 2	1995	1995	2007	1997	1996	1999	1994
# 3	1974	1981	2003	1987	1983	1989	1981
# 4	1946	1965	2000	1975	1968	1979	1966
# 5	1910	1948	1996	1962	1951	1967	1952
# 6	1866	1928	1991	1948	1928	1954	1938
# 7	1823	1906	1987	1931	1899	1941	1924
# 8	1785	1882	1982	1911	1867	1928	1910
# 9	1748	1856	1976	1889	1832	1916	1896
# 10	1708	1826	1971	1864	1795	1903	1881
# 11	1629	1779	1962	1822	1738	1883	1856
# 12	1527	1710	1950	1763	1664	1856	1824
# 13	1444	1638	1937	1701	1591	1829	1790
# 14	1365	1565	1924	1637	1517	1802	1755
# 15	1285	1490	1911	1574	1441	1777	1718
# 16	1203	1412	1896	1509	1366	1751	1681
# 17	1120	1334	1882	1440	1292	1726	1644
# 18	1036	1254	1866	1367	1215	1699	1606
# 19	950	1173	1851	1292	1136	1673	1565
# 20	863	1091	1836	1220	1059	1647	1522
# 21	735	965	1814	1112	943	1610	1454
# 22	562	792	1785	969	788	1560	1360
# 23	387	608	1755	835	635	1507	1264
# 24	212	411	1725	700	485	1455	1171
# 25	37	213	1693	562	333	1400	1084

Table B. 10. Dating summary of each section of the cores collected from Lake Huron

Dating								
Section #	**H001**	**H006**	**H012**	**H032**	**H038**	**H048**	**H061**	**H095**
# 1	2012	2011	2012	2012	2010	2009	2010	2009
# 2	2012	2008	2010	2009	2002	1998	2002	2001
# 3	2011	2004	2007	2005	1993	1985	1993	1989
# 4	2010	1999	2003	2002	1982	1969	1981	1972
# 5	2009	1993	2000	1997	1968	1954	1963	1947
# 6	2008	1986	1996	1993	1950	1937	1939	1911
# 7	2007	1978	1992	1988	1927	1920	1908	1869
# 8	2006	1970	1987	1982	1900	1903	1875	1829
# 9	2004	1961	1983	1977	1872	1884	1842	1789
# 10	2003	1952	1979	1972	1844	1865	1810	1751
# 11	2002	1929	1974	1967	1801	1844	1761	1718
# 12	2000	1892	1970	1961	1744	1822	1695	1686
# 13	1999	1855	1965	1956	1685	1800	1629	1654
# 14	1998	1819	1961	1950	1625	1776	1559	1622
# 15	1996	1781	1957	1945	1559	1752	1486	1590
# 16	1994	1723	1949	1937	1490	1716	1415	
# 17	1991	1646	1939	1925	1421	1669	1349	
# 18	1988	1570	1929	1914	1354	1645	1285	
# 19	1985	1495	1919	1903	1289	1602	1220	
# 20	1981	1419	1909	1892	1227		1153	
# 21	1978	1341		1881				
# 22	1975	1262		1869				
# 23	1971	1183		1857				
# 24	1968	1105		1845				
# 25	1964	1028		1833				

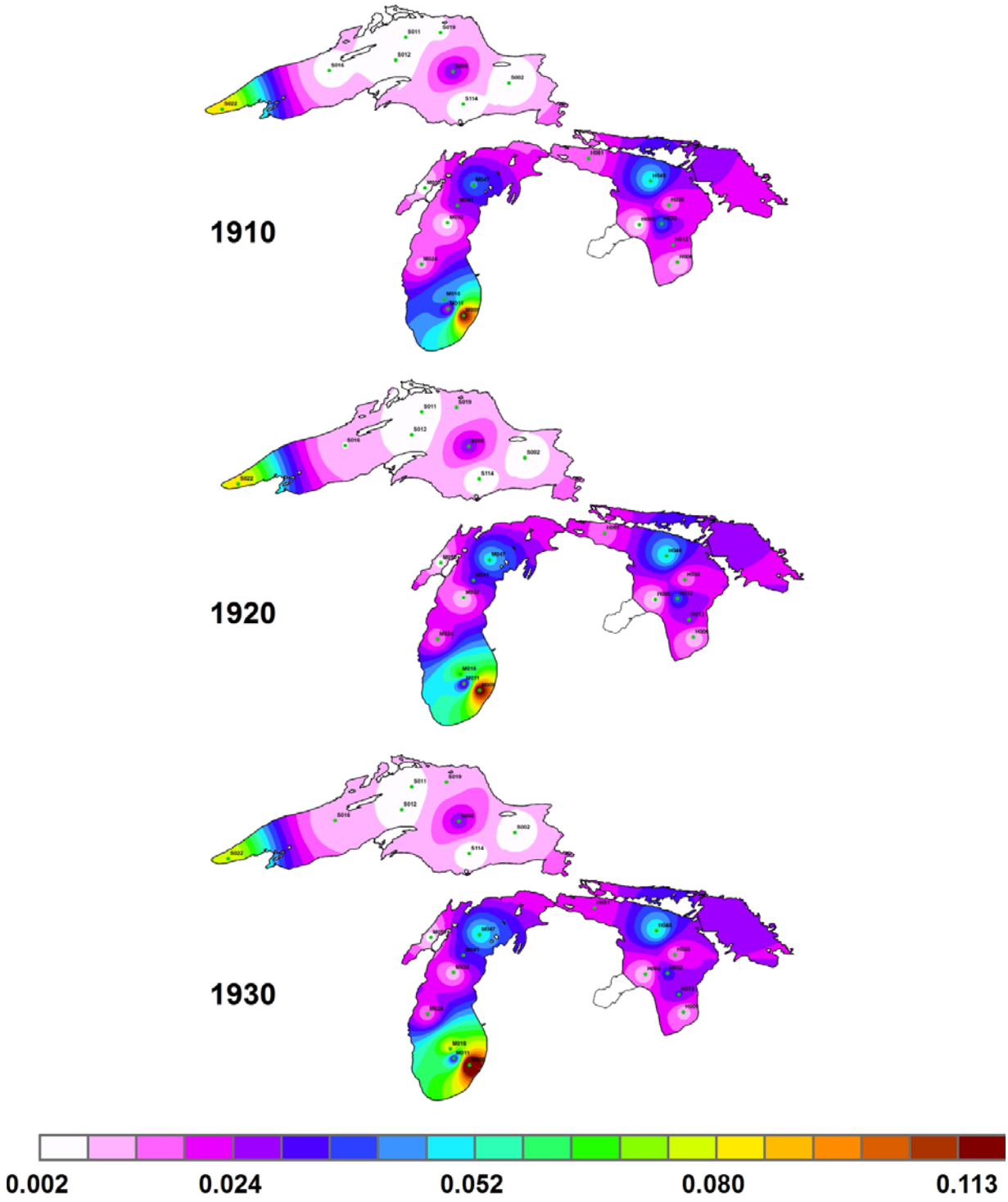
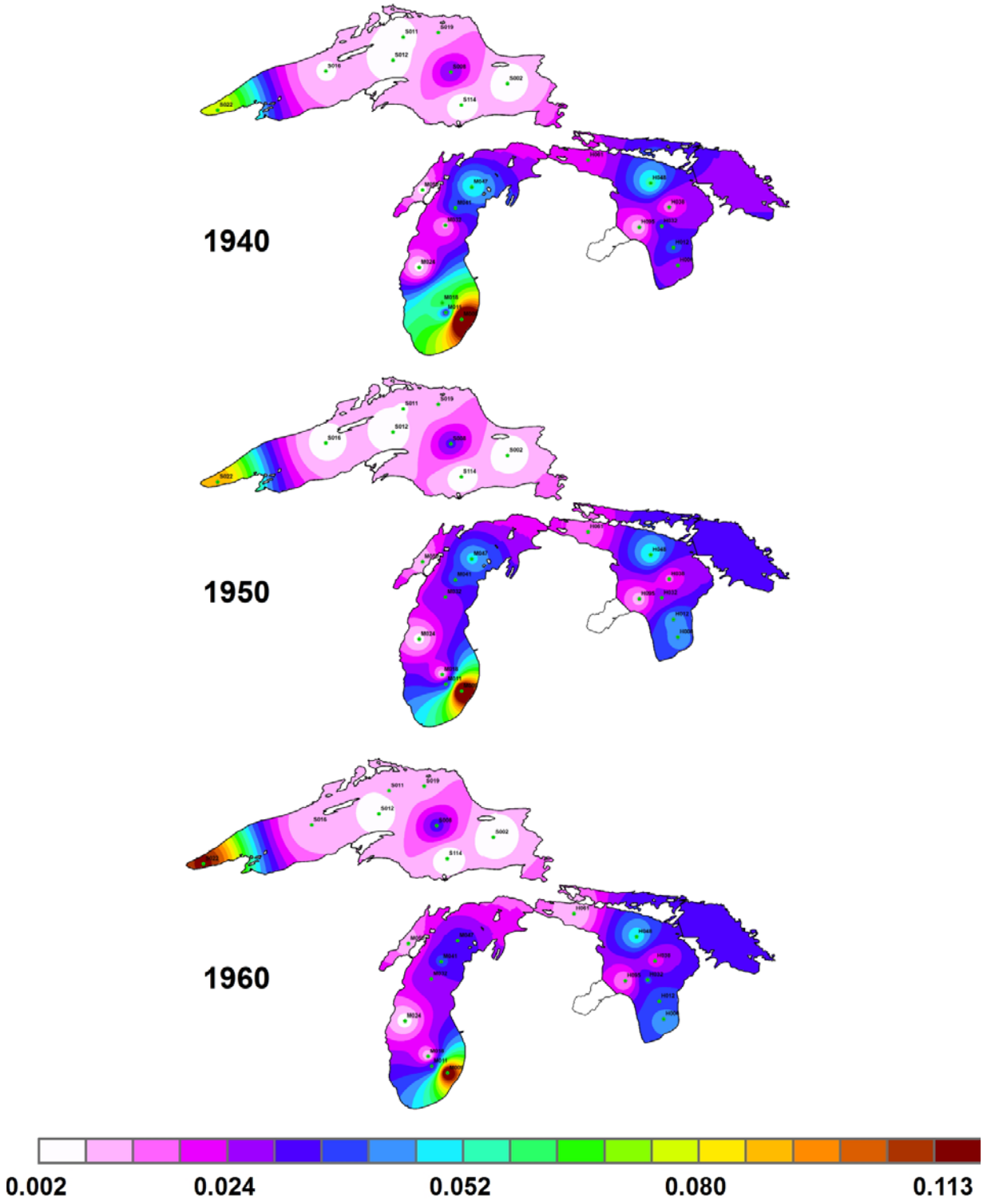


Figure B1. Spatially distributed deposition of BC to upper Great Lakes (excluding Saginaw Bay) in 1910, 1920, and 1930 (mg/cm^2/yr)



FigureB2. Spatially distributed deposition of BC to upper Great Lakes (excluding Saginaw Bay) in 1940, 1950, and 1960 (mg/cm^2/yr)

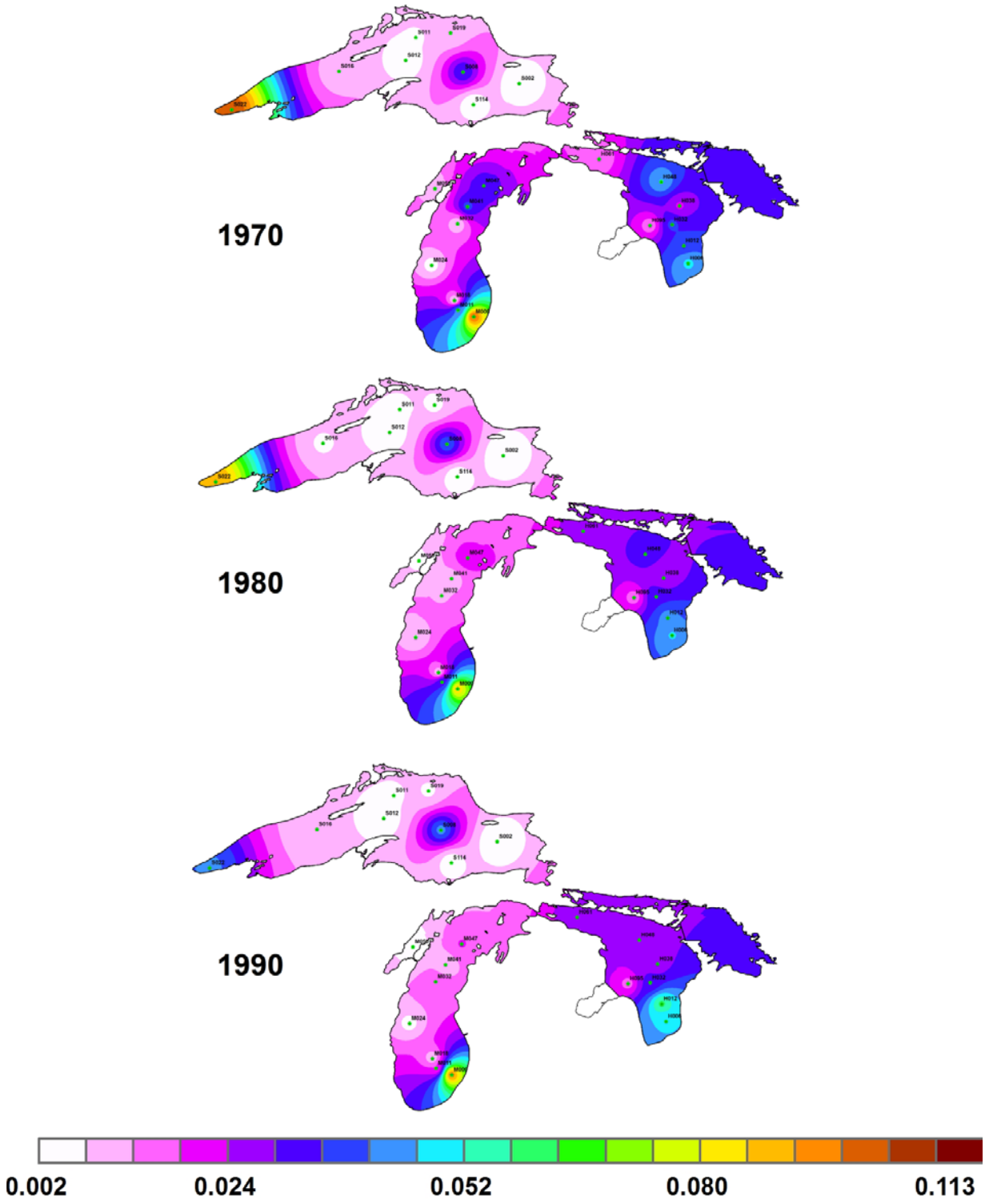


Figure B3. Spatially distributed deposition of BC to upper Great Lakes (excluding Saginaw Bay) in 1970, 1980, and 1990 (mg/cm^2/yr)

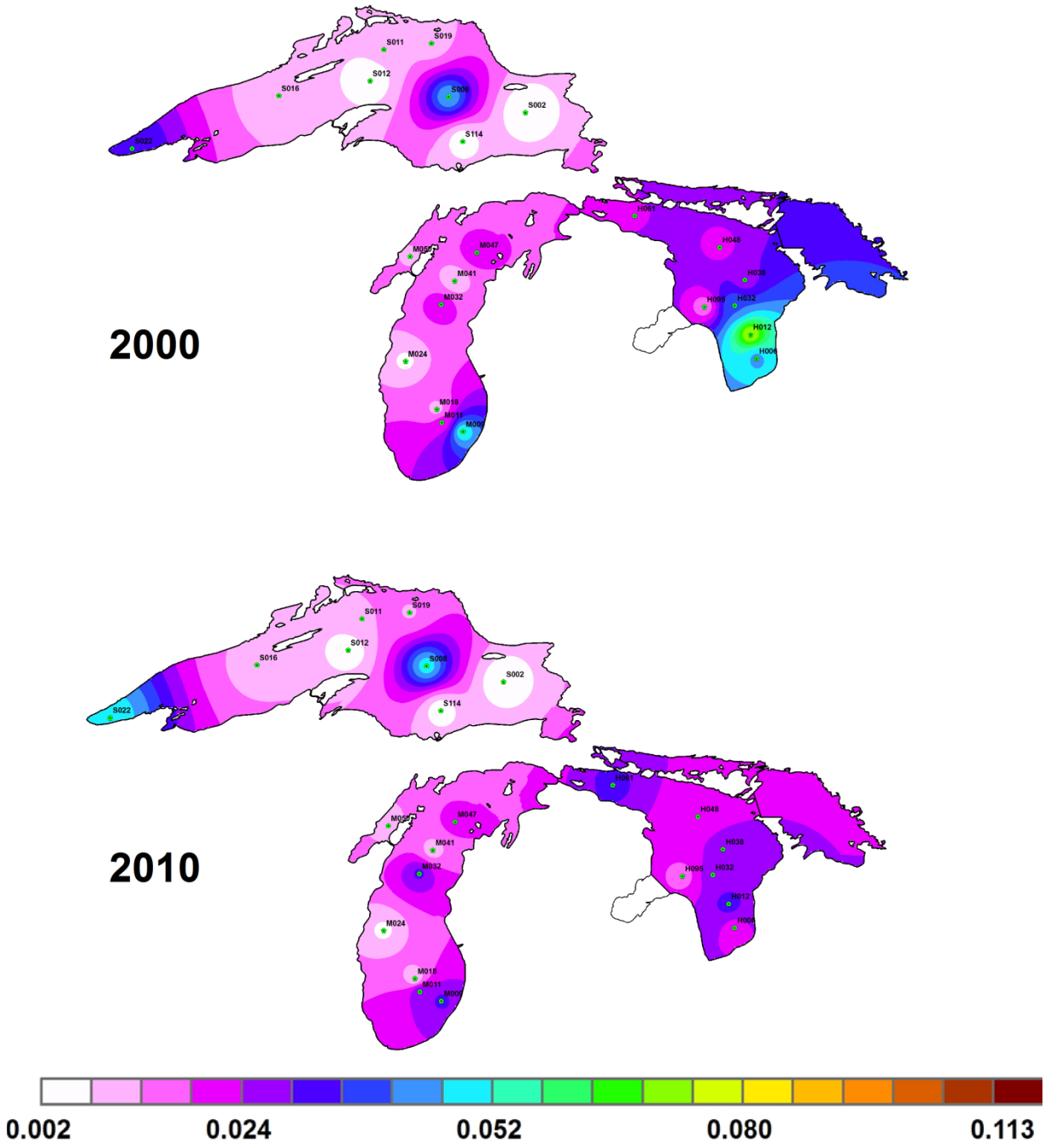


Figure B4. Spatially distributed deposition of BC to upper Great Lakes (excluding Saginaw Bay) in 2000 and 2010 (mg/cm^2/yr)

Appendix C

Table C. 1. Summary of sampling locations in Lake Superior

Location	Sample	Date	Time CDT [1]	Latitude (D)	Longitude (D)	Depth (m) [2]	Grab	Core Seg't
S001	MC,PG,WPF	5/25/2011	4:49	46.993	-85.1612	95.4	1	25
S002	MC, PG	5/25/2011	8:31	47.3603	-85.6208	153.7	1	25
S102	PG	5/25/2011	10:58	47.6173	-85.6973	92.4	1	0
S105	PG	5/25/2011	13:51	47.6177	-86.3217	80.8	1	0
S008	MC, P, WPF	5/25/2011	16:08	47.6058	-86.8177	300.7	1	25
S104	PG	5/25/2011	20:47	48.0382	-86.3217	188.8	1	0
S108	PG	5/25/2011	23:07	48.0392	-86.9493	226.7	1	0
S009*	MC,PG	5/26/2011	2:21	48.4392	-87.0823	-	-	-
S120	PG	5/26/2011	14:12	47.6185	-90.0712	178.1	1	0
S019	MC,PG,WPF	5/26/2011	17:47	47.3703	-90.8535	187.8	1	25
S022	MC, PG	5/26/2011	23:43	46.8002	-91.7508	54.5	1	25
S121	PG	5/27/2011	7:27	47.1955	-90.0727	146	1	0
S119	PG	5/27/2011	10:04	47.1955	-89.5048	196.5	1	0
S016	MC, PG	5/27/2011	12:58	47.6212	-89.4633	180	1	25
S118	PG	5/27/2011	16:37	47.6175	-88.842	188.8	1	0
S117	PG	5/27/2011	19:44	47.6175	-88.2007	269.5	1	0
S012	MC, PG	5/27/2011	21:52	47.8553	-88.0418	238.4	1	26
S116	PG	5/28/2011	0:52	48.0392	-88.2007	254	1	0
S011	MC, PG	5/28/2011	3:38	48.3438	-87.825	229.6	1	25
S112	PG	5/28/2011	6:42	48.0393	-87.5733	216	1	0
S113	PG	5/28/2011	9:35	47.6177	-87.573	171.2	1	0
S106	PG	5/28/2011	12:44	47.1807	-87.3183	218.9	1	0
S110	PG	5/28/2011	15:57	46.7735	-86.9495	138.2	1	0
S114**	MC,PG,WPF	5/29/2011	17:56	46.9095	-86.598	398	1	26
S103	PG	5/29/2011	0:41	46.9838	-85.6972	164.4	1	0
Total							**24**	**227**

Notes:

(1) Arrival Time CDT is (Arrival Time GMT– 5 hours).
(2) Latitude and Longitude data were obtained directly from the R/V Lake Guardian ship log at the moment the spider sampler or surface grab was deployed.
(3) Adjusted depth is (Measured Depth × 0.973), according to Captain's instructions.
* Originally planned coring station, aborted due to weather. ** Added station.

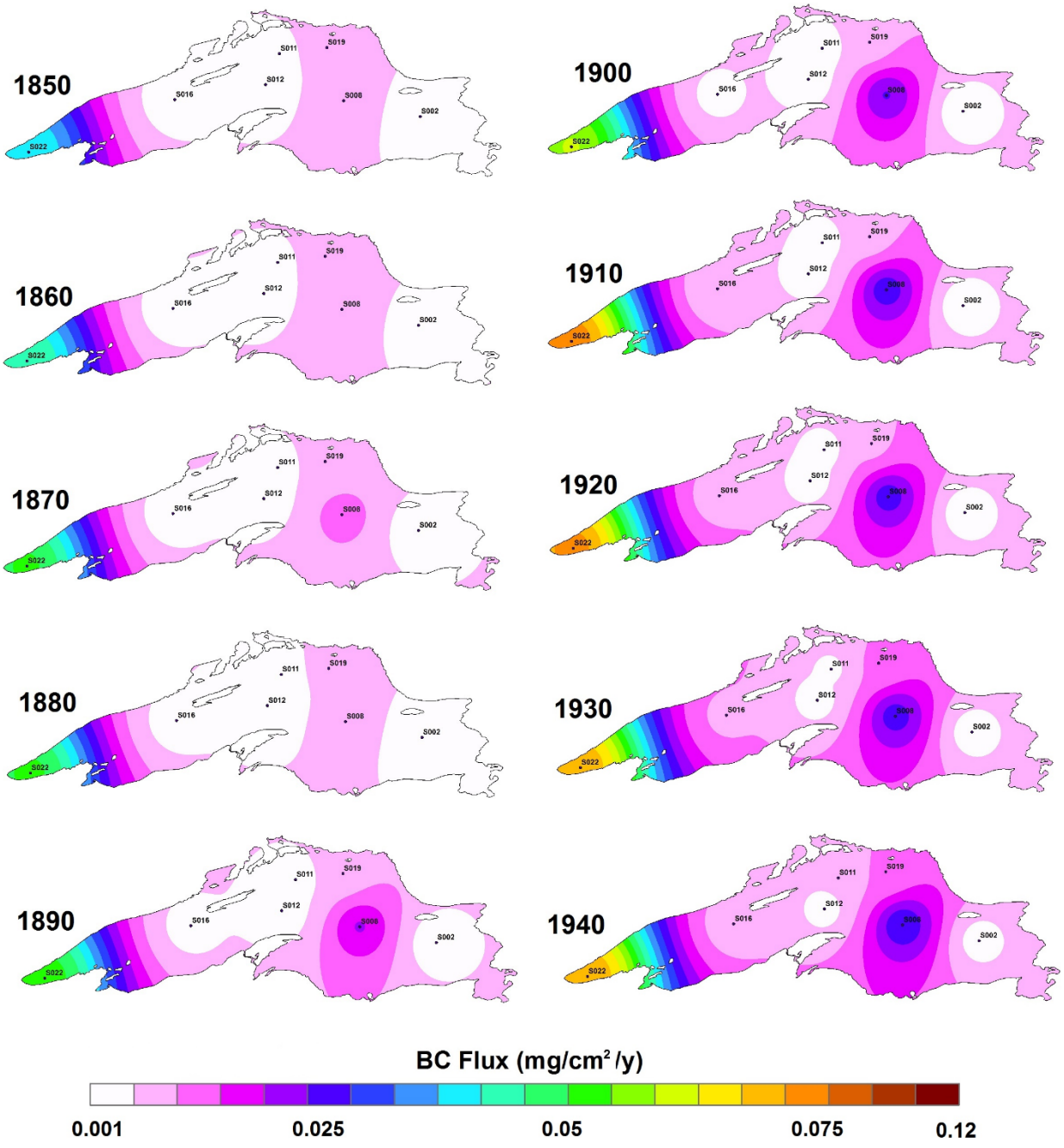


Figure C. 1. Temporal and spatial flux of BC to Lake Superior from 1850 to 1940 in Lake Superior

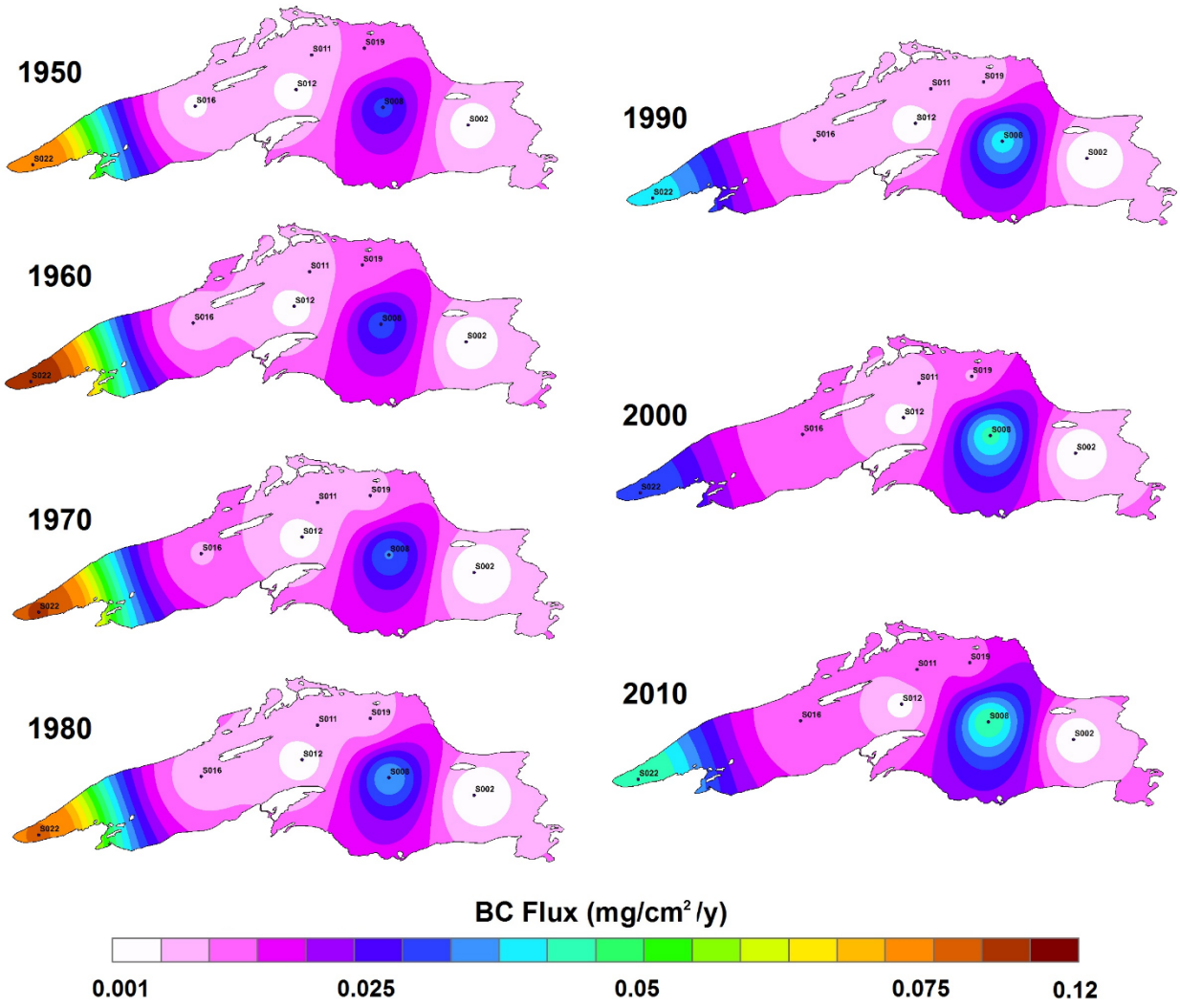


Figure C. 2. Temporal and spatial flux of BC to Lake Superior from 1950 to 2010 in Lake Superior

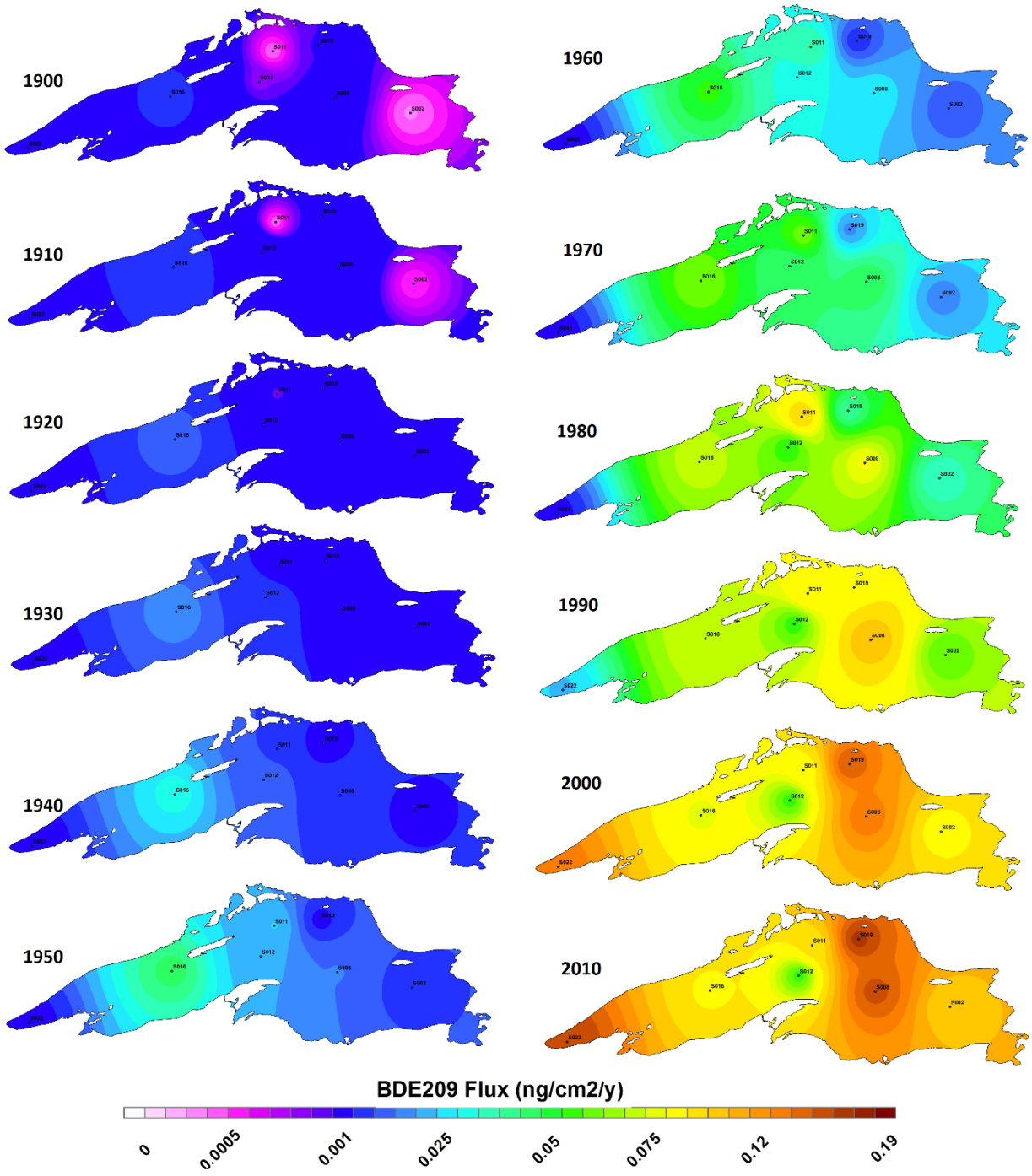


Figure C. 3. Temporal and spatial depositional flux of BDE209 during 1900-2010 in Lake Superior

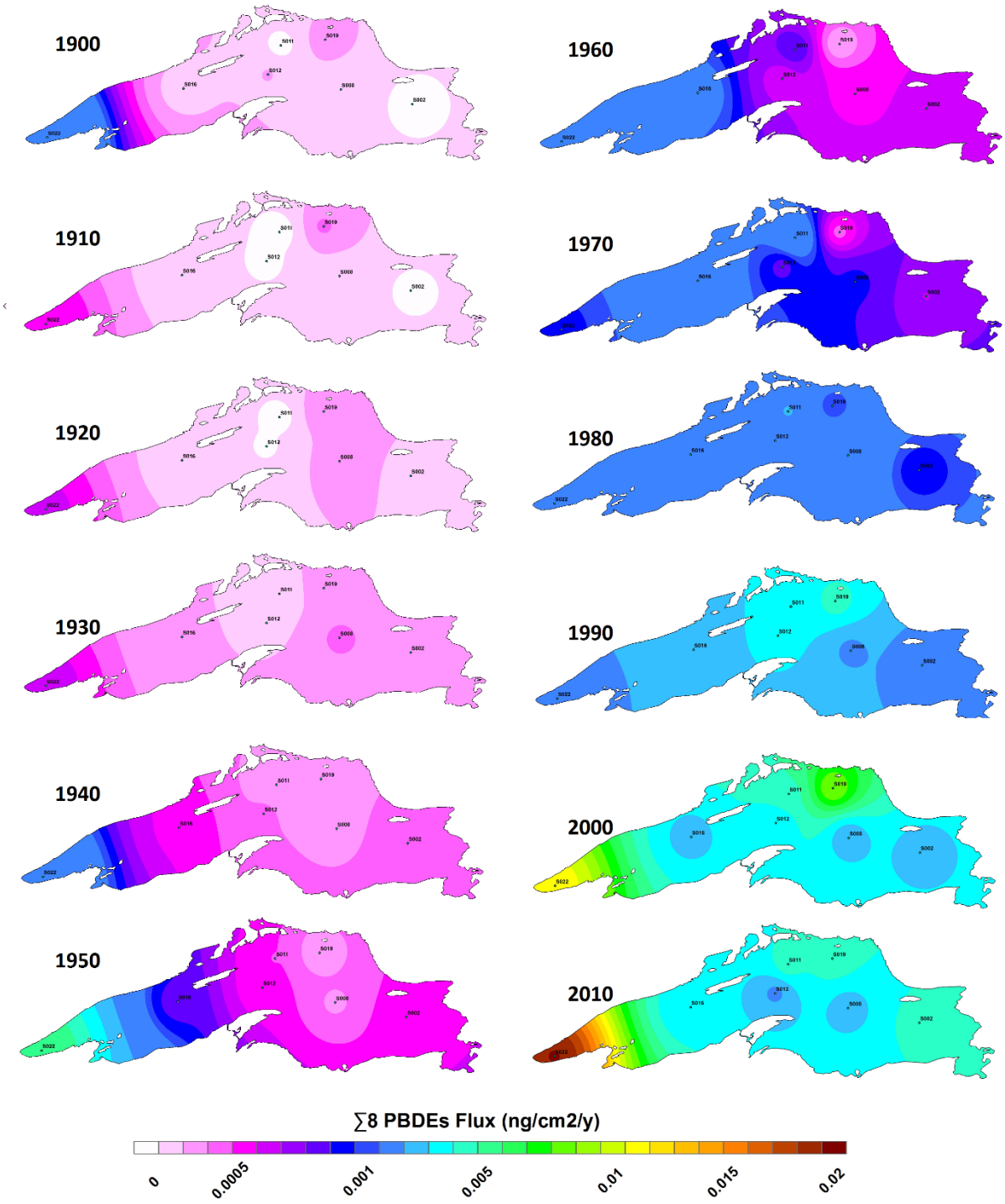


Figure C. 4. Temporal and spatial depositional flux of ∑8 PBDEs (excluding BDE209) during 1900-2010 in Lake Superior

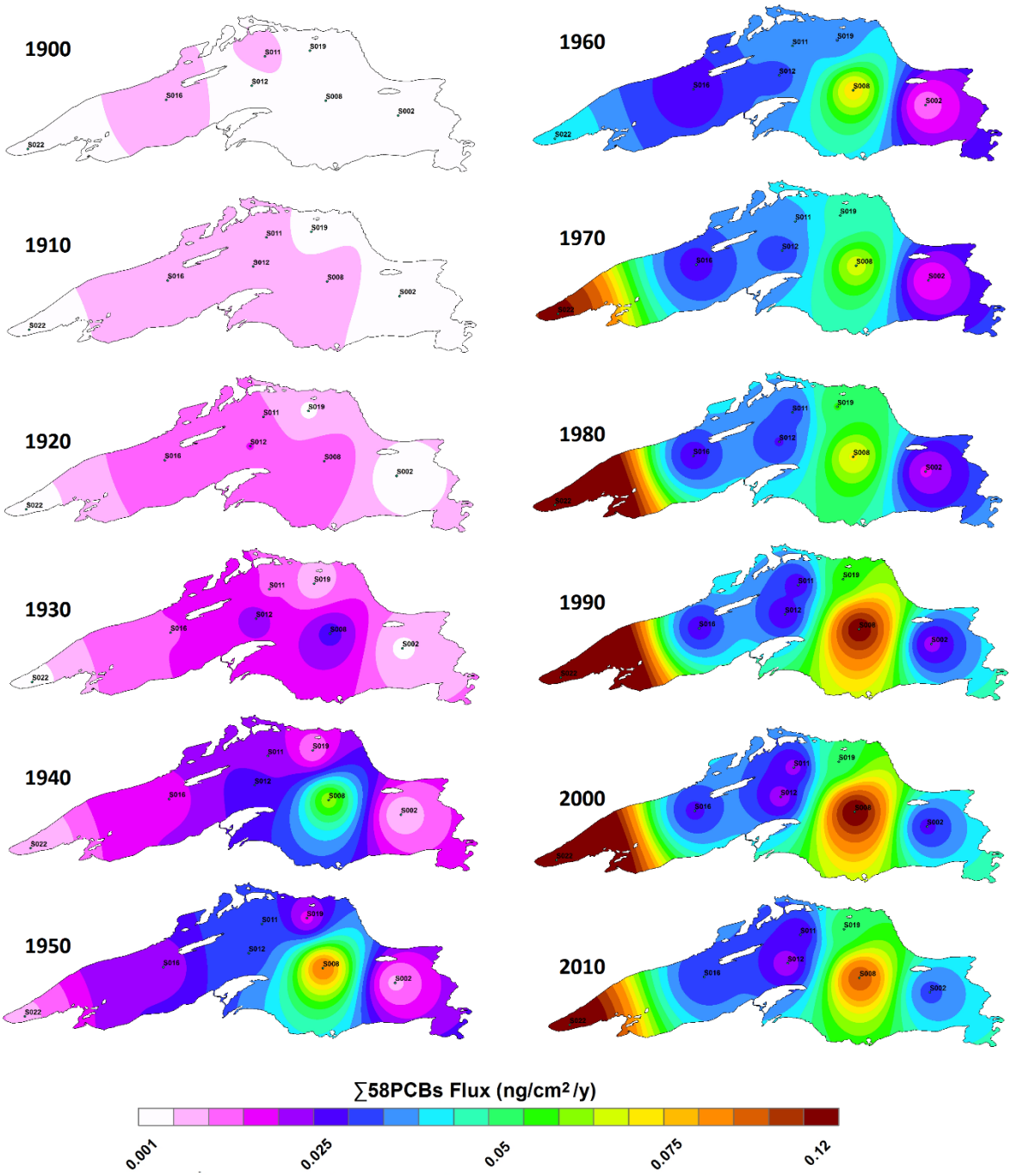


Figure C. 5.Temporal and spatial depositional flux of ∑58 PCBs during 1900-2010 in Lake Superior

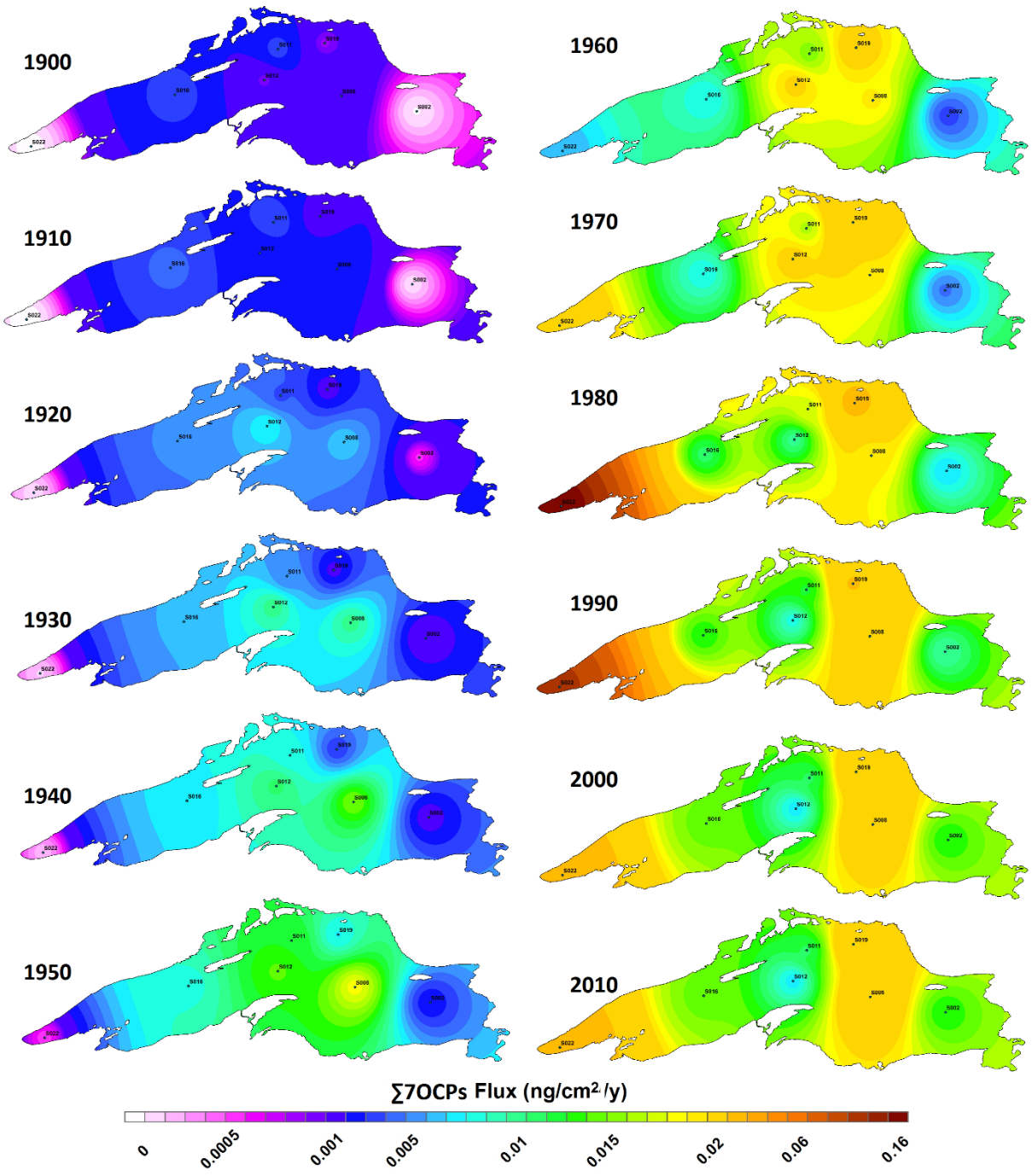


Figure C. 6. Temporal and spatial depositional flux of ∑7OCPs during 1900-2010 in Lake Superior

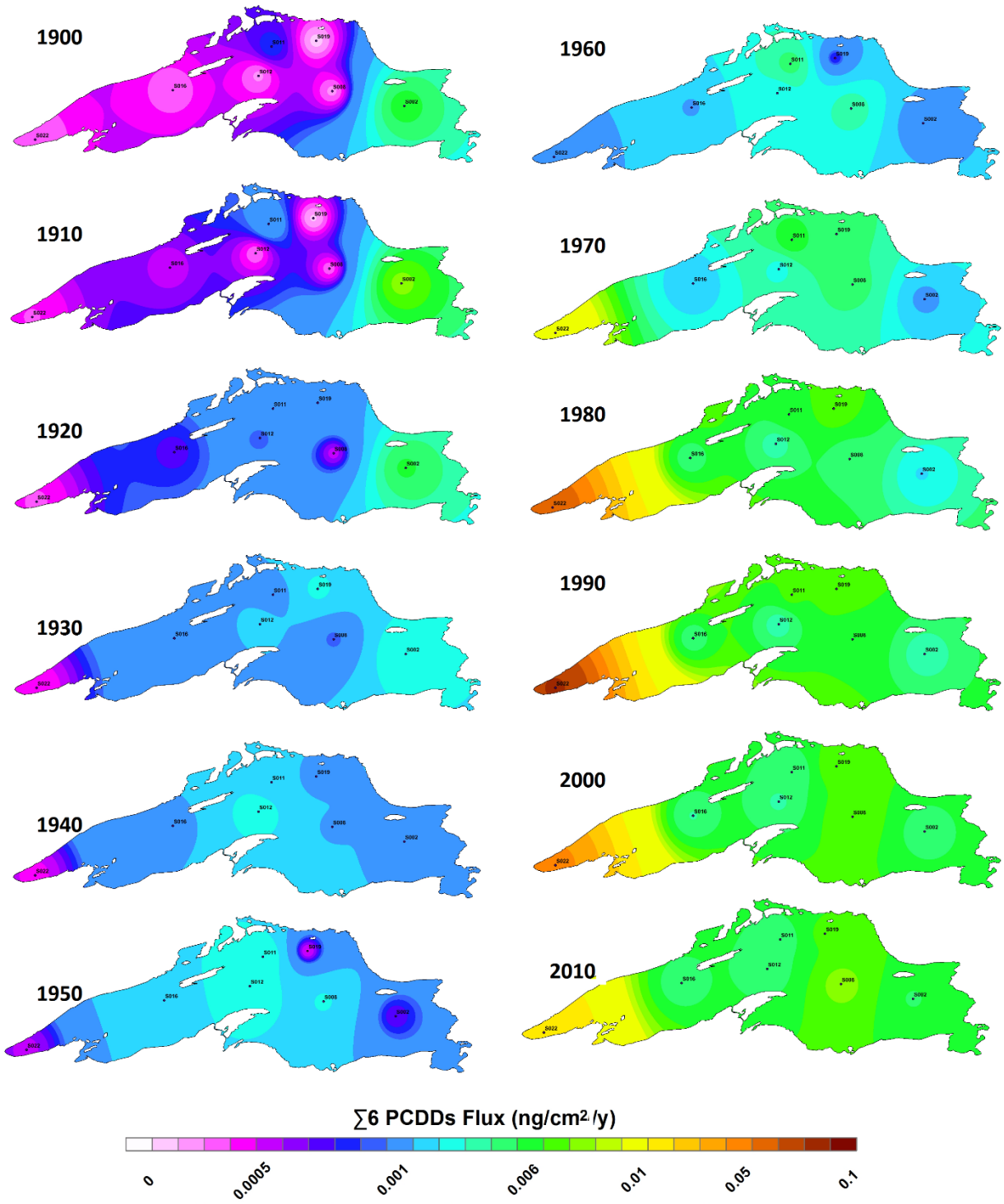


Figure C. 7. Temporal and spatial depositional flux of ∑6 PCDDs during 1900-2010 in Lake Superior

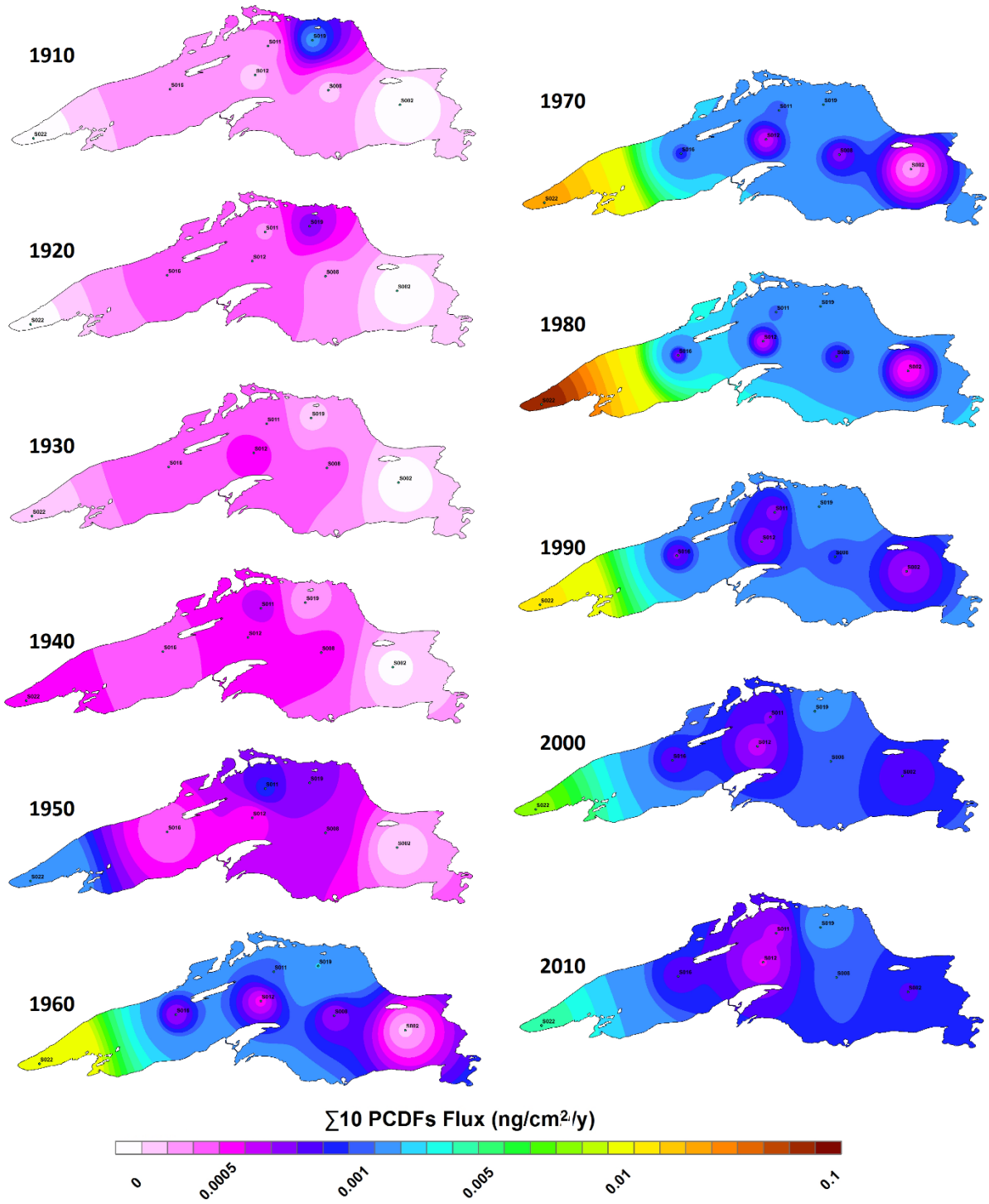


Figure C. 8.Temporal and spatial depositional flux of ∑10 PCFDs during 1910-2010 in Lake Superior

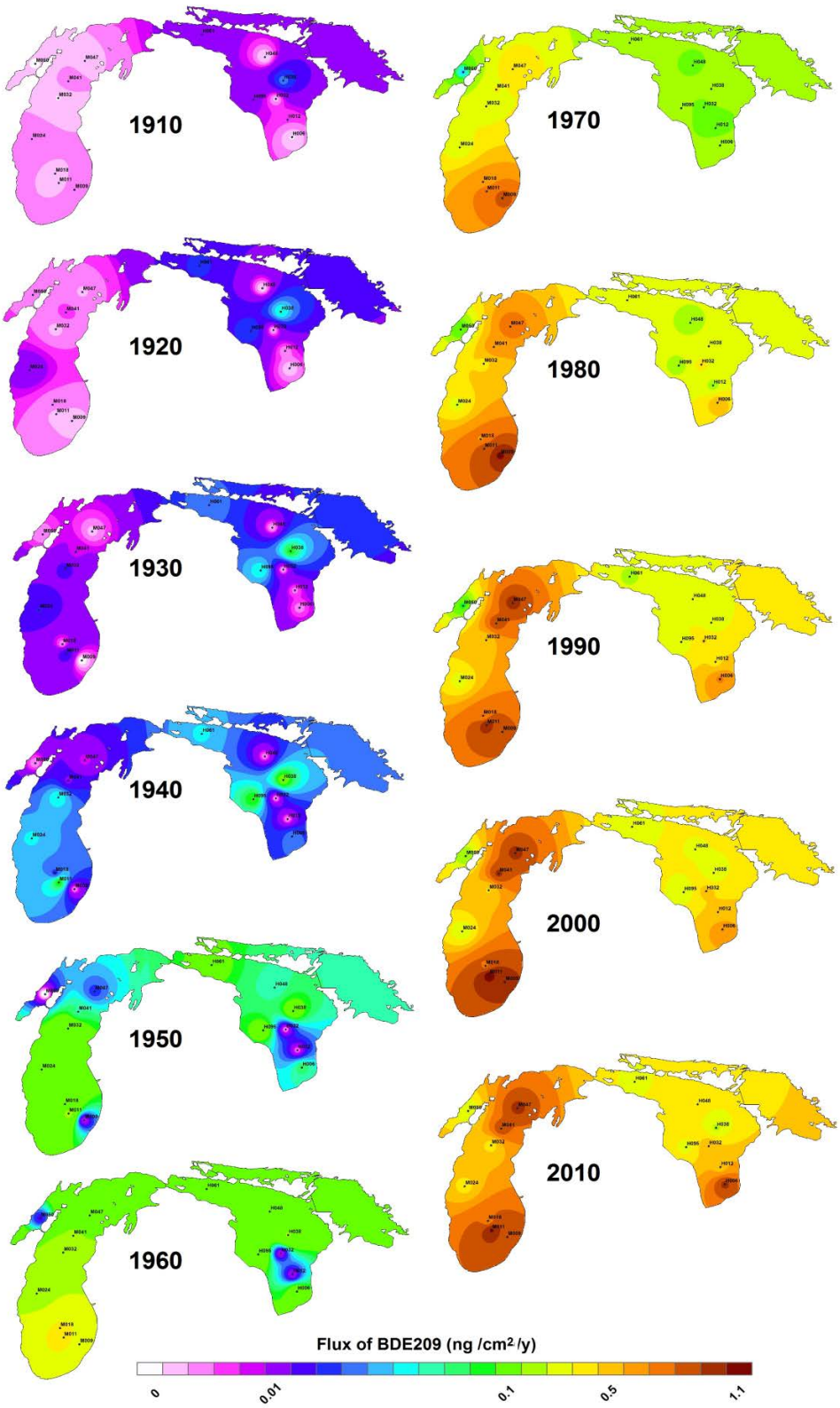


Figure C. 9.Temporal and spatial depositional flux of BDE209 during 1900-2010 in Lake Michigan and Lake Huron (excluding Saginaw Bay)

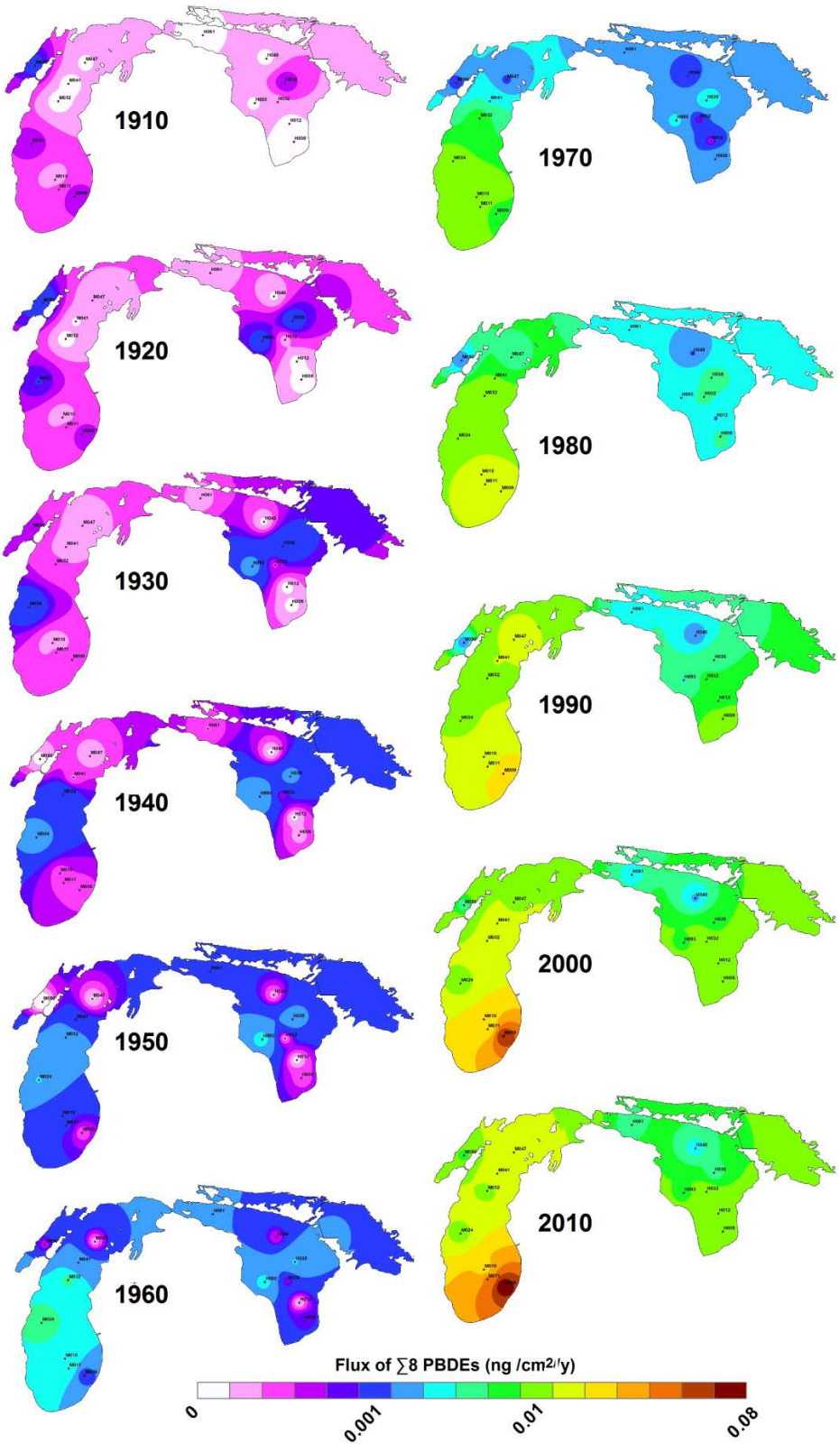


Figure C.10.Temporal and spatial depositional fluxes of ∑8 PBDEs (excluding BDE209) during 1900-2010 in Lake Michigan and Lake Huron (excluding Saginaw Bay)

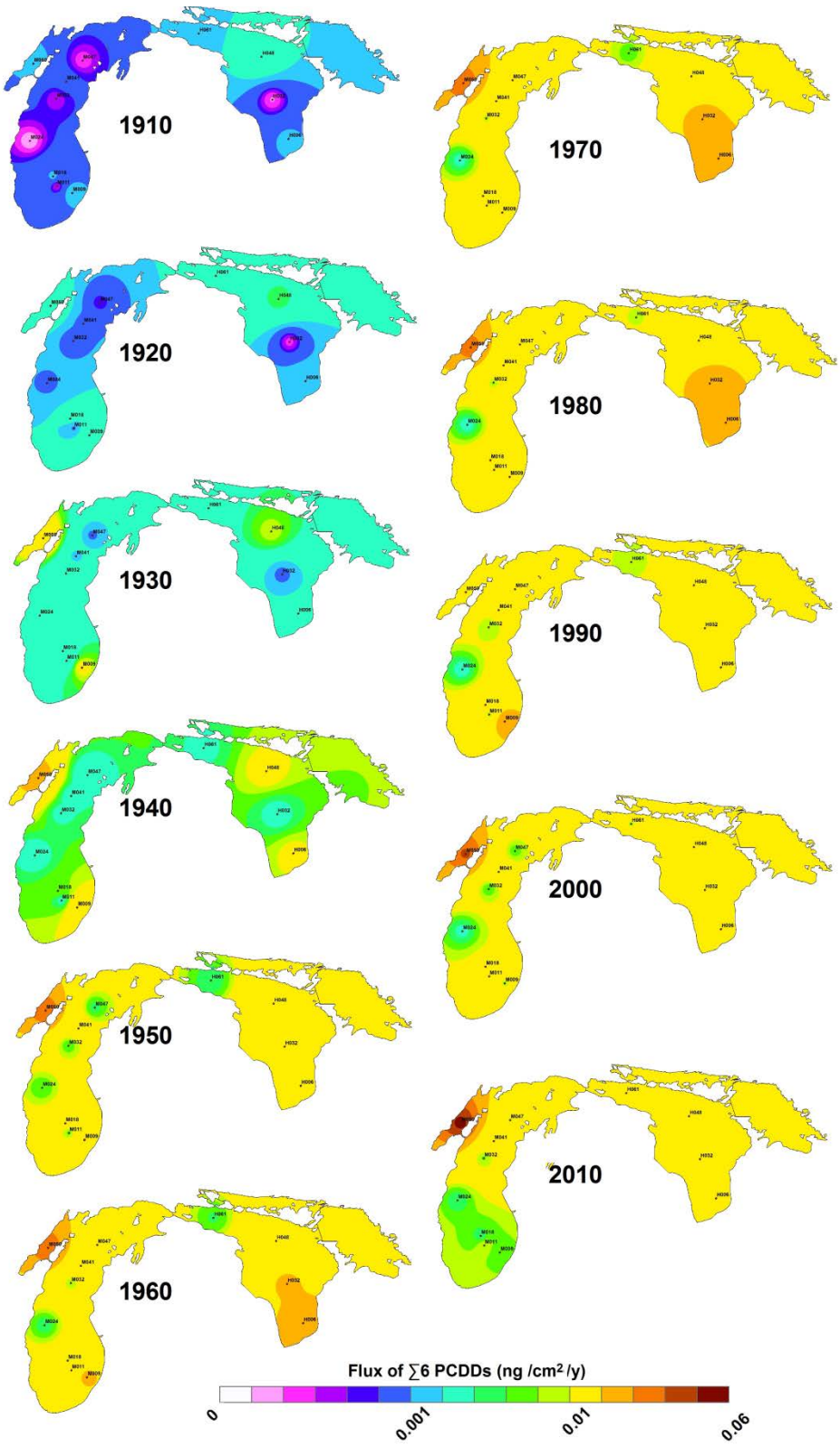


Figure C.11.Temporal and spatial depositional flux of ∑6 PCDDs during 1900-2010 in Lake Michigan and Lake Huron (excluding Saginaw Bay)

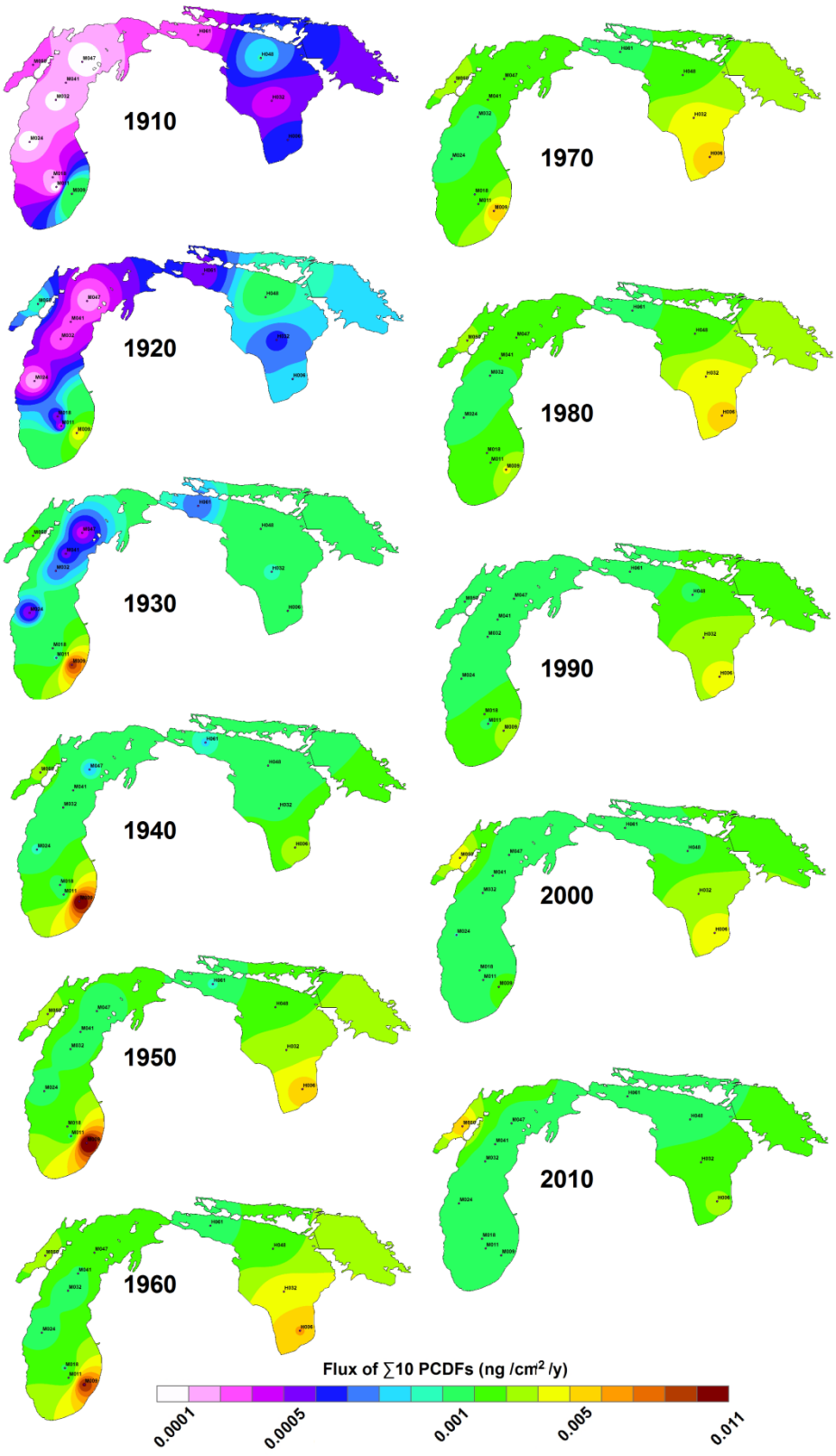
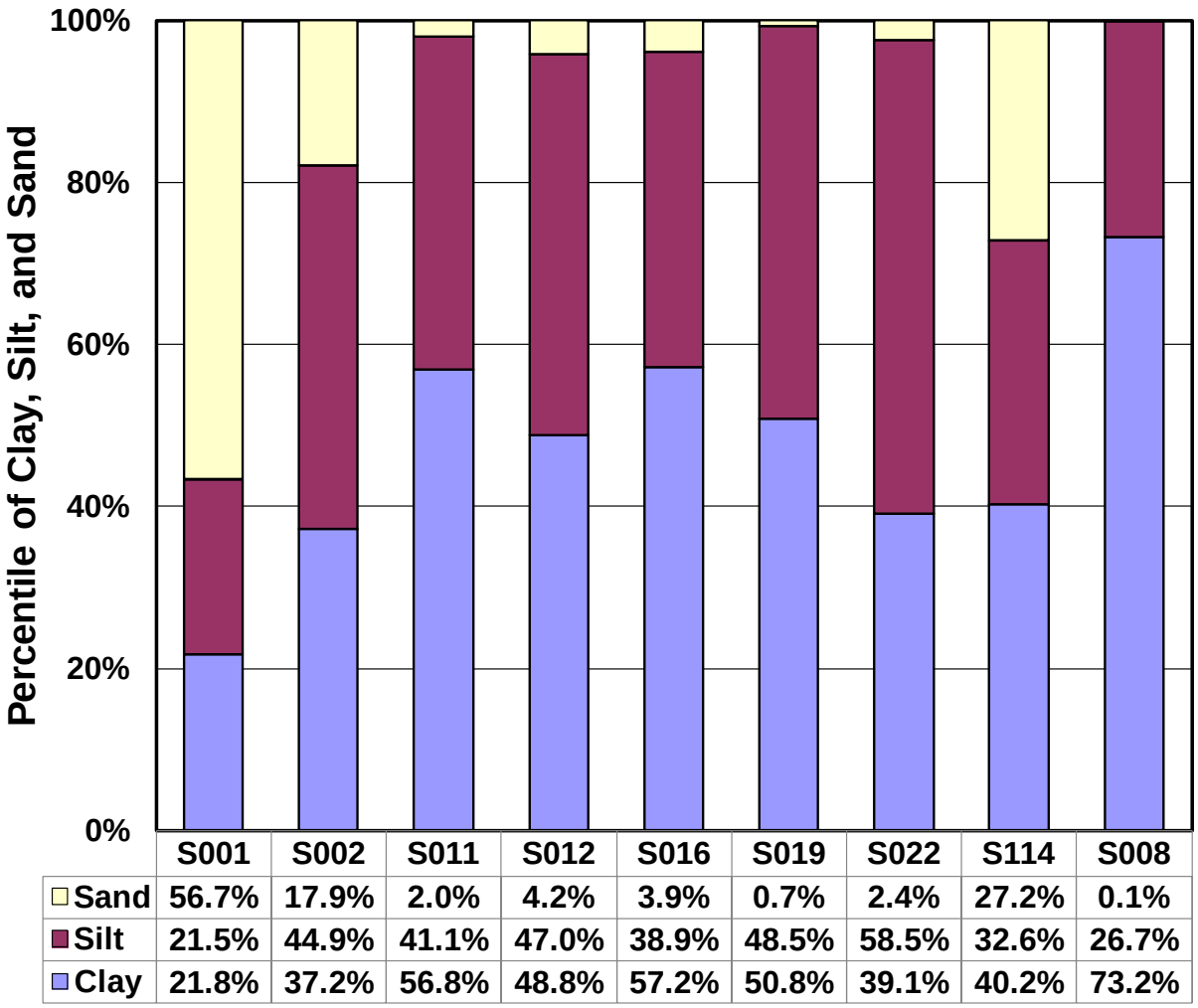


Figure C.12.Temporal and spatial depositional flux of ∑10 PCDFs during 1900-2010 in Lake Michigan and Lake Huron (excluding Saginaw Bay)



	S001	S002	S011	S012	S016	S019	S022	S114	S008
Sand	56.7%	17.9%	2.0%	4.2%	3.9%	0.7%	2.4%	27.2%	0.1%
Silt	21.5%	44.9%	41.1%	47.0%	38.9%	48.5%	58.5%	32.6%	26.7%
Clay	21.8%	37.2%	56.8%	48.8%	57.2%	50.8%	39.1%	40.2%	73.2%

Figure C.13. detail of the average contributions of sand, silt, and clay in all sites of Lake Superior

Appendix D

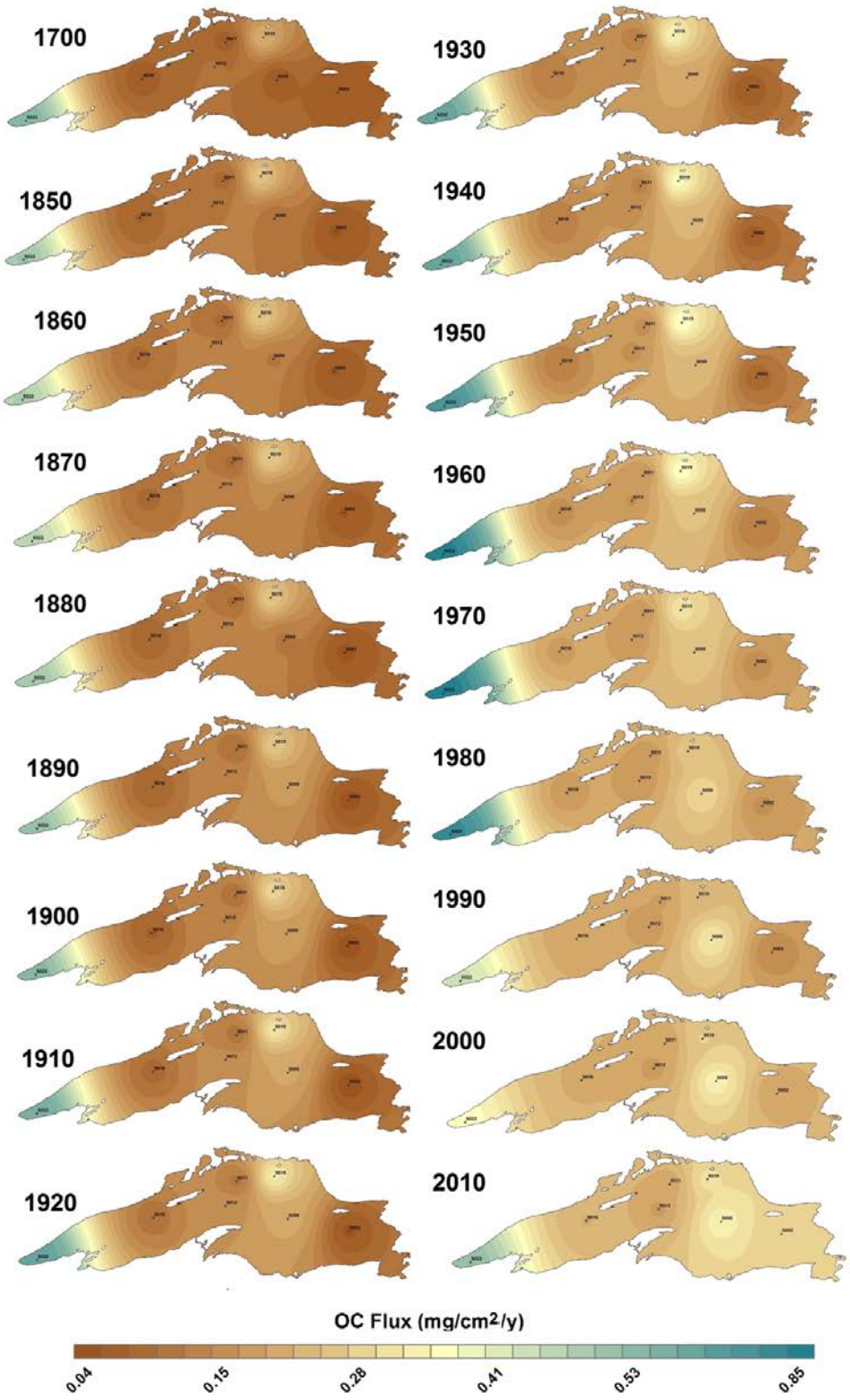


Figure D.1.Temporal and spatial depositional flux of OC during 1850-2010 in Lake Superior

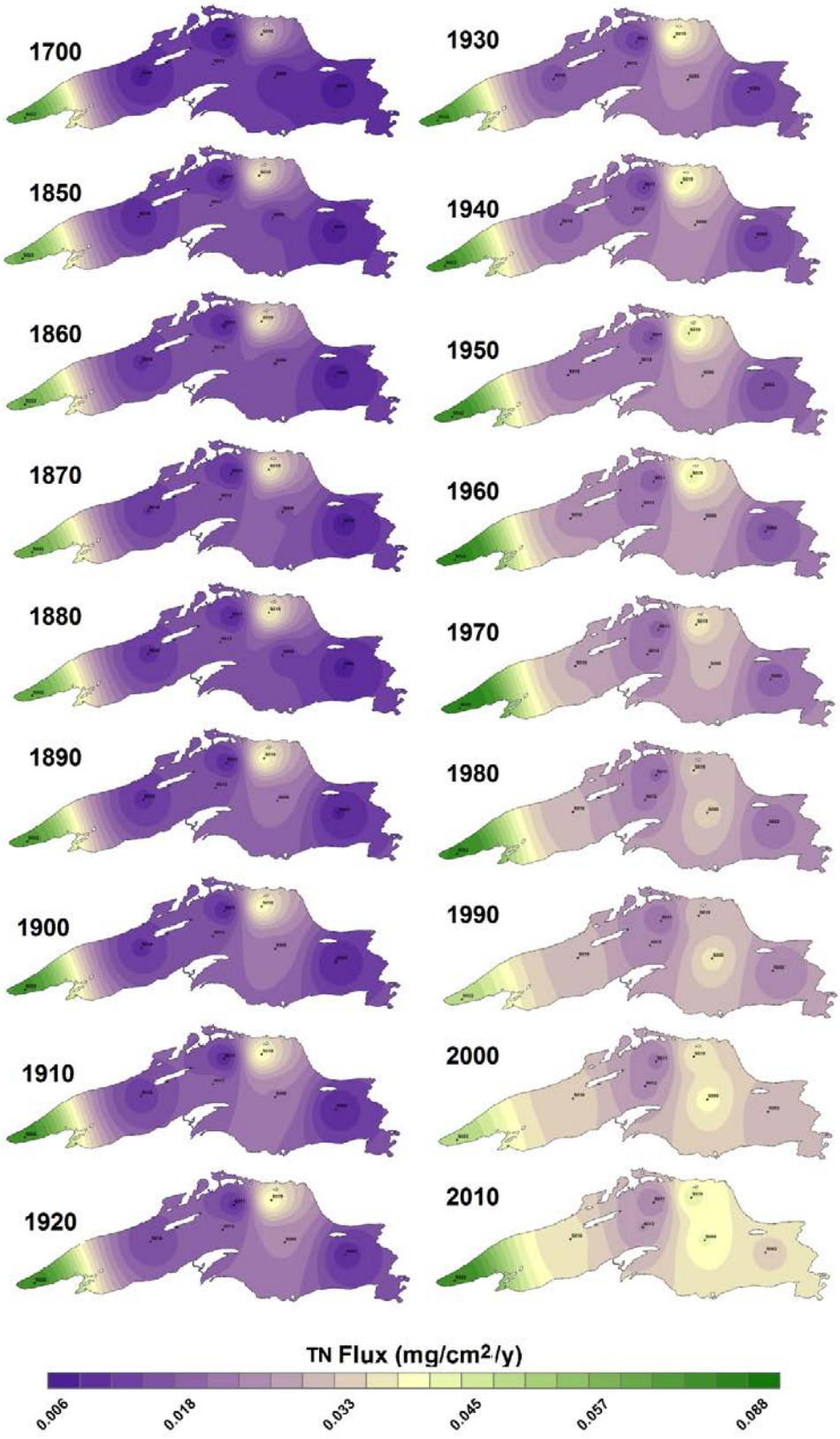


Figure D.2.Temporal and spatial depositional flux of TN during 1850-2010 in Lake Superior

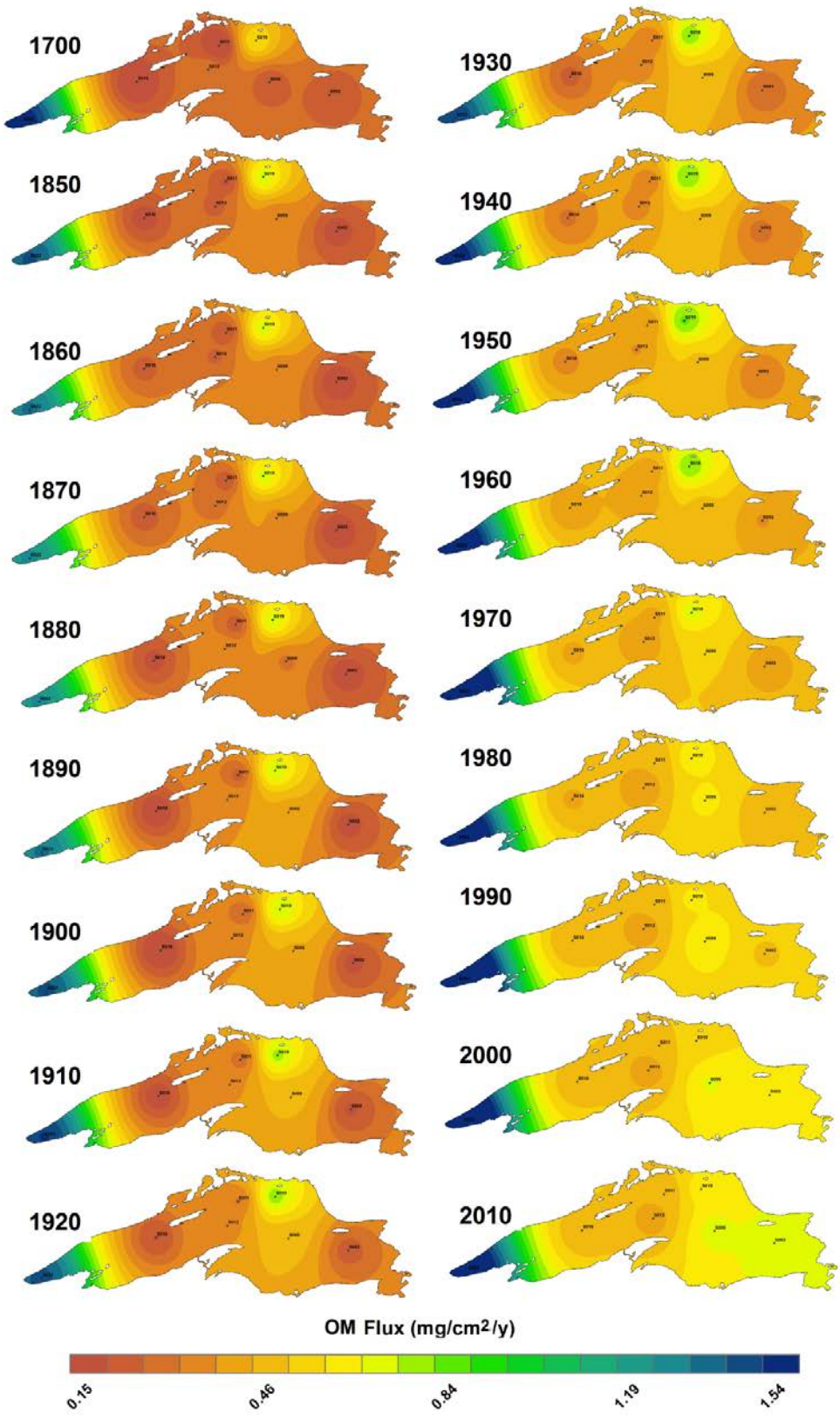


Figure D.3.Temporal and spatial depositional flux of OM during 1850-2010 in Lake Superior

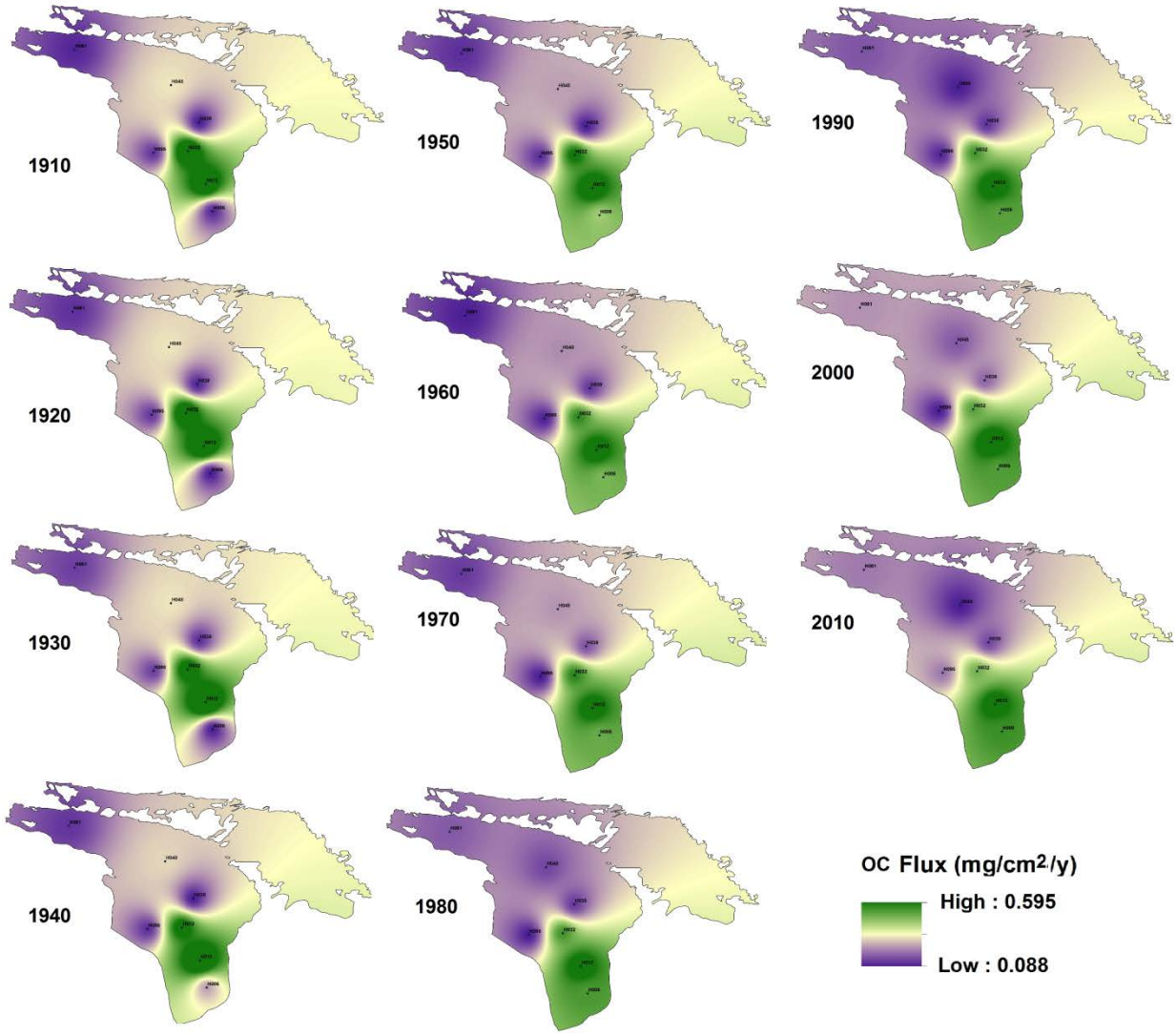


Figure D.4.Temporal and spatial depositional flux of OC during 1910-2010 in Lake Huron (excluding Saginaw Bay)

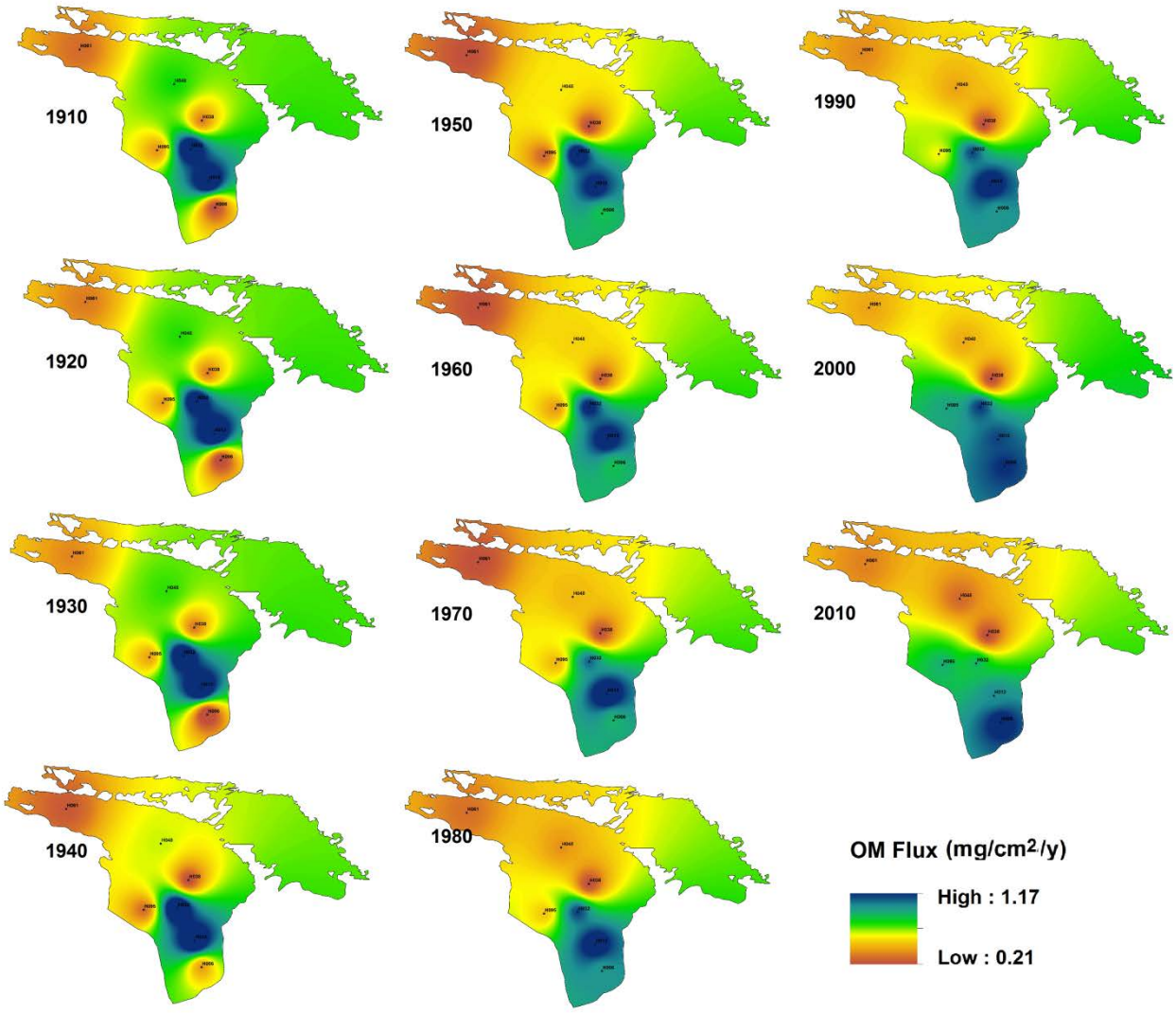


Figure D.5.Temporal and spatial depositional flux of OM during 1910-2010 in Lake Huron (excluding Saginaw Bay)

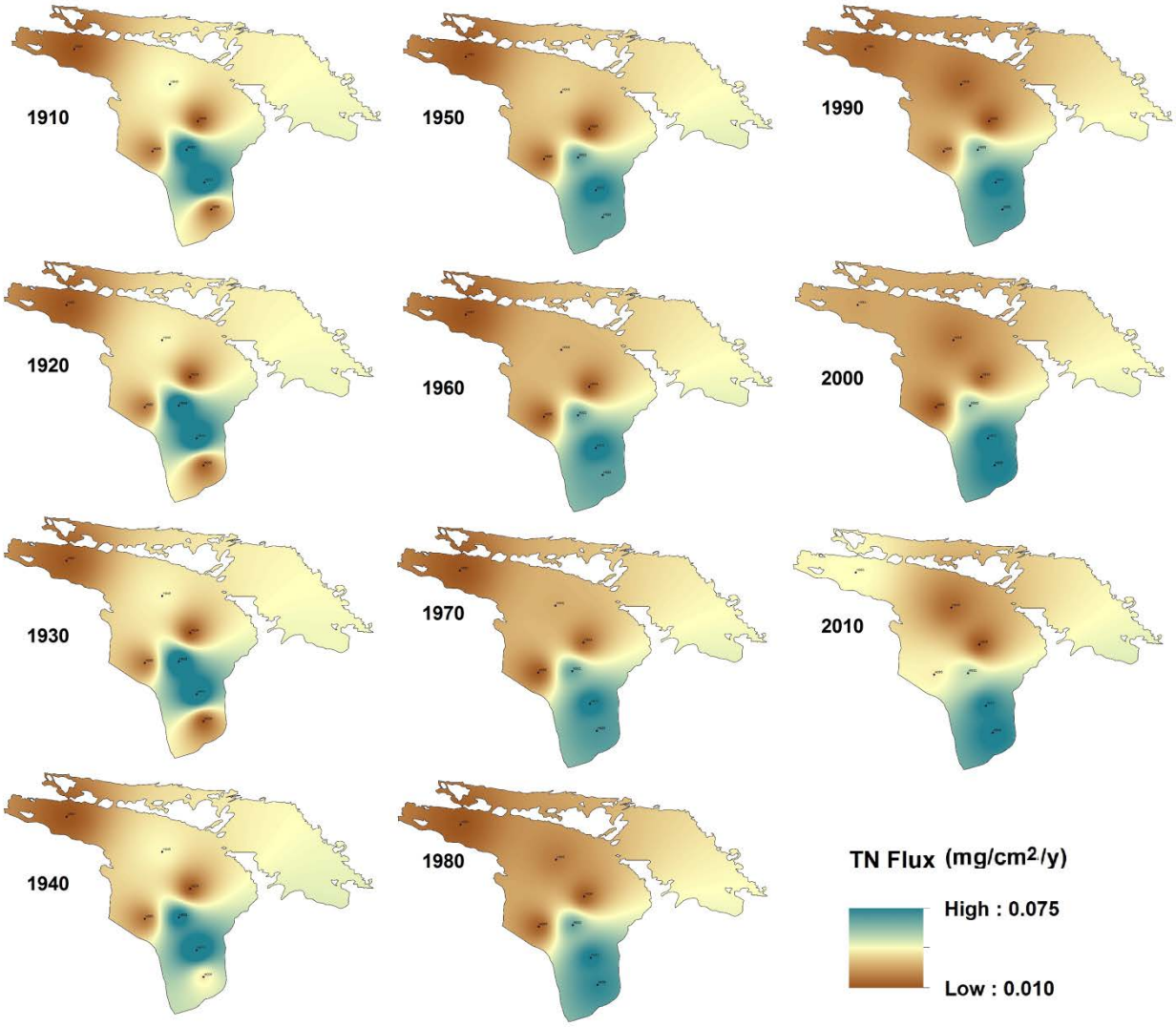
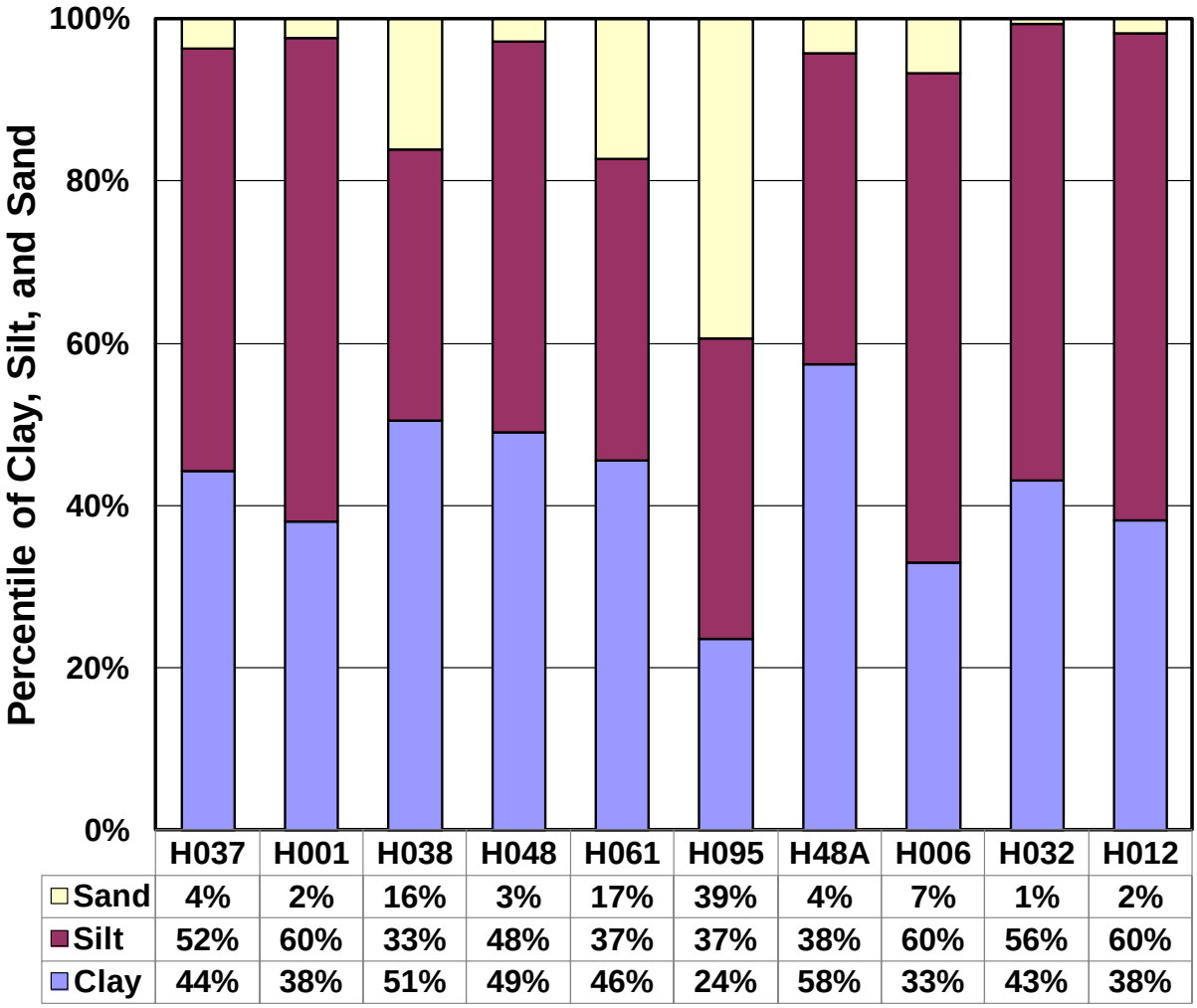


Figure D.6.Temporal and spatial depositional flux of TN during 1910-2010 in Lake Huron (excluding Saginaw Bay)



	H037	H001	H038	H048	H061	H095	H48A	H006	H032	H012
Sand	4%	2%	16%	3%	17%	39%	4%	7%	1%	2%
Silt	52%	60%	33%	48%	37%	37%	38%	60%	56%	60%
Clay	44%	38%	51%	49%	46%	24%	58%	33%	43%	38%

Figure D.7. detail of the average contributions of sand, silt, and clay in all sites of Lake Huron

Appendix E

Table E.1.Metropolitans used for the UDF analysis, their coordination, and their population

City name	Latidude	Longitude	Population, 2000			City name	Latidude	Longitude	Population, 2000		
			Used in calc.	City	City+Sub				Used in calc.	City	City+Sub
Akron, OH	41.0804	81.5215	217,074	217,074		Manitowoc, WI	44.0986	87.6774	82,887	34053	82887
Albany, NY	42.6658	73.7990	875,583	95,658	875,583	Marquette, MI	46.5508	87.3957	19,661	19661	
Allentown, PA	40.5963	75.4777	637,958	106,632	637,958	Memphis, TN	35.1056	90.0070	1,135,614	650,100	1,135,614
Aurora, IL	41.7676	88.2930	142,990	142990		Milwaukee, WI	43.0634	87.9666	1,689,572	596974	1689572
Barrie, ON	44.3667	79.7000	148,480	103,710	148,480	Minneapolis, MN	44.9619	93.2668	2,968,806	382618	2968806
Bay City, MI	43.5901	83.8886	403,070	36817	403070	Mississauga, ON	43.6333	79.6000	612,925	612,925	
Belleville, ON	44.1667	77.3667	87,395	45,986	87,395	Montréal, QC	45.5000	73.6000	1,789,041	1,789,041	
Benton Harbor, MI	42.1164	86.4462	162,453	11182	162453	Muskegon, MI	43.2276	86.2555	40,105	40105	
Boston, MA	42.3360	71.0179	589,141	589,141		Naperville, IL	41.7626	88.1543	128,358	128,358	
Brampton, ON	43.6833	79.7667	325,428	325,428		Nashville-Davidson, TN	36.1716	86.7848	1,231,311	545,524	1,231,311
Brantford, ON	43.1500	80.2833	86,417	86,417		New York, NY	40.6698	73.9438	21,199,865	8008278	21199865
Buffalo, NY	42.8898	78.8597	1,170,111	292648	1170111	Newark, NJ	40.7241	74.1732	273,546	273,546	
Canton, OH	40.8122	81.3733	406,934	80,806	406,934	Niagara Falls, NY	43.0912	79.0162	55,593	55,593	
Cedar Rapids, IA	41.9730	91.6696	191,701	120,758	191701	Niagara Falls, ON	43.0833	79.1000	78,815	78,815	
Chicago, IL	41.8371	87.6850	9,157,540	2896016	9157540	North Bay, ON	46.3333	79.4667	63,681	52,771	63,681
Cincinnati, OH	39.1398	84.5060	1,979,202	331285	1979202	Oakville, ON	43.4500	79.6833	144,738	144,738	
Cleveland, OH	41.4797	81.6785	2,945,831	478403	2945831	Omaha, NE	41.2639	96.0117	716,998	390,007	716998
Collingwood, ON	44.5000	80.2333	21,500	21500		Orillia, ON	44.6000	79.4333	40,256	29,121	40,256
Columbus, OH	39.9889	82.9874	1,540,157	711470	1540157	Oshawa, ON	43.8833	78.8500	139,051	139051	
Dayton, OH	39.7791	84.1974	950,558	166179	950558	Ottawa, ON	45.4167	75.7167	827,854	774,072	827,854
Dearborn, MI	42.3113	83.2135	97,775	97,775		Owen Sound, ON	44.5667	80.8500	21,431	21431	
Des Moines, IA	41.5767	93.6174	456,022	198,682	456022	Peoria, IL	40.7450	89.6092	112,936	112,936	
Detroit, MI	42.3831	83.1022	5,456,428	951270	5456428	Peterborough, ON	44.3333	78.3333	71,446	71,446	
Duluth, MN	46.7810	92.1180	243,815	86918	243815	Philadelphia, PA	40.0068	75.1347	6,188,463	1,517,550	6,188,463
Erie, PA	42.1259	80.0866	280,843	103717	280843	Pittsburgh, PA	40.4392	79.9767	2,358,695	334563	2358695
Evansville, IN	37.9842	87.5433	296,195	121,582	296195	Port Huron, MI	42.9937	82.4336	32,338	32338	
Flint, MI	43.0229	83.6928	124,943	124,943		Richmond Hill, ON	43.8667	79.1167	132,030	132,030	
Fort Wayne, IN	41.0738	85.1390	502,141	205,727	502141	Rochester, NY	43.1687	77.6158	1,037,831	219773	1037831
Gary, IN	41.5958	87.3441	102,746	102,746		Rockford, IL	42.2703	89.0631	371,236	150115	371236
Grand Rapids, MI	42.9613	85.6557	1,088,514	197800	1088514	Sarnia, ON	42.9500	82.4000	70,876	70876	
Green Bay, WI	44.5216	87.9898	226,778	102313	226778	St Ste. Marie, MI	46.4846	84.3655	16,542	16542	
Guelph, ON	43.5500	80.2500	117,344	106,170	117,344	South Bend, IN	46.5333	84.3333	74,566	74566	
Hamilton, ON	43.2500	79.8333	662,401	490268	662401	Springfield, IL	39.7814	89.6447	201,437	111,454	201437
Hammond, IN	41.6210	87.4904	83,048	83048		St Ste. Marie, ON	41.6753	86.2657	265,559	107789	265559
Houghton, MI	47.1136	88.5618	7,010	7010		St. Catharines, ON	43.1667	79.2500	377,009	129170	377009
Indianapolis, IN	39.7764	86.1462	1,607,486	781870	1607486	St. Louis, MS	38.6361	90.2443	2,603,607	348,189	2603607
Jersey City, NJ	40.7113	74.0650	240,055	240,055		St. Paul, MN	44.9477	93.1037	287,151	287,151	
Joliet, IL	41.5267	88.1224	106,221	106221		St. Paul, MN	44.9333	93.0833	287,151	287151	
Kalamazoo, MI	42.2747	85.5883	452,851	77145	452851	St. Thomas, ON	42.7833	81.2000	33,236	33,236	
Kansas City, MS	39.1223	94.5520	1,776,062	441,545	1776062	Sterling Heights, MI	42.5800	83.0305	124,471	124,471	
Kingston, ON	44.2333	76.5000	146,838	114195	146838	Sudbury, ON	46.5000	81.0167	155,601	155,219	155,601
Kitchener, ON	43.4500	80.5000	414,284	190,399	414,284	Syracuse, NY	43.0411	76.1441	650,154	147306	650154
Lansing, MI	42.7091	84.5540	447,728	119128	447728	Thunder Bay, ON	48.4500	89.2000	121,986	109016	121986
Leamington, ON	42.0500	82.5833	25,000	25000		Toledo, OH	41.6640	83.5816	618,203	313619	618203
Lexington-Fayette, K	38.0427	84.4595	479,198	260,512	479198	Toronto, ON	43.7000	79.4167	5,603,686	2518772	5603686
Lincoln, NE	40.8164	96.6882	250,291	225,581	250291	Traverse City, MI	44.7544	85.6029	14,532	14532	
Livonia, MI	42.3982	83.3725	100,545	100,545		Utica, NY	43.0969	75.2284	299,896	60,651	299,896
London, ON	42.9667	81.2500	432,451	336,539	432,451	Vaughan, ON	43.7833	79.6000	182,022	182,022	
Louisville, KY	38.2248	85.7412	1,025,598	256,231	1025598	Warren, MI	42.4930	83.0282	138,247	138,247	
Mackinac Island, MI	45.8560	84.6217	523	523		Washington, DC	38.9051	77.0162	7,608,070	572,059	7,608,070
Madison, WI	43.0798	89.3875	426,526	208054	426526	Windsor, ON	42.3000	83.0167	307,877	208402	307877

