SEDIMENT DESCRIPTIONS
R/V POLAR DUKE
CRUISE IV, 1989

DESCRIPTIONS OF SEDIMENT RECOVERED BY THE R/V POLAR DUKE, CRUISE IV UNITED STATES ANTARCTIC PROGRAM 1989

Edited by
Steven A. Hovan and Thomas R. Janecek

Sediment Descriptions
Dennis S. Cassidy
F. Amisar Kaharoeddin
Xinlan Liu

Technical Assistant
Carl Painter

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

Sedimentology Research Laboratory
Contribution No. 60
August, 1994

Funding for the Antarctic Marine Geology Research Facility and publication of this volume was provided by the National Science Foundation (OPP-9322647)

TABLE OF CONTENTS

INTRODUCTION

This volume contains descriptions of sediments obtained by the R/V Polar Duke, cruise IV of 1989 (herein referred to as PD89-IV). The primary purpose of this cruise was to take heat flow measurements in the basins around the Antarctic Peninsula (Figure 1). A small number of piston cores were included to compliment these studies 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, 1994), 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 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 collected during cruise PD89-IV.

R/V POLAR DUKE 1989 - CRUISE IV

Coring Progam

The objectives and preliminary results of the PD89-IV cruise have been summarized by Lawver (1989). For the convenience of those using this sediment description volume, we have included a brief summary of the coring program below:

Piston cores were taken mainly to determine sediment characteristics prior to taking in-situ heat flow measurements. Since the outside air temperature was extremely cold for this season [below -10°C], some unusual problems were encountered during coring operations. For instance, although core liners were removed from the bottom barrel of the piston core without much trouble, by the time the core liners were extracted from the upper barrel, they had frozen to the pipe. This caused some difficulties during the initial coring operations, which resulted in breakage and splitting of the core liner in the upper section of the first piston core (PC 1). The sediments previously removed from the lower core barrel rapidly froze in the liner and expanded forcing off the end caps of the core liner. Coring operations were subsequently modified so that core pipes were brought into the heated lower aft lab as rapidly as possible and the core liners were removed only after the barrels had warmed up.

A total of 10 piston and trigger cores were attempted on this cruise, six in the King George Basin and four in the Central Bransfield Basin (Figure 1). Piston coring in the King George Basin was generally successful, although no sediments were recovered from PC 2 because the piston jammed in the core catcher and separated. Coring proved to be less successful in the Central Bransfield Basin. Only one out of four cores in this region contained full recovery (PC 8). Cores PC 7 and PC 10 hit hard volcanic debris that mangled the cutter head resulting in low recovery. Core PC 9 encountered gravelly ice-rafted debris which prevented further penetration. In addition to the 9 piston cores and 9 trigger cores recovered, minor amounts of sediments lodged in the core cutter, the core catcher, or core liners (8 piston core samples and 6 trigger core samples) were also collected and placed in plastic bags.

TABLE 1

Coring Summary for R/V Polar Duke 89-IV cruise.

Station No.	Latitude[1] (°S)	Longitude (°W)	Water[2] Depth (m)	Piston Core[3] length (cm)	Trigger Core length (cm)
1	62°16.433	57°36.283	1995	543	87
2	62°14.575	57°32.608	2005	NR	30
3	62°14.635	57°28.931	1989	567	33
4	62°19.149	57°39.646	1997	595	50
5	62°17.860	57°49.033	1980	556	62
6	62°21.974	58°02.170	1977	333	64
7	62°46.016	59°33.424	1489	25	NR
8	62°45.317	59°31.178	1488	556	56
9	62°35.860	59°21.939	1380	27	62
10	62°39.700	59°22.848	1399	42	58

1. Latitude and longitude are from R/V Polar Duke 89-IV cruise report (Lawver et al., 1989) and, except for Station 5, correspond to the location of the ship when the coring apparatus hit the sediment. The latitude and longitude for Station 5 corresponds to the last point before previous satellite fix and may be inaccurate.

2. Water depth for each station (except Stations 1 and 3) indicate depth when core penetrated the sediment. Water depths for Stations 1 and 3 indicate depth when core was at the surface.

3. Piston and trigger core length are the described length, including the bag samples, for each core. Bag samples from the core catcher or core cutter are not included in the core length. NR= no recovery.

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. Bagged samples are placed in labeled plastic bags and are also kept in refrigerated storage.

CORE DESCRIPTION PROCEDURES

General Information

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 than piston cores.

In addition to the recovery of piston and trigger cores, a variety of bagged sediments are normally collected during most cruises. Description of these sediments (found on the graphic core logs) 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, lense, 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 2):

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 3 and 4). 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").

