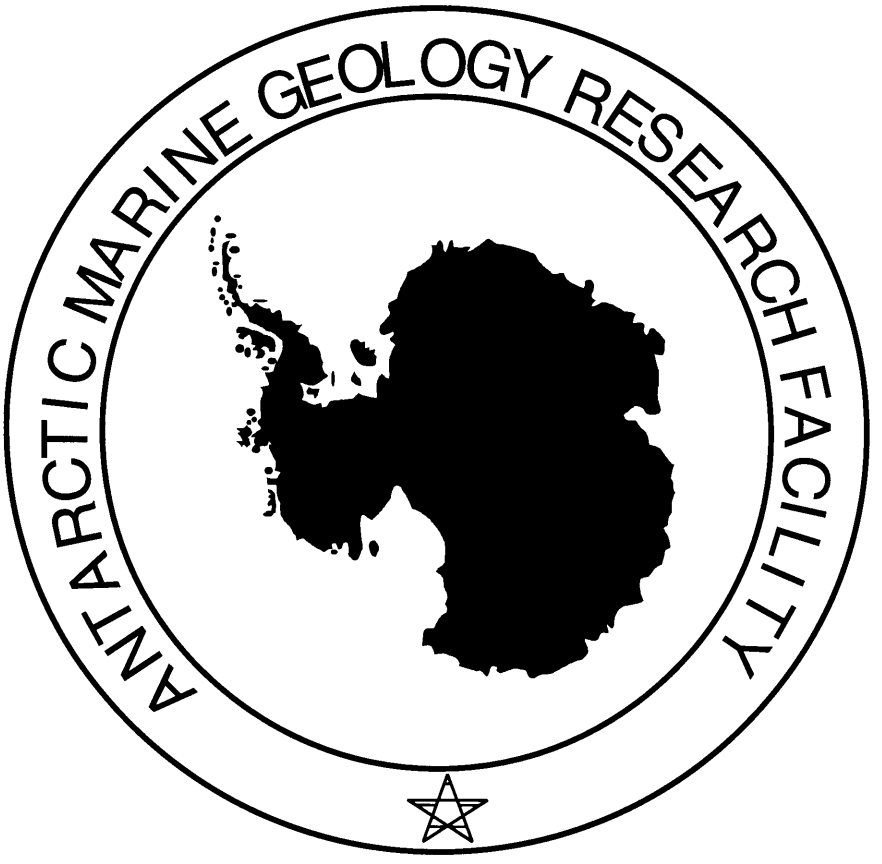

SEDIMENT DESCRIPTIONS
for
R/V *POLAR DUKE*
CRUISES II & VII, 1990

Sedimentology Research Laboratory Contribution No. 61

Department of Geology

FLORIDA STATE UNIVERSITY

Tallahassee, Florida

DESCRIPTIONS OF SEDIMENT RECOVERED BY THE R/V POLAR DUKE, CRUISES II & VII UNITED STATES ANTARCTIC PROGRAM 1990

Edited by
Steven A. Hovan and Thomas R. Janecek

Sediment Descriptions
Xinlan Liu

Technical Assistant
Carl Painter

Antarctic Marine Geology Research Facility
Department of Geology
Florida State University
Tallahassee, FL 32306-3026

Sedimentology Research Laboratory
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INTRODUCTION

This volume contains the descriptions of sediments recovered by the R/V Polar Duke during two cruises made in 1990 (PD90-II and PD90-VII). The cruise objectives were to study the coastal and shelf regions of Antarctica. A number of marine geologic samples (piston cores, trigger cores, and grab samples) were collected and are described here to assist geoscientists as a guide for sediment sampling.

The sediments are curated at the Antarctic Marine Geology Research Facility, Florida State University, Tallahassee. This facility contains an extensive collection of Antarctic and subantarctic sediments retrieved by coring, dredging, trawling, and grab sampling from a number of research cruises and vessels, and other research initiatives, including: forty-seven cruises of the USNS Eltanin (Goodell, 1964, 1965, 1968; Frakes, 1971, 1973; Cassidy et al., 1977a), five cruises of the ARA Islas Orcadas (Cassidy et al., 1977b; Kaharoeddin, 1978; Kaharoeddin et al., 1979, 1980, 1982), more than 13 cruises of the USCGC Glacier (Goodell et al., 1961; Anderson et al., 1981, 1986; Kellogg et al., 1981; Kaharoeddin et al., 1983, 1984, 1988; Anderson et al., 1987; Bryan, 1992a, b), eight cruises of the R/V Polar Duke (Jeffers, 1987; Jeffers and Anderson, 1986; Anderson, 1988; Domack, 1988; Lawver and Villinger, 1989; Anderson and Bartek, 1990; Anderson, 1991; Domack, 1992; Bryan and Pospichal, 1993; Hovan and Janecek, 1994a, b), three cruises of the R/V N.B. Palmer (Lawver, 1993), the Dry Valley Drilling Project (DVDP) (Dry Valley Drilling Project, 1974, 1975, 1976; McGinnis, 1979; Torii, 1981), the Ross Ice Shelf Project (RISP) (Clough and Hansen, 1979; Webb, 1978, 1979), the Eastern Taylor Valley Project (ETV) (Elston et al., 1981, 1983; Robinson, 1983, 1985; Robinson and Jaegers, 1984; Robinson et al., 1984), the Cenozoic Investigations in the Western Ross Sea Project (CIROS-1, CIROS-2) (Barrett, 1982, 1985, 1987; Barrett et al., 1985; Pyne et al., 1985; Robinson et al., 1987), and collections from miscellaneous vessels operating in the Southern Ocean (Anton Brun, Robert Conrad, Hero, and Vema).

This volume includes a summary of the scientific objectives of two cruises made by the R/V Polar Duke in 1990, cruises PD90-II and PD90-VII a discussion of core recovery and processing, a table and map of station

locations, an explanation of laboratory descriptive procedures, and lithologic descriptions of piston and trigger cores.

R/V POLAR DUKE 1990 - CRUISE II

Cruise objectives

The objectives and preliminary results of the PD90-II cruise have been summarized by Anderson and Bartek (1990). For the convenience of those using this sediment description volume, we have included a brief summary of those objectives below:

The scientific objective of this cruise was to acquire high-resolution seismic reflection data on the continental shelf that, in conjunction with existing drill sites on the continental shelf (DSDP Leg 28, sites 270, 271, 272, and 273) and sites in McMurdo Sound (MSSTS and CIROS), will provide the basis for developing a high-resolution seismic stratigraphy for the late Paleogene and Neogene strata on the continental shelf.

The Ross Sea continental shelf has long been recognized as a key region for investigating the long-term glacial history of Antarctica. During DSDP Leg 28, four sites were drilled on the continental shelf, explicitly to examine the history of glaciation in the region (Hayes and Frakes, 1975). Unfortunately, recovery was poor at these sites and the interpretation of the recovered strata has remained problematic. While the recovery at these sites is too sparse to allow confident paleoclimatic interpretations from lithologic units, these sites provide a rare statigraphic column with which to conduct sequence stratigraphic studies of Antarctica.

Athough the Ross Sea seismic reflection database is considerable, much of the existing data is unsuitable for seismic facies and high-resolution sequence stratigraphic analyses. The objective of this cruise was to acquire high-resolution data suitable for these types of analyses. Approximately 6000 km of seismic data were collected within the Ross Sea and 800 km were acquired in the transit from McMurdo to Palmer Station, including two shelf transects offshore of Marguerite Bay. Gravity and magnetic data acquisition occurred

throughout the cruise, resulting in a total of about 8000 km of data. Two coring stations were included in this study (Table 1; Figure 1). Two piston cores and one trigger core were recovered at these two coring stations and are described in this volume.

Table 1. Coring Summary for R/V Polar Duke 90-II cruise.

Station No.	Latitude (°S)	Longitude (°E)	Depth (m)	Additional Samples
PD90-II-01	76°56.72'	166°20.32'	875	TC
PD90-II-02	77°05.19'	166°29.20'	912	TC*

* no recovery

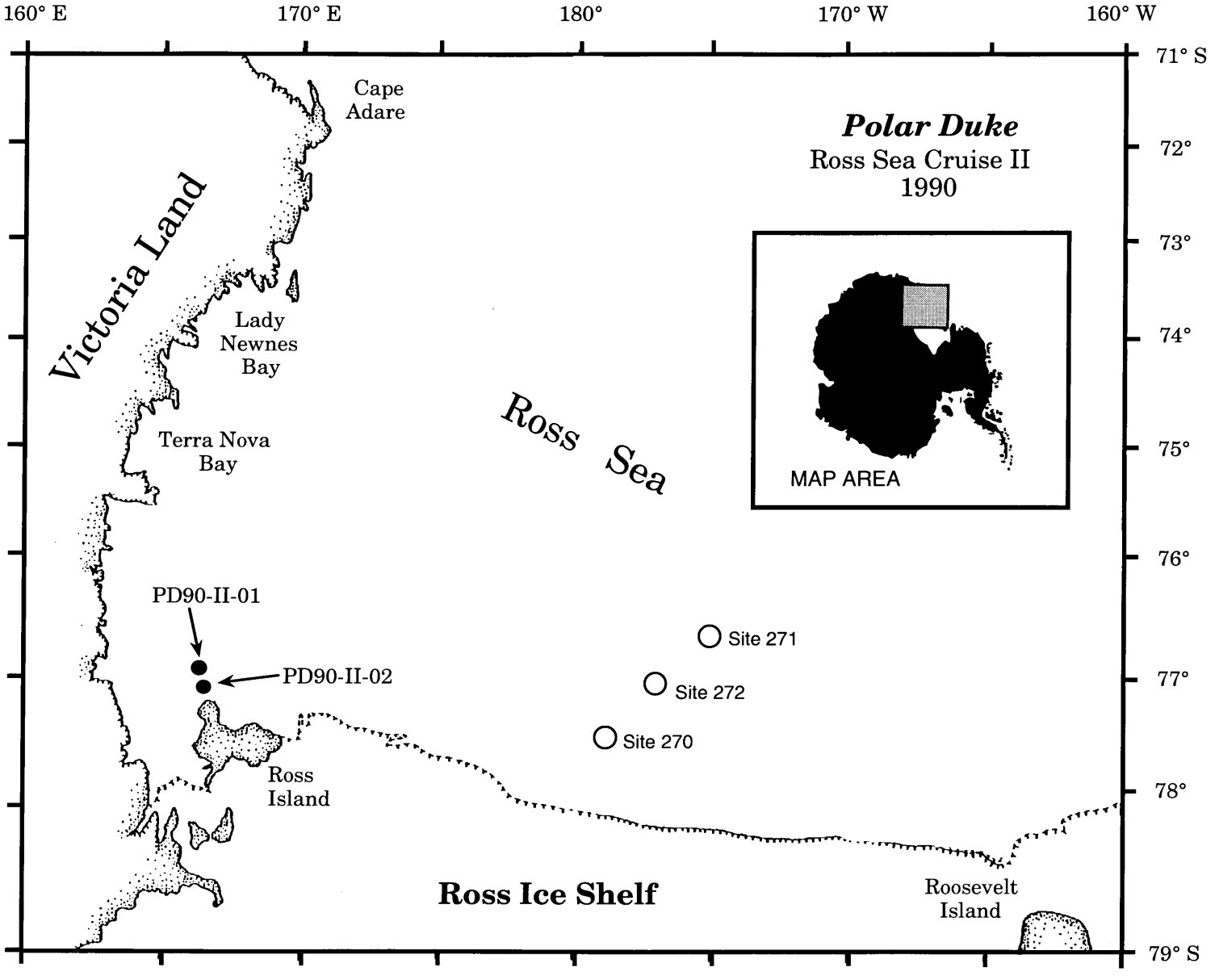


Figure 1. Location map of coring sites during PD90-II. Open circles represent sites previously drilled during DSDP Leg 28.

R/V POLAR DUKE 1990 - CRUISE VII

Cruise objectives

The following summary of the PD90-VII cruise objectives was modified from Domack et al. (1991):

The objective of this cruise was to obtain a complimentary set of oceanographic and marine geologic data that would help to understand the depositional processes and resulting stratigraphy within Antarctic fjords and corresponding offshore basins (Table 2; Figures 2 and 3). The cruise plan was based upon results obtained from earlier cruises during the 1987-1988 field season (Domack, 1988; Domack et al., 1989; Ishman 1990; Hovan and Janecek, 1994a). The justification of this study is based upon a fundamental need to provide a better understanding of how the marine, cryosphere, and biotic systems of the Antarctic have responded to climatic perurbations during the last 18,000 years. Such results will provide the predictive database to assess the impact of environmental change in the Antarctic region and surrounding oceans. The Antarctic Peninsula is a critical area in which to address such problems because of the transitional character of its marine, climatic and resulting glaciologic settings. Specifically, this study was designed to understand how the glaciologic transition between tidewater glaciers and ice shelves influences circulation patterns and resulting sediment lithofacies and biofacies. Because the transition between tidewater fronts and ice shelves is climatically controlled (Swithinbank, 1988; Anderson and Domack 1991), changes in sediment facies near this region could presumably record past climatic changes associated with movement of the transitional setting.

Past investigations have shown that mid- and deep-water cold layers are associated with partially floating glacial termini and that these oceanographic features also have low light transmissivity (high suspended particulate loads). Such cold tongues could represent a major mechanism for the transport of terrigenous sediment to the fjord system in the absence of estuarine overflows; the latter are surface overflows associated with melt-dominated tidewater glaciers. The cruise plan was designed to investigate

the origin of the cold-tongue phenomena, its association with ice shelves, and the size and composition of the associated suspended particulate matter.

Prior results also demonstrated that there is a relatively thick sedimentary sequence that lies within inner-shelf basins and fjords. In order to define the spatial and temporal records of this sedimentary package, high-resolution seismic data and long (9 m) piston cores were obtained (Table 2; Figures 2 and 3). Such information is a vital "first-step" in the process of interpreting the sedimentary sequence in terms of paleoclimate.