City coordination: http://worldatlas.com/aatlas/imageg.htm

Population: US cities: 2000 census, Ontario 2001 Canadian census

Distance: http://www.meridianworlddata.com/Distance-Calculation.asp, http://shum.cc.huji.ac.il/~cariel/2002astronomy4/distance7.html, http://jan.ucc.nau.edu/~cvm/latlongdist.html

Distance = (Radius of Earth)*arccos (sin (Lat1/57.2958)*sin (Lat2/57.2958) +cos (Lat1/57.2958)*cos (Lat2/57.2958)*cos (lon1/57.2958-Lon2/57.2958))

Radius of Earth =6378.7km, **1 degree latitude =** 110.6 km = 68.703 mi, and **1 degree longitude =** 111.3km * cos(latitude) = 69.172mi * cos(latitude)

Table E.2.The summary of different UDFs calculated at each site and the BC concentration in PGs in the Great Lakes (part1)

Site ID	Lat (N)	Long (W)	UDF1 sqrtP/D	UDF2 P/sqrtD	UDF3 sqrtP/sqrtD	UDF4 P/D	UDF5 P/D^2	UDF6 sqrtP/D^2	UDF7 lnP/D^2	BC (mg/g)
H101PG	43.269	82.3349	229	495	3867	266794	1182	1371	391	1.69
H102PG	43.7059	82.4039	203	477	3711	240769	824	818	189	1.83
H103PG	44.1449	82.2209	187	462	3588	222509	655	642	146	6.06
H104PG	44.372	81.838	183	457	3552	217905	628	627	148	1.37
H107PG	44.6154	82.5541	168	443	3433	201463	505	488	111	0.75
H108PG	44.5574	83.0502	167	441	3423	199998	500	483	108	0.75
H109PG	44.1502	83	182	456	3544	216449	626	614	135	1.48
H110PG	43.7723	83.8037	213	468	3676	241110	1569	2032	423	3.15
H118PG	44.9168	83.166	156	429	3322	187243	421	405	93	1.03
H119PG	45.3977	82.8107	146	417	3220	175422	359	350	83	0.87
H121PG	45.8189	83.4039	135	402	3107	162061	301	310	85	0.68
H123PG	45.9365	83.9059	133	396	3071	157556	289	334	114	1.07
H124PG	45.8512	84.4216	134	395	3071	157193	290	419	354	4.94
TB001(GLERL46)	44.8996	83.1496	156	429	3327	187880	424	409	94	0.81
TB002(GLERL30)	44.9387	83.2405	155	428	3313	186113	415	400	92	0.84
TB003(GLERL18)	44.9552	83.277	154	427	3307	185389	411	396	92	0.12
TB004(GLERL10)	44.9997	83.3742	153	425	3291	183474	401	387	90	0.74
NC68	46.0413	83.8536	132	394	3053	155663	286	344	119	0.91
NC70	46.1365	83.672	131	392	3039	154361	280	333	109	2.89
NC71	46.2335	83.7462	130	390	3021	152318	280	363	127	2.61
NC73	46.1869	83.3552	129	393	3034	154315	273	300	88	0.98
NC76	46.0003	83.4329	132	397	3069	157957	286	307	88	3.38
NC77	45.9704	83.1977	133	399	3081	159513	290	300	81	5.56
NC79	46.123	82.8867	131	396	3058	157376	282	289	75	3.66
NC82	45.9369	82.7588	135	402	3101	162130	301	303	76	2.19
NC83	46	82.5497	134	401	3093	161596	300	303	75	1.20
NC84	46.0917	82.5564	133	399	3073	159452	292	296	74	0.64
NC87	46.0611	82.1971	135	401	3091	161811	306	314	77	1.22
NC88	46.0553	81.9998	136	402	3099	162929	315	329	81	3.67
NC89	45.9165	82.1617	138	405	3125	165455	320	325	79	2.62
GB01	44.7178	80.8564	192	455	3548	219413	765	1225	528	1.74
GB03	44.7253	80.617	194	457	3562	223037	785	1041	375	0.85
GB04	44.6457	80.1673	211	467	3642	238294	1053	1570	615	2.11
GB05	44.7969	80.2431	194	457	3555	224786	820	987	310	1.39
GB06	44.7382	80.436	196	459	3570	225506	819	1030	346	2.67
GB09	44.8716	79.9675	191	455	3530	223030	811	930	266	2.19
GB12	44.9202	80.8748	178	446	3461	208347	611	696	209	1.26
GB17	45.2449	80.8742	163	433	3348	194039	494	513	132	1.83
GB24	45.7457	80.8394	148	416	3205	176771	395	418	104	0.90
GB29	45.5836	81.083	151	420	3241	180532	408	420	104	1.05
GB35	45.5257	81.6705	149	419	3236	178691	387	389	94	1.08
GB36	45.7082	81.6201	145	414	3192	173777	365	374	91	1.08
GB39	45.8729	81.2584	144	411	3165	171318	368	399	99	0.89
GB42	45.9125	81.5954	141	408	3146	168546	347	370	91	2.25
ON01	43.3038	79.73377	404	560	4438	438107	11004	12937	2428	0.76
ON02	43.3706	79.35325	363	563	4357	433794	6972	6155	1155	0.99
ON03	43.582	79.41491	500	623	4651	718991	36960	20394	2360	1.86
ON04	43.2469	79.42001	357	554	4333	403017	5836	6503	1339	0.62
ON05	43.5175	79.07975	336	557	4247	424350	6730	4900	834	0.97
ON06	43.3354	79.07048	328	547	4227	385670	4722	4713	1000	0.92
ON07	43.6491	79.0407	340	557	4235	434327	7714	5509	951	0.38
ON08	43.3566	78.93906	307	540	4151	365901	3835	3678	774	1.29
ON09	43.598	78.80092	289	532	4063	353850	3572	3082	615	0.93
ON10	43.4853	78.65563	270	524	3993	328611	2598	2351	473	0.60
ON11	43.7587	78.51475	253	510	3890	305380	2153	2121	468	0.53
ON12	43.43	78.4149	249	514	3895	304923	1948	1813	360	1.51
ON13	43.5418	78.31532	241	508	3846	295056	1758	1639	329	1.07
ON14	43.8354	78.20456	226	495	3753	275415	1443	1418	311	0.45
ON15	43.56	78.16581	232	503	3796	285564	1583	1485	295	1.44
ON16	43.7182	78.02556	221	494	3726	271707	1350	1299	269	0.96

Table E.3.The summary of different UDFs calculated at each site and the BC concentration in PGs in the Great Lakes (part2)

Site ID	Lat (N)	Long (W)	UDF1 sqrtP/D	UDF2 P/sqrtD	UDF3 sqrtP/sqrtD	UDF4 P/D	UDF5 P/D^2	UDF6 sqrtP/D^2	UDF7 lnP/D^2	BC (mg/g)
M024	43.4827	87.487	182	446	3432	225949	1083	911	163	2.09
M050	45.1819	87.41685	133	392	3045	158301	330	344	82	2.90
M047	45.1782	86.3749	136	400	3102	163051	325	329	87	1.16
M032	44.3715	86.9394	155	418	3251	183989	488	511	122	1.51
M093	44.9629	86.065117	143	408	3168	170094	361	398	126	1.49
M093	44.7709	86.117067	147	412	3207	175104	391	434	137	0.96
M093	44.8662	86.24325	144	409	3177	171792	372	392	112	2.18
M048	43.0582	86.6638	197	465	3580	243003	1072	986	220	1.62
M018	42.7339	86.99935	203	476	3617	264698	1403	1030	182	2.96
M011	42.5285	86.921367	211	485	3663	277885	1614	1147	204	4.22
M009	42.5177	86.924483	211	485	3665	278879	1634	1157	206	5.04
M008	41.9837	87.013967	239	513	3780	342880	3425	1954	320	5.07
M028	43.8041	86.7957	170	437	3388	205891	656	620	136	0.17
M041	44.7364	86.72165	145	409	3178	173282	396	403	98	1.23
M010	42.0652	87.378833	266	540	3843	434783	7765	3327	382	0.22
M020	42.3666	87.66775	227	503	3685	334020	3333	1724	238	0.15
M30	42.6614	87.739283	212	481	3606	288400	2203	1456	213	0.24
M044	42.954	87.3158	201	469	3566	259455	1537	1147	184	0.47
M088	44.7223	87.1822	146	406	3161	172258	424	465	112	0.14
M113	45.3266	87.0088	131	391	3038	156607	304	307	75	0.49
M120	45.5289	86.17165	130	392	3042	155874	286	288	77	1.52
M103	45.0628	86.490183	138	402	3120	165407	340	344	89	0.94
M041	44.7364	86.72165	145	409	3178	173282	396	403	98	1.22
M083	44.4737	86.706533	152	417	3238	181322	449	454	108	1.20
M061	43.0583	86.662	197	465	3581	243001	1073	988	220	1.97
M019	42.7335	86.583583	206	476	3649	258597	1252	1056	205	0.91
S001	46.993	85.1612	112	366	2826	133245	202	234	73	0.21
S002	47.3603	85.6208	104	356	2743	125948	173	178	49	0.24
S008	47.6058	86.8177	98	346	2665	119092	155	159	44	0.38
S011	48.3438	87.825	90	330	2535	108209	135	148	40	0.46
S012	47.8553	88.0418	94	336	2593	112948	147	166	50	0.50
S016	47.6212	89.4633	94	333	2569	111555	153	178	52	0.57
S019	47.3703	90.8535	92	329	2534	110170	161	169	39	0.40
S022	46.8002	91.7508	107	334	2600	120701	482	776	187	0.81
S102	47.6173	85.6973	100	351	2698	122083	161	162	43	0.25
S103	46.9838	85.6972	109	363	2804	131397	192	204	59	0.28
S104	48.0382	86.3217	94	341	2615	115016	142	139	36	0.31
S105	47.6177	86.3217	99	348	2678	120326	157	158	42	0.18
S106	47.1807	87.3183	103	351	2714	123222	172	196	65	0.89
S108	48.0392	86.9493	93	338	2598	113465	140	141	37	0.36
S110	46.7735	86.9495	110	361	2794	130409	199	262	102	0.16
S112	48.0393	87.5733	93	336	2581	111991	140	149	41	0.35
S113	47.6177	87.573	97	342	2640	116858	153	165	50	0.43
S114	46.9095	86.598	108	360	2783	129442	188	206	64	0.22
S116	48.0392	88.2007	93	333	2566	110694	146	172	50	0.52
S117	47.6175	88.2007	96	339	2620	115185	154	181	63	0.47
S118	47.6175	88.842	95	336	2597	113459	156	191	66	0.38
S119	47.1955	89.5048	97	339	2617	115958	162	177	54	0.40
S120	47.6185	90.0712	91	329	2540	109627	149	161	42	0.27
S121	47.1955	90.0727	95	336	2590	114219	162	167	42	0.47
H001PG	43.9374	83.6142	192	460	3596	225304	831	904	193	7.38
H002PG	44.1249	83.3324	182	455	3539	215964	647	648	141	0.07
H006PG	43.5265	82.0185	215	486	3789	252489	938	962	227	5.01
H012PG	43.9007	82.113	197	472	3669	234072	752	744	169	5.10
H027PG	44.0999	82.5025	186	461	3584	221862	653	636	143	0.33
H032PG	44.3542	82.3596	178	453	3518	212797	582	566	128	0.64
H037PG	44.7619	82.7836	162	436	3381	194726	463	446	101	2.99
H038PG	44.7507	82.2024	167	441	3416	199672	496	484	113	0.91
H048PG	45.2614	82.5912	150	422	3262	180527	385	374	88	1.31
H061PG	45.7498	83.9164	136	401	3105	161446	300	323	104	1.07
H095PG	44.3328	82.8326	176	450	3498	209919	567	550	122	3.59

Table E.4.The summary of different UDFs calculated at each site and the BC concentration in PGs in the Great Lakes (part3)

Site ID	Lat (N)	Long (W)	UDF1 sqrtP/D	UDF2 P/sqrtD	UDF3 sqrtP/sqrtD	UDF4 P/D	UDF5 P/D^2	UDF6 sqrtP/D^2	UDF7 lnP/D^2	BC (mg/g)
ON17	43.5897	78.01394	225	498	3749	277525	1464	1385	272	1.22
ON18	43.6817	77.84817	216	491	3690	266618	1289	1243	251	1.28
ON19	43.3998	77.81943	232	502	3756	287490	2114	2008	338	2.03
ON20	43.8727	77.71173	206	481	3621	252667	1080	1129	257	0.26
ON21	43.5419	77.68553	218	493	3687	270913	1511	1441	263	1.35
ON22	43.6104	77.37583	204	484	3600	255826	1177	1140	220	1.95
ON23	43.7873	77.44974	201	479	3583	249043	1037	1079	238	0.26
ON24	43.3618	77.50046	231	499	3709	288021	2742	2626	411	2.19
ON25	43.4178	77.37624	215	492	3647	270578	1723	1635	276	1.82
ON26	43.4583	77.0713	197	483	3556	252997	1116	1051	193	1.41
ON27	43.7328	77.01319	190	474	3504	240113	901	910	193	1.33
ON28	43.5645	76.71115	186	474	3472	240124	890	854	166	1.54
ON29	43.3951	76.87082	192	481	3522	249516	1026	959	176	0.43
ON30	43.542	76.90134	190	478	3509	244722	954	909	175	1.38
ON31	43.7473	76.60203	181	467	3430	232052	808	819	172	0.68
ON32	43.4921	76.5817	185	475	3461	241017	917	875	165	0.35
ON33	43.5988	76.5477	182	471	3441	236398	853	824	161	1.25
ON34	43.8959	76.54845	179	463	3405	227106	800	905	209	0.78
ON35	43.9943	76.48833	180	459	3390	224531	867	1141	287	1.29
ON36	44.0772	76.41123	183	456	3378	223116	1046	1655	450	1.09
ON37	43.5833	76.33246	179	469	3410	234362	848	818	157	0.76
ER02	41.5091	81.7135	600	622	4516	924267	154189	90253	7955	2.70
ER03	42.1357	80.1106	448	526	4141	396884	55748	104166	24619	5.10
ER04	41.7019	83.4488	295	526	4071	343883	6028	6879	1189	2.60
ER05	41.8915	83.3074	275	532	4078	341954	3101	2612	479	0.10
ER06	41.4762	82.1842	250	528	3974	325945	2678	1920	281	1.98
ER07	41.9126	80.7964	227	515	3886	285792	1284	1128	209	1.54
ER09	42.5387	79.6163	245	519	3950	295048	1486	1512	307	2.29
ER10	42.6803	79.6922	256	522	4004	303844	1689	1751	361	2.23
ER15	42.5171	79.893	244	517	3956	292153	1423	1497	312	1.76
ER20	41.7604	83.3065	268	526	4039	327790	2868	2695	485	3.27
ER21	41.9783	83.1879	288	541	4132	365411	3959	3061	567	0.83
ER22	41.821	83.0769	265	530	4049	332228	2614	2150	406	3.10
ER23	41.5746	82.5184	242	522	3956	307846	1810	1437	259	2.38
ER25	41.876	82.3292	254	528	4017	320276	2085	1746	382	1.76
ER26	41.6729	82.1004	256	532	4006	332349	2826	2018	304	3.81
ER27	41.6756	81.7518	285	545	4075	384900	6717	4277	487	4.07
ER28	41.8061	81.6075	256	532	4004	334896	3130	2176	303	3.88
ER29	41.8237	81.3076	242	525	3951	311975	2120	1581	245	3.87
ER30	42.4298	81.2055	239	514	3955	286915	1302	1320	303	1.77
ER31	42.2536	81.1075	234	515	3934	287162	1282	1188	244	1.90
ER32	42.0817	81.0113	231	516	3916	288210	1315	1158	221	4.06
ER36	41.9353	81.4779	243	525	3964	310246	1981	1509	246	3.28
ER37	42.1097	81.5748	240	521	3962	300753	1606	1318	244	3.10
ER38	42.282	81.6717	240	519	3968	296376	1474	1287	262	4.10
ER42	41.9654	82.041	249	527	4002	316572	2010	1585	296	4.04
ER43	41.7885	81.9461	256	532	4012	332653	2831	2019	304	4.08
ER58	41.6847	82.9335	250	523	3990	313704	1997	1666	317	3.27
ER59	41.7269	83.1494	258	525	4015	320619	2336	2035	375	10.55
ER60	41.8922	83.1959	275	534	4083	344531	3106	2525	468	2.80
ER61	41.9466	83.0454	282	539	4115	357544	3558	2773	528	4.54
ER63	42.4173	79.7991	240	516	3928	288951	1382	1467	304	2.56
ER73	41.9778	81.7571	246	526	3984	313314	1999	1535	262	3.42
ER78	42.1168	81.2501	235	518	3936	292675	1415	1212	230	3.36
ER81	42.3542	80.8079	235	514	3935	284261	1229	1225	261	2.09
ER84	42.7052	79.2665	266	526	4015	316147	2240	2306	458	0.16
ER85	42.8499	79.2503	292	532	4105	337040	3082	3414	724	0.80
ER91	41.8418	82.9163	265	531	4052	333002	2571	2095	420	2.88
ER92	41.9506	82.6867	275	535	4087	340435	2837	2843	869	2.94
ER93	42.6164	80.0002	249	519	3984	295328	1478	1557	328	1.08
ER95	42	80.6666	228	514	3888	283334	1237	1163	227	0.73
ER98	41.5833	82.9163	243	519	3955	304563	1762	1479	274	2.48
ER99	42.417	79.5834	237	516	3909	288644	1354	1369	276	1.43

Appendix F

Table F.1.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S001, sections 1-12

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S001-1	/01	0-0.5	0.25	3.9225	1.2916	1.0904	5.0129	3.9225	2.6999	1.6095	0.5300	41%	59%
2011-S001-1	/02	0-0.5	0.25	3.9756	1.3091	1.0762	5.0518	3.9756	2.7181	1.6419	0.5407	41%	59%
2011-S001-1	/03	0-0.5	0.25	3.9702	1.3073	1.0683	5.0385	3.9702	2.7023	1.634	0.5381	41%	59%
2011-S001-2	/01	0.5-1	0.75	4.426	1.4574	1.1084	5.5344	4.426	3.4926	2.3842	0.7851	54%	46%
2011-S001-2	/02	0.5-1	0.75	4.3493	1.4322	1.0945	5.4438	4.3493	3.4109	2.3164	0.7628	53%	47%
2011-S001-2	/03	0.5-1	0.75	4.3634	1.4368	1.0981	5.4615	4.3634	3.4232	2.3251	0.7656	53%	47%
2011-S001-3	/01	1-1.5	1.25	4.4921	1.4792	1.1136	5.6057	4.4921	3.6496	2.536	0.8351	56%	44%
2011-S001-3	/02	1-1.5	1.25	4.4641	1.4700	1.1068	5.5709	4.4641	3.6279	2.5211	0.8302	56%	44%
2011-S001-3	/03	1-1.5	1.25	4.4884	1.4780	1.106	5.5944	4.4884	3.6473	2.5413	0.8368	57%	43%
2011-S001-4	/01	1.5-2	1.75	4.2889	1.4123	1.1088	5.3977	4.2889	3.3144	2.2056	0.7263	51%	49%
2011-S001-4	/02	1.5-2	1.75	4.2948	1.4142	1.0897	5.3845	4.2948	3.3155	2.2258	0.7329	52%	48%
2011-S001-4	/03	1.5-2	1.75	4.2934	1.4138	1.1056	5.399	4.2934	3.3441	2.2385	0.7371	52%	48%
2011-S001-5	/01	2-2.5	2.25	4.4392	1.4618	1.1083	5.5475	4.4392	3.6107	2.5024	0.8240	56%	44%
2011-S001-5	/02	2-2.5	2.25	4.5639	1.5028	1.0904	5.6543	4.5639	3.7113	2.6209	0.8630	57%	43%
2011-S001-5	/03	2-2.5	2.25	4.5382	1.4944	1.106	5.6442	4.5382	3.6765	2.5705	0.8464	57%	43%
2011-S001-6	/01	2.5-3	2.75	4.5955	1.5133	1.0758	5.6713	4.5955	3.803	2.7272	0.8980	59%	41%
2011-S001-6	/02	2.5-3	2.75	4.584	1.5095	1.0798	5.6638	4.584	3.7849	2.7051	0.8908	59%	41%
2011-S001-6	/03	2.5-3	2.75	4.6624	1.5353	1.1145	5.7769	4.6624	3.9336	2.8191	0.9283	60%	40%
2011-S001-7	/01	3-3.5	3.25	4.7207	1.5545	1.1063	5.827	4.7207	4.0361	2.9298	0.9648	62%	38%
2011-S001-7	/02	3-3.5	3.25	4.7003	1.5478	1.1359	5.8362	4.7003	4.0308	2.8949	0.9533	62%	38%
2011-S001-7	/03	3-3.5	3.25	4.7156	1.5528	1.0853	5.8009	4.7156	3.992	2.9067	0.9571	62%	38%
2011-S001-8	/01	3.5-4	3.75	4.5734	1.5060	1.0791	5.6525	4.5734	3.7117	2.6326	0.8669	58%	42%
2011-S001-8	/02	3.5-4	3.75	4.6033	1.5158	1.106	5.7093	4.6033	3.7632	2.6572	0.8750	58%	42%
2011-S001-8	/03	3.5-4	3.75	4.5657	1.5034	1.0938	5.6595	4.5657	3.7262	2.6324	0.8668	58%	42%
2011-S001-9	/01	4-4.5	4.25	4.5948	1.5130	1.1038	5.6986	4.5948	3.7436	2.6398	0.8693	57%	43%
2011-S001-9	/02	4-4.5	4.25	4.589	1.5111	1.0991	5.6881	4.589	3.7585	2.6594	0.8757	58%	42%
2011-S001-9	/03	4-4.5	4.25	4.5786	1.5077	1.0928	5.6714	4.5786	3.7132	2.6204	0.8629	57%	43%
2011-S001-10	/01	4.5-5	4.75	3.8839	1.2789	1.1219	5.0058	3.8839	3.5959	2.474	0.8147	64%	36%
2011-S001-10	/02	4.5-5	4.75	3.9634	1.3051	1.0854	5.0488	3.9634	3.5748	2.4894	0.8197	63%	37%
2011-S001-10	/03	4.5-5	4.75	3.9312	1.2945	1.1031	5.0343	3.9312	3.66	2.5569	0.8420	65%	35%
2011-S001-11	/01	5-6	5.5	4.6457	1.5298	1.0809	5.7266	4.6457	3.8511	2.7702	0.9122	60%	40%
2011-S001-11	/02	5-6	5.5	4.6921	1.5451	1.0927	5.7848	4.6921	3.8944	2.8017	0.9226	60%	40%
2011-S001-11	/03	5-6	5.5	4.7118	1.5515	1.1024	5.8142	4.7118	3.9404	2.838	0.9345	60%	40%
2011-S001-12	/01	6-7	6.5	5.179	1.7054	1.0921	6.2711	5.179	4.7235	3.6314	1.1958	70%	30%
2011-S001-12	/02	6-7	6.5	5.0937	1.6773	1.1025	6.1962	5.0937	4.6651	3.5626	1.1731	70%	30%
2011-S001-12	/03	6-7	6.5	5.1799	1.7057	1.0856	6.2655	5.1799	4.7289	3.6433	1.1997	70%	30%

Table F.2.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S001, sections 13-24

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S001-13	/01	7-8	7.5	4.9005	1.6137	1.1003	6.0008	4.9005	4.31	3.2097	1.0569	65%	35%
2011-S001-13	/02	7-8	7.5	4.9344	1.6248	1.0821	6.0165	4.9344	4.3221	3.24	1.0669	66%	34%
2011-S001-13	/03	7-8	7.5	4.9836	1.6411	1.0749	6.0585	4.9836	4.3793	3.3044	1.0881	66%	34%
2011-S001-14	/01	8-9	8.5	4.9512	1.6304	1.0881	6.0393	4.9512	4.3916	3.3035	1.0878	67%	33%
2011-S001-14	/02	8-9	8.5	4.9749	1.6382	1.1144	6.0893	4.9749	4.4418	3.3274	1.0957	67%	33%
2011-S001-14	/03	8-9	8.5	4.93522	1.6251	1.0745	6.00972	4.93522	4.4358	3.3613	1.1068	68%	32%
2011-S001-15	/01	9-10	9.5	4.9195	1.6199	1.0977	6.0172	5.601	4.3226	3.2249	1.4234	70%	30%
2011-S001-15	/02	9-10	9.5	5.0252	1.6547	1.0917	6.1169	5.5922	4.4119	3.3202	1.4528	70%	30%
2011-S001-15	/03	9-10	9.5	4.9821	1.6406	1.0921	6.0742	5.6577	4.376	3.2839	1.4410	70%	30%
2011-S001-16	/01	10-11	10.5	4.8521	1.5977	1.0927	5.9448	4.8521	4.1988	3.1061	1.0228	64%	36%
2011-S001-16	/02	10-11	10.5	4.8609	1.6006	1.1093	5.9702	4.8609	4.2193	3.11	1.0241	64%	36%
2011-S001-16	/03	10-11	10.5	4.8706	1.6038	1.083	5.9536	4.8706	4.1998	3.1168	1.0263	64%	36%
2011-S001-17	/01	11-12	11.5	4.9924	1.6439	1.0969	6.0893	4.9924	4.4419	3.345	1.1015	67%	33%
2011-S001-17	/02	11-12	11.5	5.0603	1.6663	1.1009	6.1612	5.0603	4.5059	3.405	1.1212	67%	33%
2011-S001-17	/03	11-12	11.5	5.1447	1.6941	1.0089	6.1536	5.1447	4.5107	3.5018	1.1531	68%	32%
2011-S001-18	/01	12-13	12.5	5.0613	1.6666	1.0978	6.1591	5.0613	4.5347	3.4369	1.1317	68%	32%
2011-S001-18	/02	12-13	12.5	5.0971	1.6784	1.0815	6.1786	5.0971	4.5429	3.4614	1.1398	68%	32%
2011-S001-18	/03	12-13	12.5	5.1104	1.6828	1.0809	6.1913	5.1104	4.5684	3.4875	1.1484	68%	32%
2011-S001-19	/01	13-14	13.5	4.9132	1.6179	1.085	5.9982	4.9132	4.2999	3.2149	1.0586	65%	35%
2011-S001-19	/02	13-14	13.5	4.9707	1.6368	1.1401	6.1108	4.9707	4.4124	3.2723	1.0775	66%	34%
2011-S001-19	/03	13-14	13.5	4.9546	1.6315	1.0851	6.0397	4.9546	4.3857	3.3006	1.0869	67%	33%
2011-S001-20	/01	14-15	14.5	4.96	1.6333	1.0816	6.0416	4.96	4.4046	3.323	1.0942	67%	33%
2011-S001-20	/02	14-15	14.5	5.079	1.6725	1.1073	6.1863	5.079	4.5736	3.4663	1.1414	68%	32%
2011-S001-20	/03	14-15	14.5	5.1628	1.7001	1.1116	6.2744	5.1628	4.6916	3.58	1.1789	69%	31%
2011-S001-21	/01	15-17	16	5.164	1.7005	1.0927	6.2567	5.164	4.6772	3.5845	1.1803	69%	31%
2011-S001-21	/02	15-17	16	5.1809	1.7060	1.1076	6.2885	5.1809	4.7213	3.6137	1.1900	70%	30%
2011-S001-21	/03	15-17	16	5.1881	1.7084	1.1083	6.2964	5.1881	4.7516	3.6433	1.1997	70%	30%
2011-S001-22	/01	17-19	18	5.0485	1.6624	1.1131	6.1616	5.0485	4.4831	3.37	1.1097	67%	33%
2011-S001-22	/02	17-19	18	5.0836	1.6740	1.1017	6.1853	5.0836	4.5112	3.4095	1.1227	67%	33%
2011-S001-22	/03	17-19	18	4.9484	1.6295	1.0997	6.0481	4.9484	4.4239	3.3242	1.0946	67%	33%
2011-S001-23	/01	19-21	20	5.2001	1.7123	1.0996	6.2997	5.2001	4.7435	3.6439	1.1999	70%	30%
2011-S001-23	/02	19-21	20	5.2445	1.7270	1.1025	6.347	5.2445	4.7846	3.6821	1.2125	70%	30%
2011-S001-23	/03	19-21	20	5.2201	1.7189	1.1114	6.3315	5.2201	4.7714	3.66	1.2052	70%	30%
2011-S001-24	/01	21-23	22	5.1819	1.7063	1.1012	6.2831	5.1819	4.7593	3.6581	1.2046	71%	29%
2011-S001-24	/02	21-23	22	5.2431	1.7265	1.1095	6.3526	5.2431	4.8249	3.7154	1.2234	71%	29%
2011-S001-24	/03	21-23	22	5.2028	1.7132	1.0988	6.3016	5.2028	4.7759	3.6771	1.2108	71%	29%

Table F.3.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S002, sections 1-12

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S002-1	/01	0-0.5	0.25	3.1182	1.0361	1.0978	4.216	3.1182	1.4165	0.3187	0.1059	10%	90%
2011-S002-1	/02	0-0.5	0.25	3.1481	1.0460	1.1173	4.2654	3.1481	1.4356	0.3183	0.1058	10%	90%
2011-S002-1	/03	0-0.5	0.25	3.1364	1.0421	1.1086	4.245	3.1364	1.4383	0.3297	0.1096	11%	89%
2011-S002-2	/01	0.5-1	0.75	3.3962	1.1285	1.0751	4.4713	3.3962	1.8108	0.7357	0.2445	22%	78%
2011-S002-2	/02	0.5-1	0.75	3.3644	1.1179	1.0945	4.4589	3.3644	1.8162	0.7217	0.2398	21%	79%
2011-S002-2	/03	0.5-1	0.75	3.3854	1.1249	1.0831	4.4685	3.3854	1.804	0.7209	0.2395	21%	79%
2011-S002-3	/01	1-1.5	1.25	3.6058	1.1981	1.0811	4.6869	3.6058	2.1325	1.0514	0.3494	29%	71%
2011-S002-3	/02	1-1.5	1.25	3.5297	1.1728	1.0849	4.6146	3.5297	2.0725	0.9876	0.3282	28%	72%
2011-S002-3	/03	1-1.5	1.25	3.5119	1.1669	1.1033	4.6152	3.5119	2.0498	0.9465	0.3145	27%	73%
2011-S002-4	/01	1.5-2	1.75	3.6648	1.2177	1.1029	4.7677	3.6648	2.3789	1.276	0.4240	35%	65%
2011-S002-4	/02	1.5-2	1.75	3.6272	1.2052	1.0993	4.7265	3.6272	2.3925	1.2932	0.4297	36%	64%
2011-S002-4	/03	1.5-2	1.75	3.7713	1.2531	1.1021	4.8734	3.7713	2.4611	1.359	0.4516	36%	64%
2011-S002-5	/01	2-2.5	2.25	3.9503	1.3126	1.1009	5.0512	3.9503	2.7508	1.6499	0.5482	42%	58%
2011-S002-5	/02	2-2.5	2.25	3.8997	1.2958	1.1126	5.0123	3.8997	2.7888	1.6762	0.5570	43%	57%
2011-S002-5	/03	2-2.5	2.25	3.9894	1.3256	1.1142	5.1036	3.9894	2.8137	1.6995	0.5647	43%	57%
2011-S002-6	/01	2.5-3	2.75	4.0964	1.3611	1.0903	5.1867	4.0964	2.9728	1.8825	0.6255	46%	54%
2011-S002-6	/02	2.5-3	2.75	4.0964	1.3611	1.0683	5.1647	4.0964	2.991	1.9227	0.6389	47%	53%
2011-S002-6	/03	2.5-3	2.75	4.0319	1.3397	1.0859	5.1178	4.0319	2.9522	1.8663	0.6201	46%	54%
2011-S002-7	/01	3-3.5	3.25	3.9842	1.3238	1.0908	5.075	3.9842	2.7754	1.6846	0.5597	42%	58%
2011-S002-7	/02	3-3.5	3.25	3.9462	1.3112	1.1223	5.0685	3.9462	2.7798	1.6575	0.5507	42%	58%
2011-S002-7	/03	3-3.5	3.25	4.0074	1.3316	1.1167	5.1241	4.0074	2.7956	1.6789	0.5579	42%	58%
2011-S002-8	/01	3.5-4	3.75	3.7596	1.2492	1.0859	4.8455	3.7596	2.5792	1.4933	0.4962	40%	60%
2011-S002-8	/02	3.5-4	3.75	3.836	1.2746	1.0969	4.9329	3.836	2.6085	1.5116	0.5023	39%	61%
2011-S002-8	/03	3.5-4	3.75	3.8441	1.2773	1.1167	4.9608	3.8441	2.6389	1.5222	0.5058	40%	60%
2011-S002-9	/01	4-4.5	4.25	3.8642	1.2840	1.0856	4.9498	3.8642	2.6363	1.5507	0.5153	40%	60%
2011-S002-9	/02	4-4.5	4.25	3.8648	1.2842	1.0974	4.9622	3.8648	2.6329	1.5355	0.5102	40%	60%
2011-S002-9	/03	4-4.5	4.25	3.866	1.2846	1.082	4.948	3.866	2.614	1.532	0.5090	40%	60%
2011-S002-10	/01	4.5-5	4.75	4.0102	1.3325	1.097	5.1072	4.0102	2.8129	1.7159	0.5701	43%	57%
2011-S002-10	/02	4.5-5	4.75	4.0123	1.3332	1.0918	5.1041	4.0123	2.8089	1.7171	0.5705	43%	57%
2011-S002-10	/03	4.5-5	4.75	3.9975	1.3283	1.1033	5.1008	3.9975	2.8201	1.7168	0.5704	43%	57%
2011-S002-11	/01	5-6	5.5	4.4498	1.4786	1.0845	5.5343	4.4498	3.5044	2.4199	0.8041	54%	46%
2011-S002-11	/02	5-6	5.5	4.4176	1.4679	1.0894	5.507	4.4176	3.4946	2.4052	0.7992	54%	46%
2011-S002-11	/03	5-6	5.5	4.4069	1.4643	1.0944	5.5013	4.4069	3.4694	2.375	0.7892	54%	46%
2011-S002-12	/01	6-7	6.5	4.0089	1.3321	1.0846	5.0935	4.0089	2.8461	1.7615	0.5853	44%	56%
2011-S002-12	/02	6-7	6.5	4.0509	1.3460	1.1021	5.153	4.0509	2.913	1.8109	0.6017	45%	55%
2011-S002-12	/03	6-7	6.5	4.0436	1.3436	1.0969	5.1405	4.0436	2.8707	1.7738	0.5894	44%	56%

Table F.4.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S002, sections 13-25

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S002-13	/01	7-8	7.5	3.9407	1.3094	1.1045	5.0452	3.9407	2.7597	1.6552	0.5500	42%	58%
2011-S002-13	/02	7-8	7.5	3.9487	1.3121	1.1055	5.0542	3.9487	2.7515	1.646	0.5469	42%	58%
2011-S002-13	/03	7-8	7.5	3.9165	1.3014	1.0989	5.0154	3.9165	2.7329	1.634	0.5429	42%	58%
2011-S002-14	/01	8-9	8.5	3.9553	1.3142	1.0911	5.0464	3.9553	2.7333	1.6422	0.5457	42%	58%
2011-S002-14	/02	8-9	8.5	3.9429	1.3101	1.0769	5.0198	3.9429	2.7144	1.6375	0.5441	42%	58%
2011-S002-14	/03	8-9	8.5	3.8888	1.2921	1.1021	4.9909	3.8888	2.7091	1.607	0.5340	41%	59%
2011-S002-15	/01	9-10	9.5	3.951	1.3128	1.1015	5.0525	3.951	2.7577	1.6562	0.5503	42%	58%
2011-S002-15	/02	9-10	9.5	3.9216	1.3030	1.0895	5.0111	3.9216	2.7297	1.6402	0.5450	42%	58%
2011-S002-15	/03	9-10	9.5	3.9527	1.3134	1.1061	5.0588	3.9527	2.7588	1.6527	0.5491	42%	58%
2011-S002-16	/01	10-11	10.5	4.0206	1.3359	1.1135	5.1341	4.0206	2.8584	1.7449	0.5798	43%	57%
2011-S002-16	/02	10-11	10.5	4.0067	1.3313	1.1274	5.1341	4.0067	2.861	1.7336	0.5760	43%	57%
2011-S002-16	/03	10-11	10.5	4.0238	1.3370	1.1137	5.1375	4.0238	2.8086	1.6949	0.5632	42%	58%
2011-S002-17	/01	11-12	11.5	3.9917	1.3263	1.0924	5.0841	3.9917	2.8097	1.7173	0.5706	43%	57%
2011-S002-17	/02	11-12	11.5	3.9648	1.3174	1.1076	5.0724	3.9648	2.7945	1.6869	0.5605	43%	57%
2011-S002-17	/03	11-12	11.5	3.9549	1.3141	1.1086	5.0635	3.9549	2.7967	1.6881	0.5609	43%	57%
2011-S002-18	/01	12-13	12.5	4.0317	1.3396	1.0819	5.1136	4.0317	2.865	1.7831	0.5925	44%	56%
2011-S002-18	/02	12-13	12.5	3.9917	1.3263	1.0995	5.0912	3.9917	2.8555	1.756	0.5835	44%	56%
2011-S002-18	/03	12-13	12.5	4.0046	1.3306	1.1341	5.1387	4.0046	2.8957	1.7616	0.5853	44%	56%
2011-S002-19	/01	13-14	13.5	4.0496	1.3456	1.0891	5.1387	4.0496	2.8957	1.8066	0.6003	45%	55%
2011-S002-19	/02	13-14	13.5	4.0329	1.3400	1.0763	5.1092	4.0329	2.8661	1.7898	0.5947	44%	56%
2011-S002-19	/03	13-14	13.5	3.987	1.3248	1.0989	5.0859	3.987	2.8477	1.7488	0.5811	44%	56%
2011-S002-20	/01	14-15	14.5	4.016	1.3344	1.0916	5.1076	4.016	2.8726	1.781	0.5918	44%	56%
2011-S002-20	/02	14-15	14.5	4.0162	1.3345	1.0875	5.1037	4.0162	2.869	1.7815	0.5919	44%	56%
2011-S002-20	/03	14-15	14.5	4.0968	1.3613	1.0923	5.1891	4.0968	2.9122	1.8199	0.6047	44%	56%
2011-S002-21	/01	15-17	16	3.978	1.3218	1.1142	5.0922	3.978	2.8576	1.7434	0.5793	44%	56%
2011-S002-21	/02	15-17	16	4.0095	1.3323	1.1158	5.1253	4.0095	2.8715	1.7557	0.5834	44%	56%
2011-S002-21	/03	15-17	16	4.0074	1.3316	1.101	5.1084	4.0074	2.8548	1.7538	0.5827	44%	56%
2011-S002-22	/01	17-19	18	4.0101	1.3325	1.0944	5.1045	4.0101	2.906	1.8116	0.6019	45%	55%
2011-S002-22	/02	17-19	18	4.0062	1.3312	1.0981	5.1043	4.0062	2.9007	1.8026	0.5990	45%	55%
2011-S002-22	/03	17-19	18	4.0609	1.3493	1.1061	5.167	4.0609	2.9415	1.8354	0.6099	45%	55%
2011-S002-23	/01	19-21	20	3.9903	1.3259	1.0797	5.07	3.9903	2.8619	1.7822	0.5922	45%	55%
2011-S002-23	/02	19-21	20	4.0419	1.3430	1.1026	5.1445	4.0419	2.9119	1.8093	0.6012	45%	55%
2011-S002-23	/03	19-21	20	3.9923	1.3265	1.1059	5.0982	3.9923	2.8864	1.7805	0.5916	45%	55%
2011-S002-24	/01	21-23	22	4.0305	1.3392	1.086	5.1165	4.0305	2.8959	1.8099	0.6014	45%	55%
2011-S002-24	/02	21-23	22	4.0429	1.3434	1.056	5.0989	4.0429	2.8717	1.8157	0.6033	45%	55%
2011-S002-24	/03	21-23	22	4.0247	1.3373	1.0881	5.1128	4.0247	2.8923	1.8042	0.5995	45%	55%
2011-S002-25	/01	23-25	24	3.9933	1.3269	1.1076	5.1009	3.9933	2.8796	1.772	0.5888	44%	56%
2011-S002-25	/02	23-25	24	4.0508	1.3460	1.091	5.1418	4.0508	2.9024	1.8114	0.6019	45%	55%
2011-S002-25	/03	23-25	24	4.0504	1.3458	1.1006	5.151	4.0504	2.9112	1.8106	0.6016	45%	55%

Table F.5.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S008, sections 1-12

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S008-1	/01	0-0.5	0.25	3.2393	1.09266	1.0814	4.3207	3.2393	1.5323	0.4509	0.15210	14%	86%
2011-S008-1	/02	0-0.5	0.25	3.2182	1.08555	1.0741	4.2923	3.2182	1.492	0.4179	0.14096	13%	87%
2011-S008-1	/03	0-0.5	0.25	3.202	1.08008	1.0856	4.2876	3.202	1.503	0.4174	0.14080	13%	87%
2011-S008-2	/01	0.5-1	0.75	3.2084	1.09558	1.1071	4.3155	3.2084	1.5911	0.484	0.16527	15%	85%
2011-S008-2	/02	0.5-1	0.75	3.1426	1.07311	1.0997	4.2423	3.1426	1.5483	0.4486	0.15318	14%	86%
2011-S008-2	/03	0.5-1	0.75	3.2584	1.11265	1.1147	4.3731	3.2584	1.6178	0.5031	0.17179	15%	85%
2011-S008-3	/01	1-1.5	1.25	3.3521	1.12748	1.1074	4.4595	3.3521	1.7524	0.645	0.21695	19%	81%
2011-S008-3	/02	1-1.5	1.25	3.3227	1.11759	1.0816	4.4043	3.3227	1.651	0.5694	0.19152	17%	83%
2011-S008-3	/03	1-1.5	1.25	3.2951	1.10830	1.0911	4.3862	3.2951	1.64	0.5489	0.18462	17%	83%
2011-S008-4	/01	1.5-2	1.75	3.3697	1.12861	1.0864	4.4561	3.3697	1.7733	0.6869	0.23006	20%	80%
2011-S008-4	/02	1.5-2	1.75	3.3866	1.13427	1.0995	4.4861	3.3866	1.7919	0.6924	0.23190	20%	80%
2011-S008-4	/03	1.5-2	1.75	3.3563	1.12412	1.1105	4.4668	3.3563	1.7865	0.676	0.22641	20%	80%
2011-S008-5	/01	2-2.5	2.25	3.4113	1.14254	1.0773	4.4886	3.4113	1.8248	0.7475	0.25036	22%	78%
2011-S008-5	/02	2-2.5	2.25	3.4025	1.13959	1.0796	4.4821	3.4025	1.8249	0.7453	0.24962	22%	78%
2011-S008-5	/03	2-2.5	2.25	3.4159	1.14408	1.0867	4.5026	3.4159	1.8316	0.7449	0.24949	22%	78%
2011-S008-6	/01	2.5-3	2.75	3.4171	1.14448	1.0855	4.5026	3.4171	1.9062	0.8207	0.27488	24%	76%
2011-S008-6	/02	2.5-3	2.75	3.4692	1.16193	1.0901	4.5593	3.4692	1.9226	0.8325	0.27883	24%	76%
2011-S008-6	/03	2.5-3	2.75	3.4508	1.15577	1.0942	4.545	3.4508	1.9092	0.815	0.27297	24%	76%
2011-S008-7	/01	3-3.5	3.25	3.5068	1.17453	1.0964	4.6032	3.5068	2.1431	1.0467	0.35057	30%	70%
2011-S008-7	/02	3-3.5	3.25	3.5058	1.17419	1.1142	4.62	3.5058	2.0036	0.8894	0.29789	25%	75%
2011-S008-7	/03	3-3.5	3.25	3.5292	1.18203	1.1186	4.6478	3.5292	2.0137	0.8951	0.29979	25%	75%
2011-S008-8	/01	3.5-4	3.75	3.4833	1.16665	1.1002	4.5835	3.4833	2.0688	0.9686	0.32441	28%	72%
2011-S008-8	/02	3.5-4	3.75	3.5599	1.19231	1.0874	4.6473	3.5599	2.0886	1.0012	0.33533	28%	72%
2011-S008-8	/03	3.5-4	3.75	3.5086	1.17513	1.1022	4.6108	3.5086	2.0806	0.9784	0.32769	28%	72%
2011-S008-9	/01	4-4.5	4.25	3.6814	1.23300	1.0988	4.7802	3.6814	2.2702	1.1714	0.39233	32%	68%
2011-S008-9	/02	4-4.5	4.25	3.62488	1.21407	1.1407	4.76558	3.62488	2.2983	1.1576	0.38771	32%	68%
2011-S008-9	/03	4-4.5	4.25	3.6796	1.23240	1.1219	4.8015	3.6796	2.301	1.1791	0.39491	32%	68%
2011-S008-10	/01	4.5-5	4.75	3.665	1.22751	1.0926	4.7576	3.665	2.2877	1.1951	0.40027	33%	67%
2011-S008-10	/02	4.5-5	4.75	3.5526	1.18987	1.0928	4.6454	3.5526	2.2529	1.1601	0.38855	33%	67%
2011-S008-10	/03	4.5-5	4.75	3.722	1.24660	1.0979	4.8199	3.722	2.3133	1.2154	0.40707	33%	67%
2011-S008-11	/01	5-6	5.5	3.7651	1.26104	1.1279	4.893	3.7651	2.4392	1.3113	0.43919	35%	65%
2011-S008-11	/02	5-6	5.5	3.7089	1.24221	1.1167	4.8256	3.7089	2.4083	1.2916	0.43259	35%	65%
2011-S008-11	/03	5-6	5.5	3.783	1.26703	1.0872	4.8702	3.783	2.4176	1.3304	0.44559	35%	65%
2011-S008-12	/01	6-7	6.5	3.8534	1.29061	1.0817	4.9351	3.8534	2.544	1.4623	0.48977	38%	62%
2011-S008-12	/02	6-7	6.5	3.8414	1.28659	1.1241	4.9655	3.8414	2.5916	1.4675	0.49151	38%	62%
2011-S008-12	/03	6-7	6.5	3.8468	1.28840	1.1147	4.9615	3.8468	2.5759	1.4612	0.48940	38%	62%

Table F.6.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S008, sections 13-25

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S008-13	/01	7-8	7.5	3.8727	1.29708	1.0843	4.957	3.8727	2.5368	1.4525	0.48648	38%	62%
2011-S008-13	/02	7-8	7.5	3.8453	1.28790	1.0814	4.9267	3.8453	2.5232	1.4418	0.48290	37%	63%
2011-S008-13	/03	7-8	7.5	3.8375	1.28529	1.0756	4.9131	3.8375	2.5154	1.4398	0.48223	38%	62%
2011-S008-14	/01	8-9	8.5	3.8175	1.27859	1.0857	4.9032	3.8175	2.5482	1.4625	0.48983	38%	62%
2011-S008-14	/02	8-9	8.5	3.8211	1.27979	1.0789	4.9	3.8211	2.5391	1.4602	0.48906	38%	62%
2011-S008-14	/03	8-9	8.5	3.8393	1.28589	1.093	4.9323	3.8393	2.5561	1.4631	0.49003	38%	62%
2011-S008-15	/01	9-10	9.5	3.923	1.31392	1.0828	5.0058	3.923	2.6503	1.5675	0.52500	40%	60%
2011-S008-15	/02	9-10	9.5	3.9661	1.32836	1.0827	5.0488	3.9661	2.6669	1.5842	0.53059	40%	60%
2011-S008-15	/03	9-10	9.5	3.9318	1.31687	1.1025	5.0343	3.9318	2.6659	1.5634	0.52363	40%	60%
2011-S008-16	/01	10-11	10.5	3.9037	1.30746	1.0791	4.9828	3.9037	2.6458	1.5667	0.52473	40%	60%
2011-S008-16	/02	10-11	10.5	3.9267	1.31516	1.0869	5.0136	3.9267	2.6609	1.574	0.52718	40%	60%
2011-S008-16	/03	10-11	10.5	3.9299	1.31623	1.0862	5.0161	3.9299	2.6633	1.5771	0.52822	40%	60%
2011-S008-17	/01	11-12	11.5	3.9065	1.30840	1.0873	4.9938	3.9065	2.6705	1.5832	0.53026	41%	59%
2011-S008-17	/02	11-12	11.5	3.8995	1.30605	1.0757	4.9752	3.8995	2.6553	1.5796	0.52905	41%	59%
2011-S008-17	/03	11-12	11.5	3.8939	1.30418	1.097	4.9909	3.8939	2.6735	1.5765	0.52801	40%	60%
2011-S008-18	/01	12-13	12.5	3.9073	1.30866	1.096	5.0033	3.9073	2.6952	1.5992	0.53562	41%	59%
2011-S008-18	/02	12-13	12.5	3.9359	1.31824	1.1124	5.0483	3.9359	2.7288	1.6164	0.54138	41%	59%
2011-S008-18	/03	12-13	12.5	3.9392	1.31935	1.0796	5.0188	3.9392	2.7029	1.6233	0.54369	41%	59%
2011-S008-19	/01	13-14	13.5	3.9654	1.32812	1.1058	5.0712	3.9654	2.7534	1.6476	0.55183	42%	58%
2011-S008-19	/02	13-14	13.5	3.9699	1.32963	1.1111	5.081	3.9699	2.7627	1.6516	0.55317	42%	58%
2011-S008-19	/03	13-14	13.5	3.9629	1.32729	1.1073	5.0702	3.9629	2.7549	1.6476	0.55183	42%	58%
2011-S008-20	/01	14-15	14.5	3.9939	1.33767	1.0833	5.0772	3.9939	2.7545	1.6712	0.55973	42%	58%
2011-S008-20	/02	14-15	14.5	3.9888	1.33596	1.1096	5.0984	3.9888	2.7816	1.672	0.56000	42%	58%
2011-S008-20	/03	14-15	14.5	4.0183	1.34584	1.1098	5.1281	4.0183	2.7933	1.6835	0.56385	42%	58%
2011-S008-21	/01	15-17	16	4.0064	1.34186	1.1059	5.1123	4.0064	2.7936	1.6877	0.56526	42%	58%
2011-S008-21	/02	15-17	16	3.9795	1.33285	1.092	5.0715	3.9795	2.7739	1.6819	0.56332	42%	58%
2011-S008-21	/03	15-17	16	3.9953	1.33814	1.1076	5.1029	3.9953	2.7965	1.6889	0.56566	42%	58%
2011-S008-22	/01	17-19	18	4.0809	1.36681	1.1135	5.1944	4.0809	2.9055	1.792	0.60019	44%	56%
2011-S008-22	/02	17-19	18	4.0647	1.36138	1.0962	5.1609	4.0647	2.9016	1.8054	0.60468	44%	56%
2011-S008-22	/03	17-19	18	4.1293	1.38302	1.0917	5.221	4.1293	2.9175	1.8258	0.61151	44%	56%
2011-S008-23	/01	19-21	20	4.1156	1.37843	1.0794	5.195	4.1156	2.9175	1.8381	0.61563	45%	55%
2011-S008-23	/02	19-21	20	4.1469	1.38891	1.1072	5.2541	4.1469	2.9641	1.8569	0.62193	45%	55%
2011-S008-23	/03	19-21	20	4.1114	1.37702	1.0861	5.1975	4.1114	3.0356	1.9495	0.65294	47%	53%
2011-S008-24	/01	21-23	22	4.2467	1.42234	1.0861	5.3328	4.2467	3.1613	2.0752	0.69504	49%	51%
2011-S008-24	/02	21-23	22	4.2328	1.41768	1.1049	5.3377	4.2328	3.1863	2.0814	0.69712	49%	51%
2011-S008-24	/03	21-23	22	4.24243	1.42091	1.0947	5.33713	4.24243	3.1903	2.0956	0.70188	49%	51%
2011-S008-25	/01	23-25	24	4.0974	1.37233	1.0831	5.1805	4.0974	2.9782	1.8951	0.63472	46%	54%
2011-S008-25	/02	23-25	24	4.1514	1.39042	1.0985	5.2499	4.1514	3.021	1.9225	0.64390	46%	54%
2011-S008-25	/03	23-25	24	4.169	1.39632	1.0905	5.2595	4.169	3.0207	1.9302	0.64648	46%	54%

Table F.7.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S011, sections 1-12

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S011-1	/01	0-0.5	0.25	3.2441	1.1019	1.0912	4.3353	3.2441	1.5829	0.4917	0.1670	15%	85%
2011-S011-1	/02	0-0.5	0.25	3.2139	1.0916	1.1021	4.316	3.2139	1.5659	0.4638	0.1575	14%	86%
2011-S011-1	/03	0-0.5	0.25	3.2408	1.1007	1.0641	4.3049	3.2408	1.5419	0.4778	0.1623	15%	85%
2011-S011-2	/01	0.5-1	0.75	3.2338	1.0984	1.0893	4.3231	3.2338	1.5973	0.508	0.1725	16%	84%
2011-S011-2	/02	0.5-1	0.75	3.2516	1.1044	1.0913	4.3429	3.2516	1.6037	0.5124	0.1740	16%	84%
2011-S011-2	/03	0.5-1	0.75	3.2488	1.1035	1.1061	4.3549	3.2488	1.6392	0.5331	0.1811	16%	84%
2011-S011-3	/01	1-1.5	1.25	3.2589	1.1069	1.0997	4.3586	3.2589	1.6786	0.5789	0.1966	18%	82%
2011-S011-3	/02	1-1.5	1.25	3.2518	1.1045	1.097	4.3488	3.2518	1.6456	0.5486	0.1863	17%	83%
2011-S011-3	/03	1-1.5	1.25	3.2656	1.1092	1.1031	4.3687	3.2656	1.667	0.5639	0.1915	17%	83%
2011-S011-4	/01	1.5-2	1.75	3.3342	1.1325	1.0742	4.4084	3.3342	1.7372	0.663	0.2252	20%	80%
2011-S011-4	/02	1.5-2	1.75	3.2982	1.1202	1.0874	4.3856	3.2982	1.7305	0.6431	0.2184	19%	81%
2011-S011-4	/03	1.5-2	1.75	3.3203	1.1277	1.0653	4.3856	3.3203	1.7084	0.6431	0.2184	19%	81%
2011-S011-5	/01	2-2.5	2.25	3.3624	1.1420	1.0908	4.4532	3.3624	1.7997	0.7089	0.2408	21%	79%
2011-S011-5	/02	2-2.5	2.25	3.3176	1.1268	1.1068	4.4244	3.3176	1.8025	0.6957	0.2363	21%	79%
2011-S011-5	/03	2-2.5	2.25	3.3142	1.1257	1.0787	4.3929	3.3142	1.7816	0.7029	0.2387	21%	79%
2011-S011-6	/01	2.5-3	2.75	3.3487	1.1374	1.1036	4.4523	3.3487	1.863	0.7594	0.2579	23%	77%
2011-S011-6	/02	2.5-3	2.75	3.431	1.1653	1.1031	4.5341	3.431	1.8823	0.7792	0.2647	23%	77%
2011-S011-6	/03	2.5-3	2.75	3.3654	1.1431	1.1264	4.4918	3.3654	1.8908	0.7644	0.2596	23%	77%
2011-S011-7	/01	3-3.5	3.25	3.5401	1.2024	1.0811	4.6212	3.5401	2.0603	0.9792	0.3326	28%	72%
2011-S011-7	/02	3-3.5	3.25	3.5196	1.1954	1.072	4.5916	3.5196	2.0496	0.9776	0.3320	28%	72%
2011-S011-7	/03	3-3.5	3.25	3.519	1.1952	1.0735	4.5925	3.519	2.0467	0.9732	0.3305	28%	72%
2011-S011-8	/01	3.5-4	3.75	3.5619	1.2098	1.0818	4.6437	3.5619	2.1411	1.0593	0.3598	30%	70%
2011-S011-8	/02	3.5-4	3.75	3.5908	1.2196	1.0919	4.6827	3.5908	2.1648	1.0729	0.3644	30%	70%
2011-S011-8	/03	3.5-4	3.75	3.6396	1.2362	1.0836	4.7232	3.6396	2.1729	1.0893	0.3700	30%	70%
2011-S011-9	/01	4-4.5	4.25	3.6575	1.2423	1.109	4.7665	3.6575	2.3336	1.2246	0.4159	33%	67%
2011-S011-9	/02	4-4.5	4.25	3.6695	1.2463	1.1025	4.772	3.6695	2.3215	1.219	0.4140	33%	67%
2011-S011-9	/03	4-4.5	4.25	3.7111	1.2605	1.1078	4.8189	3.7111	2.3283	1.2205	0.4145	33%	67%
2011-S011-10	/01	4.5-5	4.75	3.7415	1.2708	1.0918	4.8333	3.7415	2.3908	1.299	0.4412	35%	65%
2011-S011-10	/02	4.5-5	4.75	3.7108	1.2604	1.129	4.8398	3.7108	2.4202	1.2912	0.4386	35%	65%
2011-S011-10	/03	4.5-5	4.75	3.7128	1.2610	1.1007	4.8135	3.7128	2.393	1.2923	0.4389	35%	65%
2011-S011-11	/01	5-6	5.5	3.9107	1.3283	1.0782	4.9889	3.9107	2.6124	1.5342	0.5211	39%	61%
2011-S011-11	/02	5-6	5.5	3.8944	1.3227	1.0997	4.9941	3.8944	2.6349	1.5352	0.5214	39%	61%
2011-S011-11	/03	5-6	5.5	3.8769	1.3168	1.0954	4.9723	3.8769	2.6408	1.5454	0.5249	40%	60%
2011-S011-12	/01	6-7	6.5	3.8511	1.3080	1.1033	4.9544	3.8511	2.5966	1.4933	0.5072	39%	61%
2011-S011-12	/02	6-7	6.5	3.8472	1.3067	1.1017	4.9489	3.8472	2.6161	1.5144	0.5144	39%	61%
2011-S011-12	/03	6-7	6.5	3.8623	1.3118	1.1159	4.9782	3.8623	2.6316	1.5157	0.5148	39%	61%

Table F.8.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S011, sections 13-25

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Vet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S011-13	/01	7-8	7.5	3.9326	1.3357	1.1154	5.048	3.9326	2.7847	1.6693	0.5670	42%	58%
2011-S011-13	/02	7-8	7.5	3.9747	1.3500	1.0934	5.0681	3.9747	2.7922	1.6988	0.5770	43%	57%
2011-S011-13	/03	7-8	7.5	4.0009	1.3589	1.0778	5.0787	4.0009	2.7876	1.7098	0.5807	43%	57%
2011-S011-14	/01	8-9	8.5	3.8348	1.3004	1.0967	4.9315	3.8348	2.6941	1.5974	0.5417	42%	58%
2011-S011-14	/02	8-9	8.5	3.9104	1.3260	1.1095	5.0199	3.9104	2.7296	1.6201	0.5494	41%	59%
2011-S011-14	/03	8-9	8.5	3.9278	1.3319	1.0787	5.0065	3.9278	2.716	1.6373	0.5552	42%	58%
2011-S011-15	/01	9-10	9.5	3.9145	1.3274	1.093	5.0075	3.9145	2.7096	1.6166	0.5482	41%	59%
2011-S011-15	/02	9-10	9.5	3.9558	1.3414	1.1146	5.0704	3.9558	2.7631	1.6485	0.5590	42%	58%
2011-S011-15	/03	9-10	9.5	3.9504	1.3396	1.0916	5.042	3.9504	2.7647	1.6731	0.5673	42%	58%
2011-S011-16	/01	10-11	10.5	3.9626	1.3437	1.1019	5.0645	3.9626	2.802	1.7001	0.5765	43%	57%
2011-S011-16	/02	10-11	10.5	3.9759	1.3482	1.1024	5.0783	3.9759	2.8327	1.7303	0.5867	44%	56%
2011-S011-16	/03	10-11	10.5	3.9979	1.3557	1.0982	5.0961	3.9979	2.8474	1.7492	0.5932	44%	56%
2011-S011-17	/01	11-12	11.5	3.9917	1.3536	1.0993	5.091	3.9917	2.8907	1.7914	0.6075	45%	55%
2011-S011-17	/02	11-12	11.5	4.0715	1.3806	1.1058	5.1773	4.0715	2.9384	1.8326	0.6214	45%	55%
2011-S011-17	/03	11-12	11.5	4.0629	1.3777	1.099	5.1619	4.0629	2.9339	1.8349	0.6222	45%	55%
2011-S011-18	/01	12-13	12.5	4.1352	1.4022	1.1173	5.2525	4.1352	3.0836	1.9663	0.6668	48%	52%
2011-S011-18	/02	12-13	12.5	4.0641	1.3781	1.1068	5.1709	4.0641	3.0417	1.9349	0.6561	48%	52%
2011-S011-18	/03	12-13	12.5	4.1329	1.4015	1.0751	5.208	4.1329	3.0607	1.9856	0.6733	48%	52%
2011-S011-19	/01	13-14	13.5	4.0547	1.3749	1.0811	5.1358	4.0547	2.9857	1.9046	0.6458	47%	53%
2011-S011-19	/02	13-14	13.5	4.1294	1.4003	1.1102	5.2396	4.1294	3.0608	1.9506	0.6614	47%	53%
2011-S011-19	/03	13-14	13.5	4.1178	1.3963	1.0809	5.1987	4.1178	3.0435	1.9626	0.6655	48%	52%
2011-S011-20	/01	14-15	14.5	4.0192	1.3629	1.1132	5.1324	4.0192	2.9115	1.7983	0.6098	45%	55%
2011-S011-20	/02	14-15	14.5	4.0095	1.3596	1.1115	5.121	4.0095	2.9036	1.7921	0.6077	45%	55%
2011-S011-20	/03	14-15	14.5	4.024	1.3645	1.1013	5.1253	4.024	2.9078	1.8065	0.6126	45%	55%
2011-S011-21	/01	15-17	16	3.9518	1.3400	1.119	5.0708	3.9518	2.9866	1.8676	0.6333	47%	53%
2011-S011-21	/02	15-17	16	4.0147	1.3614	1.0728	5.0875	4.0147	3.0607	1.9879	0.6741	50%	50%
2011-S011-21	/03	15-17	16	4.0218	1.3638	1.0688	5.0906	4.0218	3.044	1.9752	0.6698	49%	51%
2011-S011-22	/01	17-19	18	3.9822	1.3504	1.0806	5.0628	3.9822	2.8331	1.7525	0.5943	44%	56%
2011-S011-22	/02	17-19	18	4.0182	1.3626	1.0734	5.0916	4.0182	2.8614	1.788	0.6063	44%	56%
2011-S011-22	/03	17-19	18	4.0626	1.3776	1.0717	5.1343	4.0626	2.8904	1.8187	0.6167	45%	55%
2011-S011-23	/01	19-21	20	3.9622	1.3436	1.1005	5.0627	3.9622	2.7882	1.6877	0.5723	43%	57%
2011-S011-23	/02	19-21	20	3.9921	1.3537	1.0997	5.0918	3.9921	2.8025	1.7028	0.5774	43%	57%
2011-S011-23	/03	19-21	20	3.9502	1.3395	1.0834	5.0336	3.9502	2.7633	1.6799	0.5697	43%	57%
2011-S011-24	/01	21-23	22	4.0292	1.3663	1.0942	5.1234	4.0292	2.8715	1.7773	0.6027	44%	56%
2011-S011-24	/02	21-23	22	4.0521	1.3741	1.0856	5.1377	4.0521	2.8892	1.8036	0.6116	45%	55%
2011-S011-24	/03	21-23	22	4.0325	1.3674	1.0844	5.1169	4.0325	2.9109	1.8265	0.6194	45%	55%
2011-S011-25	/01	23-25	24	4.0587	1.3763	1.1005	5.1592	4.0587	2.8677	1.7672	0.5993	44%	56%
2011-S011-25	/02	23-25	24	4.0352	1.3683	1.1116	5.1468	4.0352	2.8745	1.7629	0.5978	44%	56%
2011-S011-25	/03	23-25	24	4.02	1.3632	1.0947	5.1147	4.02	2.8522	1.7575	0.5960	44%	56%

Table F.9.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S012, sections 1-13

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S012-1	/01	0-0.5	0.25	3.2007	1.0638	1.0893	4.29	3.2007	1.5532	0.4639	0.1542	14%	86%
2011-S012-1	/02	0-0.5	0.25	3.1828	1.0578	1.0947	4.2775	3.1828	1.5378	0.4431	0.1473	14%	86%
2011-S012-1	/03	0-0.5	0.25	3.2326	1.0744	1.0892	4.3218	3.2326	1.5364	0.4472	0.1486	14%	86%
2011-S012-2	/01	0.5-1	0.75	3.2423	1.0776	1.0876	4.3299	3.2423	1.6242	0.5366	0.1783	17%	83%
2011-S012-2	/02	0.5-1	0.75	3.2386	1.0764	1.0933	4.3319	3.2386	1.6049	0.5116	0.1700	16%	84%
2011-S012-2	/03	0.5-1	0.75	3.2474	1.0793	1.0943	4.3417	3.2474	1.5983	0.504	0.1675	16%	84%
2011-S012-3	/01	1-1.5	1.25	3.2735	1.0880	1.0682	4.3417	3.2735	1.6399	0.5717	0.1900	17%	83%
2011-S012-3	/02	1-1.5	1.25	3.2707	1.0871	1.0879	4.3586	3.2707	1.641	0.5531	0.1838	17%	83%
2011-S012-3	/03	1-1.5	1.25	3.2412	1.0772	1.0891	4.3303	3.2412	1.6429	0.5538	0.1841	17%	83%
2011-S012-4	/01	1.5-2	1.75	3.2909	1.0938	1.0707	4.3616	3.2909	1.6639	0.5932	0.1972	18%	82%
2011-S012-4	/02	1.5-2	1.75	3.2525	1.0810	1.0949	4.3474	3.2525	1.6659	0.571	0.1898	18%	82%
2011-S012-4	/03	1.5-2	1.75	3.3006	1.0970	1.1134	4.414	3.3006	1.7125	0.5991	0.1991	18%	82%
2011-S012-5	/01	2-2.5	2.25	3.32585	1.1054	1.09255	4.4184	3.32585	1.7326	0.64005	0.2127	19%	81%
2011-S012-5	/02	2-2.5	2.25	3.3388	1.1097	1.0853	4.4241	3.3388	1.7466	0.6613	0.2198	20%	80%
2011-S012-5	/03	2-2.5	2.25	3.3289	1.1064	1.0976	4.4265	3.3289	1.7696	0.672	0.2233	20%	80%
2011-S012-6	/01	2.5-3	2.75	3.322	1.1041	1.0897	4.4117	3.322	1.792	0.7023	0.2334	21%	79%
2011-S012-6	/02	2.5-3	2.75	3.3741	1.1214	1.0771	4.4512	3.3741	1.7868	0.7097	0.2359	21%	79%
2011-S012-6	/03	2.5-3	2.75	3.3669	1.1190	1.0814	4.4483	3.3669	1.7923	0.7109	0.2363	21%	79%
2011-S012-7	/01	3-3.5	3.25	3.4039	1.1313	1.107	4.5109	3.4039	1.8692	0.7622	0.2533	22%	78%
2011-S012-7	/02	3-3.5	3.25	3.3954	1.1285	1.1099	4.5053	3.3954	1.8695	0.7596	0.2525	22%	78%
2011-S012-7	/03	3-3.5	3.25	3.3834	1.1245	1.0945	4.4779	3.3834	1.8339	0.7394	0.2457	22%	78%
2011-S012-8	/01	3.5-4	3.75	3.3411	1.1104	1.0945	4.4356	3.3411	1.8878	0.7933	0.2637	24%	76%
2011-S012-8	/02	3.5-4	3.75	3.4445	1.1448	1.1056	4.5501	3.4445	1.9226	0.817	0.2715	24%	76%
2011-S012-8	/03	3.5-4	3.75	3.4184	1.1361	1.0922	4.5106	3.4184	1.9051	0.8129	0.2702	24%	76%
2011-S012-9	/01	4-4.5	4.25	3.4203	1.1368	1.0894	4.5097	3.4203	1.9241	0.8347	0.2774	24%	76%
2011-S012-9	/02	4-4.5	4.25	3.4873	1.1590	1.1031	4.5904	3.4873	1.9548	0.8517	0.2831	24%	76%
2011-S012-9	/03	4-4.5	4.25	3.4681	1.1527	1.09	4.5581	3.4681	1.9349	0.8449	0.2808	24%	76%
2011-S012-10	/01	4.5-5	4.75	3.4691	1.1530	1.1119	4.581	3.4691	1.9909	0.879	0.2921	25%	75%
2011-S012-10	/02	4.5-5	4.75	3.5112	1.1670	1.0918	4.603	3.5112	1.9877	0.8959	0.2978	26%	74%
2011-S012-10	/03	4.5-5	4.75	3.4589	1.1496	1.0983	4.5572	3.4589	1.9864	0.8881	0.2952	26%	74%
2011-S012-11	/01	5-6	5.5	3.51014	1.1666	1.1119	4.62204	3.51014	1.9864	0.8745	0.2906	25%	75%
2011-S012-11	/02	5-6	5.5	3.4869	1.1589	1.0795	4.5664	3.4869	2.0339	0.9544	0.3172	27%	73%
2011-S012-11	/03	5-6	5.5	3.505	1.1649	1.1116	4.6166	3.505	1.9872	0.8756	0.2910	25%	75%
2011-S012-12	/01	6-7	6.5	3.5041	1.1646	1.0882	4.5923	3.5041	2.0739	0.9857	0.3276	28%	72%
2011-S012-12	/02	6-7	6.5	3.5387	1.1761	1.1069	4.6456	3.5387	2.0883	0.9814	0.3262	28%	72%
2011-S012-12	/03	6-7	6.5	3.5309	1.1735	1.095	4.6259	3.5309	2.0699	0.9749	0.3240	28%	72%
2011-S012-13	/01	7-8	7.5	3.5258	1.1718	1.1084	4.6342	3.5258	2.1062	0.9978	0.3316	28%	72%
2011-S012-13	/02	7-8	7.5	3.5266	1.1721	1.0881	4.6147	3.5266	2.0779	0.9898	0.3290	28%	72%
2011-S012-13	/03	7-8	7.5	3.518	1.1692	1.1123	4.6303	3.518	2.1031	0.9908	0.3293	28%	72%

Table F.10.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core S012, sections 14-26

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Vet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S012-14	/01	8-9	8.5	3.5686	1.1861	1.0915	4.6601	3.5686	2.1475	1.056	0.3510	30%	70%
2011-S012-14	/02	8-9	8.5	3.5844	1.1913	1.0882	4.6726	3.5844	2.1453	1.0571	0.3513	29%	71%
2011-S012-14	/03	8-9	8.5	3.5692	1.1863	1.102	4.6712	3.5692	2.1585	1.0565	0.3511	30%	70%
2011-S012-15	/01	9-10	9.5	3.6098	1.1998	1.0835	4.6933	3.6098	2.1759	1.0924	0.3631	30%	70%
2011-S012-15	/02	9-10	9.5	3.5915	1.1937	1.0962	4.6877	3.5915	2.1889	1.0927	0.3632	30%	70%
2011-S012-15	/03	9-10	9.5	3.6304	1.2066	1.0662	4.6966	3.6304	2.1596	1.0934	0.3634	30%	70%
2011-S012-16	/01	10-11	10.5	3.6283	1.2059	1.1019	4.7302	3.6283	2.2407	1.1388	0.3785	31%	69%
2011-S012-16	/02	10-11	10.5	3.6136	1.2010	1.093	4.7066	3.6136	2.2143	1.1213	0.3727	31%	69%
2011-S012-16	/03	10-11	10.5	3.6615	1.2169	1.0913	4.7528	3.6615	2.2362	1.1449	0.3805	31%	69%
2011-S012-17	/01	11-12	11.5	3.5967	1.1954	1.1179	4.7146	3.5967	2.2719	1.154	0.3835	32%	68%
2011-S012-17	/02	11-12	11.5	3.6543	1.2145	1.0865	4.7408	3.6543	2.2488	1.1623	0.3863	32%	68%
2011-S012-17	/03	11-12	11.5	3.6409	1.2101	1.0937	4.7346	3.6409	2.2571	1.1634	0.3867	32%	68%
2011-S012-18	/01	12-13	12.5	3.6686	1.2193	1.1067	4.7753	3.6686	2.2996	1.1929	0.3965	33%	67%
2011-S012-18	/02	12-13	12.5	3.6907	1.2266	1.0918	4.7825	3.6907	2.2778	1.186	0.3942	32%	68%
2011-S012-18	/03	12-13	12.5	3.6539	1.2144	1.0796	4.7335	3.6539	2.2476	1.168	0.3882	32%	68%
2011-S013-19	/01	13-14	13.5	3.666	1.2184	1.1033	4.7693	3.666	2.2905	1.1872	0.3946	32%	68%
2011-S013-19	/02	13-14	13.5	3.6521	1.2138	1.0903	4.7424	3.6521	2.253	1.1627	0.3864	32%	68%
2011-S013-19	/03	13-14	13.5	3.611	1.2002	1.0899	4.7009	3.611	2.236	1.1461	0.3809	32%	68%
2011-S012-20	/01	14-15	14.5	3.6188	1.2027	1.1013	4.7201	3.6188	2.262	1.1607	0.3858	32%	68%
2011-S012-20	/02	14-15	14.5	3.6447	1.2114	1.0988	4.7435	3.6447	2.2655	1.1667	0.3878	32%	68%
2011-S012-20	/03	14-15	14.5	3.6376	1.2090	1.1056	4.7432	3.6376	2.2708	1.1652	0.3873	32%	68%
2011-S012-21	/01	15-17	16	3.64	1.2098	1.1235	4.7635	3.64	2.2725	1.149	0.3819	32%	68%
2011-S012-21	/02	15-17	16	3.6226	1.2040	1.1006	4.7232	3.6226	2.2406	1.14	0.3789	31%	69%
2011-S012-21	/03	15-17	16	3.6401	1.2098	1.0954	4.7355	3.6401	2.2374	1.142	0.3796	31%	69%
2011-S012-22	/01	17-19	18	3.6188	1.2027	1.0952	4.714	3.6188	2.237	1.1418	0.3795	32%	68%
2011-S012-22	/02	17-19	18	3.6633	1.2175	1.0877	4.751	3.6633	2.2346	1.1469	0.3812	31%	69%
2011-S012-22	/03	17-19	18	3.6233	1.2042	1.0894	4.7127	3.6233	2.2236	1.1342	0.3770	31%	69%
2011-S012-23	/01	19-21	20	3.6695	1.2196	1.0803	4.7498	3.6695	2.2604	1.1801	0.3922	32%	68%
2011-S012-23	/02	19-21	20	3.636	1.2085	1.1151	4.7511	3.636	2.2802	1.1651	0.3872	32%	68%
2011-S012-23	/03	19-21	20	3.654	1.2144	1.1107	4.7647	3.654	2.2817	1.171	0.3892	32%	68%
2011-S012-24	/01	21-23	22	3.6961	1.2284	1.1088	4.8049	3.6961	2.3333	1.2245	0.4070	33%	67%
2011-S012-24	/02	21-23	22	3.6604	1.2166	1.1096	4.77	3.6604	2.314	1.2044	0.4003	33%	67%
2011-S012-24	/03	21-23	22	3.7008	1.2300	1.1156	4.8164	3.7008	2.3392	1.2236	0.4067	33%	67%
2011-S012-25	/01	23-25	24	3.687	1.2254	1.1212	4.8082	3.687	2.3643	1.2431	0.4132	34%	66%
2011-S012-25	/02	23-25	24	3.6948	1.2280	1.0908	4.7856	3.6948	2.3227	1.2319	0.4094	33%	67%
2011-S012-25	/03	23-25	24	3.6981	1.2291	1.0733	4.7714	3.6981	2.2968	1.2235	0.4066	33%	67%
2011-S012-26	/01			3.6507	1.2133	1.0962	4.7469	3.6507	2.2675	1.1713	0.3893	32%	68%
2011-S012-26	/02			3.6605	1.2166	1.1012	4.7617	3.6605	2.2639	1.1627	0.3864	32%	68%
2011-S012-26	/03			3.6605	1.2166	1.131	4.7915	3.6605	2.2995	1.1685	0.3884	32%	68%

Table F.11.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S016, sections 1-12

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S016-1	/01	0-0.5	0.25	3.2579	1.0849	1.1004	4.3583	3.2579	1.4058	0.3054	0.1017	9%	91%
2011-S016-1	/02	0-0.5	0.25	3.1875	1.0615	1.1071	4.2946	3.1875	1.5731	0.466	0.1552	15%	85%
2011-S016-1	/03	0-0.5	0.25	3.2289	1.0753	1.0725	4.3014	3.2289	1.5801	0.5076	0.1690	16%	84%
2011-S016-2	/01	0.5-1	0.75	3.2507	1.0825	1.1065	4.3572	3.2507	1.6687	0.5622	0.1872	17%	83%
2011-S016-2	/02	0.5-1	0.75	3.2422	1.0797	1.1246	4.3668	3.2422	1.6406	0.516	0.1718	16%	84%
2011-S016-2	/03	0.5-1	0.75	3.2329	1.0766	1.0969	4.3298	3.2329	1.6374	0.5405	0.1800	17%	83%
2011-S016-3	/01	1-1.5	1.25	3.2993	1.0987	1.0882	4.3875	3.2993	1.7063	0.6181	0.2058	19%	81%
2011-S016-3	/02	1-1.5	1.25	3.3192	1.1053	1.0853	4.4045	3.3192	1.6995	0.6142	0.2045	19%	81%
2011-S016-3	/03	1-1.5	1.25	3.2929	1.0966	1.1292	4.4221	3.2929	1.7365	0.6073	0.2022	18%	82%
2011-S016-4	/01	1.5-2	1.75	3.3233	1.1067	1.1218	4.4451	3.3233	1.7942	0.6724	0.2239	20%	80%
2011-S016-4	/02	1.5-2	1.75	3.3483	1.1150	1.0745	4.4228	3.3483	1.7296	0.6551	0.2182	20%	80%
2011-S016-4	/03	1.5-2	1.75	3.3661	1.1210	1.0939	4.46	3.3661	1.7721	0.6782	0.2258	20%	80%
2011-S016-5	/01	2-2.5	2.25	3.4736	1.1568	1.0884	4.562	3.4736	1.9811	0.8927	0.2973	26%	74%
2011-S016-5	/02	2-2.5	2.25	3.4888	1.1618	1.09	4.5788	3.4888	1.9872	0.8972	0.2988	26%	74%
2011-S016-5	/03	2-2.5	2.25	3.4741	1.1569	1.0761	4.5502	3.4741	1.9718	0.8957	0.2983	26%	74%
2011-S016-6	/01	2.5-3	2.75	3.5851	1.1939	1.0924	4.6775	3.5851	2.2039	1.1115	0.3701	31%	69%
2011-S016-6	/02	2.5-3	2.75	3.5949	1.1971	1.1098	4.7047	3.5949	2.2186	1.1088	0.3692	31%	69%
2011-S016-6	/03	2.5-3	2.75	3.4973	1.1646	1.1034	4.6007	3.4973	2.1803	1.0769	0.3586	31%	69%
2011-S016-7	/01	3-3.5	3.25	3.8255	1.2739	1.0844	4.9099	3.8255	2.5783	1.4939	0.4975	39%	61%
2011-S016-7	/02	3-3.5	3.25	3.8333	1.2765	1.1064	4.9397	3.8333	2.5189	1.4125	0.4704	37%	63%
2011-S016-7	/03	3-3.5	3.25	3.8572	1.2845	1.1013	4.9585	3.8572	2.5539	1.4526	0.4837	38%	62%
2011-S016-8	/01	3.5-4	3.75	3.8407	1.2790	1.0962	4.9369	3.8407	2.5419	1.4457	0.4814	38%	62%
2011-S016-8	/02	3.5-4	3.75	3.7794	1.2586	1.0875	4.8669	3.7794	2.5625	1.475	0.4912	39%	61%
2011-S016-8	/03	3.5-4	3.75	3.7999	1.2654	1.1094	4.9093	3.7999	2.5879	1.4785	0.4924	39%	61%
2011-S016-9	/01	4-4.5	4.25	3.8834	1.2932	1.0847	4.9681	3.8834	2.647	1.5623	0.5203	40%	60%
2011-S016-9	/02	4-4.5	4.25	3.9116	1.3026	1.0696	4.9812	3.9116	2.6566	1.587	0.5285	41%	59%
2011-S016-9	/03	4-4.5	4.25	3.9311	1.3091	1.1107	5.0418	3.9311	2.6946	1.5839	0.5275	40%	60%
2011-S016-10	/01	4.5-5	4.75	3.9466	1.3143	1.1126	5.0592	3.9466	2.7924	1.6798	0.5594	43%	57%
2011-S016-10	/02	4.5-5	4.75	3.994	1.3301	1.1083	5.1023	3.994	2.8164	1.7081	0.5688	43%	57%
2011-S016-10	/03	4.5-5	4.75	3.9702	1.3221	1.0868	5.057	3.9702	2.7889	1.7021	0.5668	43%	57%
2011-S016-11	/01	5-6	5.5	3.9478	1.3147	1.0896	5.0374	3.9478	2.7883	1.6987	0.5657	43%	57%
2011-S016-11	/02	5-6	5.5	3.9621	1.3194	1.1027	5.0648	3.9621	2.8062	1.7035	0.5673	43%	57%
2011-S016-11	/03	5-6	5.5	3.9636	1.3199	1.0756	5.0392	3.9636	2.7786	1.703	0.5671	43%	57%
2011-S016-12	/01	6-7	6.5	3.9171	1.3044	1.0907	5.0078	3.9171	2.6886	1.5979	0.5321	41%	59%
2011-S016-12	/02	6-7	6.5	3.9187	1.3050	1.1063	5.025	3.9187	2.6968	1.5905	0.5297	41%	59%
2011-S016-12	/03	6-7	6.5	3.9021	1.2995	1.0617	4.9638	3.9021	2.6584	1.5967	0.5317	41%	59%

Table F.12.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core S016, sections 13-25

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Vet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S016-13	/01	7-8	7.5	3.8971	1.2978	1.102	4.9991	3.8971	2.6993	1.5973	0.5319	41%	59%
2011-S016-13	/02	7-8	7.5	3.9134	1.3032	1.1264	5.0398	3.9134	2.7305	1.6041	0.5342	41%	59%
2011-S016-13	/03	7-8	7.5	3.9072	1.3011	1.0969	5.0041	3.9072	2.7199	1.623	0.5405	42%	58%
2011-S016-14	/01	8-9	8.5	3.9435	1.3132	1.0916	5.0351	3.9435	2.7644	1.6728	0.5571	42%	58%
2011-S016-14	/02	8-9	8.5	3.9435	1.3132	1.0795	5.023	3.9435	2.7593	1.6798	0.5594	43%	57%
2011-S016-14	/03	8-9	8.5	3.9639	1.3200	1.1073	5.0712	3.9639	2.7946	1.6873	0.5619	43%	57%
2011-S016-15	/01	9-10	9.5	3.923	1.3064	1.0827	5.0057	3.923	2.7518	1.6691	0.5558	43%	57%
2011-S016-15	/02	9-10	9.5	3.9442	1.3135	1.0874	5.0316	3.9442	2.7832	1.6958	0.5647	43%	57%
2011-S016-15	/03	9-10	9.5	3.9825	1.3262	1.1087	5.0912	3.9825	2.8102	1.7015	0.5666	43%	57%
2011-S016-16	/01	10-11	10.5	3.95	1.3154	1.0967	5.0467	3.95	2.7745	1.6778	0.5587	42%	58%
2011-S016-16	/02	10-11	10.5	3.938	1.3114	1.1333	5.0713	3.938	2.8141	1.6808	0.5597	43%	57%
2011-S016-16	/03	10-11	10.5	3.9411	1.3124	1.0892	5.0303	3.9411	2.7673	1.6781	0.5588	43%	57%
2011-S016-17	/01	11-12	11.5	3.9186	1.3049	1.1054	5.024	3.9186	2.724	1.6186	0.5390	41%	59%
2011-S016-17	/02	11-12	11.5	3.9094	1.3019	1.1076	5.017	3.9094	2.6995	1.5919	0.5301	41%	59%
2011-S016-17	/03	11-12	11.5	3.9096	1.3019	1.097	5.0066	3.9096	2.7026	1.6056	0.5347	41%	59%
2011-S016-18	/01	12-13	12.5	4.0313	1.3425	1.0923	5.1236	4.0313	2.8787	1.7864	0.5949	44%	56%
2011-S016-18	/02	12-13	12.5	4.0678	1.3546	1.1069	5.1747	4.0678	2.9257	1.8188	0.6057	45%	55%
2011-S016-18	/03	12-13	12.5	4.0047	1.3336	1.0735	5.0782	4.0047	2.8737	1.8002	0.5995	45%	55%
2011-S016-19	/01	13-14	13.5	3.9783	1.3248	1.0999	5.0782	3.9783	2.8006	1.7007	0.5664	43%	57%
2011-S016-19	/02	13-14	13.5	3.9517	1.3160	1.0982	5.0499	3.9517	2.8126	1.7144	0.5709	43%	57%
2011-S016-19	/03	13-14	13.5	3.9731	1.3231	1.0821	5.0552	3.9731	2.772	1.6899	0.5628	43%	57%
2011-S016-20	/01	14-15	14.5	3.9589	1.3184	1.0881	5.047	3.9589	2.7896	1.7015	0.5666	43%	57%
2011-S016-20	/02	14-15	14.5	4.03	1.3420	1.1136	5.1436	4.03	2.8446	1.731	0.5764	43%	57%
2011-S016-20	/03	14-15	14.5	4.003	1.3331	1.1132	5.1162	4.003	2.8293	1.7161	0.5715	43%	57%
2011-S016-21	/01	15-17	16	3.9311	1.3091	1.0944	5.0255	3.9311	2.7722	1.6778	0.5587	43%	57%
2011-S016-21	/02	15-17	16	3.975	1.3237	1.1102	5.0852	3.975	2.8243	1.7141	0.5708	43%	57%
2011-S016-21	/03	15-17	16	3.98	1.3254	1.1018	5.0818	3.98	2.8153	1.7135	0.5706	43%	57%
2011-S016-22	/01	17-19	18	3.96551	1.3206	1.0506	5.01611	3.96551	2.7875	1.7369	0.5784	44%	56%
2011-S016-22	/02	17-19	18	4.0166	1.3376	1.09	5.1066	4.0166	2.8497	1.7597	0.5860	44%	56%
2011-S016-22	/03	17-19	18	3.9296	1.3086	1.088	5.0176	3.9296	2.8172	1.7292	0.5758	44%	56%
2011-S016-23	/01	19-21	20	3.9645	1.3202	1.0757	5.0402	3.9645	2.7488	1.6731	0.5572	42%	58%
2011-S016-23	/02	19-21	20	3.9613	1.3192	1.0726	5.0339	3.9613	2.7399	1.6673	0.5552	42%	58%
2011-S016-23	/03	19-21	20	3.9393	1.3118	1.0914	5.0307	3.9393	2.738	1.6466	0.5483	42%	58%
2011-S016-24	/01	21-23	22	3.9044	1.3002	1.1326	5.037	3.9044	2.7811	1.6485	0.5490	42%	58%
2011-S016-24	/02	21-23	22	3.9503	1.3155	1.1052	5.0555	3.9503	2.7649	1.6597	0.5527	42%	58%
2011-S016-24	/03	21-23	22	3.9319	1.3094	1.1147	5.0466	3.9319	2.7675	1.6528	0.5504	42%	58%
2011-S016-25	/01	23-25	24	3.9994	1.3319	1.1039	5.1033	3.9994	2.8499	1.746	0.5814	44%	56%
2011-S016-25	/02	23-25	24	3.9488	1.3150	1.1042	5.053	3.9488	2.831	1.7268	0.5750	44%	56%
2011-S016-25	/03	23-25	24	3.996	1.3307	1.1132	5.1092	3.996	2.8514	1.7382	0.5788	43%	57%

Table F.13.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core S019, sections 1-12

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S019-1	/01	0-0.5	0.25	3.3331	1.1348	1.0936	4.4267	3.3331	1.7021	0.6085	0.2072	18%	82%
2011-S019-1	/02	0-0.5	0.25	3.3324	1.1346	1.0808	4.4132	3.3324	1.7115	0.6307	0.2147	19%	81%
2011-S019-1	/03	0-0.5	0.25	3.4371	1.1702	1.0918	4.5289	3.4371	1.7365	0.6447	0.2195	19%	81%
2011-S019-2	/01	0.5-1	0.75	3.3777	1.1409	1.101	4.4787	3.3777	1.8431	0.7421	0.2507	22%	78%
2011-S019-2	/02	0.5-1	0.75	3.3108	1.1183	1.1028	4.4136	3.3108	1.787	0.6842	0.2311	21%	79%
2011-S019-2	/03	0.5-1	0.75	3.3512	1.1319	1.1235	4.4747	3.3512	1.8499	0.7264	0.2454	22%	78%
2011-S019-3	/01	1-1.5	1.25	3.4527	1.1779	1.0954	4.5481	3.4527	1.9211	0.8257	0.2817	24%	76%
2011-S019-3	/02	1-1.5	1.25	3.4531	1.1780	1.0735	4.5266	3.4531	1.9244	0.8509	0.2903	25%	75%
2011-S019-3	/03	1-1.5	1.25	3.4546	1.1785	1.0948	4.5494	3.4546	1.9694	0.8746	0.2984	25%	75%
2011-S019-4	/01	1.5-2	1.75	3.4894	1.1786	1.0748	4.5642	3.4894	1.9244	0.8496	0.2870	24%	76%
2011-S019-4	/02	1.5-2	1.75	3.5056	1.1841	1.1143	4.6199	3.5056	1.9694	0.8551	0.2888	24%	76%
2011-S019-4	/03	1.5-2	1.75	3.4675	1.1712	1.0881	4.5556	3.4675	1.9354	0.8473	0.2862	24%	76%
2011-S019-5	/01	2-2.5	2.25	3.38	1.1394	1.108	4.488	3.38	1.8855	0.7775	0.2621	23%	77%
2011-S019-5	/02	2-2.5	2.25	3.418	1.1522	1.09	4.508	3.418	1.8674	0.7774	0.2621	23%	77%
2011-S019-5	/03	2-2.5	2.25	3.3635	1.1338	1.1117	4.4752	3.3635	1.8689	0.7572	0.2552	23%	77%
2011-S019-6	/01	2.5-3	2.75	3.4053	1.1555	1.0854	4.4907	3.4053	1.8749	0.7895	0.2679	23%	77%
2011-S019-6	/02	2.5-3	2.75	3.4001	1.1538	1.113	4.5131	3.4001	1.9057	0.7927	0.2690	23%	77%
2011-S019-6	/03	2.5-3	2.75	3.4298	1.1639	1.1049	4.5347	3.4298	1.8947	0.7898	0.2680	23%	77%
2011-S019-7	/01	3-3.5	3.25	3.422	1.1662	1.1013	4.5233	3.422	1.9069	0.8056	0.2745	24%	76%
2011-S019-7	/02	3-3.5	3.25	3.415	1.1638	1.0827	4.4977	3.415	1.8859	0.8032	0.2737	24%	76%
2011-S019-7	/03	3-3.5	3.25	3.4323	1.1697	1.0632	4.4955	3.4323	1.8716	0.8084	0.2755	24%	76%
2011-S019-8	/01	3.5-4	3.75	3.4467	1.1639	1.1059	4.5526	3.4467	1.9311	0.8252	0.2787	24%	76%
2011-S019-8	/02	3.5-4	3.75	3.4496	1.1649	1.0769	4.5265	3.4496	1.9022	0.8253	0.2787	24%	76%
2011-S019-8	/03	3.5-4	3.75	3.4599	1.1684	1.0971	4.557	3.4599	1.9327	0.8356	0.2822	24%	76%
2011-S019-9	/01	4-4.5	4.25	3.4573	1.1667	1.1213	4.5786	3.4573	1.9681	0.8468	0.2857	24%	76%
2011-S019-9	/02	4-4.5	4.25	3.4931	1.1787	1.1073	4.6004	3.4931	1.9639	0.8566	0.2891	25%	75%
2011-S019-9	/03	4-4.5	4.25	3.4895	1.1775	1.1115	4.601	3.4895	1.9699	0.8584	0.2897	25%	75%
2011-S019-10	/01	4.5-5	4.75	3.452	1.1944	1.121	4.573	3.452	1.9849	0.8639	0.2989	25%	75%
2011-S019-10	/02	4.5-5	4.75	3.4453	1.1921	1.0622	4.5075	3.4453	1.9234	0.8612	0.2980	25%	75%
2011-S019-10	/03	4.5-5	4.75	3.4597	1.1971	1.0911	4.5508	3.4597	1.9651	0.874	0.3024	25%	75%
2011-S019-11	/01	5-6	5.5	3.5027	1.1830	1.0937	4.5964	3.5027	2.0498	0.9561	0.3229	27%	73%
2011-S019-11	/02	5-6	5.5	3.4855	1.1772	1.1182	4.6037	3.4855	2.0838	0.9656	0.3261	28%	72%
2011-S019-11	/03	5-6	5.5	3.5003	1.1822	1.106	4.6063	3.5003	2.071	0.965	0.3259	28%	72%
2011-S019-12	/01	6-7	6.5	3.5245	1.1917	1.1021	4.6266	3.5245	1.9994	0.8973	0.3034	25%	75%
2011-S019-12	/02	6-7	6.5	3.5488	1.1999	1.0979	4.6467	3.5488	2.0286	0.9307	0.3147	26%	74%
2011-S019-12	/03	6-7	6.5	3.5382	1.1964	1.1003	4.6385	3.5382	2.0148	0.9145	0.3092	26%	74%

Table F.14.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core S019, sections 13-25

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S019-13	/01	7-8	7.5	3.5451	1.1999	1.1131	4.6582	3.5451	2.1099	0.9968	0.3374	28%	72%
2011-S019-13	/02	7-8	7.5	3.5506	1.2017	1.0804	4.631	3.5506	2.0853	1.0049	0.3401	28%	72%
2011-S019-13	/03	7-8	7.5	3.5966	1.2173	1.0777	4.6743	3.5966	2.1047	1.027	0.3476	29%	71%
2011-S019-14	/01	8-9	8.5	3.5601	1.2227	1.1102	4.6703	3.5601	2.1345	1.0243	0.3518	29%	71%
2011-S019-14	/02	8-9	8.5	3.5832	1.2306	1.1116	4.6948	3.5832	2.1529	1.0413	0.3576	29%	71%
2011-S019-14	/03	8-9	8.5	3.6028	1.2373	1.1025	4.7053	3.6028	2.1579	1.0554	0.3625	29%	71%
2011-S019-15	/01	9-10	9.5	3.6453	1.2303	1.0994	4.7447	3.6453	2.1739	1.0745	0.3627	29%	71%
2011-S019-15	/02	9-10	9.5	3.5723	1.2057	1.1028	4.6751	3.5723	2.1589	1.0561	0.3564	30%	70%
2011-S019-15	/03	9-10	9.5	3.6158	1.2204	1.0893	4.7051	3.6158	2.161	1.0717	0.3617	30%	70%
2011-S019-16	/01	10-11	10.5	3.5872	1.2065	1.1218	4.709	3.5872	2.1755	1.0537	0.3544	29%	71%
2011-S019-16	/02	10-11	10.5	3.6129	1.2151	1.1026	4.7155	3.6129	2.1688	1.0662	0.3586	30%	70%
2011-S019-16	/03	10-11	10.5	3.6054	1.2126	1.1188	4.7242	3.6054	2.1939	1.0751	0.3616	30%	70%
2011-S019-17	/01	11-12	11.5	3.6018	1.2067	1.0978	4.6996	3.6018	2.1796	1.0818	0.3624	30%	70%
2011-S019-17	/02	11-12	11.5	3.609	1.2091	1.107	4.716	3.609	2.1902	1.0832	0.3629	30%	70%
2011-S019-17	/03	11-12	11.5	3.6164	1.2116	1.1143	4.7307	3.6164	2.2019	1.0876	0.3644	30%	70%
2011-S019-18	/01	12-13	12.5	3.6259	1.2237	1.086	4.7119	3.6259	2.1981	1.1121	0.3753	31%	69%
2011-S019-18	/02	12-13	12.5	3.6294	1.2249	1.1132	4.7426	3.6294	2.223	1.1098	0.3746	31%	69%
2011-S019-18	/03	12-13	12.5	3.6002	1.2151	1.0648	4.665	3.6002	2.223	1.1582	0.3909	32%	68%
2011-S019-19	/01	13-14	13.5	3.7018	1.2822	1.0972	4.799	3.7018	2.2899	1.1927	0.4131	32%	68%
2011-S019-19	/02	13-14	13.5	3.6817	1.2753	1.0859	4.7676	3.6817	2.2753	1.1894	0.4120	32%	68%
2011-S019-19	/03	13-14	13.5	3.6922	1.2789	1.1179	4.8101	3.6922	2.3305	1.2126	0.4200	33%	67%
2011-S019-20	/01	14-15	14.5	3.691	1.2545	1.129	4.82	3.691	2.378	1.249	0.4245	34%	66%
2011-S019-20	/02	14-15	14.5	3.7102	1.2610	1.1082	4.8184	3.7102	2.3853	1.2771	0.4341	34%	66%
2011-S019-20	/03	14-15	14.5	3.7105	1.2611	1.0811	4.7916	3.7105	2.3534	1.2723	0.4324	34%	66%
2011-S019-21	/01	15-17	16	3.7332	1.2550	1.0986	4.8318	3.7332	2.4103	1.3117	0.4410	35%	65%
2011-S019-21	/02	15-17	16	3.7467	1.2596	1.0803	4.827	3.7467	2.4114	1.3311	0.4475	36%	64%
2011-S019-21	/03	15-17	16	3.7725	1.2683	1.0713	4.8438	3.7725	2.4403	1.369	0.4602	36%	64%
2011-S019-22	/01	17-19	18	3.7916	1.2884	1.0944	4.886	3.7916	2.4614	1.367	0.4645	36%	64%
2011-S019-22	/02	17-19	18	3.8162	1.2967	1.1015	4.9177	3.8162	2.4919	1.3904	0.4725	36%	64%
2011-S019-22	/03	17-19	18	3.8118	1.2952	1.0929	4.9047	3.8118	2.4779	1.385	0.4706	36%	64%
2011-S019-23	/01	19-21	20	3.8354	1.3033	1.1099	4.9453	3.8354	2.4979	1.388	0.4716	36%	64%
2011-S019-23	/02	19-21	20	3.7904	1.2880	1.0939	4.8843	3.7904	2.455	1.3611	0.4625	36%	64%
2011-S019-23	/03	19-21	20	3.8458	1.3068	1.1108	4.9566	3.8458	2.5029	1.3921	0.4730	36%	64%
2011-S019-24	/01	21-23	22	3.7842	1.2748	1.1055	4.8897	3.7842	2.3918	1.2863	0.4333	34%	66%
2011-S019-24	/02	21-23	22	3.759	1.2663	1.0977	4.8567	3.759	2.3925	1.2948	0.4362	34%	66%
2011-S019-24	/03	21-23	22	3.7919	1.2774	1.0842	4.8761	3.7919	2.3929	1.3087	0.4409	35%	65%
2011-S019-25	/01	23-25	24	3.6682	1.2420	1.0801	4.7483	3.6682	2.2779	1.1978	0.4055	33%	67%
2011-S019-25	/02	23-25	24	3.6366	1.2313	1.093	4.7296	3.6366	2.2939	1.2009	0.4066	33%	67%
2011-S019-25	/03	23-25	24	3.6724	1.2434	1.1027	4.7751	3.6724	2.3169	1.2142	0.4111	33%	67%

Table F.15.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core S022, sections 1-12