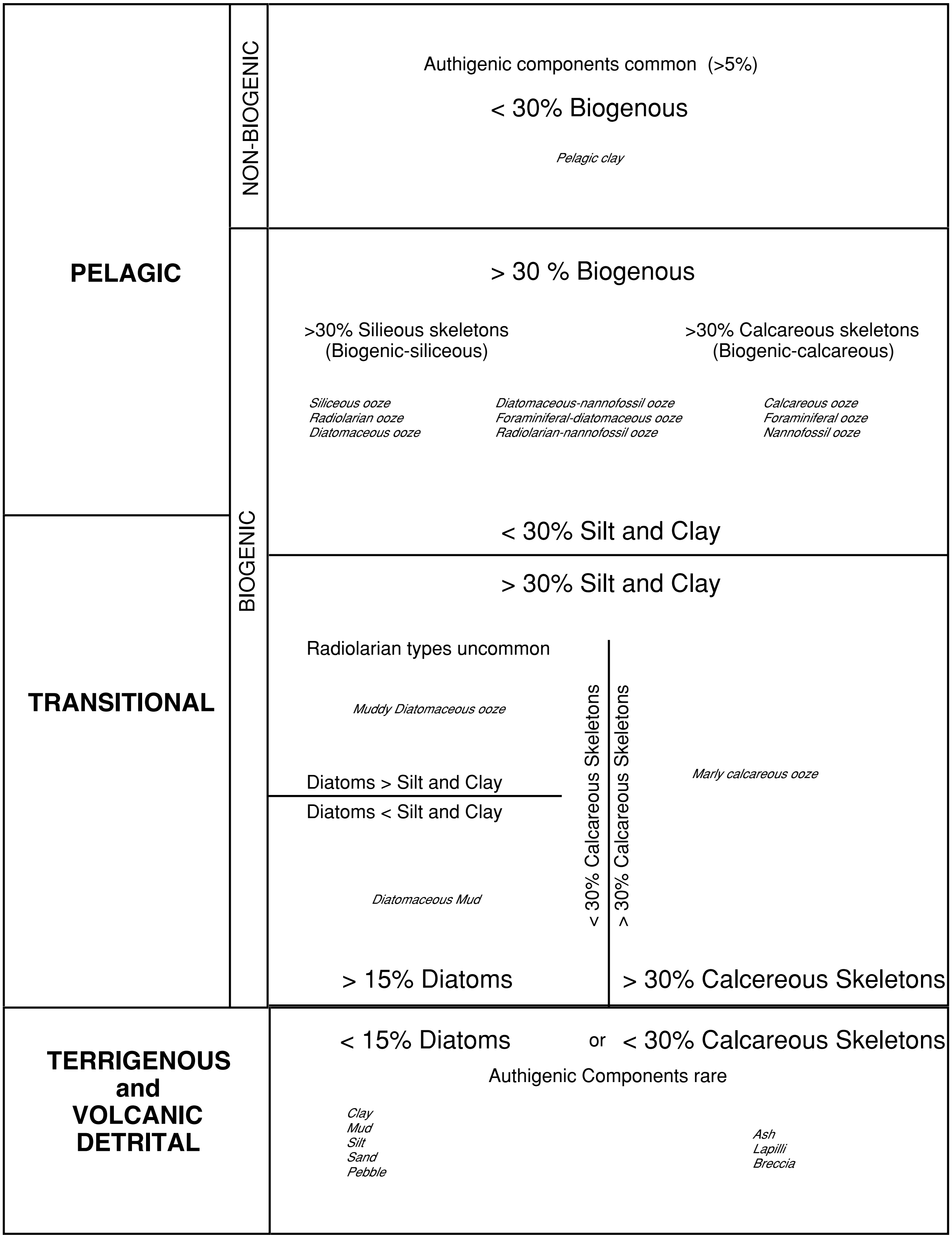


Figure 2. Classification scheme used for marine sediments.

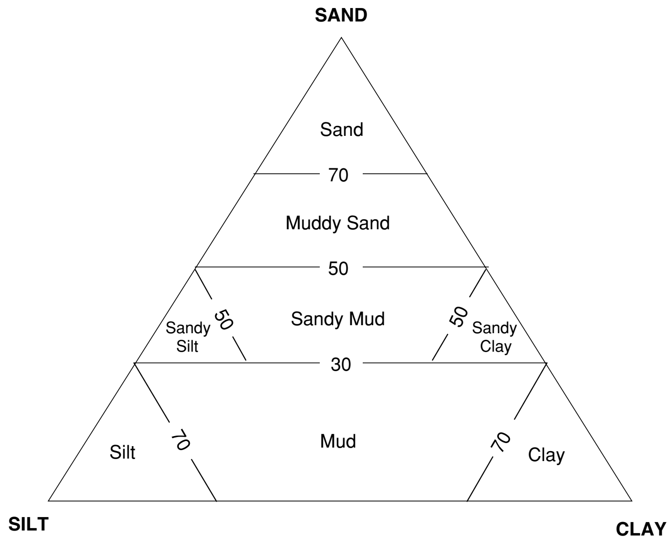
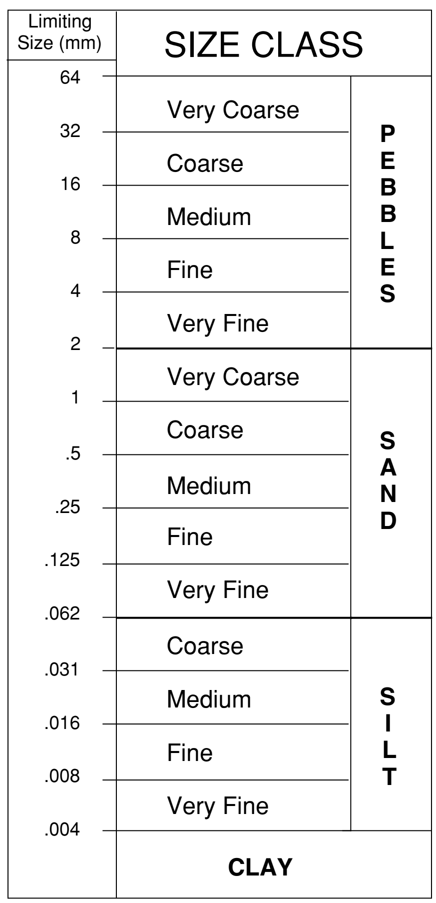


Figure 3. Classification of clastic sediments



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

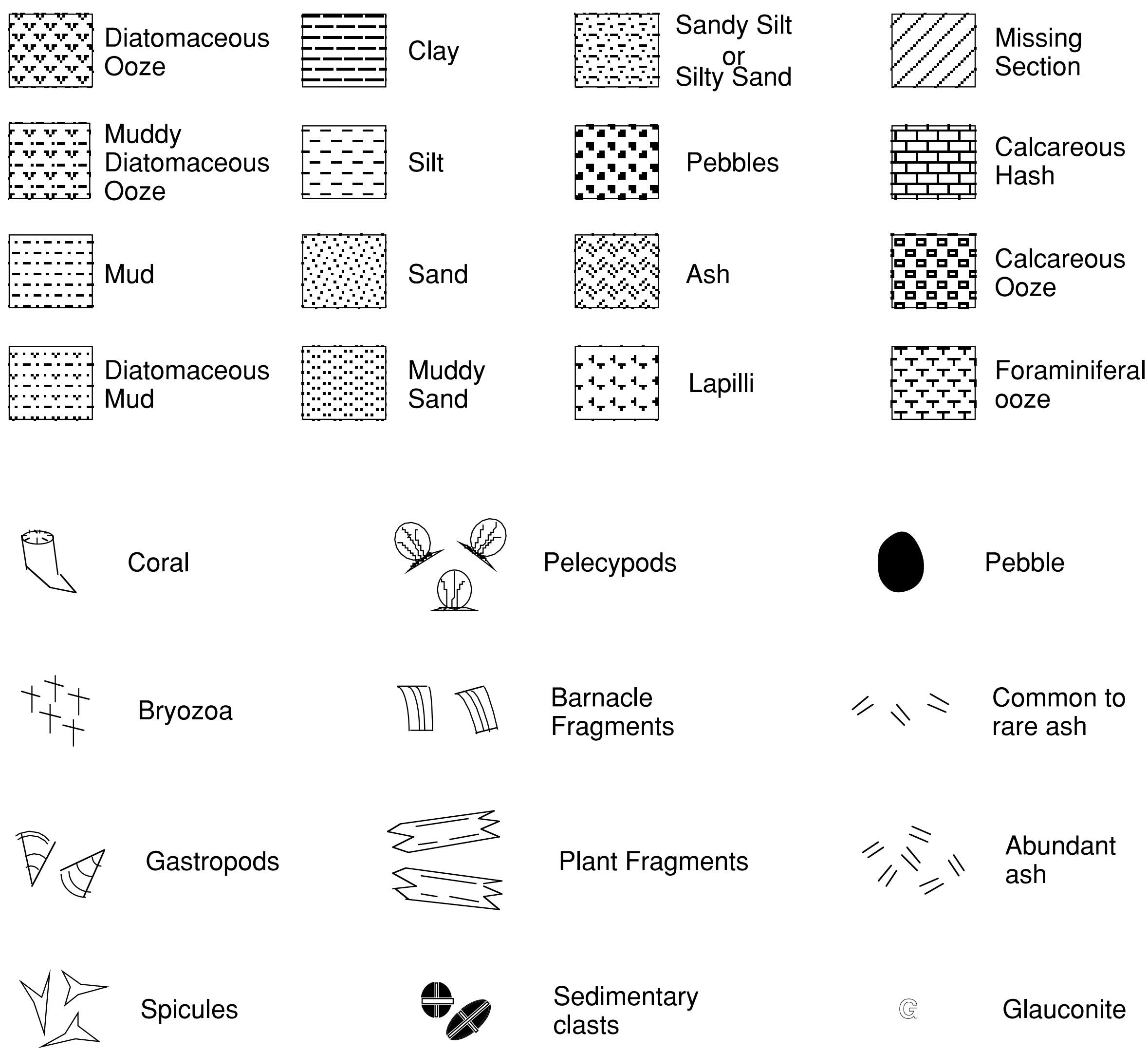
Figure 4. Standard size classes of sediments.