Table 2

Coring Summary for R/V Polar Duke 90-VII cruise

Station No.	Latitude (S°)	Longitude (W°)	Water Depth (m)	Sample(s) taken
2	64°57.12'	63°31.85'	460	SMG
3	65°00.10'	63°20.85'	500	SMG
4	64°04.05'	63°10.52'	580	SMG
5	65°05.31'	63°09.07'	530	SMG
6	65°07.24'	63°11.43'	171	SMG
7	65°08.36'	63°12.27'	408	SMG
8	65°09.28'	63°13.18'	493	SMG
9	65°09.95'	63°13.68'	490	SMG
10	65°11.20'	63°14.51'	470	SMG
11	65°00.38'	63°20.75'	445	SMG
12	64°58.70'	63°25.08'	440	SMG
13	64°51.98'	62°30.13'	420	SMG
14	64°52.30'	62°28.38'	480	SMG
15	64°52.38'	62°26.49'	310	SMG
16	64°52.20'	62°25.87'	521	SMG
17	64°54.85'	62°35.34'	270	SMG
18	64°54.80'	62°34.69'	210	KC
19	64°54.70'	62°35.79'	245	KC
20	64°54.56'	62°36.07'	245	KC
21	65°54.41'	62°35.96'	240	SMG
22	64°53.96'	62°35.80'	270	SMG
23	64°53.26'	62°36.46'	165	SMG
24	64°52.51'	62°36.53'	230	SMG
25	64°51.60'	62°36.86'	230	SMG
26	64°51.07'	62°36.85'	210	SMG
27	64°50.60'	62°37.47'	325	SMG
28	64°50.19'	62°38.10'	400	KC
29	64°50.20'	62°37.84'	395	KC
30	64°49.41'	62°38.75'	440	GC
31	64°48.67'	62°40.32'	404	GC
32	64°48.23'	62°41.34'	450	GC
33	64°47.30'	62°44.44'	409	SMG
34	64°46.65'	62°43.25'	446	SMG
35	64°47.72'	62°45.91'	320	SMG
36	64°46.16'	62°45.97'	462	GC
37	64°45.20'	62°47.44'	374	GC
38	64°15.78'	60°59.94'	278	SMG
39	64°16.65'	60°59.72'	452	KC
40	64°16.12'	61°00.76'	302	GC
41	64°16.34'	60°58.52'	170	GC
42	64°16.49'	60°59.69'	452	PC,TC
43	64°16.19'	61°03.54'	512	PC,TC
44	64°16.16'	61°03.58'	504	KC
45	64°15.45'	61°08.17'	460	PC,TC

Table 2 (continued)

Station No.	Latitude (S°)	Longitude (W°)	Water Depth (m)	Sample(s) taken
46	64°13.25'	61°14.43'	575	KC
47	64°16.99'	61°53.69'	1150	PC,TC
48	64°16.53'	61°52.42'	1135	PC,TC
49	64°05.89'	61°49.85'	1240	PC,TC
50	64°04.55'	61°48.61'	1220	PC,TC
51	63°59.99'	61°42.96'	1203	PC,TC
52	63°57.80'	61°41.48'	1155	PC,TC
53	63°52.31'	61°35.48'	1066	PC,TC
54	63°50.17'	61°33.51'	1000	GC
55	63°50.56'	61°33.48'	1030	PC,TC
56	64°55.65'	64°16.32'	1415	PC,TC
57	66°45.46'	66°58.15'	780	SMG
58	66°57.00'	66°49.58'	722	SMG
59	67°04.80'	66°50.95'	420	SMG
60	67°08.22'	66°47.56'	650	SMG
61	67°12.57'	66°53.32'	677	SMG
62	67°14.28'	66°48.28'	210	SMG
63	67°13.02'	66°46.53'	195	SMG
64	67°13.01'	66°46.59'	200	GC
65	67°11.97'	66°45.17'	220	SMG
66	67°11.10'	66°39.23'	620	SMG
67	67°19.86'	66°28.21'	590	SMG
68	67°19.87'	66°28.16'	590	GC
69	67°17.29'	66°30.12'	540	SMG
70	67°15.00'	66°32.26'	501	SMG
71	67°12.46'	66°53.21'	660	PC,TC
72	67°12.55'	66°53.29'	655	KC
73	67°09.99'	66°50.00'	803	PC,TC
74	67°08.39'	66°47.97'	640	PC,TC
75	67°08.40'	66°47.81'	644	KC
76	64°16.09'	61°03.51'	515	PC,TC

SMG = Smith-McIntyre grab sample

PC = Piston core

GC = Gravity core

TC = Trigger core

KC = Kasten core (described in Domack et al., 1991)

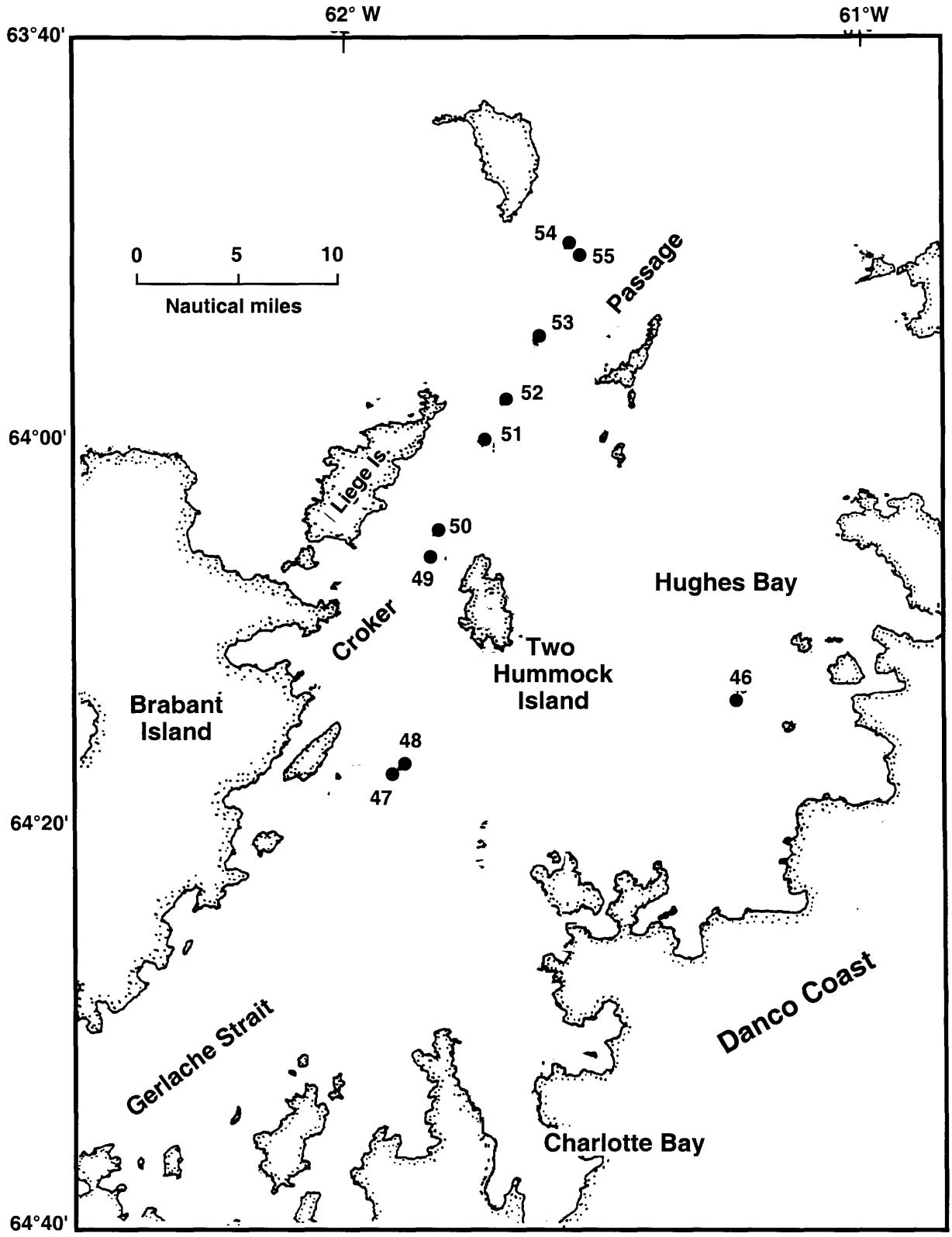


Figure 3a. Sample locations in the vicinity of Hughes Bay and Croker Passage. See Figure 2 for location of map.

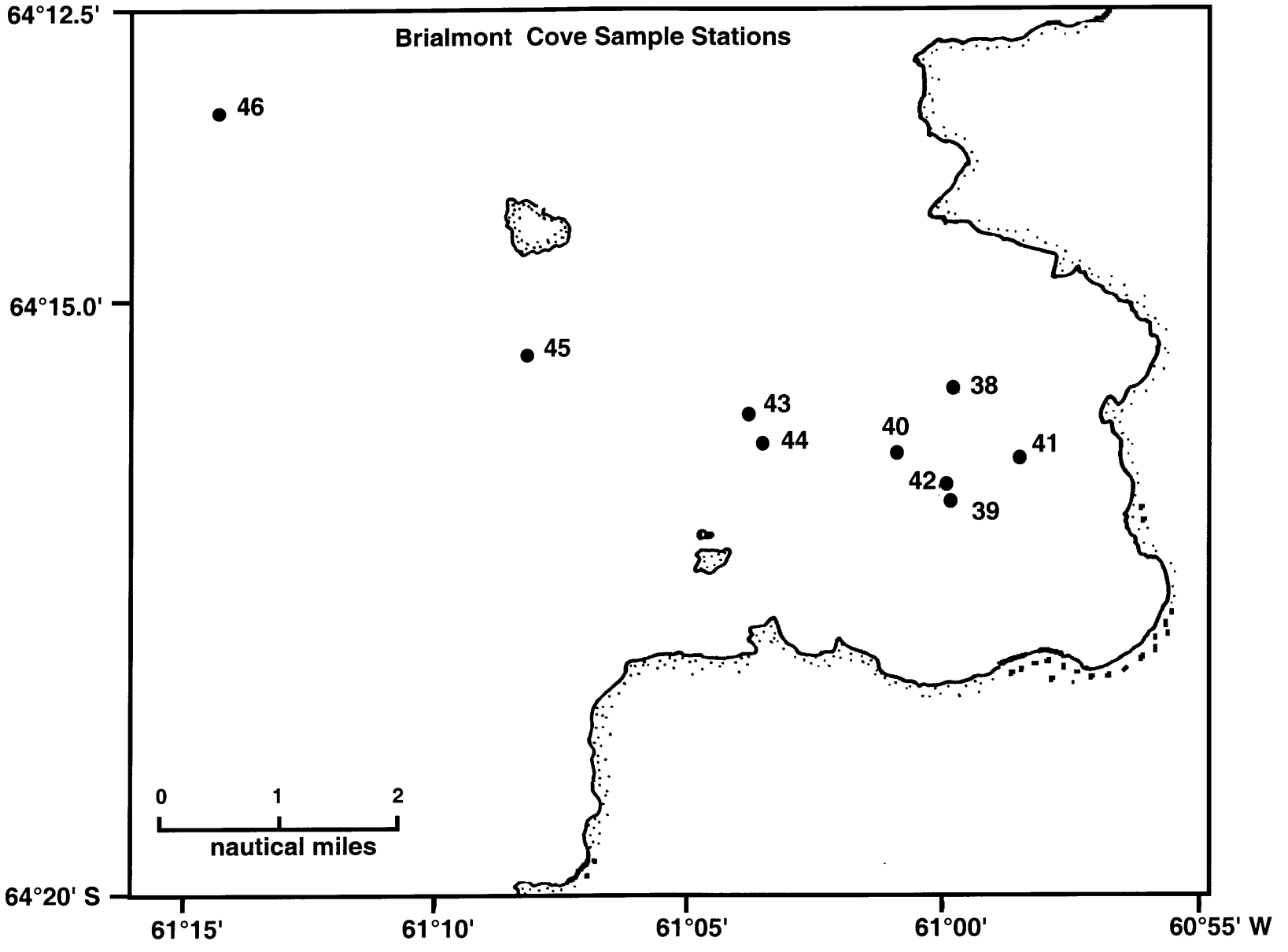


Figure 3b. Sample locations within Brialmont Cove. See Figure 2 for location of map.

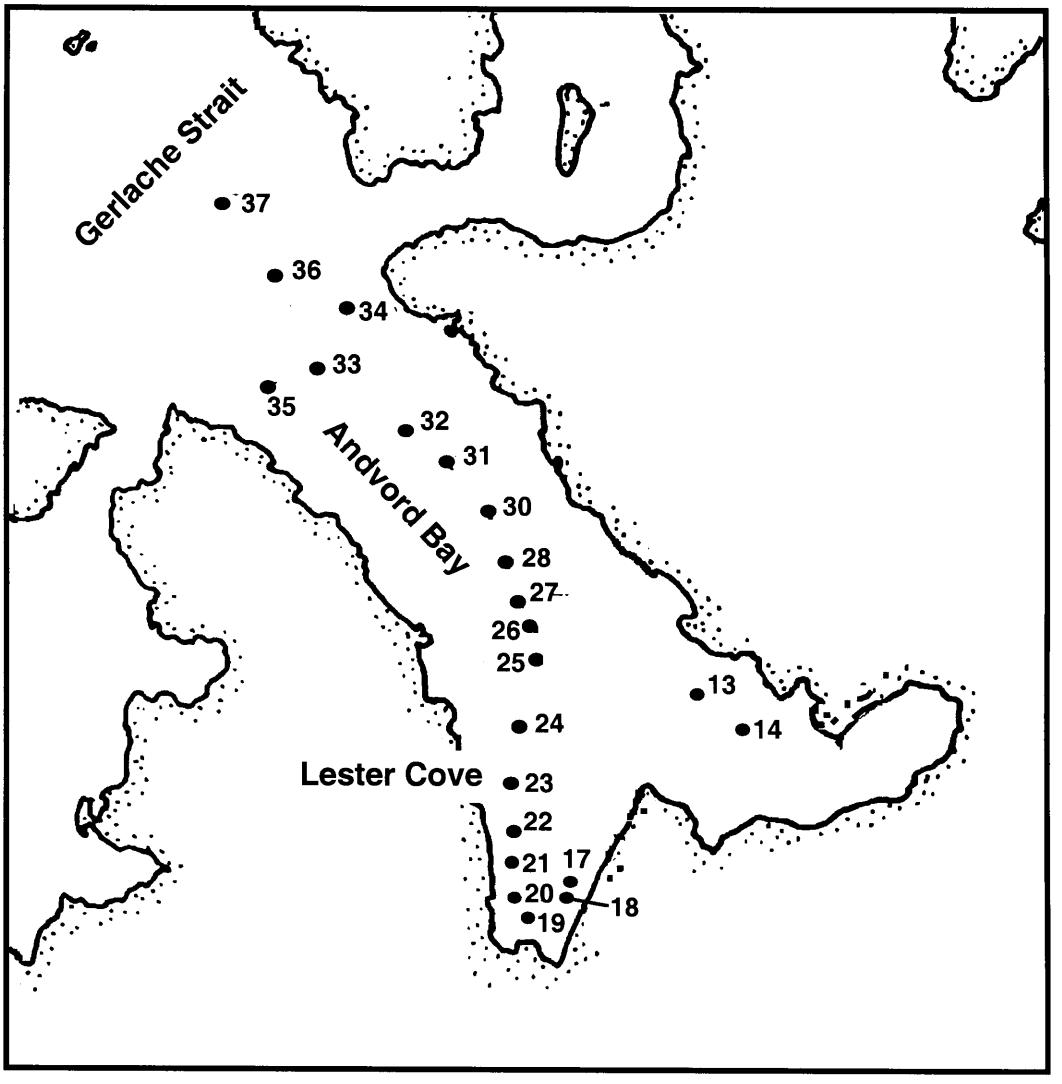


Figure 3c. Sample locations within Andvord Bay. See Figure 2 for location of map.

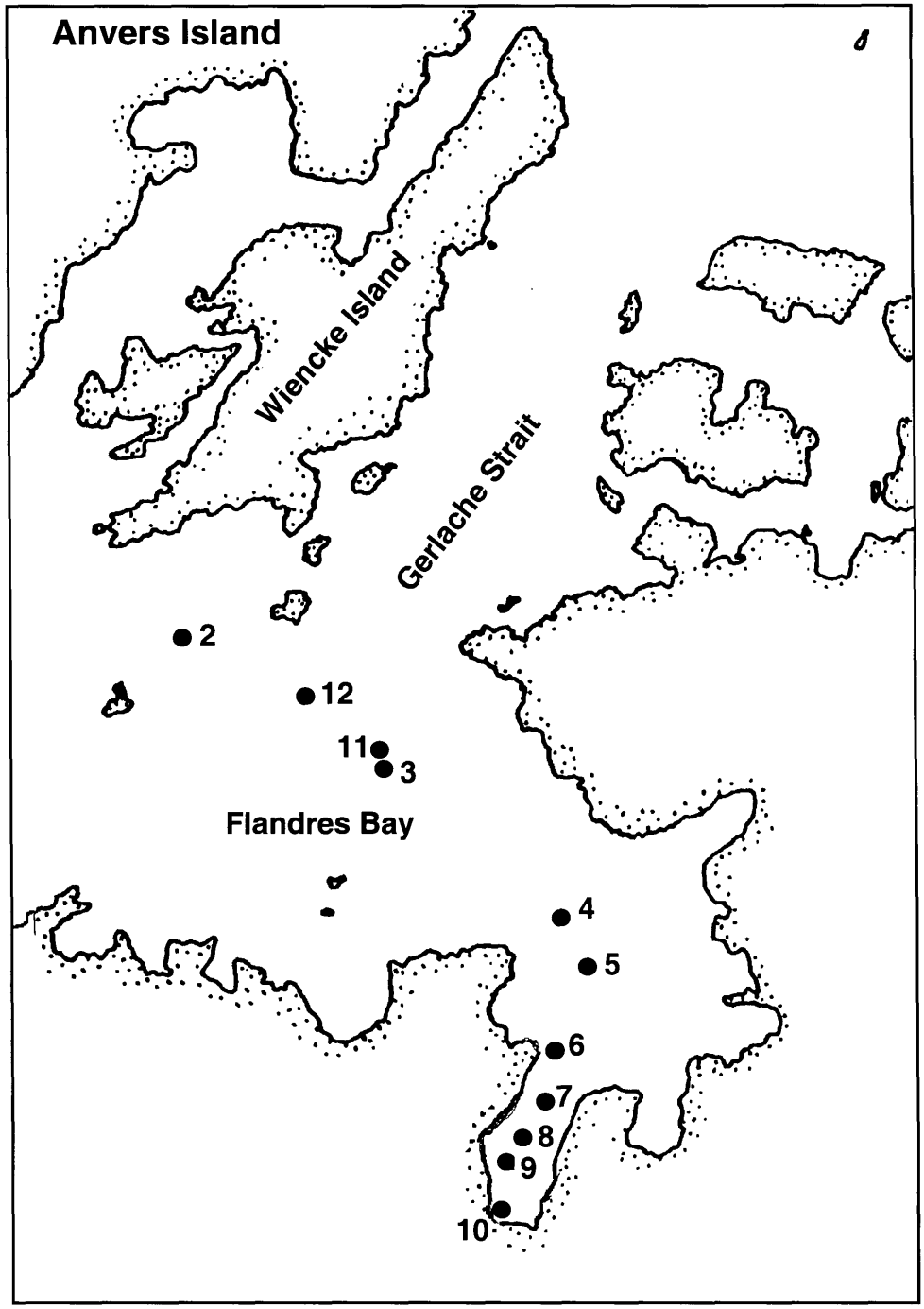


Figure 3d. Sample locations within Flandres Bay. See Figure 2 for location of map.