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S022-1	/01	0-0.5	0.25	3.438	1.1617	1.1381	4.5761	3.438	1.8828	0.7447	0.2516	22%	78%
2011-S022-1	/02	0-0.5	0.25	3.4108	1.1525	1.1304	4.5412	3.4108	1.859	0.7286	0.2462	21%	79%
2011-S022-1	/03	0-0.5	0.25	3.4294	1.1588	1.0991	4.5285	3.4294	1.8498	0.7507	0.2537	22%	78%
2011-S022-2	/01	0.5-1	0.75	3.4694	1.1723	1.1043	4.5737	3.4694	1.9229	0.8186	0.2766	24%	76%
2011-S022-2	/02	0.5-1	0.75	3.4512	1.1662	1.1246	4.5758	3.4512	1.9173	0.7927	0.2679	23%	77%
2011-S022-2	/03	0.5-1	0.75	3.4454	1.1642	1.1509	4.5963	3.4454	1.9564	0.8055	0.2722	23%	77%
2011-S022-3	/01	1-1.5	1.25	3.5276	1.1920	1.1325	4.6601	3.5276	2.0519	0.9194	0.3107	26%	74%
2011-S022-3	/02	1-1.5	1.25	3.4755	1.1744	1.0889	4.5644	3.4755	1.9334	0.8445	0.2854	24%	76%
2011-S022-3	/03	1-1.5	1.25	3.5065	1.1848	1.0716	4.5781	3.5065	1.9959	0.9243	0.3123	26%	74%
2011-S022-4	/01	1.5-2	1.75	3.6047	1.2180	1.1034	4.7081	3.6047	2.1482	1.0448	0.3530	29%	71%
2011-S022-4	/02	1.5-2	1.75	3.6152	1.2216	1.1072	4.7224	3.6152	2.1365	1.0293	0.3478	28%	72%
2011-S022-4	/03	1.5-2	1.75	3.5833	1.2108	1.1227	4.706	3.5833	2.1193	0.9966	0.3368	28%	72%
2011-S022-5	/01	2-2.5	2.25	3.6947	1.2484	1.0996	4.7943	3.6947	2.2437	1.1441	0.3866	31%	69%
2011-S022-5	/02	2-2.5	2.25	3.654	1.2347	1.0971	4.7511	3.654	2.1884	1.0913	0.3687	30%	70%
2011-S022-5	/03	2-2.5	2.25	3.651	1.2337	1.1046	4.7556	3.651	2.2229	1.1183	0.3779	31%	69%
2011-S022-6	/01	2.5-3	2.75	3.6755	1.2419	1.1066	4.7821	3.6755	2.2829	1.1763	0.3975	32%	68%
2011-S022-6	/02	2.5-3	2.75	3.6754	1.2419	1.0589	4.7343	3.6754	2.2403	1.1814	0.3992	32%	68%
2011-S022-6	/03	2.5-3	2.75	3.6755	1.2419	1.1011	4.7766	3.6755	2.2966	1.1955	0.4040	33%	67%
2011-S022-7	/01	3-3.5	3.25	3.6905	1.2470	1.1022	4.7927	3.6905	2.2705	1.1683	0.3948	32%	68%
2011-S022-7	/02	3-3.5	3.25	3.5238	1.1907	1.1092	4.633	3.5238	2.228	1.1188	0.3780	32%	68%
2011-S022-7	/03	3-3.5	3.25	3.7146	1.2552	1.0842	4.7988	3.7146	2.26	1.1758	0.3973	32%	68%
2011-S022-8	/01	3.5-4	3.75	3.6671	1.2391	1.1239	4.791	3.6671	2.275	1.1511	0.3890	31%	69%
2011-S022-8	/02	3.5-4	3.75	3.6753	1.2419	1.1062	4.7815	3.6753	2.2558	1.1496	0.3884	31%	69%
2011-S022-8	/03	3.5-4	3.75	3.6682	1.2395	1.0871	4.7553	3.6682	2.2254	1.1383	0.3846	31%	69%
2011-S022-9	/01	4-4.5	4.25	3.6519	1.2340	1.0824	4.7343	3.6519	2.2334	1.151	0.3889	32%	68%
2011-S022-9	/02	4-4.5	4.25	3.6436	1.2312	1.0915	4.7351	3.6436	2.2288	1.1373	0.3843	31%	69%
2011-S022-9	/03	4-4.5	4.25	3.6547	1.2349	1.0988	4.7535	3.6547	2.2284	1.1296	0.3817	31%	69%
2011-S022-10	/01	4.5-5	4.75	3.6347	1.2282	1.1023	4.737	3.6347	2.2613	1.159	0.3916	32%	68%
2011-S022-10	/02	4.5-5	4.75	3.6433	1.2311	1.1068	4.7501	3.6433	2.2604	1.1536	0.3898	32%	68%
2011-S022-10	/03	4.5-5	4.75	3.6768	1.2424	1.098	4.7748	3.6768	2.2617	1.1637	0.3932	32%	68%
2011-S022-11	/01	5-6	5.5	3.6986	1.2498	1.0889	4.7875	3.6986	2.2899	1.201	0.4058	32%	68%
2011-S022-11	/02	5-6	5.5	3.7093	1.2534	1.1115	4.8208	3.7093	2.3173	1.2058	0.4074	33%	67%
2011-S022-11	/03	5-6	5.5	3.6925	1.2477	1.1048	4.7973	3.6925	2.3004	1.1956	0.4040	32%	68%
2011-S022-12	/01	6-7	6.5	3.7257	1.2589	1.1133	4.839	3.7257	2.3504	1.2371	0.4180	33%	67%
2011-S022-12	/02	6-7	6.5	3.6926	1.2477	1.1085	4.8011	3.6926	2.336	1.2275	0.4148	33%	67%
2011-S022-12	/03	6-7	6.5	3.7199	1.2570	1.0886	4.8085	3.7199	2.326	1.2374	0.4181	33%	67%

Table F.16.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core S022, sections 13-25

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S022-13	/01	7-8	7.5	3.7338	1.2616	1.0815	4.8153	3.7338	2.3329	1.2514	0.4228	34%	66%
2011-S022-13	/02	7-8	7.5	3.7488	1.2667	1.0766	4.8254	3.7488	2.3311	1.2545	0.4239	33%	67%
2011-S022-13	/03	7-8	7.5	3.7294	1.2602	1.0906	4.82	3.7294	2.3376	1.247	0.4214	33%	67%
2011-S022-14	/01	8-9	8.5	3.6654	1.2385	1.0897	4.7551	3.6654	2.2395	1.1498	0.3885	31%	69%
2011-S022-14	/02	8-9	8.5	3.6697	1.2400	1.0742	4.7439	3.6697	2.2254	1.1512	0.3890	31%	69%
2011-S022-14	/03	8-9	8.5	3.6641	1.2381	1.0549	4.719	3.6641	2.2019	1.147	0.3876	31%	69%
2011-S022-15	/01	9-10	9.5	3.6447	1.2315	1.1028	4.7475	3.6447	2.2352	1.1324	0.3826	31%	69%
2011-S022-15	/02	9-10	9.5	3.6816	1.2440	1.1161	4.7977	3.6816	2.2535	1.1374	0.3843	31%	69%
2011-S022-15	/03	9-10	9.5	3.6672	1.2391	1.1012	4.7684	3.6672	2.2358	1.1346	0.3834	31%	69%
2011-S022-16	/01	10-11	10.5	3.6476	1.2325	1.1061	4.7537	3.6476	2.2414	1.1353	0.3836	31%	69%
2011-S022-16	/02	10-11	10.5	3.66771	1.2393	1.0882	4.75591	3.66771	2.2313	1.1431	0.3863	31%	69%
2011-S022-16	/03	10-11	10.5	3.6793	1.2432	1.1092	4.7885	3.6793	2.2566	1.1474	0.3877	31%	69%
2011-S022-17	/01	11-12	11.5	3.666	1.2387	1.1115	4.7775	3.666	2.2891	1.1776	0.3979	32%	68%
2011-S022-17	/02	11-12	11.5	3.6686	1.2396	1.0957	4.7643	3.6686	2.2749	1.1792	0.3985	32%	68%
2011-S022-17	/03	11-12	11.5	3.69	1.2468	1.1216	4.8116	3.69	2.3105	1.1889	0.4017	32%	68%
2011-S022-18	/01	12-13	12.5	3.6741	1.2415	1.0602	4.7343	3.6741	2.2531	1.1929	0.4031	32%	68%
2011-S022-18	/02	12-13	12.5	3.767	1.2729	1.0999	4.8669	3.767	2.3219	1.222	0.4129	32%	68%
2011-S022-18	/03	12-13	12.5	3.678	1.2428	1.0983	4.7763	3.678	2.2954	1.1971	0.4045	33%	67%
2011-S022-19	/01	13-14	13.5	3.6008	1.2167	1.0898	4.6906	3.6008	2.2374	1.1476	0.3878	32%	68%
2011-S022-19	/02	13-14	13.5	3.6595	1.2365	1.0843	4.7438	3.6595	2.2529	1.1686	0.3949	32%	68%
2011-S022-19	/03	13-14	13.5	3.682	1.2441	1.1308	4.8128	3.682	2.3088	1.178	0.3980	32%	68%
2011-S022-20	/01	14-15	14.5	3.6173	1.2223	1.0947	4.712	3.6173	2.2105	1.1158	0.3770	31%	69%
2011-S022-20	/02	14-15	14.5	3.5862	1.2118	1.0965	4.6827	3.5862	2.2069	1.1104	0.3752	31%	69%
2011-S022-20	/03	14-15	14.5	3.6278	1.2258	1.1101	4.7379	3.6278	2.2388	1.1287	0.3814	31%	69%
2011-S022-21	/01	15-17	16	3.5848	1.2113	1.0618	4.6466	3.5848	2.163	1.1012	0.3721	31%	69%
2011-S022-21	/02	15-17	16	3.6433	1.2311	1.1119	4.7552	3.6433	2.2267	1.1148	0.3767	31%	69%
2011-S022-21	/03	15-17	16	3.6752	1.2418	1.0927	4.7679	3.6752	2.2193	1.1266	0.3807	31%	69%
2011-S022-22	/01	17-19	18	3.6974	1.2493	1.0837	4.7811	3.6974	2.2619	1.1782	0.3981	32%	68%
2011-S022-22	/02	17-19	18	3.6943	1.2483	1.0824	4.7767	3.6943	2.2599	1.1775	0.3979	32%	68%
2011-S022-22	/03	17-19	18	3.6429	1.2309	1.1265	4.7694	3.6429	2.2902	1.1637	0.3932	32%	68%
2011-S022-23	/01	19-21	20	3.686	1.2455	1.0791	4.7651	3.686	2.271	1.1919	0.4027	32%	68%
2011-S022-23	/02	19-21	20	3.6515	1.2338	1.1012	4.7527	3.6515	2.261	1.1598	0.3919	32%	68%
2011-S022-23	/03	19-21	20	3.6726	1.2410	1.0626	4.7352	3.6726	2.2434	1.1808	0.3990	32%	68%
2011-S022-24	/01	21-23	22	3.6786	1.2430	1.1209	4.7995	3.6786	2.3148	1.1939	0.4034	32%	68%
2011-S022-24	/02	21-23	22	3.7163	1.2557	1.0911	4.8074	3.7163	2.2978	1.2067	0.4077	32%	68%
2011-S022-24	/03	21-23	22	3.6511	1.2337	1.079	4.7301	3.6511	2.2699	1.1909	0.4024	33%	67%
2011-S022-25	/01	23-25	24	3.7181	1.2563	1.1061	4.8242	3.7181	2.3525	1.2464	0.4212	34%	66%
2011-S022-25	/02	23-25	24	3.7045	1.2517	1.0895	4.794	3.7045	2.3414	1.2519	0.4230	34%	66%
2011-S022-25	/03	23-25	24	3.7485	1.2666	1.1028	4.8513	3.7485	2.3515	1.2487	0.4219	33%	67%

Table F.17.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core S114, sections 1-13

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S114-1	/01	0-0.5	0.25	3.7359	1.2518	1.1165	4.8524	3.7359	2.3972	1.2807	0.4291	34%	66%
2011-S114-1	/02	0-0.5	0.25	3.7328	1.2508	1.0976	4.8304	3.7328	2.3792	1.2816	0.4294	34%	66%
2011-S114-1	/03	0-0.5	0.25	3.7374	1.2523	1.0714	4.8088	3.7374	2.3684	1.297	0.4346	35%	65%
2011-S114-2	/01	0.5-1	0.75	4.078	1.3946	1.1052	5.1832	4.078	2.994	1.8888	0.6459	46%	54%
2011-S114-2	/02	0.5-1	0.75	4.0574	1.3875	1.1164	5.1738	4.0574	3.0056	1.8892	0.6461	47%	53%
2011-S114-2	/03	0.5-1	0.75	4.1008	1.4024	1.0985	5.1993	4.1008	3.01774	1.91924	0.6563	47%	53%
2011-S114-3	/01	1-1.5	1.25	4.0618	1.3546	1.0835	5.1453	4.0618	2.8486	1.7651	0.5886	43%	57%
2011-S114-3	/02	1-1.5	1.25	3.9637	1.3219	1.0733	5.037	3.9637	2.7293	1.656	0.5523	42%	58%
2011-S114-3	/03	1-1.5	1.25	3.9048	1.3022	1.1012	5.006	3.9048	2.8101	1.7089	0.5699	44%	56%
2011-S114-4	/01	1.5-2	1.75	3.8878	1.3138	1.0702	4.958	3.8878	2.6067	1.5365	0.5192	40%	60%
2011-S114-4	/02	1.5-2	1.75	3.8824	1.3120	1.0656	4.948	3.8824	2.5916	1.526	0.5157	39%	61%
2011-S114-4	/03	1.5-2	1.75	3.9331	1.3291	1.0859	5.019	3.9331	2.6841	1.5982	0.5401	41%	59%
2011-S114-5	/01	2-2.5	2.25	4.1577	1.3866	1.0724	5.2301	4.1577	3.0779	2.0055	0.6688	48%	52%
2011-S114-5	/02	2-2.5	2.25	4.1495	1.3838	1.071	5.2205	4.1495	3.0667	1.9957	0.6656	48%	52%
2011-S114-5	/03	2-2.5	2.25	4.2299	1.4106	1.1002	5.3301	4.2299	3.158	2.0578	0.6863	49%	51%
2011-S114-6	/01	2.5-3	2.75	4.2931	1.4182	1.1254	5.4185	4.2931	3.3145	2.1891	0.7231	51%	49%
2011-S114-6	/02	2.5-3	2.75	4.3347	1.4319	1.0964	5.4311	4.3347	3.3179	2.2215	0.7338	51%	49%
2011-S114-6	/03	2.5-3	2.75	4.3207	1.4273	1.1061	5.4268	4.3207	3.3191	2.213	0.7310	51%	49%
2011-S114-7	/01	3-3.5	3.25	4.2849	1.4334	1.1048	5.3897	4.2849	3.3345	2.2297	0.7459	52%	48%
2011-S114-7	/02	3-3.5	3.25	4.2879	1.4344	1.1276	5.4155	4.2879	3.363	2.2354	0.7478	52%	48%
2011-S114-7	/03	3-3.5	3.25	4.3329	1.4495	1.1076	5.4405	4.3329	3.3736	2.266	0.7580	52%	48%
2011-S114-8	/01	3.5-4	3.75	4.3557	1.4393	1.1223	5.478	4.3557	3.3806	2.2583	0.7462	52%	48%
2011-S114-8	/02	3.5-4	3.75	4.3089	1.4238	1.1045	5.4134	4.3089	3.3472	2.2427	0.7411	52%	48%
2011-S114-8	/03	3.5-4	3.75	4.2367	1.4000	1.1179	5.3546	4.2367	3.3327	2.2148	0.7319	52%	48%
2011-S114-9	/01	4-4.5	4.25	4.1908	1.3622	1.0854	5.2762	4.1908	3.0739	1.9885	0.6464	47%	53%
2011-S114-9	/02	4-4.5	4.25	4.1998	1.3652	1.1032	5.303	4.1998	3.093	1.9898	0.6468	47%	53%
2011-S114-9	/03	4-4.5	4.25	4.1462	1.3477	1.0938	5.24	4.1462	3.0596	1.9658	0.6390	47%	53%
2011-S114-10	/01	4.5-5	4.75	4.1467	1.3708	1.0954	5.2421	4.1467	3.0297	1.9343	0.6394	47%	53%
2011-S114-10	/02	4.5-5	4.75	4.1544	1.3733	1.0887	5.2431	4.1544	3.0323	1.9436	0.6425	47%	53%
2011-S114-10	/03	4.5-5	4.75	4.128	1.3646	1.0938	5.2218	4.128	3.0192	1.9254	0.6365	47%	53%
2011-S114-11	/01	5-6	5.5	4.1289	1.3917	1.108	5.2369	4.1289	3.0552	1.9472	0.6563	47%	53%
2011-S114-11	/02	5-6	5.5	4.1585	1.4017	1.1204	5.2789	4.1585	3.0946	1.9742	0.6654	47%	53%
2011-S114-11	/03	5-6	5.5	4.1712	1.4060	1.0823	5.2535	4.1712	3.0636	1.9813	0.6678	47%	53%
2011-S114-12	/01	6-7	6.5	4.4468	1.4501	1.0811	5.5279	4.4468	3.4985	2.4174	0.7883	54%	46%
2011-S114-12	/02	6-7	6.5	4.455	1.4528	1.0838	5.5388	4.455	3.4888	2.405	0.7843	54%	46%
2011-S114-12	/03	6-7	6.5	4.4277	1.4439	1.0812	5.5089	4.4277	3.5056	2.4244	0.7906	55%	45%
2011-S114-13	/01	7-8	7.5	4.5174	1.4772	1.077	5.5944	4.5174	3.6078	2.5308	0.8276	56%	44%
2011-S114-13	/02	7-8	7.5	4.5043	1.4729	1.0803	5.5846	4.5043	3.6038	2.5235	0.8252	56%	44%
2011-S114-13	/03	7-8	7.5	4.5347	1.4828	1.0804	5.6151	4.5347	3.6166	2.5362	0.8293	56%	44%

Table F.18.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core S114, sections 14-26

Sample ID	Duplicate	Depth (cm)	Ave Depth (cm)	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S114-14	/01	8-9	8.5	4.4799	1.4573	1.1177	5.5976	4.4799	3.5851	2.4674	0.8026	55%	45%
2011-S114-14	/02	8-9	8.5	4.4689	1.4537	1.0877	5.5566	4.4689	3.5542	2.4665	0.8024	55%	45%
2011-S114-14	/03	8-9	8.5	4.475	1.4557	1.0867	5.5617	4.475	3.552	2.4653	0.8020	55%	45%
2011-S114-15	/01	9-10	9.5	4.3742	1.4553	1.0721	5.4463	4.3742	3.3384	2.2663	0.7540	52%	48%
2011-S114-15	/02	9-10	9.5	4.2843	1.4254	1.0822	5.3665	4.2843	3.3006	2.2184	0.7381	52%	48%
2011-S114-15	/03	9-10	9.5	4.3729	1.4549	1.0965	5.4694	4.3729	3.3671	2.2706	0.7554	52%	48%
2011-S114-16	/01	10-11	10.5	4.3723	1.4166	1.0821	5.4544	4.3723	3.4182	2.3361	0.7569	53%	47%
2011-S114-16	/02	10-11	10.5	4.4358	1.4372	1.1374	5.5732	4.4358	3.5041	2.3667	0.7668	53%	47%
2011-S114-16	/03	10-11	10.5	4.3798	1.4190	1.0967	5.4765	4.3798	3.4344	2.3377	0.7574	53%	47%
2011-S114-17	/01	11-12	11.5	4.3164	1.4621	1.0686	5.385	4.3164	3.3927	2.3241	0.7872	54%	46%
2011-S114-17	/02	11-12	11.5	4.3676	1.4794	1.0804	5.448	4.3676	3.4386	2.3582	0.7988	54%	46%
2011-S114-17	/03	11-12	11.5	4.3994	1.4902	1.0642	5.4636	4.3994	3.4328	2.3686	0.8023	54%	46%
2011-S114-18	/01	12-13	12.5	4.5262	1.5349	1.0923	5.6185	4.5262	3.6406	2.5483	0.8642	56%	44%
2011-S114-18	/02	12-13	12.5	4.4758	1.5178	1.0802	5.556	4.4758	3.5948	2.5146	0.8528	56%	44%
2011-S114-18	/03	12-13	12.5	4.534	1.5376	1.1143	5.6483	4.534	3.6618	2.5475	0.8639	56%	44%
2011-S114-19	/01	13-14	13.5	4.3295	1.4638	1.088	5.4175	4.3295	3.37	2.282	0.7715	53%	47%
2011-S114-19	/02	13-14	13.5	4.3936	1.4855	1.1	5.4936	4.3936	3.4188	2.3188	0.7840	53%	47%
2011-S114-19	/03	13-14	13.5	4.3896	1.4841	1.1005	5.4901	4.3896	3.4136	2.3131	0.7820	53%	47%
2011-S114-20	/01	14-15	14.5	4.1764	1.3994	1.0995	5.2759	4.1764	3.1194	2.0199	0.6768	48%	52%
2011-S114-20	/02	14-15	14.5	4.1745	1.3988	1.0944	5.2689	4.1745	3.1069	2.0125	0.6744	48%	52%
2011-S114-20	/03	14-15	14.5	4.2267	1.4163	1.113	5.3397	4.2267	3.148	2.035	0.6819	48%	52%
2011-S114-21	/01	15-17	16	4.1089	1.3640	1.0742	5.1831	4.1089	2.9656	1.8914	0.6279	46%	54%
2011-S114-21	/02	15-17	16	4.017	1.3335	1.0896	5.1066	4.017	2.9372	1.8476	0.6133	46%	54%
2011-S114-21	/03	15-17	16	3.9778	1.3205	1.105	5.0828	3.9778	2.9325	1.8275	0.6067	46%	54%
2011-S114-22	/01	17-19	18	4.135	1.3641	1.1026	5.2376	4.135	3.0676	1.965	0.6483	48%	52%
2011-S114-22	/02	17-19	18	4.168	1.3750	1.106	5.274	4.168	3.0854	1.9794	0.6530	47%	53%
2011-S114-22	/03	17-19	18	4.1734	1.3768	1.0745	5.2479	4.1734	3.0594	1.9849	0.6548	48%	52%
2011-S114-23	/01	19-21	20	4.1422	1.3710	1.0835	5.2257	4.1422	3.0335	1.95	0.6454	47%	53%
2011-S114-23	/02	19-21	20	4.2033	1.3912	1.0746	5.2779	4.2033	3.0667	1.9921	0.6594	47%	53%
2011-S114-23	/03	19-21	20	4.0786	1.3500	1.1075	5.1861	4.0786	3.021	1.9135	0.6333	47%	53%
2011-S114-24	/01	21-23	22	4.231	1.4682	1.1044	5.3354	4.231	3.1958	2.0914	0.7257	49%	51%
2011-S114-24	/02	21-23	22	4.2323	1.4686	1.0796	5.3119	4.2323	3.1694	2.0898	0.7252	49%	51%
2011-S114-24	/03	21-23	22	4.236	1.4699	1.0771	5.3131	4.236	3.1689	2.0918	0.7259	49%	51%
2011-S114-25	/01	23-25	24	4.4558	1.4650	1.1188	5.5746	4.4558	3.5245	2.4057	0.7910	54%	46%
2011-S114-25	/02	23-25	24	4.425	1.4549	1.0915	5.5165	4.425	3.4841	2.3926	0.7867	54%	46%
2011-S114-25	/03	23-25	24	4.4187	1.4528	1.0864	5.5051	4.4187	3.4677	2.3813	0.7829	54%	46%
2011-S114-26	/01			3.9403	1.2984	1.0655	5.0058	3.9403	2.7464	1.6809	0.5539	43%	57%
2011-S114-26	/02			3.9808	1.3117	1.0925	5.0733	3.9808	2.7902	1.6977	0.5594	43%	57%
2011-S114-26	/03			4.027	1.3269	1.0936	5.1206	4.027	2.8177	1.7241	0.5681	43%	57%

Table F.19.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of ponar grabs in Lake Superior

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S102PG	/01	3.95147	1.3441	1.0867	5.03817	3.95147	2.72094	1.63424	0.5559	41%	59%
2011-S102PG	/02	4.03951	1.3741	1.09161	5.13112	4.03951	2.77334	1.68173	0.5721	42%	58%
2011-S102PG	/03	4.04864	1.3772	1.11901	5.16765	4.04864	2.8042	1.68519	0.5732	42%	58%
2010-S116 PG	/01	3.36581	1.1261	1.08689	4.4527	3.36581	1.87888	0.79199	0.2650	24%	76%
2010-S116 PG	/02	3.42801	1.1469	1.08364	4.51165	3.42801	1.89587	0.81223	0.2718	24%	76%
2010-S116 PG	/03	3.40993	1.1409	1.1027	4.51263	3.40993	1.90823	0.80553	0.2695	24%	76%
2011-S011PG	/01	3.3805	1.1480	1.0948	4.4753	3.3805	1.92894	0.83414	0.2833	25%	75%
2011-S011PG	/02	3.42896	1.1644	1.08804	4.517	3.42896	1.93181	0.84377	0.2865	25%	75%
2011-S011PG	/03	3.36734	1.1435	1.08332	4.45066	3.36734	1.91495	0.83163	0.2824	25%	75%
2011-S112PG	/01	3.3138	1.1326	1.1034	4.4172	3.3138	2.01579	0.91239	0.3118	28%	72%
2011-S112PG	/02	3.44774	1.1783	1.10833	4.55607	3.44774	2.05749	0.94916	0.3244	28%	72%
2011-S112PG	/03	3.53648	1.2087	1.06108	4.59756	3.53648	2.03594	0.97486	0.3332	28%	72%
2011-S113PG	/01	3.53033	1.2023	1.09817	4.6285	3.53033	2.07684	0.97867	0.3333	28%	72%
2011-S113PG	/02	3.408	1.1606	1.10879	4.51679	3.408	2.05412	0.94533	0.3219	28%	72%
2011-S113PG	/03	3.53588	1.2042	1.07142	4.6073	3.53588	2.04998	0.97856	0.3333	28%	72%
2011-S106PG	/01	3.38462	1.1874	1.1183	4.50292	3.38462	1.90206	0.78376	0.2750	23%	77%
2011-S106PG	/02	3.44727	1.2091	1.11748	4.56475	3.44645	1.91428	0.7968	0.2795	23%	77%
2011-S106PG	/03	3.51029	1.2119	1.06183	4.57212	3.45464	1.87329	0.81146	0.2847	22%	78%
2011-S110PG	/01	4.70677	1.5943	1.09466	5.80143	4.70677	3.95891	2.86425	0.9702	61%	39%
2011-S110PG	/02	4.31057	1.4601	1.11835	5.42892	4.31057	3.80301	2.68466	0.9093	62%	38%
2011-S110PG	/03	4.76961	1.6156	1.12307	5.89268	4.76961	4.05906	2.93599	0.9945	62%	38%
2011-S114PG	/01	4.13001	1.3988	1.12361	5.25362	4.13001	3.02983	1.90622	0.6456	46%	54%
2011-S114PG	/02	4.17293	1.4134	1.11897	5.2919	4.17293	3.05225	1.93328	0.6548	46%	54%
2011-S114PG	/03	4.11847	1.3949	1.1136	5.23207	4.11847	3.01982	1.90622	0.6456	46%	54%
2011-S103PG	/01	3.7562	1.2862	1.0755	4.8317	3.7562	2.58103	1.50553	0.5155	40%	60%
2011-S103PG	/02	3.80742	1.3038	1.09067	4.89809	3.80742	2.6181	1.52743	0.5230	40%	60%
2011-S103PG	/03	3.85966	1.3217	1.09829	4.95795	3.85966	2.64545	1.54716	0.5298	40%	60%
2011-S001PG	/01	4.81019	1.6042	1.09582	5.90601	4.81019	4.1079	3.01208	1.0045	63%	37%
2011-S001PG	/02	4.82231	1.6083	1.09262	5.91493	4.82231	4.13334	3.04072	1.0141	63%	37%
2011-S001PG	/03	4.81511	1.6059	1.10859	5.9237	4.81511	4.1104	3.00181	1.0011	62%	38%
2011-S002PG	/01	3.82089	1.2743	1.07747	4.89836	3.82089	2.48459	1.40712	0.4693	37%	63%
2011-S002PG	/02	3.8268	1.2762	1.07211	4.89891	3.8268	2.46459	1.39248	0.4644	36%	64%
2011-S002PG	/03	3.81926	1.2737	1.10541	4.92467	3.81926	2.51418	1.40877	0.4698	37%	63%
2011-S012PG	/01	3.4877	1.1988	1.0917	4.5794	3.4877	1.95958	0.86788	0.2983	25%	75%
2011-S012PG	/02	3.37135	1.1588	1.10095	4.4723	3.37135	1.94433	0.84338	0.2899	25%	75%
2011-S012PG	/03	3.47443	1.1943	1.09438	4.56881	3.47443	1.96006	0.86568	0.2976	25%	75%

Table F.20.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of ponar grabs in Lake Superior

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2011-S105PG	/01	4.11847	1.4156	1.10423	5.2227	4.11847	3.02827	1.92404	0.6613	47%	53%
2011-S105PG	/02	4.10469	1.4109	1.09527	5.19996	4.10469	3.02306	1.92779	0.6626	47%	53%
2011-S105PG	/03	4.0968	1.4082	1.0657	5.1625	4.0968	2.99456	1.92886	0.6630	47%	53%
2011-S008PG	/01	3.69514	1.2843	1.11909	4.81423	3.69514	2.35311	1.23402	0.4289	33%	67%
2011-S008PG	/02	3.62548	1.2600	1.08948	4.71496	3.62548	2.31039	1.22091	0.4243	34%	66%
2011-S008PG	/03	3.65519	1.2704	1.08982	4.74501	3.65519	2.31218	1.22236	0.4248	33%	67%
2011-S104PG	/01	3.62105	1.2076	1.12136	4.74241	3.62105	2.18694	1.06558	0.3554	29%	71%
2011-S104PG	/02	3.60892	1.2036	1.08526	4.69418	3.60892	2.14916	1.0639	0.3548	29%	71%
2011-S104PG	/03	3.62777	1.2099	1.1194	4.74717	3.62777	2.19001	1.07061	0.3571	30%	70%
2011-S108PG	/01	3.56938	1.1824	1.10522	4.6746	3.56938	2.12739	1.02217	0.3386	29%	71%
2011-S108PG	/02	3.46694	1.1485	1.11078	4.57772	3.46694	2.1033	0.99252	0.3288	29%	71%
2011-S108PG	/03	3.56751	1.1818	1.09099	4.6585	3.56751	2.11434	1.02335	0.3390	29%	71%
2011-S120PG	/01	3.69207	1.2549	1.11299	4.80506	3.69207	2.44219	1.3292	0.4518	36%	64%
2011-S120PG	/02	3.77493	1.2830	1.11344	4.88837	3.77493	2.49081	1.37737	0.4681	36%	64%
2011-S120PG	/03	3.80612	1.2936	1.12161	4.92773	3.80612	2.49743	1.37582	0.4676	36%	64%
2011-S019PG	/01	3.43614	1.1460	1.10909	4.54523	3.43614	1.99788	0.88879	0.2964	26%	74%
2011-S019PG	/02	3.52243	1.1747	1.08817	4.6106	3.52243	2.0021	0.91393	0.3048	26%	74%
2011-S019PG	/03	3.53352	1.1784	1.07639	4.60991	3.53352	1.99425	0.91786	0.3061	26%	74%
2011-S22PG	/01	3.53903	1.2363	1.11737	4.6564	3.53903	2.20636	1.08899	0.3804	31%	69%
2011-S22PG	/02	3.60733	1.2601	1.07942	4.68675	3.60733	2.1924	1.11298	0.3888	31%	69%
2011-S22PG	/03	3.50923	1.2259	1.09429	4.60352	3.50923	2.1702	1.07591	0.3758	31%	69%
2011-S121PG	/01	3.60142	1.2137	1.09658	4.698	3.60142	2.21716	1.12058	0.3776	31%	69%
2011-S121PG	/02	3.61718	1.2190	1.08934	4.70652	3.61718	2.20119	1.11185	0.3747	31%	69%
2011-S121PG	/03	3.6811	1.2405	1.0992	4.7803	3.6811	2.17343	1.07423	0.3620	29%	71%
2011-S119PG	/01	3.38568	1.1642	1.13052	4.5162	3.38568	2.06649	0.93597	0.3218	28%	72%
2011-S119PG	/02	3.51928	1.2101	1.09042	4.6097	3.51928	2.06172	0.9713	0.3340	28%	72%
2011-S119PG	/03	3.45684	1.1887	1.09446	4.5513	3.45684	2.0482	0.95374	0.3280	28%	72%
2011-S016PG	/01	3.66595	1.2491	1.10519	4.77114	3.66595	2.25956	1.15437	0.3933	31%	69%
2011-S016PG	/02	3.60663	1.2288	1.09037	4.697	3.60663	2.22547	1.1351	0.3867	31%	69%
2011-S016PG	/03	3.61048	1.2302	1.11138	4.72186	3.61048	2.2466	1.13522	0.3868	31%	69%
2011-S118PG	/01	3.83142	1.3217	1.09179	4.92321	3.83142	2.54442	1.45263	0.5011	38%	62%
2011-S118PG	/02	3.83658	1.3235	1.10142	4.938	3.83658	2.5538	1.45238	0.5010	38%	62%
2011-S118PG	/03	3.81582	1.3163	1.11748	4.9333	3.81582	2.56394	1.44646	0.4990	38%	62%
2011-S117PG	/01	3.20351	1.0684	1.10347	4.30698	3.20351	1.8792	0.77573	0.2587	24%	76%
2011-S117PG	/02	3.44018	1.1473	1.06743	4.50761	3.44018	1.9045	0.83707	0.2792	24%	76%
2011-S117PG	/03	3.46432	1.1554	1.08624	4.55056	3.46432	1.92286	0.83662	0.2790	24%	76%

Table F.21.In-situ properties of water in sediment interface at each location in Lake Superior

SITE ID	ORP (mV)	DO (mg/L)	Water Temp (°C)	pH	Turbidity (NTU)	Conductivity (µs)	TDS (mg/L as NaCl)	Salinity (%)
2011-S102PG	221	7.9	11.5	7.49	no data	88	42	0.0
2010-S116 PG	253	7.9	2.6	7.21	9.2	116	55	0.0
2011-S011PG	287	7.2	2.5	7.26	10	121	57	0.1
2011-S112PG	265	8.3	11.0	7.14	8	90	14	0.0
2011-S113PG	203	7.9	11.5	7.29	7.3	112	55	0.1
2011-S106PG	no water sample	no water sample	no water sample	no water sample	no water sample	no water sample	no water sample	no water sample
2011-S110PG	214	7.3	2.8	7.35	11.8	116	55	0.1
2011-S114PG	230	8.5	2.9	7.20	9.1	106	50	0.1
2011-S103PG	266	10.4	2.5	7.84	no data	91	43	0.0
2011-S001PG	164	9.0	13.7	7.75	no data	95	45	0.0
2011-S002PG	241	8.0	12.8	7.59	no data	92	43	0.0
2011-S012PG	263	7.4	2.7	7.16	6.8	94	43	0.0
2011-S105PG	218	8.1	14.5	7.54	no data	90	43	0.0
2011-S008PG	231	9.2	15.2	7.06	no data	96	46	0.0
2011-S104PG	209	10.2	11.5	7.23	no data	90	43	0.0
2011-S108PG	225	8.2	2.7	7.13	no data	92	44	0.0
2011-S120PG	281	8.8	2.8	7.17	no data	91	42	0.0
2011-S019PG	228	9.7	2.6	7.06	5	98	46	0.0
2011-S22PG	239	8.5	5.0	7.20	53	97	47	0.0
2011-S121PG	149	7.3	2.7	7.23	78	527	241	0.3
2011-S119PG	193	11.5	2.7	7.27	9	96	44	0.0
2011-S016PG	174	9.1	15.0	7.31	8	96	45	0.0
2011-S118PG	216	8.0	2.7	8.02	11	97	44	0.0
2011-S117PG	260	9.2	2.8	7.14	11	90	43	0.0

Table F.22.Results of the particle size distribution analysis for cores S001 and S002

Sample ID	Clay	Silt	Sand	External Surface Area	Specific Surface Area (Calculated)	d-0.1	d-0.5	d-0.9
	(%)	(%)	(%)	(m^2/g)	(m^2/g)	(mm)	(mm)	(mm)
2011-S001-1	4.6%	10.9%	84.5%	0.3	7.2	22.1	375.2	579.5
2011-S001-2	5.7%	11.4%	82.9%	1.3	7.9	1.4	174.6	502.2
2011-S001-3	6.8%	11.9%	81.3%	1.2	8.7	1.5	192.6	517.2
2011-S001-4	8.0%	12.3%	79.7%	1.2	9.5	1.6	210.6	532.2
2011-S001-5	9.1%	12.8%	78.1%	0.6	10.3	5.2	322.9	569.7
2011-S001-6	10.7%	14.4%	74.9%	1.2	11.5	1.5	192.6	517.2
2011-S001-7	12.3%	16.0%	71.7%	1.3	12.6	1.3	156.7	487.2
2011-S001-8	13.9%	17.6%	68.5%	1.5	13.8	1.1	120.7	457.2
2011-S001-9	15.5%	19.2%	65.4%	1.6	15.0	1.0	84.7	427.1
2011-S001-10	17.1%	20.8%	62.2%	1.7	16.2	0.8	48.7	397.1
2011-S001-11	18.6%	22.3%	59.0%	1.1	17.4	1.6	228.6	547.2
2011-S001-12	21.2%	23.3%	55.5%	1.9	19.1	0.7	13.4	385.4
2011-S001-13	23.8%	24.3%	52.0%	2.0	20.9	0.7	14.0	403.8
2011-S001-14	26.3%	25.2%	48.5%	2.1	22.6	0.7	14.7	422.1
2011-S001-15	28.9%	26.2%	44.9%	2.2	24.4	0.8	15.3	440.5
2011-S001-16	31.4%	27.2%	41.4%	2.1	26.1	0.9	24.6	493.5
2011-S001-17	32.0%	27.3%	40.7%	1.8	26.5	0.6	12.8	367.1
2011-S001-18	32.6%	27.3%	40.0%	1.4	26.9	0.5	9.6	275.3
2011-S001-19	33.2%	27.4%	39.3%	0.9	27.3	0.3	6.4	183.5
2011-S001-20	33.9%	27.5%	38.6%	0.5	27.7	0.2	3.2	91.8
2011-S001-21	34.5%	27.6%	37.9%	2.3	28.1	0.8	16.0	458.9
2011-S001-22	34.5%	27.6%	37.9%	2.3	28.1	0.8	16.0	458.9
2011-S001-23	34.5%	27.6%	37.9%	2.3	28.1	0.8	16.0	458.9
2011-S001-24	34.5%	27.6%	37.9%	2.3	28.1	0.8	16.0	458.9
2011-S002-1	29.5%	46.1%	24.4%	1.7	26.8	1.2	13.6	407.4
2011-S002-2	29.8%	42.4%	27.8%	1.7	26.6	1.2	14.2	419.3
2011-S002-3	30.1%	38.6%	31.3%	1.8	26.4	1.1	14.8	431.2
2011-S002-4	30.5%	34.8%	34.7%	1.8	26.3	1.1	15.3	443.1
2011-S002-5	30.8%	31.1%	38.1%	1.8	26.1	1.1	15.9	455.0
2011-S002-6	31.0%	31.6%	37.4%	1.9	26.3	1.0	15.7	451.9
2011-S002-7	31.2%	32.1%	36.7%	1.9	26.5	1.0	15.5	448.7
2011-S002-8	31.4%	32.6%	35.9%	1.9	26.7	1.0	15.3	445.5
2011-S002-9	31.6%	33.1%	35.2%	1.9	26.9	1.0	15.1	442.3
2011-S002-10	31.8%	33.7%	34.5%	2.0	27.0	1.0	14.9	439.1
2011-S002-11	32.0%	34.2%	33.8%	2.0	27.2	0.9	14.7	435.9
2011-S002-12	35.0%	37.9%	27.1%	2.1	29.5	0.9	12.7	354.8
2011-S002-13	38.0%	41.6%	20.4%	2.3	31.8	0.9	10.8	273.7
2011-S002-14	40.9%	45.3%	13.8%	2.4	34.1	0.9	8.9	192.6
2011-S002-15	43.9%	49.0%	7.1%	2.6	36.4	0.8	6.9	111.5
2011-S002-16	46.9%	52.7%	0.4%	2.7	38.7	0.8	5.0	30.4
2011-S002-17	45.9%	53.6%	0.6%	2.7	38.1	0.8	5.3	31.8
2011-S002-18	44.8%	54.5%	0.7%	2.7	37.5	0.8	5.6	33.1
2011-S002-19	43.8%	55.3%	0.8%	2.7	37.0	0.8	5.9	34.5
2011-S002-20	42.8%	56.2%	0.9%	2.7	36.4	0.8	6.3	35.9
2011-S002-21	41.8%	57.1%	1.1%	2.7	35.9	0.8	6.6	37.3
2011-S002-22	41.8%	57.1%	1.1%	2.7	35.9	0.8	6.6	37.3
2011-S002-23	41.8%	57.1%	1.1%	2.7	35.9	0.8	6.6	37.3
2011-S002-24	41.8%	57.1%	1.1%	2.7	35.9	0.8	6.6	37.3
2011-S002-25	41.8%	57.1%	1.1%	2.7	35.9	0.8	6.6	37.3

Table F.23.Results of the particle size distribution analysis for cores S008 and S011

Sample ID	Clay	Silt	Sand	External Surface Area	Specific Surface Area (Calculated)	d-0.1	d-0.5	d-0.9
	(%)	(%)	(%)	(m^2/g)	(m^2/g)	(mm)	(mm)	(mm)
2011-S008-1	52.3%	47.4%	0.3%	2.7	41.6	0.9	3.9	34.1
2011-S008-2	55.0%	44.7%	0.3%	2.9	43.1	0.8	3.6	29.4
2011-S008-3	57.8%	42.0%	0.2%	3.0	44.6	0.8	3.3	24.6
2011-S008-4	60.5%	39.3%	0.2%	3.2	46.1	0.8	3.0	19.8
2011-S008-5	63.3%	36.6%	0.2%	3.4	47.6	0.7	2.8	15.0
2011-S008-6	63.8%	36.0%	0.2%	3.6	47.9	0.7	2.6	15.3
2011-S008-7	64.3%	35.5%	0.2%	3.8	48.2	0.7	2.5	15.7
2011-S008-8	64.9%	34.9%	0.2%	4.0	48.5	0.6	2.4	16.0
2011-S008-9	65.4%	34.4%	0.2%	4.2	48.8	0.6	2.2	16.3
2011-S008-10	66.0%	33.8%	0.2%	4.5	49.1	0.6	2.1	16.6
2011-S008-11	66.5%	33.2%	0.2%	4.7	49.4	0.5	2.0	16.9
2011-S008-12	70.7%	29.1%	0.2%	4.7	51.7	0.5	1.9	14.5
2011-S008-13	74.9%	25.0%	0.1%	4.8	53.9	0.5	1.8	12.1
2011-S008-14	79.1%	20.8%	0.1%	4.9	56.2	0.5	1.7	9.8
2011-S008-15	83.3%	16.7%	0.0%	4.9	58.5	0.6	1.7	7.4
2011-S008-16	87.5%	12.5%	0.0%	5.0	60.8	0.6	1.6	5.0
2011-S008-17	86.5%	13.5%	0.0%	5.0	60.3	0.6	1.6	5.5
2011-S008-18	85.6%	14.4%	0.0%	5.1	59.8	0.5	1.6	5.9
2011-S008-19	84.7%	15.3%	0.0%	5.1	59.3	0.5	1.6	6.3
2011-S008-20	83.7%	16.3%	0.0%	5.2	58.7	0.5	1.5	6.7
2011-S008-21	82.8%	17.2%	0.0%	5.2	58.2	0.5	1.5	7.2
2011-S008-22	82.8%	17.2%	0.0%	5.2	58.2	0.5	1.5	7.2
2011-S008-23	82.8%	17.2%	0.0%	5.2	58.2	0.5	1.5	7.2
2011-S008-24	82.8%	17.2%	0.0%	5.2	58.2	0.5	1.5	7.2
2011-S008-25	82.8%	17.2%	0.0%	5.2	58.2	0.5	1.5	7.2
2011-S011-1	30.9%	56.6%	12.5%	1.9	28.8	1.1	11.2	66.6
2011-S011-2	36.6%	54.0%	9.4%	2.1	32.2	1.1	9.3	56.1
2011-S011-3	42.3%	51.3%	6.4%	2.3	35.6	1.0	7.5	45.5
2011-S011-4	48.0%	48.7%	3.3%	2.5	39.0	1.0	5.6	35.0
2011-S011-5	53.7%	46.1%	0.2%	2.7	42.4	0.9	3.7	24.5
2011-S011-6	54.5%	45.0%	0.6%	2.7	42.8	0.9	3.7	24.2
2011-S011-7	55.2%	43.8%	0.9%	2.7	43.2	0.9	3.6	23.9
2011-S011-8	56.0%	42.7%	1.3%	2.8	43.5	0.9	3.5	23.6
2011-S011-9	56.7%	41.6%	1.7%	2.8	43.9	0.9	3.5	23.4
2011-S011-10	57.5%	40.5%	2.0%	2.9	44.3	0.9	3.4	23.1
2011-S011-11	58.2%	39.4%	2.4%	2.9	44.6	0.9	3.3	22.8
2011-S011-12	59.8%	38.2%	2.0%	3.0	45.5	0.9	3.2	20.6
2011-S011-13	61.3%	37.0%	1.6%	3.1	46.4	0.8	3.1	18.5
2011-S011-14	62.9%	35.8%	1.3%	3.2	47.3	0.8	3.0	16.3
2011-S011-15	64.5%	34.6%	0.9%	3.3	48.2	0.8	2.8	14.1
2011-S011-16	66.0%	33.4%	0.6%	3.4	49.1	0.8	2.7	12.0
2011-S011-17	65.0%	34.5%	0.5%	3.3	48.5	0.8	2.8	12.3
2011-S011-18	63.9%	35.6%	0.5%	3.3	47.9	0.8	2.8	12.6
2011-S011-19	62.8%	36.7%	0.4%	3.2	47.3	0.8	2.9	12.8
2011-S011-20	61.8%	37.8%	0.4%	3.2	46.8	0.8	2.9	13.1
2011-S011-21	60.7%	38.9%	0.3%	3.2	46.2	0.8	3.0	13.4
2011-S011-22	60.7%	38.9%	0.3%	3.2	46.2	0.8	3.0	13.4
2011-S011-23	60.7%	38.9%	0.3%	3.2	46.2	0.8	3.0	13.4
2011-S011-24	60.7%	38.9%	0.3%	3.2	46.2	0.8	3.0	13.4
2011-S011-25	60.7%	38.9%	0.3%	3.2	46.2	0.8	3.0	13.4

Table F.24.Results of the particle size distribution analysis for cores S012 and S016

Sample ID	Clay	Silt	Sand	External Surface Area	Specific Surface Area (Calculated)	d-0.1	d-0.5	d-0.9
	(%)	(%)	(%)	(m^2/g)	(m^2/g)	(mm)	(mm)	(mm)
2011-S012-1	20.73%	43.06%	36.21%	1.2	20.8	1.7	31.5	311.5
2011-S012-2	28.01%	44.82%	27.16%	1.5	25.7	1.5	24.7	240.4
2011-S012-3	35.29%	46.59%	18.12%	1.9	30.6	1.3	17.9	169.2
2011-S012-4	42.57%	48.35%	9.08%	2.3	35.4	1.1	11.1	98.0
2011-S012-5	49.85%	50.12%	0.03%	2.6	40.3	0.9	4.3	26.9
2011-S012-6	50.42%	49.49%	0.09%	2.7	40.6	0.9	4.2	25.6
2011-S012-7	50.98%	48.87%	0.15%	2.7	40.9	0.9	4.1	24.3
2011-S012-8	51.55%	48.24%	0.21%	2.7	41.2	0.9	4.1	23.1
2011-S012-9	52.12%	47.61%	0.27%	2.7	41.5	0.9	4.0	21.8
2011-S012-10	52.69%	46.98%	0.32%	2.7	41.8	0.9	3.9	20.5
2011-S012-11	53.26%	46.36%	0.38%	2.8	42.1	0.9	3.8	19.3
2011-S012-12	50.89%	48.58%	0.52%	2.7	40.8	0.9	4.3	21.4
2011-S012-13	48.52%	50.81%	0.67%	2.6	39.5	0.9	4.8	23.5
2011-S012-14	46.15%	53.04%	0.81%	2.5	38.2	0.9	5.2	25.6
2011-S012-15	43.78%	55.27%	0.95%	2.5	36.9	0.9	5.7	27.8
2011-S012-16	41.41%	57.50%	1.10%	2.4	35.6	0.9	6.2	29.9
2011-S012-17	45.11%	53.82%	1.07%	2.6	37.6	0.9	5.5	26.9
2011-S012-18	48.81%	50.14%	1.05%	2.7	39.7	0.9	4.9	23.8
2011-S013-19	52.51%	46.46%	1.03%	2.9	41.7	0.8	4.3	20.8
2011-S012-20	56.22%	42.78%	1.00%	3.0	43.7	0.8	3.6	17.7
2011-S012-21	59.92%	39.10%	0.98%	3.2	45.7	0.8	3.0	14.7
2011-S012-22	59.92%	39.10%	0.98%	3.2	45.7	0.8	3.0	14.7
2011-S012-23	59.92%	39.10%	0.98%	3.2	45.7	0.8	3.0	14.7
2011-S012-24	59.92%	39.10%	0.98%	3.2	45.7	0.8	3.0	14.7
2011-S012-25	59.92%	39.10%	0.98%	3.2	45.7	0.8	3.0	14.7
2011-S016-1	48.7%	43.7%	7.6%	2.6	38.9	0.9	4.5	51.9
2011-S016-2	47.9%	43.5%	8.6%	2.6	38.4	0.8	4.8	62.9
2011-S016-3	47.1%	43.2%	9.6%	2.7	37.9	0.8	5.0	73.9
2011-S016-4	46.3%	43.0%	10.6%	2.7	37.3	0.8	5.2	84.9
2011-S016-5	45.6%	42.8%	11.6%	2.8	36.8	0.8	5.5	95.9
2011-S016-6	48.4%	41.9%	9.7%	2.9	38.6	0.8	5.0	82.3
2011-S016-7	51.3%	40.9%	7.8%	3.0	40.3	0.7	4.5	68.6
2011-S016-8	54.1%	40.0%	5.8%	3.1	42.1	0.7	4.1	55.0
2011-S016-9	57.0%	39.1%	3.9%	3.2	43.8	0.7	3.6	41.3
2011-S016-10	59.9%	38.2%	2.0%	3.4	45.6	0.7	3.2	27.7
2011-S016-11	62.7%	37.2%	0.1%	3.5	47.3	0.7	2.7	14.0
2011-S016-12	60.0%	39.2%	0.8%	3.4	45.8	0.7	3.0	17.9
2011-S016-13	57.3%	41.1%	1.6%	3.3	44.2	0.7	3.4	21.7
2011-S016-14	54.6%	43.1%	2.3%	3.2	42.7	0.7	3.7	25.6
2011-S016-15	51.9%	45.0%	3.1%	3.1	41.1	0.7	4.1	29.4
2011-S016-16	49.2%	47.0%	3.8%	3.0	39.6	0.7	4.4	33.3
2011-S016-17	53.4%	43.6%	3.0%	3.2	41.9	0.7	4.0	28.9
2011-S016-18	57.5%	40.2%	2.3%	3.3	44.3	0.7	3.6	24.6
2011-S016-19	61.6%	36.8%	1.5%	3.4	46.6	0.7	3.2	20.3
2011-S016-20	65.8%	33.5%	0.8%	3.5	48.9	0.7	2.7	16.0
2011-S016-21	69.9%	30.1%	0.0%	3.7	51.2	0.7	2.3	11.7
2011-S016-22	69.9%	30.1%	0.0%	3.7	51.2	0.7	2.3	11.7
2011-S016-23	69.9%	30.1%	0.0%	3.7	51.2	0.7	2.3	11.7
2011-S016-24	69.9%	30.1%	0.0%	3.7	51.2	0.7	2.3	11.7
2011-S016-25	69.9%	30.1%	0.0%	3.7	51.2	0.7	2.3	11.7

Table F.25.Results of the particle size distribution analysis for cores S019 and S022

Sample ID	Clay	Silt	Sand	External Surface Area	Specific Surface Area (Calculated)	d-0.1	d-0.5	d-0.9
	(%)	(%)	(%)	(m^2/g)	(m^2/g)	(mm)	(mm)	(mm)
2011-S019-1	49.04%	50.91%	0.04%	2.6	39.9	0.9	4.4	24.3
2011-S019-2	48.97%	50.99%	0.04%	2.6	39.8	0.9	4.4	24.1
2011-S019-3	48.89%	51.07%	0.04%	2.6	39.8	0.9	4.4	23.8
2011-S019-4	48.82%	51.15%	0.04%	2.6	39.8	0.9	4.4	23.5
2011-S019-5	48.74%	51.23%	0.03%	2.6	39.7	0.9	4.5	23.3
2011-S019-6	47.21%	52.76%	0.03%	2.5	38.9	0.9	4.7	23.4
2011-S019-7	45.68%	54.28%	0.04%	2.4	38.1	1.0	4.9	23.5
2011-S019-8	44.15%	55.81%	0.04%	2.4	37.2	1.0	5.1	23.5
2011-S019-9	42.62%	57.34%	0.04%	2.3	36.4	1.0	5.4	23.6
2011-S019-10	41.09%	58.87%	0.04%	2.2	35.6	1.0	5.6	23.7
2011-S019-11	39.56%	60.40%	0.04%	2.2	34.7	1.1	5.8	23.8
2011-S019-12	43.13%	56.50%	0.36%	2.4	36.6	1.0	5.3	23.5
2011-S019-13	46.70%	52.61%	0.69%	2.6	38.5	0.9	4.8	23.1
2011-S019-14	50.27%	48.72%	1.01%	2.9	40.5	0.8	4.3	22.8
2011-S019-15	53.84%	44.83%	1.33%	3.1	42.4	0.8	3.8	22.5
2011-S019-16	57.40%	40.94%	1.65%	3.4	44.3	0.7	3.2	22.1
2011-S019-17	57.35%	41.08%	1.58%	3.3	44.2	0.7	3.2	21.8
2011-S019-18	57.29%	41.21%	1.50%	3.3	44.2	0.7	3.3	21.4
2011-S019-19	57.23%	41.35%	1.42%	3.3	44.2	0.7	3.3	21.1
2011-S019-20	57.18%	41.48%	1.34%	3.3	44.2	0.7	3.3	20.8
2011-S019-21	57.12%	41.61%	1.27%	3.3	44.2	0.7	3.3	20.4
2011-S019-22	57.12%	41.61%	1.27%	3.3	44.2	0.7	3.3	20.4
2011-S019-23	57.12%	41.61%	1.27%	3.3	44.2	0.7	3.3	20.4
2011-S019-24	57.12%	41.61%	1.27%	3.3	44.2	0.7	3.3	20.4
2011-S019-25	57.12%	41.61%	1.27%	3.3	44.2	0.7	3.3	20.4
2011-S022-1	45.5%	52.4%	2.1%	2.4	37.8	1.0	4.9	22.8
2011-S022-2	40.9%	55.1%	4.0%	2.2	35.1	1.2	6.0	33.3
2011-S022-3	36.4%	57.8%	5.8%	1.9	32.4	1.4	7.2	43.8
2011-S022-4	31.8%	60.6%	7.6%	1.7	29.7	1.5	8.3	54.3
2011-S022-5	27.2%	63.3%	9.5%	1.5	27.1	1.7	9.4	64.9
2011-S022-6	29.5%	62.5%	8.0%	1.6	28.4	1.6	8.9	57.8
2011-S022-7	31.7%	61.8%	6.5%	1.8	29.8	1.5	8.3	50.7
2011-S022-8	33.9%	61.1%	5.0%	1.9	31.2	1.3	7.7	43.6
2011-S022-9	36.2%	60.3%	3.5%	2.0	32.5	1.2	7.1	36.5
2011-S022-10	38.4%	59.6%	2.0%	2.2	33.9	1.1	6.5	29.5
2011-S022-11	40.7%	58.8%	0.5%	2.3	35.3	1.0	5.9	22.4
2011-S022-12	41.2%	58.4%	0.4%	2.3	35.6	1.0	5.8	21.8
2011-S022-13	41.7%	58.0%	0.3%	2.3	35.9	1.0	5.7	21.2
2011-S022-14	42.3%	57.5%	0.2%	2.4	36.2	1.0	5.6	20.5
2011-S022-15	42.8%	57.1%	0.1%	2.4	36.5	1.0	5.5	19.9
2011-S022-16	43.3%	56.7%	0.0%	2.4	36.8	0.9	5.4	19.3
2011-S022-17	42.9%	57.0%	0.1%	2.4	36.5	0.9	5.5	19.8
2011-S022-18	42.4%	57.3%	0.3%	2.4	36.3	0.9	5.5	20.3
2011-S022-19	42.0%	57.6%	0.4%	2.4	36.0	0.9	5.6	20.8
2011-S022-20	41.6%	57.9%	0.6%	2.4	35.8	0.9	5.7	21.4
2011-S022-21	41.1%	58.2%	0.7%	2.4	35.5	0.9	5.8	21.9
2011-S022-22	41.1%	58.2%	0.7%	2.4	35.5	0.9	5.8	21.9
2011-S022-23	41.1%	58.2%	0.7%	2.4	35.5	0.9	5.8	21.9
2011-S022-24	41.1%	58.2%	0.7%	2.4	35.5	0.9	5.8	21.9
2011-S022-25	41.1%	58.2%	0.7%	2.4	35.5	0.9	5.8	21.9

Table F.26.Results of the particle size distribution analysis for cores S114

Sample ID	Clay	Silt	Sand	External Surface Area	Specific Surface Area (Calculated)	d-0.1	d-0.5	d-0.9
	(%)	(%)	(%)	(m^2/g)	(m^2/g)	(mm)	(mm)	(mm)
2011-S114-1	22.96%	32.66%	44.38%	1.4	21.2	1.4	41.7	260.2
2011-S114-2	25.09%	30.98%	43.93%	1.6	22.4	1.3	37.7	245.9
2011-S114-3	27.22%	29.30%	43.48%	1.7	23.6	1.1	33.6	231.5
2011-S114-4	29.35%	27.62%	43.04%	1.9	24.8	1.0	29.5	217.1
2011-S114-5	31.47%	25.94%	42.59%	2.0	26.0	0.9	25.4	202.7
2011-S114-6	32.87%	27.88%	39.26%	2.1	27.1	0.9	22.6	187.8
2011-S114-7	34.26%	29.82%	35.92%	2.2	28.2	0.9	19.7	173.0
2011-S114-8	35.65%	31.76%	32.59%	2.3	29.3	0.8	16.9	158.1
2011-S114-9	37.04%	33.70%	29.25%	2.4	30.4	0.8	14.0	143.3
2011-S114-10	38.44%	35.64%	25.92%	2.4	31.5	0.8	11.2	128.4
2011-S114-11	39.83%	37.59%	22.59%	2.5	32.6	0.8	8.3	113.6
2011-S114-12	39.87%	34.29%	25.85%	2.5	32.3	0.8	8.7	127.3
2011-S114-13	39.90%	30.99%	29.11%	2.5	32.0	0.8	9.2	141.1
2011-S114-14	39.94%	27.69%	32.37%	2.5	31.7	0.8	9.6	154.8
2011-S114-15	39.97%	24.39%	35.64%	2.5	31.4	0.8	10.0	168.6
2011-S114-16	40.01%	21.09%	38.90%	2.6	31.0	0.8	10.4	182.4
2011-S114-17	42.64%	25.19%	32.17%	2.7	33.2	0.7	9.1	154.3
2011-S114-18	45.27%	29.29%	25.45%	2.9	35.3	0.7	7.7	126.1
2011-S114-19	47.89%	33.39%	18.72%	3.1	37.4	0.7	6.4	98.0
2011-S114-20	50.52%	37.48%	11.99%	3.3	39.5	0.6	5.0	69.9
2011-S114-21	53.15%	41.58%	5.27%	3.5	41.6	0.6	3.7	41.8
2011-S114-22	53.15%	41.58%	5.27%	3.5	41.6	0.6	3.7	41.8
2011-S114-23	53.15%	41.58%	5.27%	3.5	41.6	0.6	3.7	41.8
2011-S114-24	53.15%	41.58%	5.27%	3.5	41.6	0.6	3.7	41.8
2011-S114-25	53.15%	41.58%	5.27%	3.5	41.6	0.6	3.7	41.8

Table F.27.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H001, sections 1-12

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H001-1	/01	3.0377	1.0170	1.1045	4.1422	3.0377	1.3738	0.2693	0.0902	9%	91%
2012-H001-1	/02	3.0677	1.0270	1.1051	4.1728	3.0677	1.3737	0.2686	0.0899	9%	91%
2012-H001-1	/03	3.0458	1.0197	1.1	4.1458	3.0458	1.3729	0.2729	0.0914	9%	91%
2012-H001-2	/01	3.093	1.0355	1.105	4.198	3.093	1.4215	0.3165	0.1060	10%	90%
2012-H001-2	/02	3.0853	1.0329	1.1065	4.1918	3.0853	1.4194	0.3129	0.1048	10%	90%
2012-H001-2	/03	3.1015	1.0383	1.0996	4.2011	3.1015	1.4099	0.3103	0.1039	10%	90%
2012-H001-3	/01	3.1633	1.0590	1.0812	4.2445	3.1633	1.4609	0.3797	0.1271	12%	88%
2012-H001-3	/02	3.126	1.0465	1.1039	4.2299	3.126	1.4832	0.3793	0.1270	12%	88%
2012-H001-3	/03	3.1004	1.0379	1.0649	4.1653	3.1004	1.4243	0.3594	0.1203	12%	88%
2012-H001-4	/01	3.2022	1.0720	1.0697	4.2719	3.2022	1.5092	0.4395	0.1471	14%	86%
2012-H001-4	/02	3.1775	1.0638	1.1239	4.3014	3.1775	1.5568	0.4329	0.1449	14%	86%
2012-H001-4	/03	3.2099	1.0746	1.0935	4.3034	3.2099	1.5401	0.4466	0.1495	14%	86%
2012-H001-5	/01	3.2023	1.0721	1.0983	4.3006	3.2023	1.5816	0.4833	0.1618	15%	85%
2012-H001-5	/02	3.2257	1.0799	1.0963	4.322	3.2257	1.5753	0.479	0.1604	15%	85%
2012-H001-5	/03	3.213	1.0756	1.1109	4.3239	3.213	1.5932	0.4823	0.1615	15%	85%
2012-H001-6	/01	3.2441	1.0861	1.0955	4.3396	3.2441	1.6305	0.535	0.1791	16%	84%
2012-H001-6	/02	3.2339	1.0826	1.1303	4.3642	3.2339	1.6685	0.5382	0.1802	17%	83%
2012-H001-6	/03	3.2692	1.0945	1.1061	4.3753	3.2692	1.6553	0.5492	0.1839	17%	83%
2012-H001-7	/01	3.24531	1.0865	1.10849	4.3538	3.24531	1.6406	0.53211	0.1781	16%	84%
2012-H001-7	/02	3.2419	1.0853	1.1213	4.3632	3.2419	1.6718	0.5505	0.1843	17%	83%
2012-H001-7	/03	3.2455	1.0865	1.0974	4.3429	3.2455	1.6484	0.551	0.1845	17%	83%
2012-H001-8	/01	3.2472	1.0871	1.1026	4.3498	3.2472	1.6608	0.5582	0.1869	17%	83%
2012-H001-8	/02	3.2737	1.0960	1.0688	4.3425	3.2737	1.63	0.5612	0.1879	17%	83%
2012-H001-8	/03	3.2264	1.0801	1.0805	4.3069	3.2264	1.6336	0.5531	0.1852	17%	83%
2012-H001-9	/01	3.265	1.0931	1.112	4.377	3.265	1.7025	0.5905	0.1977	18%	82%
2012-H001-9	/02	3.2657	1.0933	1.0845	4.3502	3.2657	1.6702	0.5857	0.1961	18%	82%
2012-H001-9	/03	3.269	1.0944	1.1042	4.3732	3.269	1.6915	0.5873	0.1966	18%	82%
2012-H001-10	/01	3.2939	1.1027	1.1049	4.3988	3.2939	1.713	0.6081	0.2036	18%	82%
2012-H001-10	/02	3.2893	1.1012	1.0983	4.3876	3.2893	1.701	0.6027	0.2018	18%	82%
2012-H001-10	/03	3.3168	1.1104	1.0909	4.4077	3.3168	1.7028	0.6119	0.2049	18%	82%
2012-H001-11	/01	3.2678	1.0940	1.1043	4.3721	3.2678	1.727	0.6227	0.2085	19%	81%
2012-H001-11	/02	3.2892	1.1012	1.1169	4.4061	3.2892	1.7416	0.6247	0.2091	19%	81%
2012-H001-11	/03	3.2785	1.0976	1.1034	4.3819	3.2785	1.725	0.6216	0.2081	19%	81%
2012-H001-12	/01	3.3311	1.1152	1.0788	4.4099	3.3311	1.7209	0.6421	0.2150	19%	81%
2012-H001-12	/02	3.3012	1.1052	1.0906	4.3918	3.3012	1.7236	0.633	0.2119	19%	81%
2012-H001-12	/03	3.3244	1.1130	1.0754	4.3998	3.3244	1.7164	0.641	0.2146	19%	81%

Table F.28.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H001, sections 13-24

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H001-13	/01	3.2925	1.1023	1.0955	4.388	3.2925	1.7336	0.6381	0.2136	19%	81%
2012-H001-13	/02	3.3314	1.1153	1.0884	4.4198	3.3314	1.7317	0.6433	0.2154	19%	81%
2012-H001-13	/03	3.3133	1.1092	1.1131	4.4264	3.3133	1.752	0.6389	0.2139	19%	81%
2012-H001-14	/01	3.2884	1.1009	1.1021	4.3905	3.2884	1.7391	0.637	0.2133	19%	81%
2012-H001-14	/02	3.2912	1.1018	1.0888	4.38	3.2912	1.7267	0.6379	0.2136	19%	81%
2012-H001-14	/03	3.2518	1.0887	1.1035	4.3553	3.2518	1.7342	0.6307	0.2111	19%	81%
2012-H001-15	/01	3.3581	1.1242	1.0852	4.4433	3.3581	1.7729	0.6877	0.2302	20%	80%
2012-H001-15	/02	3.3355	1.1167	1.1212	4.4567	3.3355	1.7939	0.6727	0.2252	20%	80%
2012-H001-15	/03	3.3527	1.1224	1.0876	4.4403	3.3527	1.775	0.6874	0.2301	21%	79%
2012-H001-16	/01	3.3363	1.1169	1.1028	4.4391	3.3363	1.7836	0.6808	0.2279	20%	80%
2012-H001-16	/02	3.3029	1.1058	1.0659	4.3688	3.3029	1.7258	0.6599	0.2209	20%	80%
2012-H001-16	/03	3.3447	1.1198	1.0878	4.4325	3.3447	1.7594	0.6716	0.2248	20%	80%
2012-H001-17	/01	3.3624	1.1257	1.1494	4.5118	3.3624	1.8723	0.7229	0.2420	21%	79%
2012-H001-17	/02	3.3952	1.1367	1.1174	4.5126	3.3952	1.8466	0.7292	0.2441	21%	79%
2012-H001-17	/03	3.3747	1.1298	1.0755	4.4502	3.3747	1.795	0.7195	0.2409	21%	79%
2012-H001-18	/01	3.4073	1.1407	1.1286	4.5359	3.4073	1.8863	0.7577	0.2537	22%	78%
2012-H001-18	/02	3.3355	1.1167	1.1149	4.4504	3.3355	1.8546	0.7397	0.2476	22%	78%
2012-H001-18	/03	3.3843	1.1330	1.1063	4.4906	3.3843	1.8524	0.7461	0.2498	22%	78%
2012-H001-19	/01	3.3369	1.1171	1.141	4.4779	3.3369	1.8743	0.7333	0.2455	22%	78%
2012-H001-19	/02	3.3881	1.1343	1.0903	4.4784	3.3881	1.8322	0.7419	0.2484	22%	78%
2012-H001-19	/03	3.3823	1.1323	1.0624	4.4447	3.3823	1.8009	0.7385	0.2472	22%	78%
2012-H001-20	/01	3.3966	1.1371	1.0828	4.4794	3.3966	1.8406	0.7578	0.2537	22%	78%
2012-H001-20	/02	3.3838	1.1328	1.0742	4.458	3.3838	1.828	0.7538	0.2524	22%	78%
2012-H001-20	/03	3.3875	1.1341	1.0834	4.4709	3.3875	1.8326	0.7492	0.2508	22%	78%
2012-H001-21	/01	3.3775	1.1307	1.0688	4.4463	3.3775	1.838	0.7692	0.2575	23%	77%
2012-H001-21	/02	3.3966	1.1371	1.0784	4.475	3.3966	1.8506	0.7722	0.2585	23%	77%
2012-H001-21	/03	3.4195	1.1448	1.058	4.4775	3.4195	1.8348	0.7768	0.2601	23%	77%
2012-H001-22	/01	3.4104	1.1418	1.1037	4.5141	3.4104	1.9168	0.8131	0.2722	24%	76%
2012-H001-22	/02	3.4436	1.1529	1.1348	4.5784	3.4436	1.9426	0.8078	0.2704	23%	77%
2012-H001-22	/03	3.4301	1.1483	1.1316	4.5617	3.4301	1.936	0.8044	0.2693	23%	77%
2012-H001-23	/01	3.4389	1.1513	1.0909	4.5298	3.4389	1.919	0.8281	0.2772	24%	76%
2012-H001-23	/02	3.4097	1.1415	1.071	4.4807	3.4097	1.8912	0.8202	0.2746	24%	76%
2012-H001-23	/03	3.421	1.1453	1.1186	4.5396	3.421	1.9355	0.8169	0.2735	24%	76%
2012-H001-24	/01	3.4386	1.1512	1.1142	4.5528	3.4386	1.9676	0.8534	0.2857	25%	75%
2012-H001-24	/02	3.4262	1.1470	1.0792	4.5054	3.4262	1.9216	0.8424	0.2820	25%	75%
2012-H001-24	/03	3.42	1.1450	1.1036	4.5236	3.42	1.942	0.8384	0.2807	25%	75%
2012-H001-25	/01	3.411	1.1419	1.0847	4.4957	3.411	1.9503	0.8656	0.2898	25%	75%
2012-H001-25	/02	3.4436	1.1528	1.0681	4.5117	3.4436	1.9378	0.8697	0.2912	25%	75%
2012-H001-25	/03	3.4572	1.1574	1.1084	4.5656	3.4572	1.9873	0.8789	0.2942	25%	75%

Table F.29.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H006, sections 1-12

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H006-1	/01	3.0649	1.0277	1.0537	4.1186	3.0649	1.3107	0.257	0.0862	8%	92%
2012-H006-1	/02	3.0992	1.0392	1.0576	4.1568	3.0992	1.3213	0.2637	0.0884	9%	91%
2012-H006-1	/03	3.156	1.0582	1.0909	4.2469	3.156	1.3548	0.2639	0.0885	8%	92%
2012-H006-2	/01	3.1855	1.0681	1.137	4.3225	3.1855	1.4878	0.3508	0.1176	11%	89%
2012-H006-2	/02	3.2029	1.0740	1.1027	4.3056	3.2029	1.4626	0.3599	0.1207	11%	89%
2012-H006-2	/03	3.1531	1.0573	1.083	4.2361	3.1531	1.409	0.326	0.1093	10%	90%
2012-H006-3	/01	3.306	1.1085	1.0937	4.3997	3.306	1.5699	0.4762	0.1597	14%	86%
2012-H006-3	/02	3.2655	1.0950	1.1261	4.3916	3.2655	1.5903	0.4642	0.1557	14%	86%
2012-H006-3	/03	3.236	1.0851	1.0924	4.3284	3.236	1.5426	0.4502	0.1510	14%	86%
2012-H006-4	/01	3.2449	1.0881	1.1279	4.3728	3.2449	1.676	0.5481	0.1838	17%	83%
2012-H006-4	/02	3.2905	1.1033	1.0794	4.3699	3.2905	1.636	0.5566	0.1866	17%	83%
2012-H006-4	/03	3.3074	1.1090	1.11	4.4174	3.3074	1.6716	0.5616	0.1883	17%	83%
2012-H006-5	/01	3.3172	1.1123	1.1239	4.4411	3.3172	1.7551	0.6312	0.2116	19%	81%
2012-H006-5	/02	3.3342	1.1180	1.0577	4.3919	3.3342	1.6956	0.6379	0.2139	19%	81%
2012-H006-5	/03	3.3431	1.1210	1.1023	4.4454	3.3431	1.7409	0.6386	0.2141	19%	81%
2012-H006-6	/01	3.3923	1.1375	1.0823	4.4746	3.3923	1.7932	0.7109	0.2384	21%	79%
2012-H006-6	/02	3.3747	1.1316	1.0723	4.447	3.3747	1.7777	0.7054	0.2365	21%	79%
2012-H006-6	/03	3.3829	1.1343	1.0317	4.4146	3.3829	1.7393	0.7076	0.2373	21%	79%
2012-H006-7	/01	3.374	1.1313	1.1022	4.4762	3.374	1.8584	0.7562	0.2536	22%	78%
2012-H006-7	/02	3.4242	1.1482	1.1368	4.561	3.4242	1.9109	0.7741	0.2596	23%	77%
2012-H006-7	/03	3.3704	1.1301	1.103	4.4734	3.3704	1.8622	0.7592	0.2546	23%	77%
2012-H006-8	/01	3.4263	1.1489	1.067	4.4933	3.4263	1.8726	0.8056	0.2701	24%	76%
2012-H006-8	/02	3.4201	1.1468	1.0478	4.4679	3.4201	1.8425	0.7947	0.2665	23%	77%
2012-H006-8	/03	3.443	1.1545	1.054	4.497	3.443	1.8552	0.8012	0.2687	23%	77%
2012-H006-9	/01	3.466	1.1622	1.1319	4.5979	3.466	1.9842	0.8523	0.2858	25%	75%
2012-H006-9	/02	3.4642	1.1616	1.1366	4.6008	3.4642	1.9868	0.8502	0.2851	25%	75%
2012-H006-9	/03	3.4743	1.1650	1.1278	4.6021	3.4743	1.9741	0.8463	0.2838	24%	76%
2012-H006-10	/01	3.4771	1.1659	1.0748	4.5519	3.4771	1.9389	0.8641	0.2897	25%	75%
2012-H006-10	/02	3.4492	1.1566	1.0882	4.5374	3.4492	1.9442	0.856	0.2870	25%	75%
2012-H006-10	/03	3.4764	1.1657	1.0935	4.5699	3.4764	1.9557	0.8622	0.2891	25%	75%
2012-H006-11	/01	3.5065	1.1758	1.0604	4.5669	3.5065	1.9725	0.9121	0.3058	26%	74%
2012-H006-11	/02	3.4798	1.1668	1.1049	4.5847	3.4798	2.0113	0.9064	0.3039	26%	74%
2012-H006-11	/03	3.4857	1.1688	1.0658	4.5515	3.4857	1.9766	0.9108	0.3054	26%	74%
2012-H006-12	/01	3.5004	1.1737	1.0885	4.5889	3.5004	2.041	0.9525	0.3194	27%	73%
2012-H006-12	/02	3.5417	1.1876	1.1065	4.6482	3.5417	2.0628	0.9563	0.3207	27%	73%
2012-H006-12	/03	3.5338	1.1849	1.1031	4.6369	3.5338	2.0603	0.9572	0.3210	27%	73%

Table F.30.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H006, sections 13-25

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H006-13	/01	3.519	1.1800	1.0828	4.6018	3.519	1.9884	0.9056	0.3037	26%	74%
2012-H006-13	/02	3.4834	1.1680	1.0922	4.5756	3.4834	1.9714	0.8792	0.2948	25%	75%
2012-H006-13	/03	3.4721	1.1642	1.1038	4.5759	3.4721	1.9768	0.873	0.2927	25%	75%
2012-H006-14	/01	3.5349	1.1853	1.0679	4.6028	3.5349	1.9851	0.9172	0.3075	26%	74%
2012-H006-14	/02	3.5499	1.1903	1.1099	4.6598	3.5499	1.9959	0.886	0.2971	25%	75%
2012-H006-14	/03	3.5264	1.1824	1.133	4.6594	3.5264	2.0346	0.9016	0.3023	26%	74%
2012-H006-15	/01	3.5523	1.1911	1.117	4.6693	3.5523	2.0994	0.9824	0.3294	28%	72%
2012-H006-15	/02	3.537	1.1860	1.14	4.677	3.537	2.1168	0.9768	0.3275	28%	72%
2012-H006-15	/03	3.5456	1.1889	1.0912	4.6368	3.5456	2.0645	0.9733	0.3264	27%	73%
2012-H006-16	/01	3.5406	1.1872	1.0653	4.6059	3.5406	2.0278	0.9625	0.3227	27%	73%
2012-H006-16	/02	3.5255	1.1821	1.0567	4.5822	3.5255	1.9983	0.9416	0.3157	27%	73%
2012-H006-16	/03	3.511	1.1773	1.1032	4.6142	3.511	2.0439	0.9407	0.3154	27%	73%
2012-H006-17	/01	3.5399	1.1870	1.0834	4.6233	3.5399	2.0396	0.9562	0.3206	27%	73%
2012-H006-17	/02	3.51	1.1769	1.0744	4.5844	3.51	2.0144	0.94	0.3152	27%	73%
2012-H006-17	/03	3.5307	1.1839	1.116	4.6467	3.5307	2.0611	0.9451	0.3169	27%	73%
2012-H006-18	/01	3.5494	1.1902	1.0598	4.6092	3.5494	2.0173	0.9575	0.3211	27%	73%
2012-H006-18	/02	3.5397	1.1869	1.126	4.6657	3.5397	2.0598	0.9338	0.3131	26%	74%
2012-H006-18	/03	3.5079	1.1762	1.1472	4.6551	3.5079	2.0659	0.9187	0.3081	26%	74%
2012-H006-19	/01	3.5254	1.1821	1.1033	4.6287	3.5254	2.0489	0.9456	0.3171	27%	73%
2012-H006-19	/02	3.5368	1.1859	1.1387	4.6755	3.5368	2.0743	0.9356	0.3137	26%	74%
2012-H006-19	/03	3.5052	1.1753	1.1005	4.6057	3.5052	2.0247	0.9242	0.3099	26%	74%
2012-H006-20	/01	3.5249	1.1819	1.1257	4.6506	3.5249	2.0827	0.957	0.3209	27%	73%
2012-H006-20	/02	3.5234	1.1814	1.1238	4.6472	3.5234	2.0674	0.9436	0.3164	27%	73%
2012-H006-20	/03	3.5271	1.1827	1.1215	4.6486	3.5271	2.0557	0.9342	0.3132	26%	74%
2012-H006-21	/01	3.5665	1.1959	1.1024	4.6689	3.5665	2.0968	0.9944	0.3334	28%	72%
2012-H006-21	/02	3.5393	1.1868	1.1127	4.652	3.5393	2.0878	0.9751	0.3270	28%	72%
2012-H006-21	/03	3.567	1.1961	1.0466	4.6136	3.567	2.0272	0.9806	0.3288	27%	73%
2012-H006-22	/01	3.568	1.1964	1.0596	4.6276	3.568	2.0507	0.9911	0.3323	28%	72%
2012-H006-22	/02	3.5381	1.1864	1.1088	4.6469	3.5381	2.0909	0.9821	0.3293	28%	72%
2012-H006-22	/03	3.5403	1.1871	1.1238	4.6641	3.5403	2.1045	0.9807	0.3288	28%	72%
2012-H006-23	/01	3.5509	1.1907	1.1097	4.6606	3.5509	2.0936	0.9839	0.3299	28%	72%
2012-H006-23	/02	3.5322	1.1844	1.1448	4.677	3.5322	2.1204	0.9756	0.3271	28%	72%
2012-H006-23	/03	3.4942	1.1716	1.0698	4.564	3.4942	2.0185	0.9487	0.3181	27%	73%
2012-H006-24	/01	3.5459	1.1890	1.0829	4.6288	3.5459	2.0537	0.9708	0.3255	27%	73%
2012-H006-24	/02	3.5386	1.1865	1.1101	4.6487	3.5386	2.0726	0.9625	0.3227	27%	73%
2012-H006-24	/03	3.492	1.1709	1.0537	4.5457	3.492	1.9987	0.945	0.3169	27%	73%
2012-H006-25	/01	3.5345	1.1852	1.1429	4.6774	3.5345	2.1031	0.9602	0.3220	27%	73%
2012-H006-25	/02	3.526	1.1823	1.0604	4.5864	3.526	2.0141	0.9537	0.3198	27%	73%
2012-H006-25	/03	3.5259	1.1823	1.1357	4.6616	3.5259	2.0878	0.9521	0.3193	27%	73%

Table F.31.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core H12, sections 1-12

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H12-1	/01	3.0977	1.0294	1.0961	4.1938	3.0977	1.3968	0.3007	0.0999	10%	90%
2012-H12-1	/02	3.2115	1.0672	1.1168	4.3283	3.2115	1.4518	0.335	0.1113	10%	90%
2012-H12-1	/03	3.1822	1.0575	1.0857	4.2679	3.1822	1.3962	0.3105	0.1032	10%	90%
2012-H12-2	/01	3.2854	1.0918	1.0951	4.3805	3.2854	1.5589	0.4638	0.1541	14%	86%
2012-H12-2	/02	3.2721	1.0874	1.0859	4.358	3.2721	1.5501	0.4642	0.1543	14%	86%
2012-H12-2	/03	3.3082	1.0994	1.1207	4.4289	3.3082	1.5964	0.4757	0.1581	14%	86%
2012-H12-3	/01	3.2964	1.0954	1.1338	4.4302	3.2964	1.6689	0.5351	0.1778	16%	84%
2012-H12-3	/02	3.3471	1.1123	1.1087	4.4558	3.3471	1.6471	0.5384	0.1789	16%	84%
2012-H12-3	/03	3.2966	1.0955	1.0538	4.3504	3.2966	1.5872	0.5334	0.1773	16%	84%
2012-H12-4	/01	3.2766	1.0889	1.1102	4.3868	3.2766	1.6759	0.5657	0.1880	17%	83%
2012-H12-4	/02	3.3267	1.1055	1.111	4.4377	3.3267	1.677	0.566	0.1881	17%	83%
2012-H12-4	/03	3.2988	1.0962	1.0966	4.3954	3.2988	1.6769	0.5803	0.1928	18%	82%
2012-H12-5	/01	3.3208	1.1036	1.1024	4.4232	3.3208	1.7486	0.6462	0.2147	19%	81%
2012-H12-5	/02	3.3138	1.1012	1.1237	4.4375	3.3138	1.7649	0.6412	0.2131	19%	81%
2012-H12-5	/03	3.3541	1.1146	1.0686	4.4227	3.3541	1.723	0.6544	0.2175	20%	80%
2012-H12-6	/01	3.36	1.1166	1.0908	4.4508	3.36	1.785	0.6942	0.2307	21%	79%
2012-H12-6	/02	3.3137	1.1012	1.1269	4.4406	3.3137	1.8114	0.6845	0.2275	21%	79%
2012-H12-6	/03	3.3626	1.1174	1.1112	4.4738	3.3626	1.811	0.6998	0.2326	21%	79%
2012-H12-7	/01	3.3811	1.1236	1.1177	4.4988	3.3811	1.8505	0.7328	0.2435	22%	78%
2012-H12-7	/02	3.3737	1.1211	1.0586	4.4323	3.3737	1.789	0.7304	0.2427	22%	78%
2012-H12-7	/03	3.3672	1.1190	1.0846	4.4518	3.3672	1.8149	0.7303	0.2427	22%	78%
2012-H12-8	/01	3.3774	1.1224	1.0888	4.4662	3.3774	1.816	0.7272	0.2417	22%	78%
2012-H12-8	/02	3.4041	1.1312	1.0866	4.4907	3.4041	1.8238	0.7372	0.2450	22%	78%
2012-H12-8	/03	3.3719	1.1205	1.1019	4.4738	3.3719	1.8308	0.7289	0.2422	22%	78%
2012-H12-9	/01	3.4318	1.1404	1.1377	4.5695	3.4318	1.9185	0.7808	0.2595	23%	77%
2012-H12-9	/02	3.3951	1.1282	1.1241	4.5192	3.3951	1.8847	0.7606	0.2528	22%	78%
2012-H12-9	/03	3.3966	1.1287	1.0535	4.4501	3.3966	1.7969	0.7434	0.2470	22%	78%
2012-H12-10	/01	3.3906	1.1267	1.0938	4.4844	3.3906	1.8343	0.7405	0.2461	22%	78%
2012-H12-10	/02	3.3956	1.1284	1.1098	4.5054	3.3956	1.8619	0.7521	0.2499	22%	78%
2012-H12-10	/03	3.4094	1.1330	1.0839	4.4933	3.4094	1.844	0.7601	0.2526	22%	78%
2012-H12-11	/01	3.4109	1.1335	1.0842	4.4951	3.4109	1.8579	0.7737	0.2571	23%	77%
2012-H12-11	/02	3.3926	1.1274	1.1213	4.5139	3.3926	1.8788	0.7575	0.2517	22%	78%
2012-H12-11	/03	3.3981	1.1292	1.0879	4.486	3.3981	1.8496	0.7617	0.2531	22%	78%
2012-H12-12	/01	3.3673	1.1190	1.1073	4.4746	3.3673	1.8576	0.7503	0.2493	22%	78%
2012-H12-12	/02	3.3804	1.1234	1.0905	4.4709	3.3804	1.846	0.7555	0.2511	22%	78%
2012-H12-12	/03	3.4074	1.1323	1.1018	4.5092	3.4074	1.8651	0.7633	0.2537	22%	78%

Table F.32.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H12, sections 13-25

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H12-13	/01	3.4146	1.1347	1.0541	4.4687	3.4146	1.8285	0.7744	0.2573	23%	77%
2012-H12-13	/02	3.4147	1.1348	1.1468	4.5615	3.4147	1.9126	0.7658	0.2545	22%	78%
2012-H12-13	/03	3.4017	1.1304	1.1229	4.5246	3.4017	1.8855	0.7626	0.2534	22%	78%
2012-H12-14	/01	3.4573	1.1489	1.1086	4.5659	3.4573	1.8704	0.7618	0.2532	22%	78%
2012-H12-14	/02	3.4249	1.1381	1.086	4.5109	3.4249	1.8386	0.7526	0.2501	22%	78%
2012-H12-14	/03	3.4069	1.1322	1.1073	4.5142	3.4069	1.8539	0.7466	0.2481	22%	78%
2012-H12-15	/01	3.3731	1.1209	1.0993	4.4724	3.3731	1.853	0.7537	0.2505	22%	78%
2012-H12-15	/02	3.3161	1.1020	1.1184	4.4345	3.3161	1.8582	0.7398	0.2458	22%	78%
2012-H12-15	/03	3.41	1.1332	1.0853	4.4953	3.41	1.8419	0.7566	0.2514	22%	78%
2012-H12-16	/01	3.4373	1.1423	1.1115	4.5488	3.4373	1.955	0.8435	0.2803	25%	75%
2012-H12-16	/02	3.4593	1.1496	1.0981	4.5574	3.4593	1.9529	0.8548	0.2841	25%	75%
2012-H12-16	/03	3.4472	1.1456	1.1312	4.5784	3.4472	1.9745	0.8433	0.2802	24%	76%
2012-H12-17	/01	3.5013	1.1635	1.1004	4.6017	3.5013	1.988	0.8876	0.2950	25%	75%
2012-H12-17	/02	3.4688	1.1527	1.083	4.5518	3.4688	1.9551	0.8721	0.2898	25%	75%
2012-H12-17	/03	3.4749	1.1548	1.135	4.6099	3.4749	2.0077	0.8727	0.2900	25%	75%
2012-H12-18	/01	3.4982	1.1625	1.1319	4.6301	3.4982	2.012	0.8801	0.2925	25%	75%
2012-H12-18	/02	3.4462	1.1452	1.0865	4.5327	3.4462	1.9425	0.856	0.2845	25%	75%
2012-H12-18	/03	3.4653	1.1516	1.1272	4.5925	3.4653	1.9926	0.8654	0.2876	25%	75%
2012-H12-19	/01	3.4746	1.1547	1.1113	4.5859	3.4746	1.9855	0.8742	0.2905	25%	75%
2012-H12-19	/02	3.4625	1.1506	1.1035	4.566	3.4625	1.9706	0.8671	0.2882	25%	75%
2012-H12-19	/03	3.4723	1.1539	1.0869	4.5592	3.4723	1.9563	0.8694	0.2889	25%	75%
2012-H12-20	/01	3.4404	1.1433	1.1039	4.5443	3.4404	1.972	0.8681	0.2885	25%	75%
2012-H12-20	/02	3.4724	1.1539	1.14	4.6124	3.4724	2.0136	0.8736	0.2903	25%	75%
2012-H12-20	/03	3.4678	1.1524	1.1346	4.6024	3.4678	2.0016	0.867	0.2881	25%	75%
2012-H12-21	/01	3.4431	1.1442	1.0603	4.5034	3.4431	1.9266	0.8663	0.2879	25%	75%
2012-H12-21	/02	3.4869	1.1587	1.0575	4.5444	3.4869	1.9268	0.8693	0.2889	25%	75%
2012-H12-21	/03	3.4473	1.1456	1.0891	4.5364	3.4473	1.9457	0.8566	0.2847	25%	75%
2012-H12-22	/01	3.4142	1.1346	1.1159	4.5301	3.4142	1.9625	0.8466	0.2813	25%	75%
2012-H12-22	/02	3.4369	1.1421	1.1019	4.5388	3.4369	1.9441	0.8422	0.2799	25%	75%
2012-H12-22	/03	3.4563	1.1486	1.074	4.5303	3.4563	1.9185	0.8445	0.2806	24%	76%
2012-H12-23	/01	3.4321	1.1405	1.0815	4.5136	3.4321	1.9352	0.8537	0.2837	25%	75%
2012-H12-23	/02	3.4558	1.1484	1.1104	4.5662	3.4558	1.9718	0.8614	0.2863	25%	75%
2012-H12-23	/03	3.5101	1.1665	1.0821	4.5922	3.5101	1.9574	0.8753	0.2909	25%	75%
2012-H12-24	/01	3.4512	1.1469	1.0982	4.5494	3.4512	1.9771	0.8789	0.2921	25%	75%
2012-H12-24	/02	3.4922	1.1605	1.0945	4.5867	3.4922	1.9787	0.8842	0.2938	25%	75%
2012-H12-24	/03	3.4919	1.1604	1.1067	4.5986	3.4919	1.9892	0.8825	0.2933	25%	75%
2012-H12-25	/01	3.468	1.1525	1.1005	4.5685	3.468	2.0183	0.9178	0.3050	26%	74%
2012-H12-25	/02	3.4612	1.1502	1.1285	4.5897	3.4612	1.9904	0.8619	0.2864	25%	75%
2012-H12-25	/03	3.4621	1.1505	1.1397	4.6018	3.4621	1.9947	0.855	0.2841	25%	75%

Table F.33.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core H32, sections 1-12

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H32-1	/01	3.0759	1.0283	1.1201	4.196	3.0759	1.4354	0.3153	0.1054	10%	90%
2012-H32-1	/02	3.101	1.0367	1.1028	4.2038	3.101	1.4122	0.3094	0.1034	10%	90%
2012-H32-1	/03	3.1329	1.0474	1.1224	4.2553	3.1329	1.4334	0.311	0.1040	10%	90%
2012-H32-2	/01	3.2053	1.0716	1.0907	4.296	3.2053	1.5019	0.4112	0.1375	13%	87%
2012-H32-2	/02	3.1915	1.0670	1.1123	4.3038	3.1915	1.5201	0.4078	0.1363	13%	87%
2012-H32-2	/03	3.1813	1.0635	1.1154	4.2967	3.1813	1.5289	0.4135	0.1382	13%	87%
2012-H32-3	/01	3.203	1.0708	1.0997	4.3027	3.203	1.5735	0.4738	0.1584	15%	85%
2012-H32-3	/02	3.2553	1.0883	1.0833	4.3386	3.2553	1.5679	0.4846	0.1620	15%	85%
2012-H32-3	/03	3.2291	1.0795	1.0667	4.2958	3.2291	1.5457	0.479	0.1601	15%	85%
2012-H32-4	/01	3.2378	1.0824	1.0819	4.3197	3.2378	1.6322	0.5503	0.1840	17%	83%
2012-H32-4	/02	3.2587	1.0894	1.1058	4.3645	3.2587	1.6577	0.5519	0.1845	17%	83%
2012-H32-4	/03	3.2547	1.0881	1.0822	4.3369	3.2547	1.6354	0.5532	0.1849	17%	83%
2012-H32-5	/01	3.2533	1.0876	1.0968	4.3501	3.2533	1.6899	0.5931	0.1983	18%	82%
2012-H32-5	/02	3.2548	1.0881	1.1115	4.3663	3.2548	1.7083	0.5968	0.1995	18%	82%
2012-H32-5	/03	3.29	1.0999	1.0953	4.3853	3.29	1.6964	0.6011	0.2010	18%	82%
2012-H32-6	/01	3.2967	1.1021	1.0926	4.3893	3.2967	1.7285	0.6359	0.2126	19%	81%
2012-H32-6	/02	3.297	1.1022	1.1065	4.4035	3.297	1.7399	0.6334	0.2118	19%	81%
2012-H32-6	/03	3.296	1.1019	1.1024	4.3984	3.296	1.7334	0.631	0.2110	19%	81%
2012-H32-7	/01	3.3047	1.1048	1.0999	4.4046	3.3047	1.7619	0.662	0.2213	20%	80%
2012-H32-7	/02	3.3222	1.1106	1.0881	4.4103	3.3222	1.7527	0.6646	0.2222	20%	80%
2012-H32-7	/03	3.3234	1.1111	1.0959	4.4193	3.3234	1.7636	0.6677	0.2232	20%	80%
2012-H32-8	/01	3.3328	1.1142	1.0932	4.426	3.3328	1.7872	0.694	0.2320	21%	79%
2012-H32-8	/02	3.3178	1.1092	1.0889	4.4067	3.3178	1.7764	0.6875	0.2298	21%	79%
2012-H32-8	/03	3.2917	1.1005	1.1143	4.406	3.2917	1.7949	0.6806	0.2275	21%	79%
2012-H32-9	/01	3.2966	1.1021	1.0909	4.3875	3.2966	1.7761	0.6852	0.2291	21%	79%
2012-H32-9	/02	3.3135	1.1077	1.1044	4.4179	3.3135	1.7911	0.6867	0.2296	21%	79%
2012-H32-9	/03	3.3193	1.1097	1.1134	4.4327	3.3193	1.8007	0.6873	0.2298	21%	79%
2012-H32-10	/01	3.3389	1.1162	1.0932	4.4321	3.3389	1.8038	0.7106	0.2376	21%	79%
2012-H32-10	/02	3.3501	1.1200	1.0559	4.406	3.3501	1.7679	0.712	0.2380	21%	79%
2012-H32-10	/03	3.36	1.1233	1.1243	4.4843	3.36	1.8381	0.7138	0.2386	21%	79%
2012-H32-11	/01	3.3623	1.1241	1.0963	4.4586	3.3623	1.8039	0.7076	0.2366	21%	79%
2012-H32-11	/02	3.3078	1.1058	1.0923	4.4001	3.3078	1.7875	0.6952	0.2324	21%	79%
2012-H32-11	/03	3.3147	1.1081	1.0909	4.4056	3.3147	1.7891	0.6982	0.2334	21%	79%
2012-H32-12	/01	3.2848	1.0981	1.0968	4.3816	3.2848	1.7928	0.696	0.2327	21%	79%
2012-H32-12	/02	3.3585	1.1228	1.0716	4.4301	3.3585	1.7799	0.7083	0.2368	21%	79%
2012-H32-12	/03	3.3761	1.1287	1.0836	4.4597	3.3761	1.7959	0.7123	0.2381	21%	79%

Table F.34.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core S011, sections 13-25

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H32-13	/01	3.3348	1.1149	1.0702	4.405	3.3348	1.7835	0.7133	0.2385	21%	79%
2012-H32-13	/02	3.3673	1.1257	1.092	4.4593	3.3673	1.8085	0.7165	0.2395	21%	79%
2012-H32-13	/03	3.3626	1.1242	1.0904	4.453	3.3626	1.8056	0.7152	0.2391	21%	79%
2012-H32-14	/01	3.3716	1.1272	1.1102	4.4818	3.3716	1.8444	0.7342	0.2455	22%	78%
2012-H32-14	/02	3.3115	1.1071	1.0981	4.4096	3.3115	1.8191	0.721	0.2410	22%	78%
2012-H32-14	/03	3.349	1.1196	1.1152	4.4642	3.349	1.8389	0.7237	0.2419	22%	78%
2012-H32-15	/01	3.3601	1.1233	1.093	4.4531	3.3601	1.8296	0.7366	0.2463	22%	78%
2012-H32-15	/02	3.3709	1.1269	1.0589	4.4298	3.3709	1.7971	0.7382	0.2468	22%	78%
2012-H32-15	/03	3.3758	1.1286	1.1134	4.4892	3.3758	1.8522	0.7388	0.2470	22%	78%
2012-H32-16	/01	3.364	1.1246	1.0801	4.4441	3.364	1.8219	0.7418	0.2480	22%	78%
2012-H32-16	/02	3.3851	1.1317	1.1053	4.4904	3.3851	1.8416	0.7363	0.2462	22%	78%
2012-H32-16	/03	3.3819	1.1306	1.0896	4.4715	3.3819	1.8167	0.7271	0.2431	21%	79%
2012-H32-17	/01	3.3522	1.1207	1.075	4.4272	3.3522	1.8118	0.7368	0.2463	22%	78%
2012-H32-17	/02	3.3312	1.1137	1.0849	4.4161	3.3312	1.814	0.7291	0.2437	22%	78%
2012-H32-17	/03	3.3544	1.1214	1.0784	4.4328	3.3544	1.8175	0.7391	0.2471	22%	78%
2012-H32-18	/01	3.3543	1.1214	1.1074	4.4617	3.3543	1.8216	0.7142	0.2388	21%	79%
2012-H32-18	/02	3.3665	1.1255	1.0899	4.4564	3.3665	1.8166	0.7267	0.2429	22%	78%
2012-H32-18	/03	3.3487	1.1195	1.0676	4.4163	3.3487	1.7903	0.7227	0.2416	22%	78%
2012-H32-19	/01	3.3259	1.1119	1.0943	4.4202	3.3259	1.8331	0.7388	0.2470	22%	78%
2012-H32-19	/02	3.3841	1.1313	1.1053	4.4894	3.3841	1.8384	0.7331	0.2451	22%	78%
2012-H32-19	/03	3.3347	1.1148	1.1129	4.4476	3.3347	1.8189	0.706	0.2360	21%	79%
2012-H32-20	/01	3.3676	1.1258	1.1124	4.48	3.3676	1.8644	0.752	0.2514	22%	78%
2012-H32-20	/02	3.2668	1.0921	1.0823	4.3491	3.2668	1.8178	0.7355	0.2459	23%	77%
2012-H32-20	/03	3.3357	1.1152	1.0706	4.4063	3.3357	1.8144	0.7438	0.2487	22%	78%
2012-H32-21	/01	3.3803	1.1301	1.073	4.4533	3.3803	1.8439	0.7709	0.2577	23%	77%
2012-H32-21	/02	3.3502	1.1200	1.0817	4.4319	3.3502	1.8375	0.7558	0.2527	23%	77%
2012-H32-21	/03	3.3571	1.1223	1.0835	4.4406	3.3571	1.8397	0.7562	0.2528	23%	77%
2012-H32-22	/01	3.4143	1.1414	1.0923	4.5066	3.4143	1.8639	0.7716	0.2580	23%	77%
2012-H32-22	/02	3.3955	1.1352	1.0977	4.4932	3.3955	1.8794	0.7817	0.2613	23%	77%
2012-H32-22	/03	3.4253	1.1451	1.0926	4.5179	3.4253	1.8742	0.7816	0.2613	23%	77%
2012-H32-23	/01	3.3699	1.1266	1.0753	4.4452	3.3699	1.8601	0.7848	0.2624	23%	77%
2012-H32-23	/02	3.407	1.1390	1.0861	4.4931	3.407	1.881	0.7949	0.2657	23%	77%
2012-H32-23	/03	3.3911	1.1337	1.105	4.4961	3.3911	1.8999	0.7949	0.2657	23%	77%
2012-H32-24	/01	3.4034	1.1378	1.1103	4.5137	3.4034	1.9099	0.7996	0.2673	23%	77%
2012-H32-24	/02	3.4112	1.1404	1.0958	4.507	3.4112	1.8936	0.7978	0.2667	23%	77%
2012-H32-24	/03	3.3673	1.1257	1.1005	4.4678	3.3673	1.88013	0.77963	0.2606	23%	77%
2012-H32-25	/01	3.3986	1.1362	1.1016	4.5002	3.3986	1.9142	0.8126	0.2717	24%	76%
2012-H32-25	/02	3.4232	1.1444	1.1104	4.5336	3.4232	1.9242	0.8138	0.2721	24%	76%
2012-H32-25	/03	3.4252	1.1451	1.0968	4.522	3.4252	1.9074	0.8106	0.2710	24%	76%

Table F.35.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core H37, sections 1-12

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H37-1	/01	3.1395	1.0469	1.0899	4.2294	3.1395	1.5126	0.4227	0.1410	13%	87%
2012-H37-1	/02	3.1768	1.0593	1.0937	4.2705	3.1768	1.5279	0.4342	0.1448	14%	86%
2012-H37-1	/03	3.197	1.0661	1.1078	4.3048	3.197	1.5586	0.4508	0.1503	14%	86%
2012-H37-2	/01	3.3709	1.1241	1.1076	4.4785	3.3709	1.8495	0.7419	0.2474	22%	78%
2012-H37-2	/02	3.3388	1.1134	1.0982	4.437	3.3388	1.8214	0.7232	0.2412	22%	78%
2012-H37-2	/03	3.3966	1.1326	1.1227	4.5193	3.3966	1.8993	0.7766	0.2590	23%	77%
2012-H37-3	/01	3.6996	1.2337	1.0705	4.7701	3.6996	2.387	1.3165	0.4390	36%	64%
2012-H37-3	/02	3.7535	1.2517	1.105	4.8585	3.7535	2.4571	1.3521	0.4509	36%	64%
2012-H37-3	/03	3.7413	1.2476	1.0887	4.83	3.7413	2.3894	1.3007	0.4337	35%	65%
2012-H37-4	/01	3.7922	1.2646	1.0979	4.8901	3.7922	2.4932	1.3953	0.4653	37%	63%
2012-H37-4	/02	3.8107	1.2707	1.1076	4.9183	3.8107	2.4977	1.3901	0.4635	36%	64%
2012-H37-4	/03	3.7642	1.2552	1.0915	4.8557	3.7642	2.4631	1.3716	0.4574	36%	64%
2012-H37-5	/01	3.7046	1.2354	1.0929	4.7975	3.7046	2.3489	1.256	0.4188	34%	66%
2012-H37-5	/02	3.7214	1.2410	1.0927	4.8141	3.7214	2.3529	1.2602	0.4202	34%	66%
2012-H37-5	/03	3.6901	1.2305	1.0756	4.7657	3.6901	2.3144	1.2388	0.4131	34%	66%
2012-H37-6	/01	3.6552	1.2189	1.1131	4.7683	3.6552	2.2609	1.1478	0.3828	31%	69%
2012-H37-6	/02	3.6402	1.2139	1.0974	4.7376	3.6402	2.2338	1.1364	0.3789	31%	69%
2012-H37-6	/03	3.6359	1.2124	1.116	4.7519	3.6359	2.2509	1.1349	0.3784	31%	69%
2012-H37-7	/01	3.5837	1.1950	1.102	4.6857	3.5837	2.1461	1.0441	0.3482	29%	71%
2012-H37-7	/02	3.5599	1.1871	1.0919	4.6518	3.5599	2.1239	1.032	0.3441	29%	71%
2012-H37-7	/03	3.6078	1.2031	1.1008	4.7086	3.6078	2.1479	1.0471	0.3492	29%	71%
2012-H37-8	/01	3.664	1.2218	1.0896	4.7536	3.664	2.285	1.1954	0.3986	33%	67%
2012-H37-8	/02	3.6493	1.2169	1.082	4.7313	3.6493	2.273	1.191	0.3972	33%	67%
2012-H37-8	/03	3.6628	1.2214	1.089	4.7518	3.6628	2.2738	1.1848	0.3951	32%	68%
2012-H37-9	/01	3.6665	1.2226	1.0876	4.7541	3.6665	2.368	1.2804	0.4270	35%	65%
2012-H37-9	/02	3.6922	1.2312	1.1054	4.7976	3.6922	2.3903	1.2849	0.4285	35%	65%
2012-H37-9	/03	3.7464	1.2493	1.0863	4.8327	3.7464	2.3858	1.2995	0.4333	35%	65%
2012-H37-10	/01	3.7726	1.2580	1.114	4.8866	3.7726	2.4518	1.3378	0.4461	35%	65%
2012-H37-10	/02	3.7674	1.2563	1.0842	4.8516	3.7674	2.4191	1.3349	0.4451	35%	65%
2012-H37-10	/03	3.735	1.2455	1.1155	4.8505	3.735	2.4306	1.3151	0.4385	35%	65%
2012-H37-11	/01	3.7291	1.2435	1.1104	4.8395	3.7291	2.4098	1.2994	0.4333	35%	65%
2012-H37-11	/02	3.7207	1.2407	1.0916	4.8123	3.7207	2.3847	1.2931	0.4312	35%	65%
2012-H37-11	/03	3.7242	1.2419	1.0897	4.8139	3.7242	2.3816	1.2919	0.4308	35%	65%
2012-H37-12	/01	3.6838	1.2284	1.0775	4.7613	3.6838	2.318	1.2405	0.4137	34%	66%
2012-H37-12	/02	3.6978	1.2331	1.0615	4.7593	3.6978	2.3006	1.2391	0.4132	34%	66%
2012-H37-12	/03	3.689	1.2301	1.0796	4.7686	3.689	2.3209	1.2413	0.4139	34%	66%