SEDIMENT CORE DESCRIPTIONS

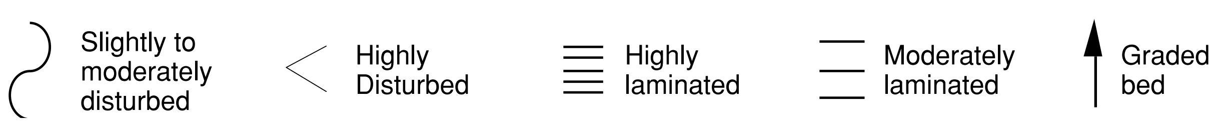
R/V POLAR DUKE

CRUISE IV, 1989

Graphic Lithology Key

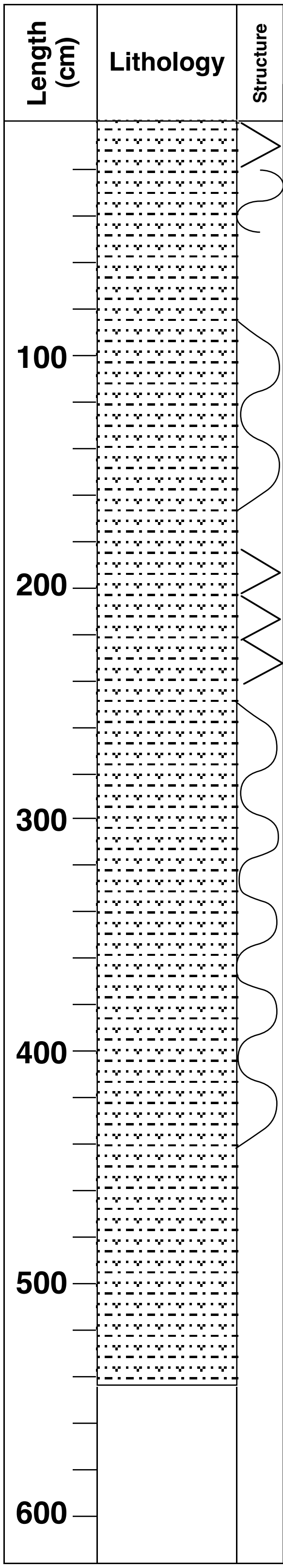


Graphic Structures Key



Piston Cores

PD89-IV-1 PC



Latitude: 62°16.433' S **Water Depth:** 1995 m
Longitude: 57°36.283' W **Core Length:** 543 cm

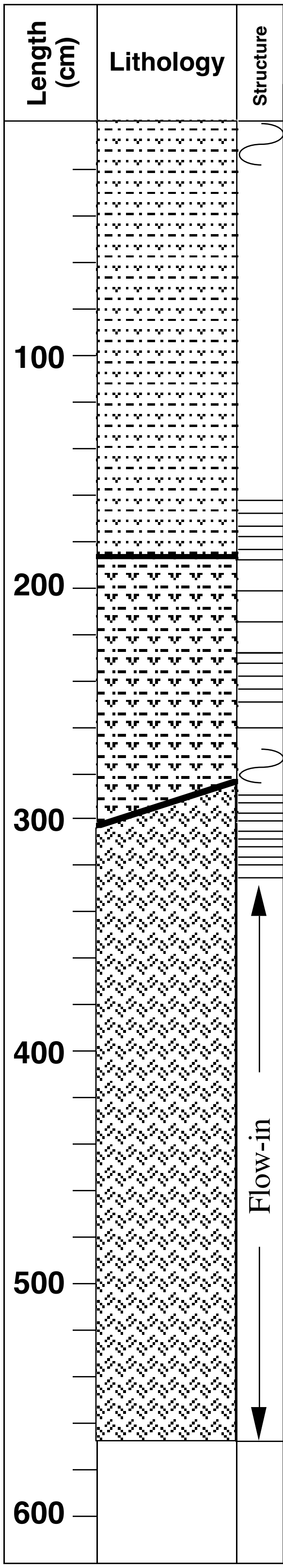
LITHOLOGIC DESCRIPTION

0-543 cm: Diatomaceous mud, light olive gray (5Y 5/2); fine ash abundant throughout; highly disturbed between 0-15 cm and 180-236 cm; moderately disturbed between 15-40 cm and 393-435 cm; slightly disturbed between 96-180 cm and 236-393 cm.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Core section breaks at 95 cm, 230 cm, 236 cm, and 393 cm.

PD89-IV-3 PC



Latitude:	**62°14.635' S**	**Water Depth:**	**1989 m**
Longitude:	**57°28.931' W**	**Core Length:**	**567 cm**

LITHOLOGIC DESCRIPTION

0-192 cm: Diatomaceous mud, light olive gray (5Y 5/2); ash content increases with depth; highly laminated with coarse ash, grayish black (N2), and diatomaceous ooze, light olive gray (5Y 5/2), between 179-192 cm; moderately bioturbated between 0-15 cm; sharp contact.

192-299 cm: Muddy diatomaceous ooze, light olive gray (5Y 5/2); moderately laminated with diatomaceous ooze, light olive brown (5Y 5/6), between 192-228 cm and 252-260 cm; highly laminated with diatomaceous ooze, light olive brown (5Y 5/6), between 228-252 cm; moderately disturbed between 274-284 cm; sharp inclined contact.