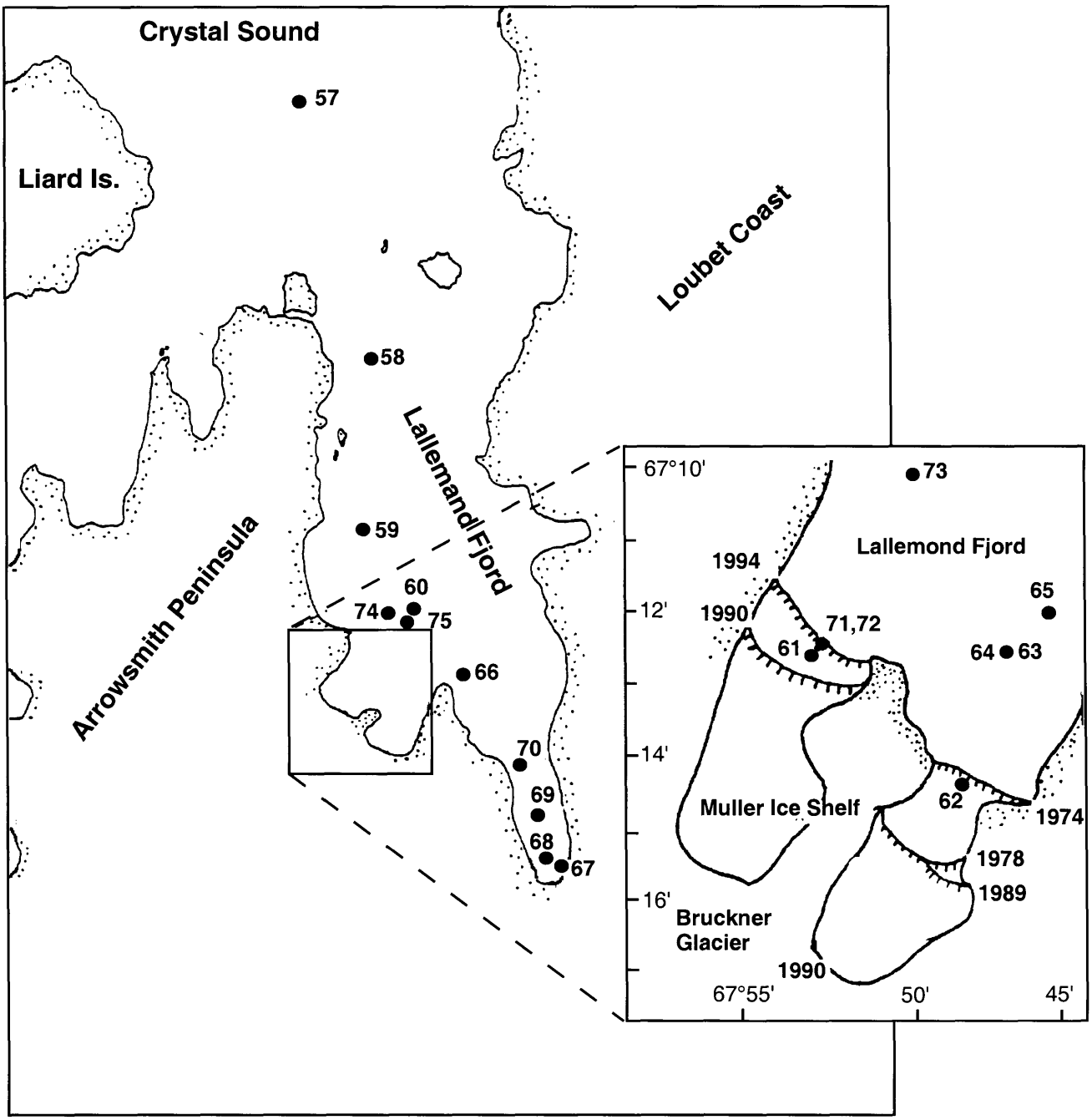


Figure 3e. Sample locations within Lallemond Fjord. See Figure 2 for location of map.

CORE PROCESSING

Piston and trigger cores are cut at the Antarctic Research Facility using an adjustable, track-operated, radial power saw (Cassidy and Devore, 1973). The saw is adjusted to cut only through the thickness of the plastic core liner. Two cuts are made on opposite sides of the core liner. Once the liner is cut, the core sediments are manually split by drawing a wire through the middle of the core. Each half section of core is cleaned of plastic debris (which results from cutting the liners) by scraping the sediment perpendicular to the core axis with a stainless steel spatula. This exposes fresh sediment. Core halves are then measured, labeled every 20 cm (taking into account any bagged sediments), and heat-sealed within polyethylene sleeving to prevent desiccation. Structures in the sediment resulting from disturbance from flow-in or sediment washing are recorded immediately after the core is opened.

All cores are stored in a refrigerated store room (~2°C) at the Antarctic Research Facility, Florida State University. Bagged samples are placed in labeled plastic bags and are also kept in refrigerated storage.

CORE DESCRIPTION PROCEDURES

General Description Procedures

Procedures used for describing the cores listed in this volume are in general similar to those used in previous studies published by the Antarctic Research Facility (e.g., Kaharoeddin et al., 1988; Bryan, 1992a, b). These procedures are presented below.

The description of each core consists of three types of information:

1. The primary information (latitude, longitude, water depth, core length);

2. The lithologic description (using megascopic and smear slide observations);

3. Information concerning core conditions that are not inherent to the lithologic character of the sediments (disturbance, missing section, etc.).

Most of the primary information is obtained from the deck-log, or from other information provided by the chief scientist of the cruise. Core conditions not inherent to the lithologic character of the sediments are recorded from the deck log and from initial observations after cutting the core liner.

Each core description is accompanied by a graphic log illustrating the main lithologies, boundaries, inclusions, sedimentary structures, and disturbances of the sedimentary units. The same criteria and format used for describing piston cores are used for describing trigger cores. The positions of the core section breaks are also indicated in the log in order to inform the investigator as to where samples should not be taken, since the cutting of cores into sections may result in sediment disturbance. Not all information appearing in the written portion of the lithologic description is illustrated in the graphic log. Note that a different scale of the graphic log is used for trigger cores and gravity cores than piston cores.

In addition to the recovery of piston, gravity and trigger cores, a variety of bagged sediments are normally collected during most cruises. Description of these sediments is the same as with piston and trigger cores. Weights of bagged sediments are given in the description as an indication of the amount of sediment available for sampling. Bagged sediments include:

1. Sediments representing the total recovery of sediment by the coring attempt (piston and trigger cores).

2. Sediments recovered by grab-sampling.

3. Sediment that has come out of the core liner. Most bagged sediments in this category are from the top or bottom of core sections, and usually result from the accidental spilling of sediment from the liner end either during handling or cutting of the liner into shorter sections, or from difficult extrusion of the core liner from the core barrel.

Megascopic Examination and Description

The elements of description of each unit are presented in the following order:

1. The upper and lower boundaries of the unit in centimeters. (For bagged sediments, this interval is replaced by the weight of the sediment in grams). Lithologic units are recognized on the basis of compositional, textural, and other sedimentological characteristics.

2. Name, color, and color code of the sediment. Gradual changes in texture or color of the unit are described accordingly. The term "graded" can be applied to the name of the unit (see the following section on sediment classification). Interlayering with other types of sediment is also noted.

3. Observable distribution of volcanic ash, manganese nodules, and staining.

4. Internal structures within the unit: zone, layer, lamina, lens, stringer.

5. Inclusions: Sedimentary clasts, pebbles, lapilli, manganese nodules.

6. Bioturbation.

7. Disturbances due to the coring operation and/or transportation.

8. Nature of the bottom contact of the unit.

Other than coarse volcaniclastics, most of the cores consist of muddy lithologies, and classification is based on smear slide observations. Sediments larger than 63 µm in size must usually be avoided in smear slide preparations. In the case of sediments with mixed sizes (> and < 63 µm), an estimate of coarse -vs- fine fraction is necessary for sediment classification. If there is an obvious coarse fraction within an otherwise muddy lithology, a small portion of the sediment is wet-sieved (63 µm sieve) and observed under the binocular microscope. A rough visual estimate is then made of the amount of coarse -vs- fine sediment (based on the amount sieved -vs- residual coarse sediment >63 µm). For example, if a smear slide is a diatomaceous mud, but approximately half of the original lithology is sand, the sediment will be a sandy diatomaceous mud. Thus, estimated values of dominant

constituents from smear slide analyses, wet-sieving, and megascopic examination are used in classification.

Glacial marine sediments generally consist of mixed-size classes (such as pebbles in mud). However, no attempt was made to utilize a separate classification for these sediments. Instead, the matrix is classified according to the guidelines outlined herein for fine-grained sediments, and clasts are described separately as inclusions within the lithology.

The size class and sorting of a sand or pebble unit are always mentioned in the description. Size classes of sand-size fractions were determined by use of the AMSTRAT (American/ Canadian Stratigraphic) size class comparison card. On this card, each of the five size classes (very coarse, coarse, medium, fine, very fine) of sand-size particles has been divided into two subclasses (very coarse-upper, very coarse lower; coarse-upper, coarse lower; etc.). The ten subclasses (separated by 0.5 phi intervals) are graphically depicted on the card for comparison with the sediment. Determination of the mean grain size of sand is a matter of matching the size of the most abundant grains to one of the five size classes exhibited on the card.

A unit may exhibit several colors, and color changes within a unit are described as being gradational or sharp (abrupt). Mottling refers to irregular spots of differing color within the sediment, and the color of mottling may be included in the description. The color of the sediment is determined by visual comparison of fresh sediment with the Geological Society of America color chart (Goddard et al., 1970). If the color of a sediment cannot be matched exactly with the color chart, the closest color is used. These charts are designed for rock color determinations and are included here because they represent the only color data recorded for these sediments. The editors, however, recommend using Munsell soil color charts for descriptions of oceanic sediments.

Any variation in the abundance of a major component in a unit, observable either megascopically or through smear slide analyses, is given in the description. Minor constituents that are scattered within a unit (micro-manganese nodules, lapilli, ash, etc.) may also be identified on smear slides. Their abundance is determined after a thorough examination of the core and

described as scattered, common, or abundant. Manganese and ferrous oxides that occur as staining materials can be either in the form of small patches, or spread uniformly within a certain interval. These stainings are described by the terms slightly, moderately, or highly stained.

In describing the internal structures within a sedimentary unit, the stratigraphic position of each structure is noted, and when applicable, the composition and the color are also described. Each structure is defined as follows: Zones are defined as small intervals (less than 20 cm) in which a notable change in the abundance of some components or inclusions in the unit can be detected, either through megascopic examination or in the smear slide analysis. Layers have a thickness of between 1 to 10 cm and are separated from the main unit by a discrete change in lithology and distinct planes of contact. Laminae are similar to layers, but have a thickness of less than 1 cm. Stringers are laminae which are discontinuous and often irregular in form. In the description of a unit, the following sequence is used: zones, layers, laminae, and stringers.

Inclusions within an unit are described in the following order:

1. Sedimentary clasts are described in detail including size, composition, color, and position in the core (Example: "sedimentary clasts up to 12 mm composed of calcareous, ash-bearing mud, diatomaceous mud, and muddy diatomaceous ooze, all olive gray (5Y 4/1), common throughout").

2. Manganese nodules are described as to their size and position in the core.

3. Volcaniclastics are described as to their textural class and position in the core. Sometimes the rock type (pumice, scoria) is also mentioned.

4. Pebbles are described as to their size, roundness, and position in the core. Occasionally, their rock type is also given. Coatings, encrustations, and cementation by manganese or ferrous oxides are common on clastics and volcaniclastics; they are mentioned when present (Example: "very fine to fine, subangular to subrounded pebbles common throughout").

Bioturbated sediments are described in terms of slightly, moderately, or highly bioturbated. The qualifiers can be approximated as follows:

Slightly: less than 5% bioturbation

Moderately: between 5% to 30% bioturbation

Highly: 30% or more bioturbation

Operational disturbances are disturbances in the sediment usually occurring during the coring operation, transportation, and occasionally during the splitting of the core, resulting in total or partial loss of the primary sedimentary structures and the stratigraphic integrity of the sediment. The degree of the disturbance is described in terms of slightly, moderately, or highly disturbed. Slightly disturbed sediments still retain most of their primary sedimentary structures, particularly along the central axis of the core. Moderately disturbed sediments have lost almost half of their original structures, and must be sampled carefully if they are to be stratigraphically meaningful. Highly disturbed sediments have lost most or all of their primary structures; it is not recommended that these be sampled for stratigraphic study because of mixing of sediment components. Highly mixed sediment that has randomly entered the core by suction during the coring operation is described as flow-in and is usually characterized by vertical striations that can be traced from the base of the core.

Water entrapped in the liner can wash sediment along the side of the liner during transport. Sediments disturbed in this manner are described as slightly or moderately washed along the side, and can still be sampled carefully for stratigraphic work. The term, "highly washed along the side", is not used because such sediment is almost always highly disturbed. An uncommon disturbance occurs when the overlying sediment is dragged along the side of the liner. Cores described in this manner can be sampled (carefully) for stratigraphic work.

Smear Slide Analysis

Smear slides are routinely made from regular intervals throughout the core during the description process. Slides are made from each

macroscopically visible lithologic unit in the core (as recognized by compositional, textural, and color changes), but if the core is homogeneous in composition (e.g., a diatomaceous ooze), only one or two slides may be made for the entire core.

Smear slides are made as follows: Using a toothpick, a small amount of sediment is obtained from the core. This sample is mixed with a drop of water on a standard 1" x 3" glass slide until the sediment and water are smeared into a very thin film (treatment of the slide with an anti-fogging glass cleaner or saliva prevents cohesion of the water drop and ensures an even smear of the sediment slurry). The slide is then dried on a hot plate (using low temperature). When the slurry is dry, 1 to 3 drops of Norland Optical Adhesive (NOA 61) are put over the dried sediment film and covered with a glass cover slip (care must be taken to exclude air bubbles). The slide is then placed under an ultraviolet lamp for 2 or 3 minutes to cure the adhesive. The slide is then ready for viewing under a petrographic microscope. Using transmitted light and phase contrast, biogenic sediment components and heavy minerals are readily visible. Polarized light is used to view most clastic components.