Table F.36.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H37, sections 13-24

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H37-13	/01	3.6409	1.2141	1.1093	4.7502	3.6409	2.2545	1.1452	0.3819	31%	69%
2012-H37-13	/02	3.6387	1.2134	1.0842	4.7229	3.6387	2.2389	1.1547	0.3851	32%	68%
2012-H37-13	/03	3.6701	1.2238	1.0918	4.7619	3.6701	2.2617	1.1699	0.3901	32%	68%
2012-H37-14	/01	3.6534	1.2183	1.1148	4.7682	3.6534	2.2808	1.166	0.3888	32%	68%
2012-H37-14	/02	3.6357	1.2124	1.0869	4.7226	3.6357	2.2359	1.149	0.3832	32%	68%
2012-H37-14	/03	3.6053	1.2022	1.1067	4.712	3.6053	2.235	1.1283	0.3762	31%	69%
2012-H37-15	/01	3.6361	1.2125	1.0758	4.7119	3.601	2.2092	1.1334	0.3779	30%	70%
2012-H37-15	/02	3.6359	1.2124	1.1078	4.7437	3.5922	2.2318	1.124	0.3748	30%	70%
2012-H37-15	/03	3.6665	1.2226	1.0786	4.7451	3.6577	2.2159	1.1373	0.3792	31%	69%
2012-H37-16	/01	3.6163	1.2059	1.0976	4.7139	3.6163	2.1875	1.0899	0.3634	30%	70%
2012-H37-16	/02	3.6211	1.2075	1.1056	4.7267	3.6211	2.1957	1.0901	0.3635	30%	70%
2012-H37-16	/03	3.6055	1.2023	1.0908	4.6963	3.6055	2.1674	1.0766	0.3590	30%	70%
2012-H37-17	/01	3.6085	1.2033	1.0846	4.6931	3.6085	2.1819	1.0973	0.3659	30%	70%
2012-H37-17	/02	3.6225	1.2080	1.1033	4.7258	3.6225	2.2121	1.1088	0.3697	31%	69%
2012-H37-17	/03	3.6129	1.2048	1.1051	4.718	3.6129	2.2079	1.1028	0.3677	31%	69%
2012-H37-18	/01	3.6453	1.2156	1.1039	4.7492	3.6453	2.2359	1.132	0.3775	31%	69%
2012-H37-18	/02	3.6526	1.2180	1.1059	4.7585	3.6526	2.2392	1.1333	0.3779	31%	69%
2012-H37-18	/03	3.6207	1.2074	1.1129	4.7336	3.6207	2.2319	1.119	0.3731	31%	69%
2012-H37-19	/01	3.60478	1.2021	1.10932	4.7141	3.60478	2.2379	1.12858	0.3763	31%	69%
2012-H37-19	/02	3.6444	1.2153	1.0905	4.7349	3.6444	2.2407	1.1502	0.3836	32%	68%
2012-H37-19	/03	3.5825	1.1946	1.0741	4.6566	3.5825	2.1999	1.1258	0.3754	31%	69%
2012-H37-20	/01	3.6818	1.2277	1.0708	4.7526	3.6818	2.2826	1.2118	0.4041	33%	67%
2012-H37-20	/02	3.6454	1.2156	1.0717	4.7171	3.6454	2.2679	1.1962	0.3989	33%	67%
2012-H37-20	/03	3.6658	1.2224	1.1074	4.7732	3.6658	2.3117	1.2043	0.4016	33%	67%
2012-H37-21	/01	3.723	1.2415	1.0861	4.8091	3.723	2.3811	1.295	0.4318	35%	65%
2012-H37-21	/02	3.7263	1.2426	1.0887	4.815	3.7263	2.3839	1.2952	0.4319	35%	65%
2012-H37-21	/03	3.7289	1.2435	1.0952	4.8241	3.7289	2.4047	1.3095	0.4367	35%	65%
2012-H37-22	/01	3.8145	1.2720	1.0571	4.8716	3.8145	2.4876	1.4305	0.4770	38%	62%
2012-H37-22	/02	3.8009	1.2675	1.0664	4.8673	3.8009	2.4996	1.4332	0.4779	38%	62%
2012-H37-22	/03	3.806	1.2692	1.0892	4.8952	3.806	2.5103	1.4211	0.4739	37%	63%
2012-H37-23	/01	3.908	1.3032	1.0919	4.9999	3.908	2.6702	1.5783	0.5263	40%	60%
2012-H37-23	/02	3.9212	1.3076	1.0782	4.9994	3.9212	2.667	1.5888	0.5298	41%	59%
2012-H37-23	/03	3.8977	1.2997	1.0917	4.9894	3.8977	2.6629	1.5712	0.5239	40%	60%
2012-H37-24	/01	3.9237	1.3084	1.0592	4.9829	3.9237	2.6464	1.5872	0.5293	40%	60%
2012-H37-24	/02	3.9289	1.3101	1.1073	5.0362	3.9289	2.6885	1.5812	0.5273	40%	60%
2012-H37-24	/03	3.8896	1.2970	1.0852	4.9748	3.8896	2.6458	1.5606	0.5204	40%	60%

Table F.37.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core H38, sections 1-12

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H38-1	/01	3.1708	1.0649	1.109	4.2798	3.1708	1.447	0.338	0.1135	11%	89%
2012-H38-1	/02	3.1225	1.0486	1.0848	4.2073	3.1225	1.4046	0.3198	0.1074	10%	90%
2012-H38-1	/03	3.1722	1.0653	1.1207	4.2929	3.1722	1.4569	0.3362	0.1129	11%	89%
2012-H38-2	/01	3.1794	1.0678	1.0754	4.2548	3.1794	1.5093	0.4339	0.1457	14%	86%
2012-H38-2	/02	3.2392	1.0878	1.1199	4.3591	3.2392	1.5719	0.452	0.1518	14%	86%
2012-H38-2	/03	3.2033	1.0758	1.0995	4.3028	3.2033	1.5447	0.4452	0.1495	14%	86%
2012-H38-3	/01	3.2341	1.0861	1.0796	4.3137	3.2341	1.5646	0.485	0.1629	15%	85%
2012-H38-3	/02	3.302	1.1089	1.0879	4.3899	3.302	1.5709	0.483	0.1622	15%	85%
2012-H38-3	/03	3.2545	1.0930	1.0938	4.3483	3.2545	1.5798	0.486	0.1632	15%	85%
2012-H38-4	/01	3.3436	1.1229	1.0928	4.4364	3.3436	1.7408	0.648	0.2176	19%	81%
2012-H38-4	/02	3.3115	1.1121	1.0884	4.3999	3.3115	1.7094	0.621	0.2086	19%	81%
2012-H38-4	/03	3.354	1.1264	1.0834	4.4374	3.354	1.7491	0.6657	0.2236	20%	80%
2012-H38-5	/01	3.4176	1.1478	1.0924	4.51	3.4176	1.9118	0.8194	0.2752	24%	76%
2012-H38-5	/02	3.4207	1.1488	1.112	4.5327	3.4207	1.9274	0.8154	0.2738	24%	76%
2012-H38-5	/03	3.4264	1.1507	1.1127	4.5391	3.4264	1.9298	0.8171	0.2744	24%	76%
2012-H38-6	/01	3.5771	1.2013	1.0908	4.6679	3.5771	2.1766	1.0858	0.3647	30%	70%
2012-H38-6	/02	3.5907	1.2059	1.0992	4.6899	3.5907	2.1959	1.0967	0.3683	31%	69%
2012-H38-6	/03	3.6259	1.2177	1.1081	4.734	3.6259	2.2253	1.1172	0.3752	31%	69%
2012-H38-7	/01	3.6721	1.2332	1.1075	4.7796	3.6721	2.3797	1.2722	0.4272	35%	65%
2012-H38-7	/02	3.6984	1.2421	1.1164	4.8148	3.6984	2.3899	1.2735	0.4277	34%	66%
2012-H38-7	/03	3.7585	1.2622	1.0915	4.85	3.7585	2.3924	1.3009	0.4369	35%	65%
2012-H38-8	/01	3.7924	1.2736	1.1065	4.8989	3.7924	2.5409	1.4344	0.4817	38%	62%
2012-H38-8	/02	3.8082	1.2789	1.0978	4.906	3.8082	2.5337	1.4359	0.4822	38%	62%
2012-H38-8	/03	3.8027	1.2771	1.0787	4.8814	3.8027	2.5197	1.441	0.4839	38%	62%
2012-H38-9	/01	3.8206	1.2831	1.0779	4.8985	3.8206	2.5526	1.4747	0.4953	39%	61%
2012-H38-9	/02	3.7914	1.2733	1.0756	4.867	3.7914	2.5365	1.4609	0.4906	39%	61%
2012-H38-9	/03	3.7924	1.2736	1.0957	4.8881	3.7924	2.5592	1.4635	0.4915	39%	61%
2012-H38-10	/01	3.7937	1.2741	1.113	4.9067	3.7937	2.6099	1.4969	0.5027	39%	61%
2012-H38-10	/02	3.8008	1.2764	1.093	4.8938	3.8008	2.5982	1.5052	0.5055	40%	60%
2012-H38-10	/03	3.816	1.2815	1.0805	4.8965	3.816	2.592	1.5115	0.5076	40%	60%
2012-H38-11	/01	3.814	1.2809	1.0979	4.9119	3.814	2.5786	1.4807	0.4973	39%	61%
2012-H38-11	/02	3.8043	1.2776	1.0795	4.8838	3.8043	2.5559	1.4764	0.4958	39%	61%
2012-H38-11	/03	3.7977	1.2754	1.0749	4.8726	3.7977	2.5467	1.4718	0.4943	39%	61%
2012-H38-12	/01	3.7989	1.2758	1.1009	4.8998	3.7989	2.5772	1.4763	0.4958	39%	61%
2012-H38-12	/02	3.8205	1.2831	1.0987	4.9192	3.8205	2.5798	1.4811	0.4974	39%	61%
2012-H38-12	/03	3.8044	1.2777	1.0779	4.8823	3.8044	2.5556	1.4777	0.4963	39%	61%

Table F 38.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core S016, sections 13-25

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H38-13	/01	3.855	1.2946	1.1057	4.9607	3.855	2.6429	1.5372	0.5162	40%	60%
2012-H38-13	/02	3.8379	1.2889	1.0983	4.9362	3.8379	2.6282	1.5299	0.5138	40%	60%
2012-H38-13	/03	3.8234	1.2840	1.0818	4.9052	3.8234	2.6074	1.5256	0.5124	40%	60%
2012-H38-14	/01	3.8619	1.2970	1.0917	4.9536	3.8619	2.6975	1.6058	0.5393	42%	58%
2012-H38-14	/02	3.8476	1.2922	1.0938	4.9414	3.8476	2.6976	1.6038	0.5386	42%	58%
2012-H38-14	/03	3.8983	1.3092	1.1021	5.0004	3.8983	2.7277	1.6256	0.5459	42%	58%
2012-H38-15	/01	4.0489	1.3598	1.1147	5.1636	4.0489	2.9235	1.8088	0.6075	45%	55%
2012-H38-15	/02	4.0405	1.3569	1.0856	5.1261	4.0405	2.8869	1.8013	0.6049	45%	55%
2012-H38-15	/03	4.0424	1.3576	1.0926	5.135	4.0424	2.8969	1.8043	0.6059	45%	55%
2012-H38-16	/01	4.0231	1.3511	1.0978	5.1209	4.0231	2.8685	1.7707	0.5947	44%	56%
2012-H38-16	/02	4.0245	1.3516	1.0875	5.112	4.0245	2.8564	1.7689	0.5941	44%	56%
2012-H38-16	/03	4.0125	1.3475	1.0905	5.103	4.0125	2.8545	1.764	0.5924	44%	56%
2012-H38-17	/01	3.9978	1.3426	1.0929	5.0907	3.9978	2.8828	1.7899	0.6011	45%	55%
2012-H38-17	/02	4.0404	1.3569	1.1333	5.1737	4.0404	2.9599	1.8266	0.6134	45%	55%
2012-H38-17	/03	4.0351	1.3551	1.0778	5.1129	4.0351	2.8931	1.8153	0.6096	45%	55%
2012-H38-18	/01	3.9678	1.3325	1.1057	5.0735	3.9678	2.7839	1.6782	0.5636	42%	58%
2012-H38-18	/02	3.9245	1.3180	1.1021	5.0266	3.9245	2.7584	1.6563	0.5562	42%	58%
2012-H38-18	/03	3.9836	1.3378	1.0889	5.0725	3.9836	2.7661	1.6772	0.5633	42%	58%
2012-H38-19	/01	3.9064	1.3119	1.1015	5.0079	3.9064	2.752	1.6505	0.5543	42%	58%
2012-H38-19	/02	3.9482	1.3259	1.1069	5.0551	3.9482	2.7816	1.6747	0.5624	42%	58%
2012-H38-19	/03	3.9645	1.3314	1.1098	5.0743	3.9645	2.7849	1.6751	0.5626	42%	58%
2012-H38-20	/01	3.9172	1.3155	1.0944	5.0116	3.9172	2.6759	1.5815	0.5311	40%	60%
2012-H38-20	/02	3.8686	1.2992	1.1108	4.9794	3.8686	2.6594	1.5486	0.5201	40%	60%
2012-H38-20	/03	3.9146	1.3147	1.1019	5.0165	3.9146	2.6659	1.564	0.5252	40%	60%
2012-H38-21	/01	3.8696	1.2995	1.09	4.9596	3.8696	2.6163	1.5263	0.5126	39%	61%
2012-H38-21	/02	3.8361	1.2883	1.12	4.9561	3.8361	2.6399	1.5199	0.5104	40%	60%
2012-H38-21	/03	3.8777	1.3023	1.0954	4.9731	3.8777	2.6392	1.5438	0.5185	40%	60%
2012-H38-22	/01	3.8567	1.2952	1.0858	4.9425	3.8567	2.5969	1.5111	0.5075	39%	61%
2012-H38-22	/02	3.8493	1.2927	1.1244	4.9737	3.8493	2.632	1.5076	0.5063	39%	61%
2012-H38-22	/03	3.862	1.2970	1.0816	4.9436	3.862	2.587	1.5054	0.5056	39%	61%
2012-H38-23	/01	3.8168	1.2818	1.0904	4.9072	3.8168	2.5385	1.4481	0.4863	38%	62%
2012-H38-23	/02	3.8096	1.2794	1.0905	4.9001	3.8096	2.5299	1.4394	0.4834	38%	62%
2012-H38-23	/03	3.80555	1.2780	1.0953	4.90085	3.80555	2.5384	1.4431	0.4846	38%	62%
2012-H38-24	/01	3.7916	1.2734	1.089	4.8806	3.7916	2.4888	1.3998	0.4701	37%	63%
2012-H38-24	/02	3.77	1.2661	1.0948	4.8648	3.77	2.4846	1.3898	0.4667	37%	63%
2012-H38-24	/03	3.7806	1.2697	1.0837	4.8643	3.7806	2.4793	1.3956	0.4687	37%	63%
2012-H38-25	/01	3.8141	1.2810	1.1038	4.9179	3.8141	2.5148	1.411	0.4739	37%	63%
2012-H38-25	/02	3.7962	1.2749	1.0875	4.8837	3.7962	2.4917	1.4042	0.4716	37%	63%
2012-H38-25	/03	3.8082	1.2790	1.0904	4.8986	3.8082	2.4992	1.4088	0.4731	37%	63%

Table F.39.Wet bulk density, dry bulk density, percentage of solid content, and other parameters measured for determination of physical properties of core H48, sections 1-12

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H48-1	/01	3.052	1.0521	1.0908	4.1428	3.052	1.4695	0.3787	0.1305	12%	88%
2012-H48-1	/02	3.0143	1.0391	1.1269	4.1412	3.0143	1.5011	0.3742	0.1290	12%	88%
2012-H48-1	/03	3.1067	1.0710	1.1154	4.2221	3.1067	1.4948	0.3794	0.1308	12%	88%
2012-H48-2	/01	3.2816	1.1313	1.1049	4.3865	3.2816	1.7515	0.6466	0.2229	20%	80%
2012-H48-2	/02	3.3639	1.1596	1.1169	4.4808	3.3639	1.7773	0.6604	0.2277	20%	80%
2012-H48-2	/03	3.3189	1.1441	1.0604	4.3793	3.3189	1.7207	0.6603	0.2276	20%	80%
2012-H48-3	/01	3.3293	1.1477	1.0935	4.4228	3.3293	1.8418	0.7483	0.2580	22%	78%
2012-H48-3	/02	3.3377	1.1506	1.0868	4.4245	3.3377	1.8329	0.7461	0.2572	22%	78%
2012-H48-3	/03	3.3312	1.1484	1.0854	4.4166	3.3312	1.8297	0.7443	0.2566	22%	78%
2012-H48-4	/01	3.3994	1.1719	1.0686	4.468	3.3994	1.8502	0.7816	0.2694	23%	77%
2012-H48-4	/02	3.3775	1.1643	1.0652	4.4427	3.3775	1.831	0.7658	0.2640	23%	77%
2012-H48-4	/03	3.3572	1.1573	1.1525	4.5097	3.3572	1.9188	0.7663	0.2642	23%	77%
2012-H48-5	/01	3.3874	1.1677	1.0921	4.4795	3.3874	1.871	0.7789	0.2685	23%	77%
2012-H48-5	/02	3.3622	1.1590	1.0571	4.4193	3.3622	1.832	0.7749	0.2671	23%	77%
2012-H48-5	/03	3.3638	1.1596	1.1063	4.4701	3.3638	1.8787	0.7724	0.2663	23%	77%
2012-H48-6	/01	3.3697	1.1616	1.1332	4.5029	3.3697	1.9471	0.8139	0.2806	24%	76%
2012-H48-6	/02	3.4332	1.1835	1.0839	4.5171	3.4332	1.91	0.8261	0.2848	24%	76%
2012-H48-6	/03	3.4245	1.1805	1.1303	4.5548	3.4245	1.9531	0.8228	0.2836	24%	76%
2012-H48-7	/01	3.4283	1.1818	1.1349	4.5632	3.4283	2.0113	0.8764	0.3021	26%	74%
2012-H48-7	/02	3.4442	1.1873	1.0651	4.5093	3.4442	1.9454	0.8803	0.3035	26%	74%
2012-H48-7	/03	3.4346	1.1840	1.1138	4.5484	3.4346	1.9888	0.875	0.3016	25%	75%
2012-H48-8	/01	3.4496	1.1892	1.1224	4.572	3.4496	2.0315	0.9091	0.3134	26%	74%
2012-H48-8	/02	3.4879	1.2024	1.0934	4.5813	3.4879	2.0108	0.9174	0.3163	26%	74%
2012-H48-8	/03	3.4555	1.1912	1.1249	4.5804	3.4555	2.0312	0.9063	0.3124	26%	74%
2012-H48-9	/01	3.4725	1.1971	1.0974	4.5699	3.4725	1.9928	0.8954	0.3087	26%	74%
2012-H48-9	/02	3.474	1.1976	1.0982	4.5722	3.474	1.9912	0.893	0.3078	26%	74%
2012-H48-9	/03	3.4416	1.1864	1.0817	4.5233	3.4416	1.9669	0.8852	0.3052	26%	74%
2012-H48-10	/01	3.485	1.2014	1.073	4.558	3.485	1.9901	0.9171	0.3161	26%	74%
2012-H48-10	/02	3.4821	1.2004	1.121	4.6031	3.4821	2.0284	0.9074	0.3128	26%	74%
2012-H48-10	/03	3.486	1.2017	1.0784	4.5644	3.486	1.9833	0.9049	0.3119	26%	74%
2012-H48-11	/01	3.5234	1.2146	1.1228	4.6462	3.5234	2.0533	0.9305	0.3208	26%	74%
2012-H48-11	/02	3.5017	1.2071	1.1105	4.6122	3.5017	2.0341	0.9236	0.3184	26%	74%
2012-H48-11	/03	3.5183	1.2129	1.1308	4.6491	3.5183	2.0549	0.9241	0.3186	26%	74%
2012-H48-12	/01	3.5139	1.2113	1.1077	4.6216	3.5139	2.0719	0.9642	0.3324	27%	73%
2012-H48-12	/02	3.496	1.2052	1.1033	4.5993	3.496	2.0583	0.955	0.3292	27%	73%
2012-H48-12	/03	3.5191	1.2131	1.1222	4.6413	3.5191	2.0877	0.9655	0.3328	27%	73%

Table F.40.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H48, sections 13-25

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H48-13	/01	3.5175	1.2126	1.1062	4.6237	3.5175	2.0851	0.9789	0.3375	28%	72%
2012-H48-13	/02	3.5191	1.2131	1.1617	4.6808	3.5191	2.1359	0.9742	0.3358	28%	72%
2012-H48-13	/03	3.5125	1.2109	1.1085	4.621	3.5125	2.0803	0.9718	0.3350	28%	72%
2012-H48-14	/01	3.5754	1.2325	1.1167	4.6921	3.5754	2.1727	1.056	0.3640	30%	70%
2012-H48-14	/02	3.5972	1.2401	1.0739	4.6711	3.5972	2.1519	1.078	0.3716	30%	70%
2012-H48-14	/03	3.5984	1.2405	1.1177	4.7161	3.5984	2.2228	1.1051	0.3810	31%	69%
2012-H48-15	/01	3.562	1.2279	1.1058	4.6678	3.562	2.1807	1.0749	0.3705	30%	70%
2012-H48-15	/02	3.6103	1.2446	1.0868	4.6971	3.6103	2.1419	1.0551	0.3637	29%	71%
2012-H48-15	/03	3.5714	1.2312	1.1122	4.6836	3.5714	2.1517	1.0395	0.3583	29%	71%
2012-H48-16	/01	3.5073	1.2091	1.0816	4.5889	3.5073	2.0985	1.0169	0.3506	29%	71%
2012-H48-16	/02	3.5843	1.2356	1.0752	4.6595	3.5843	2.1032	1.028	0.3544	29%	71%
2012-H48-16	/03	3.532	1.2176	1.0864	4.6184	3.532	2.1009	1.0145	0.3497	29%	71%
2012-H48-17	/01	3.4839	1.2010	1.0867	4.5706	3.4839	2.0237	0.937	0.3230	27%	73%
2012-H48-17	/02	3.4962	1.2052	1.0658	4.562	3.4962	2.0084	0.9426	0.3249	27%	73%
2012-H48-17	/03	3.5357	1.2189	1.085	4.6207	3.5357	2.0417	0.9567	0.3298	27%	73%
2012-H48-18	/01	3.5825	1.2350	1.1726	4.7551	3.5825	2.214	1.0414	0.3590	29%	71%
2012-H48-18	/02	3.5199	1.2134	1.1513	4.6712	3.5199	2.1831	1.0318	0.3557	29%	71%
2012-H48-18	/03	3.5418	1.2210	1.1199	4.6617	3.5418	2.1425	1.0226	0.3525	29%	71%
2012-H48-19	/01	3.5586	1.2267	1.0743	4.6329	3.5586	2.1002	1.0259	0.3537	29%	71%
2012-H48-19	/02	3.5305	1.2171	1.0562	4.5867	3.5305	2.0615	1.0053	0.3466	28%	72%
2012-H48-19	/03	3.5544	1.2253	1.0804	4.6348	3.5544	2.105	1.0246	0.3532	29%	71%
2012-H48-20	/01	3.5116	1.2105	1.0664	4.578	3.5116	2.066	0.9996	0.3446	28%	72%
2012-H48-20	/02	3.5117	1.2106	1.0902	4.6019	3.5117	2.0861	0.9959	0.3433	28%	72%
2012-H48-20	/03	3.5282	1.2163	1.0888	4.617	3.5282	2.0861	0.9973	0.3438	28%	72%
2012-H48-21	/01	3.5906	1.2378	1.0577	4.6483	3.5906	2.1074	1.0497	0.3619	29%	71%
2012-H48-21	/02	3.5805	1.2343	1.0782	4.6587	3.5805	2.119	1.0408	0.3588	29%	71%
2012-H48-21	/03	3.567	1.2296	1.127	4.694	3.567	2.1623	1.0353	0.3569	29%	71%
2012-H48-22	/01	3.6033	1.2422	1.1342	4.7375	3.6033	2.2026	1.0684	0.3683	30%	70%
2012-H48-22	/02	3.5667	1.2295	1.1232	4.6899	3.5667	2.1763	1.0531	0.3630	30%	70%
2012-H48-22	/03	3.574	1.2321	1.124	4.698	3.574	2.1826	1.0586	0.3649	30%	70%
2012-H48-23	/01	3.6355	1.2533	1.1223	4.7578	3.6355	2.2645	1.1422	0.3937	31%	69%
2012-H48-23	/02	3.6091	1.2442	1.1351	4.7442	3.6091	2.2654	1.1303	0.3896	31%	69%
2012-H48-23	/03	3.6567	1.2606	1.1185	4.7752	3.6567	2.2636	1.1451	0.3947	31%	69%
2012-H48-24	/01	3.6429	1.2558	1.0769	4.7198	3.6429	2.2689	1.192	0.4109	33%	67%
2012-H48-24	/02	3.6395	1.2546	1.0885	4.728	3.6395	2.2777	1.1892	0.4099	33%	67%
2012-H48-24	/03	3.6739	1.2665	1.0699	4.7438	3.6739	2.2606	1.1907	0.4105	32%	68%
2012-H48-25	/01	3.6132	1.2456	1.1132	4.7264	3.6132	2.2574	1.1442	0.3944	32%	68%
2012-H48-25	/02	3.6475	1.2574	1.1532	4.8007	3.6475	2.3028	1.1496	0.3963	32%	68%
2012-H48-25	/03	3.6217	1.2485	1.0918	4.7135	3.6217	2.2329	1.1411	0.3934	32%	68%

Table F.41.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H54, sections 1-12

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H54-1	/01	3.1671	1.0443	1.1148	4.2819	3.1671	1.5468	0.432	0.1424	14%	86%
2012-H54-1	/02	3.1758	1.0471	1.1098	4.2856	3.1758	1.5651	0.4553	0.1501	14%	86%
2012-H54-1	/03	3.1853	1.0503	1.1166	4.3019	3.1853	1.5573	0.4407	0.1453	14%	86%
2012-H54-2	/01	3.2692	1.0779	1.0965	4.3657	3.2692	1.7127	0.6162	0.2032	19%	81%
2012-H54-2	/02	3.3146	1.0929	1.0993	4.4139	3.3146	1.7415	0.6422	0.2117	19%	81%
2012-H54-2	/03	3.3098	1.0913	1.1097	4.4195	3.3098	1.7433	0.6336	0.2089	19%	81%
2012-H54-3	/01	3.3851	1.1161	1.1046	4.4897	3.3851	1.8392	0.7346	0.2422	22%	78%
2012-H54-3	/02	3.3452	1.1030	1.0848	4.43	3.3452	1.7909	0.7061	0.2328	21%	79%
2012-H54-3	/03	3.393	1.1187	1.1086	4.5016	3.393	1.844	0.7354	0.2425	22%	78%
2012-H54-4	/01	3.4277	1.1302	1.1005	4.5282	3.4277	1.9107	0.8102	0.2671	24%	76%
2012-H54-4	/02	3.4158	1.1263	1.0975	4.5133	3.4158	1.8899	0.7924	0.2613	23%	77%
2012-H54-4	/03	3.4395	1.1341	1.0774	4.5169	3.4395	1.8887	0.8113	0.2675	24%	76%
2012-H54-5	/01	3.4316	1.1315	1.0898	4.5214	3.4316	1.9108	0.821	0.2707	24%	76%
2012-H54-5	/02	3.4328	1.1319	1.0993	4.5321	3.4328	1.915	0.8157	0.2690	24%	76%
2012-H54-5	/03	3.4445	1.1357	1.105	4.5495	3.4445	1.9272	0.8222	0.2711	24%	76%
2012-H54-6	/01	3.4605	1.1410	1.0943	4.5548	3.4605	1.9573	0.863	0.2846	25%	75%
2012-H54-6	/02	3.4704	1.1443	1.1149	4.5853	3.4704	1.9725	0.8576	0.2828	25%	75%
2012-H54-6	/03	3.4599	1.1408	1.1087	4.5686	3.4599	1.965	0.8563	0.2823	25%	75%
2012-H54-7	/01	3.471	1.1445	1.0975	4.5685	3.471	1.9812	0.8837	0.2914	25%	75%
2012-H54-7	/02	3.4907	1.1510	1.0907	4.5814	3.4907	1.9828	0.8921	0.2941	26%	74%
2012-H54-7	/03	3.4668	1.1431	1.0868	4.5536	3.4668	1.9728	0.886	0.2921	26%	74%
2012-H54-8	/01	3.511	1.1577	1.1079	4.6189	3.511	2.031	0.9231	0.3044	26%	74%
2012-H54-8	/02	3.5179	1.1599	1.0864	4.6043	3.5179	2.0097	0.9233	0.3044	26%	74%
2012-H54-8	/03	3.517	1.1596	1.0938	4.6108	3.517	2.0136	0.9198	0.3033	26%	74%
2012-H54-9	/01	3.541	1.1675	1.0959	4.6369	3.541	2.1006	1.0047	0.3313	28%	72%
2012-H54-9	/02	3.5618	1.1744	1.1198	4.6816	3.5618	2.1148	0.995	0.3281	28%	72%
2012-H54-9	/03	3.5489	1.1702	1.1078	4.6567	3.5489	2.0997	0.9919	0.3271	28%	72%
2012-H54-10	/01	3.617	1.1926	1.0971	4.7141	3.617	2.1999	1.1028	0.3636	30%	70%
2012-H54-10	/02	3.622	1.1943	1.0921	4.7141	3.622	2.2053	1.1132	0.3670	31%	69%
2012-H54-10	/03	3.6271	1.1959	1.0977	4.7248	3.6271	2.2049	1.1072	0.3651	31%	69%
2012-H54-11	/01	3.6966	1.2189	1.0742	4.7708	3.6966	2.3202	1.246	0.4108	34%	66%
2012-H54-11	/02	3.7087	1.2228	1.1006	4.8093	3.7087	2.3437	1.2431	0.4099	34%	66%
2012-H54-11	/03	3.6834	1.2145	1.0969	4.7803	3.6834	2.3318	1.2349	0.4072	34%	66%
2012-H54-12	/01	3.7218	1.2272	1.0896	4.8114	3.7218	2.3927	1.3031	0.4297	35%	65%
2012-H54-12	/02	3.7135	1.2244	1.1159	4.8294	3.7135	2.4165	1.3006	0.4288	35%	65%
2012-H54-12	/03	3.7619	1.2404	1.1106	4.8725	3.7619	2.4289	1.3183	0.4347	35%	65%

Table F.42.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H54, sections 13-25

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H54-13	/01	3.7838	1.2476	1.0905	4.8743	3.7838	2.4548	1.3643	0.4498	36%	64%
2012-H54-13	/02	3.7189	1.2262	1.0887	4.8076	3.7189	2.4194	1.3307	0.4388	36%	64%
2012-H54-13	/03	3.734	1.2312	1.0798	4.8138	3.734	2.4249	1.3451	0.4435	36%	64%
2012-H54-14	/01	3.7004	1.2201	1.1092	4.8096	3.7004	2.4467	1.3375	0.4410	36%	64%
2012-H54-14	/02	3.7833	1.2474	1.1149	4.8982	3.7833	2.4844	1.3695	0.4516	36%	64%
2012-H32-14	/03	3.7824	1.2471	1.1072	4.8896	3.7824	2.4805	1.3733	0.4528	36%	64%
2012-H54-15	/01	3.8275	1.2620	1.0994	4.9269	3.8275	2.5037	1.4043	0.4630	37%	63%
2012-H54-15	/02	3.8464	1.2682	1.1009	4.9473	3.8464	2.5118	1.4109	0.4652	37%	63%
2012-H54-15	/03	3.8127	1.2571	1.1089	4.9216	3.8127	2.4941	1.3852	0.4567	36%	64%
2012-H54-16	/01	3.7985	1.2525	1.079	4.8775	3.7985	2.4787	1.3997	0.4615	37%	63%
2012-H54-16	/02	3.8047	1.2545	1.0877	4.8924	3.8047	2.4944	1.4067	0.4638	37%	63%
2012-H54-16	/03	3.7989	1.2526	1.0858	4.8847	3.7989	2.487	1.4012	0.4620	37%	63%
2012-H54-17	/01	3.8205	1.2597	1.1136	4.9341	3.8205	2.5124	1.3988	0.4612	37%	63%
2012-H54-17	/02	3.8135	1.2574	1.085	4.8985	3.8135	2.4851	1.4001	0.4616	37%	63%
2012-H54-17	/03	3.8177	1.2588	1.0933	4.911	3.8177	2.4958	1.4025	0.4624	37%	63%
2012-H54-18	/01	3.8566	1.2716	1.1049	4.9615	3.8566	2.5308	1.4259	0.4702	37%	63%
2012-H54-18	/02	3.8177	1.2588	1.1223	4.94	3.8177	2.5333	1.411	0.4652	37%	63%
2012-H54-18	/03	3.7987	1.2525	1.1081	4.9068	3.7987	2.5069	1.3988	0.4612	37%	63%
2012-H54-19	/01	3.7822	1.2471	1.1101	4.8923	3.7822	2.5271	1.417	0.4672	37%	63%
2012-H54-19	/02	3.8057	1.2548	1.0967	4.9024	3.8057	2.521	1.4243	0.4696	37%	63%
2012-H54-19	/03	3.8192	1.2593	1.1129	4.9321	3.8192	2.543	1.4301	0.4715	37%	63%
2012-H54-20	/01	3.8314	1.2633	1.0963	4.9277	3.8314	2.5447	1.4484	0.4776	38%	62%
2012-H54-20	/02	3.8514	1.2699	1.1119	4.9633	3.8514	2.5864	1.4745	0.4862	38%	62%
2012-H54-20	/03	3.8246	1.2611	1.1068	4.9314	3.8246	2.5492	1.4424	0.4756	38%	62%
2012-H54-21	/01	3.843	1.2671	1.0927	4.9357	3.843	2.5598	1.4671	0.4837	38%	62%
2012-H54-21	/02	3.8647	1.2743	1.0897	4.9544	3.8647	2.5785	1.4888	0.4909	39%	61%
2012-H54-21	/03	3.8339	1.2641	1.088	4.9219	3.8339	2.5576	1.4696	0.4846	38%	62%
2012-H54-22	/01	3.8192	1.2593	1.1207	4.9399	3.8192	2.5893	1.4686	0.4842	38%	62%
2012-H54-22	/02	3.8569	1.2717	1.0812	4.9381	3.8569	2.5695	1.4883	0.4907	39%	61%
2012-H54-22	/03	3.839	1.2658	1.1141	4.9531	3.839	2.5919	1.4778	0.4873	38%	62%
2012-H54-23	/01	3.889	1.2823	1.0767	4.9657	3.889	2.6403	1.5636	0.5156	40%	60%
2012-H54-23	/02	3.8881	1.2820	1.0927	4.9808	3.8881	2.6552	1.5625	0.5152	40%	60%
2012-H54-23	/03	3.8979	1.2852	1.0892	4.9871	3.8979	2.653	1.5638	0.5156	40%	60%
2012-H54-24	/01	3.895	1.2843	1.1019	4.9969	3.895	2.6912	1.5893	0.5240	41%	59%
2012-H54-24	/02	3.9234	1.2936	1.062	4.9854	3.9234	2.6616	1.5996	0.5274	41%	59%
2012-H54-24	/03	3.911	1.2895	1.0613	4.9723	3.911	2.6499	1.5886	0.5238	41%	59%
2012-H54-25	/01	3.942	1.2998	1.0786	5.0206	3.942	2.7328	1.6542	0.5454	42%	58%
2012-H54-25	/02	3.937	1.2981	1.0923	5.0293	3.937	2.7289	1.6366	0.5396	42%	58%
2012-H54-25	/03	3.9553	1.3042	1.0799	5.0352	3.9553	2.7222	1.6423	0.5415	42%	58%

Table F.43.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H61, sections 1-12

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H61-1	/01	3.1202	0.7801	1.0653	4.1855	3.1202	1.3705	0.3052	0.0763	10%	90%
2012-H61-1	/02	3.1575	0.7894	1.133	4.2905	3.1575	1.4481	0.3151	0.0788	10%	90%
2012-H61-1	/03	3.1121	0.7780	1.0696	4.1817	3.1121	1.378	0.3084	0.0771	10%	90%
2012-H61-2	/01	3.2255	0.8064	1.0929	4.3184	3.2255	1.5276	0.4347	0.1087	13%	87%
2012-H61-2	/02	3.2378	0.8095	1.1436	4.3814	3.2378	1.5628	0.4192	0.1048	13%	87%
2012-H61-2	/03	3.2194	0.8049	1.1369	4.3563	3.2194	1.5882	0.4513	0.1128	14%	86%
2012-H61-3	/01	3.2451	0.8113	1.0735	4.3186	3.2451	1.5846	0.5111	0.1278	16%	84%
2012-H61-3	/02	3.2535	0.8134	1.1117	4.3652	3.2535	1.6156	0.5039	0.1260	15%	85%
2012-H61-3	/03	3.2298	0.8075	1.0877	4.3175	3.2298	1.6159	0.5282	0.1321	16%	84%
2012-H61-4	/01	3.3499	0.8375	1.105	4.4549	3.3499	1.7874	0.6824	0.1706	20%	80%
2012-H61-4	/02	3.4077	0.8519	1.0808	4.4885	3.4077	1.8282	0.7474	0.1869	22%	78%
2012-H61-4	/03	3.3789	0.8447	1.1056	4.4845	3.3789	1.8295	0.7239	0.1810	21%	79%
2012-H61-5	/01	3.5498	0.8875	1.0746	4.6244	3.5498	2.1469	1.0723	0.2681	30%	70%
2012-H61-5	/02	3.6181	0.9046	1.0619	4.68	3.6181	2.1608	1.0989	0.2747	30%	70%
2012-H61-5	/03	3.5912	0.8978	1.0719	4.6631	3.5912	2.1531	1.0812	0.2703	30%	70%
2012-H61-6	/01	3.7642	0.9411	1.0745	4.8387	3.7642	2.4239	1.3494	0.3374	36%	64%
2012-H61-6	/02	3.7111	0.9278	1.0967	4.8078	3.7111	2.4315	1.3348	0.3337	36%	64%
2012-H61-6	/03	3.7418	0.9355	1.1005	4.8423	3.7418	2.4447	1.3442	0.3361	36%	64%
2012-H61-7	/01	3.9976	0.9994	1.0924	5.09	3.9976	2.824	1.7316	0.4329	43%	57%
2012-H61-7	/02	3.9947	0.9987	1.1692	5.1639	3.9947	2.9205	1.7513	0.4378	44%	56%
2012-H61-7	/03	3.9822	0.9956	1.0702	5.0524	3.9822	2.8183	1.7481	0.4370	44%	56%
2012-H61-8	/01	3.938	0.9845	1.0628	5.0008	3.938	2.701	1.6382	0.4096	42%	58%
2012-H61-8	/02	3.9623	0.9906	1.0595	5.0218	3.9623	2.7408	1.6813	0.4203	42%	58%
2012-H61-8	/03	3.8696	0.9674	1.1084	4.978	3.8696	2.7236	1.6152	0.4038	42%	58%
2012-H61-9	/01	3.9405	0.9852	1.1359	5.0764	3.9405	2.7993	1.6634	0.4159	42%	58%
2012-H61-9	/02	3.8916	0.9729	1.064	4.9556	3.8916	2.7027	1.6387	0.4097	42%	58%
2012-H61-9	/03	3.9537	0.9885	1.1187	5.0724	3.9537	2.7906	1.6719	0.4180	42%	58%
2012-H61-10	/01	3.9001	0.9751	1.1096	5.0097	3.9001	2.761	1.6514	0.4129	42%	58%
2012-H61-10	/02	3.8834	0.9709	1.1378	5.0212	3.8834	2.7749	1.6371	0.4093	42%	58%
2012-H61-10	/03	3.8924	0.9731	1.0666	4.959	3.8924	2.7092	1.6426	0.4107	42%	58%
2012-H61-11	/01	3.8236	0.9559	1.1028	4.9264	3.8236	2.7114	1.6086	0.4022	42%	58%
2012-H61-11	/02	3.9515	0.9879	1.0804	5.0319	3.9515	2.755	1.6746	0.4187	42%	58%
2012-H61-11	/03	3.9295	0.9824	1.085	5.0145	3.9295	2.7359	1.6509	0.4127	42%	58%
2012-H61-12	/01	3.9647	0.9912	1.1357	5.1004	3.9647	2.8172	1.6815	0.4204	42%	58%
2012-H61-12	/02	3.9772	0.9943	1.1195	5.0967	3.9772	2.8118	1.6923	0.4231	43%	57%
2012-H61-12	/03	3.9522	0.9881	1.1055	5.0577	3.9522	2.7909	1.6854	0.4214	43%	57%

Table F.44.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core S114, sections 13-25

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H61-13	/01	3.9638	0.9910	1.1246	5.0884	3.9638	2.7902	1.6656	0.4164	42%	58%
2012-H61-13	/02	3.9431	0.9858	1.1063	5.0494	3.9431	2.7664	1.6601	0.4150	42%	58%
2012-H61-13	/03	3.9392	0.9848	1.0628	5.002	3.9392	2.709	1.6462	0.4116	42%	58%
2012-H61-14	/01	4.0534	1.0134	1.0776	5.131	4.0534	2.9392	1.8616	0.4654	46%	54%
2012-H61-14	/02	4.0692	1.0173	1.0916	5.1608	4.0692	2.9793	1.8877	0.4719	46%	54%
2012-H61-14	/03	4.0432	1.0108	1.0748	5.118	4.0432	2.9141	1.8393	0.4598	45%	55%
2012-H61-15	/01	4.0655	1.0164	1.0929	5.1584	4.0655	2.9636	1.8707	0.4677	46%	54%
2012-H61-15	/02	4.0834	1.0209	1.1114	5.1948	4.0834	2.9982	1.8868	0.4717	46%	54%
2012-H61-15	/03	4.0757	1.0190	1.1373	5.213	4.0757	3.0138	1.8765	0.4691	46%	54%
2012-H61-16	/01	3.9451	0.9863	1.1063	5.0514	3.9451	2.7814	1.6751	0.4188	42%	58%
2012-H61-16	/02	3.8693	0.9674	1.1218	4.9911	3.8693	2.7633	1.6415	0.4104	42%	58%
2012-H61-16	/03	4.0132	1.0033	1.0983	5.1115	4.0132	2.8404	1.7421	0.4355	43%	57%
2012-H61-17	/01	3.9913	0.9979	1.1026	5.0939	3.9913	2.7945	1.6919	0.4230	42%	58%
2012-H61-17	/02	3.9129	0.9783	1.0698	4.9827	3.9129	2.7157	1.6459	0.4115	42%	58%
2012-H61-17	/03	3.9823	0.9956	1.1216	5.1039	3.9823	2.8093	1.6877	0.4219	42%	58%
2012-H61-18	/01	3.8871	0.9718	1.1025	4.9896	3.8871	2.6606	1.5581	0.3895	40%	60%
2012-H61-18	/02	3.8746	0.9687	1.0615	4.9361	3.8746	2.6207	1.5592	0.3898	40%	60%
2012-H61-18	/03	3.8643	0.9661	1.1139	4.9782	3.8643	2.6813	1.5674	0.3919	41%	59%
2012-H61-19	/01	3.9702	0.9926	1.1058	5.076	3.9702	2.8189	1.7131	0.4283	43%	57%
2012-H61-19	/02	3.9892	0.9973	1.0738	5.063	3.9892	2.7914	1.7176	0.4294	43%	57%
2012-H61-19	/03	3.964	0.9910	1.1334	5.0974	3.964	2.836	1.7026	0.4257	43%	57%
2012-H61-20	/01	3.9403	0.9851	1.1052	5.0455	3.9403	2.762	1.6568	0.4142	42%	58%
2012-H61-20	/02	3.9746	0.9937	1.1336	5.1082	3.9746	2.8109	1.6773	0.4193	42%	58%
2012-H61-20	/03	3.8988	0.9747	1.0849	4.9837	3.8988	2.7217	1.6368	0.4092	42%	58%
2012-H61-21	/01	4.0099	1.0025	1.0751	5.085	4.0099	2.7892	1.7141	0.4285	43%	57%
2012-H61-21	/02	3.9954	0.9989	1.1199	5.1153	3.9954	2.8326	1.7127	0.4282	43%	57%
2012-H61-21	/03	3.9517	0.9880	1.0981	5.0498	3.9517	2.7915	1.6934	0.4234	43%	57%
2012-H61-22	/01	3.9467	0.9867	1.1356	5.0823	3.9467	2.7691	1.6335	0.4084	41%	59%
2012-H61-22	/02	3.9083	0.9771	1.1221	5.0304	3.9083	2.7386	1.6165	0.4041	41%	59%
2012-H61-22	/03	3.92	0.9800	1.0924	5.0124	3.92	2.7093	1.6169	0.4042	41%	59%
2012-H61-23	/01	3.9073	0.9769	1.1731	5.0804	3.9073	2.8004	1.6273	0.4068	42%	58%
2012-H61-23	/02	3.917	0.9793	1.1336	5.0506	3.917	2.774	1.6404	0.4101	42%	58%
2012-H61-23	/03	3.8688	0.9672	1.1235	4.9923	3.8688	2.7389	1.6154	0.4039	42%	58%
2012-H61-24	/01	4.0741	1.0186	1.1012	5.1753	4.0741	3.0212	1.92	0.4800	47%	53%
2012-H61-24	/02	4.09	1.0225	1.1213	5.2113	4.09	3.0561	1.9348	0.4837	47%	53%
2012-H61-24	/03	4.1074	1.0269	1.0837	5.1911	4.1074	3.0234	1.9397	0.4849	47%	53%
2012-H61-25	/01	4.3351	1.0838	1.1048	5.4399	4.3351	3.4828	2.378	0.5945	55%	45%
2012-H61-25	/02	4.4476	1.1119	1.1233	5.5709	4.4476	3.5595	2.4362	0.6091	55%	45%
2012-H61-25	/03	4.3885	1.0972	1.1467	5.5352	4.3885	3.5582	2.4115	0.6029	55%	45%

Table F.45.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H95, sections 1-12

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H095-1	/01	3.0635	1.0208	1.1282	4.1917	3.0635	1.4088	0.2806	0.0935	9%	91%
2012-H095-1	/02	3.0932	1.0307	1.0637	4.1569	3.0932	1.338	0.2743	0.0914	9%	91%
2012-H095-1	/03	3.0569	1.0186	1.0725	4.1294	3.0569	1.3434	0.2709	0.0903	9%	91%
2012-H095-2	/01	3.2006	1.0665	1.1148	4.3154	3.2006	1.5144	0.3996	0.1332	12%	88%
2012-H095-2	/02	3.1806	1.0598	1.1149	4.2955	3.1806	1.5169	0.402	0.1340	13%	87%
2012-H095-2	/03	3.1407	1.0465	1.1345	4.2752	3.1407	1.5055	0.371	0.1236	12%	88%
2012-H095-3	/01	3.3111	1.1033	1.1387	4.4498	3.3111	1.758	0.6193	0.2064	19%	81%
2012-H095-3	/02	3.286	1.0950	1.1123	4.3983	3.286	1.7026	0.5903	0.1967	18%	82%
2012-H095-3	/03	3.2799	1.0929	1.0529	4.3328	3.2799	1.6544	0.6015	0.2004	18%	82%
2012-H095-4	/01	3.431	1.1433	1.0745	4.5055	3.431	1.913	0.8385	0.2794	24%	76%
2012-H095-4	/02	3.4271	1.1420	1.1019	4.529	3.4271	1.9649	0.863	0.2876	25%	75%
2012-H095-4	/03	3.4263	1.1417	1.0864	4.5127	3.4263	1.923	0.8366	0.2788	24%	76%
2012-H095-5	/01	3.6796	1.2261	1.0999	4.7795	3.6796	2.3255	1.2256	0.4084	33%	67%
2012-H095-5	/02	3.6727	1.2238	1.1192	4.7919	3.6727	2.3339	1.2147	0.4048	33%	67%
2012-H095-5	/03	3.6814	1.2267	1.1044	4.7858	3.6814	2.3389	1.2345	0.4114	34%	66%
2012-H095-6	/01	4.0211	1.3399	1.0946	5.1157	4.0211	2.8682	1.7736	0.5910	44%	56%
2012-H095-6	/02	4.0152	1.3380	1.1233	5.1385	4.0152	2.889	1.7657	0.5884	44%	56%
2012-H095-6	/03	3.9849	1.3279	1.0912	5.0761	3.9849	2.8536	1.7624	0.5873	44%	56%
2012-H095-7	/01	4.0207	1.3398	1.1009	5.1216	4.0207	2.8302	1.7293	0.5762	43%	57%
2012-H095-7	/02	4.046	1.3482	1.1115	5.1575	4.046	2.8606	1.7491	0.5828	43%	57%
2012-H095-7	/03	4.0101	1.3363	1.1229	5.133	4.0101	2.8508	1.7279	0.5758	43%	57%
2012-H095-8	/01	3.89	1.2962	1.149	5.039	3.89	2.7439	1.5949	0.5315	41%	59%
2012-H095-8	/02	3.9116	1.3034	1.0973	5.0089	3.9116	2.6845	1.5872	0.5289	41%	59%
2012-H095-8	/03	3.9203	1.3063	1.0777	4.998	3.9203	2.6643	1.5866	0.5287	40%	60%
2012-H095-9	/01	4.0609	1.3532	1.1152	5.1761	4.0609	2.9634	1.8482	0.6159	46%	54%
2012-H095-9	/02	4.0369	1.3452	1.078	5.1149	4.0369	2.8814	1.8034	0.6009	45%	55%
2012-H095-9	/03	4.0204	1.3397	1.086	5.1064	4.0204	2.863	1.777	0.5921	44%	56%
2012-H095-10	/01	3.7643	1.2543	1.1189	4.8832	3.7643	2.49	1.3711	0.4569	36%	64%
2012-H095-10	/02	3.7471	1.2486	1.0755	4.8226	3.7471	2.4305	1.355	0.4515	36%	64%
2012-H095-10	/03	3.877	1.2919	1.1486	5.0256	3.877	2.5489	1.4003	0.4666	36%	64%
2012-H095-11	/01	3.7592	1.2526	1.1346	4.8938	3.7592	2.4677	1.3331	0.4442	35%	65%
2012-H095-11	/02	3.7559	1.2515	1.104	4.8599	3.7559	2.4172	1.3132	0.4376	35%	65%
2012-H095-11	/03	3.7612	1.2533	1.0727	4.8339	3.7612	2.4193	1.3466	0.4487	36%	64%
2012-H095-12	/01	3.7519	1.2502	1.118	4.8699	3.7519	2.4695	1.3515	0.4503	36%	64%
2012-H095-12	/02	3.7484	1.2490	1.1188	4.8672	3.7484	2.4502	1.3314	0.4437	36%	64%
2012-H095-12	/03	3.7702	1.2563	1.0668	4.837	3.7702	2.4662	1.3994	0.4663	37%	63%

Table F.46.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core H95, sections 13-25

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H095-13	/01	3.7486	1.2491	1.102	4.8506	3.7486	2.4267	1.3247	0.4414	35%	65%
2012-H095-13	/02	3.7622	1.2536	1.0933	4.8555	3.7622	2.4267	1.3334	0.4443	35%	65%
2012-H095-13	/03	3.7564	1.2517	1.0584	4.8148	3.7564	2.3827	1.3243	0.4413	35%	65%
2012-H095-14	/01	3.7108	1.2365	1.1355	4.8463	3.7108	2.4256	1.2901	0.4299	35%	65%
2012-H095-14	/02	3.7147	1.2378	1.0936	4.8083	3.7147	2.3838	1.2902	0.4299	35%	65%
2012-H095-14	/03	3.7406	1.2464	1.1375	4.8781	3.7406	2.4329	1.2954	0.4317	35%	65%
2012-H095-15	/01	3.8217	1.2735	1.1244	4.9461	3.8217	2.5298	1.4054	0.4683	37%	63%
2012-H095-15	/02	3.822	1.2736	1.1321	4.9541	3.822	2.5391	1.407	0.4688	37%	63%
2012-H095-15	/03	3.8189	1.2725	1.1086	4.9275	3.8189	2.5106	1.402	0.4672	37%	63%
2012-H095-16	/01	4.035	1.3445	1.1429	5.1779	4.035	2.9255	1.7826	0.5940	44%	56%
2012-H095-16	/02	4.017	1.3386	1.1209	5.1379	4.017	2.8858	1.7649	0.5881	44%	56%
2012-H095-16	/03	4.005	1.3346	1.0712	5.0762	4.005	2.7947	1.7235	0.5743	43%	57%
2012-H095-17	/01	3.9928	1.3305	1.0558	5.0486	3.9928	2.7537	1.6979	0.5658	43%	57%
2012-H095-17	/02	4.0211	1.3399	1.0588	5.0799	4.0211	2.7759	1.7171	0.5722	43%	57%
2012-H095-17	/03	3.9946	1.3311	1.1191	5.1137	3.9946	2.8299	1.7108	0.5701	43%	57%
2012-H095-18	/01	3.9591	1.3192	1.1209	5.08	3.9591	2.7899	1.669	0.5561	42%	58%
2012-H095-18	/02	3.9525	1.3170	1.1154	5.0679	3.9525	2.7589	1.6435	0.5476	42%	58%
2012-H095-18	/03	3.9686	1.3224	1.1267	5.0953	3.9686	2.7873	1.6606	0.5533	42%	58%
2012-H095-19	/01	3.8942	1.2976	1.0844	4.9786	3.8942	2.6629	1.5785	0.5260	41%	59%
2012-H095-19	/02	3.8848	1.2944	1.0845	4.9693	3.8848	2.6322	1.5477	0.5157	40%	60%
2012-H095-19	/03	3.9309	1.3098	1.0607	4.9916	3.9309	2.621	1.5603	0.5199	40%	60%
2012-H095-20	/01	4.071	1.3565	1.0939	5.1649	4.071	2.8982	1.8043	0.6012	44%	56%
2012-H095-20	/02	4.0203	1.3396	1.1382	5.1585	4.0203	2.9171	1.7789	0.5927	44%	56%
2012-H095-20	/03	4.0012	1.3332	1.1316	5.1328	4.0012	2.9113	1.7797	0.5930	44%	56%
2012-H095-21	/01	3.3475	1.1154	1.1105	4.458	3.3475	2.6816	1.5711	0.5235	47%	53%
2012-H095-21	/02	3.3159	1.1049	1.1066	4.4225	3.3159	2.6764	1.5698	0.5231	47%	53%
2012-H095-21	/03	3.3848	1.1278	1.1146	4.4994	3.3848	2.7429	1.6283	0.5426	48%	52%
2012-H095-22	/01	3.9354	1.3113	1.1074	5.0428	3.9354	2.7166	1.6092	0.5362	41%	59%
2012-H095-22	/02	3.9069	1.3018	1.0739	4.9808	3.9069	2.6624	1.5885	0.5293	41%	59%
2012-H095-22	/03	3.9204	1.3063	1.1237	5.0441	3.9204	2.708	1.5843	0.5279	40%	60%
2012-H095-23	/01	3.9734	1.3240	1.0645	5.0379	3.9734	2.6755	1.611	0.5368	41%	59%
2012-H095-23	/02	3.9313	1.3099	1.1163	5.0476	3.9313	2.7069	1.5906	0.5300	40%	60%
2012-H095-23	/03	3.962	1.3202	1.0889	5.0509	3.962	2.6862	1.5973	0.5322	40%	60%
2012-H095-24	/01	3.7714	1.2567	1.1154	4.8868	3.7714	2.4599	1.3445	0.4480	36%	64%
2012-H095-24	/02	3.7513	1.2500	1.1428	4.8941	3.7513	2.4888	1.346	0.4485	36%	64%
2012-H095-24	/03	3.7682	1.2556	1.0749	4.8431	3.7682	2.4282	1.3533	0.4509	36%	64%
2012-H095-25	/01	3.7203	1.2396	1.1199	4.8402	3.7203	2.371	1.2511	0.4169	34%	66%
2012-H095-25	/02	3.6741	1.2242	1.1093	4.7834	3.6741	2.3416	1.2323	0.4106	34%	66%
2012-H095-25	/03	3.6568	1.2185	1.1344	4.7912	3.6568	2.3604	1.226	0.4085	34%	66%

Table F.47.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of ponar grabs in Lake Huron

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H101PG	/01	4.3382	1.4511	1.0753	5.4135	4.3382	3.3412	2.2659	0.7579	52%	48%
2012-H101PG	/02	4.3181	1.4444	1.1293	5.4474	4.3181	3.3744	2.2451	0.7510	52%	48%
2012-H101PG	/03	4.3904	1.4686	1.0971	5.4875	4.3904	3.4239	2.3268	0.7783	53%	47%
2012-HOSTOXD PG	/01	4.2852	1.4518	1.0991	5.3843	4.2852	3.2464	2.1473	0.7275	50%	50%
2012-HOSTOXD PG	/02	4.2415	1.4370	1.0983	5.3398	4.2415	3.2094	2.1111	0.7152	50%	50%
2012-HOSTOXD PG	/03	4.2583	1.4427	1.1094	5.3677	4.2583	3.1995	2.0901	0.7081	49%	51%
2012-H006PG	/01	3.3534	1.1425	1.097	4.4504	3.3534	1.9285	0.8315	0.2833	25%	75%
2012-H006PG	/02	3.4738	1.1835	1.1169	4.5907	3.4738	1.9673	0.8504	0.2897	24%	76%
2012-H006PG	/03	3.4656	1.1807	1.0836	4.5492	3.4656	1.9369	0.8533	0.2907	25%	75%
2012-H102PG	/01	4.0375	1.3604	1.1065	5.144	4.0375	2.8576	1.7511	0.5900	43%	57%
2012-H102PG	/02	3.9717	1.3382	1.0858	5.0575	3.9717	2.8007	1.7149	0.5778	43%	57%
2012-H102PG	/03	4.0012	1.3481	1.0917	5.0929	4.0012	2.8159	1.7242	0.5809	43%	57%
2012-H012PG	/01	3.3696	1.1389	1.0797	4.4493	3.3696	1.8277	0.748	0.2528	22%	78%
2012-H012PG	/02	3.4358	1.1613	1.1284	4.5642	3.4358	1.8967	0.7683	0.2597	22%	78%
2012-H012PG	/03	3.3968	1.1481	1.0801	4.4769	3.3968	1.8336	0.7535	0.2547	22%	78%
2012-H103PG	/01	3.3832	1.1475	1.0817	4.4649	3.3832	1.8329	0.7512	0.2548	22%	78%
2012-H103PG	/02	3.4513	1.1763	1.0985	4.5498	3.4681	1.8875	0.789	0.2676	23%	77%
2012-H103PG	/03	3.3937	1.1394	1.0641	4.4578	3.3593	1.8198	0.7557	0.2563	21%	79%
2012-H032PG	/01	3.3402	1.1193	1.067	4.4072	3.3402	1.7505	0.6835	0.2290	20%	80%
2012-H032PG	/02	3.347	1.1216	1.0993	4.4463	3.347	1.7867	0.6874	0.2304	21%	79%
2012-H032PG	/03	3.356	1.1246	1.0657	4.4217	3.356	1.7766	0.7109	0.2382	21%	79%
2012-H104PG	/01	3.7735	1.2763	1.0967	4.8702	3.7735	2.4024	1.3057	0.4416	35%	65%
2012-H104PG	/02	3.7231	1.2593	1.1047	4.8278	3.7231	2.3946	1.2899	0.4363	35%	65%
2012-H104PG	/03	3.7443	1.2664	1.0831	4.8274	3.7443	2.3899	1.3068	0.4420	35%	65%
2012-H027PG	/01	5.1153	1.7266	1.1045	6.2198	5.1153	4.6272	3.5227	1.1891	69%	31%
2012-H027PG	/02	5.0429	1.7022	1.0884	6.1313	5.0429	4.5021	3.4137	1.1523	68%	32%
2012-H027PG	/03	5.0572	1.7070	1.0933	6.1505	5.0572	4.5173	3.424	1.1557	68%	32%
2012-H095PG	/01	3.6315	1.2315	1.1176	4.7491	3.6315	2.2203	1.1027	0.3739	30%	70%
2012-H095PG	/02	3.5962	1.2195	1.0848	4.681	3.5962	2.1716	1.0868	0.3685	30%	70%
2012-H095PG	/03	3.5944	1.2189	1.0886	4.683	3.5944	2.1795	1.0909	0.3699	30%	70%
2012-H002PG	/01	5.2945	1.7954	1.098	6.3925	5.2945	5.5036	4.4056	1.4940	83%	17%
2012-H002PG	/02	5.3506	1.8144	1.1127	6.4633	5.3506	5.5144	4.4017	1.4927	82%	18%
2012-H002PG	/03	5.3497	1.8141	1.1271	6.4768	5.3497	5.5235	4.3964	1.4909	82%	18%
2012-H109PG	/01	4.4766	1.5115	1.1055	5.5821	4.4766	3.4527	2.3472	0.7925	52%	48%
2012-H109PG	/02	4.4763	1.5114	1.0862	5.5625	4.4763	3.4408	2.3546	0.7950	53%	47%
2012-H109PG	/03	4.5394	1.5327	1.0935	5.6329	4.5394	3.5787	2.4852	0.8391	55%	45%
2012-H001PG	/01	3.3531	1.1308	1.0831	4.4362	3.3531	1.736	0.6529	0.2202	19%	81%
2012-H001PG	/02	3.3547	1.1314	1.0773	4.432	3.3547	1.7335	0.6562	0.2213	20%	80%
2012-H001PG	/03	3.3126	1.1172	1.1177	4.4303	3.3126	1.7633	0.6456	0.2177	19%	81%

Table F.48.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of ponar grabs in Lake Huron

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-H110PG	/01	3.7922	1.3118	1.1056	4.8978	3.7922	2.602	1.4964	0.5176	39%	61%
2012-H110PG	/02	3.9524	1.3672	1.1167	5.0691	3.9524	2.7204	1.6037	0.5548	41%	59%
2012-H110PG	/03	3.9658	1.3719	1.1071	5.0729	3.9658	2.7288	1.6217	0.5610	41%	59%
2012-H037PG	/01	3.7265	1.2637	1.1048	4.8313	3.7265	2.3861	1.2813	0.4345	34%	66%
2012-H037PG	/02	3.6486	1.2373	1.0706	4.7192	3.6486	2.3235	1.2529	0.4249	34%	66%
2012-H037PG	/03	3.6704	1.2447	1.0964	4.7668	3.6704	2.3486	1.2522	0.4246	34%	66%
2012-H048PG	/01	3.9772	1.3451	1.1039	5.0811	3.9772	2.8213	1.7174	0.5808	43%	57%
2012-H048PG	/02	4.0106	1.3564	1.0915	5.1021	4.0106	2.826	1.7345	0.5866	43%	57%
2012-H048PG	/03	4.0087	1.3558	1.1087	5.1174	4.0087	2.8436	1.7349	0.5868	43%	57%
2012-H038PG	/01	3.6602	1.2416	1.0988	4.759	3.6602	2.2504	1.1516	0.3906	31%	69%
2012-H038PG	/02	3.6484	1.2376	1.0825	4.7309	3.6484	2.2307	1.1482	0.3895	31%	69%
2012-H038PG	/03	3.667	1.2439	1.0826	4.7496	3.667	2.2401	1.1575	0.3926	32%	68%
2012-H107PG	/01	5.4343	1.8428	1.0701	6.5044	5.4343	5.1243	4.0542	1.3748	75%	25%
2012-H107PG	/02	5.4089	1.8342	1.0993	6.5082	5.4089	5.0507	3.9514	1.3400	73%	27%
2012-H107PG	/03	5.4899	1.8617	1.0957	6.5856	5.4899	5.1257	4.03	1.3666	73%	27%
2012-H118PG	/01	4.967	1.6594	1.0999	6.0669	4.967	4.1327	3.0328	1.0132	61%	39%
2012-H118PG	/02	4.9999	1.6704	1.1	6.0999	4.9999	4.199	3.099	1.0353	62%	38%
2012-H118PG	/03	4.9103	1.6404	1.1123	6.0226	4.9103	4.1191	3.0068	1.0045	61%	39%
2012-H108PG	/01	4.9605	1.6738	1.1034	6.0639	4.9605	4.2555	3.1521	1.0636	64%	36%
2012-H108PG	/02	5.0081	1.6899	1.0873	6.0954	5.0081	4.2915	3.2042	1.0812	64%	36%
2012-H108PG	/03	5.1504	1.7379	1.0781	6.2285	5.1504	4.3994	3.3213	1.1207	64%	36%
2012-H124PG	/01	3.569	1.1929	1.0898	4.6588	3.569	2.0787	0.9889	0.3305	28%	72%
2012-H124PG	/02	3.5799	1.1966	1.0927	4.6726	3.5799	2.0676	0.9749	0.3259	27%	73%
2012-H124PG	/03	3.4841	1.1645	1.0746	4.5587	3.4841	2.0812	1.0066	0.3364	29%	71%
2012-H123PG	/01	5.3125	1.7750	1.0881	6.4006	5.3125	4.9331	3.845	1.2847	72%	28%
2012-H123PG	/02	5.2441	1.7521	1.0897	6.3338	5.2441	4.8309	3.7412	1.2500	71%	29%
2012-H123PG	/03	5.3176	1.7767	1.1266	6.4442	5.3176	4.9399	3.8133	1.2741	72%	28%
2012-H061PG	/01	3.8266	1.2784	1.0724	4.899	3.8266	2.5296	1.4572	0.4868	38%	62%
2012-H061PG	/02	3.8392	1.2826	1.0722	4.9114	3.8392	2.5675	1.4953	0.4995	39%	61%
2012-H061PG	/03	3.8408	1.2831	1.1108	4.9516	3.8408	2.5993	1.4885	0.4973	39%	61%
2012-H119PG	/01	3.8131	1.2931	1.0945	4.9076	3.8131	2.562	1.4675	0.4976	38%	62%
2012-H119PG	/02	3.8133	1.2931	1.0777	4.891	3.8133	2.5371	1.4594	0.4949	38%	62%
2012-H119PG	/03	3.7848	1.2835	1.0861	4.8709	3.7848	2.5409	1.4548	0.4933	38%	62%
2012-H054PG	/01	3.3573	1.1385	1.0795	4.4368	3.3573	1.7594	0.6799	0.2306	20%	80%
2012-H054PG	/02	3.3524	1.1368	1.1016	4.454	3.3524	1.7809	0.6793	0.2304	20%	80%
2012-H054PG	/03	3.3526	1.1369	1.0948	4.4474	3.3526	1.78	0.6852	0.2324	20%	80%
2012-NC70PG	/01	3.4598	1.1348	1.1119	4.5717	3.4598	2.0918	0.9799	0.3214	28%	72%
2012-NC70PG	/02	3.5163	1.1533	1.0843	4.6006	3.5163	2.0742	0.9899	0.3247	28%	72%
2012-NC70PG	/03	3.5334	1.1589	1.084	4.6174	3.5334	2.0784	0.9944	0.3262	28%	72%

Table F.49.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of ponar grabs in Lake Huron

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-NC79PG	/01	3.5837	1.1754	1.1143	4.698	3.5837	2.1618	1.0475	0.3436	29%	71%
2012-NC79PG	/02	3.5666	1.1698	1.0863	4.6529	3.5666	2.129	1.0427	0.3420	29%	71%
2012-NC79PG	/03	3.5765	1.1731	1.1002	4.6767	3.5765	2.148	1.0478	0.3437	29%	71%
2012-NC89PG	/01	3.3889	1.1115	1.1188	4.5077	3.3889	1.8992	0.7804	0.2560	23%	77%
2012-NC89PG	/02	3.4303	1.1251	1.092	4.5223	3.4303	1.8826	0.7906	0.2593	23%	77%
2012-NC89PG	/03	3.4532	1.1326	1.0843	4.5375	3.4532	1.8799	0.7956	0.2610	23%	77%
2012-GB35PG	/01	4.6353	1.5203	1.1007	5.736	4.6353	3.8634	2.7627	0.9061	60%	40%
2012-GB35PG	/02	4.6769	1.5340	1.1004	5.7773	4.6769	3.896	2.7956	0.9169	60%	40%
2012-GB35PG	/03	4.7066	1.5437	1.0732	5.7798	4.7066	3.9068	2.8336	0.9294	60%	40%
2012-GB01PG	/01	3.4053	1.1169	1.0992	4.5045	3.4053	1.8939	0.7947	0.2607	23%	77%
2012-GB01PG	/02	3.3917	1.1125	1.0725	4.4642	3.3917	1.8699	0.7974	0.2615	24%	76%
2012-GB01PG	/03	3.4243	1.1231	1.1134	4.5377	3.4243	1.9206	0.8072	0.2648	24%	76%
2012-NC73PG	/01	5.1392	1.6856	1.0837	6.2229	5.1392	4.6462	3.5625	1.1685	69%	31%
2012-NC73PG	/02	5.1655	1.6942	1.0871	6.2526	5.1655	4.6687	3.5816	1.1747	69%	31%
2012-NC73PG	/03	5.2365	1.7175	1.0882	6.3247	5.2365	4.7616	3.6734	1.2048	70%	30%
2012-NC84PG	/01	3.7455	1.2285	1.1024	4.8479	3.7455	2.4153	1.3129	0.4306	35%	65%
2012-NC84PG	/02	3.6002	1.1808	1.0877	4.6879	3.6002	2.3566	1.2689	0.4162	35%	65%
2012-NC84PG	/03	3.718	1.2195	1.0922	4.8102	3.718	2.4048	1.3126	0.4305	35%	65%
2012-GB39PG	/01	4.1416	1.3584	1.0879	5.2295	4.1416	3.0402	1.9523	0.6403	47%	53%
2012-GB39PG	/02	4.1438	1.3591	1.0957	5.2395	4.1438	3.0602	1.9645	0.6443	47%	53%
2012-GB39PG	/03	4.1393	1.3577	1.1109	5.2502	4.1393	3.056	1.9451	0.6380	47%	53%
2012-GB24PG	/01	4.6336	1.5198	1.1045	5.7381	4.6336	3.8433	2.7388	0.8983	59%	41%
2012-GB24PG	/02	4.6553	1.5269	1.106	5.7613	4.6553	3.8713	2.7653	0.9070	59%	41%
2012-GB24PG	/03	4.6666	1.5306	1.0629	5.7295	4.6666	3.8398	2.7769	0.9108	60%	40%
2012-GB06PG	/01	3.3516	1.0993	1.1119	4.4635	3.3516	1.8255	0.7136	0.2341	21%	79%
2012-GB06PG	/02	3.4039	1.1165	1.0848	4.4887	3.4039	1.813	0.7282	0.2388	21%	79%
2012-GB06PG	/03	3.3767	1.1075	1.0821	4.4588	3.3767	1.8092	0.7271	0.2385	22%	78%
2012-NC68PG	/01	3.9842	1.3068	1.1078	5.092	3.9842	2.8011	1.6933	0.5554	43%	57%
2012-NC68PG	/02	3.9984	1.3114	1.1151	5.1135	3.9984	2.8536	1.7385	0.5702	43%	57%
2012-NC68PG	/03	4.033	1.3228	1.088	5.121	4.033	2.8434	1.7554	0.5758	44%	56%
2012-NC77PG	/01	3.311	1.0860	1.1209	4.4319	3.311	1.7855	0.6646	0.2180	20%	80%
2012-NC77PG	/02	3.3389	1.0951	1.0933	4.4322	3.3389	1.7398	0.6465	0.2120	19%	81%
2012-NC77PG	/03	3.3822	1.1093	1.1256	4.5078	3.3822	1.8224	0.6968	0.2285	21%	79%
2012-NC87PG	/01	4.1446	1.3594	1.079	5.2236	4.1446	3.0407	1.9617	0.6434	47%	53%
2012-NC87PG	/02	4.1229	1.3523	1.1167	5.2396	4.1229	3.0659	1.9492	0.6393	47%	53%
2012-NC87PG	/03	4.1694	1.3675	1.0997	5.2691	4.1694	3.0639	1.9642	0.6442	47%	53%
2012-GB36PG	/01	4.3179	1.4162	1.1055	5.4234	4.3179	3.3569	2.2514	0.7384	52%	48%
2012-GB36PG	/02	4.349	1.4264	1.1069	5.4559	4.349	3.3743	2.2674	0.7437	52%	48%
2012-GB36PG	/03	4.2719	1.4012	1.1047	5.3766	4.2719	3.3027	2.198	0.7209	51%	49%

Table F.50.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of ponar grabs in Lake Huron

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2012-GB12PG	/01	3.5811	1.1746	1.0965	4.6776	3.5811	2.1997	1.1032	0.3618	31%	69%
2012-GB12PG	/02	3.6247	1.1889	1.0893	4.714	3.6247	2.2024	1.1131	0.3651	31%	69%
2012-GB12PG	/03	3.5969	1.1798	1.105	4.7019	3.5969	2.2098	1.1048	0.3624	31%	69%
2012-NC71PG	/01	3.2934	1.0802	1.0843	4.3777	3.2934	1.7483	0.664	0.2178	20%	80%
2012-NC71PG	/02	3.3233	1.0900	1.1127	4.436	3.3233	1.7805	0.6678	0.2190	20%	80%
2012-NC71PG	/03	3.3272	1.0913	1.0923	4.4195	3.3272	1.7633	0.671	0.2201	20%	80%
2012-NC82PG	/01	3.5054	1.1497	1.0938	4.5992	3.5054	2.0594	0.9656	0.3167	28%	72%
2012-NC82PG	/02	3.5171	1.1536	1.1246	4.6417	3.5171	2.0882	0.9636	0.3161	27%	73%
2012-NC82PG	/03	3.5499	1.1643	1.1083	4.6582	3.5499	2.0811	0.9728	0.3191	27%	73%
2012-NC88PG	/01	3.4451	1.1300	1.089	4.5341	3.4451	1.9347	0.8457	0.2774	25%	75%
2012-NC88PG	/02	3.4511	1.1319	1.095	4.5461	3.4511	1.9411	0.8461	0.2775	25%	75%
2012-NC88PG	/03	3.4327	1.1259	1.0873	4.52	3.4327	1.9326	0.8453	0.2773	25%	75%
2012-GB29PG	/01	3.7345	1.2249	1.095	4.8295	3.7345	2.4316	1.3366	0.4384	36%	64%
2012-GB29PG	/02	3.8024	1.2472	1.0677	4.8701	3.8024	2.4565	1.3888	0.4555	37%	63%
2012-GB29PG	/03	3.7714	1.2370	1.098	4.8694	3.7714	2.4445	1.3465	0.4416	36%	64%
2012-GB03PG	/01	4.9781	1.6328	1.0997	6.0778	4.9781	4.4301	3.3304	1.0923	67%	33%
2012-GB03PG	/02	5.1316	1.6831	1.1049	6.2365	5.1316	4.6131	3.5082	1.1507	68%	32%
2012-GB03PG	/03	5.0828	1.6671	1.0898	6.1726	5.0828	4.5682	3.4784	1.1409	68%	32%
2012-H121PG	/01	5.4098	1.7744	1.1098	6.5196	5.4098	5.1175	4.0077	1.3145	74%	26%
2012-H121PG	/02	5.3937	1.7691	1.0944	6.4881	5.3937	5.078	3.9836	1.3066	74%	26%
2012-H121PG	/03	5.5194	1.8103	1.1004	6.6198	5.5194	5.2112	4.1108	1.3483	74%	26%
2012-NC76PG	/01	3.2858	1.0777	1.111	4.3968	3.2858	1.7448	0.6338	0.2079	19%	81%
2012-NC76PG	/02	3.3072	1.0847	1.0791	4.3863	3.3072	1.716	0.6369	0.2089	19%	81%
2012-NC76PG	/03	3.3114	1.0861	1.0818	4.3932	3.3114	1.7191	0.6373	0.2090	19%	81%
2012-NC83PG	/01	3.5037	1.1492	1.0813	4.585	3.5037	2.129	1.0477	0.3436	30%	70%
2012-NC83PG	/02	3.5284	1.1573	1.0887	4.6171	3.5284	2.1369	1.0482	0.3438	30%	70%
2012-NC83PG	/03	3.6241	1.1887	1.0952	4.7193	3.6241	2.1937	1.0985	0.3603	30%	70%
2012-GB42PG	/01	3.4185	1.1212	1.0887	4.5072	3.4185	1.8882	0.7995	0.2622	23%	77%
2012-GB42PG	/02	3.4161	1.1205	1.0809	4.497	3.4161	1.8832	0.8023	0.2631	23%	77%
2012-GB42PG	/03	3.4504	1.1317	1.1253	4.5757	3.4504	1.9486	0.8233	0.2700	24%	76%
2012-GB17PG	/01	3.3535	1.0999	1.1148	4.4683	3.3535	1.8495	0.7347	0.2410	22%	78%
2012-GB17PG	/02	3.3657	1.1039	1.0867	4.4524	3.3657	1.8251	0.7384	0.2422	22%	78%
2012-GB17PG	/03	3.3787	1.1082	1.0989	4.4776	3.3787	1.8378	0.7389	0.2424	22%	78%
2012-GB04PG	/01	3.4697	1.1380	1.0817	4.5514	3.4697	2.037	0.9553	0.3133	28%	72%
2012-GB04PG	/02	3.5689	1.1706	1.0998	4.6687	3.5689	2.1439	1.0441	0.3425	29%	71%
2012-GB04PG	/03	3.6126	1.1849	1.1	4.7126	3.6126	2.1235	1.0235	0.3357	28%	72%
2012-GB09PG	/01	3.3851	1.1103	1.0689	4.454	3.3851	1.8344	0.7655	0.2511	23%	77%
2012-GB09PG	/02	3.3871	1.1109	1.0834	4.4705	3.3871	1.8437	0.7603	0.2494	22%	78%
2012-GB09PG	/03	3.393	1.1129	1.0825	4.4755	3.393	1.8482	0.7657	0.2511	23%	77%
2012-GB05PG	/01	4.2932	1.4081	1.1031	5.3963	4.2932	3.2803	2.1772	0.7141	51%	49%
2012-GB05PG	/02	4.3349	1.4218	1.0939	5.4288	4.3349	3.3123	2.2184	0.7276	51%	49%
2012-GB05PG	/03	4.3139	1.4149	1.087	5.4009	4.3139	3.305	2.218	0.7275	51%	49%
2012-TB02PG	/01	5.4013	1.7716	1.0969	6.4982	5.4013	4.9988	3.9019	1.2798	72%	28%
2012-TB02PG	/02	5.3493	1.7545	1.0741	6.4234	5.3493	4.9046	3.8305	1.2564	72%	28%
2012-TB02PG	/03	5.3394	1.7513	1.1085	6.4479	5.3394	4.9302	3.8217	1.2535	72%	28%
2012-TB01PG	/01	4.8998	1.6071	1.1087	6.0085	4.8998	4.3433	3.2346	1.0609	66%	34%
2012-TB01PG	/02	5.0158	1.6451	1.0932	6.109	5.0158	4.4589	3.3657	1.1039	67%	33%
2012-TB01PG	/03	4.9743	1.6315	1.0913	6.0656	4.9743	4.4139	3.3226	1.0898	67%	33%
2012-TB04PG	/01	5.5438	1.8183	1.2134	6.7572	5.5438	5.3347	4.1213	1.3518	74%	26%
2012-TB04PG	/02	5.3513	1.7552	1.1063	6.4576	5.3513	5.0649	3.9586	1.2984	74%	26%
2012-TB04PG	/03	5.2937	1.7363	1.0775	6.3712	5.2937	4.9407	3.8632	1.2671	73%	27%

Table F.51.In-situ properties of water in sediment interface at each location in Lake Huron

SITE ID	Depth (m) (m)	Air Pressure (mb)	Air Temp (°C)	ORP (mV)	DO (mg/L)	Water Temp (°C)	pH	Turbidity (NTU)	Conductivity (µs)	TDS (mg/L as NaCl)	Salinity (%)
2012-H101PG	30.4	1003	17.1	68.4	5.41	20.1	5.94	16.3	494	237	0.2
HOSTOXD PG	36.1	1003	16.8	128.1	5.09	20.1	6.71	19.1	483	231	0.2
2012-H006PG	60.3	1001	16.3	132.5	4.87	12	7.65	8.61	236	110	0.1
2012-H102PG	51.4	1000	17	129	4.97	17.8	7.63	122.1	146.9	70	0.1
2012-H012PG	94.7	999	17.8	188.1	5.09	16	7.05	11.6	239	118	0.1
2012-H103PG	N/A	998	18.1	113.8	4.33	18.5	7.34	108	403	193	0.2
2012-H032PG	90.5	997	18.3	156.1	5.29	17	6.92	26.8	443	212	0.2
2012-H104PG	125.7	1000	17	141.3	4.43	18.7	6.35	78.1	393	186	0.2
2012-H027PG	63.2	997	18.6	156.1	5.13	19.8	7.08	23.4	439	194	0.2
2012-H095PG	67	996	18.8	171.4	4.9	18	6.98	1.46	436	210	0.2
2012-H002PG	19.2	994	22	146.1	4.53	22.5	7.65	1.98	436	210	0.2
2012-H109PG	34.8	994	21.4	103.7	4.76	21	6.69	48.7	212	44.5	0.2
2012-H001PG	13.4	994	22.9	143.3	5.05	20.6	7.97	4.3	538	257	0.3
2012-H110PG	7.9	994	21.7	-12.1	3.35	21.3	6.7	745	590	283	0.3
2012-H037PG	73.4	991	19.2	206.2	5.52	12	7.21	4.8	439	208	0.2
2012-H048PG	166.2	987	19.9	117.3	4.96	17	6.92	11.9	437	209	0.2
2012-H038PG	158.4	991	19.6	204	5.29	15	6.64	65.5	420	200	0.2
2012-H107PG	63.4	991	19.3	198.5	5.28	18.4	7.61	68.2	435	209	0.2
2012-H118PG	44.6	992	18.7	139.1	5.32	18.1	7.85	39.1	441	211	0.2
2012-H108PG	53.2	993	20.7	128	5.25	19.8	8.04	31.6	445	213	0.2
2012-H124PG	55.6	No water	No water	No water	No water	No water	No water	No water	No water	No water	No water
2012-H123PG	30.4	984	9.9	110.9	4.83	16	7.57	20.2	312	149	0.1
2012-H061PG	116.1	985	11.7	110.8	5.23	21	7.08	4.53	438	208	0.2
2012-H119PG	N/A	N/A	N/A	118.9	4.73	18.2	6.41	80.1	434	207	0.2
2012-H054PG	134.9	986	15.5	-4.7	3.83	17.9	6.73	410	412	200	0.2

Table F.52.Results of the particle size distribution analysis for cores H37 and H001

Sample ID	Clay	Silt	Sand	External Surface Area	Specific Surface Area (Calculated)	d-0.1	d-0.5	d-0.9
	(%)	(%)	(%)	(m^2/g)	(m^2/g)	(mm)	(mm)	(mm)
2012-H37-1	37.7%	46.4%	15.9%	2.1	32.1	1.0	7.9	78.4
2012-H37-2	38.2%	49.2%	12.6%	2.6	32.7	0.8	4.2	25.4
2012-H37-3	38.7%	52.0%	9.3%	2.6	33.3	0.8	4.3	26.0
2012-H37-4	39.2%	54.8%	6.0%	2.6	34.0	0.8	4.5	26.7
2012-H37-5	39.8%	57.5%	2.7%	2.3	34.6	1.0	2.7	31.6
2012-H37-6	40.9%	56.6%	2.5%	2.6	35.2	0.8	4.3	26.0
2012-H37-7	42.0%	55.7%	2.3%	2.6	35.8	0.8	4.1	24.8
2012-H37-8	43.1%	54.8%	2.1%	2.5	36.5	0.7	3.8	23.5
2012-H37-9	44.2%	53.9%	1.9%	2.4	37.1	0.7	3.5	22.3
2012-H37-10	45.4%	52.9%	1.7%	2.4	37.7	0.7	3.3	21.0
2012-H37-11	46.5%	52.0%	1.5%	2.7	38.3	0.9	4.6	27.3
2012-H37-12	45.5%	52.9%	1.6%	2.5	37.8	0.7	3.2	20.7
2012-H37-13	44.4%	53.8%	1.7%	2.6	37.2	0.7	3.3	21.7
2012-H37-14	43.4%	54.7%	1.8%	2.7	36.7	0.7	3.5	22.7
2012-H37-15	42.4%	55.7%	1.9%	2.8	36.1	0.8	3.6	23.7
2012-H37-16	41.4%	56.6%	2.0%	2.3	35.5	1.2	4.9	18.4
2012-H37-17	43.4%	54.5%	2.2%	2.3	36.6	0.6	3.0	19.7
2012-H37-18	45.3%	52.4%	2.3%	1.8	37.7	0.5	2.3	14.8
2012-H37-19	47.3%	50.3%	2.4%	1.2	38.7	0.3	1.5	9.9
2012-H37-20	49.3%	48.2%	2.5%	0.6	39.8	0.2	0.8	4.9
2012-H37-21	51.3%	46.1%	2.6%	2.9	40.8	0.8	3.8	24.7
2012-H37-22	51.3%	46.1%	2.6%	2.9	40.8	0.8	3.8	24.7
2012-H37-23	51.3%	46.1%	2.6%	2.9	40.8	0.8	3.8	24.7
2012-H37-24	51.3%	46.1%	2.6%	2.9	40.8	0.8	3.8	24.7
2012-H001-1	34.5%	62.5%	3.0%	1.9	31.7	1.4	6.3	27.5
2012-H001-2	35.8%	61.7%	2.5%	1.9	32.4	1.3	6.1	26.4
2012-H001-3	37.1%	60.9%	2.0%	2.0	33.2	1.3	5.9	25.2
2012-H001-4	38.3%	60.1%	1.6%	2.0	33.9	1.2	5.8	24.1
2012-H001-5	39.6%	59.3%	1.1%	2.1	34.6	1.2	5.6	22.9
2012-H001-6	40.1%	58.6%	1.3%	2.1	34.9	1.1	5.6	23.0
2012-H001-7	40.5%	58.0%	1.5%	2.1	35.1	1.1	5.5	23.1
2012-H001-8	41.0%	57.4%	1.6%	2.2	35.4	1.1	5.5	23.1
2012-H001-9	41.5%	56.7%	1.8%	2.2	35.6	1.1	5.4	23.2
2012-H001-10	41.9%	56.1%	2.0%	2.2	35.8	1.1	5.4	23.3
2012-H001-11	42.4%	55.5%	2.1%	2.2	36.1	1.1	5.3	23.3
2012-H001-12	42.0%	56.0%	2.0%	2.2	35.9	1.1	5.4	24.0
2012-H001-13	41.6%	56.6%	1.8%	2.2	35.7	1.1	5.4	24.6
2012-H001-14	41.3%	57.1%	1.6%	2.3	35.5	1.0	5.5	25.2
2012-H001-15	40.9%	57.7%	1.4%	2.3	35.3	1.0	5.5	25.9
2012-H001-16	40.5%	58.2%	1.3%	2.3	35.1	1.0	5.6	26.5
2012-H001-17	39.0%	59.2%	1.8%	2.2	34.3	1.0	5.9	29.3
2012-H001-18	37.5%	60.2%	2.3%	2.2	33.4	1.0	6.3	32.0
2012-H001-19	36.0%	61.2%	2.8%	2.1	32.5	1.1	6.6	34.8
2012-H001-20	34.5%	62.2%	3.3%	2.1	31.7	1.1	7.0	37.6
2012-H001-21	33.0%	63.2%	3.8%	2.0	30.8	1.1	7.3	40.4
2012-H001-22	33.0%	63.2%	3.8%	2.0	30.8	1.1	7.3	40.4
2012-H001-23	33.0%	63.2%	3.8%	2.0	30.8	1.1	7.3	40.4
2012-H001-24	33.0%	63.2%	3.8%	2.0	30.8	1.1	7.3	40.4
2012-H001-25	33.0%	63.2%	3.8%	2.0	30.8	1.1	7.3	40.4

Table F.53.Results of the particle size distribution analysis for cores H38 and H48

Sample ID	Clay	Silt	Sand	External Surface Area	Specific Surface Area (Calculated)	d-0.1	d-0.5	d-0.9
	(%)	(%)	(%)	(m^2/g)	(m^2/g)	(mm)	(mm)	(mm)
2012-H38-1	54.1%	44.2%	1.7%	3.0	42.5	0.8	3.4	17.1
2012-H38-2	48.4%	39.4%	12.2%	2.8	38.3	0.9	4.3	85.3
2012-H38-3	42.8%	34.5%	22.7%	2.6	34.2	0.9	5.2	153.4
2012-H38-4	37.1%	29.6%	33.2%	2.4	30.0	0.9	6.1	221.6
2012-H38-5	31.5%	24.8%	43.8%	2.2	25.9	1.0	7.0	289.8
2012-H38-6	32.6%	25.7%	41.7%	2.1	26.7	1.0	8.3	319.1
2012-H38-7	33.7%	26.6%	39.7%	2.0	27.6	1.0	9.7	348.4
2012-H38-8	34.9%	27.5%	37.6%	2.0	28.4	1.1	11.1	377.8
2012-H38-9	36.0%	28.4%	35.5%	1.9	29.2	1.1	12.5	407.1
2012-H38-10	37.2%	29.3%	33.5%	1.8	30.1	1.1	13.8	436.4
2012-H38-11	38.3%	30.2%	31.4%	1.8	30.9	1.1	15.2	465.8
2012-H38-12	43.5%	31.2%	25.4%	2.1	34.3	1.1	12.7	375.4
2012-H38-13	48.6%	32.1%	19.3%	2.5	37.7	1.0	10.2	285.1
2012-H38-14	53.7%	33.1%	13.2%	2.8	41.1	0.9	7.7	194.8
2012-H38-15	58.8%	34.0%	7.1%	3.2	44.5	0.8	5.2	104.5
2012-H38-16	64.0%	35.0%	1.1%	3.5	47.9	0.7	2.8	14.2
2012-H38-17	63.7%	35.4%	0.8%	3.7	47.8	0.7	2.7	13.2
2012-H38-18	63.5%	35.9%	0.6%	3.8	47.7	0.7	2.7	12.2
2012-H38-19	63.3%	36.3%	0.4%	3.9	47.6	0.6	2.7	11.3
2012-H38-20	63.0%	36.8%	0.2%	4.0	47.5	0.6	2.7	10.3
2012-H38-21	62.8%	37.2%	0.0%	4.1	47.4	0.6	2.7	9.3
2012-H38-22	62.8%	37.2%	0.0%	4.1	47.4	0.6	2.7	9.3
2012-H38-23	62.8%	37.2%	0.0%	4.1	47.4	0.6	2.7	9.3
2012-H38-24	62.8%	37.2%	0.0%	4.1	47.4	0.6	2.7	9.3
2012-H38-25	62.8%	37.2%	0.0%	4.1	47.4	0.6	2.7	9.3
2012-H48-1	41.4%	56.9%	1.7%	2.3	35.6	1.1	5.1	23.2
2012-H48-2	45.5%	53.2%	1.3%	2.5	37.8	1.0	4.6	20.8
2012-H48-3	49.6%	49.5%	0.9%	2.7	40.1	0.9	4.1	18.5
2012-H48-4	53.7%	45.8%	0.5%	3.0	42.4	0.8	3.7	16.1
2012-H48-5	57.8%	42.0%	0.1%	3.2	44.6	0.8	3.2	13.8
2012-H48-6	57.0%	42.9%	0.2%	3.2	44.2	0.8	3.3	14.2
2012-H48-7	56.1%	43.7%	0.2%	3.2	43.7	0.8	3.3	14.5
2012-H48-8	55.3%	44.5%	0.2%	3.1	43.2	0.8	3.4	14.9
2012-H48-9	54.4%	45.3%	0.3%	3.1	42.8	0.8	3.5	15.3
2012-H48-10	53.6%	46.1%	0.3%	3.1	42.3	0.8	3.5	15.6
2012-H48-11	52.7%	46.9%	0.4%	3.1	41.8	0.8	3.6	16.0
2012-H48-12	49.3%	48.0%	2.7%	2.9	39.8	0.8	4.1	23.7
2012-H48-13	45.9%	49.0%	5.1%	2.7	37.7	0.9	4.6	31.3
2012-H48-14	42.5%	50.0%	7.5%	2.5	35.6	1.0	5.1	39.0
2012-H48-15	39.1%	51.0%	9.8%	2.3	33.5	1.0	5.6	46.6
2012-H48-16	35.8%	52.1%	12.2%	2.1	31.4	1.1	6.2	54.3
2012-H48-17	39.0%	51.2%	9.7%	2.3	33.5	1.0	5.7	46.3
2012-H48-18	42.3%	50.4%	7.3%	2.4	35.5	1.0	5.2	38.3
2012-H48-19	45.6%	49.5%	4.9%	2.5	37.5	1.0	4.7	30.3
2012-H48-20	48.9%	48.7%	2.4%	2.7	39.5	0.9	4.3	22.3
2012-H48-21	52.1%	47.9%	0.0%	2.8	41.6	0.9	3.8	14.3
2012-H48-22	52.1%	47.9%	0.0%	2.8	41.6	0.9	3.8	14.3
2012-H48-23	52.1%	47.9%	0.0%	2.8	41.6	0.9	3.8	14.3
2012-H48-24	52.1%	47.9%	0.0%	2.8	41.6	0.9	3.8	14.3
2012-H48-25	52.1%	47.9%	0.0%	2.8	41.6	0.9	3.8	14.3

Table F.544.Results of the particle size distribution analysis for cores H61 and H95

Sample ID	Clay	Silt	Sand	External Surface Area	Specific Surface Area (Calculated)	d-0.1	d-0.5	d-0.9
	(%)	(%)	(%)	(m^2/g)	(m^2/g)	(mm)	(mm)	(mm)
2012-H61-1	54.2%	42.4%	3.4%	2.9	42.3	0.8	3.6	29.1
2012-H61-2	48.1%	37.5%	14.4%	2.5	37.9	0.9	31.6	115.4
2012-H61-3	42.0%	32.6%	25.4%	2.2	33.5	1.0	59.6	201.8
2012-H61-4	36.0%	27.7%	36.4%	1.8	29.1	1.1	87.6	288.1
2012-H61-5	29.9%	22.8%	47.3%	1.5	24.7	1.2	115.6	374.4
2012-H61-6	33.4%	24.7%	41.9%	1.7	27.1	1.2	97.0	363.6
2012-H61-7	36.9%	26.7%	36.5%	2.0	29.6	1.1	78.4	352.8
2012-H61-8	40.3%	28.6%	31.0%	2.2	32.0	1.0	59.8	342.1
2012-H61-9	43.8%	30.6%	25.6%	2.4	34.5	0.9	41.2	331.3
2012-H61-10	47.3%	32.6%	20.2%	2.6	36.9	0.9	22.5	320.5
2012-H61-11	50.8%	34.5%	14.7%	2.9	39.3	0.8	3.9	309.7
2012-H61-12	51.5%	34.5%	14.0%	2.9	39.8	0.8	3.8	285.5
2012-H61-13	52.3%	34.4%	13.2%	3.0	40.3	0.8	3.8	261.3
2012-H61-14	53.1%	34.4%	12.5%	3.0	40.8	0.8	3.7	237.1
2012-H61-15	53.9%	34.4%	11.7%	3.1	41.3	0.7	3.6	212.9
2012-H61-16	54.7%	34.3%	11.0%	3.1	41.9	0.7	3.5	188.7
2012-H61-17	52.4%	37.4%	10.2%	3.0	40.7	0.8	3.7	154.2
2012-H61-18	50.1%	40.5%	9.5%	2.9	39.5	0.8	3.9	119.6
2012-H61-19	47.8%	43.5%	8.7%	2.8	38.3	0.8	4.1	85.1
2012-H61-20	45.5%	46.6%	7.9%	2.8	37.2	0.8	4.3	50.6
2012-H61-21	43.2%	49.6%	7.2%	2.7	36.0	0.9	4.5	16.1
2012-H61-22	43.2%	49.6%	7.2%	2.7	36.0	0.9	4.5	16.1
2012-H61-23	43.2%	49.6%	7.2%	2.7	36.0	0.9	4.5	16.1
2012-H61-24	43.2%	49.6%	7.2%	2.7	36.0	0.9	4.5	16.1
2012-H61-25	43.2%	49.6%	7.2%	2.7	36.0	0.9	4.5	16.1
2012-H095-1	40.2%	54.4%	5.4%	2.2	34.5	1.0	6.2	46.8
2012-H095-2	34.4%	50.0%	15.6%	1.9	30.3	1.3	20.2	133.9
2012-H095-3	28.6%	45.5%	25.8%	1.6	26.2	1.5	34.2	221.0
2012-H095-4	22.9%	41.1%	36.0%	1.3	22.0	1.7	48.2	308.2
2012-H095-5	17.1%	36.7%	46.2%	1.0	17.8	2.0	62.2	395.3
2012-H095-6	20.0%	40.5%	39.5%	1.2	20.1	1.8	53.1	335.5
2012-H095-7	22.9%	44.3%	32.7%	1.4	22.4	1.7	44.0	275.7
2012-H095-8	25.9%	48.2%	26.0%	1.6	24.7	1.5	34.9	215.9
2012-H095-9	28.8%	52.0%	19.2%	1.8	26.9	1.3	25.8	156.2
2012-H095-10	31.7%	55.8%	12.5%	2.0	29.2	1.2	16.7	96.4
2012-H095-11	34.6%	59.7%	5.7%	2.2	31.5	1.0	7.6	36.6
2012-H095-12	32.3%	54.6%	13.1%	2.0	29.4	1.1	15.2	107.8
2012-H095-13	29.9%	49.5%	20.6%	1.8	27.4	1.2	22.9	179.0
2012-H095-14	27.6%	44.4%	28.0%	1.7	25.4	1.2	30.6	250.3
2012-H095-15	25.2%	39.4%	35.5%	1.5	23.3	1.3	38.3	321.5
2012-H095-16	22.8%	34.3%	42.9%	1.4	21.3	1.4	46.0	392.7
2012-H095-17	21.1%	30.5%	48.4%	1.3	19.8	1.5	78.0	413.4
2012-H095-18	19.4%	26.6%	53.9%	1.2	18.3	1.6	110.0	434.2
2012-H095-19	17.7%	22.8%	59.5%	1.1	16.8	1.7	142.0	454.9
2012-H095-20	16.0%	19.0%	65.0%	1.1	15.4	1.8	174.0	475.6
2012-H095-21	14.3%	15.2%	70.5%	1.0	13.9	1.9	206.0	496.4
2012-H095-22	14.3%	15.2%	70.5%	1.0	13.9	1.9	206.0	496.4
2012-H095-23	14.3%	15.2%	70.5%	1.0	13.9	1.9	206.0	496.4
2012-H095-24	14.3%	15.2%	70.5%	1.0	13.9	1.9	206.0	496.4
2012-H095-25	14.3%	15.2%	70.5%	1.0	13.9	1.9	206.0	496.4

Table F.555.Results of the particle size distribution analysis for cores H48-A and H006

Sample ID	Clay	Silt	Sand	External Surface Area	Specific Surface Area (Calculated)	d-0.1	d-0.5	d-0.9
	(%)	(%)	(%)	(m^2/g)	(m^2/g)	(mm)	(mm)	(mm)
2012-H48-A-1	55.0%	44.4%	0.6%	3.0	43.1	0.8	3.4	15.3
2012-H48-A-2	53.7%	45.3%	1.1%	3.0	42.3	0.8	3.6	16.4
2012-H48-A-3	52.4%	46.1%	1.5%	2.9	41.6	0.8	3.7	17.5
2012-H48-A-4	51.1%	47.0%	1.9%	2.9	40.8	0.8	3.8	18.6
2012-H48-A-5	49.8%	47.9%	2.3%	2.9	40.1	0.8	4.0	19.8
2012-H48-A-6	50.1%	48.0%	1.9%	3.0	40.3	0.8	3.9	19.3
2012-H48-A-7	50.3%	48.1%	1.5%	3.0	40.4	0.8	3.9	18.8
2012-H48-A-8	50.6%	48.3%	1.1%	3.1	40.6	0.7	3.8	18.4
2012-H48-A-9	50.8%	48.4%	0.8%	3.2	40.8	0.7	3.8	17.9
2012-H48-A-10	51.0%	48.6%	0.4%	3.3	40.9	0.7	3.7	17.4
2012-H48-A-11	51.3%	48.7%	0.0%	3.4	41.1	0.7	3.7	16.9
2012-H48-A-12	51.0%	45.3%	3.7%	3.4	40.6	0.7	3.7	33.2
2012-H48-A-13	50.8%	41.9%	7.4%	3.4	40.1	0.7	3.7	49.4
2012-H48-A-14	50.5%	38.5%	11.1%	3.4	39.6	0.6	3.7	65.6
2012-H48-A-15	50.2%	35.0%	14.7%	3.4	39.0	0.6	3.7	81.8
2012-H48-A-16	50.0%	31.6%	18.4%	3.4	38.5	0.6	3.7	98.0
2012-H48-A-17	54.8%	30.5%	14.7%	3.7	41.5	0.6	3.3	81.0
2012-H48-A-18	59.7%	29.3%	11.1%	4.0	44.5	0.6	2.9	64.0
2012-H48-A-19	64.5%	28.1%	7.4%	4.3	47.6	0.6	2.5	47.0
2012-H48-A-20	69.4%	27.0%	3.7%	4.5	50.6	0.6	2.1	30.0
2012-H48-A-21	74.2%	25.8%	0.0%	4.8	53.6	0.5	1.7	13.0
2012-H48-A-22	74.2%	25.8%	0.0%	4.8	53.6	0.5	1.7	13.0
2012-H48-A-23	74.2%	25.8%	0.0%	4.8	53.6	0.5	1.7	13.0
2012-H48-A-24	74.2%	25.8%	0.0%	4.8	53.6	0.5	1.7	13.0
2012-H48-A-25	74.2%	25.8%	0.0%	4.8	53.6	0.5	1.7	13.0
2012-H006-1	30.9%	64.2%	4.9%	1.9	29.5	1.2	7.9	36.5
2012-H006-2	31.5%	64.1%	4.3%	1.9	29.9	1.2	7.8	37.1
2012-H006-3	32.2%	64.1%	3.7%	1.9	30.3	1.2	7.7	37.6
2012-H006-4	32.8%	64.0%	3.2%	2.0	30.7	1.1	7.5	38.2
2012-H006-5	33.5%	63.9%	2.6%	2.0	31.1	1.1	7.4	38.7
2012-H006-6	33.3%	63.0%	3.7%	2.0	31.0	1.1	7.8	42.1
2012-H006-7	33.2%	62.1%	4.7%	2.0	30.8	1.1	8.3	45.5
2012-H006-8	33.1%	61.2%	5.7%	2.0	30.6	1.1	8.7	48.8
2012-H006-9	32.9%	60.3%	6.7%	2.0	30.4	1.1	9.1	52.2
2012-H006-10	32.8%	59.4%	7.8%	1.9	30.3	1.1	9.5	55.6
2012-H006-11	32.7%	58.5%	8.8%	1.9	30.1	1.1	9.9	58.9
2012-H006-12	32.5%	58.6%	8.9%	1.9	30.0	1.1	9.8	59.0
2012-H006-13	32.3%	58.7%	9.0%	1.9	29.9	1.1	9.7	59.1
2012-H006-14	32.1%	58.8%	9.1%	1.9	29.7	1.1	9.6	59.2
2012-H006-15	31.9%	58.9%	9.2%	1.9	29.6	1.1	9.5	59.3
2012-H006-16	31.7%	59.0%	9.3%	1.8	29.5	1.2	9.4	59.5
2012-H006-17	32.2%	59.0%	8.8%	1.9	29.9	1.1	9.1	57.9
2012-H006-18	32.8%	58.9%	8.3%	2.0	30.2	1.1	8.8	56.3
2012-H006-19	33.4%	58.9%	7.7%	2.0	30.6	1.1	8.5	54.7
2012-H006-20	34.0%	58.9%	7.2%	2.1	31.0	1.0	8.2	53.1
2012-H006-21	34.5%	58.8%	6.6%	2.1	31.3	1.0	8.0	51.5
2012-H006-22	34.5%	58.8%	6.6%	2.1	31.3	1.0	8.0	51.5
2012-H006-23	34.5%	58.8%	6.6%	2.1	31.3	1.0	8.0	51.5
2012-H006-24	34.5%	58.8%	6.6%	2.1	31.3	1.0	8.0	51.5
2012-H006-25	34.5%	58.8%	6.6%	2.1	31.3	1.0	8.0	51.5