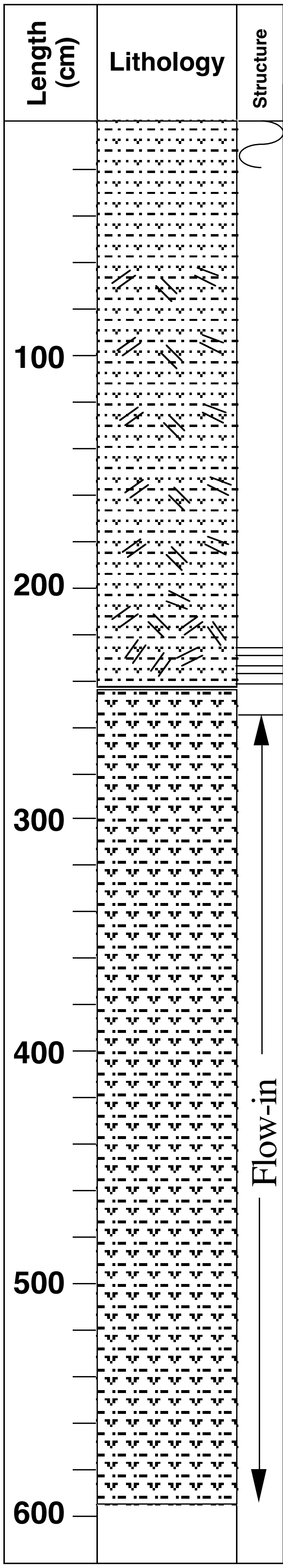
299-567 cm: Coarse ash, grayish black (N2); highly laminated with diatomaceous mud, olive gray (5Y 3/2); flow-in between 322-567 cm.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Core breaks at 269 and 274 cm; sediment between 269-274 cm (stored in a bag; 293g) consists of muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD89-IV-4 PC

Latitude: 62°19.149' S
Longitude: 57°39.646' W
Water Depth: 1997 m
Core Length: 595 cm



LITHOLOGIC DESCRIPTION

0-241 cm: Diatomaceous mud, light olive gray (5Y 5/2); coarse ash common between 70-200 cm, abundant between 200-234 cm; highly laminated with muddy diatomaceous ooze, light olive gray (5Y 5/2) between 230-234 cm; layer of coarse ash, grayish black (N2), highly laminated with diatomaceous mud, olive gray (5Y 3/2), between 234-241 cm; moderately disturbed between 0-15 cm; sharp contact with unit below.

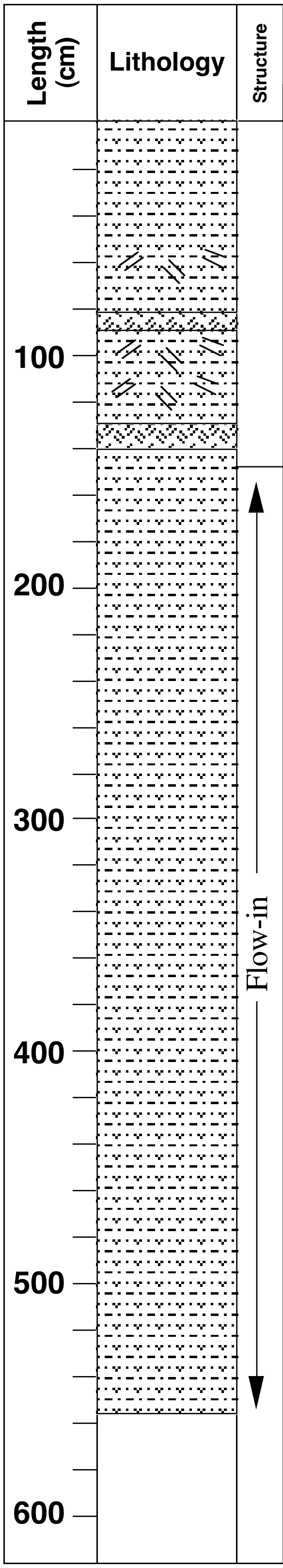
241-595 cm: Muddy diatomaceous ooze, light olive gray (5Y 5/2); flow-in between 248 -595 cm.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Core section break at 286 cm; sediment between 286-287 cm (126 g) and 594-595 cm (33 g; stored in bags) consists of muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD89-IV-5 PC

Latitude: 62°17.860' S
Longitude: 57°49.033' W
Water Depth: 1980 m
Core Length: 556 cm



LITHOLOGIC DESCRIPTION

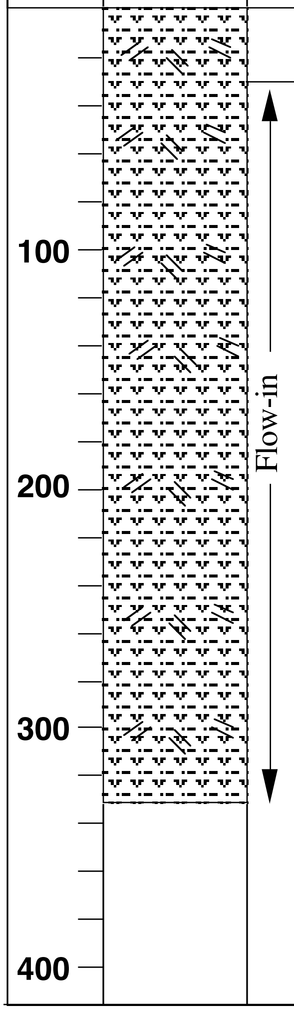
0-556 cm: Diatomaceous mud, light olive gray (5Y 5/2); increasing ash content with depth between 70-81 cm; variable ash content between 86-120 cm; layers of coarse ash, grayish black (N2), betweeen 81-86 cm and 131-141 cm; slightly washed between 0-20 cm; flow-in between 148-556 cm.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Core section break at 249 cm.

PD89-IV-6 PC

Length (cm)	Lithology	Structure	
			Latitude: 62°21.974' S **Longitude:** 58°02.170' W **Water Depth:** 1977 m **Core Length:** 333 cm
			LITHOLOGIC DESCRIPTION

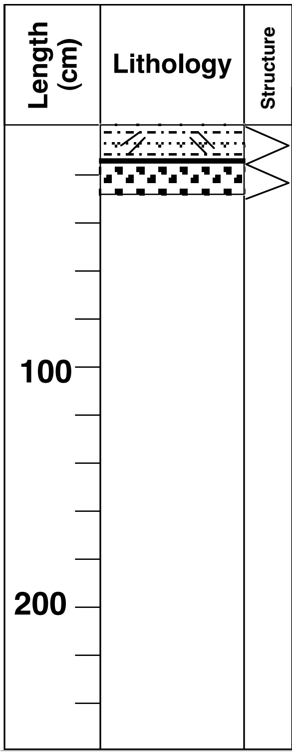


0-333 cm: Muddy diatomaceous ooze, light olive gray (5Y 5/2); fine and coarse ash common throughout; flow-in between 28-333 cm.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Sediment between 0-28 cm is stored in 2 bags (526 and 655 g).