For each smear slide, the percentage abundance of the following constituents are estimated using the percentage composition chart of Shvetsov (Terry and Chilingar, 1955):

1. Minerals: quartz, feldspar, mica, heavy minerals, volcanic glass, glauconite, pyrite, and micromanganese nodules.

2. Biogenic constituents: foraminifera, calcareous nannofossils, unspecified carbonate, diatoms, radiolarians, sponge spicules, silicoflagellates, ebridians, and ostracodes.

On the basis of the dominant sedimentary constituents, the sediment is classified according to the guidelines outlined below.

SEDIMENT CLASSIFICATION

The system of sediment classification used in this volume is that used in Bryan (1992b), which is modified from Kaharoeddin et al. (1988). This classification is strictly descriptive and is based on abundance estimates of constituent particles (from smear slide observations) and megascopic examination.

Details of Classification

The three major groups of sediment are (Figure 4):

I. Pelagic sediments, consisting of pelagic clay, siliceous ooze, calcareous ooze, or mixtures of siliceous and calcareous ooze;

II. Transitional sediments consisting of mixtures of biogenic and clastic sediments; and

III. Terrigenous and volcanic detrital sediments.

Pelagic Sediments

PELAGIC CLAY

This type of sediment accumulates at a very slow rate and generally has a brown hue. Authigenic components are common (5% or more in estimated abundance), however, they may be present only in small quantities and distributed in such a manner that they are not found on the smear slide. Usually, a careful examination of the core, aided by the smear slide analysis, is necessary to determine whether or not a sediment is a pelagic clay. The primary components of pelagic clay are clay minerals and silt-size quartz particles, and the clay may contain less than 30% biogenic components. A qualifier cannot be added to pelagic clay; hence, pelagic clay containing 25% diatoms is not called diatomaceous pelagic clay.

PELAGIC BIOGENIC SEDIMENTS

Included in this group are sediments containing at least 30% biogenic skeletons, but containing less than 30% silt and clay. They are named

according to their principal fossil types: diatomaceous ooze, radiolarian ooze, siliceous ooze, foraminiferal ooze, nannofossil ooze, or calcareous ooze. A second (lesser) biogenic component may be used as a qualifier if more than 15%. The following rules apply for naming pelagic biogenic sediments:

1. If both the principal and lesser fossil types are similar in their chemical composition (i.e., calcareous or siliceous), the sediment may be called a siliceous ooze or calcareous ooze, depending on its chemical composition.

2. Calcareous sediment that has unspecified carbonate more than one-third of the total carbonate is called calcareous ooze.

3. If the principal and lesser fossil types differ in chemical composition, then both components are used in the sediment name, joined by a hyphen (e.g., diatomaceous-foraminiferal ooze).

Transitional Biogenic Sediments

Included in this group are sediments containing at least 30% silt and clay. Two subdivisions are recognized: the transitional siliceous sediments having at least 15% diatoms but less than 30% calcareous skeletons, and transitional calcareous sediments having at least 30% calcareous skeletons. The following rules apply for naming transitional biogenic sediments:

1. A transitional siliceous sediment is called muddy diatomaceous ooze if diatoms are more abundant than silt and clay; otherwise, it is called diatomaceous mud.

2. The transitional calcareous sediments are named according to their principal fossil types: marly foraminiferal ooze or marly nannofossil ooze. If the lesser biogenic component exceeds 15%, the sediment is called marly calcareous ooze.

Terrigenous and Volcanic Detrital Sediments

TERRIGENOUS DETRITAL SEDIMENTS

Sediments in this group are classified according to their texture as defined by the standard size classes of sediment according to Friedman and Sanders

(1978; Figures 5 and 6). The following rules apply for sediments which are primarily composed of mixtures of sand, silt and clay:

1. The sediments are named after their major clastic component (end-member) if that component is greater than or equal to 70% (i.e., sand, silt, clay).

2. Sediments containing a mixture of silt and clay greater than or equal to 70% are called mud.

3. Sediments containing between 30% and 50% sand are named: sandy silt if the silt content is between 50% and 70%; sandy clay if the clay content is between 50% and 70%, or sandy mud if the mud content is less than 70%.

4. Sediments containing between 50% and 70% sand and between 30% and 50% mud are called muddy sand.

5. Sediments containing a minor component between 15% and 30% (e.g., diatoms or pebbles) should have a qualifier (e.g., diatomaceous muddy sand).

Pebbles are seldom encountered as a distinct sedimentary unit in marine sediments except in glacial marine sediments. The following rules apply to the naming of sediments which consist primarily of pebbles:

1. Sediments containing 70% or more pebbles are called pebbles.

2. Sediments containing between 50% and 70% pebbles and between 30% and 50% either mud or sand are called muddy pebbles or sandy pebbles, respectively.

Pebble units often contain finer matrix sediment, some or nearly all of which may be washed away during core retrieval or transportation. Removal of matrix sediment by washing is usually easily identified during core-description. If the matrix sediment constitutes more than 10% of a pebble unit, the composition of the matrix is mentioned.

In graded sequences in which the size of the particles ranges from one textural class to another (e.g., silt to sand), the term graded clastics is used as the name of the unit. If the size of the particles ranges within one textural class, the unit is named according to its textural class (e.g., "sand, yellow gray (5Y 7/2), graded").

VOLCANICLASTICS

This sediment group is classified according to the classification proposed by Fisher (1961, 1966). The nomenclature and the size limits are as follows:

Fine ash: less than 63 µm
Coarse ash: 63 µm to 2 mm
Lapilli: 2 mm to 64 mm

As suggested by Fisher (1966), the term "volcanic" is not used as an adjective of ash or lapilli. The term "volcaniclastic" is used only for graded sequences where the particles size grades from ash to lapilli; thus, the name of the unit is graded volcaniclastics. In the case of graded sequences where the size of the particles ranges within one textural class, the unit is named according to its textural class (e.g., "coarse ash, brownish black (5YR 2/1) graded, well sorted").

Volcaniclastics that have biogenic or terrigenous components in excess of 15% will have a qualifier with the term "bearing" added to the qualifier (e.g., "diatom-bearing coarse ash"). The same term is also added to the qualifier of other groups of sediment if the unit contains more than 15% volcaniclastics (e.g., "ash-bearing diatomaceous ooze").

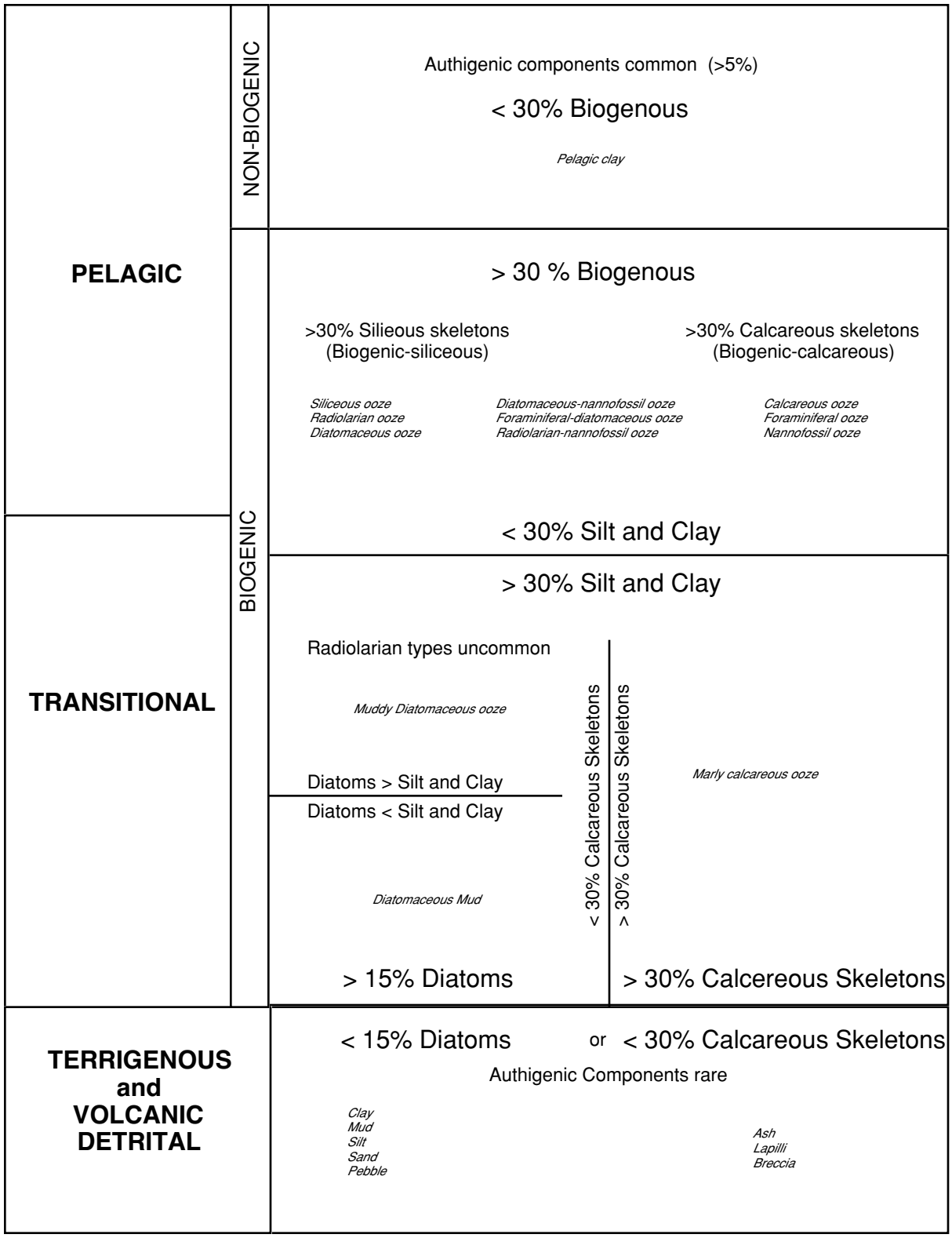


Figure 4. Classification scheme used for marine sediments.

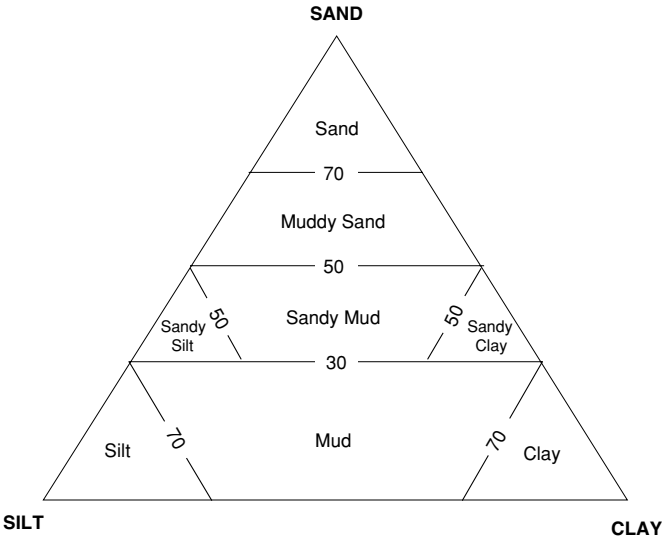


Figure 5. Classification of clastic sediments

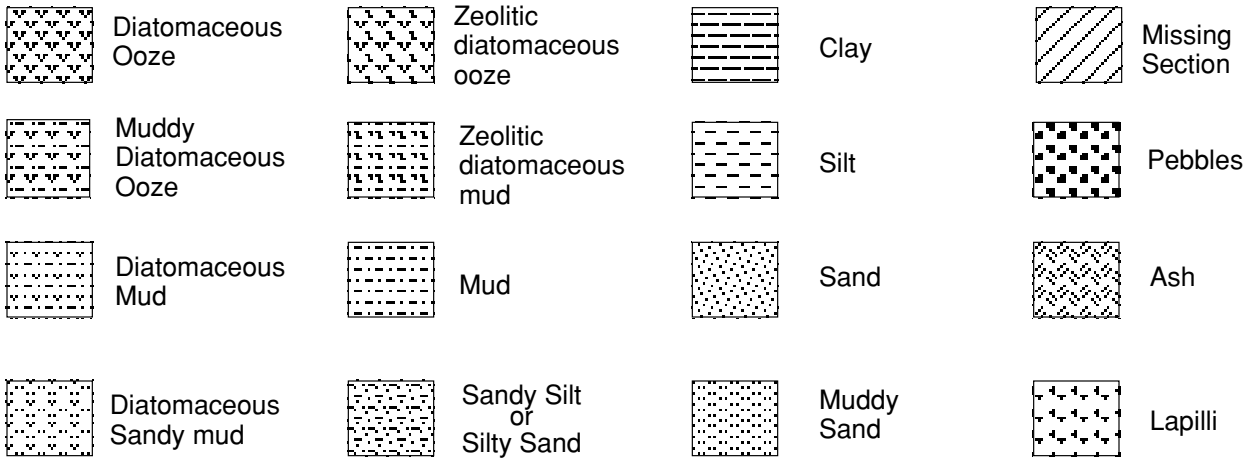
Limiting Size (mm)	SIZE CLASS	
64		
	Very Coarse	PEBBLES
32		
	Coarse	
16		
	Medium	
8		
	Fine	
4		
	Very Fine	
2		
	Very Coarse	SAND
1		
	Coarse	
.5		
	Medium	
.25		
	Fine	
.125		
	Very Fine	
.062		
	Coarse	SILT
.031		
	Medium	
.016		
	Fine	
.008		
	Very Fine	
.004		
	CLAY	

Standard size classes of sediment
(modified after Friedman and Sanders, 1978)

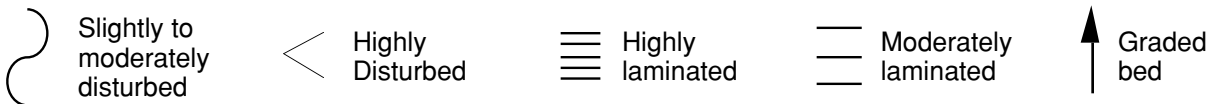
Figure 6. Standard size classes of sediments.

SEDIMENT CORE DESCRIPTIONS
Polar Duke Cruise 90-II

Graphic Lithology Key



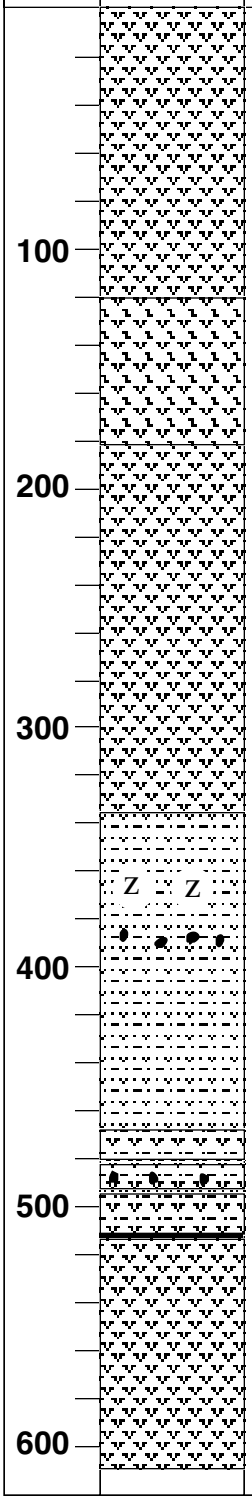
Graphic Structures Key



Piston Cores

PD90-II-1 PC

Length (cm)	Lithology	Structure	Latitude: 76°5672' S Longitude: 166°20.32' E Water Depth: 875 m Core Length: 604 cm
			LITHOLOGIC DESCRIPTION

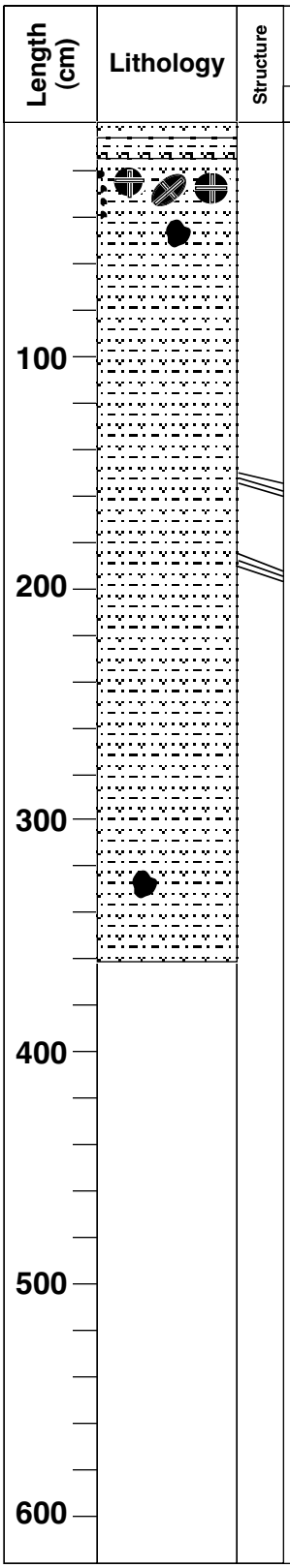


0-338 cm: Diatomaceous ooze, moderate olive gray (5Y 4/4); layer of zeolitic diatomaceous ooze, moderate olive gray (5Y 4/4), between 120-180 cm; gradational contact with unit below.