Table F.566.Results of the particle size distribution analysis for cores H32 and H12

Sample ID	Clay	Silt	Sand	External Surface Area	Specific Surface Area (Calculated)	d-0.1	d-0.5	d-0.9
	(%)	(%)	(%)	(m^2/g)	(m^2/g)	(mm)	(mm)	(mm)
2012-H32-1	31.1%	65.2%	3.7%	1.8	29.8	1.3	7.9	33.7
2012-H32-2	35.0%	62.2%	2.8%	2.0	31.9	1.2	7.0	29.9
2012-H32-3	38.8%	59.3%	1.9%	2.2	34.1	1.1	6.1	26.0
2012-H32-4	42.7%	56.3%	1.1%	2.3	36.3	1.1	5.3	22.2
2012-H32-5	46.5%	53.3%	0.2%	2.5	38.5	1.0	4.4	18.3
2012-H32-6	46.5%	53.4%	0.1%	2.5	38.5	1.0	4.4	18.1
2012-H32-7	46.5%	53.4%	0.1%	2.6	38.5	0.9	4.4	17.8
2012-H32-8	46.5%	53.4%	0.1%	2.6	38.5	0.9	4.4	17.6
2012-H32-9	46.5%	53.5%	0.1%	2.6	38.5	0.9	4.4	17.3
2012-H32-10	46.5%	53.5%	0.0%	2.6	38.5	0.9	4.4	17.1
2012-H32-11	46.5%	53.5%	0.0%	2.7	38.5	0.9	4.4	16.8
2012-H32-12	47.0%	53.0%	0.0%	2.7	38.8	0.9	4.3	17.0
2012-H32-13	47.5%	52.5%	0.0%	2.7	39.1	0.9	4.2	17.2
2012-H32-14	48.1%	51.9%	0.0%	2.7	39.4	0.9	4.2	17.4
2012-H32-15	48.6%	51.4%	0.0%	2.7	39.6	0.9	4.1	17.6
2012-H32-16	49.1%	50.9%	0.0%	2.8	39.9	0.9	4.0	17.8
2012-H32-17	46.9%	53.0%	0.1%	2.6	38.7	0.9	4.4	18.5
2012-H32-18	44.7%	55.0%	0.3%	2.5	37.5	1.0	4.7	19.2
2012-H32-19	42.5%	57.1%	0.4%	2.4	36.3	1.0	5.1	19.9
2012-H32-20	40.2%	59.2%	0.6%	2.3	35.0	1.1	5.5	20.6
2012-H32-21	38.0%	61.3%	0.7%	2.2	33.8	1.1	5.8	21.4
2012-H32-22	38.0%	61.3%	0.7%	2.2	33.8	1.1	5.8	21.4
2012-H32-23	38.0%	61.3%	0.7%	2.2	33.8	1.1	5.8	21.4
2012-H32-24	38.0%	61.3%	0.7%	2.2	33.8	1.1	5.8	21.4
2012-H32-25	38.0%	61.3%	0.7%	2.2	33.8	1.1	5.8	21.4
2012-H12-1	34.5%	63.5%	2.0%	2.0	31.8	1.1	7.0	29.4
2012-H12-2	35.4%	62.7%	1.8%	2.1	32.3	1.1	6.7	28.5
2012-H12-3	36.4%	62.0%	1.6%	2.2	32.9	1.0	6.5	27.6
2012-H12-4	37.4%	61.2%	1.4%	2.3	33.4	1.0	6.2	26.7
2012-H12-5	38.4%	60.5%	1.1%	2.4	34.0	0.9	6.0	25.8
2012-H12-6	38.3%	60.6%	1.1%	2.3	33.9	1.0	6.0	25.3
2012-H12-7	38.2%	60.7%	1.1%	2.3	33.9	1.0	5.9	24.8
2012-H12-8	38.1%	60.9%	1.1%	2.3	33.8	1.0	5.9	24.2
2012-H12-9	37.9%	61.0%	1.0%	2.2	33.7	1.0	5.9	23.7
2012-H12-10	37.8%	61.1%	1.0%	2.2	33.7	1.1	5.9	23.2
2012-H12-11	37.7%	61.3%	1.0%	2.2	33.6	1.1	5.9	22.7
2012-H12-12	37.8%	60.7%	1.5%	2.2	33.6	1.1	6.0	24.2
2012-H12-13	37.9%	60.0%	2.1%	2.2	33.6	1.0	6.0	25.8
2012-H12-14	38.0%	59.4%	2.6%	2.2	33.6	1.0	6.1	27.4
2012-H12-15	38.1%	58.8%	3.1%	2.2	33.6	1.0	6.2	28.9
2012-H12-16	38.2%	58.2%	3.7%	2.3	33.6	1.0	6.2	30.5
2012-H12-17	38.5%	58.4%	3.1%	2.3	33.8	1.0	6.1	29.0
2012-H12-18	38.9%	58.5%	2.6%	2.3	34.1	1.0	5.9	27.5
2012-H12-19	39.2%	58.7%	2.1%	2.3	34.3	1.0	5.8	25.9
2012-H12-20	39.5%	58.9%	1.5%	2.3	34.6	1.0	5.7	24.4
2012-H12-21	39.9%	59.1%	1.0%	2.3	34.8	1.0	5.5	22.9
2012-H12-22	39.9%	59.1%	1.0%	2.3	34.8	1.0	5.5	22.9
2012-H12-23	39.9%	59.1%	1.0%	2.3	34.8	1.0	5.5	22.9
2012-H12-24	39.9%	59.1%	1.0%	2.3	34.8	1.0	5.5	22.9
2012-H12-25	39.9%	59.1%	1.0%	2.3	34.8	1.0	5.5	22.9

Table F.57.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON30

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON30-1	/01	3.10690	1.04267	1.11130	4.21820	3.10690	1.32240	0.21110	0.07084	6.79%	93.21%
2013-ON30-1	/02	3.10400	1.04170	1.11260	4.21660	3.10400	1.32720	0.21460	0.07202	6.91%	93.09%
2013-ON30-2	/01	3.05490	1.02522	1.11830	4.17320	3.05490	1.31880	0.20050	0.06729	6.56%	93.44%
2013-ON30-2	/02	3.07950	1.03347	1.13740	4.21690	3.07950	1.34470	0.20730	0.06957	6.73%	93.27%
2013-ON30-3	/01	3.22300	1.08163	1.12800	4.35100	3.22300	1.45260	0.32460	0.10894	10.07%	89.93%
2013-ON30-3	/02	3.20351	1.07509	1.09229	4.29580	3.20351	1.42410	0.33181	0.11135	10.36%	89.64%
2013-ON30-4	/01	3.28900	1.10378	1.08180	4.37080	3.28900	1.52140	0.43960	0.14753	13.37%	86.63%
2013-ON30-4	/02	3.24070	1.08757	1.05960	4.30030	3.24070	1.47900	0.41940	0.14075	12.94%	87.06%
2013-ON30-5	/01	3.32520	1.11593	1.10830	4.43350	3.32520	1.68910	0.58080	0.19492	17.47%	82.53%
2013-ON30-5	/02	3.33950	1.12073	1.11360	4.45310	3.33950	1.69020	0.57660	0.19351	17.27%	82.73%
2013-ON30-6	/01	3.33350	1.11871	1.08510	4.41860	3.33350	1.69850	0.61340	0.20586	18.40%	81.60%
2013-ON30-6	/02	3.33250	1.11838	1.06880	4.40130	3.33250	1.68200	0.61320	0.20579	18.40%	81.60%
2013-ON30-7	/01	3.28350	1.10193	1.08570	4.36920	3.28350	1.69310	0.60740	0.20384	18.50%	81.50%
2013-ON30-7	/02	3.31570	1.11274	1.07900	4.39470	3.31570	1.68610	0.60710	0.20374	18.31%	81.69%
2013-ON30-8	/01	3.28370	1.10200	1.11090	4.39460	3.28370	1.66400	0.55310	0.18562	16.84%	83.16%
2013-ON30-8	/02	3.30530	1.10925	1.05240	4.35770	3.30530	1.60800	0.55560	0.18646	16.81%	83.19%
2013-ON30-9	/01	3.32380	1.11546	1.11520	4.43900	3.32380	1.68230	0.56710	0.19032	17.06%	82.94%
2013-ON30-9	/02	3.35490	1.12590	1.09250	4.44740	3.35490	1.67180	0.57930	0.19441	17.27%	82.73%
2013-ON30-10	/01	3.33880	1.12049	1.10620	4.44500	3.33880	1.72100	0.61480	0.20633	18.41%	81.59%
2013-ON30-10	/02	3.35420	1.12566	1.10670	4.46090	3.35420	1.73270	0.62600	0.21008	18.66%	81.34%
2013-ON30-11	/01	3.42920	1.15083	1.04000	4.46920	3.42920	1.77380	0.73380	0.24626	21.40%	78.60%
2013-ON30-11	/02	3.41020	1.14446	1.09160	4.50180	3.41020	1.81600	0.72440	0.24311	21.24%	78.76%
2013-ON30-12	/01	3.41910	1.14744	1.11510	4.53420	3.41910	1.82760	0.71250	0.23911	20.84%	79.16%
2013-ON30-12	/02	3.42090	1.14805	1.08160	4.50250	3.42090	1.84460	0.76300	0.25606	22.30%	77.70%
2013-ON30-13	/01	3.43720	1.15352	1.09760	4.53480	3.43720	1.87700	0.77940	0.26156	22.68%	77.32%
2013-ON30-13	/02	3.42920	1.15083	1.11770	4.54690	3.42920	1.89740	0.77970	0.26167	22.74%	77.26%
2013-ON30-14	/01	3.45230	1.15858	1.11710	4.56940	3.45230	1.91800	0.80090	0.26878	23.20%	76.80%
2013-ON30-14	/02	3.47620	1.16660	1.09070	4.56690	3.47620	1.89260	0.80190	0.26912	23.07%	76.93%
2013-ON30-15	/01	3.46290	1.16214	1.12550	4.58840	3.46290	1.92440	0.79890	0.26811	23.07%	76.93%
2013-ON30-15	/02	3.43450	1.15261	1.10950	4.54400	3.43450	1.92940	0.81990	0.27516	23.87%	76.13%
2013-ON30-16	/01	3.35880	1.12721	1.12040	4.47920	3.35880	1.91980	0.79940	0.26828	23.80%	76.20%
2013-ON30-16	/02	3.41590	1.14637	1.11920	4.53510	3.41590	1.92800	0.80880	0.27143	23.68%	76.32%
2013-ON30-17	/01	3.45540	1.15962	1.08680	4.54220	3.45540	1.89580	0.80900	0.27150	23.41%	76.59%
2013-ON30-17	/02	3.48920	1.17097	1.15200	4.64120	3.48920	1.99520	0.84320	0.28298	24.17%	75.83%
2013-ON30-18	/01	3.45680	1.16009	1.07450	4.53130	3.45680	1.91800	0.84350	0.28308	24.40%	75.60%
2013-ON30-18	/02	3.48730	1.17033	1.13600	4.62330	3.48730	2.00540	0.86940	0.29177	24.93%	75.07%
2013-ON30-19	/01	3.47770	1.16711	1.11820	4.59590	3.47770	1.98020	0.86200	0.28929	24.79%	75.21%
2013-ON30-19	/02	3.45590	1.15979	1.08760	4.54350	3.45590	1.94310	0.85550	0.28710	24.75%	75.25%
2013-ON30-20	/01	3.44700	1.15681	1.12070	4.56770	3.44700	1.95500	0.83430	0.27999	24.20%	75.80%
2013-ON30-20	/02	3.48040	1.16801	1.10950	4.58990	3.48040	1.98580	0.87630	0.29408	25.18%	74.82%
2013-ON30-21	/01	3.49450	1.17275	1.07490	4.56940	3.49450	1.96170	0.88680	0.29761	25.38%	74.62%
2013-ON30-21	/02	3.48020	1.16795	1.10060	4.58080	3.48020	1.97840	0.87780	0.29459	25.22%	74.78%
2013-ON30-22	/01	3.43910	1.15415	1.12440	4.56350	3.43910	2.00750	0.88310	0.29637	25.68%	74.32%
2013-ON30-22	/02	3.46290	1.16214	1.09450	4.55740	3.46290	1.98210	0.88760	0.29788	25.63%	74.37%
2013-ON30-23	/01	3.48250	1.16872	1.09580	4.57830	3.48250	2.00590	0.91010	0.30543	26.13%	73.87%
2013-ON30-23	/02	3.50140	1.17506	1.08220	4.58360	3.50140	1.99640	0.91420	0.30680	26.11%	73.89%
2013-ON30-24	/01	3.48510	1.16959	1.11130	4.59640	3.48510	2.02060	0.90930	0.30516	26.09%	73.91%
2013-ON30-24	/02	3.51680	1.18023	1.15890	4.67570	3.51680	2.07720	0.91830	0.30818	26.11%	73.89%
2013-ON30-25	/01	3.47660	1.16674	1.12590	4.60250	3.47660	2.04780	0.92190	0.30939	26.52%	73.48%
2013-ON30-25	/02	3.49330	1.17234	1.05860	4.55190	3.49330	1.98460	0.92600	0.31076	26.51%	73.49%

Table F.588.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON02

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON02-1	/01	3.09040	1.03622	1.12720	4.21760	3.09040	1.39620	0.26900	0.09020	8.70%	91.30%
2013-ON02-1	/02	3.09020	1.03615	1.10420	4.19440	3.09020	1.43240	0.32820	0.11005	10.62%	89.38%
2013-ON02-2	/01	3.26200	1.09375	1.09660	4.35860	3.26200	1.55810	0.46150	0.15474	14.15%	85.85%
2013-ON02-2	/02	3.27810	1.09915	1.11090	4.38900	3.27810	1.56960	0.45870	0.15380	13.99%	86.01%
2013-ON02-3	/01	3.34810	1.12262	1.07870	4.42680	3.34810	1.60270	0.52400	0.17570	15.65%	84.35%
2013-ON02-3	/02	3.22180	1.08027	1.10780	4.32960	3.22180	1.60350	0.49570	0.16621	15.39%	84.61%
2013-ON02-4	/01	3.27010	1.09647	1.10090	4.37100	3.27010	1.67240	0.57150	0.19162	17.48%	82.52%
2013-ON02-4	/02	3.27020	1.09650	1.12380	4.39400	3.27020	1.69680	0.57300	0.19213	17.52%	82.48%
2013-ON02-5	/01	3.31120	1.11025	1.07800	4.38920	3.31120	1.71500	0.63700	0.21359	19.24%	80.76%
2013-ON02-5	/02	3.29550	1.10499	1.09750	4.39300	3.29550	1.72720	0.62970	0.21114	19.11%	80.89%
2013-ON02-6	/01	3.37160	1.13050	1.08760	4.45920	3.37160	1.82360	0.73600	0.24678	21.83%	78.17%
2013-ON02-6	/02	3.37110	1.13033	1.09240	4.46350	3.37110	1.82950	0.73710	0.24715	21.87%	78.13%
2013-ON02-7	/01	3.53100	1.18395	1.10920	4.64020	3.53100	2.07040	0.96120	0.32229	27.22%	72.78%
2013-ON02-7	/02	3.51030	1.17701	1.11610	4.62640	3.51030	2.07200	0.95590	0.32051	27.23%	72.77%
2013-ON02-8	/01	3.61710	1.21282	1.10920	4.72630	3.61710	2.21130	1.10210	0.36954	30.47%	69.53%
2013-ON02-8	/02	3.60660	1.20930	1.07520	4.68180	3.60660	2.17060	1.09540	0.36729	30.37%	69.63%
2013-ON02-9	/01	3.63960	1.22036	1.05540	4.69500	3.63960	2.19610	1.14070	0.38248	31.34%	68.66%
2013-ON02-9	/02	3.66860	1.23009	1.11670	4.78530	3.66860	2.27270	1.15600	0.38761	31.51%	68.49%
2013-ON02-10	/01	3.61040	1.21057	1.08410	4.69450	3.61040	2.18760	1.10350	0.37000	30.56%	69.44%
2013-ON02-10	/02	3.56290	1.19464	1.09770	4.66060	3.56290	2.18420	1.08650	0.36430	30.49%	69.51%
2013-ON02-11	/01	3.62610	1.21584	1.08380	4.70990	3.62610	2.20000	1.11620	0.37426	30.78%	69.22%
2013-ON02-11	/02	3.61950	1.21362	1.12180	4.74130	3.61950	2.23740	1.11560	0.37406	30.82%	69.18%
2013-ON02-12	/01	3.46420	1.16155	1.09990	4.56410	3.46420	2.14220	1.04230	0.34948	30.09%	69.91%
2013-ON02-12	/02	3.56350	1.19485	1.07880	4.64230	3.56350	2.15020	1.07140	0.35924	30.07%	69.93%
2013-ON02-13	/01	3.48940	1.17000	1.12040	4.60980	3.48940	2.17330	1.05290	0.35304	30.17%	69.83%
2013-ON02-13	/02	3.56510	1.19538	1.08210	4.64720	3.56510	2.15420	1.07210	0.35948	30.07%	69.93%
2013-ON02-14	/01	3.57960	1.20024	1.12310	4.70270	3.57960	2.22200	1.09890	0.36846	30.70%	69.30%
2013-ON02-14	/02	3.58290	1.20135	1.08260	4.66550	3.58290	2.18720	1.10460	0.37037	30.83%	69.17%
2013-ON02-15	/01	3.64270	1.22140	1.10030	4.74300	3.64270	2.23850	1.13820	0.38164	31.25%	68.75%
2013-ON02-15	/02	3.56250	1.19451	1.10890	4.67140	3.56250	2.21700	1.10810	0.37155	31.10%	68.90%
2013-ON02-16	/01	3.62300	1.21480	1.10250	4.72550	3.62300	2.27150	1.16900	0.39197	32.27%	67.73%
2013-ON02-16	/02	3.61670	1.21268	1.12630	4.74300	3.61670	2.29470	1.16840	0.39177	32.31%	67.69%
2013-ON02-17	/01	3.62410	1.21517	1.07110	4.69520	3.62410	2.21760	1.14650	0.38442	31.64%	68.36%
2013-ON02-17	/02	3.61450	1.21195	1.11330	4.72780	3.61450	2.25330	1.14000	0.38224	31.54%	68.46%
2013-ON02-18	/01	3.59480	1.20534	1.11520	4.71000	3.59480	2.24440	1.12920	0.37862	31.41%	68.59%
2013-ON02-18	/02	3.60060	1.20729	1.13700	4.73760	3.60060	2.26770	1.13070	0.37913	31.40%	68.60%
2013-ON02-19	/01	3.63360	1.21835	1.07750	4.71110	3.63360	2.21800	1.14050	0.38241	31.39%	68.61%
2013-ON02-19	/02	3.63500	1.21882	1.11220	4.74720	3.63500	2.25370	1.14150	0.38275	31.40%	68.60%
2013-ON02-20	/01	3.64710	1.22288	1.13790	4.78500	3.64710	2.31240	1.17450	0.39381	32.20%	67.80%
2013-ON02-20	/02	3.65400	1.22519	1.12460	4.77860	3.65400	2.30100	1.17640	0.39445	32.19%	67.81%
2013-ON02-21	/01	3.58420	1.20179	1.13120	4.71540	3.58420	2.28260	1.15140	0.38607	32.12%	67.88%
2013-ON02-21	/02	3.62030	1.21389	1.08960	4.70990	3.62030	2.24910	1.15950	0.38878	32.03%	67.97%
2013-ON02-22	/01	3.59130	1.20417	1.10330	4.69460	3.59130	2.23060	1.12730	0.37799	31.39%	68.61%
2013-ON02-22	/02	3.60470	1.20866	1.11580	4.72050	3.60470	2.24640	1.13060	0.37909	31.36%	68.64%
2013-ON02-23	/01	3.66110	1.22757	1.14170	4.80280	3.66110	2.28440	1.14270	0.38315	31.21%	68.79%
2013-ON02-23	/02	3.61190	1.21107	1.09280	4.70470	3.61190	2.22730	1.13450	0.38040	31.41%	68.59%
2013-ON02-24	/01	3.56680	1.19595	1.09880	4.66560	3.56680	2.22000	1.12120	0.37594	31.43%	68.57%
2013-ON02-24	/02	3.60890	1.21007	1.11490	4.72380	3.60890	2.24950	1.13460	0.38043	31.44%	68.56%
2013-ON02-25	/01	3.64500	1.22217	1.11440	4.75940	3.64500	2.30570	1.19130	0.39944	32.68%	67.32%
2013-ON02-25	/02	3.61240	1.21124	1.11140	4.72380	3.61240	2.31200	1.20060	0.40256	33.24%	66.76%

Table F.599.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON06

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON06-1	/01	3.37210	1.15068	1.10410	4.47620	3.37210	1.84620	0.74210	0.25323	22.01%	77.99%
2013-ON06-1	/02	3.48970	1.19081	1.06200	4.55170	3.48970	1.86150	0.79950	0.27282	22.91%	77.09%
2013-ON06-2	/01	3.63750	1.24124	1.10950	4.74700	3.63750	2.21390	1.10440	0.37686	30.36%	69.64%
2013-ON06-2	/02	3.67010	1.25236	1.12180	4.79190	3.67010	2.25420	1.13240	0.38641	30.85%	69.15%
2013-ON06-3	/01	3.68890	1.25878	1.12420	4.81310	3.68890	2.38550	1.26130	0.43040	34.19%	65.81%
2013-ON06-3	/02	3.54540	1.20981	1.08290	4.62830	3.54540	2.27580	1.19290	0.40706	33.65%	66.35%
2013-ON06-4	/01	3.65550	1.24738	1.08880	4.74430	3.65550	2.26610	1.17730	0.40174	32.21%	67.79%
2013-ON06-4	/02	3.60070	1.22868	1.12360	4.72430	3.60070	2.24730	1.12370	0.38345	31.21%	68.79%
2013-ON06-5	/01	3.55140	1.21186	1.07880	4.63020	3.55140	2.23910	1.16030	0.39593	32.67%	67.33%
2013-ON06-5	/02	3.68450	1.25728	1.06980	4.75430	3.68450	2.30690	1.23710	0.42214	33.58%	66.42%
2013-ON06-6	/01	3.71030	1.26608	1.11130	4.82160	3.71030	2.43480	1.32350	0.45162	35.67%	64.33%
2013-ON06-6	/02	3.73340	1.27397	1.15740	4.89080	3.73340	2.43060	1.27320	0.43446	34.10%	65.90%
2013-ON06-7	/01	3.70000	1.26257	1.11910	4.81910	3.70000	2.44260	1.32350	0.45162	35.77%	64.23%
2013-ON06-7	/02	3.72200	1.27007	1.11990	4.84190	3.72200	2.44920	1.32930	0.45360	35.71%	64.29%
2013-ON06-8	/01	3.70360	1.26380	1.10300	4.80660	3.70360	2.43330	1.33030	0.45394	35.92%	64.08%
2013-ON06-8	/02	3.69730	1.26165	1.11180	4.80910	3.69730	2.44790	1.33610	0.45592	36.14%	63.86%
2013-ON06-9	/01	3.66970	1.25223	1.09340	4.76310	3.66970	2.44800	1.35460	0.46224	36.91%	63.09%
2013-ON06-9	/02	3.68380	1.25704	1.16000	4.84380	3.68380	2.51890	1.35890	0.46370	36.89%	63.11%
2013-ON06-10	/01	3.76940	1.28625	1.10060	4.87000	3.76940	2.44250	1.34190	0.45790	35.60%	64.40%
2013-ON06-10	/02	3.68290	1.25673	1.06010	4.74300	3.68290	2.30920	1.24910	0.42624	33.92%	66.08%
2013-ON06-11	/01	3.72780	1.27205	1.12270	4.85050	3.72780	2.45850	1.33580	0.45582	35.83%	64.17%
2013-ON06-11	/02	3.70480	1.26421	1.09940	4.80420	3.70480	2.41890	1.31950	0.45026	35.62%	64.38%
2013-ON06-12	/01	3.79580	1.29526	1.09320	4.88900	3.79580	2.50890	1.41570	0.48309	37.30%	62.70%
2013-ON06-12	/02	3.77120	1.28686	1.10230	4.87350	3.77120	2.50460	1.40230	0.47851	37.18%	62.82%
2013-ON06-13	/01	3.88900	1.32706	1.15390	5.04290	3.88900	2.71440	1.56050	0.53250	40.13%	59.87%
2013-ON06-13	/02	3.86980	1.32051	1.09290	4.96270	3.86980	2.64100	1.54810	0.52827	40.00%	60.00%
2013-ON06-14	/01	3.85640	1.31594	1.12320	4.97960	3.85640	2.77000	1.64680	0.56195	42.70%	57.30%
2013-ON06-14	/02	3.91500	1.33593	1.13140	5.04640	3.91500	2.77160	1.64020	0.55969	41.90%	58.10%
2013-ON06-15	/01	4.07150	1.38934	1.08310	5.15460	4.07150	2.97950	1.89640	0.64712	46.58%	53.42%
2013-ON06-15	/02	4.02360	1.37299	1.11790	5.14150	4.02360	2.98700	1.86910	0.63780	46.45%	53.55%
2013-ON06-16	/01	4.17810	1.42571	1.14240	5.32050	4.17810	3.10860	1.96620	0.67094	47.06%	52.94%
2013-ON06-16	/02	4.13000	1.40930	1.11850	5.24850	4.13000	3.04240	1.92390	0.65650	46.58%	53.42%
2013-ON06-17	/01	4.26740	1.45618	1.11600	5.38340	4.26740	3.21840	2.10240	0.71741	49.27%	50.73%
2013-ON06-17	/02	4.25700	1.45264	1.13530	5.39230	4.25700	3.24100	2.10570	0.71854	49.46%	50.54%
2013-ON06-18	/01	4.02770	1.37439	1.12090	5.14860	4.02770	2.95810	1.83720	0.62692	45.61%	54.39%
2013-ON06-18	/02	4.00850	1.36784	1.12510	5.13360	4.00850	2.94320	1.81810	0.62040	45.36%	54.64%
2013-ON06-19	/01	4.07430	1.39029	1.11550	5.18980	4.07430	3.04970	1.93420	0.66002	47.47%	52.53%
2013-ON06-19	/02	4.09690	1.39800	1.09850	5.19540	4.09690	3.02880	1.93030	0.65869	47.12%	52.88%
2013-ON06-20	/01	4.02150	1.37227	1.08030	5.10180	4.02150	2.96590	1.88560	0.64343	46.89%	53.11%
2013-ON06-20	/02	4.06030	1.38551	1.07460	5.13490	4.06030	2.96460	1.89000	0.64493	46.55%	53.45%
2013-ON06-21	/01	4.07230	1.38961	1.12670	5.19900	4.07230	2.98320	1.85650	0.63350	45.59%	54.41%
2013-ON06-21	/02	4.11190	1.40312	1.09490	5.20680	4.11190	2.96340	1.86850	0.63760	45.44%	54.56%
2013-ON06-22	/01	3.96930	1.35446	1.10580	5.07510	3.96930	2.80540	1.69960	0.57996	42.82%	57.18%
2013-ON06-22	/02	3.83730	1.30942	1.13980	4.97710	3.83730	2.79200	1.65220	0.56379	43.06%	56.94%
2013-ON06-23	/01	3.95130	1.34832	1.12570	5.07700	3.95130	2.78210	1.65640	0.56522	41.92%	58.08%
2013-ON06-23	/02	3.84500	1.31205	1.12630	4.97130	3.84500	2.73210	1.60580	0.54795	41.76%	58.24%

Table F.6060.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON13

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON13-1	/01	3.12440	1.06620	1.10890	4.23330	3.12440	1.34330	0.23440	0.07999	7.50%	92.50%
2013-ON13-1	/02	3.08820	1.05384	1.12310	4.21130	3.08820	1.37630	0.25320	0.08640	8.20%	91.80%
2013-ON13-2	/01	3.20530	1.09380	1.11180	4.31710	3.20530	1.42580	0.31400	0.10715	9.80%	90.20%
2013-ON13-2	/02	3.17020	1.08182	1.10220	4.27240	3.17020	1.43840	0.33620	0.11473	10.61%	89.39%
2013-ON13-3	/01	3.26180	1.11308	1.05610	4.31790	3.26180	1.53590	0.47980	0.16373	14.71%	85.29%
2013-ON13-3	/02	3.26710	1.11489	1.09860	4.36570	3.26710	1.57610	0.47750	0.16295	14.62%	85.38%
2013-ON13-4	/01	3.33230	1.13714	1.06050	4.39280	3.33230	1.64260	0.58210	0.19864	17.47%	82.53%
2013-ON13-4	/02	3.28080	1.11957	1.10300	4.38380	3.28080	1.65050	0.54750	0.18683	16.69%	83.31%
2013-ON13-5	/01	3.31410	1.13093	1.09740	4.41150	3.31410	1.74820	0.65080	0.22208	19.64%	80.36%
2013-ON13-5	/02	3.35510	1.14492	1.13140	4.48650	3.35510	1.70120	0.56980	0.19444	16.98%	83.02%
2013-ON13-6	/01	3.28950	1.12254	1.05130	4.34080	3.28950	1.62910	0.57780	0.19717	17.56%	82.44%
2013-ON13-6	/02	3.31000	1.12953	1.08930	4.39930	3.31000	1.66790	0.57860	0.19745	17.48%	82.52%
2013-ON13-7	/01	3.28980	1.12264	1.11920	4.40900	3.28980	1.70600	0.58680	0.20024	17.84%	82.16%
2013-ON13-7	/02	3.29060	1.12291	1.09780	4.38840	3.29060	1.68200	0.58420	0.19936	17.75%	82.25%
2013-ON13-8	/01	3.34180	1.14038	1.07990	4.42170	3.34180	1.71350	0.63360	0.21621	18.96%	81.04%
2013-ON13-8	/02	3.29200	1.12339	1.11630	4.40830	3.29200	1.73810	0.62180	0.21219	18.89%	81.11%
2013-ON13-9	/01	3.34540	1.14166	1.09080	4.43620	3.34540	1.79070	0.69990	0.23885	20.92%	79.08%
2013-ON13-9	/02	3.34320	1.14091	1.11150	4.45470	3.34320	1.80930	0.69780	0.23813	20.87%	79.13%
2013-ON13-10	/01	3.44330	1.17502	1.08090	4.52420	3.44330	1.91870	0.83780	0.28590	24.33%	75.67%
2013-ON13-10	/02	3.45490	1.17898	1.13290	4.58780	3.45490	1.96900	0.83610	0.28532	24.20%	75.80%
2013-ON13-11	/01	3.47500	1.18584	1.13990	4.61490	3.47500	2.01400	0.87410	0.29828	25.15%	74.85%
2013-ON13-11	/02	3.49740	1.19348	1.08250	4.57990	3.49740	1.96210	0.87960	0.30016	25.15%	74.85%
2013-ON13-12	/01	3.48200	1.18823	1.12070	4.60270	3.48200	2.07470	0.95400	0.32555	27.40%	72.60%
2013-ON13-12	/02	3.54170	1.20860	1.07460	4.61630	3.54170	2.04520	0.97060	0.33122	27.40%	72.60%
2013-ON13-13	/01	3.49750	1.19352	1.07100	4.56850	3.49750	1.97360	0.90260	0.30801	25.81%	74.19%
2013-ON13-13	/02	3.49430	1.19242	1.07460	4.56890	3.49430	1.97590	0.90130	0.30757	25.79%	74.21%
2013-ON13-14	/01	3.45100	1.17765	1.06620	4.51720	3.45100	1.89140	0.82520	0.28160	23.91%	76.09%
2013-ON13-14	/02	3.45030	1.17741	1.09400	4.54430	3.45030	1.91850	0.82450	0.28136	23.90%	76.10%
2013-ON13-15	/01	3.41430	1.16512	1.13150	4.54580	3.41430	1.93060	0.79910	0.27269	23.40%	76.60%
2013-ON13-15	/02	3.41730	1.16615	1.11810	4.53540	3.41730	1.91900	0.80090	0.27331	23.44%	76.56%
2013-ON13-16	/01	3.46210	1.18144	1.10710	4.56920	3.46210	1.96250	0.85540	0.29190	24.71%	75.29%
2013-ON13-16	/02	3.43880	1.17348	1.09450	4.53330	3.43880	1.94430	0.84980	0.28999	24.71%	75.29%
2013-ON13-17	/01	3.43180	1.17110	1.09960	4.53140	3.43180	1.95190	0.85230	0.29085	24.84%	75.16%
2013-ON13-17	/02	3.40690	1.16260	1.11460	4.52150	3.40690	1.96050	0.84590	0.28866	24.83%	75.17%
2013-ON13-18	/01	3.45270	1.17823	1.10110	4.55380	3.45270	1.98000	0.87890	0.29992	25.46%	74.54%
2013-ON13-18	/02	3.44280	1.17485	1.08090	4.52370	3.44280	1.95820	0.87730	0.29938	25.48%	74.52%
2013-ON13-19	/01	3.50480	1.19601	1.10590	4.61070	3.50480	2.00880	0.90290	0.30811	25.76%	74.24%
2013-ON13-19	/02	3.45440	1.17881	1.13630	4.59070	3.45440	2.02750	0.89120	0.30412	25.80%	74.20%
2013-ON13-20	/01	3.49080	1.19123	1.10960	4.60040	3.49080	2.01470	0.90510	0.30886	25.93%	74.07%
2013-ON13-20	/02	3.48580	1.18952	1.12520	4.61100	3.48580	2.03050	0.90530	0.30893	25.97%	74.03%
2013-ON13-21	/01	3.48940	1.19075	1.06130	4.55070	3.48940	2.02140	0.96010	0.32763	27.51%	72.49%
2013-ON13-21	/02	3.44510	1.17563	1.10520	4.55030	3.44510	1.99270	0.88750	0.30286	25.76%	74.24%
2013-ON13-22	/01	3.51410	1.19918	1.12290	4.63700	3.51410	2.08620	0.96330	0.32872	27.41%	72.59%
2013-ON13-22	/02	3.50260	1.19526	1.10220	4.60480	3.50260	2.06090	0.95870	0.32715	27.37%	72.63%
2013-ON13-23	/01	3.54190	1.20867	1.10800	4.64990	3.54190	2.12120	1.01320	0.34575	28.61%	71.39%
2013-ON13-23	/02	3.51690	1.20014	1.08740	4.60430	3.51690	2.08870	1.00130	0.34169	28.47%	71.53%
2013-ON13-24	/01	3.45570	1.17925	1.14130	4.59700	3.45570	2.09780	0.95650	0.32640	27.68%	72.32%
2013-ON13-24	/02	3.48320	1.18864	1.12920	4.61240	3.48320	2.09480	0.96560	0.32951	27.72%	72.28%
2013-ON13-25	/01	3.47650	1.18635	1.09550	4.57200	3.47650	2.05790	0.96240	0.32842	27.68%	72.32%
2013-ON13-25	/02	3.50440	1.19587	1.11460	4.61900	3.50440	2.08560	0.97100	0.33135	27.71%	72.29%

Table F.61.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON17

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON17-1	/01	3.11000	1.04269	1.11900	4.22900	3.11000	1.37530	0.25630	0.08593	8.24%	91.76%
2013-ON17-1	/02	3.07960	1.03250	1.08790	4.16750	3.07960	1.34090	0.25300	0.08482	8.22%	91.78%
2013-ON17-2	/01	3.03050	1.01603	1.07040	4.10090	3.03050	1.35330	0.28290	0.09485	9.34%	90.66%
2013-ON17-2	/02	3.06600	1.02794	1.09210	4.15810	3.06600	1.35140	0.25930	0.08694	8.46%	91.54%
2013-ON17-3	/01	3.10810	1.04205	1.07400	4.18210	3.10810	1.45160	0.37760	0.12660	12.15%	87.85%
2013-ON17-3	/02	3.12700	1.04839	1.08700	4.21400	3.12700	1.48520	0.39820	0.13350	12.73%	87.27%
2013-ON17-4	/01	3.18970	1.06941	1.10570	4.29540	3.18970	1.61020	0.50450	0.16914	15.82%	84.18%
2013-ON17-4	/02	3.18120	1.06656	1.14100	4.32220	3.18120	1.63530	0.49430	0.16572	15.54%	84.46%
2013-ON17-5	/01	3.23440	1.08440	1.09310	4.32750	3.23440	1.65770	0.56460	0.18929	17.46%	82.54%
2013-ON17-5	/02	3.27110	1.09670	1.11780	4.38890	3.27110	1.70430	0.58650	0.19664	17.93%	82.07%
2013-ON17-6	/01	3.24510	1.08798	1.15770	4.40280	3.24510	1.74940	0.59170	0.19838	18.23%	81.77%
2013-ON17-6	/02	3.23880	1.08587	1.09320	4.33200	3.23880	1.69010	0.59690	0.20012	18.43%	81.57%
2013-ON17-7	/01	3.21790	1.07886	1.04740	4.26530	3.21790	1.58610	0.53870	0.18061	16.74%	83.26%
2013-ON17-7	/02	3.22920	1.08265	1.10430	4.33350	3.22920	1.63680	0.53250	0.17853	16.49%	83.51%
2013-ON17-8	/01	3.21650	1.07839	1.05120	4.26770	3.21650	1.59560	0.54440	0.18252	16.93%	83.07%
2013-ON17-8	/02	3.24200	1.08694	1.11820	4.36020	3.24200	1.67690	0.55870	0.18732	17.23%	82.77%
2013-ON17-9	/01	3.24920	1.08936	1.10030	4.34950	3.24920	1.65880	0.55850	0.18725	17.19%	82.81%
2013-ON17-9	/02	3.20370	1.07410	1.09330	4.29700	3.20370	1.64200	0.54870	0.18396	17.13%	82.87%
2013-ON17-10	/01	3.25190	1.09026	1.09740	4.34930	3.25190	1.70480	0.60740	0.20364	18.68%	81.32%
2013-ON17-10	/02	3.24780	1.08889	1.07820	4.32600	3.24780	1.69210	0.61390	0.20582	18.90%	81.10%
2013-ON17-11	/01	3.28450	1.10119	1.10210	4.38660	3.28450	1.80650	0.70440	0.23616	21.45%	78.55%
2013-ON17-11	/02	3.30980	1.10967	1.11220	4.42200	3.30980	1.82300	0.71080	0.23831	21.48%	78.52%
2013-ON17-12	/01	3.35930	1.12627	1.10980	4.46910	3.35930	1.90200	0.79220	0.26560	23.58%	76.42%
2013-ON17-12	/02	3.33520	1.11819	1.08450	4.41970	3.33520	1.87040	0.78590	0.26349	23.56%	76.44%
2013-ON17-13	/01	3.40350	1.14109	1.11640	4.51990	3.40350	1.93660	0.82020	0.27499	24.10%	75.90%
2013-ON17-13	/02	3.39380	1.13784	1.09440	4.48820	3.39380	1.91330	0.81890	0.27455	24.13%	75.87%
2013-ON17-14	/01	3.38000	1.13321	1.09580	4.47580	3.38000	1.94000	0.84420	0.28303	24.98%	75.02%
2013-ON17-14	/02	3.25330	1.09073	1.12040	4.37370	3.25330	1.93440	0.81400	0.27291	25.02%	74.98%
2013-ON17-15	/01	3.38890	1.13619	1.10800	4.49690	3.38890	1.99000	0.88200	0.29571	26.03%	73.97%
2013-ON17-15	/02	3.37200	1.13053	1.09120	4.46320	3.37200	1.96650	0.87530	0.29346	25.96%	74.04%
2013-ON17-16	/01	3.40240	1.14072	1.11060	4.51300	3.40240	1.96840	0.85780	0.28759	25.21%	74.79%
2013-ON17-16	/02	3.42110	1.14699	1.10290	4.52400	3.42110	1.96870	0.86580	0.29028	25.31%	74.69%
2013-ON17-17	/01	3.37730	1.13231	1.12190	4.49920	3.37730	1.95780	0.83590	0.28025	24.75%	75.25%
2013-ON17-17	/02	3.43830	1.15276	1.07400	4.51230	3.43830	1.92500	0.85100	0.28531	24.75%	75.25%
2013-ON17-18	/01	3.34120	1.12020	1.08780	4.42900	3.34120	1.87240	0.78460	0.26305	23.48%	76.52%
2013-ON17-18	/02	3.33820	1.11920	1.08900	4.42720	3.33820	1.87450	0.78550	0.26335	23.53%	76.47%
2013-ON17-19	/01	3.38060	1.13341	1.06110	4.44170	3.38060	1.88680	0.82570	0.27683	24.42%	75.58%
2013-ON17-19	/02	3.38060	1.13341	1.08810	4.46870	3.38060	1.91590	0.82780	0.27754	24.49%	75.51%
2013-ON17-20	/01	3.33500	1.11812	1.11870	4.45370	3.33500	1.93490	0.81620	0.27365	24.47%	75.53%
2013-ON17-20	/02	3.36380	1.12778	1.05270	4.41650	3.36380	1.87450	0.82180	0.27552	24.43%	75.57%
2013-ON17-21	/01	3.36760	1.12905	1.08340	4.45100	3.36760	1.90210	0.81870	0.27449	24.31%	75.69%
2013-ON17-21	/02	3.37050	1.13003	1.15590	4.52640	3.37050	1.97910	0.82320	0.27599	24.42%	75.58%
2013-ON17-22	/01	3.39850	1.13941	1.09590	4.49440	3.39850	1.93100	0.83510	0.27998	24.57%	75.43%
2013-ON17-22	/02	3.37420	1.13127	1.09580	4.47000	3.37420	1.92420	0.82840	0.27774	24.55%	75.45%
2013-ON17-23	/01	3.39740	1.13904	1.08450	4.48190	3.39740	1.92300	0.83850	0.28112	24.68%	75.32%
2013-ON17-23	/02	3.38890	1.13619	1.10730	4.49620	3.38890	1.94160	0.83430	0.27972	24.62%	75.38%
2013-ON17-24	/01	3.40990	1.14324	1.08940	4.49930	3.40990	1.96540	0.87600	0.29370	25.69%	74.31%
2013-ON17-24	/02	3.44930	1.15645	1.11590	4.56520	3.44930	2.00550	0.88960	0.29826	25.79%	74.21%
2013-ON17-25	/01	3.41560	1.14515	1.09930	4.51490	3.41560	1.98540	0.88610	0.29708	25.94%	74.06%
2013-ON17-25	/02	3.39260	1.13744	1.08110	4.47370	3.39260	1.96050	0.87940	0.29484	25.92%	74.08%

Table F.62.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON25

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON25-1	/01	3.01000	1.02701	1.10150	4.11150	3.01000	1.31820	0.21670	0.07394	7.20%	92.80%
2013-ON25-1	/02	3.03120	1.03424	1.09930	4.13050	3.03120	1.30660	0.20730	0.07073	6.84%	93.16%
2013-ON25-2	/01	3.06980	1.04741	1.09800	4.16780	3.06980	1.38980	0.29180	0.09956	9.51%	90.49%
2013-ON25-2	/02	3.10740	1.06024	1.11080	4.21820	3.10740	1.40290	0.29210	0.09966	9.40%	90.60%
2013-ON25-3	/01	3.19560	1.09033	1.13690	4.33250	3.19560	1.50890	0.37200	0.12693	11.64%	88.36%
2013-ON25-3	/02	3.16790	1.08088	1.08590	4.25380	3.16790	1.44380	0.35790	0.12211	11.30%	88.70%
2013-ON25-4	/01	3.20900	1.09491	1.08530	4.29430	3.20900	1.56150	0.47620	0.16248	14.84%	85.16%
2013-ON25-4	/02	3.20350	1.09303	1.10250	4.30600	3.20350	1.57260	0.47010	0.16040	14.67%	85.33%
2013-ON25-5	/01	3.26870	1.11528	1.08560	4.35430	3.26870	1.66250	0.57690	0.19684	17.65%	82.35%
2013-ON25-5	/02	3.28420	1.12056	1.11790	4.40210	3.28420	1.69820	0.58030	0.19800	17.67%	82.33%
2013-ON25-6	/01	3.29840	1.12541	1.10120	4.39960	3.29840	1.71230	0.61110	0.20851	18.53%	81.47%
2013-ON25-6	/02	3.30930	1.12913	1.09770	4.40700	3.30930	1.71160	0.61390	0.20946	18.55%	81.45%
2013-ON25-7	/01	3.31950	1.13261	1.06470	4.38420	3.31950	1.65480	0.59010	0.20134	17.78%	82.22%
2013-ON25-7	/02	3.27080	1.11599	1.07520	4.34600	3.27080	1.66000	0.58480	0.19953	17.88%	82.12%
2013-ON25-8	/01	3.26550	1.11418	1.08740	4.35290	3.26550	1.66700	0.57960	0.19776	17.75%	82.25%
2013-ON25-8	/02	3.26840	1.11517	1.10500	4.37340	3.26840	1.68370	0.57870	0.19745	17.71%	82.29%
2013-ON25-9	/01	3.26390	1.11364	1.08940	4.35330	3.26390	1.70320	0.61380	0.20943	18.81%	81.19%
2013-ON25-9	/02	3.29400	1.12391	1.07590	4.36990	3.29400	1.69630	0.62040	0.21168	18.83%	81.17%
2013-ON25-10	/01	3.36500	1.14813	1.14600	4.51100	3.36500	1.83830	0.69230	0.23621	20.57%	79.43%
2013-ON25-10	/02	3.35080	1.14329	1.08370	4.43450	3.35080	1.78180	0.69810	0.23819	20.83%	79.17%
2013-ON25-11	/01	3.35920	1.14615	1.08130	4.44050	3.35920	1.84400	0.76270	0.26023	22.70%	77.30%
2013-ON25-11	/02	3.37480	1.15148	1.11240	4.48720	3.37480	1.87780	0.76540	0.26115	22.68%	77.32%
2013-ON25-12	/01	3.38390	1.15458	1.07140	4.45530	3.38390	1.84710	0.77570	0.26467	22.92%	77.08%
2013-ON25-12	/02	3.41560	1.16540	1.05490	4.47050	3.41560	1.83850	0.78360	0.26736	22.94%	77.06%
2013-ON25-13	/01	3.42880	1.16990	1.13440	4.56320	3.42880	1.92850	0.79410	0.27095	23.16%	76.84%
2013-ON25-13	/02	3.39170	1.15724	1.09900	4.49070	3.39170	1.88480	0.78580	0.26811	23.17%	76.83%
2013-ON25-14	/01	3.39930	1.15984	1.11500	4.51430	3.39930	1.89480	0.77980	0.26607	22.94%	77.06%
2013-ON25-14	/02	3.35230	1.14380	1.11650	4.46880	3.35230	1.88260	0.76610	0.26139	22.85%	77.15%
2013-ON25-15	/01	3.38500	1.15496	1.11070	4.49570	3.38500	1.87880	0.76810	0.26207	22.69%	77.31%
2013-ON25-15	/02	3.39710	1.15909	1.12840	4.52550	3.39710	1.90540	0.77700	0.26511	22.87%	77.13%
2013-ON25-16	/01	3.40710	1.16250	1.06010	4.46720	3.40710	1.86490	0.80480	0.27460	23.62%	76.38%
2013-ON25-16	/02	3.42060	1.16710	1.11090	4.53150	3.42060	1.91800	0.80710	0.27538	23.60%	76.40%
2013-ON25-17	/01	3.45790	1.17983	1.11100	4.56890	3.45790	1.94100	0.83000	0.28319	24.00%	76.00%
2013-ON25-17	/02	3.44440	1.17522	1.10610	4.55050	3.44440	1.93350	0.82740	0.28231	24.02%	75.98%
2013-ON25-18	/01	3.40000	1.16008	1.08790	4.48790	3.40000	1.93110	0.84320	0.28770	24.80%	75.20%
2013-ON25-18	/02	3.41150	1.16400	1.10160	4.51310	3.41150	1.94360	0.84200	0.28729	24.68%	75.32%
2013-ON25-19	/01	3.50280	1.19515	1.07540	4.57820	3.50280	1.93710	0.86170	0.29401	24.60%	75.40%
2013-ON25-19	/02	3.40850	1.16298	1.08730	4.49580	3.40850	1.93180	0.84450	0.28814	24.78%	75.22%
2013-ON25-20	/01	3.47150	1.18447	1.07370	4.54520	3.47150	1.92780	0.85410	0.29142	24.60%	75.40%
2013-ON25-20	/02	3.43240	1.17113	1.10960	4.54200	3.43240	1.95490	0.84530	0.28842	24.63%	75.37%
2013-ON25-21	/01	3.40800	1.16280	1.11010	4.51810	3.40800	1.93870	0.82860	0.28272	24.31%	75.69%
2013-ON25-21	/02	3.44710	1.17615	1.11210	4.55920	3.44710	1.96040	0.84830	0.28944	24.61%	75.39%
2013-ON25-22	/01	3.44600	1.17577	1.11330	4.55930	3.44600	1.97930	0.86600	0.29548	25.13%	74.87%
2013-ON25-22	/02	3.43770	1.17294	1.05750	4.49520	3.43770	1.92090	0.86340	0.29459	25.12%	74.88%
2013-ON25-23	/01	3.48010	1.18741	1.05800	4.53810	3.48010	1.97740	0.91940	0.31370	26.42%	73.58%
2013-ON25-23	/02	3.50830	1.19703	1.10350	4.61180	3.50830	2.02860	0.92510	0.31564	26.37%	73.63%
2013-ON25-24	/01	3.36990	1.14981	1.12150	4.49140	3.36990	1.99770	0.87620	0.29896	26.00%	74.00%
2013-ON25-24	/02	3.39890	1.15970	1.08270	4.48160	3.39890	1.96500	0.88230	0.30104	25.96%	74.04%
2013-ON25-25	/01	3.43710	1.17273	1.11620	4.55330	3.43710	1.99620	0.88000	0.30025	25.60%	74.40%
2013-ON25-25	/02	3.44500	1.17543	1.11910	4.56410	3.44500	2.00430	0.88520	0.30203	25.70%	74.30%

Table F.633.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON36

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON36-1	/01	3.08880	1.02868	1.09320	4.18200	3.08880	1.43670	0.34350	0.11440	11.12%	88.88%
2013-ON36-1	/02	3.12930	1.04217	1.05650	4.18580	3.12930	1.42150	0.36500	0.12156	11.66%	88.34%
2013-ON36-2	/01	3.22740	1.07484	1.10020	4.32760	3.22740	1.56000	0.45980	0.15313	14.25%	85.75%
2013-ON36-2	/02	3.25470	1.08393	1.06630	4.32100	3.25470	1.58410	0.51780	0.17245	15.91%	84.09%
2013-ON36-3	/01	3.29230	1.09645	1.10700	4.39930	3.29230	1.71380	0.60680	0.20209	18.43%	81.57%
2013-ON36-3	/02	3.30930	1.10212	1.08870	4.39800	3.30930	1.69950	0.61080	0.20342	18.46%	81.54%
2013-ON36-4	/01	3.34590	1.11430	1.06830	4.41420	3.34590	1.76350	0.69520	0.23153	20.78%	79.22%
2013-ON36-4	/02	3.32940	1.10881	1.13700	4.46640	3.32940	1.82380	0.68680	0.22873	20.63%	79.37%
2013-ON36-5	/01	3.31850	1.10518	1.09900	4.41750	3.31850	1.76610	0.66710	0.22217	20.10%	79.90%
2013-ON36-5	/02	3.34480	1.11394	1.08270	4.42750	3.34480	1.75110	0.66840	0.22260	19.98%	80.02%
2013-ON36-6	/01	3.33970	1.11224	1.06780	4.40750	3.33970	1.73210	0.66430	0.22124	19.89%	80.11%
2013-ON36-6	/02	3.35100	1.11600	1.07050	4.42150	3.35100	1.73170	0.66120	0.22020	19.73%	80.27%
2013-ON36-7	/01	3.32600	1.10768	1.08150	4.40750	3.32600	1.73370	0.65220	0.21721	19.61%	80.39%
2013-ON36-7	/02	3.34890	1.11530	1.07260	4.42150	3.34890	1.74220	0.66960	0.22300	19.99%	80.01%
2013-ON36-8	/01	3.32400	1.10701	1.09700	4.42100	3.32400	1.74630	0.64930	0.21624	19.53%	80.47%
2013-ON36-8	/02	3.32180	1.10628	1.05070	4.37250	3.32180	1.69620	0.64550	0.21497	19.43%	80.57%
2013-ON36-9	/01	3.35310	1.11670	1.12020	4.47330	3.35310	1.78520	0.66500	0.22147	19.83%	80.17%
2013-ON36-9	/02	3.33910	1.11204	1.05920	4.39830	3.33910	1.72330	0.66410	0.22117	19.89%	80.11%
2013-ON36-10	/01	3.34330	1.11344	1.07420	4.41750	3.34330	1.74120	0.66700	0.22213	19.95%	80.05%
2013-ON36-10	/02	3.29750	1.09819	1.06590	4.36340	3.29750	1.73440	0.66850	0.22263	20.27%	79.73%
2013-ON36-11	/01	3.39900	1.13199	1.06750	4.46650	3.39900	1.77570	0.70820	0.23586	20.84%	79.16%
2013-ON36-11	/02	3.32540	1.10748	1.09990	4.42530	3.32540	1.79140	0.69150	0.23029	20.79%	79.21%
2013-ON36-12	/01	3.35960	1.11887	1.10460	4.46420	3.35960	1.87630	0.77170	0.25700	22.97%	77.03%
2013-ON36-12	/02	3.34560	1.11420	1.11010	4.45570	3.34560	1.87490	0.76480	0.25471	22.86%	77.14%
2013-ON36-13	/01	3.45720	1.15137	1.14680	4.60400	3.45720	2.04180	0.89500	0.29807	25.89%	74.11%
2013-ON36-13	/02	3.46850	1.15513	1.09750	4.56600	3.46850	1.97880	0.88130	0.29350	25.41%	74.59%
2013-ON36-14	/01	3.51260	1.16982	1.13520	4.64780	3.51260	2.11970	0.98450	0.32787	28.03%	71.97%
2013-ON36-14	/02	3.49320	1.16336	1.09760	4.59080	3.49320	2.08780	0.99020	0.32977	28.35%	71.65%
2013-ON36-15	/01	3.48600	1.16096	1.11090	4.59690	3.48600	2.09950	0.98860	0.32924	28.36%	71.64%
2013-ON36-15	/02	3.51620	1.17102	1.11820	4.63440	3.51620	2.10700	0.98880	0.32931	28.12%	71.88%
2013-ON36-16	/01	3.54460	1.18048	1.09280	4.63740	3.54460	2.08880	0.99600	0.33170	28.10%	71.90%
2013-ON36-16	/02	3.51060	1.16916	1.10090	4.61150	3.51060	2.08930	0.98840	0.32917	28.15%	71.85%
2013-ON36-17	/01	3.42430	1.14041	1.14870	4.57300	3.42430	2.08300	0.93430	0.31116	27.28%	72.72%
2013-ON36-17	/02	3.47740	1.15810	1.05830	4.53570	3.47740	2.01700	0.95870	0.31928	27.57%	72.43%
2013-ON36-18	/01	3.49690	1.16459	1.09460	4.59150	3.49690	2.04090	0.94630	0.31515	27.06%	72.94%
2013-ON36-18	/02	3.50690	1.16792	1.07400	4.58090	3.50690	2.02590	0.95190	0.31702	27.14%	72.86%
2013-ON36-19	/01	3.41650	1.13782	1.09810	4.51460	3.41650	2.02490	0.92680	0.30866	27.13%	72.87%
2013-ON36-19	/02	3.39590	1.13096	1.09090	4.48680	3.39590	2.01420	0.92330	0.30749	27.19%	72.81%
2013-ON36-20	/01	3.44230	1.14641	1.09500	4.53730	3.44230	2.04270	0.94770	0.31562	27.53%	72.47%
2013-ON36-20	/02	3.49990	1.16559	1.11220	4.61210	3.49990	2.07130	0.95910	0.31941	27.40%	72.60%
2013-ON36-21	/01	3.54700	1.18128	1.11470	4.66170	3.54700	2.08020	0.96550	0.32155	27.22%	72.78%
2013-ON36-21	/02	3.51460	1.17049	1.05260	4.56720	3.51460	2.01020	0.95760	0.31892	27.25%	72.75%
2013-ON36-22	/01	3.48040	1.15910	1.11770	4.59810	3.48040	2.07270	0.95500	0.31805	27.44%	72.56%
2013-ON36-22	/02	3.44620	1.14771	1.09820	4.54440	3.44620	2.04830	0.95010	0.31642	27.57%	72.43%
2013-ON36-23	/01	3.42000	1.13898	1.07740	4.49740	3.42000	2.04920	0.97180	0.32364	28.42%	71.58%
2013-ON36-23	/02	3.43030	1.14241	1.05740	4.48770	3.43030	2.03040	0.97300	0.32404	28.36%	71.64%
2013-ON36-24	/01	3.49300	1.16329	1.08320	4.57620	3.49300	2.11000	1.02680	0.34196	29.40%	70.60%
2013-ON36-24	/02	3.59280	1.19653	1.02190	4.61470	3.59280	2.07720	1.05530	0.35145	29.37%	70.63%
2013-ON36-25	/01	3.58230	1.19303	1.06270	4.64500	3.58230	2.13440	1.07170	0.35691	29.92%	70.08%
2013-ON36-25	/02	3.58370	1.19350	1.13590	4.71960	3.58370	2.21330	1.07740	0.35881	30.06%	69.94%

Table F.644.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON30-A

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON30A-1	/01	3.08400	1.04012	1.10070	4.18470	3.08400	1.40420	0.30350	0.10236	9.84%	90.16%
2013-ON30A-1	/02	3.07670	1.03766	1.10360	4.18030	3.07670	1.40490	0.30130	0.10162	9.79%	90.21%
2013-ON30A-2	/01	3.11560	1.05078	1.10030	4.21590	3.11560	1.46490	0.36460	0.12297	11.70%	88.30%
2013-ON30A-2	/02	3.12450	1.05378	1.09850	4.22300	3.12450	1.46320	0.36470	0.12300	11.67%	88.33%
2013-ON30A-3	/01	3.18310	1.07354	1.09250	4.27560	3.18310	1.52200	0.42950	0.14485	13.49%	86.51%
2013-ON30A-3	/02	3.16460	1.06731	1.11700	4.28160	3.16460	1.54400	0.42700	0.14401	13.49%	86.51%
2013-ON30A-4	/01	3.20420	1.08066	1.08550	4.28970	3.20420	1.62080	0.53530	0.18054	16.71%	83.29%
2013-ON30A-4	/02	3.21810	1.08535	1.09060	4.30870	3.21810	1.63000	0.53940	0.18192	16.76%	83.24%
2013-ON30A-5	/01	3.25460	1.09766	1.09200	4.34660	3.25460	1.70350	0.61150	0.20624	18.79%	81.21%
2013-ON30A-5	/02	3.23240	1.09017	1.09070	4.32310	3.23240	1.70080	0.61010	0.20576	18.87%	81.13%
2013-ON30A-6	/01	3.29340	1.11075	1.07820	4.37160	3.29340	1.72710	0.64890	0.21885	19.70%	80.30%
2013-ON30A-6	/02	3.29450	1.11112	1.10040	4.39490	3.29450	1.74570	0.64530	0.21764	19.59%	80.41%
2013-ON30A-7	/01	3.26940	1.10265	1.08570	4.35510	3.26940	1.71110	0.62540	0.21092	19.13%	80.87%
2013-ON30A-7	/02	3.29850	1.11247	1.10040	4.39890	3.29850	1.73120	0.63080	0.21275	19.12%	80.88%
2013-ON30A-8	/01	3.24340	1.09388	1.09360	4.33700	3.24340	1.65460	0.56100	0.18921	17.30%	82.70%
2013-ON30A-8	/02	3.21600	1.08464	1.08750	4.30350	3.21600	1.64400	0.55650	0.18769	17.30%	82.70%
2013-ON30A-9	/01	3.25190	1.09675	1.08550	4.33740	3.25190	1.63800	0.55250	0.18634	16.99%	83.01%
2013-ON30A-9	/02	3.23170	1.08994	1.10090	4.33260	3.23170	1.64820	0.54730	0.18458	16.94%	83.06%
2013-ON30A-10	/01	3.21380	1.08390	1.09220	4.30600	3.21380	1.62620	0.53400	0.18010	16.62%	83.38%
2013-ON30A-10	/02	3.23570	1.09128	1.08420	4.31990	3.23570	1.62090	0.53670	0.18101	16.59%	83.41%
2013-ON30A-11	/01	3.29830	1.11240	1.08550	4.38380	3.29830	1.74500	0.65950	0.22243	20.00%	80.00%
2013-ON30A-11	/02	3.31080	1.11661	1.10330	4.41410	3.31080	1.76500	0.66170	0.22317	19.99%	80.01%
2013-ON30A-12	/01	3.37790	1.13924	1.11160	4.48950	3.37790	1.84910	0.73750	0.24873	21.83%	78.17%
2013-ON30A-12	/02	3.35270	1.13074	1.08410	4.43680	3.35270	1.83040	0.74630	0.25170	22.26%	77.74%
2013-ON30A-13	/01	3.39190	1.14397	1.08820	4.48010	3.39190	1.85770	0.76950	0.25952	22.69%	77.31%
2013-ON30A-13	/02	3.35780	1.13246	1.07970	4.43750	3.35780	1.83880	0.75910	0.25602	22.61%	77.39%
2013-ON30A-14	/01	3.37890	1.13958	1.08190	4.46080	3.37890	1.87330	0.79140	0.26691	23.42%	76.58%
2013-ON30A-14	/02	3.38590	1.14194	1.10170	4.48760	3.38590	1.89300	0.79130	0.26688	23.37%	76.63%
2013-ON30A-15	/01	3.40410	1.14808	1.08780	4.49190	3.40410	1.90950	0.82170	0.27713	24.14%	75.86%
2013-ON30A-15	/02	3.39960	1.14656	1.09330	4.49290	3.39960	1.91570	0.82240	0.27737	24.19%	75.81%
2013-ON30A-16	/01	3.40540	1.14852	1.07170	4.47710	3.40540	1.89210	0.82040	0.27669	24.09%	75.91%
2013-ON30A-16	/02	3.39940	1.14650	1.06750	4.46690	3.39940	1.88730	0.81980	0.27649	24.12%	75.88%
2013-ON30A-17	/01	3.39460	1.14488	1.08790	4.48250	3.39460	1.90110	0.81320	0.27426	23.96%	76.04%
2013-ON30A-17	/02	3.38300	1.14096	1.06400	4.44700	3.38300	1.87980	0.81580	0.27514	24.11%	75.89%
2013-ON30A-18	/01	3.36290	1.13418	1.09960	4.46250	3.36290	1.89210	0.79250	0.26728	23.57%	76.43%
2013-ON30A-18	/02	3.38470	1.14154	1.07750	4.46220	3.38470	1.87810	0.80060	0.27001	23.65%	76.35%
2013-ON30A-19	/01	3.40340	1.14784	1.09350	4.49690	3.40340	1.96830	0.87480	0.29504	25.70%	74.30%
2013-ON30A-19	/02	3.39690	1.14565	1.08880	4.48570	3.39690	1.96200	0.87320	0.29450	25.71%	74.29%
2013-ON30A-20	/01	3.46890	1.16993	1.09440	4.56330	3.46890	2.00730	0.91290	0.30789	26.32%	73.68%
2013-ON30A-20	/02	3.44590	1.16218	1.07390	4.51980	3.44590	1.98090	0.90700	0.30590	26.32%	73.68%

Table F.655.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON30-B

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON30B-1	/01	3.00120	1.00363	1.12380	4.12500	3.00120	1.29440	0.17060	0.05705	5.68%	94.32%
2013-ON30B-1	/02	3.06710	1.02566	1.05820	4.12530	3.06710	1.22730	0.16910	0.05655	5.51%	94.49%
2013-ON30B-2	/01	3.11330	1.04111	1.05960	4.17290	3.11330	1.29470	0.23510	0.07862	7.55%	92.45%
2013-ON30B-2	/02	3.11590	1.04198	1.06130	4.17720	3.11590	1.29580	0.23450	0.07842	7.53%	92.47%
2013-ON30B-3	/01	3.19910	1.06981	1.07730	4.27640	3.19910	1.44950	0.37220	0.12447	11.63%	88.37%
2013-ON30B-3	/02	3.18610	1.06546	1.10060	4.28670	3.18610	1.46030	0.35970	0.12029	11.29%	88.71%
2013-ON30B-4	/01	3.23250	1.08098	1.08640	4.31890	3.23250	1.53860	0.45220	0.15122	13.99%	86.01%
2013-ON30B-4	/02	3.20320	1.07118	1.06610	4.26930	3.20320	1.50720	0.44110	0.14751	13.77%	86.23%
2013-ON30B-5	/01	3.27240	1.09432	1.16110	4.43350	3.27240	1.73090	0.56980	0.19055	17.41%	82.59%
2013-ON30B-5	/02	3.24690	1.08579	1.07870	4.32560	3.24690	1.64270	0.56400	0.18861	17.37%	82.63%
2013-ON30B-6	/01	3.30910	1.10659	1.10600	4.41510	3.30910	1.73250	0.62650	0.20951	18.93%	81.07%
2013-ON30B-6	/02	3.29410	1.10157	1.12640	4.42050	3.29410	1.75210	0.62570	0.20924	18.99%	81.01%
2013-ON30B-7	/01	3.29380	1.10147	1.14600	4.43980	3.29380	1.80170	0.65570	0.21927	19.91%	80.09%
2013-ON30B-7	/02	3.32930	1.11335	1.09260	4.42190	3.32930	1.75130	0.65870	0.22027	19.78%	80.22%
2013-ON30B-8	/01	3.34800	1.11960	1.08500	4.43300	3.34800	1.68420	0.59920	0.20038	17.90%	82.10%
2013-ON30B-8	/02	3.29950	1.10338	1.11630	4.41580	3.29950	1.71080	0.59450	0.19881	18.02%	81.98%
2013-ON30B-9	/01	3.32640	1.11238	1.09450	4.42090	3.32640	1.62160	0.52710	0.17627	15.85%	84.15%
2013-ON30B-9	/02	3.24250	1.08432	1.12620	4.36870	3.24250	1.66970	0.54350	0.18175	16.76%	83.24%
2013-ON30B-10	/01	3.26630	1.09228	1.10370	4.37000	3.26630	1.62550	0.52180	0.17449	15.98%	84.02%
2013-ON30B-10	/02	3.24620	1.08556	1.13140	4.37760	3.24620	1.64760	0.51620	0.17262	15.90%	84.10%
2013-ON30B-11	/01	3.30860	1.10642	1.05950	4.36810	3.30860	1.68740	0.62790	0.20998	18.98%	81.02%
2013-ON30B-11	/02	3.27910	1.09656	1.11570	4.39480	3.27910	1.73240	0.61670	0.20623	18.81%	81.19%
2013-ON30B-12	/01	3.38000	1.13030	1.06030	4.44030	3.38000	1.78240	0.72210	0.24148	21.36%	78.64%
2013-ON30B-12	/02	3.36670	1.12585	1.10370	4.47040	3.36670	1.81940	0.71570	0.23934	21.26%	78.74%
2013-ON30B-13	/01	3.40220	1.13772	1.12820	4.53040	3.40220	1.89250	0.76430	0.25559	22.46%	77.54%
2013-ON30B-13	/02	3.43230	1.14779	1.08050	4.51280	3.43230	1.84770	0.76720	0.25656	22.35%	77.65%
2013-ON30B-14	/01	3.41310	1.14137	1.12860	4.54170	3.41310	1.92250	0.79390	0.26549	23.26%	76.74%
2013-ON30B-14	/02	3.47570	1.16230	1.05610	4.53180	3.47570	1.86200	0.80590	0.26950	23.19%	76.81%
2013-ON30B-15	/01	3.42480	1.14528	1.12630	4.55110	3.42480	1.92100	0.79470	0.26575	23.20%	76.80%
2013-ON30B-15	/02	3.39360	1.13485	1.14670	4.54030	3.39360	1.92860	0.78190	0.26147	23.04%	76.96%
2013-ON30B-16	/01	3.35940	1.12341	1.14540	4.50480	3.35940	1.93080	0.78540	0.26264	23.38%	76.62%
2013-ON30B-16	/02	3.36930	1.12672	1.12320	4.49250	3.36930	1.92530	0.80210	0.26823	23.81%	76.19%
2013-ON30B-17	/01	3.48750	1.16625	1.07430	4.56180	3.48750	1.91540	0.84110	0.28127	24.12%	75.88%
2013-ON30B-17	/02	3.45470	1.15528	1.08780	4.54250	3.45470	1.91440	0.82660	0.27642	23.93%	76.07%
2013-ON30B-18	/01	3.45630	1.15582	1.07570	4.53200	3.45630	1.88530	0.80960	0.27074	23.42%	76.58%
2013-ON30B-18	/02	3.39140	1.13411	1.15460	4.54600	3.39140	1.94680	0.79220	0.26492	23.36%	76.64%
2013-ON30B-19	/01	3.53110	1.18083	1.07020	4.60130	3.53110	1.92390	0.85370	0.28548	24.18%	75.82%
2013-ON30B-19	/02	3.44620	1.15244	1.14100	4.58720	3.44620	1.98140	0.84040	0.28104	24.39%	75.61%
2013-ON30B-20	/01	3.50080	1.17070	1.13970	4.64050	3.50080	2.03900	0.89930	0.30073	25.69%	74.31%
2013-ON30B-20	/02	3.50390	1.17173	1.13750	4.64140	3.50390	2.03640	0.89890	0.30060	25.65%	74.35%

Table F.666.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON30-C

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON30C-1	/01	3.04190	1.04089	1.09190	4.13380	3.04190	1.36300	0.27110	0.09277	8.91%	91.09%
2013-ON30C-1	/02	3.06610	1.04917	1.09690	4.16300	3.06610	1.37040	0.27350	0.09359	8.92%	91.08%
2013-ON30C-2	/01	3.10120	1.06118	1.08690	4.18810	3.10120	1.39430	0.30740	0.10519	9.91%	90.09%
2013-ON30C-2	/02	3.07380	1.05180	1.08180	4.15560	3.07380	1.39860	0.31680	0.10840	10.31%	89.69%
2013-ON30C-3	/01	3.17190	1.08537	1.09410	4.26600	3.17190	1.49770	0.40360	0.13811	12.72%	87.28%
2013-ON30C-3	/02	3.14160	1.07500	1.11280	4.25440	3.14160	1.51140	0.39860	0.13639	12.69%	87.31%
2013-ON30C-4	/01	3.19680	1.09389	1.10600	4.30280	3.19680	1.59720	0.49120	0.16808	15.37%	84.63%
2013-ON30C-4	/02	3.21600	1.10046	1.08460	4.30060	3.21600	1.57850	0.49390	0.16900	15.36%	84.64%
2013-ON30C-5	/01	3.25600	1.11415	1.09500	4.35100	3.25600	1.69070	0.59570	0.20384	18.30%	81.70%
2013-ON30C-5	/02	3.28400	1.12373	1.09680	4.38080	3.28400	1.69420	0.59740	0.20442	18.19%	81.81%
2013-ON30C-6	/01	3.26110	1.11589	1.09050	4.35160	3.26110	1.72660	0.63610	0.21766	19.51%	80.49%
2013-ON30C-6	/02	3.25720	1.11456	1.08590	4.34310	3.25720	1.71760	0.63170	0.21616	19.39%	80.61%
2013-ON30C-7	/01	3.27860	1.12188	1.07700	4.35560	3.27860	1.73520	0.65820	0.22522	20.08%	79.92%
2013-ON30C-7	/02	3.31720	1.13509	1.11620	4.43340	3.31720	1.78130	0.66510	0.22759	20.05%	79.95%
2013-ON30C-8	/01	3.24240	1.10949	1.09050	4.33290	3.24240	1.67570	0.58520	0.20025	18.05%	81.95%
2013-ON30C-8	/02	3.24570	1.11062	1.08030	4.32600	3.24570	1.66460	0.58430	0.19994	18.00%	82.00%
2013-ON30C-9	/01	3.23920	1.10840	1.11530	4.35450	3.23920	1.66860	0.55330	0.18933	17.08%	82.92%
2013-ON30C-9	/02	3.23920	1.10840	1.09490	4.33410	3.23920	1.64150	0.54660	0.18704	16.87%	83.13%
2013-ON30C-10	/01	3.23190	1.10590	1.08690	4.31880	3.23190	1.62730	0.54040	0.18492	16.72%	83.28%
2013-ON30C-10	/02	3.21320	1.09950	1.09240	4.30560	3.21320	1.62620	0.53380	0.18266	16.61%	83.39%
2013-ON30C-11	/01	3.31380	1.13393	1.09580	4.40960	3.31380	1.75910	0.66330	0.22697	20.02%	79.98%
2013-ON30C-11	/02	3.28300	1.12339	1.09330	4.37630	3.28300	1.74890	0.65560	0.22434	19.97%	80.03%
2013-ON30C-12	/01	3.32440	1.13755	1.08280	4.40720	3.32440	1.79580	0.71300	0.24398	21.45%	78.55%
2013-ON30C-12	/02	3.35180	1.14693	1.09920	4.45100	3.35180	1.81940	0.72020	0.24644	21.49%	78.51%
2013-ON30C-13	/01	3.39840	1.16288	1.07470	4.47310	3.39840	1.88500	0.81030	0.27727	23.84%	76.16%
2013-ON30C-13	/02	3.42870	1.17324	1.09320	4.52190	3.42870	1.91260	0.81940	0.28038	23.90%	76.10%
2013-ON30C-14	/01	3.40610	1.16551	1.09250	4.49860	3.40610	1.89650	0.80400	0.27512	23.60%	76.40%
2013-ON30C-14	/02	3.39390	1.16134	1.08130	4.47520	3.39390	1.88390	0.80260	0.27464	23.65%	76.35%
2013-ON30C-15	/01	3.39160	1.16055	1.08170	4.47330	3.39160	1.91390	0.83220	0.28476	24.54%	75.46%
2013-ON30C-15	/02	3.34050	1.14306	1.07910	4.41960	3.34050	1.90540	0.82630	0.28275	24.74%	75.26%
2013-ON30C-16	/01	3.38170	1.15716	1.07110	4.45280	3.38170	1.88010	0.80900	0.27683	23.92%	76.08%
2013-ON30C-16	/02	3.36370	1.15100	1.08180	4.44550	3.36370	1.88850	0.80670	0.27604	23.98%	76.02%
2013-ON30C-17	/01	3.44220	1.17786	1.10180	4.54400	3.44220	1.94300	0.84120	0.28784	24.44%	75.56%
2013-ON30C-17	/02	3.41140	1.16732	1.08330	4.49470	3.41140	1.92370	0.84040	0.28757	24.64%	75.36%
2013-ON30C-18	/01	3.37910	1.15627	1.06080	4.43990	3.37910	1.85680	0.79600	0.27238	23.56%	76.44%
2013-ON30C-18	/02	3.38520	1.15836	1.06710	4.45230	3.38520	1.86410	0.79700	0.27272	23.54%	76.46%
2013-ON30C-19	/01	3.44090	1.17742	1.08600	4.52690	3.44090	1.96830	0.88230	0.30191	25.64%	74.36%
2013-ON30C-19	/02	3.41850	1.16975	1.09760	4.51610	3.41850	1.97920	0.88160	0.30167	25.79%	74.21%
2013-ON30C-20	/01	3.47740	1.18991	1.07850	4.55590	3.47740	1.99960	0.92110	0.31518	26.49%	73.51%
2013-ON30C-20	/02	3.45560	1.18245	1.09610	4.55170	3.45560	2.01200	0.91590	0.31341	26.50%	73.50%

Table F.677.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ON30-D

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON30D-1	/01	3.05860	1.02282	1.09300	4.15160	3.05860	1.26460	0.17160	0.05738	5.61%	94.39%
2013-ON30D-1	/02	3.05910	1.02299	1.10090	4.16000	3.05910	1.27880	0.17790	0.05949	5.82%	94.18%
2013-ON30D-2	/01	3.10360	1.03787	1.10230	4.20590	3.10360	1.36570	0.26340	0.08808	8.49%	91.51%
2013-ON30D-2	/02	3.12880	1.04630	1.09240	4.22120	3.12880	1.37110	0.27870	0.09320	8.91%	91.09%
2013-ON30D-3	/01	3.19500	1.06843	1.08480	4.27980	3.19500	1.47530	0.39050	0.13059	12.22%	87.78%
2013-ON30D-3	/02	3.19720	1.06917	1.11920	4.31640	3.19720	1.50830	0.38910	0.13012	12.17%	87.83%
2013-ON30D-4	/01	3.26130	1.09061	1.13480	4.39610	3.26130	1.61670	0.48190	0.16115	14.78%	85.22%
2013-ON30D-4	/02	3.22870	1.07970	1.10950	4.33820	3.22870	1.58660	0.47710	0.15955	14.78%	85.22%
2013-ON30D-5	/01	3.27660	1.09572	1.10360	4.38020	3.27660	1.67690	0.57330	0.19172	17.50%	82.50%
2013-ON30D-5	/02	3.24760	1.08602	1.09420	4.34180	3.24760	1.66290	0.56870	0.19018	17.51%	82.49%
2013-ON30D-6	/01	3.28140	1.09733	1.12810	4.40950	3.28140	1.75950	0.63140	0.21115	19.24%	80.76%
2013-ON30D-6	/02	3.21790	1.07609	1.14640	4.36430	3.21790	1.76400	0.61760	0.20653	19.19%	80.81%
2013-ON30D-7	/01	3.32940	1.11338	1.10090	4.43030	3.32940	1.74870	0.64780	0.21663	19.46%	80.54%
2013-ON30D-7	/02	3.27900	1.09653	1.11520	4.39420	3.27900	1.75110	0.63590	0.21265	19.39%	80.61%
2013-ON30D-8	/01	3.26380	1.09144	1.05960	4.32340	3.26380	1.63880	0.57920	0.19369	17.75%	82.25%
2013-ON30D-8	/02	3.28650	1.09903	1.06340	4.34990	3.28650	1.64190	0.57850	0.19346	17.60%	82.40%
2013-ON30D-9	/01	3.26280	1.09111	1.07400	4.33680	3.26280	1.60970	0.53570	0.17914	16.42%	83.58%
2013-ON30D-9	/02	3.25000	1.08683	1.09350	4.34350	3.25000	1.62680	0.53330	0.17834	16.41%	83.59%
2013-ON30D-10	/01	3.25460	1.08837	1.09290	4.34750	3.25460	1.61140	0.51850	0.17339	15.93%	84.07%
2013-ON30D-10	/02	3.24710	1.08586	1.08300	4.33010	3.24710	1.60180	0.51880	0.17349	15.98%	84.02%
2013-ON30D-11	/01	3.26140	1.09064	1.11470	4.37610	3.26140	1.74770	0.63300	0.21168	19.41%	80.59%
2013-ON30D-11	/02	3.32050	1.11040	1.08330	4.40380	3.32050	1.74040	0.65710	0.21974	19.79%	80.21%
2013-ON30D-12	/01	3.38510	1.13201	1.10930	4.49440	3.38510	1.85370	0.74440	0.24893	21.99%	78.01%
2013-ON30D-12	/02	3.40550	1.13883	1.08730	4.49280	3.40550	1.83720	0.74990	0.25077	22.02%	77.98%
2013-ON30D-13	/01	3.43800	1.14970	1.06470	4.50270	3.43800	1.83750	0.77280	0.25843	22.48%	77.52%
2013-ON30D-13	/02	3.37100	1.12729	1.08160	4.45260	3.37100	1.83720	0.75560	0.25268	22.41%	77.59%
2013-ON30D-14	/01	3.41950	1.14351	1.11160	4.53110	3.41950	1.90720	0.79560	0.26606	23.27%	76.73%
2013-ON30D-14	/02	3.42560	1.14555	1.09460	4.52020	3.42560	1.89190	0.79730	0.26662	23.27%	76.73%
2013-ON30D-15	/01	3.37140	1.12742	1.14060	4.51200	3.37140	1.97680	0.83620	0.27963	24.80%	75.20%
2013-ON30D-15	/02	3.45660	1.15592	1.06880	4.52540	3.45660	1.88820	0.81940	0.27401	23.71%	76.29%
2013-ON30D-16	/01	3.41870	1.14324	1.08710	4.50580	3.41870	1.88590	0.79880	0.26713	23.37%	76.63%
2013-ON30D-16	/02	3.40790	1.13963	1.11520	4.52310	3.40790	1.90960	0.79440	0.26565	23.31%	76.69%
2013-ON30D-17	/01	3.47830	1.16317	1.11210	4.59040	3.47830	1.96590	0.85380	0.28552	24.55%	75.45%
2013-ON30D-17	/02	3.42110	1.14404	1.10430	4.52540	3.42110	1.94380	0.83950	0.28074	24.54%	75.46%
2013-ON30D-18	/01	3.45210	1.15441	1.08420	4.53630	3.45210	1.89640	0.81220	0.27161	23.53%	76.47%
2013-ON30D-18	/02	3.43080	1.14729	1.11980	4.55060	3.43080	1.91890	0.79910	0.26723	23.29%	76.71%
2013-ON30D-19	/01	3.46520	1.15879	1.09570	4.56090	3.46520	1.95320	0.85750	0.28676	24.75%	75.25%
2013-ON30D-19	/02	3.50090	1.17073	1.10100	4.60190	3.50090	1.95420	0.85320	0.28532	24.37%	75.63%
2013-ON30D-20	/01	3.49830	1.16986	1.07550	4.57380	3.49830	1.97460	0.89910	0.30067	25.70%	74.30%
2013-ON30D-20	/02	3.46570	1.15896	1.10600	4.57170	3.46570	1.99750	0.89150	0.29813	25.72%	74.28%

Table F.688.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of ponar grabs in Lake Ontario

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON01PG	/01	4.48905	1.49571	1.10935	5.59840	4.48905	3.60600	2.49665	0.83186	55.62%	44.38%
2013-ON01PG	/02	4.23170	1.40996	1.10660	5.33830	4.23170	3.31760	2.21100	0.73668	52.25%	47.75%
2013-ON02PG	/01	3.38700	1.12851	1.06600	4.45300	3.38700	1.96820	0.90220	0.30060	26.64%	73.36%
2013-ON02PG	/02	3.39870	1.13241	1.10630	4.50500	3.39870	2.01100	0.90470	0.30144	26.62%	73.38%
2013-ON03PG	/01	3.86880	1.28904	1.07530	4.94410	3.86880	2.63970	1.56440	0.52124	40.44%	59.56%
2013-ON03PG	/02	3.84580	1.28138	1.07140	4.91720	3.84580	2.63310	1.56170	0.52034	40.61%	59.39%
2013-ON04PG	/01	3.86090	1.28641	1.11930	4.98020	3.86090	2.59660	1.47730	0.49222	38.26%	61.74%
2013-ON04PG	/02	3.92620	1.30817	1.08730	5.01350	3.92620	2.62110	1.53380	0.51105	39.07%	60.93%
2013-ON05PG	/01	3.41810	1.13888	1.08430	4.50240	3.41810	1.93900	0.85470	0.28478	25.01%	74.99%
2013-ON05PG	/02	3.37910	1.12588	1.10340	4.48250	3.37910	1.94070	0.83730	0.27898	24.78%	75.22%
2013-ON06PG	/01	3.65980	1.21941	1.07500	4.73480	3.65980	2.26570	1.19070	0.39673	32.53%	67.47%
2013-ON06PG	/02	3.53990	1.17946	1.06380	4.60370	3.53990	2.22640	1.16260	0.38737	32.84%	67.16%
2013-ON07PG	/01	3.88050	1.29294	1.09900	4.97950	3.88050	2.84700	1.74800	0.58242	45.05%	54.95%
2013-ON07PG	/02	3.93750	1.31193	1.12310	5.06060	3.93750	2.89630	1.77320	0.59081	45.03%	54.97%
2013-ON08PG	/01	3.45840	1.15230	1.09870	4.55710	3.45840	2.08160	0.98290	0.32749	28.42%	71.58%
2013-ON08PG	/02	3.51580	1.17143	1.14160	4.65740	3.51580	2.15850	1.01690	0.33882	28.92%	71.08%
2013-ON09PG	/01	3.35850	1.11902	1.09350	4.45200	3.35850	1.96090	0.86740	0.28901	25.83%	74.17%
2013-ON09PG	/02	3.37140	1.12332	1.12940	4.50080	3.37140	2.00050	0.87110	0.29024	25.84%	74.16%
2013-ON10PG	/01	4.30110	1.43308	1.11340	5.41450	4.30110	3.40710	2.29370	0.76424	53.33%	46.67%
2013-ON10PG	/02	4.28800	1.42872	1.08790	5.37590	4.28800	3.37400	2.28610	0.76170	53.31%	46.69%
2013-ON11PG	/01	4.15490	1.38437	1.09260	5.24750	4.15490	3.18660	2.09400	0.69770	50.40%	49.60%
2013-ON11PG	/02	4.11880	1.37234	1.16690	5.28570	4.11880	3.15690	1.99000	0.66305	48.32%	51.68%
2013-ON12PG	/01	3.48880	1.16243	1.08340	4.57220	3.48880	2.08760	1.00420	0.33459	28.78%	71.22%
2013-ON12PG	/02	3.59490	1.19778	1.07600	4.67090	3.59490	2.09970	1.02370	0.34109	28.48%	71.52%
2013-ON13PG	/01	3.31260	1.10372	1.07440	4.38700	3.31260	1.82810	0.75370	0.25113	22.75%	77.25%
2013-ON13PG	/02	3.31860	1.10572	1.04990	4.36850	3.31860	1.80200	0.75210	0.25059	22.66%	77.34%
2013-ON14PG	/01	4.70190	1.56662	1.08200	5.78390	4.70190	3.91660	2.83460	0.94446	60.29%	39.71%
2013-ON14PG	/02	4.84960	1.61584	1.07760	5.92720	4.84960	4.12240	3.04480	1.01450	62.78%	37.22%
2013-ON15PG	/01	3.37220	1.12358	1.08270	4.45490	3.37220	1.73720	0.65450	0.21807	19.41%	80.59%
2013-ON15PG	/02	3.32430	1.10762	1.08060	4.40490	3.32430	1.71780	0.63720	0.21231	19.17%	80.83%
2013-ON16PG	/01	3.33800	1.11219	1.15980	4.49780	3.33800	2.00770	0.84790	0.28251	25.40%	74.60%
2013-ON16PG	/02	3.38310	1.12721	1.09830	4.48140	3.38310	1.95640	0.85810	0.28591	25.36%	74.64%
2013-ON17PG	/01	3.30590	1.10149	1.09500	4.40090	3.30590	1.78490	0.68990	0.22987	20.87%	79.13%
2013-ON17PG	/02	3.40660	1.13504	1.09320	4.49980	3.40660	1.80970	0.71650	0.23873	21.03%	78.97%
2013-ON18PG	/01	3.31920	1.10592	1.07740	4.39660	3.31920	1.85940	0.78200	0.26055	23.56%	76.44%
2013-ON18PG	/02	3.25940	1.08600	1.11220	4.37160	3.25940	1.88820	0.77600	0.25856	23.81%	76.19%
2013-ON19PG	/01	3.78100	1.25979	1.10580	4.88680	3.78100	2.63900	1.53320	0.51085	40.55%	59.45%
2013-ON19PG	/02	3.79750	1.26529	1.09310	4.89060	3.79750	2.62780	1.53470	0.51135	40.41%	59.59%

Table F.699.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of ponar grabs in Lake Ontario

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2013-ON20PG	/01	5.11330	1.70370	1.08700	6.20030	5.11330	4.46060	3.37360	1.12405	65.98%	34.02%
2013-ON20PG	/02	5.03640	1.67808	1.11090	6.14730	5.03640	4.46000	3.34910	1.11589	66.50%	33.50%
2013-ON21PG	/01	3.42950	1.14267	1.07410	4.50360	3.42950	1.88460	0.81050	0.27005	23.63%	76.37%
2013-ON21PG	/02	3.40310	1.13388	1.09070	4.49380	3.40310	1.88800	0.79730	0.26565	23.43%	76.57%
2013-ON22PG	/01	3.20660	1.06841	1.09320	4.29980	3.20660	1.73940	0.64620	0.21531	20.15%	79.85%
2013-ON22PG	/02	3.24940	1.08267	1.11840	4.36780	3.24940	1.78480	0.66640	0.22204	20.51%	79.49%
2013-ON23PG	/01	5.23540	1.74438	1.11590	6.35130	5.23540	4.68970	3.57380	1.19075	68.26%	31.74%
2013-ON23PG	/02	5.03080	1.67621	1.05790	6.08870	5.03080	4.48000	3.42210	1.14021	68.02%	31.98%
2013-ON24PG	/01	3.46450	1.15434	1.06940	4.53390	3.46450	1.97560	0.90620	0.30194	26.16%	73.84%
2013-ON24PG	/02	3.62910	1.20918	1.10700	4.73610	3.62910	2.07920	0.97220	0.32393	26.79%	73.21%
2013-ON25PG	/01	3.29110	1.09656	1.10150	4.39260	3.29110	1.72710	0.62560	0.20844	19.01%	80.99%
2013-ON25PG	/02	3.32760	1.10872	1.12740	4.45500	3.32760	1.77820	0.65080	0.21684	19.56%	80.44%
2013-ON26PG	/01	3.28300	1.09386	1.08990	4.37290	3.28300	1.72670	0.63680	0.21218	19.40%	80.60%
2013-ON26PG	/02	3.33340	1.11065	1.10110	4.43450	3.33340	1.77030	0.66920	0.22297	20.08%	79.92%
2013-ON27PG	/01	3.32050	1.10636	1.08330	4.40380	3.32050	1.77370	0.69040	0.23003	20.79%	79.21%
2013-ON27PG	/02	3.22010	1.07290	1.05620	4.27630	3.22010	1.74940	0.69320	0.23097	21.53%	78.47%
2013-ON28PG	/01	3.29510	1.09789	1.11240	4.40750	3.29510	1.72190	0.60950	0.20308	18.50%	81.50%
2013-ON28PG	/02	3.26050	1.08636	1.11130	4.37180	3.26050	1.74310	0.63180	0.21051	19.38%	80.62%
2013-ON29PG	/01	4.51900	1.50568	1.07000	5.58900	4.51900	3.65380	2.58380	0.86090	57.18%	42.82%
2013-ON29PG	/02	4.54320	1.51375	1.12010	5.66330	4.54320	3.70550	2.58540	0.86143	56.91%	43.09%
2013-ON30PG	/01	3.32550	1.10802	1.06330	4.38880	3.32550	1.71130	0.64800	0.21591	19.49%	80.51%
2013-ON30PG	/02	3.32660	1.10839	1.08680	4.41340	3.32660	1.68360	0.59680	0.19885	17.94%	82.06%
2013-ON31PG	/01	3.35090	1.11649	1.11880	4.46970	3.35090	1.88760	0.76880	0.25616	22.94%	77.06%
2013-ON31PG	/02	3.36920	1.12258	1.12080	4.49000	3.36920	1.89630	0.77550	0.25839	23.02%	76.98%
2013-ON32PG	/01	4.07270	1.35698	1.11770	5.19040	4.07270	2.97390	1.85620	0.61847	45.58%	54.42%
2013-ON32PG	/02	4.25290	1.41702	1.12540	5.37830	4.25290	3.34780	2.22240	0.74048	52.26%	47.74%
2013-ON33PG	/01	3.32600	1.10819	1.04860	4.37460	3.32600	1.77020	0.72160	0.24043	21.70%	78.30%
2013-ON33PG	/02	3.36750	1.12202	1.08040	4.44790	3.36750	1.80480	0.72440	0.24136	21.51%	78.49%
2013-ON34PG	/01	3.37030	1.12295	1.07570	4.44600	3.37030	2.39560	1.31990	0.43978	39.16%	60.84%
2013-ON34PG	/02	3.54540	1.18129	1.07360	4.61900	3.54540	2.22450	1.15090	0.38347	32.46%	67.54%
2013-ON35PG	/01	3.20590	1.06817	1.08310	4.28900	3.20590	1.69400	0.61090	0.20355	19.06%	80.94%
2013-ON35PG	/02	3.55470	1.18439	1.10530	4.66000	3.55470	1.73390	0.62860	0.20944	17.68%	82.32%
2013-ON36PG	/01	3.22290	1.07384	1.08790	4.31080	3.22290	1.85190	0.76400	0.25456	23.71%	76.29%
2013-ON36PG	/02	3.36450	1.12102	1.12570	4.49020	3.36450	1.91470	0.78900	0.26289	23.45%	76.55%
2013-ON37PG	/01	4.21760	1.40526	1.08010	5.29770	4.21760	3.13990	2.05980	0.68630	48.84%	51.16%
2013-ON37PG	/02	4.17090	1.38970	1.09920	5.27010	4.17090	3.05490	1.95570	0.65162	46.89%	53.11%

TableF.70.In-situ properties of water in sediment interface at each location in Lake Ontario

SITE ID	ORP (mV)	DO (mg/L)	pH	Turbidity (NTU)	Conductivity (µs)	TDS (mg/L as NaCl)	Salinity (%)
2013-ON01PG	190.9	8.72	8.35	12.7	288	137	0.1
2013-ON02PG	220		7.88	6.6	296	141	0.1
2013-ON03PG	157.9	8.45	7.78	142	299	138	0.1
2013-ON04PG	164.1	8.59	8.17	26.3	280	133	0.1
2013-ON05PG	184	8.41	8.5	6.8	294	139	0.1
2013-ON06PG	131.5	8.57	7.54	17.7	302	143	0.1
2013-ON07PG	188.6	9.06	8.57	15.1	296	141	0.1
2013-ON08PG	155.6	7.4	7.86	61.1	282	134	0.1
2013-ON09PG	200.7	8.16	8.41	16.8	291	138	0.1
2013-ON10PG	172.3	8.87	8.42	28.4	287	130	0.1
2013-ON11PG	194	9.74	8.42	2.66	293	140	0.1
2013-ON12PG	140.2	9.02	8.07	84.7	285	135	0.1
2013-ON13PG	214.9	9.04	7.82	2.88	295	141	0.1
2013-ON14PG	200.7	9.83	8.47	0.658	293	139	0.1
2013-ON15PG	183.8	7	7.67	418	288	137	0.1
2013-ON16PG	194.4	9.33	8.6	0.473	289	137	0.1
2013-ON17PG	216.8	9.37	7.77	4.08	296	141	0.1
2013-ON18PG	200.6	8.85	8.08	0.57	289	138	0.1
2013-ON19PG	167	5.22	7.7	187	288	136	0.1
2013-ON20PG	186.4	9.32	8.51	1.93	291	138	0.1
2013-ON21PG	71.7	2.06	8.55	22	289	137	0.1
2013-ON22PG	11.4	12.38	7.15	348	280	134	0.1
2013-ON23PG	193.4	9.3	8.46	29.1	287	138	0.1
2013-ON24PG	152.6	8.6	8.01	120	287	137	0.1
2013-ON25PG	199.1	8.75	7.78	3.11	301	143	0.1
2013-ON26PG	193.2	7.59	8.11	85.6	296	140	0.1
2013-ON27PG	142	8.24	7.74	139	288	137	0.1
2013-ON28PG	191	6.97	8.34	32.4	288	137	0.1
2013-ON29PG	191.3	8.31	8.57	2.96	290	137	0.1
2013-ON30PG	214.9	9.02	7.78	4.23	297	141	0.1
2013-ON31PG	134.7	8.37	7.78	70.6	286	136	0.1
2013-ON32PG	170	8.16	8.61	19.2	290	137	0.1
2013-ON33PG	182	6.86	8.13	24.6	287	136	0.1
2013-ON34PG	146.6	7.01	7.73	205	290	138	0.1
2013-ON35PG	35.2	6.25	7.26	196	292	139	0.1
2013-ON36PG	166.6	8.22	7.67	12	297	142	0.1
2013-ON37PG	177.3	8.04	8.54	1.15	289	138	0.1

TableF.71.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER09

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER09-1	/01	3.24350	1.08656	1.09750	4.34100	3.24350	1.61610	0.51860	0.17373	15.99%	84.01%
2014-ER09-1	/02	3.22890	1.08167	1.09460	4.32350	3.22890	1.65530	0.56070	0.18783	17.37%	82.63%
2014-ER09-2	/01	3.48460	1.16733	1.06880	4.55340	3.48460	1.95090	0.88210	0.29550	25.31%	74.69%
2014-ER09-2	/02	3.45380	1.15701	1.08400	4.53780	3.45380	1.95100	0.86700	0.29044	25.10%	74.90%
2014-ER09-3	/01	3.44950	1.15557	1.07730	4.52680	3.44950	1.98270	0.90540	0.30331	26.25%	73.75%
2014-ER09-3	/02	3.43320	1.15011	1.10200	4.53520	3.43320	1.97820	0.87620	0.29352	25.52%	74.48%
2014-ER09-4	/01	3.43290	1.15001	1.10390	4.53680	3.43290	1.98130	0.87740	0.29393	25.56%	74.44%
2014-ER09-4	/02	3.42180	1.14629	1.07850	4.50030	3.42180	1.93390	0.85540	0.28656	25.00%	75.00%
2014-ER09-5	/01	3.47740	1.16492	1.09180	4.56920	3.47740	2.04830	0.95650	0.32042	27.51%	72.49%
2014-ER09-5	/02	3.51530	1.17761	1.07030	4.58560	3.51530	2.04990	0.97960	0.32816	27.87%	72.13%
2014-ER09-6	/01	3.51970	1.19488	1.06860	4.58830	3.51970	2.09610	1.02750	0.34882	29.19%	70.81%
2014-ER09-6	/02	3.55630	1.20731	1.09110	4.64740	3.55630	2.12720	1.03610	0.35174	29.13%	70.87%
2014-ER09-7	/01	3.52380	1.19628	1.11670	4.64050	3.52380	2.11510	0.99840	0.33894	28.33%	71.67%
2014-ER09-7	/02	3.51680	1.19390	1.11770	4.63450	3.51680	2.10810	0.99040	0.33623	28.16%	71.84%
2014-ER09-8	/01	3.54070	1.20201	1.10400	4.64470	3.54070	2.09060	0.98660	0.33494	27.86%	72.14%
2014-ER09-8	/02	3.52330	1.19611	1.10160	4.62490	3.52330	2.08250	0.98090	0.33300	27.84%	72.16%
2014-ER09-9	/01	3.57560	1.21386	1.08490	4.66050	3.57560	2.14410	1.05920	0.35958	29.62%	70.38%
2014-ER09-9	/02	3.58660	1.21760	1.07420	4.66080	3.58660	2.12330	1.04910	0.35615	29.25%	70.75%
2014-ER09-10	/01	3.58530	1.21715	1.08570	4.67100	3.58530	2.16310	1.07740	0.36576	30.05%	69.95%
2014-ER09-10	/02	3.59710	1.22116	1.09580	4.69290	3.59710	2.18050	1.08470	0.36824	30.15%	69.85%
2014-ER09-11	/01	3.56060	1.20877	1.10130	4.66190	3.56060	2.17170	1.07040	0.36338	30.06%	69.94%
2014-ER09-11	/02	3.54890	1.20480	1.09310	4.64200	3.54890	2.15090	1.05780	0.35911	29.81%	70.19%
2014-ER09-12	/01	3.62840	1.23179	1.07010	4.69850	3.62840	2.21750	1.14740	0.38952	31.62%	68.38%
2014-ER09-12	/02	3.61290	1.22652	1.09170	4.70460	3.61290	2.22410	1.13240	0.38443	31.34%	68.66%
2014-ER09-13	/01	3.61520	1.22730	1.07500	4.69020	3.61520	2.22650	1.15150	0.39092	31.85%	68.15%
2014-ER09-13	/02	3.60080	1.22242	1.08640	4.68720	3.60080	2.23770	1.15130	0.39085	31.97%	68.03%
2014-ER09-14	/01	3.62920	1.23206	1.10510	4.73430	3.62920	2.25060	1.14550	0.38888	31.56%	68.44%
2014-ER09-14	/02	3.62780	1.23158	1.07880	4.70660	3.62780	2.22340	1.14460	0.38857	31.55%	68.45%
2014-ER09-15	/01	3.61700	1.22792	1.09070	4.70770	3.61700	2.23260	1.14190	0.38766	31.57%	68.43%
2014-ER09-15	/02	3.61660	1.22778	1.09630	4.71290	3.61660	2.23420	1.13790	0.38630	31.46%	68.54%
2014-ER09-16	/01	3.63790	1.23501	1.09450	4.73240	3.63790	2.21760	1.12310	0.38128	30.87%	69.13%
2014-ER09-16	/02	3.65550	1.24099	1.11390	4.76940	3.65550	2.24270	1.12880	0.38321	30.88%	69.12%
2014-ER09-17	/01	3.58990	1.21872	1.09400	4.68390	3.58990	2.21060	1.11660	0.37907	31.10%	68.90%
2014-ER09-17	/02	3.61230	1.22632	1.08200	4.69430	3.61230	2.20160	1.11960	0.38009	30.99%	69.01%
2014-ER09-18	/01	3.64090	1.23603	1.07420	4.71510	3.64090	2.24670	1.17250	0.39805	32.20%	67.80%
2014-ER09-18	/02	3.65910	1.24221	1.09290	4.75200	3.65910	2.26880	1.17590	0.39920	32.14%	67.86%
2014-ER09-19	/01	3.58190	1.21600	1.08150	4.66340	3.58190	2.19530	1.11380	0.37812	31.10%	68.90%
2014-ER09-19	/02	3.57020	1.21203	1.08330	4.65350	3.57020	2.19330	1.11000	0.37683	31.09%	68.91%
2014-ER09-20	/01	3.59920	1.22187	1.08010	4.67930	3.59920	2.22410	1.14400	0.38837	31.78%	68.22%
2014-ER09-20	/02	3.59910	1.22184	1.09460	4.69370	3.59910	2.23900	1.14440	0.38851	31.80%	68.20%
2014-ER09-21	/01	3.63600	1.23437	1.08370	4.71970	3.63600	2.27030	1.18660	0.40283	32.63%	67.37%
2014-ER09-21	/02	3.61180	1.22615	1.08630	4.69810	3.61180	2.25400	1.16770	0.39642	32.33%	67.67%
2014-ER09-22	/01	3.63750	1.23488	1.06870	4.70620	3.63750	2.25510	1.18640	0.40276	32.62%	67.38%
2014-ER09-22	/02	3.65520	1.24088	1.05860	4.71380	3.65520	2.25290	1.19430	0.40545	32.67%	67.33%