PD89-IV-7 PC



Latitude: 62°46-016' S
Longitude: 59°33.424' W
Water Depth: 1486 m
Core Length: 25 cm

LITHOLOGIC DESCRIPTION

0-15 cm: Ash-bearing diatomaceous mud, moderate olive brown (5Y 4/4); highly disturbed; sharp contact.

15-25 cm: Medium angular pebbles, black (N1), basaltic in composition; minor matrix composed of diatomaceous mud, light olive gray (5Y 5/2); highly disturbed throughout.

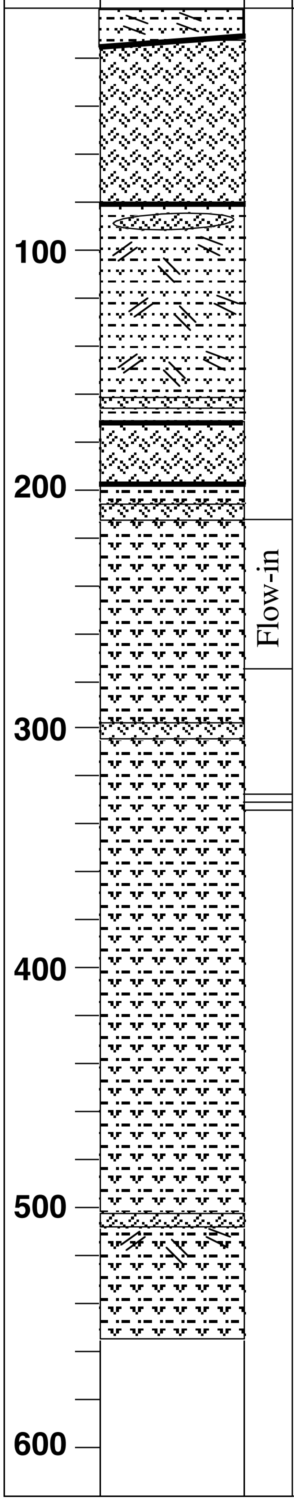
Age: Quaternary (*Thalassiosira lentiginosa* diatom zone)

Note: 15 g of pebbles and coarse ash stored in a bag.

PD89-IV-8 PC

Latitude:	62°45.317' S	Water Depth:	1488 m
Longitude:	59°31.178' W	Core Length:	556 cm

Length (cm) | Lithology | Structure



LITHOLOGIC DESCRIPTION

0-9 cm: Ash-bearing diatomaceous mud, moderate olive brown (5Y 4/4); slightly washed throughout; sharp inclined contact.

9-80 cm: Coarse ash, grayish black (N2); layer of mud-bearing fine ash, olive black (5Y 2/1), between 25-35 cm; slightly washed throughout; sharp contact.

80-172 cm: Ash-bearing diatomaceous mud, olive gray (5Y 4/1); lens of coarse ash, grayish black (N2), between 85-90 cm; layer of coarse ash, grayish black (N2), between 163-168 cm; slightly washed throughout; sharp contact.

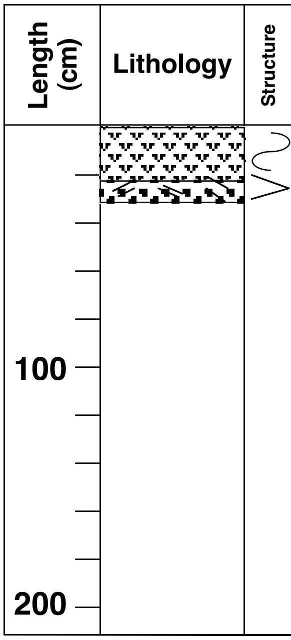
172-196 cm: Coarse ash, grayish black (N2); sharp contact.

196-556 cm: Muddy diatomaceous ooze, moderate olive brown (5Y 4/4); layers of coarse ash, grayish black (N2), between 206-213 cm, 299-301 cm and 508-509 cm; laminae of coarse ash between 336 and 337 cm; coarse ash abundant between 515 and 520 cm; mid-core flow-in between 213-275 cm..

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Core section break at 258 cm; sediment from core catcher/cutter head (placed in a bag; 302 g) consists of diatomaceous mud, olive gray (5Y 4/1).

PD89-IV-9 PC



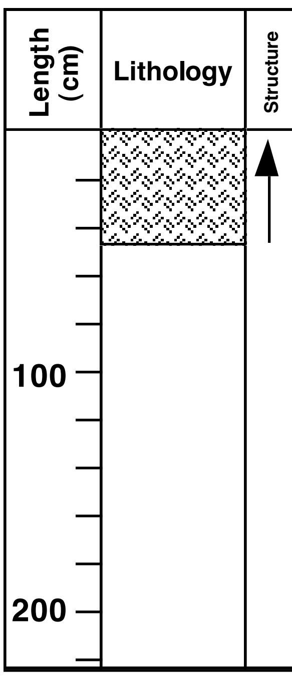
Latitude: 62°35.860' S **Water Depth:** 1380 m
Longitude: 59°21.939' W **Core Length:** 27 cm

LITHOLOGIC DESCRIPTION

0-27 cm: Diatomaceous ooze, light olive gray (5Y 5/2); layer of fine ash and medium pebbles, subangular to subrounded, predominantly basaltic in composition, between 22-27 cm; moderately disturbed between 15-25 cm, highly disturbed between 25-27 cm with matrix washed out.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

PD89-IV-10 PC



Latitude: 62°39.700' S **Water Depth:** 1399 m
Longitude: 59°22.848' W **Core Length:** 42 cm

LITHOLOGIC DESCRIPTION

0-42 cm: Graded coarse ash, grayish black (N2); diatom content decreases with depth; slightly washed along the sides throughout the core.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Small amount (14 g; placed in a bag) of sediment from the base of the core consists of broken pieces of pebbles and some coarse ash, grayish black (N2).