338-513 cm: Diatomaceous mud, dark yellowish brown (10YR 4/2); layer of diatomaceous mud, olive gray (5Y 3/2), between 338-359 cm and 369-379 cm; layer of diatomaceous mud with high zeolitic content between 359-369 cm; layer of muddy diatomaceous ooze, light olive gray (5Y 5/2), between 465- 478 cm, 481-488 cm and 491-513 cm; very fine basaltic pebbles are between 385-386 cm and 486-487 cm; sharp contact with unit below.

513-604 cm: Diatomaceous ooze, moderate olive brown (5Y 4/4).

PD90-II-2 PC



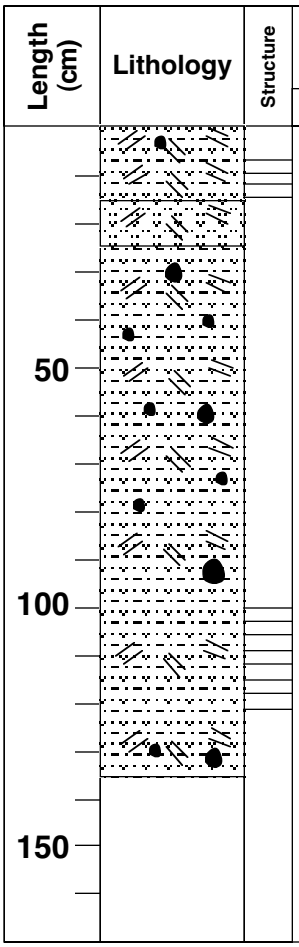
Latitude: 77°05.19' S **Water Depth:** 912 m
Longitude: 166°29.20' E **Core Length:** 360 cm

LITHOLOGIC DESCRIPTION

0-360 cm: Diatomaceous mud, olive gray (5Y 4/1); zone of diatomaceous mud with intra-formational subrounded clasts (i.e., same composition as matrix), light olive gray (5Y 5/2), between 13-31 cm; layer of zeolitic diatomaceous mud, dark yellowish brown (10YR 4/2) between 10-13 cm; inclined laminae of diatomaceous mud, greenish gray (5GY 6/1), between 154-156 cm, 184-185 cm and 186-189 cm; a coarse angular basaltic pebble between 331-334 cm; a coarse subangular pebble between 39-41 cm; very fine to fine basaltic pebbles on one side between 30-40 cm.

Trigger Core

PD90-II-1 TC



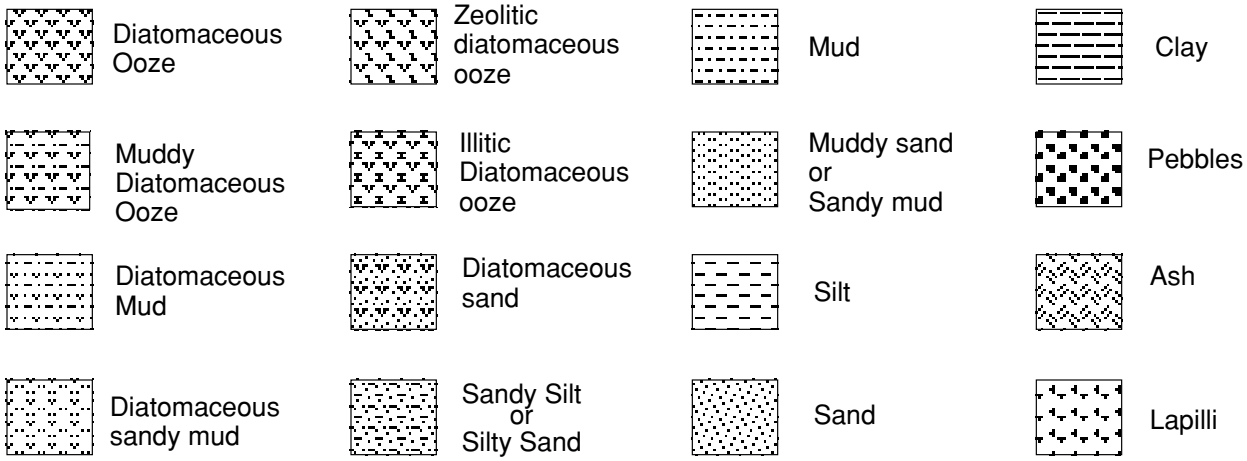
Latitude: 76°56.72' S **Water Depth:** 875 m
Longitude: 166°20.32' E **Core Length:** 133 cm

LITHOLOGIC DESCRIPTION

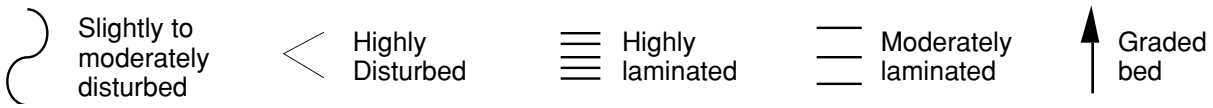
0-133 cm: Ash-bearing diatomaceous mud, olive gray (5Y 4/1) laminated with ash-bearing diatomaceous sandy mud, olive black (5Y 2/1) between 6-13 cm and 100-120 cm; layer of ash-bearing diatomaceous sandy mud, olive black (5Y 2/1), between 14-23 cm; fine and medium pebbles scattered throughout.

SEDIMENT CORE DESCRIPTIONS
Polar Duke Cruise 90-VII

Graphic Lithology Key

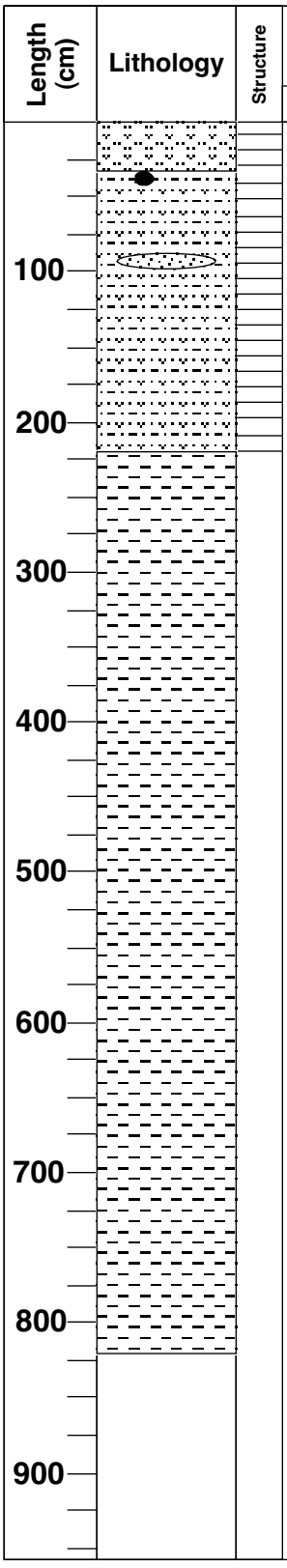


Graphic Structures Key



Piston Cores

PD90-VII-42 PC



Latitude: 64°16.49' S **Water Depth:** 452 m
Longitude: 60°59.69' W **Core Length:** 818 cm

LITHOLOGIC DESCRIPTION

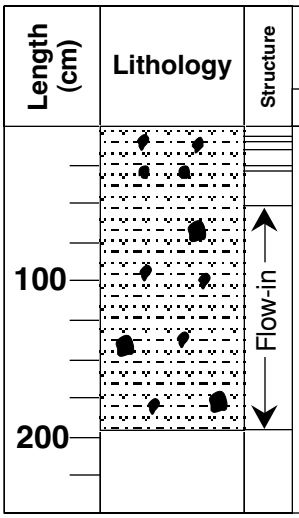
0-30 cm: Ash-bearing diatomaceous sandy mud, olive gray (5Y 4/4), laminated with ash-bearing very fine to fine sand.

30-220 cm: Diatomaceous mud, olive gray (5Y 4/1), laminated with ash-bearing sandy silt; lens of ash-bearing very fine sand, olive gray (5Y 4/4), between 90-92 cm; a medium basaltic pebble between 33-34 cm; moderately washed between 0-15 cm, slightly washed along the side between 208-220 cm; gradational contact with the unit below.

220-816 cm: Silt, medium dark gray (N4); slightly washed along the side throughout.

Section breaks at 197 and 514 cm.

PD90-VII-43 PC

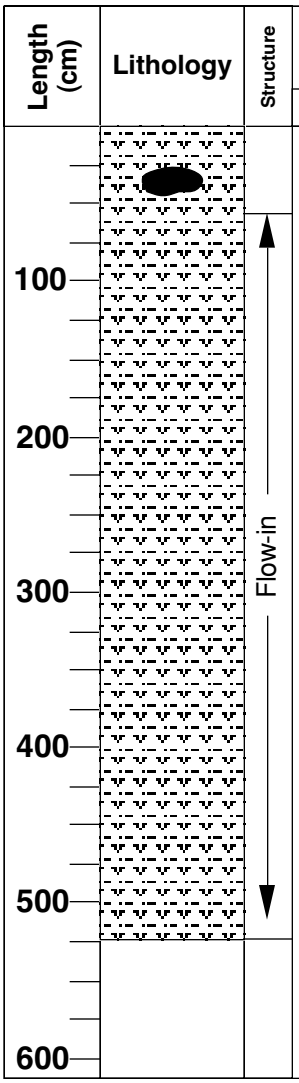


Latitude: 64°16.19' S
Longitude: 61°03.54' W
Water Depth: 512 m
Core Length: 198 cm

LITHOLOGIC DESCRIPTION

0-198 cm: Diatomaceous mud, olive gray (5Y 4/1); laminae of ash-bearing diatomaceous sandy mud, olive black (5Y 2/1), between 3-5 cm, 7-9 cm, 13-15 cm, and 27-28 cm; fine basaltic pebbles between 7-9 cm and 26-28 cm; medium to fine pebbles scattered from 40-198 cm; flow-in between 41-198 cm.

PD90-VII-45 PC



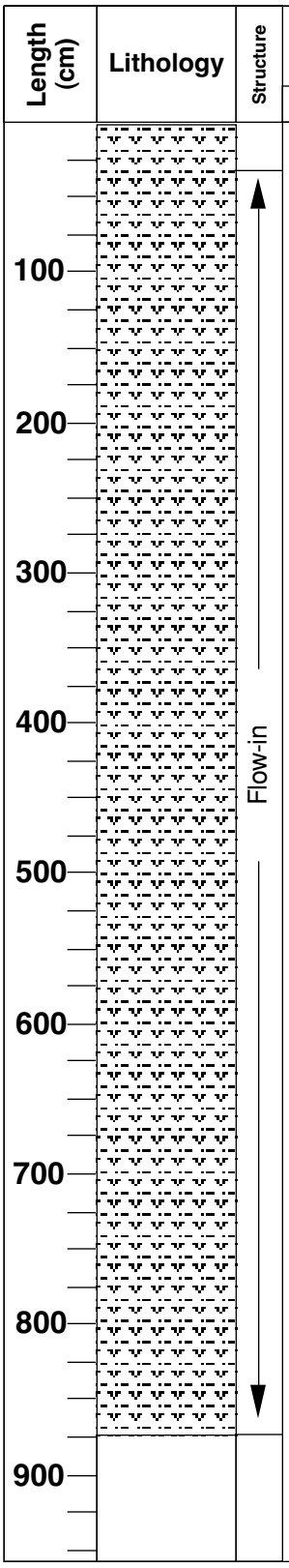
Latitude: 64°15.45' S **Water Depth:** 460 m
Longitude: 61°08.17' W **Core Length:** 523 cm

LITHOLOGIC DESCRIPTION

0-523 cm: Muddy diatomaceous ooze, olive gray (5Y 4/1); a flat, very coarse angular basaltic pebble present between 29-43 cm; flow-in between 60-523 cm.

Section break at 220 cm.

PD90-VII-47 PC



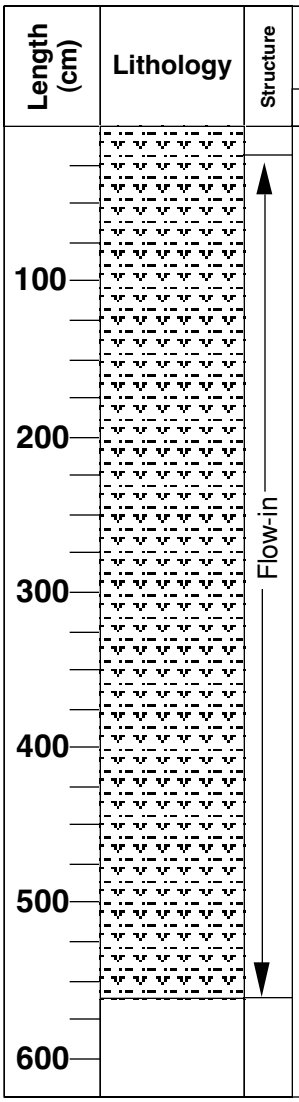
Latitude: 64°16.99' S **Water Depth:** 1150 m
Longitude: 61°53.69' W **Core Length:** 872 cm

LITHOLOGIC DESCRIPTION

0-872 cm: Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); flow-in between 30-872 cm.

Section breaks at 263 cm and 568 cm.

PD90-VII-48 PC



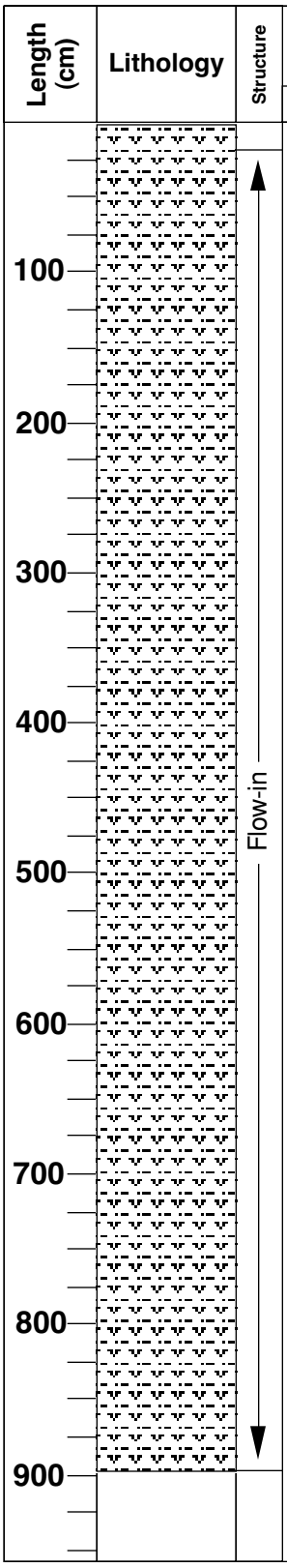
Latitude: 64°16.53' S **Water Depth:** 1135 m
Longitude: 61°52.42' W **Core Length:** 558 cm

LITHOLOGIC DESCRIPTION

0-558 cm: Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); flow-in between 16-558 cm.