Table F.702.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER15

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER15-1	/01	3.46400	1.17409	1.09590	4.55990	3.46400	1.96420	0.86830	0.29430	25.07%	74.93%
2014-ER15-1	/02	3.44600	1.16799	1.08120	4.52720	3.44600	1.91210	0.83090	0.28163	24.11%	75.89%
2014-ER15-2	/01	3.72100	1.26120	1.08950	4.81050	3.72100	2.34000	1.25050	0.42384	33.61%	66.39%
2014-ER15-2	/02	3.71790	1.26014	1.08030	4.79820	3.71790	2.32030	1.24000	0.42029	33.35%	66.65%
2014-ER15-3	/01	3.71340	1.25862	1.08660	4.80000	3.71340	2.34940	1.26280	0.42801	34.01%	65.99%
2014-ER15-3	/02	3.74720	1.27008	1.08910	4.83630	3.74720	2.36400	1.27490	0.43211	34.02%	65.98%
2014-ER15-4	/01	3.70820	1.25686	1.05840	4.76660	3.70820	2.36120	1.30280	0.44157	35.13%	64.87%
2014-ER15-4	/02	3.73360	1.26547	1.06700	4.80060	3.73360	2.36820	1.30120	0.44103	34.85%	65.15%
2014-ER15-5	/01	3.78160	1.28173	1.07470	4.85630	3.78160	2.44040	1.36570	0.46289	36.11%	63.89%
2014-ER15-5	/02	3.80390	1.28929	1.09070	4.89460	3.80390	2.46190	1.37120	0.46475	36.05%	63.95%
2014-ER15-6	/01	3.74070	1.26787	1.07670	4.81740	3.74070	2.39990	1.32320	0.44849	35.37%	64.63%
2014-ER15-6	/02	3.77170	1.27838	1.08780	4.85950	3.77170	2.42090	1.33310	0.45184	35.34%	64.66%
2014-ER15-7	/01	3.85070	1.30516	1.08530	4.93600	3.85070	2.49160	1.40630	0.47665	36.52%	63.48%
2014-ER15-7	/02	3.83930	1.30129	1.08050	4.91980	3.83930	2.48260	1.40210	0.47523	36.52%	63.48%
2014-ER15-8	/01	3.79810	1.28733	1.08510	4.88320	3.79810	2.43900	1.35390	0.45889	35.65%	64.35%
2014-ER15-8	/02	3.81550	1.29322	1.08110	4.89660	3.81550	2.44590	1.36480	0.46259	35.77%	64.23%
2014-ER15-9	/01	3.85300	1.30594	1.08200	4.93500	3.85300	2.52400	1.44200	0.48875	37.43%	62.57%
2014-ER15-9	/02	3.88500	1.31678	1.09170	4.97670	3.88500	2.54470	1.45300	0.49248	37.40%	62.60%
2014-ER15-10	/01	3.87770	1.31431	1.07840	4.95610	3.87770	2.54680	1.46840	0.49770	37.87%	62.13%
2014-ER15-10	/02	3.88200	1.31576	1.07610	4.95810	3.88200	2.54590	1.46980	0.49817	37.86%	62.14%
2014-ER15-11	/01	3.89250	1.31932	1.08440	4.97690	3.89250	2.64010	1.55570	0.52729	39.97%	60.03%
2014-ER15-11	/02	3.93180	1.33264	1.09540	5.02720	3.93180	2.66520	1.56980	0.53207	39.93%	60.07%
2014-ER15-12	/01	3.87220	1.31244	1.08460	4.95680	3.87220	2.56940	1.48480	0.50326	38.35%	61.65%
2014-ER15-12	/02	3.88000	1.31509	1.06970	4.94970	3.88000	2.55890	1.48920	0.50475	38.38%	61.62%
2014-ER15-13	/01	3.86090	1.30861	1.08220	4.94310	3.86090	2.56600	1.48380	0.50292	38.43%	61.57%
2014-ER15-13	/02	3.89430	1.31993	1.09430	4.98860	3.89430	2.58600	1.49170	0.50560	38.30%	61.70%
2014-ER15-14	/01	3.87230	1.31248	1.06980	4.94210	3.87230	2.54460	1.47480	0.49987	38.09%	61.91%
2014-ER15-14	/02	3.86040	1.30844	1.07340	4.93380	3.86040	2.54420	1.47080	0.49851	38.10%	61.90%
2014-ER15-15	/01	3.84300	1.30255	1.07960	4.92260	3.84300	2.52020	1.44060	0.48828	37.49%	62.51%
2014-ER15-15	/02	3.83460	1.29970	1.09980	4.93440	3.83460	2.52700	1.42720	0.48373	37.22%	62.78%
2014-ER15-16	/01	3.83750	1.30068	1.10510	4.94260	3.83750	2.51700	1.41190	0.47855	36.79%	63.21%
2014-ER15-16	/02	3.83280	1.29909	1.10000	4.93280	3.83280	2.51220	1.41220	0.47865	36.85%	63.15%
2014-ER15-17	/01	3.78620	1.28329	1.08900	4.87520	3.78620	2.47490	1.38590	0.46974	36.60%	63.40%
2014-ER15-17	/02	3.80430	1.28943	1.09140	4.89570	3.80430	2.48470	1.39330	0.47224	36.62%	63.38%
2014-ER15-18	/01	3.81390	1.29268	1.10330	4.91720	3.81390	2.51300	1.40970	0.47780	36.96%	63.04%
2014-ER15-18	/02	3.83590	1.30014	1.08890	4.92480	3.83590	2.50620	1.41730	0.48038	36.95%	63.05%
2014-ER15-19	/01	3.81070	1.29160	1.09350	4.90420	3.81070	2.49310	1.39960	0.47438	36.73%	63.27%
2014-ER15-19	/02	3.83600	1.30017	1.08030	4.91630	3.83600	2.49040	1.41010	0.47794	36.76%	63.24%
2014-ER15-20	/01	3.89460	1.32004	1.09510	4.98970	3.89460	2.56970	1.47460	0.49980	37.86%	62.14%
2014-ER15-20	/02	3.81650	1.29356	1.09650	4.91300	3.81650	2.54040	1.44390	0.48940	37.83%	62.17%
2014-ER15-21	/01	3.81590	1.29336	1.10110	4.91700	3.81590	2.53200	1.43090	0.48499	37.50%	62.50%
2014-ER15-21	/02	3.80100	1.28831	1.09440	4.89540	3.80100	2.52090	1.42650	0.48350	37.53%	62.47%

Table F.713.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER37

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER37-1	/01	3.37730	1.13633	1.08470	4.46200	3.37730	1.59130	0.50660	0.17045	15.00%	85.00%
2014-ER37-1	/02	3.22310	1.08445	1.08560	4.30870	3.22310	1.52400	0.43840	0.14750	13.60%	86.40%
2014-ER37-2	/01	3.32470	1.11863	1.10160	4.42630	3.32470	1.76680	0.66520	0.22381	20.01%	79.99%
2014-ER37-2	/02	3.37180	1.13448	1.10400	4.47580	3.37180	1.78400	0.68000	0.22879	20.17%	79.83%
2014-ER37-3	/01	3.39190	1.14124	1.07880	4.47070	3.39190	1.85040	0.77160	0.25961	22.75%	77.25%
2014-ER37-3	/02	3.41260	1.14821	1.10850	4.52110	3.41260	1.88300	0.77450	0.26059	22.70%	77.30%
2014-ER37-4	/01	3.45950	1.16399	1.10080	4.56030	3.45950	1.94600	0.84520	0.28438	24.43%	75.57%
2014-ER37-4	/02	3.46520	1.16591	1.11050	4.57570	3.46520	1.95800	0.84750	0.28515	24.46%	75.54%
2014-ER37-5	/01	3.43550	1.15591	1.09640	4.53190	3.43550	1.95550	0.85910	0.28905	25.01%	74.99%
2014-ER37-5	/02	3.48150	1.17139	1.09280	4.57430	3.48150	1.95810	0.86530	0.29114	24.85%	75.15%
2014-ER37-6	/01	3.49840	1.17708	1.08060	4.57900	3.49840	1.97810	0.89750	0.30197	25.65%	74.35%
2014-ER37-6	/02	3.48750	1.17341	1.10730	4.59480	3.48750	2.00060	0.89330	0.30056	25.61%	74.39%
2014-ER37-7	/01	3.51520	1.18273	1.09130	4.60650	3.51520	2.02550	0.93420	0.31432	26.58%	73.42%
2014-ER37-7	/02	3.51510	1.18270	1.07690	4.59200	3.51510	2.00760	0.93070	0.31314	26.48%	73.52%
2014-ER37-8	/01	3.52230	1.18512	1.10060	4.62290	3.52230	2.02700	0.92640	0.31170	26.30%	73.70%
2014-ER37-8	/02	3.50170	1.17819	1.08750	4.58920	3.50170	2.00500	0.91750	0.30870	26.20%	73.80%
2014-ER37-9	/01	3.47170	1.16809	1.07130	4.54300	3.47170	1.94710	0.87580	0.29467	25.23%	74.77%
2014-ER37-9	/02	3.48200	1.17156	1.09780	4.57980	3.48200	1.97360	0.87580	0.29467	25.15%	74.85%
2014-ER37-10	/01	3.43100	1.15440	1.09250	4.52350	3.43100	1.91010	0.81760	0.27509	23.83%	76.17%
2014-ER37-10	/02	3.45580	1.16274	1.09170	4.54750	3.45580	1.91680	0.82510	0.27761	23.88%	76.12%
2014-ER37-11	/01	3.43600	1.15608	1.08750	4.52350	3.43600	1.91950	0.83200	0.27994	24.21%	75.79%
2014-ER37-11	/02	3.44510	1.15914	1.08490	4.53000	3.44510	1.91820	0.83330	0.28037	24.19%	75.81%
2014-ER37-12	/01	3.44050	1.15760	1.07020	4.51070	3.44050	1.89180	0.82160	0.27644	23.88%	76.12%
2014-ER37-12	/02	3.44020	1.15749	1.08910	4.52930	3.44020	1.91370	0.82460	0.27745	23.97%	76.03%
2014-ER37-13	/01	3.43060	1.15426	1.10470	4.53530	3.43060	1.89210	0.78740	0.26493	22.95%	77.05%
2014-ER37-13	/02	3.42700	1.15305	1.09320	4.52020	3.42700	1.88770	0.79450	0.26732	23.18%	76.82%
2014-ER37-14	/01	3.40030	1.14407	1.08900	4.48930	3.40030	1.89620	0.80720	0.27159	23.74%	76.26%
2014-ER37-14	/02	3.44270	1.15834	1.07950	4.52220	3.44270	1.89160	0.81210	0.27324	23.59%	76.41%
2014-ER37-15	/01	3.46360	1.16537	1.09140	4.55500	3.46360	1.96450	0.87310	0.29376	25.21%	74.79%
2014-ER37-15	/02	3.44740	1.15992	1.08660	4.53400	3.44740	1.95650	0.86990	0.29269	25.23%	74.77%
2014-ER37-16	/01	3.55350	1.19562	1.09730	4.65080	3.55350	2.05300	0.95570	0.32156	26.89%	73.11%
2014-ER37-16	/02	3.50530	1.17940	1.09400	4.59930	3.50530	2.03910	0.94510	0.31799	26.96%	73.04%
2014-ER37-17	/01	3.56110	1.19817	1.09240	4.65350	3.56110	2.04910	0.95670	0.32189	26.87%	73.13%
2014-ER37-17	/02	3.54460	1.19262	1.09960	4.64420	3.54460	2.05890	0.95930	0.32277	27.06%	72.94%
2014-ER37-18	/01	3.57090	1.20147	1.10120	4.67210	3.57090	2.07910	0.97790	0.32903	27.39%	72.61%
2014-ER37-18	/02	3.55270	1.19535	1.08900	4.64170	3.55270	2.06270	0.97370	0.32761	27.41%	72.59%
2014-ER37-19	/01	3.55400	1.19578	1.08800	4.64200	3.55400	2.09400	1.00600	0.33848	28.31%	71.69%
2014-ER37-19	/02	3.57190	1.20181	1.09460	4.66650	3.57190	2.10390	1.00930	0.33959	28.26%	71.74%
2014-ER37-20	/01	3.51390	1.18229	1.08460	4.59850	3.51390	2.08460	1.00000	0.33646	28.46%	71.54%
2014-ER37-20	/02	3.57610	1.20322	1.07230	4.64840	3.57610	2.09250	1.02020	0.34326	28.53%	71.47%
2014-ER37-21	/01	3.54840	1.19390	1.09580	4.64420	3.54840	2.10400	1.00820	0.33922	28.41%	71.59%
2014-ER37-21	/02	3.55490	1.19609	1.10330	4.65820	3.55490	2.11690	1.01360	0.34104	28.51%	71.49%
2014-ER37-22	/01	3.58100	1.20487	1.08900	4.67000	3.58100	2.13050	1.04150	0.35042	29.08%	70.92%
2014-ER37-22	/02	3.55950	1.19763	1.08800	4.64750	3.55950	2.11960	1.03160	0.34709	28.98%	71.02%
2014-ER37-23	/01	3.59410	1.20928	1.08160	4.67570	3.59410	2.16860	1.08700	0.36573	30.24%	69.76%
2014-ER37-23	/02	3.61750	1.21715	1.08360	4.70110	3.61750	2.17760	1.09400	0.36809	30.24%	69.76%
2014-ER37-24	/01	3.60750	1.21378	1.08030	4.68780	3.60750	2.19790	1.11760	0.37603	30.98%	69.02%
2014-ER37-24	/02	3.61760	1.21718	1.09730	4.71490	3.61760	2.22000	1.12270	0.37775	31.03%	68.97%

Table F.724.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER73

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER73-1	/01	3.21950	1.08324	1.06830	4.28780	3.21950	1.47900	0.41070	0.13818	12.76%	87.24%
2014-ER73-1	/02	3.15490	1.06150	1.07320	4.22810	3.15490	1.46050	0.38730	0.13031	12.28%	87.72%
2014-ER73-2	/01	3.34950	1.12698	1.08770	4.43720	3.34950	1.73400	0.64630	0.21745	19.30%	80.70%
2014-ER73-2	/02	3.33100	1.12075	1.06870	4.39970	3.33100	1.71250	0.64380	0.21661	19.33%	80.67%
2014-ER73-3	/01	3.38870	1.14017	1.08020	4.46890	3.38870	1.82150	0.74130	0.24942	21.88%	78.12%
2014-ER73-3	/02	3.38550	1.13909	1.07840	4.46390	3.38550	1.82040	0.74200	0.24965	21.92%	78.08%
2014-ER73-4	/01	3.41150	1.14784	1.08090	4.49240	3.41150	1.84940	0.76850	0.25857	22.53%	77.47%
2014-ER73-4	/02	3.38570	1.13916	1.05000	4.43570	3.38570	1.80800	0.75800	0.25504	22.39%	77.61%
2014-ER73-5	/01	3.41590	1.14932	1.07310	4.48900	3.41590	1.85090	0.77780	0.26170	22.77%	77.23%
2014-ER73-5	/02	3.39990	1.14394	1.09050	4.49040	3.39990	1.86800	0.77750	0.26160	22.87%	77.13%
2014-ER73-6	/01	3.42700	1.15305	1.08580	4.51280	3.42700	1.90610	0.82030	0.27600	23.94%	76.06%
2014-ER73-6	/02	3.44860	1.16032	1.07930	4.52790	3.44860	1.90330	0.82400	0.27724	23.89%	76.11%
2014-ER73-7	/01	3.45030	1.16089	1.07850	4.52880	3.45030	1.91650	0.83800	0.28195	24.29%	75.71%
2014-ER73-7	/02	3.42990	1.15403	1.08190	4.51180	3.42990	1.91310	0.83120	0.27967	24.23%	75.77%
2014-ER73-8	/01	3.41510	1.14905	1.10190	4.51700	3.41510	1.90780	0.80590	0.27115	23.60%	76.40%
2014-ER73-8	/02	3.41790	1.14999	1.07450	4.49240	3.41790	1.88050	0.80600	0.27119	23.58%	76.42%
2014-ER73-9	/01	3.37570	1.13579	1.06600	4.44170	3.37570	1.82950	0.76350	0.25689	22.62%	77.38%
2014-ER73-9	/02	3.39520	1.14235	1.08000	4.47520	3.39520	1.84800	0.76800	0.25840	22.62%	77.38%
2014-ER73-10	/01	3.38150	1.13774	1.08600	4.46750	3.38150	1.85170	0.76570	0.25763	22.64%	77.36%
2014-ER73-10	/02	3.40330	1.14508	1.09200	4.49530	3.40330	1.86200	0.77000	0.25908	22.63%	77.37%
2014-ER73-11	/01	3.38260	1.13811	1.09030	4.47290	3.38260	1.85940	0.76910	0.25877	22.74%	77.26%
2014-ER73-11	/02	3.38260	1.13811	1.08420	4.46680	3.38260	1.85420	0.77000	0.25908	22.76%	77.24%
2014-ER73-12	/01	3.36160	1.13105	1.09230	4.45390	3.36160	1.84280	0.75050	0.25251	22.33%	77.67%
2014-ER73-12	/02	3.35540	1.12896	1.09500	4.45040	3.35540	1.84450	0.74950	0.25218	22.34%	77.66%
2014-ER73-13	/01	3.38680	1.13953	1.09500	4.48180	3.38680	1.85400	0.75900	0.25537	22.41%	77.59%
2014-ER73-13	/02	3.37380	1.13515	1.07400	4.44780	3.37380	1.82970	0.75570	0.25426	22.40%	77.60%
2014-ER73-14	/01	3.41720	1.14976	1.09360	4.51080	3.41720	1.88600	0.79240	0.26661	23.19%	76.81%
2014-ER73-14	/02	3.40490	1.14562	1.06760	4.47250	3.40490	1.85640	0.78880	0.26540	23.17%	76.83%
2014-ER73-15	/01	3.39740	1.14309	1.09970	4.49710	3.39740	1.86020	0.76050	0.25588	22.38%	77.62%
2014-ER73-15	/02	3.40120	1.14437	1.08930	4.49050	3.40120	1.85030	0.76100	0.25605	22.37%	77.63%
2014-ER73-16	/01	3.46040	1.16429	1.07970	4.54010	3.46040	1.90600	0.82630	0.27802	23.88%	76.12%
2014-ER73-16	/02	3.46060	1.16436	1.09110	4.55170	3.46060	1.91850	0.82740	0.27839	23.91%	76.09%
2014-ER73-17	/01	3.46640	1.16631	1.08970	4.55610	3.46640	1.97400	0.88430	0.29753	25.51%	74.49%
2014-ER73-17	/02	3.47410	1.16890	1.09250	4.56660	3.47410	1.97810	0.88560	0.29797	25.49%	74.51%
2014-ER73-18	/01	3.52030	1.18445	1.09160	4.61190	3.52030	1.99570	0.90410	0.30419	25.68%	74.32%
2014-ER73-18	/02	3.50140	1.17809	1.09950	4.60090	3.50140	2.00100	0.90150	0.30332	25.75%	74.25%
2014-ER73-19	/01	3.48920	1.17398	1.08710	4.57630	3.48920	1.99660	0.90950	0.30601	26.07%	73.93%
2014-ER73-19	/02	3.52100	1.18468	1.06950	4.59050	3.52100	1.98980	0.92030	0.30965	26.14%	73.86%
2014-ER73-20	/01	3.53270	1.18862	1.06850	4.60120	3.53270	2.02800	0.95950	0.32283	27.16%	72.84%
2014-ER73-20	/02	3.53000	1.18771	1.07220	4.60220	3.53000	2.03190	0.95970	0.32290	27.19%	72.81%
2014-ER73-21	/01	3.56610	1.19985	1.09400	4.66010	3.56610	2.08890	0.99490	0.33475	27.90%	72.10%
2014-ER73-21	/02	3.58580	1.20648	1.07930	4.66510	3.58580	2.07890	0.99960	0.33633	27.88%	72.12%
2014-ER73-22	/01	3.56910	1.20086	1.08720	4.65630	3.56910	2.09340	1.00620	0.33855	28.19%	71.81%
2014-ER73-22	/02	3.56790	1.20046	1.09230	4.66020	3.56790	2.09700	1.00470	0.33804	28.16%	71.84%
2014-ER73-23	/01	3.53080	1.18798	1.09400	4.62480	3.53080	2.05340	0.95940	0.32280	27.17%	72.83%
2014-ER73-23	/02	3.54090	1.19138	1.07530	4.61620	3.54090	2.03600	0.96070	0.32324	27.13%	72.87%
2014-ER73-24	/01	3.52990	1.18768	1.09870	4.62860	3.52990	2.08050	0.98180	0.33034	27.81%	72.19%
2014-ER73-24	/02	3.55690	1.19676	1.08600	4.64290	3.55690	2.07350	0.98750	0.33226	27.76%	72.24%

Table F.735.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER92

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER92-1	/01	3.38280	1.13174	1.08500	4.46780	3.38280	1.82600	0.74100	0.24791	21.90%	78.10%
2014-ER92-1	/02	3.32010	1.11076	1.08000	4.40010	3.32010	1.70060	0.62060	0.20763	18.69%	81.31%
2014-ER92-2	/01	3.54450	1.18583	1.08630	4.63080	3.54450	2.07700	0.99070	0.33144	27.95%	72.05%
2014-ER92-2	/02	3.56020	1.19109	1.08160	4.64180	3.56020	2.07990	0.99830	0.33399	28.04%	71.96%
2014-ER92-3	/01	3.62780	1.21370	1.09430	4.72210	3.62780	2.24830	1.15400	0.38608	31.81%	68.19%
2014-ER92-3	/02	3.64450	1.21929	1.11260	4.75710	3.64450	2.25900	1.14640	0.38354	31.46%	68.54%
2014-ER92-4	/01	3.73740	1.25037	1.10900	4.84640	3.73740	2.41780	1.30880	0.43787	35.02%	64.98%
2014-ER92-4	/02	3.71200	1.24187	1.09640	4.80840	3.71200	2.37810	1.28170	0.42880	34.53%	65.47%
2014-ER92-5	/01	3.81740	1.27713	1.08010	4.89750	3.81740	2.49970	1.41960	0.47494	37.19%	62.81%
2014-ER92-5	/02	3.84300	1.28570	1.09350	4.93650	3.84300	2.52260	1.42910	0.47811	37.19%	62.81%
2014-ER92-6	/01	3.77380	1.26255	1.07200	4.84580	3.77380	2.42050	1.34850	0.45115	35.73%	64.27%
2014-ER92-6	/02	3.79360	1.26917	1.08190	4.87550	3.79360	2.43920	1.35730	0.45409	35.78%	64.22%
2014-ER92-7	/01	3.78090	1.26962	1.08200	4.86290	3.78090	2.40520	1.32320	0.44433	35.00%	65.00%
2014-ER92-7	/02	3.77060	1.26616	1.07720	4.84780	3.77060	2.39420	1.31700	0.44225	34.93%	65.07%
2014-ER92-8	/01	3.82550	1.28459	1.09520	4.92070	3.82550	2.54220	1.44700	0.48590	37.83%	62.17%
2014-ER92-8	/02	3.88460	1.30444	1.09320	4.97780	3.88460	2.56460	1.47140	0.49409	37.88%	62.12%
2014-ER92-9	/01	3.83090	1.28641	1.10030	4.93120	3.83090	2.57230	1.47200	0.49429	38.42%	61.58%
2014-ER92-9	/02	3.87580	1.30149	1.10710	4.98290	3.87580	2.60250	1.49540	0.50215	38.58%	61.42%
2014-ER92-10	/01	3.91220	1.31371	1.09710	5.00930	3.91220	2.65240	1.55530	0.52227	39.76%	60.24%
2014-ER92-10	/02	3.88230	1.30367	1.09300	4.97530	3.88230	2.63540	1.54240	0.51793	39.73%	60.27%
2014-ER92-11	/01	3.90430	1.31106	1.06410	4.96840	3.90430	2.60730	1.54320	0.51820	39.53%	60.47%
2014-ER92-11	/02	3.82450	1.28426	1.08780	4.91230	3.82450	2.62870	1.54090	0.51743	40.29%	59.71%
2014-ER92-12	/01	3.90370	1.31085	1.09440	4.99810	3.90370	2.63530	1.54090	0.51743	39.47%	60.53%
2014-ER92-12	/02	3.89480	1.30787	1.08090	4.97570	3.89480	2.62440	1.54350	0.51830	39.63%	60.37%
2014-ER92-13	/01	3.93100	1.32002	1.08200	5.01300	3.93100	2.67950	1.59750	0.53644	40.64%	59.36%
2014-ER92-13	/02	3.92270	1.31723	1.09250	5.01520	3.92270	2.68480	1.59230	0.53469	40.59%	59.41%
2014-ER92-14	/01	4.04060	1.35682	1.09210	5.13270	4.04060	2.87320	1.78110	0.59809	44.08%	55.92%
2014-ER92-14	/02	4.03930	1.35639	1.08840	5.12770	4.03930	2.87500	1.78660	0.59994	44.23%	55.77%
2014-ER92-15	/01	4.24400	1.42513	1.10300	5.34700	4.24400	3.24390	2.14090	0.71891	50.45%	49.55%
2014-ER92-15	/02	4.29070	1.44081	1.08290	5.37360	4.29070	3.24260	2.15970	0.72522	50.33%	49.67%
2014-ER92-16	/01	4.48490	1.50602	1.08480	5.56970	4.48490	3.51090	2.42610	0.81468	54.09%	45.91%
2014-ER92-16	/02	4.50770	1.51368	1.09270	5.60040	4.50770	3.53290	2.44020	0.81941	54.13%	45.87%
2014-ER92-17	/01	4.51210	1.51515	1.08700	5.59910	4.51210	3.60660	2.51960	0.84608	55.84%	44.16%
2014-ER92-17	/02	4.50270	1.51200	1.11200	5.61470	4.50270	3.62230	2.51030	0.84295	55.75%	44.25%
2014-ER92-18	/01	4.56560	1.53312	1.09260	5.65820	4.56560	3.73040	2.63780	0.88577	57.78%	42.22%
2014-ER92-18	/02	4.54830	1.52731	1.07330	5.62160	4.54830	3.70830	2.63500	0.88483	57.93%	42.07%
2014-ER92-19	/01	4.62570	1.55330	1.08550	5.71120	4.62570	3.80030	2.71480	0.91162	58.69%	41.31%
2014-ER92-19	/02	4.61250	1.54887	1.08840	5.70090	4.61250	3.79250	2.70410	0.90803	58.63%	41.37%
2014-ER92-20	/01	4.67210	1.56888	1.09160	5.76370	4.67210	3.85670	2.76510	0.92851	59.18%	40.82%
2014-ER92-20	/02	4.67200	1.56885	1.08080	5.75280	4.67200	3.84370	2.76290	0.92778	59.14%	40.86%
2014-ER92-21	/01	4.72550	1.58681	1.07460	5.80010	4.72550	3.88460	2.81000	0.94359	59.46%	40.54%
2014-ER92-21	/02	4.72500	1.58664	1.08340	5.80840	4.72500	3.90540	2.82200	0.94762	59.72%	40.28%
2014-ER92-22	/01	4.67000	1.56818	1.08240	5.75240	4.67000	3.86770	2.78530	0.93530	59.64%	40.36%
2014-ER92-22	/02	4.67040	1.56831	1.09060	5.76100	4.67040	3.88120	2.79060	0.93708	59.75%	40.25%

Table F.746.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER15-A

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER15A-1	/01	3.33480	1.12633	1.08220	4.41700	3.33480	1.84000	0.75780	0.25595	22.72%	77.28%
2014-ER15A-1	/02	3.38890	1.14460	1.09810	4.48700	3.38890	1.77660	0.67850	0.22916	20.02%	79.98%
2014-ER15A-2	/01	3.37309	1.13926	1.10530	4.47839	3.37309	2.33740	1.23210	0.41614	36.53%	63.47%
2014-ER15A-2	/02	3.60740	1.21840	1.10350	4.71090	3.60740	2.27300	1.16950	0.39500	32.42%	67.58%
2014-ER15A-3	/01	3.68000	1.24292	1.08600	4.76600	3.68000	2.32290	1.23690	0.41776	33.61%	66.39%
2014-ER15A-3	/02	3.67010	1.23957	1.09560	4.76570	3.67010	2.32830	1.23270	0.41634	33.59%	66.41%
2014-ER15A-4	/01	3.74180	1.26379	1.09650	4.83830	3.74180	2.41800	1.32150	0.44634	35.32%	64.68%
2014-ER15A-4	/02	3.74190	1.26383	1.08080	4.82270	3.74190	2.41040	1.32960	0.44907	35.53%	64.47%
2014-ER15A-5	/01	3.76510	1.27166	1.09720	4.86230	3.76510	2.47180	1.37460	0.46427	36.51%	63.49%
2014-ER15A-5	/02	3.77720	1.27575	1.07150	4.84870	3.77720	2.45850	1.38700	0.46846	36.72%	63.28%
2014-ER15A-6	/01	3.82120	1.29061	1.07140	4.89260	3.82120	2.49800	1.42660	0.48183	37.33%	62.67%
2014-ER15A-6	/02	3.78830	1.27950	1.07730	4.86560	3.78830	2.48760	1.41030	0.47633	37.23%	62.77%
2014-ER15A-7	/01	3.74980	1.26649	1.09530	4.84510	3.74980	2.45650	1.36120	0.45974	36.30%	63.70%
2014-ER15A-7	/02	3.76200	1.27061	1.11200	4.87400	3.76200	2.47450	1.36250	0.46018	36.22%	63.78%
2014-ER15A-8	/01	3.77830	1.27612	1.08290	4.86120	3.77830	2.47120	1.38830	0.46890	36.74%	63.26%
2014-ER15A-8	/02	3.78820	1.27946	1.09750	4.88570	3.78820	2.48720	1.38970	0.46937	36.68%	63.32%
2014-ER15A-9	/01	3.78650	1.27889	1.08360	4.87010	3.78650	2.49810	1.41450	0.47775	37.36%	62.64%
2014-ER15A-9	/02	3.72120	1.25683	1.09390	4.81510	3.72120	2.48260	1.38870	0.46903	37.32%	62.68%
2014-ER15A-10	/01	3.89100	1.31418	1.07330	4.96430	3.89100	2.65220	1.57890	0.53327	40.58%	59.42%
2014-ER15A-10	/02	3.89710	1.31624	1.06850	4.96560	3.89710	2.65010	1.58160	0.53418	40.58%	59.42%
2014-ER15A-11	/01	3.81230	1.28760	1.08190	4.89420	3.81230	2.56340	1.48150	0.50038	38.86%	61.14%
2014-ER15A-11	/02	3.83340	1.29473	1.08000	4.91340	3.83340	2.57020	1.49020	0.50331	38.87%	61.13%
2014-ER15A-12	/01	3.82690	1.29253	1.07730	4.90420	3.82690	2.54780	1.47050	0.49666	38.43%	61.57%
2014-ER15A-12	/02	3.84970	1.30023	1.07660	4.92630	3.84970	2.55680	1.48020	0.49994	38.45%	61.55%
2014-ER15A-13	/01	3.84630	1.29909	1.09970	4.94600	3.84630	2.58780	1.48810	0.50261	38.69%	61.31%
2014-ER15A-13	/02	3.87130	1.30753	1.08730	4.95860	3.87130	2.58090	1.49360	0.50446	38.58%	61.42%
2014-ER15A-14	/01	3.78790	1.27936	1.07830	4.86620	3.78790	2.53410	1.45580	0.49170	38.43%	61.57%
2014-ER15A-14	/02	3.82140	1.29068	1.08600	4.90740	3.82140	2.55520	1.46920	0.49622	38.45%	61.55%
2014-ER15A-15	/01	3.74730	1.26565	1.07430	4.82160	3.74730	2.45950	1.38520	0.46785	36.97%	63.03%
2014-ER15A-15	/02	3.74750	1.26572	1.08820	4.83570	3.74750	2.47450	1.38630	0.46822	36.99%	63.01%
2014-ER15A-16	/01	3.78260	1.27757	1.07450	4.85710	3.78260	2.48620	1.41170	0.47680	37.32%	62.68%
2014-ER15A-16	/02	3.79890	1.28308	1.10280	4.90170	3.79890	2.52630	1.42350	0.48079	37.47%	62.53%
2014-ER15A-17	/01	3.72260	1.25731	1.08290	4.80550	3.72260	2.43640	1.35350	0.45714	36.36%	63.64%
2014-ER15A-17	/02	3.73880	1.26278	1.09240	4.83120	3.73880	2.45200	1.35960	0.45920	36.36%	63.64%
2014-ER15A-18	/01	3.70670	1.25194	1.10360	4.81030	3.70670	2.45890	1.35530	0.45775	36.56%	63.44%
2014-ER15A-18	/02	3.74500	1.26487	1.10110	4.84610	3.74500	2.47020	1.36910	0.46241	36.56%	63.44%
2014-ER15A-19	/01	3.78170	1.27727	1.09660	4.87830	3.78170	2.48340	1.38680	0.46839	36.67%	63.33%
2014-ER15A-19	/02	3.76940	1.27311	1.09900	4.86840	3.76940	2.48060	1.38160	0.46663	36.65%	63.35%

Table F.757.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER15-B

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER15B-1	/01	3.54300	1.22680	1.07870	4.62170	3.54300	2.07830	0.99960	0.34612	28.21%	71.79%
2014-ER15B-1	/02	3.52640	1.22105	1.09600	4.62240	3.52640	2.11610	1.02010	0.35322	28.93%	71.07%
2014-ER15B-2	/01	3.64150	1.26090	1.06010	4.70160	3.64150	2.30800	1.24790	0.43210	34.27%	65.73%
2014-ER15B-2	/02	3.72290	1.28909	1.09240	4.81530	3.72290	2.36550	1.27310	0.44082	34.20%	65.80%
2014-ER15B-3	/01	3.62950	1.25675	1.09450	4.72400	3.62950	2.32180	1.22730	0.42496	33.81%	66.19%
2014-ER15B-3	/02	3.61780	1.25270	1.08150	4.69930	3.61780	2.30690	1.22540	0.42431	33.87%	66.13%
2014-ER15B-4	/01	3.73750	1.29414	1.08500	4.82250	3.73750	2.38330	1.29830	0.44955	34.74%	65.26%
2014-ER15B-4	/02	3.68970	1.27759	1.09220	4.78190	3.68970	2.37990	1.28770	0.44588	34.90%	65.10%
2014-ER15B-5	/01	3.68550	1.27614	1.11490	4.80040	3.68550	2.42700	1.31210	0.45433	35.60%	64.40%
2014-ER15B-5	/02	3.74680	1.29736	1.09690	4.84370	3.74680	2.42210	1.32520	0.45886	35.37%	64.63%
2014-ER15B-6	/01	3.71950	1.28791	1.11330	4.83280	3.71950	2.49290	1.37960	0.47770	37.09%	62.91%
2014-ER15B-6	/02	3.72280	1.28905	1.08940	4.81220	3.72280	2.46990	1.38050	0.47801	37.08%	62.92%
2014-ER15B-7	/01	3.66820	1.27015	1.07770	4.74590	3.66820	2.41810	1.34040	0.46413	36.54%	63.46%
2014-ER15B-7	/02	3.70900	1.28427	1.09210	4.80110	3.70900	2.44430	1.35220	0.46821	36.46%	63.54%
2014-ER15B-8	/01	3.72230	1.28888	1.08460	4.80690	3.72230	2.45970	1.37510	0.47614	36.94%	63.06%
2014-ER15B-8	/02	3.75360	1.29972	1.08410	4.83770	3.75360	2.47240	1.38830	0.48071	36.99%	63.01%
2014-ER15B-9	/01	3.74110	1.29539	1.06400	4.80510	3.74110	2.46090	1.39690	0.48369	37.34%	62.66%
2014-ER15B-9	/02	3.77530	1.30723	1.10670	4.88200	3.77530	2.51420	1.40750	0.48736	37.28%	62.72%
2014-ER15B-10	/01	3.85940	1.33635	1.08940	4.94880	3.85940	2.61950	1.53010	0.52981	39.65%	60.35%
2014-ER15B-10	/02	3.83440	1.32770	1.09230	4.92670	3.83440	2.62900	1.53670	0.53210	40.08%	59.92%
2014-ER15B-11	/01	3.79860	1.31530	1.10820	4.90680	3.79860	2.58310	1.47490	0.51070	38.83%	61.17%
2014-ER15B-11	/02	3.73520	1.29335	1.10000	4.83520	3.73520	2.55010	1.45010	0.50211	38.82%	61.18%
2014-ER15B-12	/01	3.76330	1.30308	1.07810	4.84140	3.76330	2.52220	1.44410	0.50003	38.37%	61.63%
2014-ER15B-12	/02	3.76370	1.30322	1.10550	4.86920	3.76370	2.54960	1.44410	0.50003	38.37%	61.63%
2014-ER15B-13	/01	3.80460	1.31738	1.07230	4.87690	3.80460	2.57400	1.50170	0.51998	39.47%	60.53%
2014-ER15B-13	/02	3.80030	1.31589	1.10050	4.90080	3.80030	2.59690	1.49640	0.51814	39.38%	60.62%
2014-ER15B-14	/01	3.77380	1.30671	1.08260	4.85640	3.77380	2.54540	1.46280	0.50651	38.76%	61.24%
2014-ER15B-14	/02	3.77170	1.30599	1.08920	4.86090	3.77170	2.55130	1.46210	0.50627	38.77%	61.23%
2014-ER15B-15	/01	3.73640	1.29376	1.07750	4.81390	3.73640	2.44970	1.37220	0.47514	36.73%	63.27%
2014-ER15B-15	/02	3.70550	1.28306	1.09320	4.79870	3.70550	2.45190	1.35870	0.47046	36.67%	63.33%
2014-ER15B-16	/01	3.68930	1.27745	1.09380	4.78310	3.68930	2.44610	1.35230	0.46825	36.65%	63.35%
2014-ER15B-16	/02	3.72320	1.28919	1.07700	4.80020	3.72320	2.44050	1.36350	0.47212	36.62%	63.38%
2014-ER15B-17	/01	3.72160	1.28864	1.09110	4.81270	3.72160	2.47020	1.37910	0.47753	37.06%	62.94%
2014-ER15B-17	/02	3.70960	1.28448	1.09980	4.80940	3.70960	2.47600	1.37620	0.47652	37.10%	62.90%
2014-ER15B-18	/01	3.73300	1.29259	1.10340	4.83640	3.73300	2.47420	1.37080	0.47465	36.72%	63.28%
2014-ER15B-18	/02	3.73320	1.29265	1.09530	4.82850	3.73320	2.46860	1.37330	0.47552	36.79%	63.21%
2014-ER15B-19	/01	3.75010	1.29851	1.10500	4.85510	3.75010	2.50200	1.39700	0.48372	37.25%	62.75%
2014-ER15B-19	/02	3.71000	1.28462	1.10750	4.81750	3.71000	2.48570	1.37820	0.47721	37.15%	62.85%

Table F.768.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER15-C

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER15C-1	/01	3.41170	1.15936	1.09050	4.50220	3.41170	1.88420	0.79370	0.26971	23.26%	76.74%
2014-ER15C-1	/02	3.41440	1.16027	1.08000	4.49440	3.41440	1.81560	0.73560	0.24997	21.54%	78.46%
2014-ER15C-2	/01	3.67350	1.24832	1.09190	4.76540	3.67350	2.31960	1.22770	0.41719	33.42%	66.58%
2014-ER15C-2	/02	3.70830	1.26015	1.09900	4.80730	3.70830	2.34080	1.24180	0.42199	33.49%	66.51%
2014-ER15C-3	/01	3.65620	1.24244	1.10930	4.76550	3.65620	2.33790	1.22860	0.41750	33.60%	66.40%
2014-ER15C-3	/02	3.56290	1.21074	1.08310	4.64600	3.56290	2.26800	1.18490	0.40265	33.26%	66.74%
2014-ER15C-4	/01	3.64040	1.23707	1.10710	4.74750	3.64040	2.31950	1.21240	0.41200	33.30%	66.70%
2014-ER15C-4	/02	3.67900	1.25019	1.09660	4.77560	3.67900	2.32850	1.23190	0.41862	33.48%	66.52%
2014-ER15C-5	/01	3.74220	1.27167	1.10130	4.84350	3.74220	2.49190	1.39060	0.47255	37.16%	62.84%
2014-ER15C-5	/02	3.79810	1.29066	1.09730	4.89540	3.79810	2.50890	1.41160	0.47969	37.17%	62.83%
2014-ER15C-6	/01	3.72110	1.26450	1.08500	4.80610	3.72110	2.44410	1.35910	0.46185	36.52%	63.48%
2014-ER15C-6	/02	3.73190	1.26817	1.07440	4.80630	3.73190	2.43100	1.35660	0.46100	36.35%	63.65%
2014-ER15C-7	/01	3.72060	1.26433	1.08710	4.80770	3.72060	2.47620	1.38910	0.47204	37.34%	62.66%
2014-ER15C-7	/02	3.74980	1.27425	1.08820	4.83800	3.74980	2.45510	1.36690	0.46450	36.45%	63.55%
2014-ER15C-8	/01	3.72930	1.26728	1.07590	4.80520	3.72930	2.46360	1.38770	0.47157	37.21%	62.79%
2014-ER15C-8	/02	3.77980	1.28444	1.08420	4.86400	3.77980	2.49020	1.40600	0.47778	37.20%	62.80%
2014-ER15C-9	/01	3.74510	1.27265	1.09920	4.84430	3.74510	2.49550	1.39630	0.47449	37.28%	62.72%
2014-ER15C-9	/02	3.74470	1.27252	1.08430	4.82900	3.74470	2.47620	1.39190	0.47299	37.17%	62.83%
2014-ER15C-10	/01	3.81890	1.29773	1.07470	4.89360	3.81890	2.61610	1.54140	0.52380	40.36%	59.64%
2014-ER15C-10	/02	3.84880	1.30789	1.08590	4.93470	3.84880	2.64050	1.55460	0.52828	40.39%	59.61%
2014-ER15C-11	/01	3.80440	1.29280	1.09340	4.89780	3.80440	2.57720	1.48380	0.50422	39.00%	61.00%
2014-ER15C-11	/02	3.81170	1.29528	1.08920	4.90090	3.81170	2.57580	1.48660	0.50517	39.00%	61.00%
2014-ER15C-12	/01	3.79820	1.29070	1.08410	4.88230	3.79820	2.49840	1.41430	0.48060	37.24%	62.76%
2014-ER15C-12	/02	3.76270	1.27863	1.06460	4.82730	3.76270	2.46440	1.39980	0.47568	37.20%	62.80%
2014-ER15C-13	/01	3.81180	1.29532	1.08440	4.89620	3.81180	2.51640	1.43200	0.48662	37.57%	62.43%
2014-ER15C-13	/02	3.74780	1.27357	1.07910	4.82690	3.74780	2.48730	1.40820	0.47853	37.57%	62.43%
2014-ER15C-14	/01	3.79050	1.28808	1.09920	4.88970	3.79050	2.54570	1.44650	0.49155	38.16%	61.84%
2014-ER15C-14	/02	3.80730	1.29379	1.09520	4.90250	3.80730	2.54530	1.45010	0.49277	38.09%	61.91%
2014-ER15C-15	/01	3.77690	1.28346	1.08510	4.86200	3.77690	2.49850	1.41340	0.48030	37.42%	62.58%
2014-ER15C-15	/02	3.82780	1.30075	1.10150	4.92930	3.82780	2.53060	1.42910	0.48563	37.33%	62.67%
2014-ER15C-16	/01	3.82470	1.29970	1.09720	4.92190	3.82470	2.51820	1.42100	0.48288	37.15%	62.85%
2014-ER15C-16	/02	3.78620	1.28662	1.07700	4.86320	3.78620	2.47730	1.40030	0.47585	36.98%	63.02%
2014-ER15C-17	/01	3.80050	1.29148	1.07940	4.87990	3.80050	2.48070	1.40130	0.47619	36.87%	63.13%
2014-ER15C-17	/02	3.78260	1.28539	1.07700	4.85960	3.78260	2.46670	1.38970	0.47224	36.74%	63.26%
2014-ER15C-18	/01	3.76940	1.28091	1.08810	4.85750	3.76940	2.48400	1.39590	0.47435	37.03%	62.97%
2014-ER15C-18	/02	3.78470	1.28611	1.09710	4.88180	3.78470	2.49490	1.39780	0.47500	36.93%	63.07%
2014-ER15C-19	/01	3.75920	1.27744	1.08840	4.84760	3.75920	2.45490	1.36650	0.46436	36.35%	63.65%
2014-ER15C-19	/02	3.72260	1.26501	1.08660	4.80920	3.72260	2.44080	1.35420	0.46018	36.38%	63.62%

Table F.779.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER15-D

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER15D-1	/01	3.44290	1.16417	1.08410	4.52700	3.44290	1.87470	0.79060	0.26733	22.96%	77.04%
2014-ER15D-1	/02	3.51010	1.18690	1.09910	4.60920	3.51010	1.92640	0.82730	0.27974	23.57%	76.43%
2014-ER15D-2	/01	3.69240	1.24854	1.09260	4.78500	3.69240	2.33500	1.24240	0.42010	33.65%	66.35%
2014-ER15D-2	/02	3.62180	1.22467	1.07210	4.69390	3.62180	2.28880	1.21670	0.41141	33.59%	66.41%
2014-ER15D-3	/01	3.69260	1.24861	1.08460	4.77720	3.69260	2.32800	1.24340	0.42044	33.67%	66.33%
2014-ER15D-3	/02	3.69440	1.24921	1.08570	4.78010	3.69440	2.32710	1.24140	0.41976	33.60%	66.40%
2014-ER15D-4	/01	3.63610	1.22950	1.08980	4.72590	3.63610	2.35900	1.26920	0.42916	34.91%	65.09%
2014-ER15D-4	/02	3.70800	1.25381	1.08950	4.79750	3.70800	2.38950	1.30000	0.43958	35.06%	64.94%
2014-ER15D-5	/01	3.76840	1.27424	1.07240	4.84080	3.76840	2.46290	1.39050	0.47018	36.90%	63.10%
2014-ER15D-5	/02	3.77020	1.27485	1.09060	4.86080	3.77020	2.48810	1.39750	0.47255	37.07%	62.93%
2014-ER15D-6	/01	3.77690	1.27711	1.09710	4.87400	3.77690	2.48440	1.38730	0.46910	36.73%	63.27%
2014-ER15D-6	/02	3.83400	1.29642	1.09060	4.92460	3.83400	2.49750	1.40690	0.47573	36.70%	63.30%
2014-ER15D-7	/01	3.83430	1.29652	1.08660	4.92090	3.83430	2.54920	1.46260	0.49456	38.15%	61.85%
2014-ER15D-7	/02	3.77440	1.27627	1.09120	4.86560	3.77440	2.53380	1.44260	0.48780	38.22%	61.78%
2014-ER15D-8	/01	3.81690	1.29064	1.08930	4.90620	3.81690	2.48840	1.39910	0.47309	36.66%	63.34%
2014-ER15D-8	/02	3.82660	1.29392	1.08720	4.91380	3.82660	2.50260	1.41540	0.47860	36.99%	63.01%
2014-ER15D-9	/01	3.79980	1.28485	1.08520	4.88500	3.79980	2.49810	1.41290	0.47775	37.18%	62.82%
2014-ER15D-9	/02	3.77240	1.27559	1.09530	4.86770	3.77240	2.50090	1.40560	0.47529	37.26%	62.74%
2014-ER15D-10	/01	3.88360	1.31319	1.08710	4.97070	3.88360	2.64630	1.55920	0.52722	40.15%	59.85%
2014-ER15D-10	/02	3.91220	1.32286	1.07870	4.99090	3.91220	2.64850	1.56980	0.53081	40.13%	59.87%
2014-ER15D-11	/01	3.84390	1.29977	1.08700	4.93090	3.84390	2.56300	1.47600	0.49909	38.40%	61.60%
2014-ER15D-11	/02	3.78960	1.28141	1.09150	4.88110	3.78960	2.53570	1.44420	0.48834	38.11%	61.89%
2014-ER15D-12	/01	3.79870	1.28448	1.08390	4.88260	3.79870	2.46400	1.38010	0.46666	36.33%	63.67%
2014-ER15D-12	/02	3.75160	1.26856	1.08320	4.83480	3.75160	2.45380	1.37060	0.46345	36.53%	63.47%
2014-ER15D-13	/01	3.84140	1.29892	1.07380	4.91520	3.84140	2.54000	1.46620	0.49578	38.17%	61.83%
2014-ER15D-13	/02	3.87790	1.31126	1.07600	4.95390	3.87790	2.55530	1.47930	0.50021	38.15%	61.85%
2014-ER15D-14	/01	3.86120	1.30562	1.08390	4.94510	3.86120	2.56420	1.48030	0.50054	38.34%	61.66%
2014-ER15D-14	/02	3.80650	1.28712	1.07990	4.88640	3.80650	2.54160	1.46170	0.49426	38.40%	61.60%
2014-ER15D-15	/01	3.77270	1.27569	1.08000	4.85270	3.77270	2.49020	1.41020	0.47684	37.38%	62.62%
2014-ER15D-15	/02	3.79320	1.28262	1.09680	4.89000	3.79320	2.51440	1.41760	0.47934	37.37%	62.63%
2014-ER15D-16	/01	3.80630	1.28705	1.09560	4.90190	3.80630	2.55570	1.46010	0.49371	38.36%	61.64%
2014-ER15D-16	/02	3.82340	1.29283	1.10900	4.93240	3.82340	2.57620	1.46720	0.49612	38.37%	61.63%
2014-ER15D-17	/01	3.84260	1.29933	1.08050	4.92310	3.84260	2.54840	1.46790	0.49635	38.20%	61.80%
2014-ER15D-17	/02	3.87970	1.31187	1.09270	4.97240	3.87970	2.57630	1.48360	0.50166	38.24%	61.76%
2014-ER15D-18	/01	3.77830	1.27758	1.08850	4.86680	3.77830	2.49920	1.41070	0.47701	37.34%	62.66%
2014-ER15D-18	/02	3.82410	1.29307	1.09100	4.91510	3.82410	2.52020	1.42920	0.48327	37.37%	62.63%
2014-ER15D-19	/01	3.85220	1.30257	1.09950	4.95170	3.85220	2.53990	1.44040	0.48705	37.39%	62.61%
2014-ER15D-19	/02	3.82900	1.29473	1.07380	4.90280	3.82900	2.50550	1.43170	0.48411	37.39%	62.61%

Table F.80.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER78-A

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER78A-1	/01	3.17070	1.07280	1.10880	4.27950	3.17070	1.54220	0.43340	0.14664	13.67%	86.33%
2014-ER78A-1	/02	3.13730	1.06150	1.08590	4.22320	3.13730	1.49220	0.40630	0.13747	12.95%	87.05%
2014-ER78A-2	/01	3.36510	1.13858	1.07430	4.43940	3.36510	1.84380	0.76950	0.26036	22.87%	77.13%
2014-ER78A-2	/02	3.37790	1.14291	1.09410	4.47200	3.37790	1.86480	0.77070	0.26077	22.82%	77.18%
2014-ER78A-3	/01	3.42770	1.15976	1.07690	4.50460	3.42770	1.98340	0.90650	0.30671	26.45%	73.55%
2014-ER78A-3	/02	3.44500	1.16561	1.08350	4.52850	3.44500	1.98850	0.90500	0.30621	26.27%	73.73%
2014-ER78A-4	/01	3.53070	1.19461	1.06560	4.59630	3.53070	2.11180	1.04620	0.35398	29.63%	70.37%
2014-ER78A-4	/02	3.53280	1.19532	1.07910	4.61190	3.53280	2.12530	1.04620	0.35398	29.61%	70.39%
2014-ER78A-5	/01	3.53290	1.19535	1.08680	4.61970	3.53290	2.13920	1.05240	0.35608	29.79%	70.21%
2014-ER78A-5	/02	3.48870	1.18040	1.10780	4.59650	3.48870	2.14390	1.03610	0.35056	29.70%	70.30%
2014-ER78A-6	/01	3.44300	1.16493	1.08350	4.52650	3.44300	2.05250	0.96900	0.32786	28.14%	71.86%
2014-ER78A-6	/02	3.45250	1.16815	1.07500	4.52750	3.45250	2.03890	0.96390	0.32613	27.92%	72.08%
2014-ER78A-7	/01	3.44040	1.16405	1.10060	4.54100	3.44040	2.01430	0.91370	0.30915	26.56%	73.44%
2014-ER78A-7	/02	3.39510	1.14873	1.09360	4.48870	3.39510	1.97370	0.88010	0.29778	25.92%	74.08%
2014-ER78A-8	/01	3.45360	1.16852	1.08540	4.53900	3.45360	2.03360	0.94820	0.32082	27.46%	72.54%
2014-ER78A-8	/02	3.48410	1.17884	1.07240	4.55650	3.48410	2.02880	0.95640	0.32360	27.45%	72.55%
2014-ER78A-9	/01	3.53440	1.19586	1.10000	4.63440	3.53440	2.16450	1.06450	0.36017	30.12%	69.88%
2014-ER78A-9	/02	3.50550	1.18608	1.09820	4.60370	3.50550	2.15270	1.05450	0.35679	30.08%	69.92%
2014-ER78A-10	/01	3.57960	1.21115	1.06600	4.64560	3.57960	2.22540	1.15940	0.39228	32.39%	67.61%
2014-ER78A-10	/02	3.56390	1.20584	1.08550	4.64940	3.56390	2.22150	1.13600	0.38436	31.88%	68.12%
2014-ER78A-11	/01	3.66850	1.24123	1.10650	4.77500	3.66850	2.37450	1.26800	0.42903	34.56%	65.44%
2014-ER78A-11	/02	3.67360	1.24296	1.08800	4.76160	3.67360	2.33590	1.24790	0.42222	33.97%	66.03%
2014-ER78A-12	/01	3.62480	1.22645	1.07360	4.69840	3.62480	2.27780	1.20420	0.40744	33.22%	66.78%
2014-ER78A-12	/02	3.68330	1.24624	1.08850	4.77180	3.68330	2.30890	1.22040	0.41292	33.13%	66.87%
2014-ER78A-13	/01	3.63560	1.23010	1.08740	4.72300	3.63560	2.31640	1.22900	0.41583	33.80%	66.20%
2014-ER78A-13	/02	3.63440	1.22969	1.09160	4.72600	3.63440	2.32150	1.22990	0.41613	33.84%	66.16%
2014-ER78A-14	/01	3.67710	1.24414	1.08840	4.76550	3.67710	2.33180	1.24340	0.42070	33.81%	66.19%
2014-ER78A-14	/02	3.68500	1.24681	1.06610	4.75110	3.68500	2.31230	1.24620	0.42165	33.82%	66.18%
2014-ER78A-15	/01	3.72810	1.26140	1.09440	4.82250	3.72810	2.48980	1.39540	0.47213	37.43%	62.57%
2014-ER78A-15	/02	3.75250	1.26965	1.07720	4.82970	3.75250	2.48270	1.40550	0.47555	37.46%	62.54%
2014-ER78A-16	/01	3.75980	1.27212	1.08970	4.84950	3.75980	2.52240	1.43270	0.48475	38.11%	61.89%
2014-ER78A-16	/02	3.71310	1.25632	1.08940	4.80250	3.71310	2.50210	1.41270	0.47798	38.05%	61.95%
2014-ER78A-17	/01	3.79770	1.28495	1.09170	4.88940	3.79770	2.64170	1.55000	0.52444	40.81%	59.19%
2014-ER78A-17	/02	3.88650	1.31499	1.11630	5.00280	3.88650	2.70050	1.58420	0.53601	40.76%	59.24%
2014-ER78A-18	/01	3.99050	1.35018	1.08690	5.07740	3.99050	2.87520	1.78830	0.60507	44.81%	55.19%
2014-ER78A-18	/02	3.99770	1.35262	1.09110	5.08880	3.99770	2.88020	1.78910	0.60534	44.75%	55.25%
2014-ER78A-19	/01	3.99440	1.35150	1.07660	5.07100	3.99440	2.85930	1.78270	0.60317	44.63%	55.37%
2014-ER78A-19	/02	3.99040	1.35015	1.08040	5.07080	3.99040	2.86520	1.78480	0.60388	44.73%	55.27%
2014-ER78A-20	/01	4.11510	1.39234	1.09270	5.20780	4.11510	3.04050	1.94780	0.65903	47.33%	52.67%
2014-ER78A-20	/02	4.11900	1.39366	1.07090	5.18990	4.11900	3.02090	1.95000	0.65978	47.34%	52.66%

Table F.81.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER78-B

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER78B-1	/01	3.25180	1.10024	1.09620	4.34800	3.25180	1.62550	0.52930	0.17909	16.28%	83.72%
2014-ER78B-1	/02	3.20320	1.08380	1.08470	4.28790	3.20320	1.57430	0.48960	0.16566	15.28%	84.72%
2014-ER78B-2	/01	3.45920	1.17041	1.09980	4.55900	3.45920	1.97140	0.87160	0.29490	25.20%	74.80%
2014-ER78B-2	/02	3.46470	1.17228	1.09650	4.56120	3.46470	1.96880	0.87230	0.29514	25.18%	74.82%
2014-ER78B-3	/01	3.52930	1.19413	1.11720	4.64650	3.52930	2.11430	0.99710	0.33737	28.25%	71.75%
2014-ER78B-3	/02	3.51630	1.18973	1.06400	4.58030	3.51630	2.04520	0.98120	0.33199	27.90%	72.10%
2014-ER78B-4	/01	3.58880	1.21426	1.11300	4.70180	3.58880	2.17030	1.05730	0.35774	29.46%	70.54%
2014-ER78B-4	/02	3.53860	1.19728	1.06540	4.60400	3.53860	2.10950	1.04410	0.35327	29.51%	70.49%
2014-ER78B-5	/01	3.56510	1.20625	1.07250	4.63760	3.56510	2.11920	1.04670	0.35415	29.36%	70.64%
2014-ER78B-5	/02	3.55130	1.20158	1.08180	4.63310	3.55130	2.12290	1.04110	0.35225	29.32%	70.68%
2014-ER78B-6	/01	3.45870	1.17025	1.07720	4.53590	3.45870	2.00000	0.92280	0.31223	26.68%	73.32%
2014-ER78B-6	/02	3.46750	1.17322	1.08020	4.54770	3.46750	2.00110	0.92090	0.31158	26.56%	73.44%
2014-ER78B-7	/01	3.46370	1.17194	1.10090	4.56460	3.46370	2.01270	0.91180	0.30851	26.32%	73.68%
2014-ER78B-7	/02	3.42480	1.15878	1.08110	4.50590	3.42480	1.98370	0.90260	0.30539	26.35%	73.65%
2014-ER78B-8	/01	3.54920	1.20087	1.10430	4.65350	3.54920	2.17660	1.07230	0.36281	30.21%	69.79%
2014-ER78B-8	/02	3.54810	1.20049	1.08650	4.63460	3.54810	2.15710	1.07060	0.36224	30.17%	69.83%
2014-ER78B-9	/01	3.54410	1.19914	1.07700	4.62110	3.54410	2.14420	1.06720	0.36109	30.11%	69.89%
2014-ER78B-9	/02	3.51770	1.19021	1.08160	4.59930	3.51770	2.13970	1.05810	0.35801	30.08%	69.92%
2014-ER78B-10	/01	3.61100	1.22178	1.08150	4.69250	3.61100	2.28320	1.20170	0.40659	33.28%	66.72%
2014-ER78B-10	/02	3.62090	1.22513	1.08020	4.70110	3.62090	2.28550	1.20530	0.40781	33.29%	66.71%
2014-ER78B-11	/01	3.62330	1.22594	1.08860	4.71190	3.62330	2.27240	1.18380	0.40054	32.67%	67.33%
2014-ER78B-11	/02	3.58700	1.21366	1.10420	4.69120	3.58700	2.27520	1.17100	0.39621	32.65%	67.35%
2014-ER78B-12	/01	3.61800	1.22414	1.09180	4.70980	3.61800	2.27130	1.17950	0.39908	32.60%	67.40%
2014-ER78B-12	/02	3.61330	1.22255	1.08210	4.69540	3.61330	2.26090	1.17880	0.39885	32.62%	67.38%
2014-ER78B-13	/01	3.65380	1.23626	1.11390	4.76770	3.65380	2.32590	1.21200	0.41008	33.17%	66.83%
2014-ER78B-13	/02	3.66700	1.24072	1.09650	4.76350	3.66700	2.31500	1.21850	0.41228	33.23%	66.77%
2014-ER78B-14	/01	3.64670	1.23385	1.08980	4.73650	3.64670	2.28660	1.19680	0.40494	32.82%	67.18%
2014-ER78B-14	/02	3.63970	1.23149	1.10310	4.74280	3.63970	2.29940	1.19630	0.40477	32.87%	67.13%
2014-ER78B-15	/01	3.66740	1.24086	1.07490	4.74230	3.66740	2.37600	1.30110	0.44023	35.48%	64.52%
2014-ER78B-15	/02	3.66060	1.23856	1.07620	4.73680	3.66060	2.37620	1.30000	0.43985	35.51%	64.49%
2014-ER78B-16	/01	3.75830	1.27161	1.09910	4.85740	3.75830	2.52850	1.42940	0.48364	38.03%	61.97%
2014-ER78B-16	/02	3.73980	1.26536	1.09090	4.83070	3.73980	2.51170	1.42080	0.48073	37.99%	62.01%
2014-ER78B-17	/01	3.99100	1.35035	1.08620	5.07720	3.99100	2.81600	1.72980	0.58527	43.34%	56.66%
2014-ER78B-17	/02	3.91670	1.32521	1.09580	5.01250	3.91670	2.79010	1.69430	0.57326	43.26%	56.74%
2014-ER78B-18	/01	3.98410	1.34801	1.08240	5.06650	3.98410	2.87540	1.79300	0.60666	45.00%	55.00%
2014-ER78B-18	/02	3.96360	1.34108	1.07230	5.03590	3.96360	2.84620	1.77390	0.60020	44.75%	55.25%
2014-ER78B-19	/01	4.04000	1.36693	1.09560	5.13560	4.04000	2.94180	1.84620	0.62466	45.70%	54.30%
2014-ER78B-19	/02	4.04040	1.36706	1.09350	5.13390	4.04040	2.94350	1.85000	0.62594	45.79%	54.21%
2014-ER78B-20	/01	4.04460	1.36848	1.08760	5.13220	4.04460	2.92700	1.83940	0.62236	45.48%	54.52%
2014-ER78B-20	/02	4.07400	1.37843	1.07470	5.14870	4.07400	2.92830	1.85360	0.62716	45.50%	54.50%

Table F.782.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER78-C

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER78C-1	/01	3.22640	1.10002	1.07660	4.30300	3.22640	1.56150	0.48490	0.16532	15.03%	84.97%
2014-ER78C-1	/02	3.22190	1.09849	1.08860	4.31050	3.22190	1.55030	0.46170	0.15741	14.33%	85.67%
2014-ER78C-2	/01	3.48560	1.18840	1.09710	4.58270	3.48560	2.00240	0.90530	0.30866	25.97%	74.03%
2014-ER78C-2	/02	3.46840	1.18253	1.09060	4.55900	3.46840	1.99220	0.90160	0.30740	25.99%	74.01%
2014-ER78C-3	/01	3.52530	1.20193	1.09530	4.62060	3.52530	2.10890	1.01360	0.34558	28.75%	71.25%
2014-ER78C-3	/02	3.53790	1.20623	1.08810	4.62600	3.53790	2.10260	1.01450	0.34589	28.68%	71.32%
2014-ER78C-4	/01	3.55270	1.21127	1.08710	4.63980	3.55270	2.16030	1.07320	0.36590	30.21%	69.79%
2014-ER78C-4	/02	3.53990	1.20691	1.08450	4.62440	3.53990	2.15170	1.06720	0.36386	30.15%	69.85%
2014-ER78C-5	/01	3.57610	1.21925	1.10050	4.67660	3.57610	2.22060	1.12010	0.38189	31.32%	68.68%
2014-ER78C-5	/02	3.57080	1.21744	1.09780	4.66860	3.57080	2.21060	1.11280	0.37940	31.16%	68.84%
2014-ER78C-6	/01	3.57260	1.21806	1.09620	4.66880	3.57260	2.21730	1.12110	0.38223	31.38%	68.62%
2014-ER78C-6	/02	3.53320	1.20463	1.09370	4.62690	3.53320	2.20150	1.10780	0.37770	31.35%	68.65%
2014-ER78C-7	/01	3.58970	1.22389	1.09040	4.68010	3.58970	2.22540	1.13500	0.38697	31.62%	68.38%
2014-ER78C-7	/02	3.58750	1.22314	1.12450	4.71200	3.58750	2.25540	1.13090	0.38557	31.52%	68.48%
2014-ER78C-8	/01	3.65310	1.24550	1.07970	4.73280	3.65310	2.32040	1.24070	0.42301	33.96%	66.04%
2014-ER78C-8	/02	3.68710	1.25710	1.07250	4.75960	3.68710	2.33020	1.25770	0.42881	34.11%	65.89%
2014-ER78C-9	/01	3.61370	1.23212	1.09620	4.70990	3.61370	2.25540	1.15920	0.39524	32.08%	67.92%
2014-ER78C-9	/02	3.61560	1.23277	1.09780	4.71340	3.61560	2.25380	1.15600	0.39415	31.97%	68.03%
2014-ER78C-10	/01	3.50840	1.19617	1.10380	4.61220	3.50840	2.11400	1.01020	0.34442	28.79%	71.21%
2014-ER78C-10	/02	3.51750	1.19927	1.09090	4.60840	3.51750	2.10570	1.01480	0.34599	28.85%	71.15%
2014-ER78C-11	/01	3.52180	1.20074	1.12090	4.64270	3.52180	2.10890	0.98800	0.33685	28.05%	71.95%
2014-ER78C-11	/02	3.46400	1.18103	1.10380	4.56780	3.46400	2.07330	0.96950	0.33055	27.99%	72.01%
2014-ER78C-12	/01	3.48820	1.18928	1.09680	4.58500	3.48820	2.08120	0.98440	0.33563	28.22%	71.78%
2014-ER78C-12	/02	3.50800	1.19603	1.11510	4.62310	3.50800	2.10430	0.98920	0.33726	28.20%	71.80%
2014-ER78C-13	/01	3.51660	1.19897	1.09540	4.61200	3.51660	2.12750	1.03210	0.35189	29.35%	70.65%
2014-ER78C-13	/02	3.56530	1.21557	1.08680	4.65210	3.56530	2.13130	1.04450	0.35612	29.30%	70.70%
2014-ER78C-14	/01	3.56100	1.21410	1.08780	4.64880	3.56100	2.16000	1.07220	0.36556	30.11%	69.89%
2014-ER78C-14	/02	3.56420	1.21519	1.07650	4.64070	3.56420	2.16070	1.08420	0.36965	30.42%	69.58%
2014-ER78C-16	/01	3.66870	1.25082	1.08030	4.74900	3.66870	2.31670	1.23640	0.42154	33.70%	66.30%
2014-ER78C-16	/02	3.65000	1.24445	1.09070	4.74070	3.65000	2.31770	1.22700	0.41834	33.62%	66.38%
2014-ER78C-17	/01	3.66210	1.24857	1.08020	4.74230	3.66210	2.31960	1.23940	0.42257	33.84%	66.16%
2014-ER78C-17	/02	3.65820	1.24724	1.08090	4.73910	3.65820	2.32590	1.24500	0.42448	34.03%	65.97%
2014-ER78C-18	/01	3.74660	1.27738	1.10690	4.85350	3.74660	2.49830	1.39140	0.47439	37.14%	62.86%
2014-ER78C-18	/02	3.72990	1.27169	1.08820	4.81810	3.72990	2.48430	1.39610	0.47599	37.43%	62.57%
2014-ER78C-19	/01	3.79360	1.29341	1.09190	4.88550	3.79360	2.53600	1.44410	0.49236	38.07%	61.93%
2014-ER78C-19	/02	3.75700	1.28093	1.08720	4.84420	3.75700	2.50640	1.41920	0.48387	37.77%	62.23%
2014-ER78C-20	/01	3.94020	1.34339	1.07850	5.01870	3.94020	2.78970	1.71120	0.58342	43.43%	56.57%
2014-ER78C-20	/02	3.95270	1.34765	1.08130	5.03400	3.95270	2.79810	1.71680	0.58533	43.43%	56.57%

Table F.793.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core ER78-D

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER78D-1	/01	3.37800	1.15171	1.09160	4.46960	3.37800	1.70050	0.60890	0.20760	18.03%	81.97%
2014-ER78D-1	/02	3.24270	1.10558	1.08890	4.33160	3.24270	1.58270	0.49380	0.16836	15.23%	84.77%
2014-ER78D-2	/01	3.43290	1.17043	1.09480	4.52770	3.43290	1.94740	0.85260	0.29069	24.84%	75.16%
2014-ER78D-2	/02	3.42930	1.16920	1.11330	4.54260	3.42930	1.96070	0.84740	0.28892	24.71%	75.29%
2014-ER78D-3	/01	3.53510	1.20527	1.09860	4.63370	3.53510	2.11080	1.01220	0.34510	28.63%	71.37%
2014-ER78D-3	/02	3.54680	1.20926	1.08320	4.63000	3.54680	2.09510	1.01190	0.34500	28.53%	71.47%
2014-ER78D-4	/01	3.58710	1.22300	1.09740	4.68450	3.58710	2.19320	1.09580	0.37361	30.55%	69.45%
2014-ER78D-4	/02	3.60150	1.22791	1.08640	4.68790	3.60150	2.17490	1.08850	0.37112	30.22%	69.78%
2014-ER78D-5	/01	3.58290	1.22157	1.07830	4.66120	3.58290	2.17900	1.10070	0.37528	30.72%	69.28%
2014-ER78D-5	/02	3.61200	1.23149	1.07200	4.68400	3.61200	2.18260	1.11060	0.37865	30.75%	69.25%
2014-ER78D-6	/01	3.61610	1.23289	1.07960	4.69570	3.61610	2.18600	1.10640	0.37722	30.60%	69.40%
2014-ER78D-6	/02	3.62900	1.23729	1.08520	4.71420	3.62900	2.19490	1.10970	0.37835	30.58%	69.42%
2014-ER78D-7	/01	3.65450	1.24598	1.10130	4.75580	3.65450	2.31000	1.20870	0.41210	33.07%	66.93%
2014-ER78D-7	/02	3.64900	1.24411	1.10150	4.75050	3.64900	2.30900	1.20750	0.41169	33.09%	66.91%
2014-ER78D-8	/01	3.71390	1.26623	1.08100	4.79490	3.71390	2.37750	1.29650	0.44203	34.91%	65.09%
2014-ER78D-8	/02	3.71630	1.26705	1.08370	4.80000	3.71630	2.38510	1.30140	0.44371	35.02%	64.98%
2014-ER78D-9	/01	3.66320	1.24895	1.09800	4.76120	3.66320	2.30920	1.21120	0.41295	33.06%	66.94%
2014-ER78D-9	/02	3.62320	1.23531	1.11400	4.73720	3.62320	2.31780	1.20380	0.41043	33.22%	66.78%
2014-ER78D-10	/01	3.50690	1.19566	1.10090	4.60780	3.50690	2.14200	1.04110	0.35496	29.69%	70.31%
2014-ER78D-10	/02	3.52600	1.20217	1.09290	4.61890	3.52600	2.13940	1.04650	0.35680	29.68%	70.32%
2014-ER78D-11	/01	3.47900	1.18615	1.10400	4.58300	3.47900	2.11230	1.00830	0.34377	28.98%	71.02%
2014-ER78D-11	/02	3.53790	1.20623	1.09620	4.63410	3.53790	2.12160	1.02540	0.34960	28.98%	71.02%
2014-ER78D-12	/01	3.46660	1.18192	1.09140	4.55800	3.46660	2.08730	0.99590	0.33955	28.73%	71.27%
2014-ER78D-12	/02	3.51370	1.19798	1.08250	4.59620	3.51370	2.08920	1.00670	0.34323	28.65%	71.35%
2014-ER78D-13	/01	3.54200	1.20763	1.08290	4.62490	3.54200	2.13610	1.05320	0.35908	29.73%	70.27%
2014-ER78D-13	/02	3.54610	1.20902	1.09440	4.64050	3.54610	2.14630	1.05190	0.35864	29.66%	70.34%
2014-ER78D-14	/01	3.54240	1.20776	1.10190	4.64430	3.54240	2.14860	1.04670	0.35687	29.55%	70.45%
2014-ER78D-14	/02	3.51700	1.19910	1.09690	4.61390	3.51700	2.13900	1.04210	0.35530	29.63%	70.37%
2014-ER78D-16	/01	3.62740	1.23674	1.08320	4.71060	3.62740	2.21760	1.13440	0.38677	31.27%	68.73%
2014-ER78D-16	/02	3.60970	1.23071	1.10760	4.71730	3.60970	2.23640	1.12880	0.38486	31.27%	68.73%
2014-ER78D-17	/01	3.75830	1.28137	1.08250	4.84080	3.75830	2.41070	1.32820	0.45284	35.34%	64.66%
2014-ER78D-17	/02	3.72100	1.26865	1.08730	4.80830	3.72100	2.39820	1.31090	0.44694	35.23%	64.77%
2014-ER78D-18	/01	3.78410	1.29017	1.11250	4.89660	3.78410	2.55730	1.44480	0.49260	38.18%	61.82%
2014-ER78D-18	/02	3.74400	1.27650	1.09060	4.83460	3.74400	2.51910	1.42850	0.48704	38.15%	61.85%
2014-ER78D-19	/01	3.88880	1.32586	1.08960	4.97840	3.88880	2.72230	1.63270	0.55666	41.98%	58.02%
2014-ER78D-19	/02	3.91170	1.33367	1.08220	4.99390	3.91170	2.72720	1.64500	0.56085	42.05%	57.95%
2014-ER78D-20	/01	3.97210	1.35427	1.08230	5.05440	3.97210	2.80800	1.72570	0.58837	43.45%	56.55%
2014-ER78D-20	/02	3.97720	1.35600	1.09360	5.07080	3.97720	2.83230	1.73870	0.59280	43.72%	56.28%

Table F.804.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of ponar grabs in Lake Erie

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER02PG	/01	4.08690	1.38362	1.07540	5.16230	4.08690	2.97280	1.89740	0.64236	46.43%	53.57%
2014-ER02PG	/02	4.03660	1.36659	1.09240	5.12900	4.03660	2.88980	1.79740	0.60851	44.53%	55.47%
2014-ER03PG	/01	3.42260	1.15872	1.08800	4.51060	3.42260	1.95950	0.87150	0.29505	25.46%	74.54%
2014-ER03PG	/02	3.43980	1.16454	1.10450	4.54430	3.43980	1.97940	0.87490	0.29620	25.43%	74.57%
2014-ER04PG	/01	4.33600	1.46795	1.10150	5.43750	4.33600	3.39250	2.29100	0.77562	52.84%	47.16%
2014-ER04PG	/02	4.29740	1.45488	1.08860	5.38600	4.29740	3.34890	2.26030	0.76522	52.60%	47.40%
2014-ER05PG	/01	5.54380	1.87685	1.09330	6.63710	5.54380	5.66970	4.57640	1.54934	82.55%	17.45%
2014-ER05PG	/02	5.54170	1.87614	1.09250	6.63420	5.54170	5.70230	4.60980	1.56065	83.18%	16.82%
2014-ER06PG	/01	3.98950	1.35064	1.09480	5.08430	3.98950	2.82970	1.73490	0.58735	43.49%	56.51%
2014-ER06PG	/02	4.01940	1.36077	1.07980	5.09920	4.01940	2.84940	1.76960	0.59910	44.03%	55.97%
2014-ER07PG	/01	4.17020	1.41182	1.09850	5.26870	4.17020	3.08620	1.98770	0.67294	47.66%	52.34%
2014-ER07PG	/02	4.22430	1.43014	1.08950	5.31380	4.22430	3.18840	2.09890	0.71058	49.69%	50.31%
2014-ER09PG	/01	3.47290	1.17575	1.09320	4.56610	3.47290	2.07460	0.98140	0.33225	28.26%	71.74%
2014-ER09PG	/02	3.42750	1.16038	1.06920	4.49670	3.42750	1.98650	0.91730	0.31055	26.76%	73.24%
2014-ER10PG	/01	3.57920	1.21174	1.09380	4.67300	3.57920	2.18590	1.09210	0.36973	30.51%	69.49%
2014-ER10PG	/02	3.58210	1.21272	1.09800	4.68010	3.58210	2.16600	1.06800	0.36157	29.81%	70.19%
2014-ER15PG	/01	3.64340	1.23347	1.09220	4.73560	3.64340	2.29880	1.20660	0.40849	33.12%	66.88%
2014-ER15PG	/02	3.63520	1.23070	1.10040	4.73560	3.63520	2.29360	1.19320	0.40396	32.82%	67.18%
2014-ER20PG	/01	4.26720	1.44466	1.10390	5.37110	4.26720	3.28500	2.18110	0.73841	51.11%	48.89%
2014-ER20PG	/02	4.25190	1.43948	1.08590	5.33780	4.25190	3.25830	2.17240	0.73547	51.09%	48.91%
2014-ER21PG	/01	5.15340	1.74468	1.09290	6.24630	5.15340	4.60750	3.51460	1.18987	68.20%	31.80%
2014-ER21PG	/02	5.14760	1.74272	1.08520	6.23280	5.14760	4.57560	3.49040	1.18167	67.81%	32.19%
2014-ER22PG	/01	3.73420	1.26421	1.11040	4.84460	3.73420	2.42180	1.31140	0.44397	35.12%	64.88%
2014-ER22PG	/02	3.72860	1.26232	1.09390	4.82250	3.72860	2.40260	1.30870	0.44306	35.10%	64.90%
2014-ER23PG	/01	3.75960	1.27281	1.07610	4.83570	3.75960	2.42570	1.34960	0.45691	35.90%	64.10%
2014-ER23PG	/02	3.76460	1.27450	1.10530	4.86990	3.76460	2.46860	1.36330	0.46154	36.21%	63.79%
2014-ER25PG	/01	4.08940	1.38447	1.07600	5.16540	4.08940	2.94880	1.87280	0.63404	45.80%	54.20%
2014-ER25PG	/02	4.10670	1.39032	1.08090	5.18760	4.10670	2.96910	1.88820	0.63925	45.98%	54.02%
2014-ER26PG	/01	3.39410	1.14907	1.06900	4.46310	3.39410	1.86880	0.79980	0.27077	23.56%	76.44%
2014-ER26PG	/02	3.40300	1.15208	1.08530	4.48830	3.40300	1.89130	0.80600	0.27287	23.68%	76.32%
2014-ER27PG	/01	3.37260	1.14179	1.10670	4.47930	3.37260	1.86420	0.75750	0.25645	22.46%	77.54%
2014-ER27PG	/02	3.39250	1.14853	1.09520	4.48770	3.39250	1.86400	0.76880	0.26028	22.66%	77.34%
2014-ER28PG	/01	3.40450	1.15259	1.08410	4.48860	3.40450	1.80330	0.71920	0.24348	21.12%	78.88%
2014-ER28PG	/02	3.37330	1.14203	1.07620	4.44950	3.37330	1.78890	0.71270	0.24128	21.13%	78.87%
2014-ER29PG	/01	3.52870	1.19464	1.09950	4.62820	3.52870	2.02860	0.92910	0.31455	26.33%	73.67%
2014-ER29PG	/02	3.47960	1.17802	1.08950	4.56910	3.47960	1.99860	0.90910	0.30778	26.13%	73.87%
2014-ER30PG	/01	3.84160	1.30057	1.10170	4.94330	3.84160	2.56760	1.46590	0.49628	38.16%	61.84%
2014-ER30PG	/02	3.84000	1.30003	1.08850	4.92850	3.84000	2.52830	1.43980	0.48744	37.49%	62.51%
2014-ER31PG	/01	3.75950	1.27278	1.10270	4.86220	3.75950	2.41680	1.31410	0.44489	34.95%	65.05%
2014-ER31PG	/02	3.73280	1.26374	1.07060	4.80340	3.73280	2.38850	1.31790	0.44617	35.31%	64.69%
2014-ER32PG	/01	3.87820	1.31296	1.09120	4.96940	3.87820	2.56300	1.47180	0.49828	37.95%	62.05%
2014-ER32PG	/02	3.79920	1.28622	1.07580	4.87500	3.79920	2.48160	1.40580	0.47593	37.00%	63.00%
2014-ER36PG	/01	3.39370	1.14894	1.09350	4.48720	3.39370	1.87780	0.78430	0.26552	23.11%	76.89%
2014-ER36PG	/02	3.41740	1.15696	1.06760	4.48500	3.41740	1.86200	0.79440	0.26894	23.25%	76.75%

Table F.815.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of ponar grabs in Lake Erie

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
2014-ER37PG	/01	3.37850	1.14379	1.09180	4.47030	3.37850	1.88250	0.79070	0.26769	23.40%	76.60%
2014-ER37PG	/02	3.42370	1.15909	1.08460	4.50830	3.42370	1.88480	0.80020	0.27091	23.37%	76.63%
2014-ER38PG	/01	3.50060	1.18513	1.07660	4.57720	3.50060	2.00390	0.92730	0.31394	26.49%	73.51%
2014-ER38PG	/02	3.54660	1.20070	1.08820	4.63480	3.54660	1.99280	0.90460	0.30625	25.51%	74.49%
2014-ER42PG	/01	3.34260	1.13164	1.10750	4.45010	3.34260	1.79590	0.68840	0.23306	20.59%	79.41%
2014-ER42PG	/02	3.33700	1.12974	1.07030	4.40730	3.33700	1.75360	0.68330	0.23133	20.48%	79.52%
2014-ER43PG	/01	3.40620	1.15317	1.08090	4.48710	3.40620	1.81100	0.73010	0.24718	21.43%	78.57%
2014-ER43PG	/02	3.37670	1.14318	1.07400	4.45070	3.37670	1.80000	0.72600	0.24579	21.50%	78.50%
2014-ER58PG	/01	3.60070	1.21902	1.09930	4.70000	3.60070	2.19540	1.09610	0.37108	30.44%	69.56%
2014-ER58PG	/02	3.55690	1.20419	1.07710	4.63400	3.55690	2.16150	1.08440	0.36712	30.49%	69.51%
2014-ER59PG	/01	3.69230	1.25003	1.08000	4.77230	3.69230	2.33330	1.25330	0.42430	33.94%	66.06%
2014-ER59PG	/02	3.69370	1.25050	1.10460	4.79830	3.69370	2.35570	1.25110	0.42356	33.87%	66.13%
2014-ER60PG	/01	3.77080	1.27660	1.07540	4.84620	3.77080	2.45860	1.38320	0.46828	36.68%	63.32%
2014-ER60PG	/02	3.78040	1.27985	1.09820	4.87860	3.78040	2.51180	1.41360	0.47857	37.39%	62.61%
2014-ER61PG	/01	3.89790	1.31963	1.09880	4.99670	3.89790	2.70190	1.60310	0.54273	41.13%	58.87%
2014-ER61PG	/02	3.83430	1.29810	1.09930	4.93360	3.83430	2.63600	1.53670	0.52025	40.08%	59.92%
2014-ER63PG	/01	3.63910	1.23202	1.08830	4.72740	3.63910	2.10260	1.01430	0.34339	27.87%	72.13%
2014-ER63PG	/02	3.64110	1.23269	1.10010	4.74120	3.64110	2.14050	1.04040	0.35223	28.57%	71.43%
2014-ER73PG	/01	3.42850	1.16072	1.10310	4.53160	3.42850	1.90890	0.80580	0.27280	23.50%	76.50%
2014-ER73PG	/02	3.40190	1.15171	1.11450	4.51640	3.40190	1.91630	0.80180	0.27145	23.57%	76.43%
2014-ER78PG	/01	3.63090	1.22924	1.07810	4.70900	3.63090	2.13970	1.06160	0.35940	29.24%	70.76%
2014-ER78PG	/02	3.60340	1.21993	1.10200	4.70540	3.60340	2.15630	1.05430	0.35693	29.26%	70.74%
2014-ER81PG	/01	3.60100	1.21912	1.09950	4.70050	3.60100	2.18670	1.08720	0.36807	30.19%	69.81%
2014-ER81PG	/02	3.63970	1.23222	1.07760	4.71730	3.63970	2.10240	1.02480	0.34695	28.16%	71.84%
2014-ER84PG	/01	4.87690	1.65107	1.09150	5.96840	4.87690	4.13450	3.04300	1.03021	62.40%	37.60%
2014-ER84PG	/02	5.09070	1.72346	1.09350	6.18420	5.09070	4.35000	3.25650	1.10249	63.97%	36.03%
2014-ER85PG	/01	5.72520	1.93826	1.07550	6.80070	5.72520	5.43870	4.36320	1.47716	76.21%	23.79%
2014-ER85PG	/02	5.78420	1.95824	1.10490	6.88910	5.78420	5.49300	4.38810	1.48559	75.86%	24.14%
2014-ER91PG	/01	3.68400	1.24722	1.09090	4.77490	3.68400	2.35600	1.26510	0.42830	34.34%	65.66%
2014-ER91PG	/02	3.70580	1.25460	1.08540	4.79120	3.70580	2.35950	1.27410	0.43135	34.38%	65.62%
2014-ER92PG	/01	3.73560	1.26469	1.09830	4.83390	3.73560	2.40110	1.30280	0.44106	34.88%	65.12%
2014-ER92PG	/02	3.73920	1.26591	1.09860	4.83780	3.73920	2.38910	1.29050	0.43690	34.51%	65.49%
2014-ER93PG	/01	3.90800	1.32305	1.08730	4.99530	3.90800	2.74300	1.65570	0.56054	42.37%	57.63%
2014-ER93PG	/02	3.89440	1.31845	1.06730	4.96170	3.89440	2.71360	1.64630	0.55735	42.27%	57.73%
2014-ER95PG	/01	4.90530	1.66069	1.09250	5.99780	4.90530	4.19920	3.10670	1.05177	63.33%	36.67%
2014-ER95PG	/02	4.82100	1.63215	1.08170	5.90270	4.82100	4.12040	3.03870	1.02875	63.03%	36.97%
2014-ER98PG	/01	3.78050	1.27989	1.08830	4.86880	3.78050	2.49790	1.40960	0.47722	37.29%	62.71%
2014-ER98PG	/02	3.80360	1.28771	1.09290	4.89650	3.80360	2.51090	1.41800	0.48006	37.28%	62.72%
2014-ER99PG	/01	3.99120	1.35122	1.07510	5.06630	3.99120	2.75350	1.67840	0.56822	42.05%	57.95%
2014-ER99PG	/02	4.05380	1.37241	1.08370	5.13750	4.05380	2.84410	1.76040	0.59598	43.43%	56.57%

Table F.826.In-situ properties of water in sediment interface at each location in Lake Erie

SITE ID	ORP (mV)	DO (mg/L)	Temp. (°C)	pH	Turbidity (NTU)	Conductivity (µs)	TDS (mg/L as NaCl)	Salinity (%)
2014-ER02PG	158.1	6.13	18.3	7.84	2000	406	199	0.2
2014-ER03PG	74.7	4.49	22	7.36	144	348	171	0.2
2014-ER04PG	180.2	6.75	21.9	7.75	45.2	495	243	0.2
2014-ER05PG	184.4	5.22	19.9	8.02	4.2	337	165	0.2
2014-ER06PG	-39.6	6.79	24.2	7.16	585	346	349	0.3
2014-ER07PG	143.9	7.88	18.8	7.78	216	386	189	0.2
2014-ER09PG	157.9	9.13	22.6	7.87	138	290	142	0.1
2014-ER10PG	152.7	8.61	22.1	8	174	291.3	143	0.1
2014-ER15PG	168.3	7.1	20.7	7.56	142	299	146	0.1
2014-ER20PG	168	9.07	20.8	8.42	23.5	294	144	0.1
2014-ER21PG	188.4	6.02	20.6	8.08	5.4	326	160	0.2
2014-ER22PG	153.7	9.88	19.9	8.12	234	235.5	115	0.1
2014-ER23PG	189.3	5.95	22.3	7.77	123	lost	263	0.3
2014-ER25PG	151.3	9.43	20.2	8.1	31.1	264.4	130	0.1
2014-ER26PG	216.3	3.48	22.7	7.46	222	286.7	280	0.3
2014-ER27PG	not enough water collected							
2014-ER28PG	not enough water collected							
2014-ER29PG	149.4	6.67	20.8	7.59	260	300	147	0.1
2014-ER30PG	166..8	7.41	21.4	7.5	499	318	156	0.2
2014-ER31PG	179.2	7.58	20.9	7.78	249	288	141	0.1
2014-ER32PG	117.5	8.56	17.6	7.83	1050	289.6	142	0.1
2014-ER36PG	129.2	7.87	17.6	7.71	209	278.7	137	0.1
2014-ER37PG	148.5	6.31	23.8	7.51	92.2	292.8	143	0.1
2014-ER38PG	161.2	5.55	22.5	7.57	206	271.4	133	0.1
2014-ER42PG	167.7	6.55	20.3	7.67	400	not enough water		
2014-ER43PG	203.5	9.46	20.7	6.93	1087	269.2	132	0.1
2014-ER58PG	175.9	8.46	21.4	8.13	71.8	246.9	121	0.1
2014-ER59PG	170.4	9.39	20.6	8.41	83.5	262	128	0.1
2014-ER60PG	156.6	9.78	20.1	7.98	217	280.7	138	0.1
2014-ER61PG	158.9	8.94	19.6	8.09	170	235.1	115	0.1
2014-ER63PG	200.4	6.5	22.9	7.93	129	ble too small to measure		
2014-ER73PG	116.9	8.19	19.1	7.54	180	271.9	133	0.1
2014-ER78PG	169.1	8.61	20	8.11	5.65	287.2	141	0.1
2014-ER81PG	174	6.99	21.1	7.45	Too high	360	170	0.2
2014-ER84PG	164.4	8.26	20.9	missed	47.1	286.9	141	0.1
2014-ER85PG	134.8	10.05	17.2	8.18	9.95	296	145	0.1
2014-ER91PG	182.8	8.96	19.8	7.92	154	269.6	122	0.1
2014-ER92PG	120	8.56	20	7.94	7.43	256.3	126	0.1
2014-ER93PG	not enough water collected							
2014-ER95PG	123.5	9.37	17	8.23	96.5	304	149	0.1
2014-ER98PG	154.3	10.36	21.8	8.59	13.4	297.7	297	0.3
2014-ER99PG	177	9.19	22.5	8.13	15.7	294.5	144	0.1

Table F.837.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core I001

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
I001-1	/01	1.67610	1.07883	1.10380	2.77990	1.67610	1.30470	0.20090	0.12931	11.99%	88.01%
I001-1	/02	1.65620	1.06602	1.09060	2.74680	1.65620	1.28410	0.19350	0.12455	11.68%	88.32%
I001-2	/01	1.65800	1.06718	1.10530	2.76330	1.65800	1.34990	0.24460	0.15744	14.75%	85.25%
I001-2	/02	1.61680	1.04066	1.10400	2.72080	1.61680	1.33940	0.23540	0.15152	14.56%	85.44%
I001-3	/01	1.62440	1.04555	1.11240	2.73680	1.62440	1.35810	0.24570	0.15815	15.13%	84.87%
I001-3	/02	1.57190	1.01176	1.12310	2.69500	1.57190	1.36370	0.24060	0.15486	15.31%	84.69%
I001-4	/01	1.69020	1.08790	1.11510	2.80530	1.69020	1.38040	0.26530	0.17076	15.70%	84.30%
I001-4	/02	1.63050	1.04948	1.12450	2.75500	1.63050	1.38020	0.25570	0.16458	15.68%	84.32%
I001-5	/01	1.67700	1.07941	1.11420	2.79120	1.67700	1.39150	0.27730	0.17849	16.54%	83.46%
I001-5	/02	1.68130	1.08218	1.10250	2.78380	1.68130	1.38410	0.28160	0.18125	16.75%	83.25%
I001-6	/01	1.59390	1.02592	1.11740	2.71130	1.59390	1.35550	0.23810	0.15325	14.94%	85.06%
I001-6	/02	1.58490	1.02013	1.12260	2.70750	1.58490	1.35380	0.23120	0.14881	14.59%	85.41%
I001-7	/01	1.66640	1.07259	1.11170	2.77810	1.66640	1.39030	0.27860	0.17932	16.72%	83.28%
I001-7	/02	1.63980	1.05546	1.09520	2.73500	1.63980	1.36480	0.26960	0.17353	16.44%	83.56%
I001-8	/01	1.69500	1.09099	1.11480	2.80980	1.69500	1.37860	0.26380	0.16980	15.56%	84.44%
I001-8	/02	1.62690	1.04716	1.11620	2.74310	1.62690	1.37200	0.25580	0.16465	15.72%	84.28%
I001-9	/01	1.64360	1.05791	1.10170	2.74530	1.64360	1.37120	0.26950	0.17346	16.40%	83.60%
I001-9	/02	1.64250	1.05720	1.12020	2.76270	1.64250	1.38710	0.26690	0.17179	16.25%	83.75%
I001-10	/01	1.66120	1.06924	1.11540	2.77660	1.66120	1.39060	0.27520	0.17713	16.57%	83.43%
I001-10	/02	1.62980	1.04903	1.09690	2.72670	1.62980	1.36540	0.26850	0.17282	16.47%	83.53%
I001-11	/01	1.69010	1.08784	1.11770	2.80780	1.69010	1.41570	0.29800	0.19181	17.63%	82.37%
I001-11	/02	1.68070	1.08179	1.09650	2.77720	1.68070	1.39250	0.29600	0.19052	17.61%	82.39%
I001-12	/01	1.69160	1.08881	1.09000	2.78160	1.69160	1.41800	0.32800	0.21112	19.39%	80.61%
I001-12	/02	1.65160	1.06306	1.11010	2.76170	1.65160	1.42770	0.31760	0.20442	19.23%	80.77%
I001-13	/01	1.65520	1.06538	1.11120	2.76640	1.65520	1.43710	0.32590	0.20977	19.69%	80.31%
I001-13	/02	1.67020	1.07503	1.09240	2.76260	1.67020	1.41690	0.32450	0.20887	19.43%	80.57%
I001-14	/01	1.72050	1.10741	1.10770	2.82820	1.72050	1.43120	0.32350	0.20822	18.80%	81.20%
I001-14	/02	1.66590	1.07226	1.09730	2.76320	1.66590	1.41190	0.31460	0.20249	18.88%	81.12%
I001-15	/01	1.62230	1.04420	1.10970	2.73200	1.62230	1.41660	0.30690	0.19754	18.92%	81.08%
I001-15	/02	1.64080	1.05611	1.10440	2.74520	1.64080	1.40710	0.30270	0.19483	18.45%	81.55%
I001-16	/01	1.65620	1.06602	1.10080	2.75700	1.65620	1.44130	0.34050	0.21916	20.56%	79.44%
I001-16	/02	1.67480	1.07799	1.10900	2.78380	1.67480	1.45360	0.34460	0.22180	20.58%	79.42%
I001-17	/01	1.67660	1.07915	1.10370	2.78030	1.67660	1.43680	0.33310	0.21440	19.87%	80.13%
I001-17	/02	1.66520	1.07181	1.11310	2.77830	1.66520	1.44370	0.33060	0.21279	19.85%	80.15%
I001-18	/01	1.69610	1.09170	1.12410	2.82020	1.69610	1.45060	0.32650	0.21015	19.25%	80.75%
I001-18	/02	1.69560	1.09138	1.09200	2.78760	1.69560	1.41750	0.32550	0.20951	19.20%	80.80%
I001-19	/01	1.70900	1.10001	1.09720	2.80620	1.70900	1.43520	0.33800	0.21756	19.78%	80.22%
I001-19	/02	1.69000	1.08778	1.09360	2.78360	1.69000	1.42800	0.33440	0.21524	19.79%	80.21%
I001-20	/01	1.72530	1.11050	1.10900	2.83430	1.72530	1.48640	0.37740	0.24292	21.87%	78.13%
I001-20	/02	1.74760	1.12485	1.09430	2.84190	1.74760	1.49110	0.39680	0.25540	22.71%	77.29%

Table F.848.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core I002

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
I002-1	/01	3.08870	1.02721	1.11090	4.19960	3.08870	1.38390	0.27300	0.09079	8.84%	91.16%
I002-1	/02	3.14250	1.04510	1.09080	4.23330	3.14250	1.35220	0.26140	0.08693	8.32%	91.68%
I002-2	/01	3.11880	1.03722	1.10390	4.22270	3.11880	1.43358	0.32968	0.10964	10.57%	89.43%
I002-2	/02	3.22950	1.07404	1.12170	4.35120	3.22950	1.45950	0.33780	0.11234	10.46%	89.54%
I002-3	/01	3.19330	1.06200	1.10550	4.29880	3.19330	1.48880	0.38330	0.12747	12.00%	88.00%
I002-3	/02	3.19060	1.06110	1.10110	4.29170	3.19060	1.47150	0.37040	0.12318	11.61%	88.39%
I002-4	/01	1.60760	1.03952	1.09980	2.70740	1.60760	1.28900	0.18920	0.12234	11.77%	88.23%
I002-4	/02	1.66360	1.07573	1.11940	2.78300	1.66360	1.31340	0.19400	0.12545	11.66%	88.34%
I002-5	/01	1.61930	1.04708	1.10950	2.72880	1.61930	1.30560	0.19610	0.12680	12.11%	87.89%
I002-5	/02	1.62940	1.05361	1.11630	2.74570	1.62940	1.31040	0.19410	0.12551	11.91%	88.09%
I002-6	/01	1.60310	1.03661	1.11710	2.72020	1.60310	1.31060	0.19350	0.12512	12.07%	87.93%
I002-6	/02	1.63450	1.05691	1.12010	2.75460	1.63450	1.31240	0.19230	0.12435	11.77%	88.23%
I002-7	/01	1.62140	1.04844	1.11640	2.73780	1.62140	1.32210	0.20570	0.13301	12.69%	87.31%
I002-7	/02	1.56350	1.01100	1.10190	2.66540	1.56350	1.29780	0.19590	0.12667	12.53%	87.47%
I002-8	/01	1.65860	1.07249	1.11080	2.76940	1.65860	1.31930	0.20850	0.13482	12.57%	87.43%
I002-8	/02	1.63400	1.05659	1.11280	2.74680	1.63400	1.31360	0.20080	0.12984	12.29%	87.71%
I002-9	/01	1.58380	1.02413	1.10820	2.69200	1.58380	1.30940	0.20120	0.13010	12.70%	87.30%
I002-9	/02	1.61730	1.04579	1.11030	2.72760	1.61730	1.31760	0.20730	0.13405	12.82%	87.18%
I002-10	/01	1.60480	1.03770	1.10950	2.71430	1.60480	1.31870	0.20920	0.13527	13.04%	86.96%
I002-10	/02	1.61230	1.04255	1.11880	2.73110	1.61230	1.32850	0.20970	0.13560	13.01%	86.99%
I002-11	/01	1.66220	1.07482	1.09580	2.75800	1.66220	1.31140	0.21560	0.13941	12.97%	87.03%
I002-11	/02	1.59430	1.03092	1.10700	2.70130	1.59430	1.31600	0.20900	0.13514	13.11%	86.89%
I002-12	/01	1.60650	1.03880	1.09960	2.70610	1.60650	1.30820	0.20860	0.13489	12.98%	87.02%
I002-12	/02	1.60940	1.04068	1.11000	2.71940	1.60940	1.31530	0.20530	0.13275	12.76%	87.24%
I002-13	/01	1.64310	1.06247	1.10670	2.74980	1.64310	1.32230	0.21560	0.13941	13.12%	86.88%
I002-13	/02	1.64830	1.06583	1.11080	2.75910	1.64830	1.32300	0.21220	0.13721	12.87%	87.13%
I002-14	/01	1.62030	1.04773	1.10630	2.72660	1.62030	1.32450	0.21820	0.14109	13.47%	86.53%
I002-14	/02	1.62280	1.04934	1.10980	2.73260	1.62280	1.33060	0.22080	0.14277	13.61%	86.39%
I002-15	/01	1.64160	1.06150	1.10400	2.74560	1.64160	1.35990	0.25590	0.16547	15.59%	84.41%
I002-15	/02	1.61290	1.04294	1.11790	2.73080	1.61290	1.37130	0.25340	0.16385	15.71%	84.29%
I002-16	/01	1.61360	1.04339	1.11350	2.72710	1.61360	1.34530	0.23180	0.14989	14.37%	85.63%
I002-16	/02	1.62520	1.05090	1.10350	2.72870	1.62520	1.33820	0.23470	0.15176	14.44%	85.56%
I002-17	/01	1.63470	1.05704	1.10550	2.74020	1.63470	1.40020	0.29470	0.19056	18.03%	81.97%
I002-17	/02	1.69770	1.09778	1.09520	2.79290	1.69770	1.40460	0.30940	0.20007	18.22%	81.78%