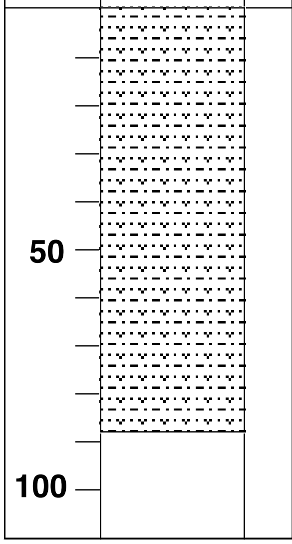
Trigger Weight Cores

PD89-IV-1 TC

Length (cm)	Lithology	Structure	Latitude: 62°16.433' S · Longitude: 57°36.283' W · Water Depth: 1995 m · Core Length: 87 cm

Latitude: 62°16.433' S **Water Depth:** 1995 m
Longitude: 57°36.283' W **Core Length:** 87 cm

LITHOLOGIC DESCRIPTION



0-87cm: Diatomaceous mud, light olive gray (5Y 5/2); zones of lower diatom content between 0-6 cm and 83-87 cm; slightly washed throughout.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

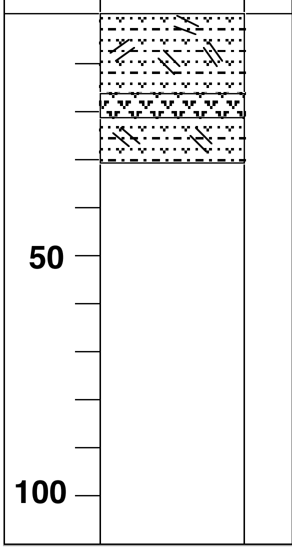
Note: Sediment from the trigger cutter head (367 g; stored in a bag) consists of diatomaceous mud, light olive gray (5Y 5/2).

PD89-IV-2 TC

Length (cm)	Lithology	Structure	Latitude: 62°14.575' S · Longitude: 57°32.608' W · Water Depth: 2005 m · Core Length: 30 cm

Latitude: 62°14.575' S **Water Depth:** 2005 m
Longitude: 57°32.608' W **Core Length:** 30 cm

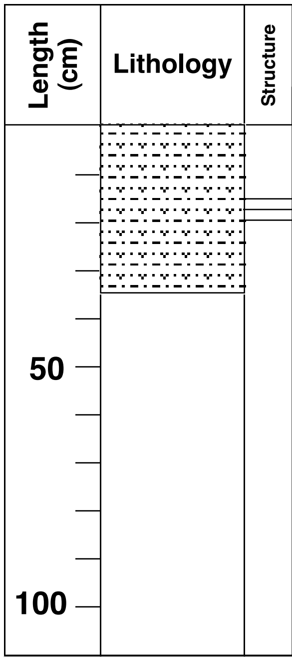
LITHOLOGIC DESCRIPTION



0-30 cm: Diatomaceous mud, light olive gray (5Y 5/2); layer of diatomaceous ooze, moderate olive brown (5Y 4/4), between 16 and 21 cm; fine ash abundant between 0-16 cm and 21-30 cm; slightly washed along the side throughout.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

PD89-IV-3 TC



Latitude: 62°14.635' S **Longitude:** 57°28.931' W

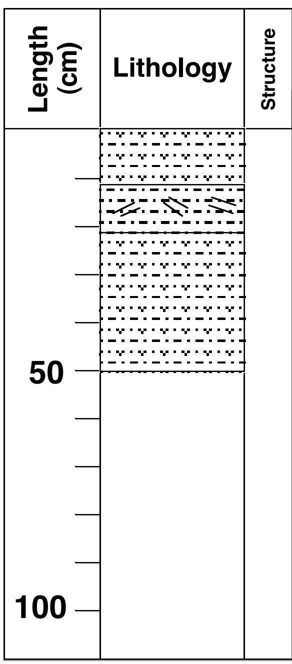
Water Depth: 1989 m **Core Length:** 33 cm

LITHOLOGIC DESCRIPTION

0-30 cm: Diatomaceous mud, moderate olive brown (5Y 4/4); laminae of coarse ash, grayish black (N2), between 16-18 cm. Slightly washed along the side between 0-15 cm.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

PD89-IV-4 TC



Latitude: 62°19.149' S **Longitude:** 57°39.646'W

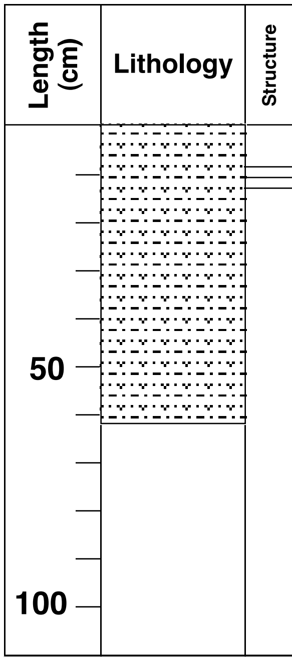
Water Depth: 1997 m **Core Length:** 50 cm

LITHOLOGIC DESCRIPTION

0-50 cm: Diatomaceous mud; light olive gray (5Y 5/2); layer of ash-bearing mud, light olive gray (5Y 5/2), between 12-21 cm; slightly washed along the side throughout.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

PD89-IV-5 TC



Latitude:	**62°17.860' S**	**Water Depth:**	**1980 m**
Longitude:	**57°49.033' W**	**Core Length:**	**62 cm**

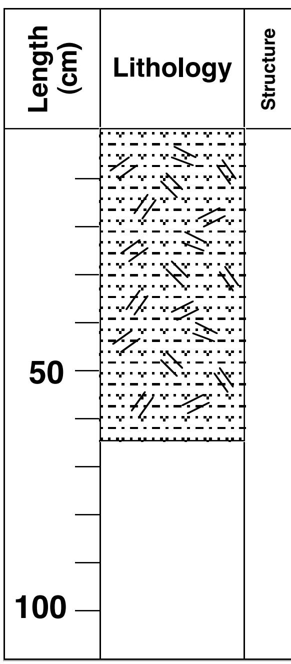
LITHOLOGIC DESCRIPTION

0-62 cm: Diatomaceous mud, light olive gray (5Y 5/2); laminae of fine ash, grayish black (N2), between 9-11 cm; slightly washed along the side throughout.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Sediment from the trigger core catcher (310 g; stored in a bag) consists of muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD89-IV-6 TC



Latitude:	**62°21.974' S**	**Water Depth:**	**1977 m**
Longitude:	**58°02.170' W**	**Core Length:**	**64 cm**

LITHOLOGIC DESCRIPTION

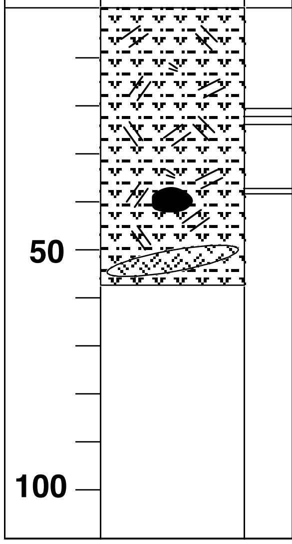
0-64 cm: Diatomaceous mud, light olive gray (5Y 5/2); fine ash abundant throughout; diatom content increases with depth; slightly washed along the side throughout.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Sediment from trigger core cutter head (324 g; stored in a bag) consists of ash-bearing diatomaceous mud, light olive gray (5Y 5/2).