Section break at 253 cm.

PD90-VII-49 PC



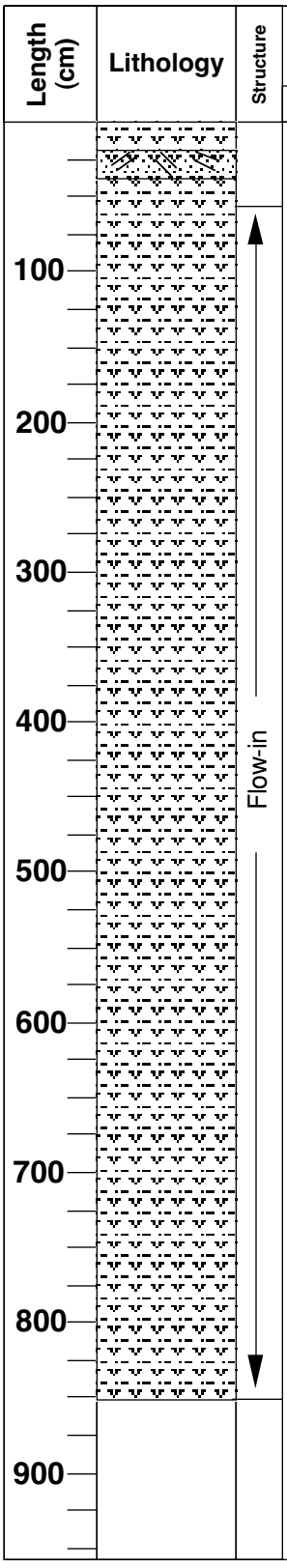
Latitude: 64°05.89' S
Longitude: 61°49.85' W
Water Depth: 1240 m
Core Length: 896 cm

LITHOLOGIC DESCRIPTION

0-896 cm: Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); flow-in from 18-896 cm.

Section breaks at 286 cm and 591 cm.

PD90-VII-50 PC



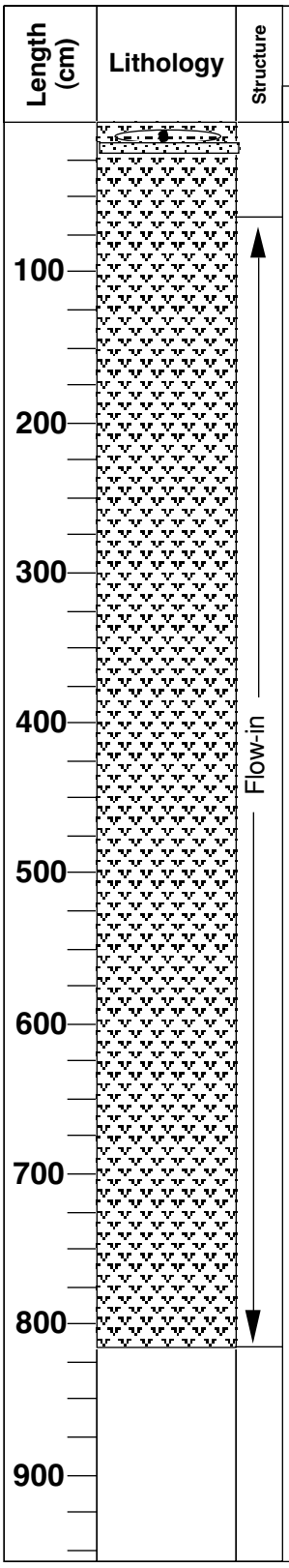
Latitude: 64°04.55' S **Water Depth:** 1220 m
Longitude: 61°48.61' W **Core Length:** 852 cm

LITHOLOGIC DESCRIPTION

0-852 cm: Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); layer of ash-bearing diatomaceous sand, olive gray (5Y 3/2), between 15-28 cm; sand is very fine, well sorted, angular to subangular; flow-in from 60-852 cm.

Section breaks at 245 cm and 550 cm.

PD90-VII-51 PC



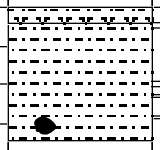
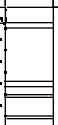
Latitude: 63°59.99' S **Water Depth:** 1203 m
Longitude: 61°42.96' W **Core Length:** 812 cm

LITHOLOGIC DESCRIPTION

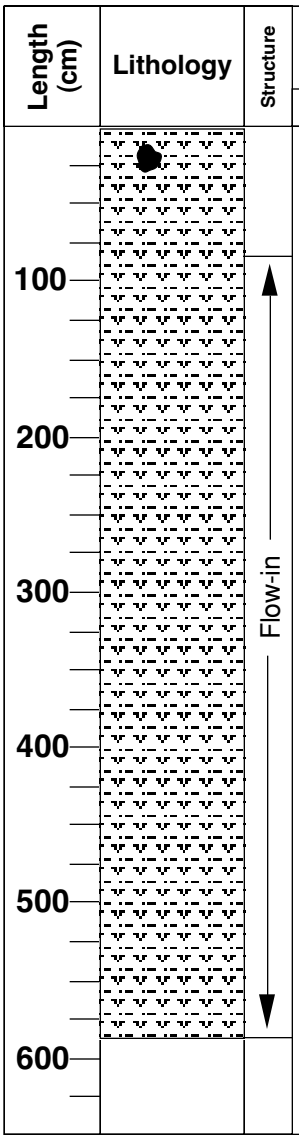
0-812 cm: Diatomaceous ooze, light olive gray (5Y 5/2); a lens of ash-bearing mud, moderate brown (5YR 3/4), between 10-13 cm; layer of ash-bearing diatomaceous sand, olive gray (5Y 3/2), between 13-18 cm; a coarse subrounded pebble between 10-13 cm; flow-in between 58-812 cm.

Section breaks at 203 cm and 506 cm.

PD90-VII-52 PC

Length (cm)	Lithology	Structure	Latitude: 63°57.80' S Longitude: 61°41.48' W Water Depth: 1155 m Core Length: 84 cm
			LITHOLOGIC DESCRIPTION
100 200			**0-84 cm:** Mud, olive gray (5Y 4/1); layer of muddy diatomaceous ooze, light olive gray (5Y 5/2), between 0-3 cm; laminae of diatomaceous ooze, moderate olive brown (5Y 4/4), between 3-4 cm; laminae of ash-bearing sandy mud, olive gray (5Y 3/2), between 49-50 cm, 57-58 cm, 65-67 cm; a coarse basaltic angular pebble between 80-82 cm.

PD90-VII-53 PC



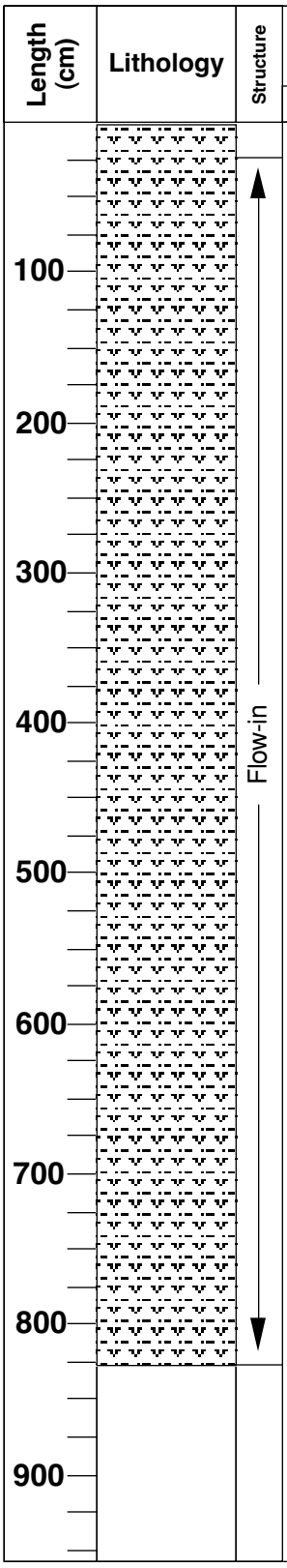
Latitude: 63°52.31' S **Water Depth:** 1066 m
Longitude: 61°35.48' W **Core Length:** 587 cm

LITHOLOGIC DESCRIPTION

0-587 cm: Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); a coarse angular pebble between 21-25 cm; flow-in from 81-587 cm.

Section break at 284 cm.

PD90-VII-55 PC



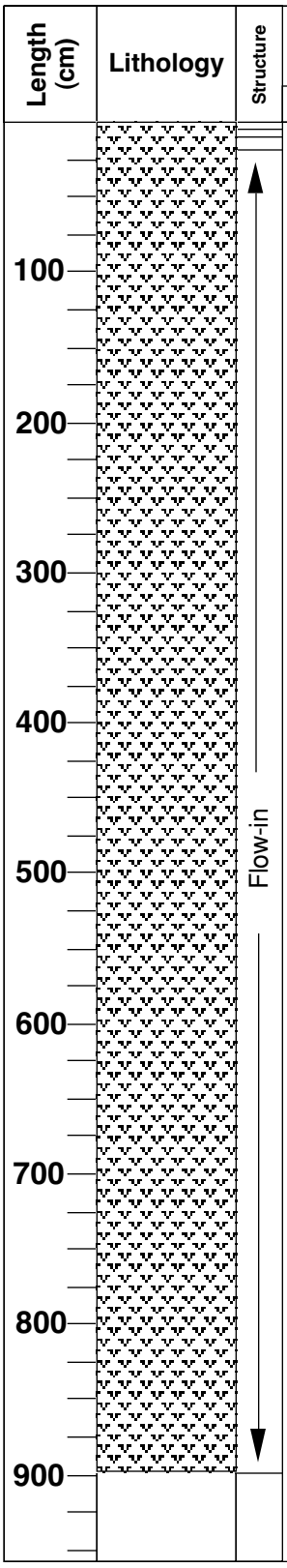
Latitude: 63°50.56' S
Longitude: 61°33.48' W
Water Depth: 1030 m
Core Length: 827 cm

LITHOLOGIC DESCRIPTION

0-827 cm: Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); flow-in between 25-827 cm.

Section breaks at 218 and 523 cm.

PD90-VII-56 PC



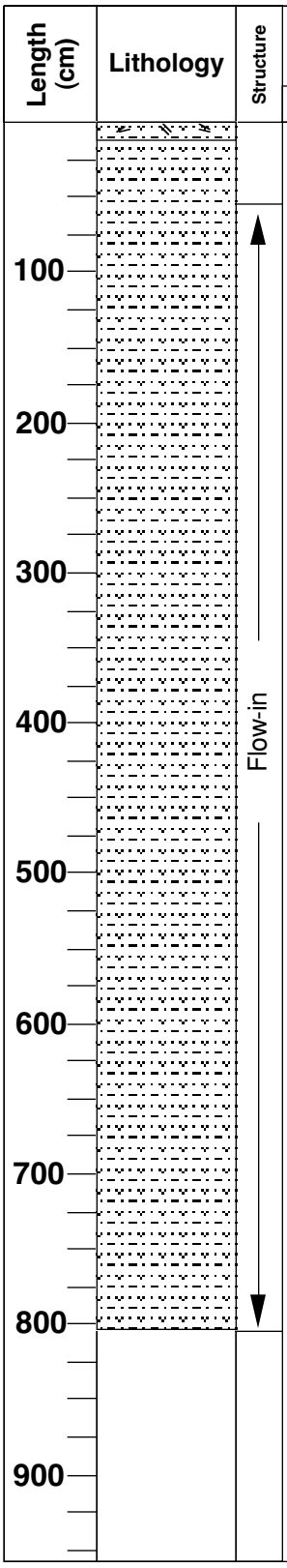
Latitude: 64°55.65' S **Water Depth:** 1415 m
Longitude: 64°16.32' W **Core Length:** 898 cm

LITHOLOGIC DESCRIPTION

0-898 cm: Diatomaceous ooze, moderate olive brown (5Y 4/4); laminae of diatomaceous mud, olive gray (5Y 4/1), between 1-2 cm; flow-in between 19-898 cm.

Section breaks at 290 cm and 595 cm.

PD90-VII-71 PC



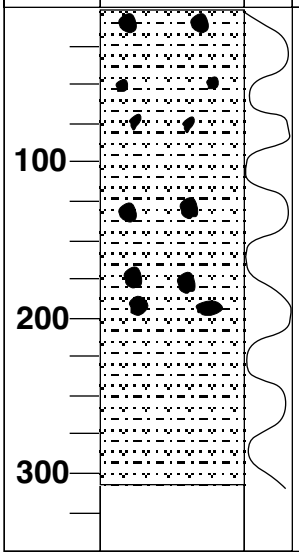
Latitude: 67°12.46' S
Longitude: 66°53.21' W
Water Depth: 660 m
Core Length: 803 cm

LITHOLOGIC DESCRIPTION

0-803 cm: Diatomaceous mud, greenish gray (5GY 6/1); layer of ash-bearing mud, olive gray (5Y 4/1), between 0-6 cm and 8-10 cm; flow-in from 53-803 cm.

Section breaks at 195 and 501 cm.

PD90-VII-73

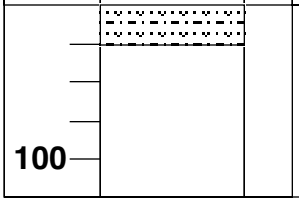


Latitude: 67°09.99' S **Water Depth:** 803 m
Longitude: 66°50.00' W **Core Length:** 304 cm

LITHOLOGIC DESCRIPTION

0-304 cm; Diatomaceous mud, light olive gray (5Y 6/1); coarse pebbles scattered between 9-12 cm, 130-134 cm, 171-173 cm and 188-191 cm; medium pebbles between 46-48 cm and 76-77 cm; the entire core is moderately disturbed.

PD90-VII-74 PC

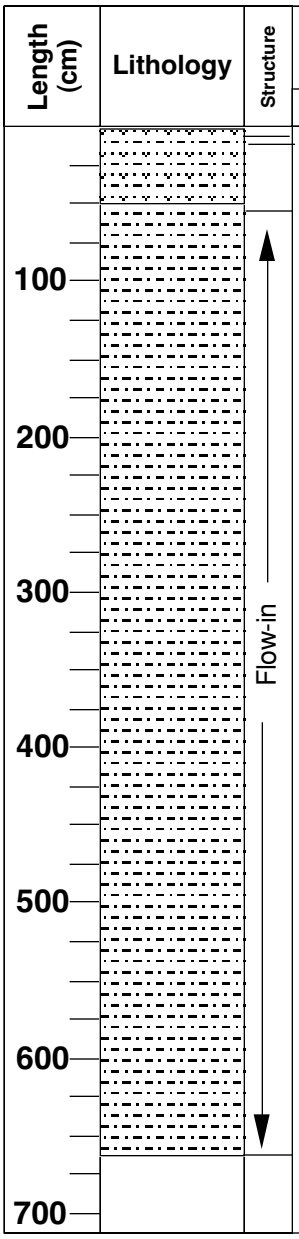


Latitude: 67°08.39' S **Water Depth:** 640 m
Longitude: 66°47.97' W **Core Length:** 27 cm

LITHOLOGIC DESCRIPTION

0-27 cm: Diatomaceous mud, greenish gray (5GY 6/1); slightly washed along the side.

PD90-VII-76 PC



Latitude: 64°16.09' S
Longitude: 61°03.51' W
Water Depth: 515 m
Core Length: 662 cm

LITHOLOGIC DESCRIPTION

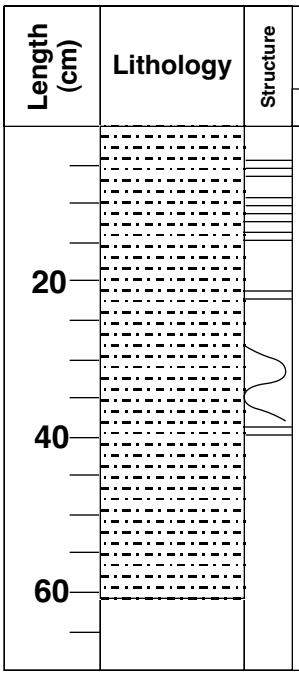
0-48 cm: Diatomaceous mud, moderate olive brown (5Y 4/4); laminae of sandy diatomaceous mud, olive gray (5Y 4/1), between 4-5 cm and 7-8 cm.