Table F.859.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core W001

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
W001-1	/01	1.51470	1.01152	1.11700	2.63170	1.51470	1.15810	0.04110	0.02745	2.71%	97.29%
W001-1	/02	1.48560	0.99209	1.11640	2.60200	1.48560	1.15470	0.03830	0.02558	2.58%	97.42%
W001-2	/01	1.46260	0.97673	1.10640	2.56900	1.46260	1.14940	0.04300	0.02872	2.94%	97.06%
W001-2	/02	1.47990	0.98828	1.10210	2.58200	1.47990	1.14390	0.04180	0.02791	2.82%	97.18%
W001-3	/01	1.50890	1.00765	1.08340	2.59230	1.50890	1.13190	0.04850	0.03239	3.21%	96.79%
W001-3	/02	1.47320	0.98381	1.10770	2.58090	1.47320	1.15460	0.04690	0.03132	3.18%	96.82%
W001-4	/01	1.50450	1.00471	1.10140	2.60590	1.50450	1.15020	0.04880	0.03259	3.24%	96.76%
W001-4	/02	1.50860	1.00745	1.09760	2.60620	1.50860	1.14420	0.04660	0.03112	3.09%	96.91%
W001-5	/01	1.51850	1.01406	1.10470	2.62320	1.51850	1.15450	0.04980	0.03326	3.28%	96.72%
W001-5	/02	1.49050	0.99536	1.12710	2.61760	1.49050	1.17400	0.04690	0.03132	3.15%	96.85%
W001-6	/01	1.52649	1.01940	1.12111	2.64760	1.52649	1.17200	0.05089	0.03398	3.33%	96.67%
W001-6	/02	1.48340	0.99062	1.12200	2.60540	1.48340	1.17110	0.04910	0.03279	3.31%	96.69%
W001-7	/01	1.54230	1.02995	1.10030	2.64260	1.54230	1.15430	0.05400	0.03606	3.50%	96.50%
W001-7	/02	1.51340	1.01065	1.10220	2.61560	1.51340	1.15360	0.05140	0.03433	3.40%	96.60%
W001-8	/01	1.46570	0.97880	1.11110	2.57680	1.46570	1.16130	0.05020	0.03352	3.42%	96.58%
W001-8	/02	1.49320	0.99716	1.10770	2.60090	1.49320	1.15690	0.04920	0.03286	3.29%	96.71%
W001-9	/01	1.50690	1.00631	1.09320	2.60010	1.50690	1.15010	0.05690	0.03800	3.78%	96.22%
W001-9	/02	1.50430	1.00458	1.09620	2.60050	1.50430	1.15020	0.05400	0.03606	3.59%	96.41%
W001-10	/01	1.50410	1.00444	1.10120	2.60530	1.50410	1.15190	0.05070	0.03386	3.37%	96.63%
W001-10	/02	1.54120	1.02922	1.10940	2.65060	1.54120	1.16080	0.05140	0.03433	3.34%	96.66%
W001-11	/01	1.51470	1.01152	1.10720	2.62190	1.51470	1.15950	0.05230	0.03493	3.45%	96.55%
W001-11	/02	1.49800	1.00037	1.11540	2.61340	1.49800	1.16640	0.05100	0.03406	3.40%	96.60%
W001-12	/01	1.48380	0.99089	1.11720	2.60100	1.48380	1.16800	0.05080	0.03392	3.42%	96.58%
W001-12	/02	1.51700	1.01306	1.09850	2.61550	1.51700	1.14780	0.04930	0.03292	3.25%	96.75%
W001-13	/01	1.52050	1.01540	1.11940	2.63990	1.52050	1.16930	0.04990	0.03332	3.28%	96.72%
W001-13	/02	1.51080	1.00892	1.10170	2.61250	1.51080	1.15040	0.04870	0.03252	3.22%	96.78%
W001-14	/01	1.52000	1.01506	1.10380	2.62380	1.52000	1.15240	0.04860	0.03246	3.20%	96.80%
W001-14	/02	1.48610	0.99242	1.10400	2.59010	1.48610	1.15000	0.04600	0.03072	3.10%	96.90%
W001-15	/01	1.48680	0.99289	1.12170	2.60850	1.48680	1.16920	0.04750	0.03172	3.19%	96.81%
W001-15	/02	1.45830	0.97386	1.11190	2.57020	1.45830	1.15880	0.04690	0.03132	3.22%	96.78%
W001-16	/01	1.51730	1.01326	1.10050	2.61780	1.51730	1.14880	0.04830	0.03225	3.18%	96.82%
W001-16	/02	1.48000	0.98835	1.09330	2.57330	1.48000	1.13960	0.04630	0.03092	3.13%	96.87%
W001-17	/01	1.50230	1.00324	1.10620	2.60850	1.50230	1.15470	0.04850	0.03239	3.23%	96.77%
W001-17	/02	1.47840	0.98728	1.12690	2.60530	1.47840	1.17220	0.04530	0.03025	3.06%	96.94%
W001-18	/01	1.49040	0.99529	1.11730	2.60770	1.49040	1.16760	0.05030	0.03359	3.37%	96.63%
W001-18	/02	1.47400	0.98434	1.13060	2.60460	1.47400	1.18130	0.05070	0.03386	3.44%	96.56%
W001-19	/01	1.47710	0.98641	1.11030	2.58740	1.47710	1.15440	0.04410	0.02945	2.99%	97.01%
W001-19	/02	1.51680	1.01292	1.11340	2.63020	1.51680	1.15890	0.04550	0.03039	3.00%	97.00%
W001-20	/01	1.49680	0.99957	1.09770	2.59450	1.49680	1.15140	0.05370	0.03586	3.59%	96.41%
W001-20	/02	1.52010	1.01513	1.11070	2.63080	1.52010	1.16370	0.05300	0.03539	3.49%	96.51%

Table F.90.Wet bulk density, dry bulk density, solid content, and other parameters measured for determination of physical properties of core W002

Sample ID	Duplicate	Wet Sed (g)	Wet Bulk Density (g/mL)	Tray Weight (g)	Tray + Wet Sed (g)	Wet Sed Mass (g)	Tray + Dry Sed at 105°C (g)	Dried Mass at 105°C (g)	Dry Bulk density (g/mL)	% Solids (%)	% Water (%)
W002-1	/01	1.50580	1.00558	1.11830	2.62410	1.50580	1.15870	0.04040	0.02698	2.68%	97.32%
W002-1	/02	1.45660	0.97272	1.10780	2.56440	1.45660	1.14710	0.03930	0.02624	2.70%	97.30%
W002-2	/01	1.47290	0.98361	1.11370	2.58660	1.47290	1.15350	0.03980	0.02658	2.70%	97.30%
W002-2	/02	1.48490	0.99162	1.11570	2.60060	1.48490	1.15530	0.03960	0.02645	2.67%	97.33%
W002-3	/01	1.52570	1.01887	1.10660	2.63230	1.52570	1.14700	0.04040	0.02698	2.65%	97.35%
W002-3	/02	1.51500	1.01172	1.10780	2.62280	1.51500	1.14750	0.03970	0.02651	2.62%	97.38%
W002-4	/01	1.49020	0.99516	1.10760	2.59780	1.49020	1.14980	0.04220	0.02818	2.83%	97.17%
W002-4	/02	1.51930	1.01459	1.11610	2.63540	1.51930	1.15820	0.04210	0.02811	2.77%	97.23%
W002-5	/01	1.49240	0.99663	1.12010	2.61250	1.49240	1.17120	0.05110	0.03412	3.42%	96.58%
W002-5	/02	1.54210	1.02982	1.12580	2.66790	1.54210	1.17730	0.05150	0.03439	3.34%	96.66%
W002-6	/01	1.49080	0.99556	1.12620	2.61700	1.49080	1.17560	0.04940	0.03299	3.31%	96.69%
W002-6	/02	1.52900	1.02107	1.10800	2.63700	1.52900	1.16000	0.05200	0.03473	3.40%	96.60%
W002-7	/01	1.63300	1.09052	1.11880	2.75180	1.63300	1.17230	0.05350	0.03573	3.28%	96.72%
W002-7	/02	1.58860	1.06087	1.09930	2.68790	1.58860	1.15110	0.05180	0.03459	3.26%	96.74%
W002-8	/01	1.54920	1.03456	1.10470	2.65390	1.54920	1.15670	0.05200	0.03473	3.36%	96.64%
W002-8	/02	1.55890	1.04104	1.12520	2.68410	1.55890	1.17700	0.05180	0.03459	3.32%	96.68%
W002-9	/01	1.53550	1.02541	1.11820	2.65370	1.53550	1.17220	0.05400	0.03606	3.52%	96.48%
W002-9	/02	1.60820	1.07396	1.10360	2.71180	1.60820	1.15860	0.05500	0.03673	3.42%	96.58%
W002-10	/01	1.60270	1.07029	1.12120	2.72390	1.60270	1.18380	0.06260	0.04180	3.91%	96.09%
W002-10	/02	1.58070	1.05560	1.10640	2.68710	1.58070	1.16540	0.05900	0.03940	3.73%	96.27%
W002-11	/01	1.48760	0.99342	1.11830	2.60590	1.48760	1.17490	0.05660	0.03780	3.80%	96.20%
W002-11	/02	1.50640	1.00598	1.10530	2.61170	1.50640	1.16340	0.05810	0.03880	3.86%	96.14%
W002-12	/01	1.51400	1.01105	1.10110	2.61510	1.51400	1.15620	0.05510	0.03680	3.64%	96.36%
W002-12	/02	1.49790	1.00030	1.10630	2.60420	1.49790	1.16120	0.05490	0.03666	3.67%	96.33%
W002-13	/01	1.49350	0.99736	1.12540	2.61890	1.49350	1.18010	0.05470	0.03653	3.66%	96.34%
W002-13	/02	1.49620	0.99917	1.10070	2.59690	1.49620	1.15370	0.05300	0.03539	3.54%	96.46%
W002-14	/01	1.52190	1.01633	1.11300	2.63490	1.52190	1.16850	0.05550	0.03706	3.65%	96.35%
W002-14	/02	1.52080	1.01560	1.09170	2.61250	1.52080	1.14620	0.05450	0.03640	3.58%	96.42%
W002-15	/01	1.52470	1.01820	1.11760	2.64230	1.52470	1.17200	0.05440	0.03633	3.57%	96.43%
W002-15	/02	1.50430	1.00458	1.10070	2.60500	1.50430	1.15370	0.05300	0.03539	3.52%	96.48%
W002-16	/01	1.51740	1.01333	1.09860	2.61600	1.51740	1.14070	0.04210	0.02811	2.77%	97.23%
W002-16	/02	1.54900	1.03443	1.11180	2.66080	1.54900	1.15260	0.04080	0.02725	2.63%	97.37%
W002-17	/01	1.49390	0.99763	1.12460	2.61850	1.49390	1.17650	0.05190	0.03466	3.47%	96.53%
W002-17	/02	1.48880	0.99423	1.09150	2.58030	1.48880	1.14380	0.05230	0.03493	3.51%	96.49%
W002-18	/01	1.49340	0.99730	1.11050	2.60390	1.49340	1.16550	0.05500	0.03673	3.68%	96.32%
W002-18	/02	1.50400	1.00438	1.10110	2.60510	1.50400	1.15620	0.05510	0.03680	3.66%	96.34%
W002-19	/01	1.48100	0.98902	1.09510	2.57610	1.48100	1.14650	0.05140	0.03433	3.47%	96.53%
W002-19	/02	1.48050	0.98868	1.10240	2.58290	1.48050	1.15380	0.05140	0.03433	3.47%	96.53%
W002-20	/01	1.50360	1.00411	1.09900	2.60260	1.50360	1.15270	0.05370	0.03586	3.57%	96.43%
W002-20	/02	1.47740	0.98661	1.09680	2.57420	1.47740	1.15000	0.05320	0.03553	3.60%	96.40%

Appendix G

Table G.1.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores S001 and S002

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
S001MC-01	0-0.5	0.5	0.25	1.09	3.57	2.49	0.07	0.37	14.08	1.01
S001MC-02	0.5-1	0.5	0.75	1.72	4.04	2.32	0.13	0.39	11.61	1.59
S001MC-03	1-1.5	0.5	1.25	1.89	4.77	2.88	0.20	0.52	12.87	1.70
S001MC-04	1.5-2	0.5	1.75	1.58	3.86	2.28	0.23	0.41	12.73	1.35
S001MC-05	2-2.5	0.5	2.25	1.17	3.73	2.56	0.16	0.41	12.53	1.01
S001MC-06	2.5-3	0.5	2.75	1.08	5.07	3.99	0.14	0.56	11.56	0.95
S001MC-07	3-3.5	0.5	3.25	1.15	3.81	2.66	0.12	0.42	14.00	1.03
S001MC-08	3.5-4	0.5	3.75	2.43	4.74	2.31	0.14	0.53	11.51	2.29
S001MC-09	4-4.5	0.5	4.25	2.61	4.47	1.86	0.15	0.49	12.59	2.46
S001MC-10	4.5-5	0.5	4.75	2.87	4.76	1.89	0.10	0.51	11.77	2.76
S001MC-11	5-6	1	5.5	2.16	4.58	2.42	0.09	0.51	10.25	2.07
S001MC-12	6-7	1	6.5	1.85	4.32	2.46	0.13	0.50	9.03	1.72
S001MC-13	7-8	1	7.5	1.81	3.40	1.58	0.11	0.38	11.92	1.70
S001MC-14	8-9	1	8.5	2.42	3.46	1.04	0.11	0.40	11.75	2.32
S001MC-15	9-10	1	9.5	2.16	3.38	1.23	0.11	0.42	12.49	2.05
S001MC-16	10-11	1	10.5	2.39	3.37	0.98	0.12	0.42	13.19	2.27
S001MC-17	11-12	1	11.5	2.25	3.16	0.91	0.10	0.39	11.08	2.15
S001MC-18	12-13	1	12.5	3.82	4.68	0.86	0.09	0.55	6.82	3.73
S001MC-19	13-14	1	13.5	2.08	4.07	2.00	0.11	0.49	11.73	1.97
S001MC-20	14-15	1	14.5	1.59	3.68	2.08	0.14	0.43	10.31	1.46
S001MC-21	15-17	2	16	2.21	2.27	0.07	0.14	0.29	10.90	2.06
S001MC-22	17-19	2	18	2.90	2.97	0.07	0.10	0.36	12.03	2.80
S001MC-23	19-21	2	20	1.98	2.16	0.18	0.12	0.29	9.56	1.86
S001MC-24	21-23	2	22	1.24	1.29	0.05	0.15	0.22	6.50	1.09
S002MC-01	0-0.5	0.5	0.25	34.68	36.74	2.06	0.19	4.25	74.92	34.49
S002MC-02	0.5-1	0.5	0.75	18.32	28.63	10.31	0.14	3.17	56.04	18.18
S002MC-03	1-1.5	0.5	1.25	22.38	22.39	0.01	0.12	2.40	45.85	22.26
S002MC-04	1.5-2	0.5	1.75	9.00	16.48	7.48	0.34	1.70	33.48	8.66
S002MC-05	2-2.5	0.5	2.25	5.08	9.96	4.88	0.21	1.06	23.24	4.87
S002MC-06	2.5-3	0.5	2.75	6.60	8.52	1.92	0.25	0.92	20.52	6.35
S002MC-07	3-3.5	0.5	3.25	6.03	8.21	2.18	0.21	0.95	24.30	5.82
S002MC-08	3.5-4	0.5	3.75	6.24	9.47	3.23	0.20	1.12	27.99	6.04
S002MC-09	4-4.5	0.5	4.25	6.33	8.99	2.66	0.17	1.06	29.37	6.15
S002MC-10	4.5-5	0.5	4.75	6.90	8.05	1.15	0.21	0.96	26.79	6.69
S002MC-11	5-6	1	5.5	4.65	4.66	0.01	0.17	0.54	17.39	4.49
S002MC-12	6-7	1	6.5	4.57	6.60	2.04	0.19	0.80	24.75	4.38
S002MC-13	7-8	1	7.5	7.31	7.36	0.05	0.23	0.91	26.81	7.08
S002MC-14	8-9	1	8.5	7.89	7.95	0.06	0.22	0.98	28.62	7.66
S002MC-15	9-10	1	9.5	8.39	8.39	0.00	0.17	1.00	28.26	8.21
S002MC-16	10-11	1	10.5	8.32	8.52	0.20	0.18	1.01	28.50	8.14
S002MC-17	11-12	1	11.5	8.34	8.37	0.03	0.22	0.98	28.08	8.13
S002MC-18	12-13	1	12.5	7.37	8.27	0.90	0.27	0.95	25.37	7.10
S002MC-19	13-14	1	13.5	8.75	8.72	-0.04	0.27	0.99	32.88	8.48
S002MC-20	14-15	1	14.5	9.26	9.13	-0.13	0.31	1.01	30.00	8.96
S002MC-21	15-17	2	16	10.04	10.41	0.36	0.23	0.91	33.41	9.81
S002MC-22	17-19	2	18	9.72	10.07	0.35	0.25	0.98	31.49	9.48
S002MC-23	19-21	2	20	9.58	10.85	1.27	0.25	1.02	31.06	9.33
S002MC-24	21-23	2	22	10.45	11.85	1.39	0.26	1.01	29.10	10.19
S002MC-25	23-25	2	24	10.92	11.32	0.39	0.22	0.99	33.52	10.70

Table G.2.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores S008 and S022

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
S008MC-01	0-0.5	0.5	0.25	39.60	42.57	2.97	5.67	4.76	81.46	33.93
S008MC-02	0.5-1	0.5	0.75	39.21	42.13	2.92	5.02	4.34	76.92	34.19
S008MC-03	1-1.5	0.5	1.25	34.63	36.97	2.34	4.57	3.92	72.69	30.06
S008MC-04	1.5-2	0.5	1.75	30.60	32.46	1.86	3.78	3.38	57.10	26.82
S008MC-05	2-2.5	0.5	2.25	28.44	30.04	1.61	3.52	3.18	59.34	24.92
S008MC-06	2.5-3	0.5	2.75	24.92	26.15	1.23	3.09	2.78	57.30	21.83
S008MC-07	3-3.5	0.5	3.25	23.76	24.87	1.11	3.20	2.63	53.18	20.55
S008MC-08	3.5-4	0.5	3.75	20.74	21.55	0.81	1.88	2.35	48.34	18.86
S008MC-09	4-4.5	0.5	4.25	13.28	13.48	0.20	0.89	1.50	37.23	12.39
S008MC-10	4.5-5	0.5	4.75	12.11	12.81	0.70	0.96	1.57	38.75	11.14
S008MC-11	5-6	1	5.5	10.10	10.17	0.07	1.06	1.26	34.28	9.04
S008MC-12	6-7	1	6.5	7.17	7.90	0.73	0.52	1.02	27.65	6.65
S008MC-13	7-8	1	7.5	6.49	6.45	-0.03	0.47	0.87	23.20	6.02
S008MC-14	8-9	1	8.5	6.21	7.32	1.11	0.44	0.80	23.72	5.77
S008MC-15	9-10	1	9.5	4.21	6.97	2.76	0.32	0.66	20.40	3.89
S008MC-16	10-11	1	10.5	3.90	6.39	2.49	0.27	0.55	20.54	3.62
S008MC-17	11-12	1	11.5	3.96	5.92	1.96	0.35	0.57	19.92	3.62
S008MC-18	12-13	1	12.5	4.25	6.31	2.06	0.30	0.57	19.84	3.96
S008MC-19	13-14	1	13.5	3.98	6.54	2.56	0.28	0.58	19.42	3.70
S008MC-20	14-15	1	14.5	4.25	7.25	2.99	0.30	0.58	19.96	3.95
S008MC-21	15-17	2	16	4.32	7.22	2.89	0.28	0.58	19.72	4.04
S008MC-22	17-19	2	18	5.26	10.04	4.78	0.32	0.56	20.37	4.94
S008MC-23	19-21	2	20	4.56	17.36	12.80	0.31	0.53	37.24	4.25
S008MC-24	21-23	2	22	5.60	25.07	19.46	0.35	0.49	35.88	5.25
S008MC-25	23-25	2	24	5.96	22.89	16.93	0.31	0.53	29.47	5.65
S022MC-01	0-0.5	0.5	0.25	18.11	18.16	0.05	1.16	2.41	38.76	16.95
S022MC-02	0.5-1	0.5	0.75	15.65	18.09	2.43	1.05	2.40	43.08	14.60
S022MC-03	1-1.5	0.5	1.25	16.21	16.31	0.10	0.98	2.27	40.35	15.23
S022MC-04	1.5-2	0.5	1.75	12.31	12.54	0.23	0.78	1.69	42.04	11.53
S022MC-05	2-2.5	0.5	2.25	14.85	14.91	0.07	0.61	1.73	45.43	14.23
S022MC-06	2.5-3	0.5	2.75	13.83	16.86	3.03	0.74	1.71	48.10	13.09
S022MC-07	3-3.5	0.5	3.25	18.11	18.11	0.00	1.59	1.72	42.01	16.52
S022MC-08	3.5-4	0.5	3.75	18.50	21.06	2.56	2.00	1.74	41.11	16.50
S022MC-09	4-4.5	0.5	4.25	18.99	20.23	1.23	2.35	1.76	40.90	16.64
S022MC-10	4.5-5	0.5	4.75	20.43	23.58	3.15	2.30	1.93	45.03	18.12
S022MC-11	5-6	1	5.5	20.40	25.26	4.86	2.64	1.85	38.98	17.76
S022MC-12	6-7	1	6.5	17.47	20.77	3.30	2.08	1.70	38.14	15.39
S022MC-13	7-8	1	7.5	14.85	16.81	1.96	1.79	1.62	35.36	13.06
S022MC-14	8-9	1	8.5	16.02	16.03	0.01	1.88	1.64	32.61	14.14
S022MC-15	9-10	1	9.5	14.40	14.71	0.32	1.95	1.64	34.55	12.45
S022MC-16	10-11	1	10.5	12.85	12.86	0.01	1.36	1.61	32.51	11.49
S022MC-17	11-12	1	11.5	12.35	12.46	0.12	1.31	1.49	29.35	11.04
S022MC-18	12-13	1	12.5	11.43	12.17	0.74	1.24	1.47	30.07	10.19
S022MC-19	13-14	1	13.5	12.18	12.14	-0.04	1.03	1.44	32.68	11.15
S022MC-20	14-15	1	14.5	13.41	13.35	-0.06	1.04	1.66	35.44	12.37
S022MC-21	15-17	2	16	12.87	14.75	1.89	1.20	1.75	35.42	11.66
S022MC-22	17-19	2	18	13.04	13.09	0.05	0.89	1.63	36.09	12.15
S022MC-23	19-21	2	20	13.47	13.83	0.36	1.09	1.67	37.18	12.37
S022MC-24	21-23	2	22	12.86	13.24	0.38	1.19	1.59	34.01	11.67
S022MC-25	23-25	2	24	13.46	13.43	-0.03	1.07	1.59	35.64	12.38

Table G.3.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores S019 and S016

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
S019MC-01	0-0.5	0.5	0.25	22.18	23.58	1.40	0.90	3.06	44.98	21.28
S019MC-02	0.5-1	0.5	0.75	19.09	20.60	1.52	0.60	2.52	39.23	18.49
S019MC-03	1-1.5	0.5	1.25	16.71	18.09	1.38	0.42	2.13	46.08	16.29
S019MC-04	1.5-2	0.5	1.75	20.76	21.63	0.87	0.47	2.50	45.91	20.29
S019MC-05	2-2.5	0.5	2.25	26.46	27.09	0.63	0.75	3.07	57.71	25.71
S019MC-06	2.5-3	0.5	2.75	26.95	27.67	0.72	0.71	3.17	60.40	26.23
S019MC-07	3-3.5	0.5	3.25	24.83	26.21	1.38	0.76	2.99	57.15	24.08
S019MC-08	3.5-4	0.5	3.75	23.02	24.48	1.46	0.48	2.90	55.29	22.53
S019MC-09	4-4.5	0.5	4.25	19.30	22.53	3.23	0.52	2.83	51.84	18.78
S019MC-10	4.5-5	0.5	4.75	20.27	20.88	0.61	0.41	2.64	51.03	19.85
S019MC-11	5-6	1	5.5	17.30	20.36	3.06	0.44	2.61	53.37	16.87
S019MC-12	6-7	1	6.5	17.68	18.93	1.25	0.40	2.39	54.86	17.28
S019MC-13	7-8	1	7.5	16.50	17.29	0.79	0.36	2.21	42.94	16.14
S019MC-14	8-9	1	8.5	16.08	17.13	1.06	0.40	2.15	43.49	15.67
S019MC-15	9-10	1	9.5	15.90	17.01	1.11	0.40	2.09	44.88	15.50
S019MC-16	10-11	1	10.5	16.11	16.87	0.76	0.40	2.09	44.00	15.70
S019MC-17	11-12	1	11.5	16.66	17.08	0.42	0.42	2.10	39.81	16.23
S019MC-18	12-13	1	12.5	15.34	15.92	0.58	0.45	1.95	37.90	14.89
S019MC-19	13-14	1	13.5	13.03	13.27	0.24	0.37	1.71	35.05	12.65
S019MC-20	14-15	1	14.5	12.03	12.42	0.40	0.35	1.58	34.11	11.67
S019MC-21	15-17	2	16	11.10	11.54	0.45	0.31	1.52	33.82	10.79
S019MC-22	17-19	2	18	11.01	11.50	0.49	0.29	1.49	33.21	10.72
S019MC-23	19-21	2	20	11.13	11.65	0.53	0.29	1.33	39.15	10.84
S019MC-24	21-23	2	22	13.08	14.99	1.92	0.63	1.72	33.62	12.45
S019MC-25	23-25	2	24	14.08	14.78	0.70	0.51	1.69	35.33	13.57
S016MC-01	0-0.5	0.5	0.25	31.57	35.23	3.66	1.48	4.98	65.21	30.09
S016MC-02	0.5-1	0.5	0.75	30.38	32.56	2.18	1.33	4.57	65.49	29.05
S016MC-03	1-1.5	0.5	1.25	26.02	29.32	3.31	0.84	4.13	61.91	25.18
S016MC-04	1.5-2	0.5	1.75	27.19	29.42	2.23	1.38	4.03	61.34	25.80
S016MC-05	2-2.5	0.5	2.25	18.94	22.17	3.24	0.65	2.99	51.02	18.29
S016MC-06	2.5-3	0.5	2.75	17.85	20.85	3.00	1.25	2.25	34.64	16.60
S016MC-07	3-3.5	0.5	3.25	10.60	17.54	6.94	0.46	1.50	24.51	10.13
S016MC-08	3.5-4	0.5	3.75	13.24	15.58	2.34	0.34	1.54	34.16	12.90
S016MC-09	4-4.5	0.5	4.25	8.37	17.52	9.15	0.32	1.14	24.37	8.05
S016MC-10	4.5-5	0.5	4.75	8.74	19.82	11.09	0.39	1.06	25.62	8.34
S016MC-11	5-6	1	5.5	8.85	18.55	9.70	0.44	1.05	22.72	8.41
S016MC-12	6-7	1	6.5	9.66	17.15	7.49	0.82	1.15	25.80	8.84
S016MC-13	7-8	1	7.5	9.42	16.94	7.53	0.40	1.17	28.77	9.02
S016MC-14	8-9	1	8.5	9.39	19.46	10.06	0.00	1.11	25.72	9.39
S016MC-15	9-10	1	9.5	8.74	19.40	10.66	0.32	1.00	24.63	8.42
S016MC-16	10-11	1	10.5	8.45	18.03	9.58	0.32	1.00	25.92	8.13
S016MC-17	11-12	1	11.5	10.52	17.07	6.54	0.36	1.18	29.83	10.16
S016MC-18	12-13	1	12.5	7.70	19.53	11.83	0.33	0.80	23.22	7.37
S016MC-19	13-14	1	13.5	9.64	18.54	8.90	0.37	1.08	28.23	9.27
S016MC-20	14-15	1	14.5	9.36	18.95	9.59	0.41	1.06	27.04	8.95
S016MC-21	15-17	2	16	8.84	17.91	9.07	0.46	0.97	25.50	8.39
S016MC-22	17-19	2	18	7.97	17.61	9.64	0.34	0.87	23.07	7.63
S016MC-23	19-21	2	20	9.80	17.50	7.71	0.58	1.13	27.27	9.22
S016MC-24	21-23	2	22	9.54	16.63	7.09	0.69	1.11	25.23	8.85
S016MC-25	23-25	2	24	9.71	17.95	8.24	0.69	1.06	24.28	9.02

Table G.4.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores S011 and S012

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
S011MC-01	0-0.5	0.5	0.25	35.13	38.44	3.32	2.09	3.81	76.18	33.03
S011MC-02	0.5-1	0.5	0.75	33.91	37.75	3.84	1.33	3.61	79.53	32.58
S011MC-03	1-1.5	0.5	1.25	32.75	36.00	3.25	1.07	3.43	76.43	31.68
S011MC-04	1.5-2	0.5	1.75	31.28	35.02	3.74	1.04	3.19	74.64	30.23
S011MC-05	2-2.5	0.5	2.25	30.39	34.08	3.69	1.16	3.08	70.85	29.22
S011MC-06	2.5-3	0.5	2.75	29.59	32.22	2.63	1.33	2.81	66.98	28.25
S011MC-07	3-3.5	0.5	3.25	23.36	32.09	8.73	0.88	2.10	55.90	22.48
S011MC-08	3.5-4	0.5	3.75	21.46	31.95	10.50	0.61	1.88	55.45	20.85
S011MC-09	4-4.5	0.5	4.25	19.20	31.81	12.62	0.44	1.68	49.90	18.75
S011MC-10	4.5-5	0.5	4.75	17.81	31.66	13.86	0.42	1.52	45.58	17.39
S011MC-11	5-6	1	5.5	16.39	31.51	15.12	0.43	1.45	40.31	15.96
S011MC-12	6-7	1	6.5	15.65	31.35	15.70	0.80	1.31	37.87	14.85
S011MC-13	7-8	1	7.5	13.48	31.18	17.69	0.60	1.12	31.88	12.88
S011MC-14	8-9	1	8.5	13.04	30.99	17.95	0.55	1.17	35.00	12.49
S011MC-15	9-10	1	9.5	12.37	30.80	18.43	0.49	1.08	33.77	11.88
S011MC-16	10-11	1	10.5	11.25	30.58	19.33	0.52	0.95	30.53	10.73
S011MC-17	11-12	1	11.5	11.25	30.35	19.09	0.55	0.95	27.41	10.70
S011MC-18	12-13	1	12.5	10.71	30.08	19.37	0.59	0.90	24.53	10.12
S011MC-19	13-14	1	13.5	10.18	29.76	19.58	0.58	0.85	26.95	9.60
S011MC-20	14-15	1	14.5	10.50	28.35	17.84	0.47	1.76	30.56	9.31
S011MC-21	15-17	2	16	10.15	29.38	19.23	0.42	0.82	33.11	8.96
S011MC-22	17-19	2	18	11.31	28.93	17.63	0.47	1.02	29.58	8.53
S011MC-23	19-21	2	20	12.63	29.56	16.93	0.70	1.14	30.24	7.94
S011MC-24	21-23	2	22	12.39	32.70	20.32	0.71	1.10	33.73	7.57
S011MC-25	23-25	2	24	11.94	28.12	16.17	0.48	1.03	31.58	7.45
S012MC-01	0-0.5	0.5	0.25	37.85	39.14	1.29	0.55	5.02	78.26	37.30
S012MC-02	0.5-1	0.5	0.75	36.55	36.82	0.27	0.46	4.69	77.98	36.09
S012MC-03	1-1.5	0.5	1.25	34.93	37.71	2.78	0.44	4.37	76.38	34.49
S012MC-04	1.5-2	0.5	1.75	34.05	35.92	1.88	0.40	4.12	76.61	33.65
S012MC-05	2-2.5	0.5	2.25	33.17	35.27	2.10	0.49	3.95	73.36	32.68
S012MC-06	2.5-3	0.5	2.75	32.34	33.46	1.12	0.55	3.79	68.65	31.79
S012MC-07	3-3.5	0.5	3.25	30.77	32.22	1.46	0.51	3.57	67.62	30.26
S012MC-08	3.5-4	0.5	3.75	30.37	31.17	0.80	0.42	3.49	69.63	29.95
S012MC-09	4-4.5	0.5	4.25	27.56	29.43	1.87	0.31	3.09	67.35	27.25
S012MC-10	4.5-5	0.5	4.75	26.30	27.30	0.99	0.32	3.22	67.22	25.98
S012MC-11	5-6	1	5.5	25.05	26.54	1.48	0.49	3.09	47.97	24.57
S012MC-12	6-7	1	6.5	19.98	24.14	4.16	0.33	2.51	58.78	19.65
S012MC-13	7-8	1	7.5	22.55	23.33	0.78	0.32	2.86	57.23	22.23
S012MC-14	8-9	1	8.5	22.09	22.45	0.36	0.26	2.78	59.16	21.83
S012MC-15	9-10	1	9.5	21.05	21.87	0.82	0.30	2.61	57.80	20.74
S012MC-16	10-11	1	10.5	19.62	20.54	0.92	0.30	2.40	56.34	19.32
S012MC-17	11-12	1	11.5	18.93	19.19	0.26	0.34	2.33	53.55	18.59
S012MC-18	12-13	1	12.5	19.53	20.29	0.75	0.40	2.35	50.77	19.14
S012MC-19	13-14	1	13.5	19.40	20.95	1.55	0.45	2.28	48.95	18.95
S012MC-20	14-15	1	14.5	19.29	20.61	1.32	0.37	2.23	51.75	18.92
S012MC-21	15-17	2	16	19.82	20.74	0.92	0.42	2.29	52.63	19.40
S012MC-22	17-19	2	18	20.64	22.58	1.94	0.33	2.34	52.99	20.32
S012MC-23	19-21	2	20	19.33	19.62	0.29	0.36	2.15	51.58	18.97
S012MC-24	21-23	2	22	18.08	18.77	0.68	0.53	2.26	47.07	17.56
S012MC-25	23-25	2	24	17.60	18.21	0.61	0.45	2.21	46.91	17.15

Table G.5.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the core S114

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
2011-S114MC										
S114MC-01	0-0.5	0.5	0.25	10.24	12.02	1.78	0.53	3.63	21.59	9.71
S114MC-02	0.5-1	0.5	0.75	4.44	6.20	1.77	0.30	2.66	15.13	4.14
S114MC-03	1-1.5	0.5	1.25	3.51	6.84	3.33	0.30	2.74	16.62	3.21
S114MC-04	1.5-2	0.5	1.75	5.68	8.46	2.79	0.27	2.17	18.46	5.40
S114MC-05	2-2.5	0.5	2.25	3.87	5.65	1.78	0.29	2.41	10.82	3.58
S114MC-06	2.5-3	0.5	2.75	4.76	5.85	1.10	0.25	2.12	9.09	4.51
S114MC-07	3-3.5	0.5	3.25	3.53	5.97	2.43	0.27	2.00	10.41	3.27
S114MC-08	3.5-4	0.5	3.75	4.41	5.43	1.03	0.26	1.95	13.50	4.15
S114MC-09	4-4.5	0.5	4.25	4.98	6.23	1.25	0.26	1.95	15.72	4.72
S114MC-10	4.5-5	0.5	4.75	5.68	6.44	0.77	0.24	1.87	17.76	5.43
S114MC-11	5-6	1	5.5	5.18	7.08	1.90	0.27	1.84	17.06	4.91
S114MC-12	6-7	1	6.5	4.13	5.61	1.49	0.32	1.65	19.92	3.81
S114MC-13	7-8	1	7.5	3.39	5.24	1.85	0.25	1.53	12.26	3.14
S114MC-14	8-9	1	8.5	2.59	4.30	1.71	0.30	1.37	8.84	2.29
S114MC-15	9-10	1	9.5	2.88	4.39	1.51	0.24	0.94	11.63	2.64
S114MC-16	10-11	1	10.5	3.46	4.63	1.16	0.22	0.77	11.55	3.24
S114MC-17	11-12	1	11.5	3.05	3.43	0.38	0.31	0.72	12.07	2.74
S114MC-18	12-13	1	12.5	2.75	3.70	0.95	0.21	0.67	10.36	2.54
S114MC-19	13-14	1	13.5	2.25	3.43	1.19	0.26	0.65	10.81	1.99
S114MC-20	14-15	1	14.5	2.93	3.77	0.84	0.30	0.63	11.89	2.63
S114MC-21	15-17	2	16	3.17	4.30	1.12	0.35	0.64	13.13	2.82
S114MC-22	17-19	2	18	3.22	3.86	0.64	0.24	0.63	13.15	2.98
S114MC-23	19-21	2	20	2.57	3.03	0.46	0.28	0.46	12.54	2.28
S114MC-24	21-23	2	22	4.19	4.80	0.61	0.32	0.45	15.58	3.87
S114MC-25	23-25	2	24	3.43	3.77	0.34	0.26	0.32	12.81	3.17

Table G.6.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the ponar grabs of Lake Superior

Sample ID	OC (mg/g)	TC (mg/g)	IC (mg/g)	BC (mg/g)	TN (mg/g)	OM (mg/g)	NBOC (mg/g)
PonarGrabs							
S001PG	2.27	3.63	1.36	0.21	0.75	7.56	2.07
S002PG	6.93	12.31	5.38	0.24	2.01	26.14	6.69
S008PG	9.96	10.64	0.67	0.38	1.38	28.35	9.59
S011PG	21.48	21.82	0.34	0.46	3.14	54.06	21.02
S012PG	21.22	22.80	1.58	0.50	3.28	50.40	20.72
S016PG	12.42	14.32	1.90	0.57	2.42	34.01	11.86
S019PG	17.06	18.24	1.18	0.40	2.81	46.99	16.66
S022PG	16.42	18.39	1.97	0.81	1.98	35.52	15.61
S102PG	2.42	3.29	0.87	0.25	0.64	15.04	2.17
S103PG	8.93	15.08	6.15	0.28	2.06	26.88	8.65
S104PG	15.26	16.33	1.07	0.31	2.74	43.73	14.95
S105PG	2.40	2.97	0.57	0.18	0.56	27.54	2.21
S106PG	17.06	23.29	6.24	0.89	3.13	52.02	16.16
S108PG	16.24	17.66	1.42	0.36	2.95	47.56	15.88
S110PG	1.48	1.82	0.34	0.16	0.25	5.47	1.32
S112PG	18.60	19.54	0.94	0.35	2.82	49.59	18.25
S113PG	18.39	19.49	1.09	0.43	2.82	45.33	17.96
S114PG	3.08	3.61	0.53	0.22	0.69	14.92	2.86
S116PG	23.30	23.88	0.58	0.52	3.22	51.83	22.78
S117PG	21.65	22.53	0.88	0.47	3.38	52.86	21.18
S118PG	7.54	8.27	0.73	0.38	1.23	27.58	7.16
S119PG	16.29	16.98	0.69	0.40	2.60	48.39	15.89
S120PG	9.81	9.90	0.08	0.27	1.33	30.82	9.54
S121PG	12.23	12.46	0.23	0.47	1.86	21.62	11.76

Table G.7.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores H001 and H006

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
H001MC-01	0-1	1	0.5	64.73	74.64	9.90	4.40	7.97	103.70	60.34
H001MC-02	1-2	1	1.5	63.34	74.66	11.32	4.59	7.64	106.35	58.75
H001MC-03	2-3	1	2.5	60.43	69.57	9.14	5.49	6.94	95.44	54.94
H001MC-04	3-4	1	3.5	59.65	69.60	9.95	6.04	6.98	94.04	53.61
H001MC-05	4-5	1	4.5	58.58	68.92	10.34	5.86	6.96	95.38	52.72
H001MC-06	5-6	1	5.5	56.40	66.37	9.98	4.24	6.45	93.59	52.15
H001MC-07	6-7	1	6.5	56.58	66.27	9.69	4.43	6.68	95.64	52.15
H001MC-08	7-8	1	7.5	58.17	65.62	7.45	5.08	6.74	98.17	53.09
H001MC-09	8-9	1	8.5	57.05	64.23	7.18	4.92	6.63	96.20	52.13
H001MC-10	9-10	1	9.5	57.12	64.90	7.78	4.68	6.54	93.81	52.43
H001MC-11	10-11	1	10.5	55.49	62.45	6.95	2.97	6.43	94.43	52.53
H001MC-12	11-12	1	11.5	53.06	61.43	8.37	3.41	6.14	97.04	49.65
H001MC-13	12-13	1	12.5	53.84	62.37	8.54	3.50	6.50	94.85	50.34
H001MC-14	13-14	1	13.5	51.32	62.21	10.89	3.70	6.23	87.05	47.61
H001MC-15	14-15	1	14.5	52.86	60.81	7.95	3.74	5.88	87.72	49.12
H001MC-16	15-17	2	16.5	52.80	61.08	8.29	4.08	6.02	83.23	48.72
H001MC-17	17-19	2	18.5	52.65	58.67	6.02	4.21	5.42	79.78	48.43
H001MC-18	19-21	2	20.5	51.31	56.78	5.47	3.66	5.46	80.55	47.65
H001MC-19	21-23	2	22.5	51.39	57.87	6.48	3.75	5.45	81.92	47.64
H001MC-20	23-25	2	24.5	51.13	58.06	6.93	4.18	5.48	81.29	46.95
H001MC-21	25-27	2	26.5	49.88	57.48	7.61	5.22	5.35	76.85	44.66
H001MC-22	27-29	2	28.5	48.22	56.59	8.38	5.13	5.40	77.45	43.08
H001MC-23	29-31	2	30.5	49.03	54.84	5.80	4.72	5.12	75.41	44.31
H001MC-24	31-33	2	32.5	46.80	53.32	6.53	5.34	5.03	74.55	41.45
H006MC-01	0-1	1	0.5	41.18	45.38	4.20	1.50	6.10	98.90	39.69
H006MC-02	1-2	1	1.5	42.61	44.75	2.13	1.89	6.20	101.23	40.73
H006MC-03	2-3	1	2.5	39.51	42.13	2.62	2.49	5.90	81.96	37.02
H006MC-04	3-4	1	3.5	38.19	41.03	2.84	3.23	5.65	80.48	34.96
H006MC-05	4-5	1	4.5	38.24	38.55	0.31	3.29	5.22	73.60	34.96
H006MC-06	5-6	1	5.5	33.60	39.40	5.80	3.05	5.14	73.35	30.55
H006MC-07	6-7	1	6.5	36.54	37.31	0.77	3.20	4.87	70.21	33.33
H006MC-08	7-8	1	7.5	32.73	38.70	5.97	3.21	4.71	68.27	29.52
H006MC-09	8-9	1	8.5	32.17	35.37	3.20	2.97	4.54	62.74	29.21
H006MC-10	9-10	1	9.5	29.83	35.33	5.50	3.11	4.29	62.75	26.71
H006MC-11	10-11	1	10.5	25.11	31.11	5.99	2.48	3.85	55.01	22.64
H006MC-12	11-12	1	11.5	26.62	30.39	3.77	2.44	3.45	56.83	24.18
H006MC-13	12-13	1	12.5	21.84	28.83	7.00	2.36	4.05	58.99	19.48
H006MC-14	13-14	1	13.5	29.30	32.04	2.75	2.12	3.87	58.90	27.18
H006MC-15	14-15	1	14.5	27.85	31.75	3.90	2.11	3.84	56.00	25.74
H006MC-16	15-17	2	16.5	30.17	31.17	1.00	1.94	3.94	58.79	28.23
H006MC-17	17-19	2	18.5	29.35	29.99	0.64	2.47	4.13	60.52	26.88
H006MC-18	19-21	2	20.5	29.83	33.33	3.50	2.60	4.35	63.13	27.23
H006MC-19	21-23	2	22.5	30.96	34.57	3.61	2.43	4.29	66.22	28.53
H006MC-20	23-25	2	24.5	32.02	32.97	0.95	2.67	4.46	64.55	29.34
H006MC-21	25-27	2	26.5	31.82	33.01	1.19	2.72	4.38	63.23	29.11
H006MC-22	27-29	2	28.5	30.30	30.74	0.44	2.61	4.28	62.61	27.70
H006MC-23	29-31	2	30.5	32.90	34.64	1.74	2.62	4.54	66.93	30.28
H006MC-24	31-33	2	32.5	32.68	33.54	0.86	2.32	4.53	63.70	30.36
H006MC-25	33-35	2	34.5	29.83	33.51	3.68	3.03	4.67	68.06	26.80

Table G.8.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores H012 and H032

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
H012MC-01	0-1	1	0.5	42.00	48.87	6.87	2.00	5.53	79.55	40.00
H012MC-02	1-2	1	1.5	41.59	46.35	4.76	3.08	5.10	79.25	38.51
H012MC-03	2-3	1	2.5	40.44	44.54	4.10	4.52	5.19	69.93	35.92
H012MC-04	3-4	1	3.5	41.77	43.96	2.19	5.48	5.22	78.24	36.28
H012MC-05	4-5	1	4.5	42.95	44.41	1.46	4.64	5.31	72.28	38.31
H012MC-06	5-6	1	5.5	39.67	41.71	2.04	3.87	5.16	82.60	35.80
H012MC-07	6-7	1	6.5	39.37	42.53	3.16	3.69	5.30	78.87	35.68
H012MC-08	7-8	1	7.5	39.46	41.49	2.03	3.53	4.98	79.30	35.93
H012MC-09	8-9	1	8.5	39.47	41.78	2.31	2.59	5.04	75.60	36.88
H012MC-10	9-10	1	9.5	38.24	40.20	1.96	2.67	4.65	75.52	35.57
H012MC-11	10-11	1	10.5	39.37	40.86	1.49	2.85	4.71	76.01	36.52
H012MC-12	11-12	1	11.5	37.07	41.34	4.26	2.35	4.75	80.31	34.73
H012MC-13	12-13	1	12.5	40.02	40.49	0.47	2.41	4.81	80.12	37.61
H012MC-14	13-14	1	13.5	38.40	40.60	2.20	2.41	4.79	75.01	35.99
H012MC-15	14-15	1	14.5	37.70	41.76	4.05	2.08	4.83	74.41	35.62
H012MC-16	15-17	2	16.5	36.77	40.89	4.11	2.80	4.23	67.35	33.97
H012MC-17	17-19	2	18.5	39.92	41.25	1.33	2.37	4.34	70.59	37.55
H012MC-18	19-21	2	20.5	42.12	42.17	0.04	1.88	4.61	71.99	40.24
H012MC-19	21-23	2	22.5	37.96	41.81	3.86	1.64	4.53	74.76	36.32
H012MC-20	23-25	2	24.5	35.95	39.51	3.55	1.33	4.63	71.74	34.62
H012MC-21	25-27	2	26.5	34.65	38.54	3.89	2.61	4.59	72.61	32.04
H012MC-22	27-29	2	28.5	37.73	41.12	3.39	2.07	4.75	75.67	35.67
H012MC-23	29-31	2	30.5	36.59	37.77	1.18	2.48	4.72	77.69	34.12
H012MC-24	31-33	2	32.5	37.31	37.51	0.21	2.13	4.48	72.41	35.17
H012MC-25	33-35	2	34.5	38.01	38.66	0.66	1.91	4.58	66.67	36.09
H032MC-01	0-1	1	0.5	40.62	44.37	3.76	1.91	5.10	85.53	38.70
H032MC-02	1-2	1	1.5	42.31	43.83	1.52	2.28	5.22	84.64	40.03
H032MC-03	2-3	1	2.5	41.81	42.25	0.44	2.76	5.20	83.92	39.04
H032MC-04	3-4	1	3.5	40.62	40.93	0.31	2.69	5.01	85.86	37.93
H032MC-05	4-5	1	4.5	40.46	40.87	0.41	3.30	5.12	83.68	37.15
H032MC-06	5-6	1	5.5	39.66	41.55	1.89	2.33	5.12	85.26	37.32
H032MC-07	6-7	1	6.5	40.19	40.84	0.66	2.12	4.96	83.27	38.07
H032MC-08	7-8	1	7.5	39.12	40.94	1.82	2.65	4.99	83.90	36.46
H032MC-09	8-9	1	8.5	37.93	40.38	2.45	2.35	4.76	79.30	35.58
H032MC-10	9-10	1	9.5	38.39	41.58	3.20	2.77	4.87	80.13	35.62
H032MC-11	10-11	1	10.5	39.80	41.82	2.02	2.42	4.73	81.35	37.38
H032MC-12	11-12	1	11.5	38.96	42.03	3.06	2.60	4.71	84.51	36.36
H032MC-13	12-13	1	12.5	40.87	41.13	0.26	2.53	4.45	84.87	38.34
H032MC-14	13-14	1	13.5	39.17	41.15	1.98	1.84	4.22	81.66	37.33
H032MC-15	14-15	1	14.5	40.26	41.98	1.72	2.42	4.33	80.67	37.84
H032MC-16	15-17	2	16.5	39.92	42.70	2.78	2.32	4.72	85.82	37.61
H032MC-17	17-19	2	18.5	41.58	46.97	5.39	2.47	5.69	78.34	39.11
H032MC-18	19-21	2	20.5	42.68	45.15	2.47	3.10	4.84	81.92	39.58
H032MC-19	21-23	2	22.5	42.41	44.07	1.66	2.67	5.06	84.99	39.74
H032MC-20	23-25	2	24.5	40.41	42.21	1.80	2.91	4.80	82.01	37.50
H032MC-21	25-27	2	26.5	40.57	42.17	1.60	3.44	4.92	76.83	37.13
H032MC-22	27-29	2	28.5	39.80	41.70	1.90	3.96	5.08	78.94	35.84
H032MC-23	29-31	2	30.5	39.47	42.10	2.62	4.71	5.06	77.87	34.76
H032MC-24	31-33	2	32.5	39.64	42.54	2.90	5.08	5.28	79.95	34.56
H032MC-25	33-35	2	34.5	38.89	41.10	2.21	4.15	5.11	78.83	34.74

Table G.9.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores H037 and H038

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
H037MC-01	0-1	1	0.5	34.04	37.60	3.57	1.71	4.87	75.87	32.32
H037MC-02	1-2	1	1.5	24.81	26.36	1.55	2.36	3.14	59.23	22.45
H037MC-03	2-3	1	2.5	16.40	16.59	0.19	1.18	2.13	42.59	15.22
H037MC-04	3-4	1	3.5	14.22	14.96	0.74	0.98	1.83	42.21	13.24
H037MC-05	4-5	1	4.5	15.88	17.53	1.65	0.70	2.05	48.11	15.18
H037MC-06	5-6	1	5.5	15.33	16.42	1.08	0.79	1.87	50.49	14.55
H037MC-07	6-7	1	6.5	15.17	17.48	2.31	0.80	2.00	57.87	14.37
H037MC-08	7-8	1	7.5	16.52	17.98	1.46	0.64	2.03	52.84	15.88
H037MC-09	8-9	1	8.5	16.83	17.80	0.97	1.44	2.14	49.10	15.39
H037MC-10	9-10	1	9.5	18.35	18.46	0.11	2.18	2.12	46.99	16.17
H037MC-11	10-11	1	10.5	18.26	19.90	1.64	1.66	2.14	48.46	16.60
H037MC-12	11-12	1	11.5	19.87	21.21	1.34	1.96	2.37	49.95	17.91
H037MC-13	12-13	1	12.5	19.76	21.87	2.11	1.84	2.55	53.00	17.92
H037MC-14	13-14	1	13.5	20.35	22.88	2.53	2.55	2.50	47.51	17.80
H037MC-15	14-15	1	14.5	20.78	21.81	1.03	2.90	2.49	41.59	17.88
H037MC-16	15-17	2	16.5	20.27	21.93	1.66	2.93	2.56	43.84	17.34
H037MC-17	17-19	2	18.5	21.49	22.05	0.55	2.40	2.52	44.61	19.09
H037MC-18	19-21	2	20.5	19.70	22.28	2.58	2.10	2.44	42.45	17.60
H037MC-19	21-23	2	22.5	17.82	19.18	1.36	2.37	2.23	40.86	15.45
H037MC-20	23-25	2	24.5	16.22	19.34	3.12	1.85	2.13	37.78	14.38
H037MC-21	25-27	2	26.5	15.04	15.76	0.72	1.83	1.91	33.07	13.22
H037MC-22	27-29	2	28.5	12.08	14.27	2.19	1.31	1.56	27.73	10.77
H037MC-23	29-31	2	30.5	11.67	12.21	0.54	1.61	1.24	23.04	10.07
H037MC-24	31-33	2	32.5	13.09	17.16	4.07	1.41	1.30	22.88	11.68
H038MC-01	0-0.5	0.5	0.25	34.73	34.80	0.07	2.71	4.25	69.01	32.02
H038MC-02	0.5-1	0.5	0.75	32.40	33.76	1.35	2.68	4.37	69.41	29.72
H038MC-03	1-1.5	0.5	1.25	31.48	31.70	0.21	2.84	4.10	64.20	28.64
H038MC-04	1.5-2	0.5	1.75	26.60	29.50	2.91	2.50	3.79	66.70	24.10
H038MC-05	2-2.5	0.5	2.25	24.79	26.21	1.43	2.38	3.22	58.74	22.41
H038MC-06	2.5-3	0.5	2.75	15.24	19.04	3.81	1.80	2.25	47.89	13.44
H038MC-07	3-3.5	0.5	3.25	12.18	15.50	3.32	1.39	1.40	36.90	10.79
H038MC-08	3.5-4	0.5	3.75	7.08	7.14	0.06	1.35	0.81	30.88	5.73
H038MC-09	4-4.5	0.5	4.25	4.78	6.12	1.34	1.38	0.54	27.95	3.40
H038MC-10	4.5-5	0.5	4.75	4.17	5.50	1.33	1.29	0.51	29.24	2.88
H038MC-11	5-6	1	5.75	4.38	5.15	0.77	1.34	0.58	27.92	3.04
H038MC-12	6-7	1	6.75	4.81	5.61	0.80	1.39	0.49	30.32	3.42
H038MC-13	7-8	1	7.75	6.15	6.37	0.22	1.47	0.55	29.76	4.68
H038MC-14	8-9	1	8.75	5.66	6.06	0.40	1.19	0.46	21.04	4.48
H038MC-15	9-10	1	9.75	5.96	6.14	0.17	1.46	0.31	20.12	4.51
H038MC-16	10-11	1	10.75	5.86	8.34	2.48	1.78	0.39	20.58	4.09
H038MC-17	11-12	1	11.75	5.68	6.24	0.56	1.90	0.33	22.86	3.78
H038MC-18	12-13	1	12.75	5.66	5.90	0.24	1.47	0.34	22.72	4.19
H038MC-19	13-14	1	13.75	4.07	6.16	2.10	1.61	0.32	24.71	2.45
H038MC-20	14-15	1	14.75	5.38	5.74	0.36	1.71	0.42	25.51	3.66
H038MC-21	15-17	2	16.75	3.66	5.68	2.02	1.37	0.41	27.59	2.29
H038MC-22	17-19	2	18.75	4.02	6.17	2.15	1.51	0.40	26.11	2.52
H038MC-23	19-21	2	20.75	4.81	5.97	1.16	1.52	0.66	28.27	3.29
H038MC-24	21-23	2	22.75	5.18	6.44	1.25	1.47	0.71	27.73	3.72
H038MC-25	23-25	2	24.75	5.50	6.93	1.43	1.70	0.69	26.83	3.80

Table G.10.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores H048 and H048-A

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
H048MC-01	0-1	1	0.5	23.95	32.61	0.06	2.12	3.88	68.79	21.83
H048MC-02	1-2	1	1.5	26.61	31.29	1.10	1.83	4.02	76.93	24.78
H048MC-03	2-3	1	2.5	18.77	30.39	1.05	2.67	3.27	68.39	16.10
H048MC-04	3-4	1	3.5	26.19	30.56	1.05	4.94	3.97	66.03	21.25
H048MC-05	4-5	1	4.5	20.41	31.17	0.95	4.50	3.40	62.40	15.91
H048MC-06	5-6	1	5.5	26.28	30.18	1.07	4.30	3.69	62.96	21.98
H048MC-07	6-7	1	6.5	20.33	31.08	0.58	3.97	3.13	62.63	16.36
H048MC-08	7-8	1	7.5	23.93	28.26	4.59	4.20	3.37	62.56	19.73
H048MC-09	8-9	1	8.5	15.85	32.25	7.23	5.24	2.63	60.21	10.61
H048MC-10	9-10	1	9.5	15.80	15.94	1.88	3.17	2.83	60.01	12.64
H048MC-11	10-11	1	10.5	12.14	5.84	0.10	3.17	2.41	56.92	8.97
H048MC-12	11-12	1	11.5	13.67	2.14	0.70	2.61	2.58	54.69	11.06
H048MC-13	12-13	1	12.5	11.06	1.91	0.38	1.32	2.06	56.49	9.74
H048MC-14	13-14	1	13.5	13.36	1.86	0.36	1.75	2.19	58.82	11.61
H048MC-15	14-15	1	14.5	17.30	1.87	0.43	1.31	2.31	57.43	15.99
H048MC-16	15-17	2	16.5	15.47	1.93	0.48	1.67	2.39	51.55	13.80
H048MC-17	17-19	2	18.5	17.90	1.94	0.49	1.82	2.51	47.14	16.07
H048MC-18	19-21	2	20.5	13.71	1.92	0.35	2.80	2.30	42.93	10.92
H048MC-19	21-23	2	22.5	14.33	1.95	0.41	2.65	2.11	41.87	11.67
H048MC-20	23-25	2	24.5	13.16	2.17	0.41	2.58	2.25	43.12	10.58
H048MC-21	25-27	2	26.5	15.82	2.68	0.44	3.46	2.41	40.76	12.36
H048MC-22	27-29	2	28.5	12.61	5.79	3.61	3.34	2.30	38.16	9.27
H048MC-23	29-31	2	30.5	13.22	8.63	6.05	2.60	2.09	39.73	10.62
H048MC-24	31-33	2	32.5	10.90	10.38	7.92	2.82	1.97	37.71	8.08
H048MC-25	33-35	2	34.5	11.13	11.36	8.54	2.45	1.83	38.56	8.68
H048AMC-01	0-1	1	0.5	32.55	31.71	7.76	1.61	4.51	69.89	30.94
H048AMC-02	1-2	1	1.5	30.19	29.15	2.55	2.33	4.30	72.29	27.85
H048AMC-03	2-3	1	2.5	29.34	28.53	9.76	2.38	4.16	68.94	26.96
H048AMC-04	3-4	1	3.5	29.51	29.26	3.08	3.78	3.93	71.37	25.73
H048AMC-05	4-5	1	4.5	30.22	28.86	8.45	5.36	3.81	64.83	24.87
H048AMC-06	5-6	1	5.5	29.11	31.59	5.31	5.90	3.56	63.30	23.21
H048AMC-07	6-7	1	6.5	30.50	31.26	10.92	5.92	3.50	61.29	24.58
H048AMC-08	7-8	1	7.5	23.66	31.16	7.23	5.58	3.28	61.97	18.08
H048AMC-09	8-9	1	8.5	25.02	28.11	12.25	4.66	2.94	51.32	20.36
H048AMC-10	9-10	1	9.5	14.06	24.82	9.02	2.75	1.71	39.47	11.31
H048AMC-11	10-11	1	10.5	5.73	21.40	9.26	1.71	0.78	27.61	4.02
H048AMC-12	11-12	1	11.5	1.44	20.35	6.69	1.18	0.25	24.96	0.26
H048AMC-13	12-13	1	12.5	1.53	18.41	7.35	1.24	0.28	24.61	0.30
H048AMC-14	13-14	1	13.5	1.50	16.89	3.53	1.23	0.27	18.57	0.27
H048AMC-15	14-15	1	14.5	1.43	17.40	0.11	1.23	0.26	15.16	0.20
H048AMC-16	15-17	2	16.5	1.45	19.11	3.64	1.44	0.29	20.34	0.02
H048AMC-17	17-19	2	18.5	1.46	19.28	1.38	1.58	0.28	20.11	-0.12
H048AMC-18	19-21	2	20.5	1.57	17.52	3.80	1.31	0.33	20.09	0.26
H048AMC-19	21-23	2	22.5	1.54	16.64	2.31	1.41	0.29	18.88	0.14
H048AMC-20	23-25	2	24.5	1.76	18.15	4.99	1.57	0.31	20.11	0.18
H048AMC-21	25-27	2	26.5	2.24	18.65	2.83	1.32	0.29	19.12	0.92
H048AMC-22	27-29	2	28.5	2.17	18.02	5.41	1.53	0.30	20.23	0.65
H048AMC-23	29-31	2	30.5	2.58	16.18	2.96	1.40	0.29	19.63	1.18
H048AMC-24	31-33	2	32.5	2.45	14.70	3.80	1.51	0.31	18.88	0.94
H048AMC-25	33-35	2	34.5	2.82	14.49	3.36	1.33	0.29	19.36	1.49

Table G.11.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores H061 and H095

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
H061MC-01	0-0.5	0.5	0.25	36.03	36.54	0.52	3.00	6.20	74.25	33.03
H061MC-02	0.5-1	0.5	0.75	34.00	34.44	0.44	2.21	5.01	76.00	31.78
H061MC-03	1-1.5	0.5	1.25	31.32	33.07	1.75	2.50	4.07	69.86	28.82
H061MC-04	1.5-2	0.5	1.75	27.05	27.85	0.80	2.49	3.34	65.89	24.56
H061MC-05	2-2.5	0.5	2.25	16.50	20.38	3.88	0.75	2.49	47.17	15.75
H061MC-06	2.5-3	0.5	2.75	15.07	16.02	0.95	1.99	1.72	42.03	13.08
H061MC-07	3-3.5	0.5	3.25	8.69	9.16	0.46	1.40	0.89	26.31	7.29
H061MC-08	3.5-4	0.5	3.75	7.16	8.16	1.00	1.29	0.67	26.19	5.87
H061MC-09	4-4.5	0.5	4.25	6.85	9.16	2.31	1.19	0.65	26.08	5.66
H061MC-10	4.5-5	0.5	4.75	5.52	6.47	0.95	1.05	0.40	26.79	4.47
H061MC-11	5-6	1	5.75	6.61	7.85	1.24	1.19	0.64	27.86	5.42
H061MC-12	6--7	1	6.75	6.77	8.42	1.65	1.46	0.57	30.56	5.31
H061MC-13	7-8	1	7.75	7.20	8.89	1.69	1.32	0.73	31.83	5.89
H061MC-14	8-9	1	8.75	5.70	7.99	2.29	1.23	0.35	21.64	4.47
H061MC-15	9-10	1	9.75	5.04	4.69	3.92	1.18	0.35	20.73	3.85
H061MC-16	10-11	1	10.75	4.76	7.64	2.88	1.36	0.26	20.78	3.40
H061MC-17	11-12	1	11.75	4.94	6.31	1.37	1.28	0.34	23.23	3.65
H061MC-18	12-13	1	12.75	5.74	6.20	0.47	1.36	0.67	26.67	4.38
H061MC-19	13-14	1	13.75	4.05	4.48	0.43	1.19	0.40	24.61	2.85
H061MC-20	14-15	1	14.75	4.99	5.02	0.02	1.16	0.52	26.82	3.84
H061MC-21	15-17	2	16.75	2.92	3.31	0.39	1.26	0.25	24.92	1.66
H061MC-22	17-19	2	18.75	2.80	3.69	0.89	1.25	0.27	27.58	1.55
H061MC-23	19-21	2	20.75	2.93	3.32	0.39	1.40	0.27	33.12	1.53
H061MC-24	21-23	2	22.75	3.60	3.83	0.23	1.30	0.31	28.77	2.30
H061MC-25	23-25	2	24.75	2.90	3.39	0.49	1.30	0.15	25.01	1.61
H095MC-01	0-1	1	0.5	30.88	34.97	4.08	1.28	5.15	98.93	29.60
H095MC-02	1-2	1	1.5	19.86	30.24	10.38	1.18	3.24	87.60	18.69
H095MC-03	2-3	1	2.5	22.98	30.25	7.26	1.36	3.60	70.49	21.62
H095MC-04	3-4	1	3.5	15.50	33.05	17.55	1.23	2.48	60.12	14.27
H095MC-05	4-5	1	4.5	13.55	18.13	4.57	0.82	2.01	41.72	12.73
H095MC-06	5-6	1	5.5	9.18	11.88	2.69	0.44	1.30	29.33	8.74
H095MC-07	6-7	1	6.5	8.46	12.49	4.03	0.44	1.28	30.50	8.02
H095MC-08	7-8	1	7.5	10.91	11.95	1.04	0.40	1.70	32.52	10.51
H095MC-09	8-9	1	8.5	7.13	10.35	3.22	0.36	1.09	27.46	6.78
H095MC-10	9-10	1	9.5	10.96	15.64	4.68	0.52	1.85	37.49	10.44
H095MC-11	10-11	1	10.5	15.48	16.86	1.37	0.59	2.13	40.55	14.89
H095MC-12	11-12	1	11.5	13.01	18.55	5.55	0.51	2.01	37.59	12.50
H095MC-13	12-13	1	12.5	14.66	15.67	1.01	0.81	2.00	40.17	13.85
H095MC-14	13-14	1	13.5	13.76	15.15	1.39	0.90	2.13	35.74	12.86
H095MC-15	14-15	1	14.5	12.49	13.66	1.16	1.01	1.85	28.25	11.49
H095MC-16	15-17	2	16.5	8.14	12.19	4.05	0.75	1.16	24.37	7.39
H095MC-17	17-19	2	18.5	9.64	11.65	2.01	0.67	1.21	23.38	8.97
H095MC-18	19-21	2	20.5	9.73	12.95	3.22	0.79	1.45	27.34	8.94
H095MC-19	21-23	2	22.5	12.84	15.73	2.89	1.02	1.64	33.46	11.82
H095MC-20	23-25	2	24.5	9.83	15.14	5.31	0.97	1.46	27.53	8.86
H095MC-21	25-27	2	26.5	10.21	12.28	2.08	0.74	0.90	15.46	9.46
H095MC-22	27-29	2	28.5	16.44	16.52	0.08	1.28	1.37	26.38	15.16
H095MC-23	29-31	2	30.5	14.66	15.82	1.16	1.18	1.11	18.28	13.49
H095MC-24	31-33	2	32.5	12.65	14.35	1.71	1.11	1.51	20.69	11.54
H095MC-25	33-35	2	34.5	12.60	13.87	1.27	1.24	1.44	23.00	11.36

Table G.12.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the ponar grabs of Lake Huron

Sample ID	OC (mg/g)	TC (mg/g)	IC (mg/g)	BC (mg/g)	TN (mg/g)	OM (mg/g)	NBOC (mg/g)
H001PG	51.68	58.49	6.81	7.38	5.51	80.24	44.30
H002PG	0.57	0.58	0.01	0.07	0.31	1.61	0.56
H006PG	32.75	33.16	0.41	5.01	3.84	55.90	27.74
H012PG	36.94	41.41	4.47	5.10	4.34	63.04	31.84
H027PG	3.50	3.54	0.05	0.33	0.39	8.85	3.17
H032PG	3.63	38.29	34.66	0.64	0.44	63.72	2.99
H037PG	12.85	16.68	3.83	2.99	1.68	29.95	9.86
H038PG	7.38	9.70	2.33	0.91	1.12	25.05	6.47
H048PG	5.14	13.83	8.69	1.31	0.36	14.93	3.83
H054PG	23.04	30.72	7.68	4.95	3.26	62.32	18.09
H061PG	7.60	9.00	1.40	1.07	1.03	24.72	6.53
H095PG	21.13	23.09	1.96	3.59	2.83	45.65	17.54
H101PG	5.47	9.05	3.58	1.69	0.89	11.30	3.78
H102PG	14.08	16.74	2.66	1.83	1.67	23.95	12.25
H103PG	35.77	40.46	4.70	6.06	4.04	59.28	29.71
H104PG	13.61	14.99	1.38	1.37	1.78	31.99	12.24
H107PG	1.20	1.60	0.40	0.75	0.14	3.95	0.45
H108PG	2.99	3.83	0.84	0.75	0.36	6.92	2.24
H109PG	4.30	8.43	4.13	1.48	0.74	13.44	2.82
H110PG	23.34	33.53	10.18	3.15	2.24	36.20	20.20
H118PG	4.30	5.74	1.44	1.03	0.43	8.28	3.27
H119PG	3.80	5.07	1.26	0.87	0.52	18.63	2.94
H121PG	1.88	2.01	0.13	0.68	0.24	5.81	1.20
H123PG	3.87	4.56	0.69	1.07	0.23	26.25	2.80
H124PG	28.50	31.35	2.85	4.94	2.58	43.31	23.56
TB001	4.23	4.44	0.21	0.81	0.40	8.85	3.43
TB002	1.84	4.12	2.28	0.84	0.19	4.11	1.01
TB003	0.58	0.64	0.06	0.12	0.38	1.45	0.54
TB004	1.90	5.91	4.02	0.74	0.15	3.60	1.16
NC68PG	5.47	9.54	4.06	0.91	0.68	17.77	4.57
NC70PG	16.75	21.31	4.56	2.89	2.24	44.85	13.86
NC71PG	21.43	22.08	0.66	2.61	3.28	61.10	18.81
NC73PG	1.51	2.24	0.72	0.98	0.28	5.50	0.53
NC76PG	28.52	31.13	2.61	3.38	4.03	67.00	25.14
NC77PG	34.40	35.10	0.70	5.56	4.20	60.71	28.84
NC79PG	17.25	24.66	7.41	3.66	2.30	49.82	13.58
NC82PG	19.78	20.27	0.49	2.19	2.76	41.63	17.59
NC83PG	14.67	15.48	0.81	1.20	1.87	46.61	13.47
NC84PG	7.59	7.99	0.40	0.64	1.08	30.63	6.95
NC87PG	2.39	2.52	0.13	1.22	0.34	13.64	1.17
NC88PG	25.04	26.68	1.64	3.67	3.42	53.12	21.36
NC89PG	1.85	19.12	17.26	2.62	2.84	49.52	-0.76
GB01PG	17.99	22.35	4.36	1.74	2.55	41.38	16.24
GB03PG	3.76	5.45	1.69	0.85	0.28	8.19	2.90
GB04PG	20.50	22.07	1.58	2.11	2.46	38.40	18.39
GB05PG	5.53	8.10	2.57	1.39	0.72	14.47	4.14
GB06PG	23.19	23.72	0.53	2.67	3.36	48.41	20.52
GB09PG	33.88	40.28	6.40	2.19	4.33	67.65	31.69
GB12PG	15.10	18.14	3.05	1.26	2.01	42.00	13.84
GB17PG	22.89	24.78	1.89	1.83	3.06	56.84	21.05
GB24PG	3.10	4.08	0.98	0.90	0.41	9.15	2.20
GB29PG	2.49	3.49	1.00	1.05	0.35	15.45	1.44
GB35PG	4.01	5.03	1.01	1.08	0.45	11.65	2.94
GB36PG	6.67	8.04	1.38	1.08	0.66	19.15	5.59
GB39PG	1.12	1.87	0.75	0.89	0.20	6.73	0.23
GB42PG	24.13	24.97	0.83	2.25	3.56	61.58	21.88

Table G.13.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores ON02 and ON06

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
ON02MC-01	0-1	1	0.5	49.4	53.4	4.06	1.77	7.27	88.4	47.6
ON02MC-02	1-2	1	1.5	43.8	48.3	4.49	1.68	6.51	92.2	42.2
ON02MC-03	2-3	1	2.5	43.8	49.0	5.28	1.58	6.07	87.8	42.2
ON02MC-04	3-4	1	3.5	49.7	57.5	7.78	2.03	5.67	81.2	47.7
ON02MC-05	4-5	1	4.5	46.9	58.8	11.85	2.41	5.37	76.1	44.5
ON02MC-06	5-6	1	5.5	35.9	42.5	6.64	2.56	4.44	67.2	33.3
ON02MC-07	6-7	1	6.5	26.9	29.0	2.13	2.29	3.37	52.6	24.6
ON02MC-08	7-8	1	7.5	18.5	20.2	1.63	1.05	2.57	46.2	17.5
ON02MC-09	8-9	1	8.5	17.2	18.0	0.75	0.92	2.51	40.7	16.3
ON02MC-10	9-10	1	9.5	17.1	18.2	1.15	1.36	2.57	38.7	15.7
ON02MC-11	10-12	2	11.5	16.1	17.6	1.46	1.43	2.62	38.6	14.7
ON02MC-12	12-14	2	13.5	17.0	18.3	1.36	1.23	2.63	39.9	15.7
ON02MC-13	14-16	2	15.5	17.3	18.1	0.85	1.16	2.57	38.9	16.1
ON02MC-14	16-18	2	17.5	17.1	18.4	1.31	1.05	2.62	38.6	16.0
ON02MC-15	18-20	2	19.5	16.5	18.2	1.66	1.13	2.65	39.6	15.4
ON02MC-16	20-22	2	21.5	15.4	16.7	1.33	1.27	2.55	35.7	14.1
ON02MC-17	22-24	2	23.5	16.0	17.1	1.08	1.00	2.43	37.8	15.0
ON02MC-18	24-26	2	25.5	16.0	17.5	1.50	1.15	2.49	38.1	14.9
ON02MC-19	26-28	2	27.5	15.5	17.3	1.83	1.09	2.48	33.6	14.4
ON02MC-20	28-30	2	29.5	15.5	16.8	1.25	1.23	2.38	33.0	14.3
ON02MC-21	30-32	2	31.5	14.1	15.9	1.84	1.14	2.44	35.2	13.0
ON02MC-22	32-34	2	33.5	15.2	16.9	1.68	1.18	2.47	36.1	14.1
ON02MC-23	34-36	2	35.5	15.9	17.6	1.70	1.33	2.55	34.3	14.6
ON02MC-24	36-38	2	37.5	15.1	16.5	1.40	1.00	2.41	34.6	14.2
ON02MC-25	38-40	2	39.5	14.8	15.9	1.13	0.98	2.28	34.2	13.8
ON06MC-01	0-1	1	0.5	24.4	24.9	0.53	1.62	2.50	56.4	22.8
ON06MC-02	1-2	1	1.5	23.2	24.6	1.40	1.60	2.36	52.5	21.6
ON06MC-03	2-3	1	2.5	24.3	29.0	4.67	1.30	2.43	53.8	23.0
ON06MC-04	3-4	1	3.5	23.9	27.7	3.72	1.64	2.49	53.5	22.3
ON06MC-05	4-5	1	4.5	24.6	30.4	5.77	1.22	2.62	54.7	23.4
ON06MC-06	5-6	1	5.5	24.4	25.8	1.43	0.88	2.31	58.0	23.5
ON06MC-07	6-7	1	6.5	22.5	26.8	4.33	0.80	2.58	60.1	21.7
ON06MC-08	7-8	1	7.5	23.6	27.5	3.88	0.99	2.81	58.3	22.6
ON06MC-09	8-9	1	8.5	22.6	28.2	5.59	0.92	2.52	62.0	21.7
ON06MC-10	9-10	1	9.5	22.8	28.1	5.34	0.86	2.66	61.0	21.9
ON06MC-11	10-12	2	11.5	24.5	27.9	3.39	0.70	2.34	62.7	23.8
ON06MC-12	12-14	2	13.5	23.6	27.5	3.92	0.75	2.63	59.9	22.8
ON06MC-13	14-16	2	15.5	22.2	24.3	2.15	0.68	2.38	54.1	21.5
ON06MC-14	16-18	2	17.5	23.9	28.7	4.84	0.82	2.35	50.9	23.0
ON06MC-15	18-20	2	19.5	22.9	27.0	4.15	1.07	2.44	44.3	21.8
ON06MC-16	20-22	2	21.5	22.9	28.2	5.37	1.14	2.27	44.2	21.7
ON06MC-17	22-24	2	23.5	21.2	29.0	7.86	1.53	2.53	42.3	19.6
ON06MC-18	24-26	2	25.5	29.3	32.0	2.65	1.30	2.50	52.0	28.0
ON06MC-19	26-28	2	27.5	26.7	32.0	5.27	1.48	2.68	47.9	25.3
ON06MC-20	28-30	2	29.5	27.6	32.3	4.75	1.36	2.66	47.5	26.2
ON06MC-21	30-32	2	31.5	24.7	31.9	7.21	1.71	2.55	45.9	23.0
ON06MC-22	32-34	2	33.5	28.8	36.5	7.69	2.08	2.89	52.4	26.7
ON06MC-23	34-36	2	35.5	28.0	36.5	8.52	1.45	2.92	55.9	26.5

Table G.14.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores ON13 and ON17

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
ON13MC-02	1-2	1	1.5	47.8	59.3	11.55	1.02	6.12	115.7	46.8
ON13MC-03	2-3	1	2.5	57.0	59.6	2.64	1.11	5.58	97.2	55.9
ON13MC-04	3-4	1	3.5	55.4	60.7	5.25	1.26	4.09	84.4	54.2
ON13MC-05	4-5	1	4.5	53.6	59.4	5.78	1.40	3.91	84.8	52.2
ON13MC-06	5-6	1	5.5	50.9	54.6	3.69	1.36	3.75	84.3	49.5
ON13MC-07	6-7	1	6.5	47.0	50.6	3.61	1.22	3.70	84.0	45.8
ON13MC-08	7-8	1	7.5	43.6	43.7	0.10	1.74	3.99	77.7	41.9
ON13MC-09	8-9	1	8.5	37.0	38.9	1.90	1.41	3.52	70.8	35.6
ON13MC-10	9-10	1	9.5	27.6	30.2	2.58	1.64	2.84	62.7	25.9
ON13MC-11	10-12	2	11.5	20.0	24.1	4.09	1.33	2.17	52.4	18.7
ON13MC-12	12-14	2	13.5	16.4	19.0	2.60	1.13	2.12	47.2	15.3
ON13MC-13	14-16	2	15.5	16.9	18.5	1.65	1.15	2.08	45.7	15.7
ON13MC-14	16-18	2	17.5	19.4	19.7	0.28	1.02	2.26	46.8	18.3
ON13MC-15	18-20	2	19.5	19.6	20.4	0.74	1.15	2.40	50.6	18.5
ON13MC-16	20-22	2	21.5	13.2	18.4	5.20	1.42	2.20	46.0	11.7
ON13MC-17	22-24	2	23.5	15.9	18.6	2.76	1.26	2.08	45.3	14.6
ON13MC-18	24-26	2	25.5	17.9	18.5	0.64	1.46	2.07	44.3	16.4
ON13MC-19	26-28	2	27.5	18.3	18.5	0.27	1.38	2.47	44.7	16.9
ON13MC-20	28-30	2	29.5	18.7	18.9	0.23	1.17	2.01	53.1	17.5
ON13MC-21	30-32	2	31.5	12.8	18.6	5.80	1.90	2.38	42.6	10.9
ON13MC-22	32-34	2	33.5	14.5	18.3	3.78	1.90	2.04	39.5	12.6
ON13MC-23	34-36	2	35.5	17.0	18.3	1.24	1.71	2.10	41.5	15.3
ON13MC-24	36-38	2	37.5	14.7	17.1	2.44	1.60	1.95	40.9	13.1
ON13MC-25	38-40	2	39.5	17.5	17.9	0.38	1.89	2.09	39.1	15.6
ON17MC-01	0-1	1	0.5	48.0	57.4	9.43	1.78	8.58	125.3	46.2
ON17MC-03	2-3	1	2.5	48.5	54.7	6.19	4.23	7.17	99.4	44.3
ON17MC-04	3-4	1	3.5	51.8	55.6	3.83	4.74	4.50	84.6	47.0
ON17MC-05	4-5	1	4.5	53.2	58.1	4.87	4.70	3.99	76.2	48.5
ON17MC-06	5-6	1	5.5	49.6	52.9	3.31	1.82	4.01	86.1	47.8
ON17MC-07	6-7	1	6.5	51.6	52.1	0.52	1.61	3.92	92.8	50.0
ON17MC-08	7-8	1	7.5	52.1	53.5	1.48	1.67	5.19	91.3	50.4
ON17MC-09	8-9	1	8.5	48.7	49.5	0.79	2.54	4.55	87.8	46.2
ON17MC-10	9-10	1	9.5	43.6	47.9	4.32	2.35	4.02	81.4	41.2
ON17MC-11	10-12	2	11.5	31.4	34.7	3.35	1.47	2.83	84.6	29.9
ON17MC-12	12-14	2	13.5	26.5	29.2	2.70	1.26	2.33	76.7	25.2
ON17MC-13	14-16	2	15.5	23.6	24.5	0.83	1.20	2.24	68.6	22.4
ON17MC-14	16-18	2	17.5	21.2	21.5	0.31	1.28	2.14	61.1	19.9
ON17MC-15	18-20	2	19.5	18.5	20.3	1.85	0.98	2.06	55.1	17.5
ON17MC-16	20-22	2	21.5	15.1	17.3	2.21	1.17	1.99	59.9	13.9
ON17MC-17	22-24	2	23.5	15.7	16.9	1.21	1.14	2.56	57.6	14.6
ON17MC-18	24-26	2	25.5	17.2	17.9	0.63	0.93	2.02	58.3	16.3
ON17MC-19	26-28	2	27.5	17.9	18.1	0.26	1.10	2.10	57.9	16.8
ON17MC-20	28-30	2	29.5	18.2	18.4	0.24	1.19	2.06	58.4	17.0
ON17MC-21	30-32	2	31.5	15.7	18.4	2.64	1.06	2.07	54.8	14.7
ON17MC-22	32-34	2	33.5	16.6	18.3	1.66	2.84	2.14	54.6	13.8
ON17MC-23	34-36	2	35.5	17.3	18.1	0.84	1.93	2.14	54.7	15.4
ON17MC-24	36-38	2	37.5	16.4	18.1	1.68	2.54	2.49	55.4	13.9
ON17MC-25	38-40	2	39.5	16.8	18.6	1.85	3.72	2.38	51.1	13.1

Table G.15.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores ON25 and ON30

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
ON25MC-01	0-1	1	0.5	55.6	61.2	5.64	1.49	8.50	118.7	54.1
ON25MC-02	1-2	1	1.5	50.5	56.6	6.10	1.45	8.40	115.0	49.1
ON25MC-03	2-3	1	2.5	54.9	60.7	5.81	1.55	7.76	110.6	53.4
ON25MC-04	3-4	1	3.5	54.1	65.6	11.50	1.46	6.97	93.6	52.6
ON25MC-05	4-5	1	4.5	52.3	70.7	18.36	1.45	5.86	81.5	50.9
ON25MC-06	5-6	1	5.5	47.3	66.7	19.49	1.74	5.44	78.8	45.5
ON25MC-07	6-7	1	6.5	46.4	62.9	16.53	1.65	5.71	80.2	44.7
ON25MC-08	7-8	1	7.5	44.7	58.4	13.71	1.95	5.63	78.5	42.7
ON25MC-09	8-9	1	8.5	39.9	50.7	10.79	2.12	4.98	74.5	37.8
ON25MC-10	9-10	1	9.5	33.1	42.3	9.19	2.14	4.29	64.9	31.0
ON25MC-11	10-12	2	11.5	30.5	35.1	4.60	1.82	3.48	53.6	28.6
ON25MC-12	12-14	2	13.5	27.9	30.3	2.42	1.72	3.13	52.8	26.1
ON25MC-13	14-16	2	15.5	24.7	26.2	1.50	1.31	2.96	48.6	23.4
ON25MC-14	16-18	2	17.5	22.6	24.0	1.37	1.25	2.97	46.3	21.3
ON25MC-15	18-20	2	19.5	20.3	21.4	1.05	1.04	2.78	42.3	19.3
ON25MC-16	20-22	2	21.5	17.6	19.1	1.56	1.05	2.66	34.7	16.5
ON25MC-17	22-24	2	23.5	16.4	18.8	2.38	1.09	2.67	36.9	15.3
ON25MC-18	24-26	2	25.5	16.8	18.2	1.43	1.02	2.58	37.5	15.8
ON25MC-19	26-28	2	27.5	18.2	19.5	1.27	0.98	2.81	37.4	17.2
ON25MC-20	28-30	2	29.5	18.3	19.2	0.87	0.89	2.76	36.4	17.4
ON25MC-21	30-32	2	31.5	17.1	19.4	2.34	1.08	2.88	37.5	16.0
ON25MC-22	32-34	2	33.5	17.6	19.3	1.75	0.99	2.80	39.5	16.6
ON25MC-23	34-36	2	35.5	17.8	19.1	1.27	1.15	2.79	37.9	16.7
ON25MC-24	36-38	2	37.5	18.0	19.1	1.08	1.00	2.75	35.9	17.0
ON25MC-25	38-40	2	39.5	17.3	18.5	1.20	1.02	2.71	35.9	16.3
ON30MC-01	0-1	1	0.5	24.3	31.0	6.71	2.27	4.83	68.5	22.0
ON30MC-02	1-2	1	1.5	26.7	33.5	6.88	2.15	5.62	59.3	24.5
ON30MC-03	2-3	1	2.5	26.0	33.7	7.76	1.81	5.31	50.6	24.2
ON30MC-04	3-4	1	3.5	24.4	39.0	14.57	1.68	5.03	47.9	22.7
ON30MC-05	4-5	1	4.5	24.4	43.5	19.15	1.52	4.55	51.7	22.9
ON30MC-06	5-6	1	5.5	25.7	42.0	16.33	1.75	3.97	55.4	23.9
ON30MC-07	6-7	1	6.5	24.8	37.1	12.27	2.08	3.23	50.2	22.7
ON30MC-08	7-8	1	7.5	24.3	31.9	7.58	2.39	3.65	49.1	22.0
ON30MC-09	8-9	1	8.5	23.8	35.3	11.49	2.22	3.52	46.4	21.6
ON30MC-10	9-10	1	9.5	21.1	30.0	8.85	2.18	2.90	41.7	19.0
ON30MC-11	10-12	2	11.5	18.5	23.5	4.98	2.07	2.28	37.0	16.4
ON30MC-12	12-14	2	13.5	17.3	22.4	5.09	1.67	2.22	33.2	15.6
ON30MC-13	14-16	2	15.5	15.7	17.0	1.31	1.62	2.04	32.3	14.1
ON30MC-14	16-18	2	17.5	14.2	17.6	3.41	1.53	2.16	31.7	12.6
ON30MC-15	18-20	2	19.5	12.4	16.4	3.95	1.62	1.81	25.4	10.8
ON30MC-16	20-22	2	21.5	10.6	12.4	1.79	1.19	1.82	28.7	9.4
ON30MC-17	22-24	2	23.5	8.1	11.5	3.42	1.19	2.00	25.7	6.9
ON30MC-18	24-26	2	25.5	9.0	9.9	0.87	1.04	1.87	25.2	8.0
ON30MC-19	26-28	2	27.5	7.9	9.8	1.93	1.04	1.94	22.1	6.9
ON30MC-20	28-30	2	29.5	8.0	9.9	1.91	0.98	1.96	15.1	7.0
ON30MC-21	30-32	2	31.5	7.5	8.4	0.89	1.19	1.79	15.6	6.3
ON30MC-22	32-34	2	33.5	7.6	9.4	1.79	1.33	1.90	14.6	6.3
ON30MC-23	34-36	2	35.5	7.2	9.1	1.92	1.11	1.88	16.7	6.1
ON30MC-24	36-38	2	37.5	7.3	9.2	1.96	1.20	1.93	16.7	6.1
ON30MC-25	38-40	2	39.5	7.6	9.2	1.53	1.37	1.91	14.9	6.3

Table G.16.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the core ON36

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
2013-ON36MC										
ON36MC-01	0-1	1	0.5	70.6	83.6	13.03	4.35	8.12	149.0	66.2
ON36MC-02	1-2	1	1.5	64.2	76.6	12.33	5.55	5.73	123.8	58.7
ON36MC-03	2-3	1	2.5	59.5	71.2	11.72	5.79	5.06	117.7	53.7
ON36MC-04	3-4	1	3.5	58.0	62.4	4.41	5.40	4.27	102.2	52.6
ON36MC-05	4-5	1	4.5	56.5	65.4	8.87	4.63	4.37	104.4	51.9
ON36MC-06	5-6	1	5.5	54.9	62.4	7.58	5.97	4.22	104.1	48.9
ON36MC-07	6-7	1	6.5	54.2	61.5	7.33	6.07	4.26	103.6	48.1
ON36MC-08	7-8	1	7.5	59.9	69.7	9.76	6.41	7.23	99.6	53.5
ON36MC-09	8-9	1	8.5	56.0	66.9	10.91	5.09	6.50	111.6	50.9
ON36MC-10	9-10	1	9.5	52.6	63.3	10.71	4.22	6.03	90.8	48.3
ON36MC-11	10-12	2	11.5	51.9	57.9	6.00	5.33	5.82	89.9	46.6
ON36MC-12	12-14	2	13.5	44.1	53.2	9.03	5.48	5.00	78.6	38.7
ON36MC-13	14-16	2	15.5	45.3	53.1	7.75	5.26	4.56	74.5	40.1
ON36MC-14	16-18	2	17.5	38.4	45.6	7.18	5.66	4.10	67.7	32.7
ON36MC-15	18-20	2	19.5	36.3	42.2	5.91	3.83	3.88	66.0	32.4
ON36MC-16	20-22	2	21.5	36.5	37.4	0.87	4.72	3.81	64.0	31.8
ON36MC-17	22-24	2	23.5	31.5	33.3	1.78	4.44	3.92	63.7	27.0
ON36MC-18	24-26	2	25.5	29.5	31.1	1.60	3.87	4.01	63.7	25.7
ON36MC-19	26-28	2	27.5	27.4	29.6	2.22	3.11	3.76	61.8	24.2
ON36MC-20	28-30	2	29.5	26.6	28.3	1.69	2.71	3.78	59.2	23.9
ON36MC-21	30-32	2	31.5	24.2	25.9	1.70	3.12	3.64	57.6	21.0
ON36MC-22	32-34	2	33.5	24.7	25.2	0.54	2.77	3.67	58.6	21.9
ON36MC-23	34-36	2	35.5	24.4	25.2	0.79	4.16	3.52	58.8	20.2
ON36MC-24	36-38	2	37.5	23.3	25.1	1.85	3.01	3.52	56.6	20.3
ON36MC-25	38-40	2	39.5	22.5	25.2	2.76	2.81	3.55	56.1	19.6

Table G.17.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the ponar grabs in Lake Ontario

Sample ID	OC (mg/g)	TC (mg/g)	IC (mg/g)	BC (mg/g)	TN (mg/g)	OM (mg/g)	NBOC (mg/g)
PonarGrabs							
ON01PG	11.9	23.9	12.00	0.76	0.84	17.3	11.1
ON02PG	20.4	22.3	1.86	0.99	2.67	50.7	19.4
ON03PG	26.2	36.6	10.35	1.86	1.97	37.3	24.3
ON04PG	12.1	16.6	4.47	0.62	1.37	28.1	11.5
ON05PG	25.6	27.7	2.07	0.97	3.07	57.7	24.7
ON06PG	23.8	31.2	7.48	0.92	2.94	51.4	22.8
ON07PG	8.9	11.6	2.62	0.38	1.10	25.5	8.6
ON08PG	28.0	37.1	9.07	1.29	2.93	58.0	26.7
ON09PG	20.9	22.4	1.53	0.93	2.81	54.9	20.0
ON10PG	4.6	6.5	1.97	0.60	0.67	15.5	4.0
ON11PG	3.2	3.8	0.58	0.53	0.44	15.3	2.7
ON12PG	29.2	34.5	5.34	1.51	2.63	56.4	27.7
ON13PG	27.8	30.0	2.21	1.07	3.14	62.5	26.7
ON14PG	0.8	6.4	5.60	0.45	0.54	10.9	0.3
ON15PG	36.0	42.7	6.70	1.44	4.04	75.3	34.5
ON16PG	24.2	25.6	1.35	0.96	3.08	57.6	23.3
ON17PG	34.6	39.0	4.43	1.22	3.76	73.6	33.3
ON18PG	29.1	29.9	0.71	1.28	3.08	68.6	27.9
ON19PG	20.4	22.1	1.74	2.03	1.80	34.8	18.4
ON20PG	1.5	5.3	3.88	0.26	0.49	7.5	1.2
ON21PG	20.7	25.8	5.09	1.35	2.50	55.7	19.4
ON22PG	41.8	45.9	4.14	1.95	4.21	81.8	39.8
ON23PG	3.0	5.2	2.17	0.26	0.49	9.1	2.7
ON24PG	28.1	31.4	3.36	2.19	2.87	55.7	25.9
ON25PG	32.7	35.4	2.72	1.82	3.59	66.8	30.9
ON26PG	32.6	37.7	5.09	1.41	3.60	65.9	31.2
ON27PG	37.7	44.4	6.69	1.33	4.30	37.9	36.4
ON28PG	32.8	41.2	8.46	1.54	3.81	63.0	31.2
ON29PG	6.0	6.9	0.86	0.43	0.83	12.7	5.6
ON30PG	26.6	33.7	7.13	1.38	3.39	59.0	25.2
ON31PG	43.7	48.0	4.26	0.68	5.00	80.1	43.0
ON32PG	7.0	8.5	1.53	0.35	0.79	12.2	6.6
ON33PG	33.8	38.8	4.97	1.25	3.42	65.7	32.5
ON34PG	13.9	27.3	13.35	0.78	2.17	30.4	13.1
ON35PG	45.1	53.3	8.21	1.29	6.24	88.8	43.8
ON36PG	50.6	54.4	3.79	1.09	4.82	89.4	49.5
ON37PG	5.9	16.7	10.83	0.76	1.04	21.7	5.2

Table G.18.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores ER09 and ER15

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
ER09MC-01	0-2	2	1	24.91	29.34	4.43	2.34	3.56	63.31	22.57
ER09MC-02	2-4	2	3	23.25	27.47	4.22	3.36	3.15	53.98	19.90
ER09MC-03	4-6	2	5	22.04	27.14	5.10	2.82	2.95	50.45	19.22
ER09MC-04	6-8	2	7	23.62	28.18	4.55	3.22	3.30	54.48	20.40
ER09MC-05	8-10	2	9	21.85	27.12	5.27	2.66	3.04	52.16	19.18
ER09MC-06	10-12	2	11	21.07	25.19	4.13	2.75	2.82	52.41	18.32
ER09MC-07	12-14	2	13	22.60	26.23	3.64	3.03	3.01	51.29	19.57
ER09MC-08	14-16	2	15	22.38	26.73	4.35	3.01	3.17	52.20	19.37
ER09MC-09	16-18	2	17	20.83	24.95	4.12	2.71	2.81	49.95	18.12
ER09MC-10	18-20	2	19	19.87	21.15	1.28	2.32	2.54	53.01	17.55
ER09MC-11	20-22	2	21	19.06	21.19	2.12	2.51	2.22	52.28	16.56
ER09MC-12	22-24	2	23	20.43	24.28	3.85	2.59	2.92	49.54	17.84
ER09MC-13	24-26	2	25	19.97	20.23	0.26	2.56	2.45	51.51	17.41
ER09MC-14	26-28	2	27	20.38	21.60	1.22	2.56	2.43	53.12	17.82
ER09MC-15	28-30	2	29	19.69	20.50	0.81	2.07	2.37	46.84	17.62
ER09MC-16	30-32	2	31	18.33	20.82	2.49	2.57	2.22	46.16	15.77
ER09MC-17	32-34	2	33	20.95	21.13	0.18	2.70	2.60	49.12	18.25
ER09MC-18	34-36	2	35	19.15	21.47	2.32	2.88	2.29	50.77	16.27
ER09MC-19	36-38	2	37	20.34	22.01	1.67	2.71	2.54	52.52	17.63
ER09MC-20	38-40	2	39	17.96	21.77	3.80	2.43	2.37	51.12	15.53
ER09MC-21	40-42	2	41	18.34	21.50	3.16	2.78	2.38	49.24	15.57
ER09MC-22	42-44	2	43	17.43	22.08	4.65	2.90	2.20	52.16	14.54
ER15MC-01	0-2	2	1	16.18	18.32	2.14	3.14	1.82	23.23	13.04
ER15MC-02	2-4	2	3	14.09	14.24	0.15	2.53	1.84	17.26	11.57
ER15MC-03	4-6	2	5	10.86	12.66	1.80	2.16	1.21	20.24	8.69
ER15MC-04	6-8	2	7	11.38	13.42	2.04	2.26	1.17	18.75	9.12
ER15MC-05	8-10	2	9	11.16	13.43	2.28	2.46	2.08	17.58	8.70
ER15MC-06	10-12	2	11	9.72	10.63	0.91	1.61	1.33	21.30	8.11
ER15MC-07	12-14	2	13	6.70	7.40	0.70	1.77	0.87	21.75	4.93
ER15MC-08	14-16	2	15	10.27	11.38	1.11	1.71	1.36	22.86	8.56
ER15MC-09	16-18	2	17	6.40	6.85	0.46	1.49	0.90	20.92	4.90
ER15MC-10	18-20	2	19	7.97	8.72	0.75	1.66	1.40	19.59	6.31
ER15MC-11	20-22	2	21	7.70	8.29	0.59	1.52	1.03	19.62	6.18
ER15MC-12	22-24	2	23	5.92	6.27	0.35	1.39	0.80	23.30	4.53
ER15MC-13	24-26	2	25	15.28	17.06	1.78	1.63	2.04	24.20	13.64
ER15MC-14	26-28	2	27	15.94	16.83	0.88	1.09	2.05	27.47	14.86
ER15MC-15	28-30	2	29	17.15	18.44	1.29	1.21	2.25	29.08	15.94
ER15MC-16	30-32	2	31	18.00	19.73	1.73	1.36	2.39	30.17	16.65
ER15MC-17	32-34	2	33	17.73	19.03	1.30	1.17	2.39	32.37	16.56
ER15MC-18	34-36	2	35	17.43	18.67	1.24	1.16	2.42	31.82	16.26
ER15MC-19	36-38	2	37	19.95	21.65	1.70	1.19	2.43	34.89	18.76
ER15MC-20	38-40	2	39	17.65	18.72	1.07	1.06	2.39	34.84	16.59
ER15MC-21	40-42	2	41	19.01	20.88	1.87	1.33	2.48	34.00	17.68

Table G.19.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores ER37 and ER73

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
ER37MC-01	0-2	2	1	30.97	35.61	4.63	4.08	4.92	65.92	26.89
ER37MC-02	2-4	2	3	28.91	32.69	3.77	4.82	4.29	58.09	24.09
ER37MC-03	4-6	2	5	26.09	30.76	4.67	4.40	3.87	51.00	21.70
ER37MC-04	6-8	2	7	24.42	29.71	5.28	4.13	3.62	46.84	20.29
ER37MC-05	8-10	2	9	24.89	29.69	4.80	3.61	3.60	47.15	21.28
ER37MC-06	10-12	2	11	24.04	28.04	3.99	3.71	3.55	47.58	20.33
ER37MC-07	12-14	2	13	22.97	27.81	4.84	3.67	3.27	48.67	19.29
ER37MC-08	14-16	2	15	23.68	27.40	3.71	3.56	3.30	49.37	20.12
ER37MC-09	16-18	2	17	30.87	33.28	2.42	3.42	3.72	51.72	27.45
ER37MC-10	18-20	2	19	28.36	31.84	3.48	3.00	3.85	55.51	25.37
ER37MC-11	20-22	2	21	27.79	31.21	3.42	3.77	3.79	56.04	24.02
ER37MC-12	22-24	2	23	28.97	31.79	2.82	3.72	3.97	60.03	25.25
ER37MC-13	24-26	2	25	29.86	33.74	3.88	3.85	4.01	60.79	26.01
ER37MC-14	26-28	2	27	28.76	32.88	4.12	3.58	3.82	58.61	25.18
ER37MC-15	28-30	2	29	26.08	29.43	3.35	2.61	3.49	51.73	23.47
ER37MC-16	30-32	2	31	21.55	24.41	2.85	3.00	2.88	42.75	18.56
ER37MC-17	32-34	2	33	21.31	23.77	2.45	2.79	2.75	44.51	18.53
ER37MC-18	34-36	2	35	19.87	23.67	3.80	2.68	2.73	44.88	17.19
ER37MC-19	36-38	2	37	19.65	22.93	3.28	2.19	2.47	39.83	17.46
ER37MC-20	38-40	2	39	19.41	22.58	3.16	1.81	2.37	38.62	17.60
ER37MC-21	40-42	2	41	19.44	21.94	2.50	2.23	2.50	41.04	17.22
ER37MC-22	42-44	2	43	17.91	20.92	3.01	2.52	2.53	39.94	15.38
ER37MC-23	44-46	2	45	18.12	20.49	2.36	2.25	2.49	40.22	15.87
ER37MC-24	46-48	2	47	18.05	20.58	2.53	2.16	2.53	41.51	15.88
ER73MC-01	0-2	2	1	34.89	35.59	0.70	1.96	5.42	76.68	32.93
ER73MC-02	2-4	2	3	29.39	31.41	2.02	2.29	4.46	58.09	27.11
ER73MC-03	4-6	2	5	27.92	30.74	2.82	2.62	4.14	53.50	25.30
ER73MC-04	6-8	2	7	27.53	29.61	2.07	2.80	3.88	49.34	24.73
ER73MC-05	8-10	2	9	27.51	28.11	0.60	2.77	4.04	52.09	24.74
ER73MC-06	10-12	2	11	26.84	26.90	0.06	3.89	3.70	54.61	22.95
ER73MC-07	12-14	2	13	26.69	26.84	0.15	2.19	3.71	53.66	24.50
ER73MC-08	14-16	2	15	28.73	30.62	1.89	2.57	3.99	56.82	26.16
ER73MC-09	16-18	2	17	30.97	33.46	2.49	3.19	4.12	56.25	27.78
ER73MC-10	18-20	2	19	30.20	30.23	0.03	3.25	4.00	53.51	26.96
ER73MC-11	20-22	2	21	31.54	32.24	0.70	2.04	4.18	58.05	29.51
ER73MC-12	22-24	2	23	31.17	33.59	2.42	2.79	4.13	59.51	28.38
ER73MC-13	24-26	2	25	31.53	34.15	2.63	3.24	4.17	57.83	28.29
ER73MC-14	26-28	2	27	31.77	35.00	3.23	3.81	4.13	55.02	27.96
ER73MC-15	28-30	2	29	30.62	33.14	2.53	3.71	4.09	51.91	26.90
ER73MC-16	30-32	2	31	28.82	31.12	2.30	3.47	3.65	50.64	25.35
ER73MC-17	32-34	2	33	27.14	29.79	2.65	3.14	3.46	49.23	24.01
ER73MC-18	34-36	2	35	25.65	28.38	2.73	3.24	3.22	46.59	22.41
ER73MC-19	36-38	2	37	24.52	27.03	2.51	3.18	3.04	43.90	21.34
ER73MC-20	38-40	2	39	22.08	23.89	1.81	3.16	2.75	39.60	18.92
ER73MC-21	40-42	2	41	20.05	21.91	1.86	2.56	2.67	36.51	17.49
ER73MC-22	42-44	2	43	18.95	20.70	1.75	2.50	2.58	35.04	16.45
ER73MC-23	44-46	2	45	18.21	19.86	1.65	2.39	2.62	34.97	15.82
ER73MC-24	46-48	2	47	19.98	20.37	0.40	2.16	2.62	32.10	17.81

Table G.20.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the core ER92

Sample ID	Depth	Thick	Ave Depth	OC	TC	IC	BC	TN	OM	NBOC
	(cm)	(cm)	(cm)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)	(mg/g)
ER92MC-01	0-2	2	1	27.33	38.03	10.70	1.52	3.24	60.75	25.81
ER92MC-02	2-4	2	3	28.68	37.93	9.25	1.21	3.14	63.51	27.48
ER92MC-03	4-6	2	5	26.84	38.76	11.92	1.25	2.79	56.09	25.59
ER92MC-04	6-8	2	7	24.62	37.82	13.20	1.58	2.48	48.30	23.03
ER92MC-05	8-10	2	9	24.28	35.74	11.46	1.55	2.31	43.94	22.73
ER92MC-06	10-12	2	11	22.36	34.97	12.61	1.39	2.53	49.58	20.97
ER92MC-07	12-14	2	13	24.75	35.70	10.95	1.33	2.59	45.79	23.42
ER92MC-08	14-16	2	15	25.66	35.40	9.74	1.39	2.45	43.56	24.27
ER92MC-09	16-18	2	17	25.05	34.76	9.72	1.51	2.38	41.26	23.54
ER92MC-10	18-20	2	19	24.27	34.53	10.27	1.90	2.21	39.48	22.36
ER92MC-11	20-22	2	21	25.83	34.05	8.22	1.63	2.23	39.78	24.19
ER92MC-12	22-24	2	23	23.24	34.54	11.29	1.67	2.19	39.26	21.57
ER92MC-13	24-26	2	25	22.81	34.01	11.20	1.69	2.08	40.13	21.12
ER92MC-14	26-28	2	27	19.28	33.24	13.97	1.19	1.84	38.06	18.09
ER92MC-15	28-30	2	29	20.59	30.83	10.24	1.36	1.48	35.75	19.23
ER92MC-16	30-32	2	31	16.47	27.46	10.99	0.78	1.27	34.71	15.69
ER92MC-17	32-34	2	33	13.30	27.53	14.23	0.72	1.23	35.45	12.58
ER92MC-18	34-36	2	35	11.91	26.87	14.96	0.71	1.11	35.60	11.19
ER92MC-19	36-38	2	37	11.06	26.25	15.19	0.82	1.02	33.69	10.24
ER92MC-20	38-40	2	39	10.36	26.27	15.91	0.61	0.99	33.52	9.76
ER92MC-21	40-42	2	41	12.75	26.93	14.18	0.43	1.03	30.05	12.32
ER92MC-22	42-44	2	43	11.46	26.67	15.21	0.61	1.07	28.45	10.85

Table G.21.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the ponar grabs in Lake Erie