PD89-IV-8 TC

Length (cm)	Lithology	Structure	Latitude: 62°45.317' S · Longitude: 59°31.178' W · Water Depth: 1488 m · Core Length: 56 cm



LITHOLOGIC DESCRIPTION

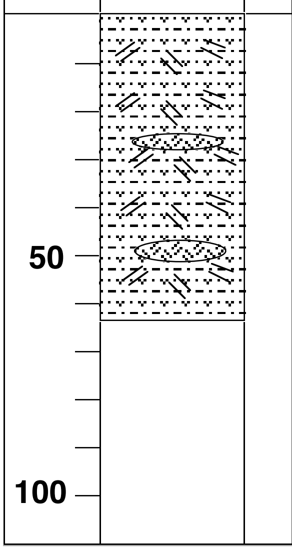
0-56 cm: Muddy diatomaceous ooze, light olive gray (5Y 5/2); fine ash abundant throughout; highly laminated with fine and coarse ash, olive black (5Y 2/2), between 20-23 cm; laminae of coarse ash, olive black (5Y 2/2), between 37-38 cm; inclined lens of fine ash, olive black (5Y 2/2), between 50-56 cm; a subrounded pebble between 38-40 cm; slightly washed along the sides between 0-40 cm.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Sediment from the trigger core catcher/cutter head (322 g; stored in a bag) consists of muddy diatomaceous ooze, light olive gray (5Y 5/2).

PD89-IV-9 TC

Length (cm)	Lithology	Structure	Latitude: 62°35.860' S · Longitude: 59°21.939' W · Water Depth: 1380 m · Core Length: 62 cm



LITHOLOGIC DESCRIPTION

0-62 cm: Ash-bearing diatomaceous mud, light olive gray (5Y 5/2); diatom content increases with depth; lenses of coarse ash, grayish black (N2), between 26-27 cm and 46-51 cm; slightly washed along the side throughout.

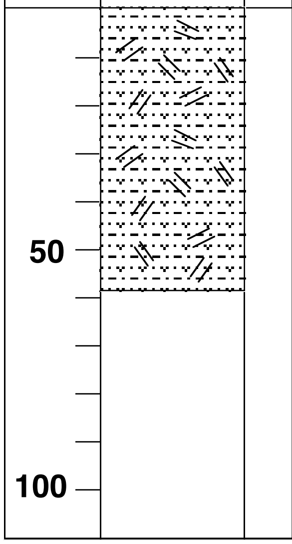
Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

Note: Sediment from the trigger core catcher/cutter head (324 g; stored in a bag) consists of ash-bearing diatomaceous mud, light olive gray (5Y 5/2).

PD89-IV-10 TC

Latitude: 62°39.700' S **Water Depth:** 1399 m
Longitude: 59°22.848' W **Core Length:** 58 cm

Length (cm)	Lithology	Structure	LITHOLOGIC DESCRIPTION



LITHOLOGIC DESCRIPTION

0-58 cm: Diatomaceous mud, light olive gray (5Y 5/2); fine ash abundant throughout; coarse ash, grayish black (N2) common to abundant between 19-40 cm.; diatom content increases with depth; slightly washed along the sides.

Age: Quaternary (*Thalassiosira lentiginosa* diatom zone).

REFERENCES

Anderson, J.B., 1988, Marine geophysical survey of the Antarctic Peninsula continental shelf (63°W to 68°W): Preliminary results. Antarctic Journal of the United States 23(5):91-94.

Anderson, J.B., 1991, USAP 91 marine geology-geophysics cruise report and R/V Polar Duke equipment status. Preliminary results of high resolution seismic and coring surveys in the Antarctic Peninsula region. Department of Geology, Rice University, 10 p.

Anderson, J.B., and Bartek, L.R., 1990, Preliminary results of a high-resolution seismic reflection survey of the Ross Sea continental shelf. Antarctic Journal of the United States 25(5):61-63.

Anderson, J.B., Bartek, L.R., and Reid, D.E., 1987, Preliminary results of a 1986-1987 austral summer marine geological survey of the western Ross Sea. Antarctic Journal of the United States 22(5):120-122.

Anderson, J.B. Davis, S.B., Domack, E.W., Kurtz, D.D., Balshaw, K.M., and Wright, R., 1981, Marine Sediment Core Descriptions--IWSOE 68, 69, 70; Deep Freeze 79. Department of Geology, Rice University, 60 p.

Anderson, J.B., DeMaster, D.J., and Nittrouer, C.A., 1986, Preliminary results from marine geological cruises aboard the U.S. Coast Guard icebreaker Glacier. Antarctic Journal of the United States 21(5):144-148.

Anderson, J.B. Kennedy, D.S., Smith, M.J., and Domack, E.W., 1991, Sedimentary facies associated with Antarctica's floating ice masses. In: Anderson, J.B., and Ashley G.M., (eds.), Glacial Marine Sedimentation; Paleoclimatic Significance. Geological Society of America Special Paper 261, pp. 1-25.

Anderson, J. B., Kurtz, D.D, and Weaver, F.M., 1979, Sedimentation on the Antarctic continental slope. Society of Economic Paleontologists and Mineralogists, Special Publication No. 27.

Anderson, J.B., Shipp, S.S., Bartek, L.R., and Reid, D.E., in press, Evidence for a grounded ice sheet on the Ross Sea continental shelf during the Late Pleistocene and preliminary paleodrainage reconstruction. In: Elliot, D.H., (ed.), Contributions to Antarctic Research III, Antarctic Research Series, American Geophysical Union, Washington, D.C.

Barker, P.F., and Dalziel, I.W.D., 1983, Progress in geodynamics in the Scotia Arc region. American Geophysical Union, Geodynamic Series 9:137-170.

Bartek, L., and Anderson, J.B., 1991, Facies distribution resulting from sedimentation under polar interglacial climatic conditions within a high-latitude marginal basin, McMurdo Sound, Antarctica. In: Anderson, J.B., and Ashley G.M., (eds.), Glacial Marine Sedimentation; Paleoclimatic Significance. Geological Society of America Special Paper 261, pp. 22-49.

Barrett, P.J., 1982, Proposal for Cenozoic Investigations in the Western Ross Sea (CIROS). New Zealand Antarctic Record 4(2):32-39.

Barrett, P.J., 1985, Drill core details antarctic glacial history. New Zealand Antarctic Record 6(3):39.

Barrett, P.J., 1987, Oligocene sequence cored at CIROS-1, western McMurdo Sound. New Zealand Antarctic Record 7(3):1-7.

Barrett, P.J., et al., 1985, Plio-Pleistocene glacial sequence cored at CIROS-2, Ferrar Fjord, western McMurdo Sound. New Zealand Antarctic Record 6(2):8-19.