48-662 cm: Mud, olive gray (5Y 4/1); flow-in from 55-662 cm.

Section breaks at 55 and 360 cm.

Trigger Cores

PD90-VII-42 TC

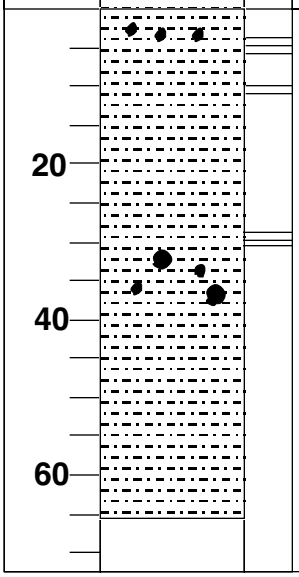


Latitude: 64°16.49' S **Water Depth:** 452 m
Longitude: 60°59.69' W **Core Length:** 61 cm

LITHOLOGIC DESCRIPTION

0-61 cm: Mud, olive gray (5Y 4/1); laminae of silt, olive gray (5Y 4/1), between 4-5 cm, 5-6 cm, 9-10 cm, 12-13 cm, 14-15 cm, 22-23 cm, 38-39 cm; laminae of silt, light olive brown (5Y 5/6), between 10-11 cm; slightly disturbed between 30-35 cm.

PD90-VII-43 TC

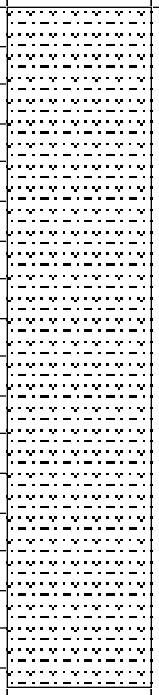


Latitude: 64°16.19' S **Water Depth:** 512 m
Longitude: 61°03.54' W **Core Length:** 66 cm

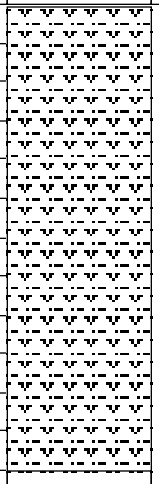
LITHOLOGIC DESCRIPTION

0-66 cm: Mud, olive gray (5Y 4/1) laminae of ash-bearing sandy mud, between 5-6 cm, 10-11 cm, and 27-30 cm; laminae of mud with fine basaltic pebbles between 3-4 cm; medium and fine pebbles scattered between 30-37 cm.

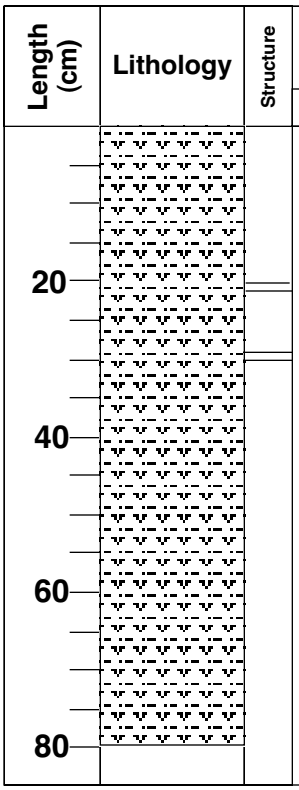
PD90-VII-45 TC

Length (cm)	Lithology	Structure	Latitude: 64°15.45' S Longitude: 61°08.17' W Water Depth: 460 m Core Length: 87 cm
			LITHOLOGIC DESCRIPTION
20 40 60 80 100			**0-87 cm:** Diatomaceous mud, olive gray (5Y 4/1). Note: Only a little sediment between 81-87 cm.

PD90-VII-47 TC

Length (cm)	Lithology	Structure	Latitude: 64°16.99' S Longitude: 61°53.69' W Water Depth: 1150 m Core Length: 59 cm
			LITHOLOGIC DESCRIPTION
20 40 60			**0-59 cm:** Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); slightly washed along the side.

PD90-VII-48 TC

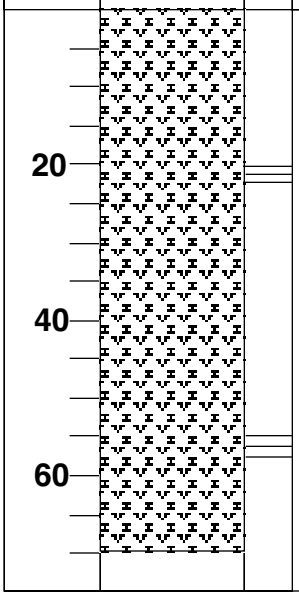


Latitude: 64°16.53' S **Water Depth:** 1135 m
Longitude: 61°52.42' W **Core Length:** 79 cm

LITHOLOGIC DESCRIPTION

0-79 cm: Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); laminae of diatomaceous ooze, light olive brown (5Y 5/6), between 20-21 cm and 28-30 cm.

PD90-VII-49 TC

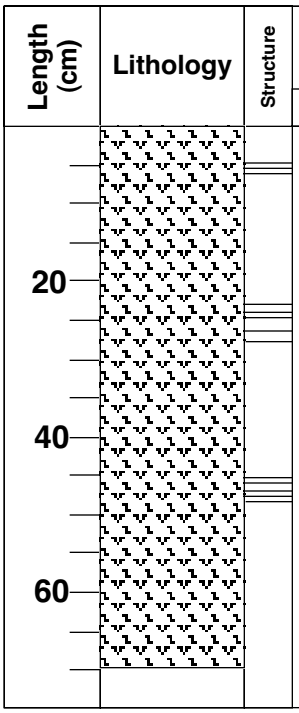


Latitude: 64°05.89' S **Water Depth:** 1240 m
Longitude: 61°49.85' W **Core Length:** 68 cm

LITHOLOGIC DESCRIPTION

0-68 cm: Illitic diatomaceous ooze, moderate olive brown (5Y 4/4); laminae of diatomaceous ooze, light olive brown (5Y 5/6), between 21-24 cm; laminae of ash-bearing muddy very fine sand, olive gray (5Y3/2), between 54-56 cm.

PD90-VII-50 TC

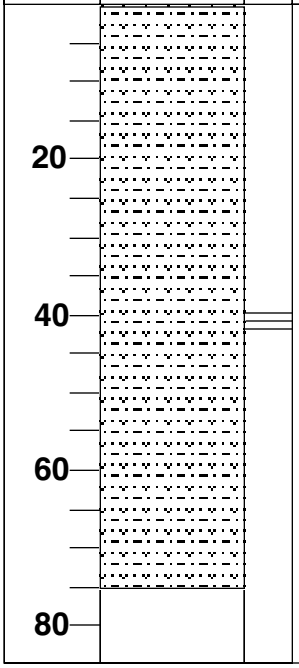


Latitude: 64°04.55' S **Water Depth:** 1220 m
Longitude: 61°48.61' W **Core Length:** 69 cm

LITHOLOGIC DESCRIPTION

0-69 cm: Zeolitic diatomaceous ooze, moderate olive brown (5Y 4/4); laminae of diatomaceous ooze, light olive brown (5Y 5/6), between 4-5 cm, 24-25 cm, 27-28 cm and 45-49 cm.

PD90-VII-51 TC



Latitude: 63°59.99' S **Water Depth:** 1203 m
Longitude: 61°42.96' W **Core Length:** 75 cm

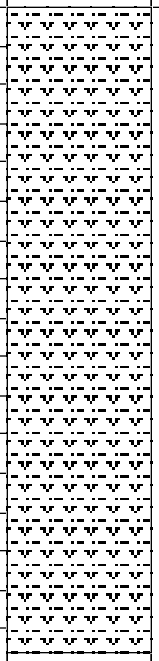
LITHOLOGIC DESCRIPTION

0-75 cm: Diatomaceous mud, olive gray (5Y 4/1); laminae of muddy diatomaceous ooze, light olive brown (5Y 5/6), between 40-43 cm.

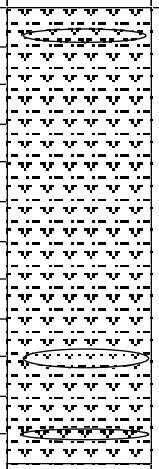
PD90-VII-52 TC

Length (cm)	Lithology	Structure	Latitude: 63°57.80' S Longitude: 61°41.48' W Water Depth: 1155 m Core Length: 75 cm
			LITHOLOGIC DESCRIPTION
20 40 60 80			**0-75 cm:** Diatomaceous mud, moderate olive brown (5Y 4/4); laminae of diatomaceous ooze, light olive brown (5Y 5/6) between 18-21 cm; slightly washed along the side from 0-20 cm.

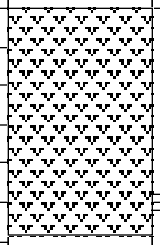
PD90-VII-53 TC

Length (cm)	Lithology	Structure	Latitude: 63°52.31' S Longitude: 61°35.48' W Water Depth: 1066 m Core Length: 83 cm
			LITHOLOGIC DESCRIPTION
20 40 60 80			**0-83 cm:** Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); slightly washed along the side from 0-20 cm.

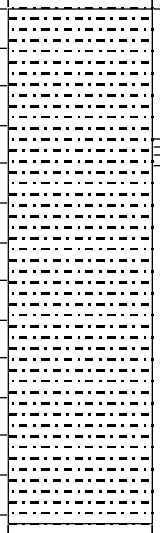
PD90-VII-55 TC

Length (cm)	Lithology	Structure	Latitude: 63°50.56' S Longitude: 61°33.48'W Water Depth: 1030 m Core Length: 58 cm
			LITHOLOGIC DESCRIPTION
20 40 60			**0-58 cm:** Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); lens of diatomaceous ooze, light olive brown (5Y 5/6), between 3-4 cm and 55-56 cm; lens of ash-bearing diatomaceous mud, black (N1), between 44-45 cm; slightly washed along the side between 0-20 cm.

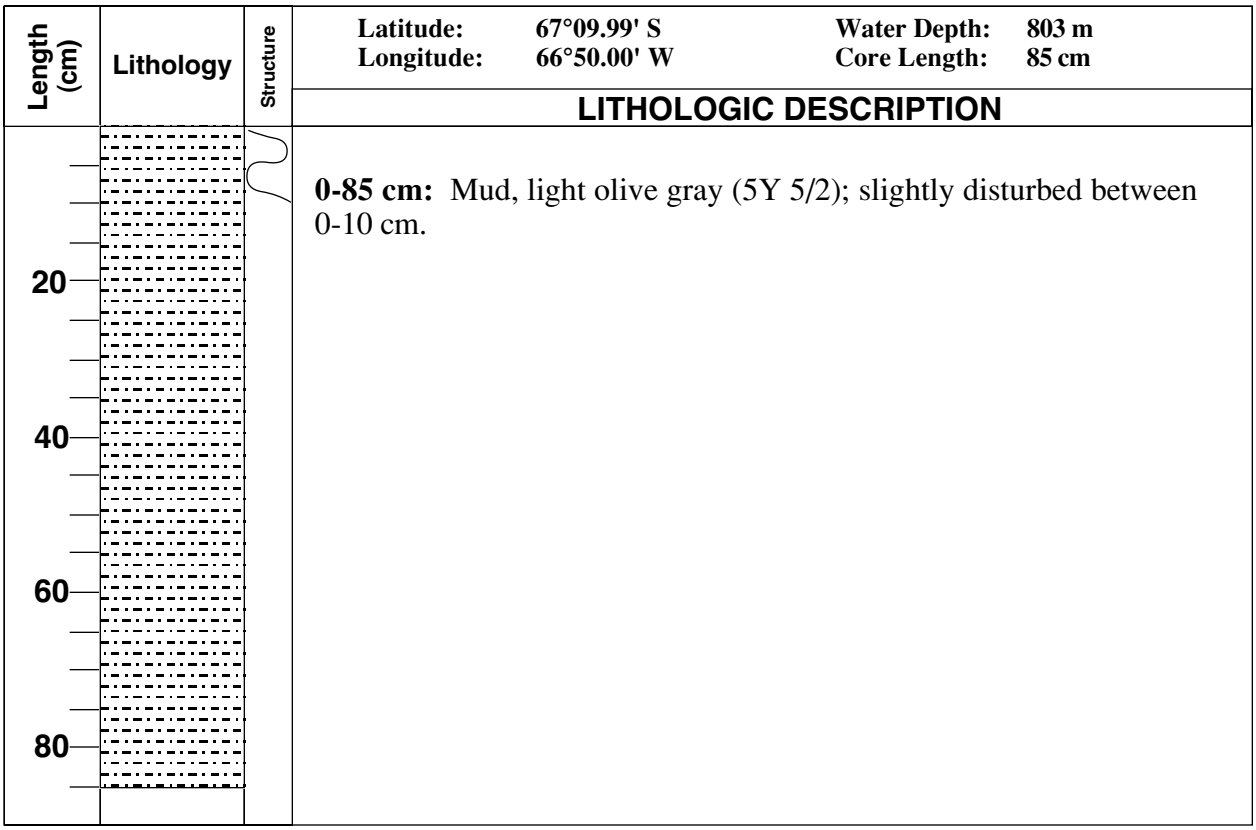
PD90-VII-56 TC

Length (cm)	Lithology	Structure	Latitude: 64°55.65' S Longitude: 64°16.32' W	Water Depth: 1415 m Core Length: 28 cm
			LITHOLOGIC DESCRIPTION	
20			**0-28 cm:** Diatomaceous ooze, moderate olive brown (5Y 4/4); laminae of ash-bearing very fine sand, olive gray (5Y 3/2), between 23-24 cm; slightly washed along the side from 0-28 cm.	

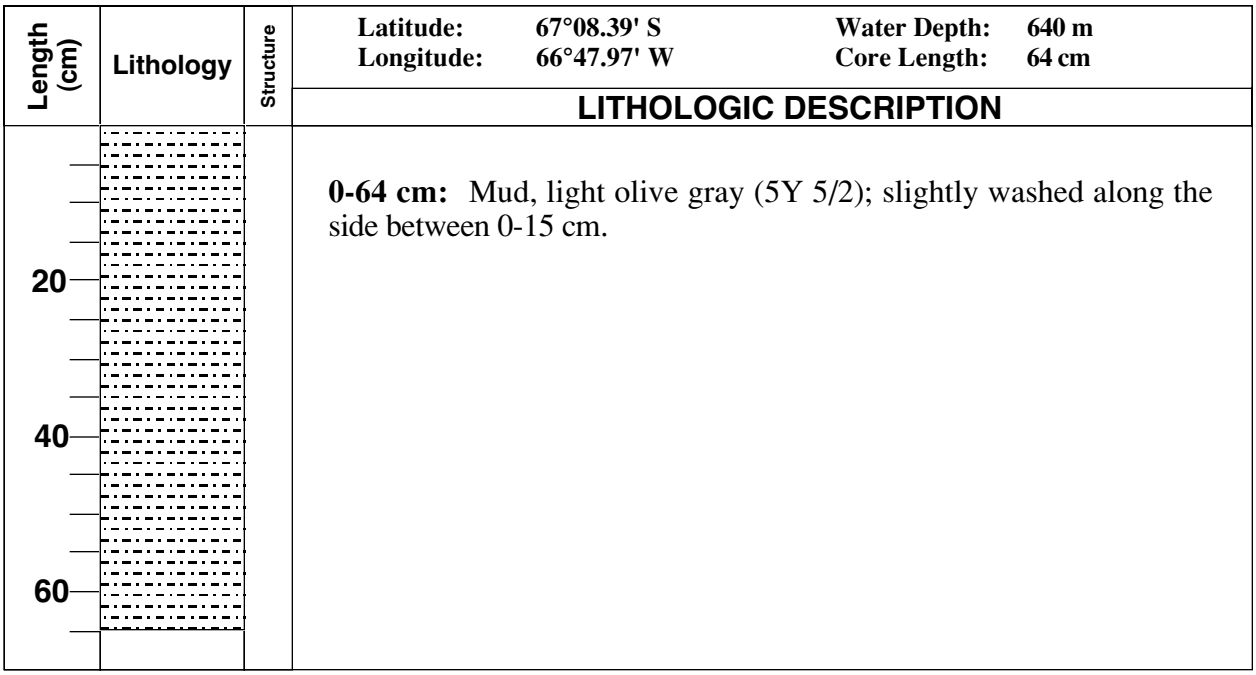
PD90-VII-71 TC

Length (cm)	Lithology	Structure	Latitude: 67°12.46' S Longitude: 66°53.21' W	Water Depth: 660 m Core Length: 66 cm
			LITHOLOGIC DESCRIPTION	
20 40 60			**0-66 cm:** Mud, light olive gray (5Y 5/2); laminae of ash-bearing very fine sand, olive gray (5Y 3/2), between 16-19 cm; slightly washed along the side between 0-10 cm.	