Sample ID	OC (mg/g)	TC (mg/g)	IC (mg/g)	BC (mg/g)	TN (mg/g)	OM (mg/g)	NBOC (mg/g)
ER02PG	18.34	22.24	3.90	2.70	1.45	32.94	15.65
ER03PG	44.37	47.09	2.73	5.10	4.60	75.89	39.27
ER04PG	22.04	36.59	14.56	2.60	2.59	47.78	19.44
ER05PG	0.53	1.09	0.56	0.10	non-detec	2.71	0.43
ER06PG	21.09	29.52	8.43	1.98	2.41	44.53	19.11
ER07PG	17.04	23.07	6.04	1.54	2.22	32.59	15.50
ER09PG	21.10	26.44	5.34	2.29	3.03	46.11	18.81
ER10PG	18.52	30.96	12.43	2.23	2.41	34.93	16.30
ER15PG	16.39	29.31	12.92	1.76	2.10	34.03	14.63
ER20PG	21.48	36.36	14.88	3.27	1.71	38.57	18.21
ER21PG	7.44	14.58	7.14	0.83	0.55	12.29	6.62
ER22PG	25.73	37.38	11.65	3.10	2.54	50.28	22.63
ER23PG	21.29	32.30	11.02	2.38	2.32	41.37	18.90
ER25PG	14.15	23.97	9.83	1.76	1.41	27.49	12.39
ER26PG	31.72	35.53	3.80	3.81	3.77	61.29	27.92
ER27PG	32.08	36.55	4.47	4.07	4.15	64.52	28.01
ER28PG	32.18	35.31	3.13	3.88	4.25	69.03	28.30
ER29PG	26.80	31.19	4.39	3.87	3.24	55.44	22.93
ER30PG	13.77	24.65	10.88	1.77	1.97	27.50	12.00
ER31PG	16.33	24.81	8.48	1.90	1.99	29.29	14.43
ER32PG	18.88	25.42	6.54	4.06	2.21	32.01	14.82
ER36PG	28.76	32.01	3.25	3.28	3.77	57.53	25.48
ER37PG	25.05	29.45	4.40	3.10	3.53	51.24	21.95
ER38PG	25.00	29.00	4.00	4.10	3.47	47.76	20.90
ER42PG	31.88	33.75	1.87	4.04	4.13	60.00	27.83
ER43PG	29.06	31.15	2.09	4.08	3.83	58.95	24.98
ER58PG	24.55	30.72	6.17	3.27	3.02	52.29	21.28
ER59PG	23.42	31.69	8.28	10.55	2.80	51.08	12.86
ER60PG	29.88	42.92	13.04	2.80	2.53	48.46	27.08
ER61PG	28.77	46.60	17.84	4.54	2.26	44.06	24.23
ER63PG	20.53	26.31	5.78	2.56	2.73	47.39	17.97
ER73PG	27.02	29.75	2.73	3.42	3.73	63.23	23.60
ER78PG	23.28	27.33	4.05	3.36	2.59	47.05	19.92
ER81PG	21.19	32.27	11.09	2.09	2.77	43.52	19.09
ER82PG	2.22	24.85	22.63	0.16	0.16	5.10	2.06
ER84PG	5.63	19.63	14.01	0.80	0.39	12.25	4.83
ER91PG	25.74	37.49	11.75	2.88	2.44	50.07	22.87
ER92PG	22.52	36.41	13.88	2.94	2.41	43.08	19.58
ER93PG	11.83	33.83	22.00	1.08	1.37	22.84	10.74
ER95PG	5.70	10.30	4.60	0.73	0.56	16.45	4.97
ER98PG	20.41	31.27	10.87	2.48	2.67	47.74	17.92
ER99PG	9.54	12.40	2.86	1.43	1.00	21.64	8.11

Table G.22.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores I001 and I002

Sample ID	Depth (cm)	Thick (cm)	Ave Depth (cm)	OC (mg/g)	TC (mg/g)	IC (mg/g)	BC (mg/g)	TN (mg/g)	OM (mg/g)	NBOC (mg/g)
2012-I001KC										
I001KC-01	0-1	1	0.5	71.3234	71.3234	0	0.91308	5.05712	153.488	70.4104
I001KC-02	1-2	1	1.5	69.1783	70.3969	1.21853	1.06238	4.70099	151.657	68.116
I001KC-03	2-3	1	2.5	67.0332	69.2307	2.1975	1.3215	4.54639	151.704	65.7118
I001KC-04	3-4	1	3.5	68.3145	68.0646	-0.2498	1.02038	4.3918	149.003	67.2941
I001KC-05	4-5	1	4.5	69.5957	68.996	-0.5996	1.02321	4.43716	157.315	68.5725
I001KC-06	5-6	1	5.5	69.6851	69.9275	0.24232	1.45651	4.48253	150.952	68.2286
I001KC-07	6-7	1	6.5	69.7746	69.4322	-0.3424	2.62679	4.46849	144.659	67.1478
I001KC-08	7-8	1	7.5	67.7876	68.9369	1.14929	2.92071	4.45444	138.78	64.8669
I001KC-09	8-9	1	8.5	65.8006	67.3433	1.54277	3.07291	4.3527	135.257	62.7277
I001KC-10	9-10	1	9.5	64.0195	65.7498	1.73033	3.16537	4.25096	125.885	60.8541
I001KC-11	10-11	1	10.5	62.2384	63.9273	1.68886	3.70303	4.14822	126.689	58.5354
I001KC-12	11-12	1	11.5	62.9753	62.1047	-0.8705	3.4803	4.04549	124.37	59.495
I001KC-13	12-13	1	12.5	63.7121	64.6807	0.96858	3.31814	4.17383	125.116	60.394
I001KC-14	13-14	1	13.5	65.1575	67.2567	2.09917	3.28772	4.30217	130.006	61.8698
I001KC-15	14-16	2	15	66.6029	66.329	-0.2739	3.22924	4.26108	134.457	63.3737
I001KC-16	16-18	2	17	65.5697	65.4013	-0.1684	3.3067	4.22	126.233	62.263
I001KC-17	18-20	2	19	64.5364	65.488	0.95159	3.14203	4.22704	128.554	61.3944
I001KC-18	20-22	2	21	65.8034	65.5747	-0.2287	3.63387	4.23408	127.189	62.1695
I001KC-19	22-24	2	23	67.0703	64.625	-2.4453	3.59645	4.1195	126.495	63.4739
I001KC-20	24-26	2	25	63.6754	63.6754	0	3.76112	4.00492	124.496	59.9143
2012-I002KC										
I002KC-01	0-1	1	0.5	74.9306	74.9306	0	1.05628	5.04143	166.412	73.8743
I002KC-02	1-2	1	1.5	75.3925	77.699	2.3065	1.51998	5.16651	157.194	73.8725
I002KC-03	2-3	1	2.5	75.8544	77.928	2.07363	1.74316	5.09838	162.797	74.1112
I002KC-04	3-4	1	3.5	77.0453	78.1571	1.11176	1.53986	5.03026	165.464	75.5054
I002KC-05	4-5	1	4.5	78.2362	78.6386	0.40234	1.47594	5.05778	171.046	76.7603
I002KC-06	5-6	1	5.5	76.9911	79.1201	2.12901	1.16791	5.0853	167.447	75.8231
I002KC-07	6-7	1	6.5	75.7459	78.5566	2.81071	0.97232	5.04237	169.474	74.7736
I002KC-08	7-8	1	7.5	75.4579	77.9931	2.53525	1.00528	4.99943	172.311	74.4526
I002KC-09	8-9	1	8.5	75.1699	77.6461	2.47624	0.9796	4.99459	172.697	74.1903
I002KC-10	9-10	1	9.5	75.1679	77.2991	2.13118	1.11796	4.98976	167.382	74.05
I002KC-11	10-11	1	10.5	75.166	77.4105	2.24454	1.35108	5.14009	164.115	73.8149
I002KC-12	11-12	1	11.5	75.897	77.5219	1.62489	1.46386	5.29042	167.56	74.4332
I002KC-13	12-13	1	12.5	76.6281	77.0095	0.38145	1.55453	5.08147	163.054	75.0736
I002KC-14	13-14	1	13.5	75.1129	76.4971	1.38425	1.432	4.87253	166.667	73.6809
I002KC-15	14-16	2	15	73.5977	76.3191	2.72141	2.17156	4.91098	165.746	71.4261
I002KC-16	16-18	2	17	72.7103	76.141	3.43074	2.32936	4.94943	156.37	70.3809
I002KC-17	18-20	2	19	71.8229	71.8229	0	2.36429	4.5415	154.493	69.4586

Table G.23.The concentrations of OC, TC, IC, BC, TN, OM, and NBOC in every section of the cores W001 and W002

Sample ID	Depth (cm)	Thick (cm)	Ave Depth (cm)	OC (mg/g)	TC (mg/g)	IC (mg/g)	BC (mg/g)	TN (mg/g)	OM (mg/g)	NBOC (mg/g)
2012-W001KC										
W001KC-01	0-1	1	0.5	272.572	272.572	0	1.77328	21.2606	483.029	270.799
W001KC-02	1-2	1	1.5	273.414	265.43	-7.984	1.76807	21.3912	504.785	271.646
W001KC-03	2-3	1	2.5	274.256	259.876	-14.38	1.73747	20.7895	449.893	272.518
W001KC-04	3-4	1	3.5	267.432	254.322	-13.109	1.29186	20.1879	467.811	266.14
W001KC-05	4-5	1	4.5	260.607	252.682	-7.9257	1.08336	20.0068	473.348	259.524
W001KC-06	5-6	1	5.5	258.319	251.041	-7.2781	1.14827	19.8257	466.395	257.171
W001KC-07	6-7	1	6.5	256.031	253.203	-2.8275	1.1064	19.9154	476.654	254.924
W001KC-08	7-8	1	7.5	256.102	255.366	-0.7366	1.1505	20.0051	485.772	254.952
W001KC-09	8-9	1	8.5	256.174	258.248	2.07392	1.03937	20.575	487.037	255.134
W001KC-10	9-10	1	9.5	261.691	261.129	-0.562	1.15038	21.1449	468.872	260.541
W001KC-11	10-11	1	10.5	267.209	260.586	-6.623	1.20391	21.0231	496.078	266.005
W001KC-12	11-12	1	11.5	269.719	260.043	-9.6763	1.1755	20.9013	501.014	268.544
W001KC-13	12-13	1	12.5	272.23	273.209	0.97965	1.48773	21.8674	503.08	270.742
W001KC-14	13-14	1	13.5	280.477	286.375	5.8979	1.37725	22.8334	536.957	279.1
W001KC-15	14-16	2	15	288.725	286.2	-2.5247	1.15215	22.7462	530.917	287.573
W001KC-16	16-18	2	17	287.443	286.026	-1.4173	1.4942	22.6589	531.317	285.949
W001KC-17	18-20	2	19	286.16	290.641	4.48012	2.3666	23.2559	540.839	283.794
W001KC-18	20-22	2	21	292.75	295.256	2.50525	2.79846	23.8529	530.572	289.952
W001KC-19	22-24	2	23	299.34	291.22	-8.1204	1.90098	23.5139	545.055	297.439
W001KC-20	24-26	2	25	287.184	287.184	0	2.47242	23.1748	518.868	284.712
2012-W002KC										
W002KC-01	0-1	1	0.5	276.79	276.79	0	4.78659	21.8233	496.183	272.003
W002KC-02	1-2	1	1.5	275.351	278.157	2.8054	3.9716	22.6705	510.101	271.38
W002KC-03	2-3	1	2.5	273.913	275.575	1.66218	3.8409	22.5891	508.816	270.072
W002KC-04	3-4	1	3.5	270.407	272.993	2.58603	4.04583	22.5078	510.689	266.361
W002KC-05	4-5	1	4.5	266.902	267.778	0.87609	3.66536	22.174	464.078	263.236
W002KC-06	5-6	1	5.5	263.808	262.562	-1.2451	3.61661	21.8401	457.692	260.191
W002KC-07	6-7	1	6.5	260.713	263.112	2.3986	3.92693	21.7518	484.556	256.786
W002KC-08	7-8	1	7.5	261.904	263.661	1.75755	3.68924	21.6634	478.764	258.215
W002KC-09	8-9	1	8.5	263.094	261.342	-1.7524	3.93846	21.3413	460	259.156
W002KC-10	9-10	1	9.5	260.364	259.023	-1.3413	4.00415	21.0191	472.881	256.36
W002KC-11	10-11	1	10.5	257.633	260.677	3.04321	4.06205	21.151	473.322	253.571
W002KC-12	11-12	1	11.5	261.079	262.331	1.25138	3.94126	21.2829	473.588	257.138
W002KC-13	12-13	1	12.5	264.525	255.898	-8.6271	4.53817	20.9154	505.66	259.987
W002KC-14	13-14	1	13.5	266.183	249.465	-16.718	4.15667	20.5479	488.073	262.027
W002KC-15	14-16	2	15	267.842	260.731	-7.1108	4.29412	21.1879	507.547	263.547
W002KC-16	16-18	2	17	269.715	271.996	2.28087	4.45108	21.8278	546.569	265.264
W002KC-17	18-20	2	19	271.589	272.117	0.52795	4.34812	21.8461	531.549	267.241
W002KC-18	20-22	2	21	273.999	272.237	-1.7615	3.59592	21.8644	542.65	270.403
W002KC-19	22-24	2	23	276.409	276.914	0.505	4.19293	22.2365	562.257	272.216
W002KC-20	24-26	2	25	281.591	281.591	0	4.01015	22.6087	545.113	277.58

Table G.24.The summary of the dating for cores M009, M018, M011, and M024

Section ID	2010-M009BC	Sed. Rate	2010-M018BC	Sed. Rate	2010-M011BC	Sed. Rate	2010-M024BC	Sed. Rate
	(date)	(g/cm2/year)	(date)	(g/cm2/year)	(date)	(g/cm2/year)	(date)	(g/cm2/year)
	Pb-210 F.F.= 2.20	**CRS 1-slope**	**Pb-210 F.F.= 1.52**	**CRS 1-slope**	**Pb-210 F.F.= 2.99**	**CRS 1-slope**	**Pb-210 F.F.= 1.98**	**CRS 1-slope**
#1	2009	0.0653	2007	0.0183	2009	0.0406	2007	0.0192
#2	2006	0.0653	2000	0.0183	2005	0.0406	2000	0.0192
#3	2001	0.0653	1990	0.0183	2000	0.0406	1992	0.0192
#4	1997	0.0653	1978	0.0183	1995	0.0406	1983	0.0192
#5	1991	0.0653	1965	0.0183	1990	0.0406	1972	0.0192
#6	1986	0.0653	1950	0.0183	1984	0.0406	1962	0.0192
#7	1980	0.0653	1935	0.0183	1978	0.0406	1951	0.0192
#8	1974	0.0653	1919	0.0183	1972	0.0406	1940	0.0192
#9	1968	0.0653	1903	0.0183	1966	0.0406	1927	0.0192
#10	1963	0.0653	1888	0.0183	1959	0.0406	1914	0.0192
#11	1953	0.0653	1865	0.0183	1949	0.0406	1894	0.0192
#12	1941	0.0653	1834	0.0183	1935	0.0406	1867	0.0192
#13	1928	0.0653	1803	0.0183	1922	0.0406	1839	0.0192
#14	1915	0.0653	1773	0.0183	1909	0.0406	1811	0.0192
#15	1901	0.0653	1743	0.0183	1895	0.0406	1783	0.0192
#16	1888	0.0653	1712	0.0183	1882	0.0406	1755	0.0192
#17	1874	0.0653	1682	0.0183	1868	0.0406	1726	0.0192
#18	1860	0.0653	1653	0.0183	1854	0.0406	1696	0.0192
#19	1845	0.0653	1622	0.0183	1839	0.0406	1666	0.0192
#20	1830	0.0653	1591	0.0183	1825	0.0406	1635	0.0192

Table G.25.The summary of the dating for cores M032, M041, M047, and M050

Section ID	2010-M032BC (date)	Sed. Rate (g/cm2/year)	2011-M041MC (date)	Sed. Rate (g/cm2/year)	2010-M047BC (date)	Sed. Rate (g/cm2/year)	2010-M050BC (date)	Sed. Rate (g/cm2/year)
	Pb-210 F.F.= 2.09	CRS 1-slope	Pb-210 F.F.= 2.11	CRS 1-slope	Pb-210 F.F.= 2.64	CRS 1-slope	Pb-210 F.F.= 2.85	CRS 2-slope
#1	2008	0.0184	2009	0.0221	2009	0.0311	2010	0.0217
#2	2002	0.0184	2003	0.0221	2004	0.0311	2007	0.0217
#3	1994	0.0184	1996	0.0221	1999	0.0311	2003	0.0217
#4	1985	0.0184	1988	0.0221	1993	0.0311	2000	0.0431
#5	1976	0.0184	1979	0.0221	1986	0.0311	1995	0.0431
#6	1966	0.0184	1971	0.0221	1979	0.0311	1991	0.0431
#7	1956	0.0184	1961	0.0221	1972	0.0311	1985	0.0431
#8	1946	0.0184	1952	0.0221	1964	0.0311	1980	0.0195
#9	1935	0.0184	1942	0.0221	1956	0.0311	1974	0.0195
#10	1923	0.0184	1931	0.0221	1948	0.0311	1968	0.0195
#11	1905	0.0184	1915	0.0221	1936	0.0311	1958	0.0195
#12	1879	0.0184	1893	0.0221	1919	0.0311	1944	0.0195
#13	1852	0.0184	1870	0.0221	1901	0.0311	1929	0.0195
#14	1824	0.0184	1846	0.0221	1881	0.0311	1914	0.0195
#15	1796	0.0184	1822	0.0221	1861	0.0311	1899	0.0195
#16	1766	0.0184	1798	0.0221	1842	0.0311	1885	0.0195
#17	1736	0.0184	1773	0.0221	1823	0.0311	1870	0.0195
#18	1706	0.0184	1748	0.0221	1803	0.0311	1853	0.0195
#19	1675	0.0184	1724	0.0221	1783	0.0311	1835	0.0195
#20	1644	0.0184	1699	0.0221	1763	0.0311		

Table G.26.The summary of the dating for cores S002, S008, S011, and S012

Section ID	2011-S002MC (date)	Sed. Rate (g/cm2/year)	2011-S008MC (date)	Sed. Rate (g/cm2/year)	2011-S011MC (date)	Sed. Rate (g/cm2/year)	2011-S012MC (date)	Sed. Rate (g/cm2/year)
	Pb-210 F.F.= 0.82	CRS 1-slope	Pb-210 F.F.= 0.76	CRS 1-slope	Pb-210 F.F.= 2.45	CRS 1-slope	Pb-210 F.F.= 1.84	CRS 1-slope
#1	2007	0.0068	2006	0.00674	2007	0.0152	2006	0.0098
#2	1995	0.0068	1995	0.00674	1999	0.0152	1994	0.0098
#3	1974	0.0068	1981	0.00674	1989	0.0152	1981	0.0098
#4	1946	0.0068	1965	0.00674	1979	0.0152	1966	0.0098
#5	1910	0.0068	1948	0.00674	1967	0.0152	1952	0.0098
#6	1866	0.0068	1928	0.00674	1954	0.0152	1938	0.0098
#7	1823	0.0068	1906	0.00674	1941	0.0152	1924	0.0098
#8	1785	0.0068	1882	0.00674	1928	0.0152	1910	0.0098
#9	1748	0.0068	1856	0.00674	1916	0.0152	1896	0.0098
#10	1708	0.0068	1826	0.00674	1903	0.0152	1881	0.0098
#11	1629	0.0068	1779	0.00674	1883	0.0152	1856	0.0098
#12	1527	0.0068	1710	0.00674	1856	0.0152	1824	0.0098
#13	1444	0.0068	1638	0.00674	1829	0.0152	1790	0.0098
#14	1365	0.0068	1565	0.00674	1802	0.0152	1755	0.0098
#15	1285	0.0068	1490	0.00674	1777	0.0152	1718	0.0098
#16	1203	0.0068	1412	0.00674	1751	0.0152	1681	0.0098
#17	1120	0.0068	1334	0.00674	1726	0.0152	1644	0.0098
#18	1036	0.0068	1254	0.00674	1699	0.0152	1606	0.0098
#19	950	0.0068	1173	0.00674	1673	0.0152	1565	0.0098
#20	863	0.0068	1091	0.00674	1647	0.0152	1522	0.0098
#21	735	0.0068	965	0.00674	1610	0.0152	1454	0.0098
#22	562	0.0068	792	0.00674	1560	0.0152	1360	0.0098
#23	387	0.0068	608	0.00674	1507	0.0152	1264	0.0098
#24	212	0.0068	411	0.00674	1455	0.0152	1171	0.0098
#25	37	0.0068	213	0.00674	1400	0.0152	1084	0.0098

Table G.27.The summary of the dating for cores S016, S019, and S022

Section ID	2011-S016MC (date)	Sed. Rate (g/cm2/year)	2011-S019MC (date)	Sed. Rate (g/cm2/year)	2011-S022MC (date)	Sed. Rate (g/cm2/year)
	Pb-210 F.F.= 1.01	CRS 1-slope	Pb-210 F.F.= 0.62	CRS 1-slope	Pb-210 F.F.=0.60	CRS 2-slope
#1	2007	0.0074	2007	0.00877	2009	0.017478688
#2	1996	0.0074	1997	0.00877	2005	0.017478688
#3	1983	0.0074	1987	0.00877	2000	0.017478688
#4	1968	0.0074	1975	0.00877	1994	0.017478688
#5	1951	0.0074	1962	0.00877	1988	0.017478688
#6	1928	0.0074	1948	0.00877	1982	0.017478688
#7	1899	0.0074	1931	0.00877	1975	0.017478688
#8	1867	0.0074	1911	0.00877	1968	0.024891908
#9	1832	0.0074	1889	0.00877	1963	0.024891908
#10	1795	0.0074	1864	0.00877	1957	0.024891908
#11	1738	0.0074	1822	0.00877	1948	0.024891908
#12	1664	0.0074	1763	0.00877	1936	0.024891908
#13	1591	0.0074	1701	0.00877	1922	0.024891908
#14	1517	0.0074	1637	0.00877	1909	0.024891908
#15	1441	0.0074	1574	0.00877	1894	0.024891908
#16	1366	0.0074	1509	0.00877	1880	0.024891908
#17	1292	0.0074	1440	0.00877	1864	0.024891908
#18	1215	0.0074	1367	0.00877	1849	0.024891908
#19	1136	0.0074	1292	0.00877	1833	0.024891908
#20	1059	0.0074	1220	0.00877	1817	0.024891908
#21	943	0.0074	1112	0.00877	1794	0.024891908
#22	788	0.0074	969	0.00877	1764	0.024891908
#23	635	0.0074	835	0.00877	1733	0.024891908
#24	485	0.0074	700	0.00877	1701	0.024891908
#25	333	0.0074	562	0.00877	1668	0.024891908

Table G.28.The summary of the dating for cores H001, H006, H012 and H032

Section ID	2012-H001MC (date)	Sed. Rate (g/cm2/year)	2012-H006MC (date)	Sed. Rate (g/cm2/year)	2012-H012MC (date)	Sed. Rate (g/cm2/year)	2012-H032MC (date)	Sed. Rate (g/cm2/year)
	Pb-210 F.F.= 3.24	CIC 1-slope	Pb-210 F.F.= 2.17	CRS 2-slope	Pb-210 F.F.= 3.49	CRS 1-slope	Pb-210 F.F.= 3.16	CRS 1-slope
#1	2012.4	0.155	2011	0.0323	2012	0.0569	2012	0.0441
#2	2012	0.155	2008	0.0323	2010	0.0569	2009	0.0441
#3	2011	0.155	2004	0.0323	2007	0.0569	2005	0.0441
#4	2010	0.155	1999	0.0323	2003	0.0569	2002	0.0441
#5	2009	0.155	1993	0.0323	2000	0.0569	1997	0.0441
#6	2008	0.155	1986	0.0323	1996	0.0569	1993	0.0441
#7	2007	0.155	1978	0.0323	1992	0.0569	1988	0.0441
#8	2006	0.155	1970	0.0323	1987	0.0569	1982	0.0441
#9	2004	0.155	1961	0.0323	1983	0.0569	1977	0.0441
#10	2003	0.155	1952	0.0323	1979	0.0569	1972	0.0441
#11	2002	0.155	1929	0.0083	1974	0.0569	1967	0.0441
#12	2000	0.155	1892	0.0083	1970	0.0569	1961	0.0441
#13	1999	0.155	1855	0.0083	1965	0.0569	1956	0.0441
#14	1998	0.155	1819	0.0083	1961	0.0569	1950	0.0441
#15	1996	0.155	1781	0.0083	1957	0.0569	1945	0.0441
#16	1994	0.155	1723	0.0083	1949	0.0569	1937	0.0441
#17	1991	0.155	1646	0.0083	1939	0.0569	1925	0.0441
#18	1988	0.155	1570	0.0083	1929	0.0569	1914	0.0441
#19	1985	0.155	1495	0.0083	1919	0.0569	1903	0.0441
#20	1981	0.155	1419	0.0083	1909	0.0569	1892	0.0441
#21	1978	0.155	1341	0.0083			1881	0.0441
#22	1975	0.155	1262	0.0083			1869	0.0441
#23	1971	0.155	1183	0.0083			1857	0.0441
#24	1968	0.155	1105	0.0083			1845	0.0441
#25	1964	0.155	1028	0.0083			1833	0.0441

Table G.29.The summary of the dating for cores H038, H061, H048 and H095

Section ID	2012-H038MC (date)	Sed. Rate (g/cm2/year)	2012-H061MC (date)	Sed. Rate (g/cm2/year)	2012-H048MC (date)	Sed. Rate (g/cm2/year)	2012-H095MC (date)	Sed. Rate (g/cm2/year)
	Pb-210 F.F.= 0.89	CRS 1-slope	Pb-210 F.F.= 0.60	CRS 1-slope	Pb-210 F.F.=1.60	CRS 1-slope	Pb-210 F.F.= 1.13	CRS 2-slope
#1	2010	0.0087	2010	0.0063	2009	0.0166	2009	0.0139
#2	2002	0.0087	2002	0.0063	1998	0.0166	2001	0.0139
#3	1993	0.0087	1993	0.0063	1983	0.0166	1989	0.0139
#4	1982	0.0087	1981	0.0063	1968	0.0166	1972	0.0139
#5	1968	0.0087	1963	0.0063	1952	0.0166	1947	0.0139
#6	1950	0.0087	1939	0.0063	1935	0.0166	1911	0.0139
#7	1927	0.0087	1908	0.0063	1917	0.0166	1869	0.0139
#8	1900	0.0087	1875	0.0063	1899	0.0166	1829	0.0139
#9	1872	0.0087	1842	0.0063	1880	0.0166	1789	0.0139
#10	1844	0.0087	1810	0.0063	1861	0.0166	1751	0.0139
#11	1801	0.0087	1761	0.0063	1842	0.0166	1718	0.0139
#12	1744	0.0087	1695	0.0063	1823	0.0166	1686	0.0139
#13	1685	0.0087	1629	0.0063	1802	0.0166	1654	0.0139
#14	1625	0.0087	1559	0.0063	1781	0.0166	1622	0.0139
#15	1559	0.0087	1486	0.0063	1759	0.0166	1590	0.0139
#16	1490	0.0087	1415	0.0063	1727	0.0166		
#17	1421	0.0087	1349	0.0063	1686	0.0166		
#18	1354	0.0087	1285	0.0063	1645	0.0166		
#19	1289	0.0087	1220	0.0063	1602	0.0166		
#20	1227	0.0087	1153	0.0063				

Table G.30.The concentrations of BDE209, other ∑8 PBDEs, ∑6 PCDDs, and ∑10 PCFDs in different sections of cores H001 and H032

Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2012-H001MC				2012-H032MC			
#1	44.518	1.052	6.4786	2.6307	41.1211	0.846	0.7322	0.1659
#2	43.1726	1.090	6.1541	2.9379	47.2386	0.936	1.1095	0.2223
#3	40.366	1.075	7.0097	3.2802	38.4621	0.925	0.5297	0.1032
#4	40.2942	1.113	7.9231	3.5263	38.4189	0.953	1.3429	0.2634
#5	41.6116	1.820	7.6797	3.1948	37.5423	0.932	1.3643	0.2725
#6	53.2826	1.005	6.8138	3.1432	42.4735	0.778	1.2716	0.2555
#7	59.23	0.941	7.2264	3.2615	30.0376	0.408	1.2539	0.2603
#8	64.67	1.362	10.8526	3.6854	35.5624	0.448	1.5706	0.3252
#9	68.0458	1.475	13.4059	4.8313	24.5814	0.477	1.7478	0.3572
#10	86.383	1.285	8.6500	4.2423	16.594	0.069	1.6202	0.3363
#11	67.0237	1.267	9.7713	4.3726	5.16433	0.028	1.4231	0.3046
#12	66.9594	1.684	11.5528	3.9955	0.49699	0.054	1.4670	0.3345
#13	73.1476	1.182	8.7160	3.8194	0.32089	0.026	1.3681	0.2796
#14	87.5079	1.300	9.9059	4.1211	0.20097	0.023	1.1667	0.2617
#15	66.7093	1.019	11.4679	3.7594	0.21667	0.027	0.7090	0.1889
#16	66.806	0.910	8.7207	3.5557	0.20943	0.074	0.2308	0.0900
#17	65.4057	0.899	10.9045	4.8389	0.20749	0.018	0.0441	0.0562
#18	54.8519	0.624	9.5643	4.0583	0.2161	0.027	0.0299	0.0383
#19	73.9699	0.632	12.0593	5.0630	0.24583	0.022	0.0229	0.0166
#20	54.2689	0.328	11.1277	5.2329	0.22762	0.014	0.0190	0.0067
#21	56.242	0.334	9.9443	4.6447	0.27648	0.016	0.0125	0.0017
#22	47.3029	0.318	12.0942	4.9230	0.21631	0.016	0.0076	0.0005
#23	44.186	0.336	12.1949	5.3324	0.19667	0.009	0.0063	0.0003
#24	20.7299	0.711	6.9796	3.1981	0.21728	0.020	0.0059	0.0000
#25	14.2421	0.193	11.9119	5.3049	0.19735	0.020	0.0046	0.0001

Table G.31.The concentrations of BDE209, other ∑8 PBDEs, ∑6 PCDDs, and ∑10 PCFDs in different sections of cores H006, H048, H037, and H061

Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs	Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw		ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2012-H006MC					2012-H048MC			
#1	62.2189	1.033	0.8687	0.2096	#1	40.251	0.495	0.9989	0.1536
#2	54.8997	1.180	0.8566	0.2225	#2	37.3891	0.331	1.0997	0.1598
#3	55.9669	1.259	0.9459	0.2345	#3	29.5485	0.224	1.3697	0.2022
#4	41.8774	0.990	1.0687	0.3261	#4	17.6477	0.097	1.3815	0.2022
#5	48.9213	0.808	1.2053	0.2934	#5	7.11979	0.032	1.6188	0.2262
#6	46.2037	0.796	1.1786	0.2851	#6	0.44882	0.014	1.0872	0.1404
#7	34.7954	0.275	1.4882	0.3798	#7	0.19105	0.016	0.7359	0.1159
#8	19.3485	0.241	1.4551	0.3603	#8	0.17474	0.015	0.3311	0.0670
#9	8.84509	0.067	1.4721	0.4083	#9	0.18688	0.012	0.1308	0.0397
#10	6.43823	0.038	1.3144	0.3926	#10	0.20183	0.011	0.0234	0.0063
#11	0.69488	0.034	0.7769	0.2495	#11	0.1846	0.010	0.0074	0.0018
#12	0.27636	0.015	0.3271	0.1055	#12	0.16824	0.013	0.0069	0.0009
#13	0.2708	0.018	0.0386	0.0144	#13	0.18854	0.008	0.0069	0.0005
#14	0.26735	0.020	0.0165	0.0022		2012-H061MC			
#15	0.35669	0.021	0.0098	0.0008	#1	34.8753	0.659	1.0935	0.1455
#16	0.48863	0.025	0.0118	0.0014	#2	33.2112	0.539	0.9772	0.1345
	2012-H037MC				#3	27.0014	0.403	0.8546	0.1111
#1	27.7101	0.477	0.6399	0.0840	#4	28.6608	0.418	0.9222	0.1247
#2	23.7367	0.322	0.4794	0.0672	#5	16.7983	0.196	0.7437	0.1005
#3	11.1943	0.078	0.2557	0.0351	#6	5.81956	0.038	0.6112	0.0841
#4	1.13494	0.026	0.0891	0.0111	#7	1.29927	0.011	0.2394	0.0318
#5	0.14994	0.015	0.0109	0.0003	#8	0.22786	0.013	0.0824	0.0092
#6	0.12961	0.012	0.0041	0.0000	#9	0.47721	0.010	0.0245	0.0021
#7	0.1211	0.009	0.0029	0.0000					
#8	0.1218	0.016	0.0033	0.0000					

Table G.32.The concentrations of BDE209, and the other ∑8 PBDEs in different sections of cores H012, H038, and H061

Section ID	BDE209	∑8PBDEs	BDE209	∑8PBDEs	BDE209	∑8PBDEs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2012-H012MC		2012-H038MC		2012-H095MC	
#1	34.3973	0.781	29.4705	0.700	30.0649	0.770
#2	32.2408	0.995	34.3603	0.892	26.7985	0.755
#3	36.3721	1.081	33.7146	0.825	27.0563	0.482
#4	34.6303	1.348	33.504	0.732	17.5802	0.350
#5	31.1367	1.021	26.9873	0.521	10.1021	0.382
#6	34.5284	0.866	13.1324	0.288	0.89349	0.014
#7	31.1122	0.653	9.12217	0.182	0.16695	0.009
#8	26.8372	0.446	1.7894	0.023	0.28645	0.008
#9	19.6566	0.295	0.35874	0.018	0.21035	0.007
#10	16.6226	0.240	0.42268	0.011	0.16279	0.010
#11	10.3031	0.149	0.23036	0.008	0.21969	0.012
#12	7.81944	0.044	0.14369	0.012		
#13	3.25027	0.021	0.11344	0.005		
#14	0.57092	0.014	6.42615	0.015		
#15	0.2975	0.013	0.10607	0.013		
#16	0.27341	0.008				
#17	0.24858	0.009				
#18	0.31747	0.007				
#19	0.27488	0.008				
#20	0.3684	0.007				
#21	0.34294	0.010				

Table G.33.The concentrations of BDE209, other ∑8 PBDEs, ∑6 PCDDs, and ∑10 PCFDs in different sections of cores S001, S002, S008, S114, S011 and S012

Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2011 S001MC			
#1	1.12575	0.021	0.0366	0.0042
#2	0.22734	0.013	0.0187	0.0028
#3	0.02807	0.031	0.0088	0.0032
#4	0.02561	0.010	0.0039	0.0003
	2011 S002MC			
#1	15.982	0.688	0.5386	0.0525
#2	12.1354	0.514	0.7211	0.0941
#3	8.66235	0.152	0.6263	0.0887
#4	2.37945	0.075	0.2718	0.0337
#5	0.50176	0.051	0.0768	0.0091
#6	0.05948	0.010	0.0047	0.0000
	2011 S008MC			
#1	17.4336	0.288	0.9485	0.1160
#2	13.9517	0.225	0.9495	0.1163
#3	9.55354	0.164	0.8066	0.0926
#4	4.0039	0.063	0.6137	0.0747
#5	1.34458	0.027	0.5994	0.0712
#6	0.28806	0.037	0.3097	0.0386
#7	0.14035	0.016	0.0823	0.0160
#8	0.15016	0.026	0.0307	0.0086
#9	0.08105	0.009	0.0326	0.0084
#10	0.0629	0.022	0.0371	0.0079
	2011 S114MC			
#1	3.60635	0.253	0.2795	0.0332
#2	2.2112	0.076	0.1832	0.0211
#3	1.13123	0.046	0.1144	0.0126
#4	0.17396	0.026	0.0732	0.0121
#5	0.02408	0.010	0.0123	0.0024

Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2011 S011MC			
#1	14.9777	0.714	0.7145	0.1059
#2	13.2195	0.781	0.8733	0.1293
#3	14.6097	0.468	0.8179	0.1207
#4	16.0791	0.307	1.1815	0.1755
#5	7.94133	0.183	1.0405	0.1603
#6	5.16435	0.076	1.0922	0.1708
#7	1.52521	0.038	0.6756	0.1024
#8	0.27194	0.017	0.4005	0.0619
#9	0.07027	0.008	0.2455	0.0450
#10	0.07303	0.012	0.2561	0.0446
#11	0.04391	0.007	0.1543	0.0262
#12	0.06296	0.009	0.0678	0.0131
#13	0.08916	0.007	0.0452	0.0101
#14	0.0668	0.007	0.0391	0.0076
	2011 S012MC			
#1	10.9535	0.340	0.8388	0.1004
#2	10.8427	0.813	0.9910	0.1291
#3	10.5906	0.223	0.8331	0.1045
#4	7.85401	0.112	0.8398	0.1050
#5	4.43626	0.087	0.6390	0.0797
#6	2.27074	0.055	0.7364	0.0914
#7	1.0887	0.018	0.6709	0.0879
#8	0.3396	0.015	0.2281	0.0332
#9	0.08802	0.048	0.0618	0.0143
#10	0.02769	0.012	0.0499	0.0098
#11	0.02735	0.020	0.0271	0.0067

Table G.34.The concentrations of BDE209, other ∑8 PBDEs, ∑6 PCDDs, and ∑10 PCFDs in different sections of cores S016, S019, and S022

Section ID	BDE209 ng/g dw	∑8PBDEs ng/g dw	t-PCDDs ng/g dw	t-PCDFs ng/g dw
	2011 S016MC			
#1	12.069	0.412	0.7765	0.1107
#2	9.99076	0.322	0.7386	0.1077
#3	10.2711	0.256	0.6390	0.0903
#4	8.68726	0.203	0.8732	0.1257
#5	6.55209	0.106	0.2133	0.0443
#6	2.11758	0.022	0.3472	0.0545
#7	0.8097	0.021	0.1270	0.0194
#8	0.25815	0.026	0.0454	0.0089
#9	0.25012	0.013	0.0253	0.0058
	2011 S019MC			
#1	11.5751	0.333	0.5479	0.0863
#2	10.2113	0.765	0.5051	0.0807
#3	4.2471	0.104	0.5650	0.1199
#4	1.80569	0.033	0.5095	0.1294
#5	0.48742	0.014	0.5745	0.1643
#6	0.18842	0.015	0.0610	0.0216
#7	0.09606	0.017	0.0300	0.0090
#8	0.07172	0.023	0.2367	0.0772
#9	0.07089	0.011	0.0140	0.0031
#10	0.06862	0.014	0.0102	0.0023
#11	0.07563	0.010	0.0095	0.0021

Section ID	BDE209 ng/g dw	∑8PBDEs ng/g dw	t-PCDDs ng/g dw	t-PCDFs ng/g dw
	2011 S022MC			
#1	5.44254	0.654	0.7576	0.1626
#2	5.69511	0.542	0.9557	0.1868
#3	5.66867	0.540	1.0026	0.1822
#4	4.5634	0.387	1.4497	0.3042
#5	1.67468	0.150	1.8210	0.4082
#6	1.07832	0.051	2.1130	0.5253
#7	0.21064	0.022	2.5379	1.3996
#8	0.07247	0.027	2.3313	2.1275
#9	0.05805	0.019	1.9577	2.1383
#10	0.05229	0.021	0.7819	1.1313
#11	0.04522	0.026	0.3369	0.5458
#12	0.05399	0.144	0.0329	0.0371
#13	0.02597	0.013	0.0153	0.0042
#14	0.0263	0.014	0.0146	0.0017
#15	0.02785	0.010	0.0098	0.0014
#16	0.05385	0.054	0.0113	0.0009
#17	0.03277	0.010	0.0103	0.0008
#18	0.0321	0.020	0.0196	0.0031

Table G.35.Concentrations of BDE209, other ∑8 PBDEs, ∑6 PCDDs, and ∑10 PCFDs in different sections of cores M008, M009, and M011

Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs	Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs	Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw		ng/g dw	ng/g dw	ng/g dw	ng/g dw		ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2010-M008BC					2010-M009BC					2010-M011BC			
#1	88.8439	2.275	0.7603	0.0947	#1	28.5951	2.673	0.2770	0.0607	#1	74.5449	3.790	0.7229	0.1188
#2	98.4495	2.460	0.6504	0.0966	#2	29.9049	2.933	0.2999	0.0606	#2	72.8234	2.015	0.6445	0.1212
#3	95.3711	2.446	0.6133	0.0936	#3	32.5951	2.567	0.3351	0.0730	#3	77.707	2.326	0.7487	0.1250
#4	95.8595	2.898	0.6038	0.0908	#4	29.2466	1.926	0.3374	0.0776	#4	83.1861	1.955	0.7255	0.1218
#5	85.3753	1.949	0.5060	0.0756	#5	27.8474	1.420	1.0496	0.1339	#5	72.3245	1.924	0.7056	0.1298
#6	60.7972	1.491	0.5865	0.0706	#6	25.115	0.973	0.5094	0.1375	#6	66.6801	1.661	0.7483	0.1278
#7	56.4787	0.646	0.4254	0.0931	#7	34.6187	0.750	0.5482	0.1401	#7	62.0143	1.653	0.9407	0.1785
#8	36.093	0.314	0.2413	0.0509	#8	37.8369	0.517	0.5869	0.1593	#8	62.081	0.880	0.8286	0.1482
#9	11.5171	0.025	0.1046	0.0128	#9	24.8168	0.203	0.6810	0.2179	#9	47.157	0.917	0.7033	0.1402
#10	1.44906	0.015	0.0334	0.0019	#10	14.9243	0.036	0.7719	0.2819	#10	32.3979	0.347	0.7883	0.1618
#11	0.36418	0.009	0.0000	0.0000	#11	0.24516	0.016	0.7315	0.3771	#11	15.0809	0.051	0.6279	0.1278
#12	0.12594	0.008	0.0000	0.0000	#12	0.14014	0.016	0.5311	0.3687	#12	3.31867	0.033	0.3946	0.0836
#13	0.13084	0.007	0.0000	0.0000	#13	0	0.013	0.3575	0.2794	#13	0.23628	0.034	0.1573	0.0334
#14	0.11233	0.010	0.0000	0.0000	#14	0.16074	0.030	0.1248	0.0854	#14	0.26255	0.038	0.0273	0.0023
#15	0.12534	0.008	0.0000	0.0000	#15	0.18629	0.017	0.0135	0.0309	#15	0.29122	0.034	0.0023	0.0000
#16	0.14581	0.009	0.0000	0.0000	#16	0.10775	0.032	0.0205	0.0059	#16	0.28385	0.024	0.0000	0.0000
#17	0.15414	0.012	0.0000	0.0000	#17	0.19043	0.023	0.0027	0.0002	#17	0.36063	0.024	0.0000	0.0000
#18	0.11777	0.011	0.0000	0.0000	#18	0.22042	0.020	0.0047	0.0005	#18	0.30545	0.029	0.0000	0.0000
#19	0.13112	0.009	0.0000	0.0000	#19	0.37495	0.062	0.0029	0.0000	#19	0.31143	0.026	0.0000	0.0000
#20	0.13491	0.013	0.0000	0.0000	#20	0.1622	0.015	0.0026	0.0000	#20	0.34567	0.029	0.0000	0.0000

Table G.366. Concentrations of BDE209, other ∑8 PBDEs, ∑6 PCDDs, and ∑10 PCFDs in different sections of cores M018, M024, and M032

Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs	Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs	Section ID	BDE209	∑8PBDEs	t-PCDDs	t-PCDFs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw		ng/g dw	ng/g dw	ng/g dw	ng/g dw		ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2010-M018BC					2010-M024BC					2010-M032BC			
#1	62.0917	2.791	0.6098	0.1000	#1	48.4278	1.715	0.7367	0.1165	#1	52.6365	2.015	1.0075	0.1524
#2	64.7793	2.592	0.9219	0.1574	#2	34.12	1.696	0.6675	0.1021	#2	54.7791	2.307	0.9434	0.1504
#3	58.5652	2.322	0.9882	0.1752	#3	37.2455	1.707	0.6384	0.1084	#3	60.1496	2.158	0.9114	0.1502
#4	56.9925	1.847	0.9638	0.1862	#4	37.9234	1.644	0.6536	0.1098	#4	61.3484	2.037	1.1643	0.1601
#5	45.1564	0.632	0.7585	0.1503	#5	37.2412	1.267	0.6557	0.1100	#5	50.2167	1.259	1.0334	0.1570
#6	8.64507	0.092	0.9652	0.1696	#6	26.9546	0.868	0.7175	0.1260	#6	36.8647	0.956	1.1556	0.1722
#7	0.30082	0.018	0.6140	0.1076	#7	18.0447	0.432	0.8592	0.1489	#7	27.7059	0.581	1.0217	0.1677
#8	0.43855	0.019	0.2809	0.0412	#8	6.36255	0.301	0.5470	0.0946	#8	11.9219	0.322	0.8643	0.1490
#9	0.21464	0.017	0.1093	0.0061	#9	2.23492	0.127	0.2862	0.0403	#9	3.88535	0.070	0.5546	0.1049
#10	0.21691	0.019	0.0594	0.0017	#10	0.98099	0.088	0.0895	0.0074	#10	0.43678	0.015	0.1812	0.0416
#11	0.18556	0.037	0.0164	0.0009	#11	0.84073	0.044	0.0132	0.0011	#11	0.13276	0.012	0.0262	0.0082
#12	0.19544	0.020	0.0000	0.0004	#12	0.16056	0.013	0.0000	0.0000	#12	0.27253	0.008	0.0095	0.0005
#13	0.20393	0.021	0.0000	0.0004	#13	0.17579	0.008	0.0000	0.0000	#13	0.18013	0.021	0.0000	0.0000
#14	0.18717	0.029	0.0000	0.0004	#14	0.13999	0.009	0.0000	0.0000	#14	0.42171	0.022	0.0000	0.0000
#15	0.19712	0.027	0.0000	0.0004	#15	0.11294	0.008	0.0000	0.0000	#15	0.24753	0.013	0.0001	0.0000
#16	0.17982	0.025	0.0000	0.0005	#16	0.13306	0.011	0.0000	0.0000	#16	0.10768	0.008	0.0000	0.0000
#17	0.18017	0.020	0.0000	0.0004	#17	0.11046	0.009	0.0000	0.0000	#17	0.14939	0.009	0.0028	0.0000
#18	0.21011	0.022	0.0000	0.0004	#18	0.10691	0.006	0.0000	0.0000	#18	0.14247	0.006	0.0000	0.0000
#19	0.26244	0.023	0.0000	0.0005	#19	0.15513	0.016	0.0000	0.0000	#19	0.12659	0.004	0.0000	0.0000
#20	0.20957	0.019	0.0073	0.0019	#20	0.08085	0.003	0.0000	0.0000	#20	0.15094	0.005	0.0000	0.0000

Table G.377. Concentrations of BDE209, other ∑8 PBDEs, ∑6 PCDDs, and ∑10 PCFDs in different sections of cores M028, M041, M047 and M050

Section ID	BDE209 ng/g dw	∑8PBDEs ng/g dw	t-PCDDs ng/g dw	t-PCDFs ng/g dw
	2011-M028MC			
#1	7.88632	0.433	0.1087	0.0117
#2	2.74814	0.106	0.0290	0.0015
#3	0.08321	0.004	0.0000	0.0000
#4	0.0845	0.010	0.0000	0.0000
#5	0.0791	0.009	0.0000	0.0000
#6	0.07656	0.007	0.0000	0.0000
#7	0.09215	0.008	0.0000	0.0000
	2011-M041MC			
#1	82.4821	2.650	0.9869	0.1441
#2	87.0662	2.664	1.0937	0.1496
#3	89.163	2.456	1.0409	0.1563
#4	79.8534	1.749	1.0275	0.1680
#5	62.2763	0.905	1.2891	0.2015
#6	39.8014	0.583	1.2011	0.2020
#7	21.3871	0.219	1.1392	0.1797
#8	8.79169	0.107	1.1777	0.1994
#9	1.93952	0.039	0.5921	0.1099
#10	0.85196	0.026	0.2651	0.0549
#11	0.51491	0.014	0.1278	0.0259
#12	0.37502	0.009	0.0950	0.0197
#13	0.34324	0.082	0.0714	0.0098
#14	0.29352	0.009	0.0437	0.0023
#15	0.30558	0.010	0.0000	0.0000
#16	0.40722	0.012	0.0000	0.0000
#17	0.39022	0.010	0.0009	0.0000
#18	0.41136	0.016	0.0000	0.0005
#19	0.35355	0.013	0.0047	0.0000
#20	0.29801	0.031	0.0259	0.0343

Section ID	BDE209 ng/g dw	∑8PBDEs ng/g dw	t-PCDDs ng/g dw	t-PCDFs ng/g dw
	2010-M047BC			
#1	78.7729	2.437	0.8436	0.1493
#2	83.9599	2.264	0.7331	0.1465
#3	77.1868	1.421	0.7192	0.1163
#4	84.5789	2.780	0.8875	0.1483
#5	71.5231	0.953	0.9373	0.1703
#6	65.0891	0.448	1.0557	0.1864
#7	44.8273	0.181	1.4445	0.2163
#8	16.484	0.036	1.2592	0.1907
#9	8.4371	0.017	0.8991	0.1642
#10	1.64218	0.015	0.5682	0.1105
#11	0.26516	0.022	0.2041	0.0498
#12	0.32352	0.018	0.0587	0.0159
#13	0.26583	0.012	0.0167	0.0047
#14	0.34067	0.014	0.0000	0.0000
#15	0.25591	0.015	0.0000	0.0000
	2011-M050MC			
#1	27.6893	0.824	4.8006	0.5176
#2	25.8014	0.798	4.2594	0.5086
#3	37.9563	0.861	5.1741	0.5133
#4	26.6949	1.033	4.8617	0.5156
#5	22.8366	0.845	3.9384	0.4207
#6	20.9005	0.685	3.7946	0.4315
#7	17.9746	0.593	4.0585	0.4303
#8	17.3556	0.586	3.8942	0.4001
#9	18.2435	0.527	3.8390	0.4523
#10	15.8694	0.376	4.4414	0.4422
#11	6.20931	0.173	4.8974	0.5204
#12	1.03789	0.028	4.7782	0.5126
#13	0.47096	0.016	3.4104	0.4042
#14	0.63844	0.185	0.8365	0.1264

Table G.388. Concentrations of different PCB homologues, and ∑58 PCBs in different sections of cores S001, S002, S008 and S011

Section ID	di-PCBs	Tri-PCBs	Tetra-PCBs	Penta-PCBs	Hexa-PCBs	Hepta-PCBs	Octa-PCBs	Nona-PCBs	Deca-PCBs	∑58 PCBs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2011 S001MC									
#1	0.02923	0.02939	0.0362992	0.089433	0.1053353	0.04210553	0.027568	0.0165585	0.025543	0.40146
#2	0.02958	0.02729	0.0259559	0.06787916	0.0741511	0.03668929	0.029519	0.043253	0.088867	0.42318
#3	0.04218	0.04222	0.0291818	0.05647309	0.0313469	0.00686017	0.003814	0.0012617	0	0.21334
#4	0.02865	0.02702	0.0193759	0.03375342	0.0182887	0.00257192	0.001002	0	0	0.13066
	2011 S002MC									
#1	0.21052	0.24095	0.4792624	1.19858622	1.298862	0.57188893	0.367799	0.2131035	0.213642	4.79462
#2	0.15609	0.17799	0.3065451	0.95605258	1.139793	0.5443912	0.34692	0.2022693	0.182782	4.01283
#3	0.08589	0.09458	0.1923456	0.59293649	0.8199885	0.47052405	0.335908	0.2251997	0.248045	3.06542
#4	0.05133	0.06609	0.1356585	0.46565423	0.4807871	0.23959229	0.176762	0.1685743	0.2519	2.03635
#5	0.04413	0.05461	0.0934225	0.30607201	0.2354186	0.07257676	0.049824	0.0343589	0.023508	0.91393
	2011 S008MC									
#1	0.17282	0.19065	1.1467585	3.587858	3.1424186	1.16377832	0.702002	0.4137941	0.454003	10.9741
#2	0.13766	0.20058	2.5989687	6.85632761	3.8967713	1.05857296	0.656713	0.4664875	0.512599	16.3847
#3	0.09876	0.1189	0.9320535	2.53560361	2.0385282	0.73299937	0.474837	0.4142482	0.650278	7.99621
#4	0.09509	0.11396	0.7189423	2.81042557	2.0427438	0.69724393	0.438327	0.2690611	0.272618	7.45841
#5	0.08109	0.1002	0.840898	4.37040837	2.8813419	0.73526598	0.4375	0.2959656	0.362344	10.105
#6	0.07337	0.07862	0.2147119	0.43719551	0.3688197	0.2459202	0.221443	0.2303475	0.384028	2.25446
#7	0.04978	0.04957	0.0458799	0.07977884	0.0801167	0.04696601	0.045646	0.0667047	0.133949	0.59839
#8	0.06222	0.06119	0.0427704	0.07611172	0.0423814	0.00873171	0.006788	0.0083176	0.00568	0.31419
#9	0.02606	0.03041	0.0266495	0.04631363	0.0220373	0.00580557	0.006926	0.009663	0.00474	0.1786
#10	0.021	0.02275	0.0192398	0.03540439	0.0183742	0.00562552	0.00722	0.0105558	0.004554	0.14472
	2011 S011MC									
#1	0.15516	0.17415	0.2922686	0.82856114	1.2694715	0.60223883	0.358394	0.2024064	0.189319	4.07197
#2	0.0803	0.09913	0.2199631	0.74193354	1.1986131	0.57819983	0.339625	0.200299	0.227005	3.68506
#3	0.09368	0.1113	0.2420596	0.82358241	1.42671	0.72330633	0.430275	0.2452343	0.264007	4.36016
#4	0.08733	0.11305	0.3023769	1.08455862	1.7148624	0.93686095	0.535415	0.2932669	0.29092	5.35864
#5	0.11538	0.12685	0.3198107	1.18394101	2.1846687	1.15538007	0.721446	0.4136048	0.448485	6.66957
#6	0.09916	0.11392	0.2581068	0.9284609	1.6163572	1.00268331	0.719048	0.4848403	0.552685	5.77526
#7	0.06463	0.06645	0.1130355	0.38459098	0.7244886	0.53747238	0.462563	0.4838078	0.591635	3.42868
#8	0.06907	0.0738	0.1176054	0.33493264	0.4844633	0.2994398	0.233565	0.2381361	0.316333	2.16734
#9	0.03571	0.03896	0.0772544	0.23230957	0.3519821	0.21851558	0.157032	0.1033339	0.104302	1.31941
#10	0.04131	0.04583	0.0700634	0.18656587	0.2786319	0.16834299	0.122719	0.0774202	0.076121	1.06701
#11	0.02756	0.02852	0.0312076	0.07234315	0.1009736	0.07828128	0.072799	0.0819423	0.109968	0.60359
#12	0.02647	0.02732	0.0246683	0.04744438	0.0349391	0.02222921	0.033495	0.0665195	0.091738	0.37482
#13	0.02862	0.02863	0.0249945	0.04224269	0.022681	0.00908089	0.012443	0.0283765	0.018757	0.21583
#14	0.02953	0.02994	0.0273995	0.04828794	0.0256619	0.0071535	0.008419	0.0133845	0.007121	0.1969

Table G.399. Concentrations of different PCB homologues, and ∑58 PCBs in different sections of cores S011, S016, and S019

Section ID	di-PCBs	Tri-PCBs	Tetra-PCBs	Penta-PCBs	Hexa-PCBs	Hepta-PCBs	Octa-PCBs	Nona-PCBs	Deca-PCBs	∑58 PCBs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2011 S012MC									
#1	0.11275	0.12655	0.2344139	0.77641532	1.3100318	0.62711469	0.360932	0.2449814	0.244093	4.03728
#2	0.10316	0.12068	0.2333468	0.80550181	1.4038762	0.69426345	0.398147	0.2953694	0.355453	4.40979
#3	0.14468	0.14899	0.2714848	1.04081246	1.8126936	0.89613914	0.504243	0.3258301	0.394723	5.53959
#4	0.11133	0.12737	0.3087707	1.17333928	1.6413823	1.14457191	0.652586	0.4245786	0.4866	6.07053
#5	0.1178	0.1249	0.2793122	1.03749458	1.9323179	1.10430589	0.672153	0.4893665	0.615176	6.37282
#6	0.07962	0.09437	0.1990013	0.73111935	1.4094787	0.87164188	0.560511	0.4562765	0.625939	5.02796
#7	0.04368	0.0438	0.096382	0.35894737	0.7618609	0.54531914	0.417317	0.4629118	0.784316	3.51454
#8	0.05227	0.05294	0.0577168	0.14037347	0.2133829	0.16286273	0.146392	0.2136558	0.319776	1.35937
#9	0.03967	0.03415	0.0276418	0.05325687	0.0623159	0.03438648	0.028814	0.0774119	0.094004	0.45165
#10	0.02274	0.01961	0.0137547	0.01952755	0.0112721	0.00422961	0.006474	0.0106449	0.008626	0.11688
#11	0.01921	0.01705	0.0153752	0.02332078	0.0105623	0.00143993	0.001433	0.0039586	0.001566	0.09392
	2011 S016MC									
#1	0.11145	0.13547	0.2683039	0.83388013	1.3236879	0.63732809	0.366697	0.2121459	0.22993	4.11889
#2	0.09367	0.10772	0.2330094	0.76081663	1.2380117	0.57273566	0.345866	0.2117874	0.28923	3.85285
#3	0.08538	0.10401	0.240114	0.77130201	1.226913	0.57564777	0.319294	0.1954876	0.199163	3.71731
#4	0.08384	0.10259	0.2394856	0.76794765	1.2746228	0.62903027	0.364414	0.2137313	0.193185	3.86884
#5	0.06635	0.08351	0.1873081	0.60962638	0.9978878	0.50258785	0.301838	0.1673526	0.184514	3.10097
#6	0.04474	0.04939	0.1002639	0.30000718	0.5148226	0.29993523	0.214026	0.1866236	0.242482	1.95229
#7	0.02728	0.02615	0.0587498	0.15862215	0.2347195	0.11574442	0.079343	0.0694758	0.082133	0.85222
#8	0.02437	0.02369	0.0281286	0.05718423	0.0650407	0.03362646	0.027286	0.0341064	0.026914	0.32035
#9	0.01706	0.01923	0.0163824	0.03201948	0.0261427	0.0090198	0.012043	0.0241762	0.022401	0.17848
	2011 S019MC									
#1	0.16735	0.16513	0.2732495	0.79608558	1.2020725	0.56379529	0.289716	0.1454605	0.139447	3.7423
#2	0.10065	0.11433	0.2318283	0.72664628	1.218563	0.58375435	0.304315	0.1611594	0.115499	3.55675
#3	0.09224	0.1003	0.2341447	0.80712058	1.3454232	0.70755353	0.363329	0.2507938	0.287499	4.1884
#4	0.05903	0.06425	0.1606434	0.583095	1.0399657	0.6585385	0.434199	0.3476112	0.334516	3.68185
#5	0.0323	0.03339	0.0745405	0.28972822	0.5804983	0.45536659	0.37019	0.3733047	0.474241	2.68356
#6	0.03066	0.02888	0.0302564	0.08042042	0.1348433	0.13011216	0.140299	0.2174413	0.265772	1.05868
#7	0.03434	0.02669	0.0231023	0.04732911	0.0602153	0.05359206	0.056955	0.0781633	0.069639	0.45003
#8	0.02258	0.02141	0.0175417	0.02704032	0.0258513	0.02010348	0.019283	0.0236448	0.020597	0.19805
#9	0.02275	0.02199	0.0149082	0.02489076	0.0149991	0.0052359	0.006366	0.007961	0.004687	0.1238
#10	0.04447	0.04	0.0234303	0.05197288	0.0247422	0.00452409	0.003203	0.0018703	0.001454	0.19566
#11	0.01868	0.01794	0.0110649	0.01753358	0.008926	0.00113148	0.00136	0.0014336	0	0.07807

Table G.40. Concentrations of different PCB homologues, and ∑58 PCBs in different sections of cores S022, and S114

Section ID	di-PCBs	Tri-PCBs	Tetra-PCBs	Penta-PCBs	Hexa-PCBs	Hepta-PCBs	Octa-PCBs	Nona-PCBs	Deca-PCBs	∑58 PCBs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2011 S022MC									
#1	0.18517	0.14629	0.3151747	1.10400286	1.4972312	0.74849656	0.337733	0.1076435	0.04321	4.48495
#2	0.17036	0.14122	0.3016198	1.10904549	1.6309248	0.86426285	0.364054	0.08852	0.050754	4.72077
#3	0.18515	0.13417	0.3164742	1.29104094	1.8802436	0.96751158	0.393851	0.095943	0.067099	5.33148
#4	0.23554	0.16676	0.4891067	2.10035271	3.0250345	1.53457896	0.596495	0.1385095	0.063188	8.34957
#5	0.20901	0.17693	0.4921645	2.35165037	3.6270444	1.93565957	0.79206	0.2094419	0.112395	9.90636
#6	0.21348	0.1828	0.564991	2.74882059	3.8716417	1.94906082	0.847006	0.3101985	0.226774	10.9148
#7	0.15495	0.13726	0.5133994	2.46961577	3.240618	1.67856592	0.886023	0.4520817	0.384839	9.91736
#8	0.14482	0.12444	0.3101298	1.44606948	1.9668571	1.21808665	0.815876	0.6846939	0.701359	7.41233
#9	0.08707	0.07168	0.1514247	0.67603699	0.9965683	0.77420587	0.61356	0.7222201	0.774934	4.86771
#10	0.04795	0.03619	0.0665994	0.28919338	0.462849	0.42187428	0.384998	0.5740813	0.605534	2.88927
#11	0.06971	0.05544	0.0456771	0.11335853	0.1344831	0.12524533	0.139526	0.2776858	0.251296	1.21242
#12	0.02445	0.02044	0.0168636	0.030699	0.0267719	0.01787558	0.021177	0.0372546	0.029135	0.22466
#13	0.02397	0.02241	0.0175715	0.02821336	0.0144669	0.00152811	0.001311	0.0013796	0.00104	0.11189
#14	0.02073	0.02056	0.0152927	0.02511069	0.0113086	0.00162297	0.001179	0.0011194	0	0.09692
#15	0.01555	0.01432	0.0113141	0.01407935	0.0067707	0.00125877	0.000855	0.0008308	0	0.06498
#16	0.02319	0.02056	0.014324	0.01726	0.0074659	0.00126635	0.001269	0.0014076	0	0.08675
#17	0.01853	0.01512	0.0122056	0.01392019	0.0061675	0.00114443	0.001175	0.0009647	0	0.06923
#18	0.02659	0.03055	0.0253494	0.05501132	0.0231095	0.00225473	0.001092	0.0009059	0	0.16486
	2011 S114MC									
#1	0.07192	0.06361	0.0713222	0.1904881	0.3216171	0.14086417	0.09061	0.0537732	0.068435	1.07264
#2	0.06028	0.05167	0.0482885	0.11614196	0.1740487	0.08574758	0.059747	0.0344455	0.051653	0.68203
#3	0.12138	0.08655	0.0459823	0.11702471	0.1699445	0.04717743	0.05206	0.0283157	0.019188	0.68763
#4	0.03421	0.02605	0.0121841	0.0211188	0.0151813	0.00531169	0.003252	0.0021254	0.002159	0.12159

Table G.401. Concentrations of different PCB homologues, and ∑58 PCBs in different ponar grabs in Lake Superior

Location ID	di-PCBs	Tri-PCBs	Tetra-PCBs	Penta-PCBs	Hexa-PCBs	Hepta-PCBs	Octa-PCBs	Nona-PCBs	Deca-PCBs	∑58 PCBs
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw
	2011 PonarGrabs									
S001PG	0.05675	0.05899	0.0810544	0.19174347	0.2376229	0.11470643	0.081583	0.0559219	0.078822	0.9572
S002PG	0.03133	0.03137	0.0540511	0.1454261	0.1847405	0.08001016	0.056578	0.0323489	0.029611	0.64546
S008PG	0.05504	0.05166	0.0676513	0.16991447	0.2139136	0.1180426	0.096648	0.0947474	0.123122	0.99075
S011PG	0.13494	0.10719	0.1082473	0.2939068	0.3985582	0.23433847	0.186188	0.1528192	0.210618	1.82681
S012PG	0.15673	0.13086	0.0914292	0.2394751	0.3448847	0.1901552	0.130748	0.0914112	0.097661	1.47336
S016PG	0.03208	0.03056	0.0370571	0.06830697	0.0580304	0.01882769	0.014997	0.0108927	0.005653	0.2764
S019PG	0.09651	0.07513	0.0570455	0.11430469	0.0786381	0.0256926	0.018982	0.0160599	0.013123	0.49548
S022PG	0.29242	0.1929	0.2187068	0.8139096	1.050226	0.58391863	0.258336	0.1992757	0.171041	3.78074
S102PG	0.03224	0.0313	0.0371314	0.06769912	0.0704152	0.04465456	0.032991	0.0233868	0.024755	0.36457
S103PG	0.04178	0.03939	0.0504681	0.1294768	0.1767877	0.08503573	0.066784	0.0513659	0.090754	0.73184
S104PG	0.03349	0.03244	0.0359531	0.07977359	0.1157403	0.0614918	0.052044	0.0387307	0.045207	0.49487
S105PG	0.0501	0.04636	0.0375845	0.06417302	0.0484341	0.01567259	0.013002	0.0122343	0.005121	0.29269
S106PG	0.24975	0.18647	0.2178358	0.58341279	0.6863431	0.35398264	0.272738	0.1942696	0.227228	2.97202
S108PG	0.10395	0.06352	0.0329812	0.04807962	0.0330489	0.00966364	0.008598	0.0083141	0.003562	0.31171
S110PG	0.0231	0.01827	0.0150698	0.03308825	0.0338854	0.01025904	0.009343	0.0165582	0.016712	0.17629
S112PG	0.07088	0.05348	0.0393399	0.08016277	0.0952677	0.04622737	0.039964	0.043652	0.06987	0.53884
S113PG	0.04019	0.03789	0.0654982	0.18605411	0.2837912	0.15860452	0.12675	0.0981927	0.108481	1.10545
S114PG	0.03249	0.03183	0.0376575	0.07840732	0.0808941	0.03206446	0.024117	0.0165225	0.007571	0.34155
S116PG	0.12375	0.09234	0.0822676	0.22288648	0.3567395	0.20744344	0.165045	0.1416282	0.174793	1.5669
S117PG	0.05565	0.06699	0.0703554	0.18221417	0.2943959	0.15270335	0.10869	0.0775951	0.083586	1.09218
S118PG	0.02318	0.02797	0.0314568	0.06147364	0.076819	0.03370674	0.024475	0.0171157	0.00857	0.30477
S119PG	0.0474	0.04334	0.0767848	0.22611454	0.353494	0.19606926	0.130773	0.0924828	0.085564	1.25202
S120PG	0.02661	0.02118	0.0176407	0.02558139	0.0219467	0.00840946	0.008997	0.0100006	0.004146	0.14452
S121PG	0.03831	0.0364	0.0620577	0.16095112	0.2248526	0.11065386	0.069174	0.0505548	0.072746	0.8257

Table G.412. Concentrations of alpha-HCH, HCB, p,p'-DDE, BDE28, BDE99, BDE100, BDE-153, BDE-154, BDE183, BDE209, ∑8 PBDEs, PnCDD, OCDD, ∑6PCDDs, TCDF, OCDF, ∑10PCDFs, and ∑16PCDD/Fs in different sections of cores S001, S008, and S002

Section ID	alpha-HCH	HCB	p,p'-DDE	BDE28	BDE-47	BDE-49	BDE99	BDE100	BDE-153	BDE-154	BDE183	BDE209	$\sum_8$ PBDEs	PnCDD	OCDD	∑6PCDDs	TCDF	OCDF	∑10PCDFs	16PCDD/F
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	pg/g dw	pg/g dw	ng/g dw	pg/g dw	pg/g dw	ng/g dw	ng/g dw
	2011 S001MC																			
#1	0.0000	0.0000	0.1107	0.0015	0.0125	0.0000	0.0046	0.0024	0.0000	0.0000	0.0000	1.1258	0.0209	0.00	0.00	0.00	0.00	2.02	0.00	0.00
#2	0.0000	0.0000	0.1078	0.0015	0.0089	0.0000	0.0019	0.0012	0.0000	0.0000	0.0000	0.2273	0.0135	0.00	0.00	0.00	0.00	0.00	0.00	0.00
#3	0.0000	0.0000	0.0047	0.0029	0.0231	0.0000	0.0021	0.0028	0.0000	0.0000	0.0000	0.0281	0.0309	0.00	0.00	0.00	0.00	0.10	0.00	0.00
#4	0.0000	0.0000	0.0019	0.0015	0.0072	0.0000	0.0000	0.0010	0.0000	0.0000	0.0000	0.0256	0.0097	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2011 S002MC																			
#1	0.0117	0.3611	0.6478	0.0148	0.1739	0.0230	0.1145	0.0547	0.0294	0.0985	0.1789	15.9820	0.6878	3.14	606.62	0.73	4.29	32.17	0.09	0.82
#2	0.0053	0.3281	1.4980	0.0125	0.1482	0.0158	0.0831	0.0385	0.0284	0.0682	0.1191	12.1354	0.5137	3.24	547.36	0.66	5.94	28.75	0.09	0.75
#3	0.0060	0.2766	1.0359	0.0034	0.0347	0.0054	0.0241	0.0112	0.0082	0.0208	0.0437	8.6624	0.1517	3.13	447.75	0.54	3.28	24.25	0.07	0.61
#4	0.0015	0.1398	0.4350	0.0058	0.0354	0.0035	0.0088	0.0064	0.0000	0.0063	0.0091	2.3794	0.0752	1.30	191.24	0.23	1.84	11.33	0.03	0.26
#5	0.0000	0.0438	0.1363	0.0053	0.0313	0.0026	0.0048	0.0057	0.0000	0.0011	0.0000	0.5018	0.0508	0.30	41.92	0.05	0.35	2.69	0.01	0.06
	2011 S008MC																			
#1	0.0414	0.5475	1.8259	0.0046	0.0715	0.0106	0.0537	0.0247	0.0159	0.0425	0.0645	17.4336	0.2880	132.98	1054.87	1.27	11.42	51.73	0.16	1.43
#2	0.0380	0.5080	2.4993	0.0041	0.0518	0.0085	0.0472	0.0170	0.0132	0.0321	0.0509	13.9517	0.2248	138.04	891.55	1.05	9.55	45.31	0.14	1.20
#3	0.0224	0.3789	1.4945	0.0029	0.0264	0.0044	0.0184	0.0145	0.0190	0.0165	0.0622	9.5535	0.1644	61.17	736.64	0.85	6.72	37.27	0.11	0.95
#4	0.0163	0.2979	1.5857	0.0024	0.0186	0.0026	0.0075	0.0068	0.0061	0.0047	0.0142	4.0039	0.0629	112.08	683.89	0.81	6.56	35.63	0.11	0.92
#5	0.0081	0.1116	1.6232	0.0028	0.0131	0.0000	0.0040	0.0036	0.0038	0.0000	0.0000	1.3446	0.0273	50.33	549.70	0.65	3.98	28.12	0.09	0.74
#6	0.0028	0.0948	0.8233	0.0026	0.0152	0.0000	0.0040	0.0103	0.0045	0.0000	0.0000	0.2881	0.0366	73.96	303.53	0.31	1.53	15.43	0.03	0.34
#7	0.0000	0.0330	0.1262	0.0015	0.0074	0.0000	0.0022	0.0029	0.0016	0.0000	0.0000	0.1403	0.0155	97.46	75.00	0.08	0.90	5.22	0.02	0.10
#8	0.0000	0.0141	0.0100	0.0020	0.0143	0.0000	0.0027	0.0051	0.0018	0.0000	0.0000	0.1502	0.0261	78.84	28.06	0.03	0.48	1.46	0.01	0.04
#9	0.0000	0.0064	0.0043	0.0014	0.0059	0.0000	0.0000	0.0013	0.0000	0.0000	0.0000	0.0810	0.0086	100.46	28.86	0.03	0.40	1.04	0.01	0.04
#10	0.0000	0.0056	0.0033	0.0014	0.0066	0.0000	0.0000	0.0042	0.0000	0.0000	0.0096	0.0629	0.0218	112.27	34.97	0.03	0.40	1.06	0.01	0.05

Table G.423. Concentrations of alpha-HCH, HCB, p,p'-DDE, BDE28, BDE99, BDE100, BDE-153, BDE-154, BDE183, BDE209, ∑8 PBDEs, PnCDD, OCDD, ∑6PCDDs, TCDF, OCDF, ∑10PCDFs, and ∑16PCDD/Fs in different sections of cores S011, and S012

Section ID	alpha-HCH	HCB	p,p'-DDE	BDE28	BDE-47	BDE-49	BDE99	BDE100	BDE-153	BDE-154	BDE183	BDE209	$\sum_8$ PBDEs	PnCDD	OCDD	∑6PCDDs	TCDF	OCDF	∑10PCDFs	16PCDD/F
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	pg/g dw	pg/g dw	ng/g dw	pg/g dw	pg/g dw	ng/g dw	ng/g dw
	2011 S011MC																			
#1	0.0192	0.3568	1.2188	0.0091	0.1777	0.0192	0.1349	0.1494	0.0592	0.0894	0.0746	14.9777	0.7135	2.83	574.59	0.69	5.84	26.56	0.08	0.77
#2	0.0163	0.3122	1.5378	0.0077	0.2334	0.0201	0.1467	0.1664	0.0330	0.0888	0.0851	13.2195	0.7811	3.32	597.05	0.72	5.11	28.44	0.08	0.80
#3	0.0193	0.3813	1.5581	0.0051	0.0900	0.0127	0.0897	0.0304	0.0312	0.0724	0.1364	14.6097	0.4679	4.29	595.08	0.73	4.98	31.40	0.10	0.83
#4	0.0103	0.4616	2.3470	0.0046	0.0583	0.0084	0.0571	0.0175	0.0200	0.0549	0.0863	16.0791	0.3071	4.98	853.98	1.02	9.34	41.50	0.11	1.14
#5	0.0309	0.5667	1.6219	0.0015	0.0174	0.0027	0.0219	0.0248	0.0196	0.0219	0.0730	7.9413	0.1828	1.57	418.94	0.50	1.99	20.22	0.06	0.55
#6	0.0026	0.4240	1.6075	0.0020	0.0151	0.0022	0.0099	0.0049	0.0075	0.0067	0.0277	5.1644	0.0760	4.23	853.88	1.01	7.47	45.73	0.13	1.14
#7	0.0076	0.2191	0.9531	0.0015	0.0089	0.0016	0.0046	0.0069	0.0049	0.0034	0.0057	1.5252	0.0376	0.85	255.61	0.30	1.76	11.99	0.04	0.33
#8	0.0039	0.1502	0.4413	0.0016	0.0063	0.0000	0.0019	0.0015	0.0024	0.0000	0.0031	0.2719	0.0168	1.47	288.69	0.33	2.42	14.48	0.05	0.38
#9	0.0026	0.0969	0.3895	0.0011	0.0038	0.0000	0.0000	0.0013	0.0015	0.0000	0.0000	0.0703	0.0078	1.15	182.28	0.21	1.98	10.23	0.03	0.25
#10	0.0021	0.0663	0.4224	0.0013	0.0055	0.0000	0.0000	0.0018	0.0031	0.0000	0.0000	0.0730	0.0117	0.83	153.14	0.18	1.48	7.68	0.03	0.20
#11	0.0007	0.0312	0.2234	0.0012	0.0043	0.0000	0.0000	0.0012	0.0000	0.0000	0.0000	0.0439	0.0067	91.74	102.92	0.12	0.79	4.80	0.02	0.14
#12	0.0000	0.0194	0.0201	0.0013	0.0058	0.0000	0.0000	0.0016	0.0000	0.0000	0.0000	0.0630	0.0087	23.71	38.56	0.05	0.00	2.32	0.01	0.06
#13	0.0000	0.0145	0.0026	0.0012	0.0047	0.0000	0.0000	0.0014	0.0000	0.0000	0.0000	0.0892	0.0073	36.46	28.05	0.03	0.00	1.36	0.01	0.04
#14	0.0000	0.0133	0.0018	0.0012	0.0048	0.0000	0.0000	0.0013	0.0000	0.0000	0.0000	0.0668	0.0073	25.73	23.20	0.02	0.00	0.81	0.01	0.03
	2011 S012MC																			
#1	0.0335	0.3933	0.7501	0.0042	0.0731	0.0111	0.0700	0.0279	0.0197	0.0558	0.0785	10.9535	0.3402	133.74	673.76	0.81	7.42	34.37	0.10	0.91
#2	0.0423	0.4450	0.7831	0.0038	0.1660	0.0101	0.1438	0.2648	0.0643	0.0816	0.0791	10.8427	0.8135	175.53	733.90	0.87	7.83	38.94	0.12	0.99
#3	0.0399	0.4608	1.1408	0.0037	0.0356	0.0063	0.0429	0.0127	0.0146	0.0377	0.0698	10.5906	0.2234	192.47	781.56	0.93	8.11	40.55	0.12	1.05
#4	0.0346	0.6728	3.6886	0.0021	0.0189	0.0032	0.0195	0.0065	0.0076	0.0199	0.0340	7.8540	0.1118	208.15	1007.16	1.19	10.84	51.02	0.15	1.35
#5	0.0286	0.4447	2.0042	0.0026	0.0163	0.0026	0.0117	0.0049	0.0054	0.0090	0.0341	4.4363	0.0867	211.96	925.61	1.09	9.05	43.86	0.13	1.23
#6	0.0196	0.3594	1.3676	0.0018	0.0087	0.0000	0.0052	0.0025	0.0085	0.0047	0.0233	2.2707	0.0548	194.97	764.54	0.90	6.73	36.46	0.11	1.01
#7	0.0096	0.2382	1.4512	0.0016	0.0079	0.0000	0.0030	0.0022	0.0013	0.0022	0.0000	1.0887	0.0181	68.60	580.94	0.60	1.74	0.12	0.04	0.64
#8	0.0021	0.0851	0.2644	0.0016	0.0070	0.0000	0.0020	0.0027	0.0017	0.0000	0.0000	0.3396	0.0151	139.96	226.26	0.26	0.00	14.79	0.04	0.30
#9	0.0006	0.0345	0.0399	0.0015	0.0151	0.0000	0.0070	0.0200	0.0049	0.0000	0.0000	0.0880	0.0485	95.04	59.57	0.07	0.64	5.29	0.02	0.09
#10	0.0000	0.0166	0.0058	0.0011	0.0045	0.0000	0.0016	0.0022	0.0028	0.0000	0.0000	0.0277	0.0121	110.98	26.60	0.03	0.71	2.16	0.01	0.04
#11	0.0000	0.0136	0.0012	0.0012	0.0053	0.0000	0.0030	0.0081	0.0027	0.0000	0.0000	0.0273	0.0202	88.30	22.08	0.03	0.46	1.10	0.01	0.04

Table G.434. Concentrations of alpha-HCH, HCB, p,p'-DDE, BDE28, BDE99, BDE100, BDE-153, BDE-154, BDE183, BDE209, ∑8 PBDEs, PnCDD, OCDD, ∑6PCDDs, TCDF, OCDF, ∑10PCDFs, and ∑16PCDD/Fs in different sections of cores S016, and S019

Section ID	alpha-HCH	HCB	p,p'-DDE	BDE28	BDE-47	BDE-49	BDE99	BDE100	BDE-153	BDE-154	BDE183	BDE209	$\sum_8$ PBDEs	PnCDD	OCDD	∑6PCDDs	TCDF	OCDF	∑10PCDFs	16PCDD/F
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	pg/g dw	pg/g dw	ng/g dw	pg/g dw	pg/g dw	ng/g dw	ng/g dw
	2011 S016MC																			
#1	0.0081	0.3976	1.6695	0.0068	0.1234	0.0172	0.0857	0.0421	0.0224	0.0613	0.0526	12.0690	0.4116	3.36	533.70	0.65	4.58	27.68	0.09	0.74
#2	0.0043	0.3390	1.4932	0.0049	0.0866	0.0124	0.0736	0.0258	0.0173	0.0493	0.0526	9.9908	0.3224	2.61	598.03	0.71	4.32	33.95	0.10	0.81
#3	0.0136	0.3780	1.2508	0.0040	0.0609	0.0091	0.0622	0.0147	0.0164	0.0417	0.0470	10.2711	0.2560	2.44	486.33	0.59	5.00	26.61	0.08	0.67
#4	0.0000	0.3964	0.5951	0.0042	0.0527	0.0071	0.0423	0.0125	0.0138	0.0316	0.0391	8.6873	0.2033	2.95	627.62	0.76	4.74	34.59	0.10	0.86
#5	0.0120	0.3207	0.7720	0.0030	0.0250	0.0037	0.0168	0.0092	0.0082	0.0149	0.0251	6.5521	0.1059	2.17	489.81	0.59	3.45	25.88	0.08	0.67
#6	0.0064	0.1448	0.6049	0.0024	0.0120	0.0000	0.0050	0.0025	0.0000	0.0000	0.0000	2.1176	0.0219	1.31	266.75	0.32	0.21	15.08	0.05	0.37
#7	0.0028	0.0724	0.3589	0.0022	0.0125	0.0000	0.0034	0.0027	0.0000	0.0000	0.0000	0.8097	0.0209	0.54	103.32	0.12	0.68	5.08	0.02	0.14
#8	0.0000	0.0387	0.1102	0.0023	0.0111	0.0000	0.0043	0.0082	0.0000	0.0000	0.0000	0.2581	0.0259	0.14	32.65	0.04	0.25	1.19	0.01	0.05
#9	0.0000	0.0188	0.0142	0.0020	0.0085	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000	0.2501	0.0129	0.02	19.14	0.02	0.17	0.44	0.01	0.03
	2011 S019MC																			
#1	0.0352	0.2520	1.2589	0.0063	0.0955	0.0123	0.0611	0.0336	0.0184	0.0464	0.0589	11.5751	0.3326	93.69	0.00	0.01	0.00	0.00	0.01	0.02
#2	0.0309	0.2515	1.2826	0.0033	0.0490	0.0077	0.0381	0.0189	0.1179	0.0491	0.4811	10.2113	0.7651	106.58	0.00	0.01	0.00	0.00	0.00	0.01
#3	0.0278	0.3118	1.4727	0.0026	0.0275	0.0041	0.0173	0.0071	0.0055	0.0139	0.0264	4.2471	0.1045	114.63	0.00	0.01	0.00	0.00	0.00	0.01
#4	0.0155	0.2035	1.6649	0.0017	0.0126	0.0000	0.0060	0.0044	0.0033	0.0055	0.0000	1.8057	0.0334	164.01	698.92	0.72	0.00	73.11	0.09	0.80
#5	0.0071	0.0769	1.3570	0.0013	0.0080	0.0000	0.0027	0.0025	0.0000	0.0000	0.0000	0.4874	0.0144	101.08	503.68	0.52	0.00	0.00	0.01	0.53
#6	0.0012	0.0000	0.2774	0.0016	0.0087	0.0000	0.0023	0.0022	0.0000	0.0000	0.0000	0.1884	0.0148	97.52	248.94	0.25	0.00	31.86	0.04	0.29
#7	0.0000	0.0000	0.1024	0.0015	0.0092	0.0000	0.0023	0.0039	0.0000	0.0000	0.0000	0.0961	0.0168	54.17	0.00	0.00	0.00	0.00	0.00	0.00
#8	0.0000	0.0000	0.0767	0.0015	0.0100	0.0000	0.0036	0.0075	0.0000	0.0000	0.0000	0.0717	0.0225	39.42	0.00	0.00	0.00	0.00	0.00	0.00
#9	0.0000	0.0000	0.0176	0.0013	0.0075	0.0000	0.0000	0.0025	0.0000	0.0000	0.0000	0.0709	0.0113	40.22	0.00	0.00	0.00	0.00	0.00	0.00
#10	0.0000	0.0000	0.0040	0.0019	0.0100	0.0000	0.0000	0.0021	0.0000	0.0000	0.0000	0.0686	0.0140	33.08	0.00	0.00	0.20	0.00	0.00	0.00
#11	0.0000	0.0000	0.0013	0.0012	0.0070	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0756	0.0105	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table G.445. Concentrations of alpha-HCH, HCB, p,p'-DDE, BDE28, BDE99, BDE100, BDE-153, BDE-154, BDE183, BDE209, ∑8 PBDEs, PnCDD, OCDD, ∑6PCDDs, TCDF, OCDF, ∑10PCDFs, and ∑16PCDD/Fs in different sections of cores S022, and S114

Section ID	alpha-HCH	HCB	p,p'-DDE	BDE28	BDE-47	BDE-49	BDE99	BDE100	BDE-153	BDE-154	BDE183	BDE209	$\sum_8$ PBDEs	PnCDD	OCDD	∑6PCDDs	TCDF	OCDF	∑10PCDFs	16PCDD/F
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	pg/g dw	pg/g dw	ng/g dw	pg/g dw	pg/g dw	ng/g dw	ng/g dw
	2011 S022MC																			
#1	0.0078	0.0997	0.5676	0.0100	0.2915	0.0224	0.1002	0.1272	0.0361	0.0392	0.0273	5.4425	0.6540	0.00	0.00	0.00	0.00	0.00	0.00	0.01
#2	0.0043	0.1235	0.6886	0.0090	0.2520	0.0200	0.0877	0.0811	0.0306	0.0374	0.0241	5.6951	0.5419	0.00	0.00	0.00	0.00	0.00	0.01	0.01
#3	0.0038	0.1634	0.5757	0.0076	0.2377	0.0183	0.0784	0.0648	0.0271	0.0357	0.0701	5.6687	0.5397	0.00	0.00	0.00	0.00	0.00	0.14	0.14
#4	0.0060	0.2049	0.9788	0.0059	0.1895	0.0140	0.0593	0.0521	0.0223	0.0254	0.0184	4.5634	0.3870	0.00	0.00	0.01	0.00	0.00	0.01	0.01
#5	0.0089	0.1792	1.3395	0.0034	0.0700	0.0057	0.0217	0.0214	0.0092	0.0093	0.0095	1.6747	0.1504	0.00	1129.25	1.13	0.00	0.00	0.01	1.14
#6	0.0183	0.0998	2.6733	0.0028	0.0257	0.0030	0.0073	0.0080	0.0047	0.0000	0.0000	1.0783	0.0515	0.00	0.00	0.00	0.00	0.00	0.00	0.00
#7	0.0158	0.0010	3.3835	0.0023	0.0127	0.0000	0.0032	0.0036	0.0000	0.0000	0.0000	0.2106	0.0218	0.00	0.00	0.00	0.00	0.00	0.00	0.00
#8	0.0087	0.0000	2.6723	0.0033	0.0176	0.0000	0.0029	0.0029	0.0000	0.0000	0.0000	0.0725	0.0268	104.37	772.61	1.05	0.00	298.34	1.17	2.22
#9	0.0043	0.0000	1.8296	0.0026	0.0117	0.0000	0.0026	0.0023	0.0000	0.0000	0.0000	0.0580	0.0191	157.08	519.21	0.79	0.00	247.41	1.24	2.03
#10	0.0000	0.0000	0.2801	0.0024	0.0126	0.0000	0.0025	0.0031	0.0000	0.0000	0.0000	0.0523	0.0206	71.75	496.28	0.66	0.00	275.48	0.93	1.59
#11	0.0000	0.0000	0.0224	0.0031	0.0168	0.0000	0.0028	0.0029	0.0000	0.0000	0.0000	0.0452	0.0257	93.78	163.28	0.25	0.00	103.61	0.36	0.61
#12	0.0000	0.0000	0.0016	0.0014	0.0423	0.0000	0.0203	0.0654	0.0096	0.0049	0.0000	0.0540	0.1439	0.00	14.38	0.03	0.00	7.01	0.02	0.05
#13	0.0000	0.0000	0.0012	0.0015	0.0079	0.0000	0.0016	0.0015	0.0000	0.0000	0.0000	0.0260	0.0125	0.00	5.54	0.03	0.00	1.06	0.00	0.03
#14	0.0000	0.0000	0.0009	0.0014	0.0089	0.0000	0.0015	0.0020	0.0000	0.0000	0.0000	0.0263	0.0139	0.00	0.00	0.05	0.00	0.00	0.00	0.05
#15	0.0000	0.0000	0.0000	0.0010	0.0065	0.0000	0.0013	0.0015	0.0000	0.0000	0.0000	0.0279	0.0104	0.00	3.64	0.03	0.00	0.00	0.00	0.03
#16	0.0000	0.0000	0.0000	0.0016	0.0158	0.0000	0.0086	0.0224	0.0059	0.0000	0.0000	0.0539	0.0543	0.00	4.45	0.02	0.00	0.00	0.00	0.02
#17	0.0000	0.0000	0.0000	0.0013	0.0061	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000	0.0328	0.0096	0.00	3.41	0.03	0.00	0.00	0.00	0.03
#18	0.0000	0.0000	0.0000	0.0027	0.0142	0.0000	0.0000	0.0031	0.0000	0.0000	0.0000	0.0321	0.0200	0.00	3.11	0.08	0.00	0.00	0.00	0.08
	2011 S114MC																			
#1	0.0150	0.1340	0.3560	0.0055	0.0821	0.0090	0.0441	0.0333	0.0164	0.0267	0.0360	3.6063	0.2531	51.79	265.30	0.31	2.65	13.98	0.04	0.36
#2	0.0070	0.0800	0.2360	0.0021	0.0257	0.0033	0.0136	0.0064	0.0041	0.0087	0.0122	2.2112	0.0762	36.02	171.20	0.20	1.57	8.78	0.03	0.23
#3	0.0040	0.0390	0.1440	0.0018	0.0127	0.0018	0.0065	0.0042	0.0046	0.0035	0.0111	1.1312	0.0462	26.47	101.74	0.12	0.98	5.33	0.02	0.14
#4	0.0010	0.0150	0.0610	0.0014	0.0062	0.0000	0.0021	0.0031	0.0026	0.0000	0.0102	0.1740	0.0256	0.00	12.61	0.02	1.00	0.48	0.01	0.03

Table G.456. Concentrations of alpha-HCH, HCB, p,p'-DDE, BDE28, BDE99, BDE100, BDE-153, BDE-154, BDE183, BDE209, ∑8 PBDEs, PnCDD, OCDD, ∑6PCDDs, TCDF, OCDF, ∑10PCDFs, and ∑16PCDD/Fs in different in different ponar grabs in Lake Superior

Section ID	alpha-HCH	HCB	p,p'-DDE	BDE28	BDE-47	BDE-49	BDE99	BDE100	BDE-153	BDE-154	BDE183	BDE209	$\sum_8$ PBDEs	PnCDD	OCDD	∑6PCDDs	TCDF	OCDF	∑10PCDFs	16PCDD/F
	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	ng/g dw	pg/g dw	pg/g dw	ng/g dw	pg/g dw	pg/g dw	ng/g dw	ng/g dw
	2011 PonarGrabs																			
S001PG	0.0032	0.0659	0.2493	0.0038	0.0142	0.0020	0.0074	0.0167	0.0000	0.0222	0.0000	2.0556	0.0664	4.58	122.32	0.15	1.07	6.14	0.02	0.16
S002PG	0.0002	0.0043	0.0037									2.5980	0.0000	4.16	112.40	0.13	1.06	5.88	0.02	0.15
S008PG	0.0015	0.0537	0.3780	0.0037	0.0130	0	0.0045	0.0164	0.0000	0.0225	0.0000	0.1864	0.0601	1.14	118.61	0.14	1.00	4.01	0.02	0.16
S011PG	0.0044	0.0892	0.7460	0.0040	0.0201	0.0022	0.0097	0.0187	0.0000	0.0271	0.0000	2.5670	0.0818	9.25	250.01	0.30	2.12	12.98	0.04	0.34
S012PG	0.0013	0.0606	0.5636	0.0037	0.0157	0	0.0039	0.0154	0.0000	0.0168	0.0000	0.6874	0.0557	8.38	193.72	0.23	1.60	9.59	0.03	0.26
S016PG	0.0005	0.0116	0.0346	0.0029	0.0116	0	0.0057	0.0162	0.0349	0.0360	0.0563	0.4744	0.1635	4.55	35.96	0.04	0.00	1.43	0.01	0.05
S019PG	0.0000	0.0187	0.0458	0.0034	0.0117	0.00154	0.0046	0.0146	0.0235	0.0266	0.0554	0.9618	0.1413	5.38	51.53	0.06	0.42	1.73	0.01	0.07
S022PG	0.0028	0.0847	2.2203	0.0045	0.0865	0.00646	0.0586	0.1457	0.0647	0.0480	0.0569	0.9212	0.4713	2.50	357.45	0.43	1.39	77.15	0.28	0.70
S102PG	0.0008	0.0163	0.0612	0.0029	0.0102	0	0.0040	0.0139	0.0000	0.0000	0.0000	0.6383	0.0311	2.24	40.74	0.05	0.45	1.38	0.01	0.06
S103PG	0.0028	0.0089	0.3076	0.0028	0.0102	0	0.0046	0.0141	0.0000	0.0000	0.0000	0.7985	0.0316	4.43	115.60	0.13	0.89	5.47	0.02	0.15
S104PG	0.0012	0.0291	0.1538	0.0027	0.0074	0	0.0036	0.0138	0.0109	0.0194	0.0000	0.5933	0.0578	5.61	94.57	0.12	0.53	4.24	0.02	0.13
S105PG	0.0007	0.0291	0.0320	0.0027	0.0082	0.00129	0.0000	0.0138	0.0133	0.0214	0.0257	0.4052	0.0865	1.21	25.98	0.03	0.00	0.77	0.00	0.03
S106PG	0.0039	0.0130	3.9574	0.0041	0.0192	0.00197	0.0051	0.0156	0.0000	0.0180	0.0222	1.3835	0.0863	10.04	361.05	0.42	3.24	22.65	0.07	0.49
S108PG	0.0000	0.0530	0.0194	0.0029	0.0102	0	0.0000	0.0157	0.0000	0.0000	0.0000	0.4349	0.0288	5.91	36.21	0.04	0.00	1.73	0.01	0.05
S110PG	0.0000	0.0126	0.0502	0.0024	0.0067	0	0.0000	0.0128	0.0000	0.0000	0.0000	0.7166	0.0219	1.90	15.30	0.02	0.00	0.73	0.00	0.02
S112PG	0.0000	0.0086	0.1796	0.0027	0.0147	0.00152	0.0038	0.0142	0.0000	0.0000	0.0000	1.0543	0.0369	4.74	51.25	0.06	0.55	3.47	0.02	0.08
S113PG	0.0025	0.0201	0.5110	0.0027	0.0084	0	0.0042	0.0149	0.0000	0.0174	0.0000	1.0391	0.0476	7.92	179.31	0.22	1.17	10.94	0.04	0.26
S114PG	0.0020	0.0721	0.0704	0.0026	0.0087	0	0.0037	0.0149	0.0000	0.0000	0.0000	0.8005	0.0298	0.60	35.94	0.04	0.30	1.50	0.01	0.05
S116PG	0.0035	0.0855	0.4585	0.0028	0.0086	0	0.0037	0.0133	0.0072	0.0178	0.0000	1.7634	0.0535	0.96	199.04	0.23	1.60	7.68	0.03	0.26
S117PG	0.0046	0.0750	0.3817	0.0029	0.0097	0	0.0053	0.0141	0.0000	0.0197	0.0000	1.6630	0.0516	7.03	177.98	0.21	1.54	8.70	0.03	0.24
S118PG	0.0016	0.0212	0.0667	0.0027	0.0132	0.00147	0.0000	0.0149	0.0000	0.0177	0.0000	0.6199	0.0500	2.73	47.02	0.06	0.00	1.73	0.01	0.06
S119PG	0.0063	0.0902	0.5845	0.0024	0.0067	0	0.0033	0.0000	0.0000	0.0000	0.0000	0.6746	0.0124	8.04	195.85	0.23	1.51	15.08	0.05	0.28
S120PG	0.0000	0.0103	0.0222	0.0024	0.0054	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.4237	0.0078	2.62	20.29	0.02	0.00	0.76	0.01	0.03
S121PG	0.0043	0.0492	0.3968	0.0026	0.0071	0.00144	0.0036	0.0136	0.0000	0.0000	0.0000	0.7844	0.0284	6.05	118.93	0.14	1.08	8.03	0.03	0.17

CURRICULUM VITAE

Soheil Hosseini

shosse3@uic.edu

EDUCATION

University of Illinois at Chicago
PhD** in **Environmental Engineering,** **Chicago, IL **1/2012-Expected 5/2016**

- **Overall GPA: 4.0/4.0**
- 2014-2015 Institute for Environmental Science and Policy Pre-Doctoral Fellowship Award

Sharif University of Technology
M.Sc.** in **Chemical Engineering,** **Tehran **8/2007-12/2009**

- **Relevant Course Work (Cumulative GPA: 18.24/20.00):** Advance Thermodynamics, Advance Heat Transfer, Advance Numerical Mathematic, Non-Newtonian Fluids Rheology, Industrial Wastewater Treatment
- First rank award in M.Sc. Chemical Engineering students, Sharif University of Technology

Isfahan University of Technology
B.Sc**. in **Chemical Engineering,** **Isfahan **7/2002-2/2007**

- **Relevant Course Work:** Analytical Chemistry, Fluid Mechanics, Heat Transfer, Mass Transfer, Unit Operation, Chemical Reactor Design, Mathematical Modeling, and Organic Chemistry
- Dean's Award for Academic Excellence

WORK EXPERIENCE

Graduate Research Assistant
University of Illinois at Chicago, Chicago, IL **1/2012- Present**

- Designed sampling trip, coordinated logistic arrangement for different sampling expeditions, improved sampling team efficiency by project management strategies, and collected sediment cores and grab samples in Lake Huron, Georgian Bay, North Channel, Lake Ontario, and Lake Erie onboard EPA *R/V Lake Guardian*.
- Conducted experimental measurements for various bio-geophysiochemical properties with more than 12,000 individual analysis using different analytical apparatuses, such as Elemental Analyzer (EA), Mercury Analyzer (MERX), Ion Chromatograph (IC), Gas Chromatograph (GC), X-ray Fluorescence Spectrometer (XRF), gamma-ray spectrometry and laser diffraction Particle Size Distribution (PSD) meter, and interpreted quantitative analyses of age-dated cores for organic chemicals of emerging concerns, using ArcGIS, SYSTAT and MATLAB.
- Studied microbial genomics community structure analysis through DNA isolation and pyrosequencing to find probable biodegradation and/or bio-dehalogenation of PBTs in sediment samples collected from Great Lakes.
- Supervised and taught new hires and interns on bio-geophysiochemical characterization of sediment and water samples to increase pace and accuracy of analytical experimentations.
- Retrieved backlogs of project from two years by leading and using process time management in analytical analysis of numerous samples in restricted timeline of project, and Observed mathematical modeling and statistical correlation analysis of PBTs and their depositional vectors in Great Lakes.
- Wrote technical manuals and standard operating procedures documents for operations, maintenance and troubleshooting of analytical apparatuses in applied environmental biotechnology lab.

Process Design Engineer and Scale up Supervisor
Ementash Sepahan Chemical Company, Isfahan **1/2010-5/2012**

- Improved efficiency of process for ethoxylation of ethylene oxide by optimization in various phenolics added, using research and development techniques (R&D).
- Performed pilot process studies and used results in scale up stage design of production line.
- Experienced in industrial project management skills, scheduling, and preparation of professional progress reports.

Graduate Research Assistant
Sharif University of Technology, Tehran **8/2008-12/2009**

- Isolated two indigenous types of Iron-Oxidizing and Sulfur-Oxidizing bacteria, Mesophile (*Acidithiobacillus ferrooxidans*) and Thermophile (*Solfubacillus thermosulfidoxidans*) from waste tails of Kooshk lead-zinc mines, Yazd.
- Implemented pilot study for bioleaching of high-grade concentrate by the GeoBiotics GEOCOAT method, and performed comparative using of thermophilic and mesophilic bacteria to bioleach zinc content of low-grade sphalerite ore in a DTFBB (draft tube fluidized bed bioreactor), published in authenticated journal of *Hydrometallurgy*.
- Studied bio-sorption of metallic ions from effluents using microbial-immobilization and Atomic Absorption (AA) analysis.

Process Design Engineer and Inspector
Kimia Fonun Chemical Company, Isfahan **7/2006-8/2007**

- Designed production process of flocculating agent chemicals, and optimized for highest efficiency.
- Optimized coagulating influences of products using standard R&D techniques.
- Conducted consulting engineering services to design wastewater treatment plants for mining industries.

Chemical Engineering Internship
Esfahan Oil Refinery Company, Isfahan **4/2004-8/2004**

- Investigated feasible methods to improve efficiency of Catalytic Reformer unit of refinery; recommended two methods based on financial considerations; and ease of implementation and company's available technical resources.
- Wrote technical manuals and standard operating procedures documents for operations, maintenance and troubleshooting of different analytical analyzers, such as Dionex IC Anion Chromatograph units.

TEACHING EXPERIENCE

Teaching Assistant and Guest Lecturer
University of Illinois at Chicago, Chicago, IL **7/2012-Present**

- Conducted 3 Fluid Mechanics laboratory sections per week for 50 students. Designed and developed laboratories, graded, and provided constructive feedback on technical laboratory reports.
- Occasionally instructed undergraduate and PhD level courses, such as Fluid Mechanics, Wastewater Treatment, Applied Environmental Biotechnology and Environmental Microbiology.

Instructor
Azad University of Shahreza, Isfahan **7/2010-5/2011**

- Taught Chemistry and Process Control courses to senior chemical engineering students to 2 classes of approximately 60 students.

Instructor

Jami Institute of Technology, Delijan **7/2010-5/2011**

- Taught Heat Transfer, Applied Mathematics and Differential Equations to junior and senior chemical engineering students to 3 classes of approximately 30 students each.

COMPUTER SKILLS

- Process Engineering: Aspen HYSYS, Aspen Plus
- Statistical Analysis and Programming Languages**:** SYSTAT, C, C++, MATLAB
- Sustainability Assessment: SimaPro, Envision™
- Geostatistical Analysis: ArcGIS
- Operating Systems: Microsoft Office, AutoCAD

CERTIFICATIONS

- Engineer-in-Training (E.I.T.)
- Professional Engineer (PE), Planned for October 2016

LEADERSHIP ACTIVITIES

- Financial Manager and Magazine Chairman of the Isfahan University of Technology Magazine
- Chess instructor for student-taught course at Sharif University of Technology
- Currently a basketball team captain, University of Illinois at Chicago amateur recreational league, and former captain of Men's basketball team at Sharif University of Technology and Isfahan University of Technology

PUBLICATIONS

- Hosseini,Soheil, Rockne, K. J., (Mar.2015) "Depositional flux of Carbonaceous Materials to Lake Huron Sediment ", Proceedings of Research Forum, University of Illinois at Chicago, Chicago, IL.

- Hosseini,Soheil, Rockne,K.J., (Jan.2015) "The Relationship between Semivolatile Persistent Bioaccumulative Toxic Chemicals (SV-PBTs) and Carbonaceous Materials in Lake Superior" Proceedings of the Battelle Eighth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, LA.

- Hosseini,Soheil, Rockne,K.J., (Mar.2014) "Black Carbon as a Vector of PBDEs Deposition in Lake Superior". Proceedings of the Christopher B. and Susan S. Burke Civil Engineering Graduate Student Poster Presentation, Chicago, IL.

- Soleimani, M., Petersen, J., Roostaazad, R., Hosseini,Soheil, Mousavi,S.M., Najafi, A.R., Kazemi Vasiri, A., (2010) "Leaching of a Zinc Ore and Concentrate Using the GEOCOAT™ Technology".Minerals Engineering, doi: 10.1016/j.mineng.2010.10.003.

- Soleimani, M., Hosseini,Soheil, Roostaazad, R., Petersen, J., Mousavi,S.M., Kazemi Vasiri, A., (2009). "Microbial leaching of a low-grade sphalerite ore using a draft tube fluidized bed bioreactor".Hydrometallurgy, Vol. 99, pp. 131-136.

- Hosseini,Soheil, Soleimani, M., Roostaazad, R., Mousavi, S.M., (2008). "Comparative study of the biosorption of zinc ions using four types of microbes". Proceedings of the 12th National Chemical Engineering Congress, Tabriz.

- Soleimani, M., Hosseini,Soheil, Roostaazad, R., Mousavi, S.M., (2009). “Application of GEOCOAT^{TM} technology for recovery of zinc from high-grade concentrate and low-grade ores as support using mesophilic bacteria”. Proceedings of the 6th International Chemical Engineering Congress, Kish Island.

- Hosseini,Soheil, Hosseini,D. (Apr.2009). “Recent developments in technology of water reclamation from waste water in stone mines and industries”. Proceedings of the 13th International Stone Mines and Industries Exhibition and Conference, Tehran.