PD90-VII-73 TC



PD90-VII-74 TC

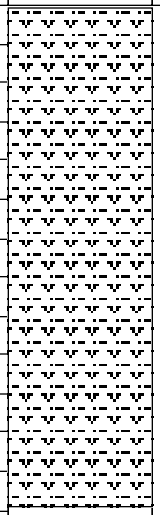


PD90-VII-76 TC

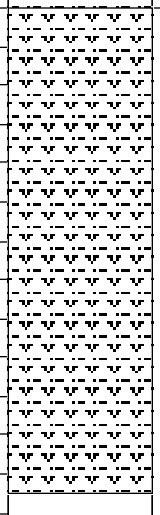
Length (cm)	Lithology	Structure	Latitude: 64°16.09' S Longitude: 61°03.51' W Water Depth: 515 m Core Length: 17 cm
			LITHOLOGIC DESCRIPTION
20			**0-17 cm:** Mud, olive gray (5Y 3/2), laminated with ash-bearing sandy mud.

Gravity Cores

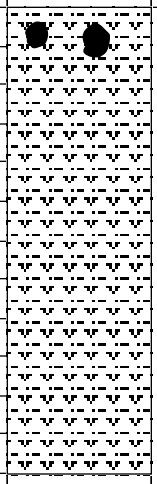
PD90-VII-30 GC

Length (cm)	Lithology	Structure	Latitude: 69°49.41' S Longitude: 62°38.75' W Water Depth: 440 m Core Length: 63 cm
			LITHOLOGIC DESCRIPTION
20 40 60			**0-63 cm:** Muddy diatomaceous ooze, moderate olive brown (5Y 4/4).

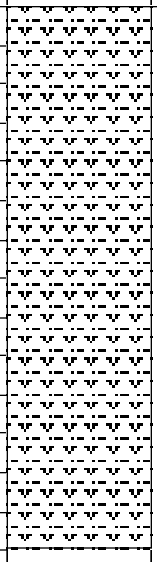
PD90-VII-31 GC

Length (cm)	Lithology	Structure	Latitude: 64°48.67' S Longitude: 62°40.32' W Water Depth: 404 m Core Length: 62 cm
			LITHOLOGIC DESCRIPTION
20 40 60			**0-62 cm:** Muddy diatomaceous ooze, moderate olive brown (5Y 4/4).

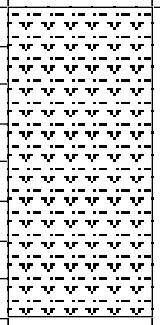
PD90-VII-32 GC

Length (cm)	Lithology	Structure	Latitude: 64°48.23' S Longitude: 62°41.34' W Water Depth: 450 m Core Length: 60 cm
			LITHOLOGIC DESCRIPTION
20 40 60			**0-60 cm:** Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); a medium subangular pebble between 3-5 cm; a coarse angular pebble between 2-5 cm.

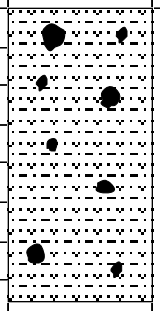
PD90-VII-36 GC

Length (cm)	Lithology	Structure	Latitude: 64°46.16' S Longitude: 62°45.97' W Water Depth: 462 m Core Length: 68 cm
			LITHOLOGIC DESCRIPTION
20 40 60			**0-68 cm:** Muddy diatomaceous ooze, moderate olive brown (5Y 4/4).

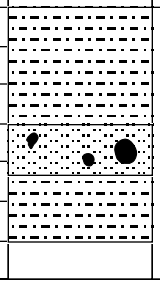
PD90-VII-37 GC

Length (cm)	Lithology	Structure	Latitude: 64°45.20' S Longitude: 62°47.44' W Water Depth: 374 m Core Length: 40 cm
			LITHOLOGIC DESCRIPTION
20 40			**0-40 cm:** Muddy diatomaceous ooze, moderate olive brown (5Y 4/4).

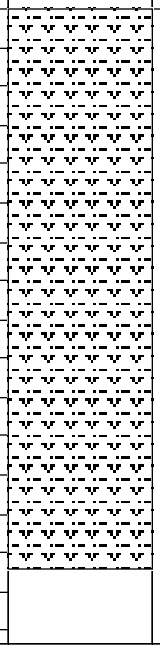
PD90-VII-40 GC

Length (cm)	Lithology	Structure	Latitude: 64°16.12' S Longitude: 61°00.76' W Water Depth: 302 m Core Length: 37 cm
			LITHOLOGIC DESCRIPTION
20 40			**0-37 cm:** Diatomaceous mud, olive gray (5Y 4/1); fine to coarse pebbles scattered throughout.

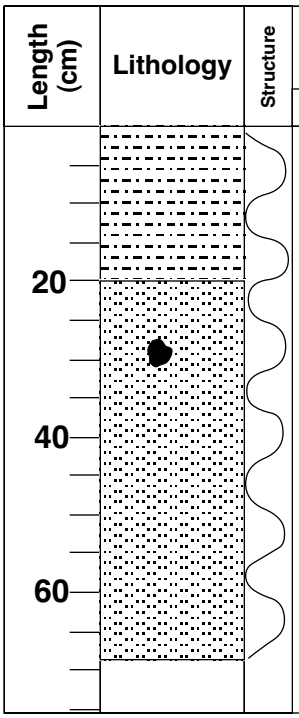
PD90-VII-41 GC

Length (cm)	Lithology	Structure	Latitude: 64°16.34' S Longitude: 60°58.52' W	Water Depth: 170 m Core Length: 30 cm
			LITHOLOGIC DESCRIPTION	
20			**0-30 cm:** Mud, olive gray (5Y 4/1); layer of sandy mud between 15-22 cm; fine to coarse pebbles present between 15-22 cm.	

PD90-VII-54 GC

Length (cm)	Lithology	Structure	Latitude: 63°50.17' S Longitude: 61°33.51' W	Water Depth: 1000 m Core Length: 73 cm
			LITHOLOGIC DESCRIPTION	
20 40 60 80			**0-73 cm:** Muddy diatomaceous ooze, moderate olive brown (5Y 4/4).	

PD90-VII-64 GC



Latitude: 67°13.01' S **Water Depth:** 200 m
Longitude: 66°46.59' W **Core Length:** 67 cm

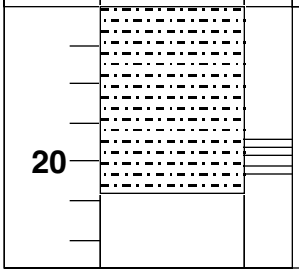
LITHOLOGIC DESCRIPTION

0-20 cm: Mud, light olive gray (5Y 6/1); gradational contact with unit below.

20-67 cm: Sandy mud, greenish gray (5GY 6/1); a 3-cm subangular pebble between 29-32 cm.

Moderately disturbed throughout the core.

PD90-VII-68 GC



Latitude: 67°19.87' S **Water Depth:** 590 m
Longitude: 66°28.16' W **Core Length:** 24 cm

LITHOLOGIC DESCRIPTION

0-24 cm: Mud, light olive gray (5Y 6/1); laminae of ash-bearing fine sand between 17-20 cm and 21-23 cm.

Bagged Samples

PD90-VII Piston Core bag samples

PD90-VII-42	Core cutter (162 g): Mud, olive gray (5Y 4/1).
PD90-VII-45	Core cutter (149 g): Diatomaceous mud, olive gray (5Y 4/1).
PD90-VII-47	Core cutter and catcher (188 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-47-2	Bottom samples in two bags (152 g, 188 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-47-3	Bottom (140 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-48	Core cutter (152 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-48-1	Bottom (110 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-48-2	Bottom (248 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-49	Core cutter (221 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-49-2	Top (300 g) and bottom (210 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-49-3	Top (169 g) and bottom (210 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-50	Core catcher and cutter (306 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-50-1	Bottom (143 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-50-2	Top (178 g); and bottom (256 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-50-3	Top (310 g) and bottom (206 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).
PD90-VII-51	Core cutter (190 g).
PD90-VII-51-2	Top, two bags (90 g, 93 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-51-2 Bottom, two bags (170 g, 201 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-51-3 Top (146 g) and bottom (146 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-52 Core cutter (12 g): Muddy fine and medium pebbles, olive black (5YR 2/1).

PD90-VII-53 Core cutter (129 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-55 Core cutter (150 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-56 Core cutter (279 g): Muddy diatomaceous ooze, light olive brown (5Y 5/6).

PD90-VII-71 Core cutter and catcher (125 g): Mud, light olive gray (5Y 6/1).

PD90-VII-71-1 Bottom 20 cm (619 g): Mud, light olive gray (5Y 6/1).

PD90-VII-76 Core cutter (433 g): Diatomaceous mud, olive gray (5Y 4/1).

PD90-VII Trigger Core Bag Samples

PD90-VII-42 Bottom (206 g): Mud, olive gray (5Y 3/2).

PD90-VII-43 Core cutter (470 g): Diatomaceous mud, olive gray (5Y 4/1).

PD90-VII-47 Core cutter (286 g): Muddy diatomaceous ooze, moderate olive brown (5Y 4/4).

PD90-VII-48 Core cutter (313 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-49 Cutter head (234 g): Mud, olive gray (5Y 4/1).

PD90-VII-50 Core cutter (267 g): Muddy diatomaceous ooze, moderate olive brown (5Y 4/4).

PD90-VII-41 Core cutter (339 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-52 Core cutter (261 g): Diatomaceous ooze, moderate olive brown (5Y 4/4).

PD90-VII-52 Bottom of trigger core (140 g): Diatomaceous ooze, moderate olive brown (5Y 4/4).

PD90-VII-53 Core cutter (271 g): Muddy diatomaceous ooze, moderate olive brown (5Y 4/4).

PD90-VII-55 Core cutter (433 g): Muddy diatomaceous ooze, moderate olive brown (5Y 4/4).

PD90-VII-56 Core cutter (306 g): Diatomaceous ooze, moderate olive brown (5Y 4/4).

PD90-VII-71 Core cutter and catcher (390 g): Mud, olive gray (5Y 4/1).

PD90-VII-71 Top 7 cm (303 g): Mud, olive gray (5Y 4/1).

PD90-VII-73 Core cutter and catcher (334 g): Diatomaceous mud, olive gray (5Y 4/1).

PD90-VII-76 Top (>610 g): Diatomaceous mud, olive gray (5Y 4/1).

PD90-VII-76 Bottom (two bags, 607 g; >610 g): Diatomaceous mud, olive gray (5Y 4/1).

PD90-VII-76 Core cutter (404g): Diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII Gravity Core Bag Samples

PD90-VII-31 Core cutter (216 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-36 Core cutter and catcher (560 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-37 Core catcher (89 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-41 Core catcher and cutter (332 g): Diatomaceous mud, olive gray (5Y 3/2).

PD90-VII-54 Core cutter (337 g): Muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD90-VII-64 Core cutter (465 g): Diatomaceous mud, greenish gray (5GY 6/1).

PD90-VII Grab Samples

PD90-VII-2	Coarse to very coarse basaltic pebbles, black (N1); two bags, 333 g and 610g.
PD90-VII-3	Diatomaceous ooze, light olive gray; 585 g.
PD90-VII-4	Muddy diatomaceous ooze, light olive gray (5Y 5/2); 462 g.
PD90-VII-5	Muddy diatomaceous ooze, light olive gray (5Y 5/2); 410g.
PD90-VII-6	Diatomaceous mud, olive gray (5Y 4/1); 529 g.
PD90-VII-7	Diatomaceous mud, light olive gray (5Y 5/2); >610g.
PD90-VII-8	Mud, olive gray (5Y 4/1); 312 g.
PD90-VII-9	Mud, olive gray (5Y 4/1); 444 g.
PD90-VII-10	Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); two bags, 441 g and 457 g.
PD90-VII-11	Very coarse subangular granitic pebble, pinkish gray (5YR 8/1); 261 g.
PD90-VII-12	Coarse basaltic pebbles, black (N1).
PD90-VII-13	Muddy diatomaceous ooze, moderate olive gray (5Y 4/4); 584 g.
PD90-VII-14	Diatomaceous ooze, moderate olive gray (5Y 4/4); 266 g.
PD90-VII-15(1)	A very coarse, angular pebble, brownish gray (5YR 4/1).
PD90-VII-15(2)	Diatomaceous mud, light olive gray (5Y 5/2); 461 g.
PD90-VII-16	Muddy diatomaceous ooze, light olive gray (5Y 5/2); 522 g.
PD90-VII-17	Ash-bearing sand, olive gray (5Y 4/1); 461 g.
PD90-VII-21	Sandy mud, olive gray (5Y 4/1); two bags >610 g.
PD90-VII-22	Mud, light olive gray (5Y 5/2); two bags >610 g.
PD90-VII-23	Mud, light olive gray (5Y 5/2); 317 g.
PD90-VII-24(1)	Subrounded pebble, pinkish gray (5YR 8/1); >610 g.
PD90-VII-24(2)	Subrounded basaltic pebble, black (N1); >610 g.

PD90-VII-24(3)	Diatomaceous mud, light olive gray (5Y 5/2); >610 g.
PD90-VII-25	Two very coarse pebbles, olive black (5Y 2/1), angular to subangular; >610 g.
PD90-VII-26	Pebble-bearing sandy diatomaceous mud, moderate olive brown (5Y 4/4); >610 g.
PD90-VII-33	Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); 394 g.
PD90-VII-34	Diatomaceous ooze, moderate olive brown (5Y 4/4); 446 g.
PD90-VII-35	Diatomaceous ooze, moderate olive brown (5Y 4/4); 420 g.
PD90-VII-38(1)	Muddy diatomaceous ooze, light olive gray (5Y 5/2); 430 g.
PD90-VII-38(2)	Diatomaceous ooze, light olive gray (5Y 5/2); >610 g.
PD90-VII-58	Diatomaceous mud, light olive gray (5Y 5/2); >610 g.
PD90-VII-59	Diatomaceous mud, light olive gray (5Y 5/2); 465 g.
PD90-VII-60	Diatomaceous mud, light olive gray (5Y 5/2); 510 g.
PD90-VII-61	Muddy diatomaceous ooze, olive gray (5Y 4/1); 360 g.
PD90-VII-62	Diatomaceous mud, light olive gray (5Y 5/2); 492 g.
PD90-VII-63	Diatomaceous mud, light olive gray (5Y 5/2); 410 g.
PD90-VII-65	Diatomaceous mud, light olive gray (5Y 5/2); >610 g.
PD90-VII-66	Muddy diatomaceous ooze, light olive gray (5Y 5/2); >610 g.
PD90-VII-67	Mud, light olive gray (5Y 5/2); > 610 g.
PD90-VII-69	Diatomaceous mud, light olive gray (5Y 5/2); 510 g.
PD90-VII-70	Diatomaceous mud, light olive gray (5Y 5/2); 364 g.

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