Birkenmajer, K, 1982, Late Cenozoic phases of block-faulting on King George Island (South Shetland Islands, West Antarctica). Bulletin de L'Academie Polonaise des Sciences, Serie des sciences de la terre 30(1-2):21-32.

Bryan, J.R., (ed.), 1992a, Descriptions of sediments recovered by the USCGC Glacier, USARP Operation Deep Freeze 1985, South Orkney Plateau, South Shetland Shelf, Bransfield Strait, Marguerite Bay, Pine Island Bay. Sedimentology Research Laboratory Contribution No. 54, Department of Geology, Florida State University, Tallahassee, 181 p.

Bryan, J.R., (ed.), 1992b, Descriptions of sediments recovered by the USCGC Glacier, USARP Operation Deep Freeze 1986, Bransfield Strait, Gerlache Strait, Marguerite Bay. Sedimentology Research Laboratory Contribution No. 55, Department of Geology, Florida State University, Tallahassee, 108 p.

Bryan, J.R., and Pospichal, J.J. (eds.), 1993, Descriptions of the sediments recovered by the 1986-1987 austral summer cruise of the R/V Polar Duke United States Antarctic Program: Bransfield Strait, Antarctic Peninsula. Sedimentology Research Laboratory Contribution No. 58, Department of Geology, Florida State University, Tallahassee, 33 p.

Cassidy, D.S., 1990, Antarctic Marine Geology Research Facility and Core Library, 1989-1990. Antarctic Journal of the United States 25(5):287-288.

Cassidy, D.S., and Devore, G.W., 1973, Antarctic Marine Geology Research Facility and Core Library. Antarctic Journal of the United States 8(3):120-128.

Cassidy, D.S., Kaharoeddin, F.A., Zemmels, I., and Knapp, M.B., 1977a, USNS ELTANIN: An inventory of core location data, with core location maps and cruise 55 core descriptions. Sedimentology Research Laboratory Contribution No. 44, Department of Geology, Florida State University, Tallahassee, 90 p.

Cassidy, D.S., Ciesielski, P.F., Kaharoeddin, F.A., Wise, S.W., Jr., and Zemmels, I., 1977b, ARA ISLAS ORCADAS Cruise 0775 sediment descriptions. Sedimentology Research Laboratory Contribution No. 45, Department of Geology, Florida State University, Tallahassee, 76p.

Clough, J.W., and Hansen, B.L., 1979, The Ross Ice Shelf Project. Science 203(4379):433-34.

Domack, E.W., 1988, Depositional environments of the antarctic continental shelf: Fjord studies from the R/V Polar Duke. Antarctic Journal of the United States 23(5):96-102.

Domack, E.W., 1992, United States Antarctic Program: R/V Polar Duke Cruise 92-2 Report. Hamilton College, 29 p.

Dry Valley Drilling Project, 1974, Dry Valley Drilling Project (DVDP), Bulletin No. 3, Department of Geology, Northern Illinois University, DeKalb, 239 p.

Dry Valley Drilling Project, 1975, Dry Valley Drilling Project (DVDP), Bulletin No. 5, Mudrey, M.G., Jr., and McGinnis, L.D., (eds.), Department of Geology, Northern Illinois University, DeKalb, 280 p.

Dry Valley Drilling Project, 1976, Dry Valley Drilling Project (DVDP), Bulletin No. 7, Barrett, P.J., and Treves, S.B., (eds.), Department of Geology, Northern Illinois University, DeKalb, 126 p.

Elston, D.P., Rieck, H.J., and Robinson, P.H., 1983, Dry Valleys/McMurdo Sound magnetostratigraphy and sedimentology. Antarctic Journal of the United States 18(5):29-31.

Elston, D.P., Robinson, P.H., and Bressler, S.L., 1981, Stratigraphy, sedimentology, and paleomagnetism of the Coral Ridge Sand Body, Eastern Taylor Valley, Victorialand, Antarctica. U.S. Geological Survey Open File Report 81-1303, Flagstaff, Arizona, 68 p.

Fisher, R.V., 1961, Proposed classification of volcaniclastic sediments and rocks. Geological Society of America Bulletin 72:1409-1414.

Fisher, R.V., 1966, Rocks composed of volcanic fragments and their classification. Earth Science Review 1:287-298.

Frakes, L.A., 1971, USNS ELTANIN Cruises 32-45, core descriptions. Sedimentology Research Laboratory Contribution No. 33, Department of Geology, Florida State University, Tallahassee, 105 p. (NOTE: Only piston cores are described; see Frakes (1973) for descriptions of other materials from cruises 32-45).

Frakes, L.A., 1973, USNS ElTANIN Cruises 47-54, sediment descriptions. Sedimentology Research Laboratory Contribution No. 37, Department of Geology, Florida State University, Tallahassee, 259 p. (NOTE: also contains descriptions of trigger and Phleger cores for ELTANIN Cruises 32-54, and dredge, trawl, and grab-retrieved sediments from ELTANIN Cruises 4-54.)

Friedman, G.M., and Sanders, J.E., 1978, Principles of Sedimentology. John Wiley and Sons, New York, 792 p.

Goddard, E.N., Trask, P.D., DeFord, R.K., Rove, O.N., Singlewald, J.T. Jr., and Overbeck, R.M., 1970, Rock-Color Chart. Geological Society of America, Boulder, Colorado.

Goodell, H.G., 1964, Marine geology of the Drake Passage, Scotia Sea, and South Sandwich Trench. Sedimentology Research Laboratory Contribution No. 7, Department of Geology, Florida State University, Tallahassee, 277 p. (NOTE: This publication provides sediment descriptions of ELTANIN Cruises 1-8 piston, trigger, and Phleger cores.)

Goodell, H.G., 1965, Marine geology, USNS ELTANIN Cruises 9-15. Sedimentology Research Laboratory Contribution No. 11, Department of Geology, Florida State University, Tallahassee, 237 p.

Goodell, H.G., 1968, USNS ELTANIN Cruises 16-27, core descriptions. Sedimentology Research Laboratory Contribution No. 25, Department of Geology, Florida State University, Tallahassee, 247 p.

Goodell, H.G., McKnight, W.M., Osmond, J.K., and Gorsline, D.S., 1961, Sedimentology of Antarctic bottom sediments taken during Deep Freeze Four: A progress report. Sedimentology Research Laboratory Contribution No. 2, Department of Geology, Florida State University, Tallahassee, 52 p. (and appendices).

Griffith, T.W., 1988, A geological and geophysical investigation of sedimentation and Recent glacial history in the Gerlache Strait region, Graham Land, Antarctica. Master of Arts thesis, Rice University, Houston, 449 p.

Herron, M.J., and Anderson, J.B., 1990, Late Quaternary glacial history of the South Orkney Plateau, Antarctica. Quaternary Research 33:265-275.

Hovan, S.A., and Janecek, T.R. (eds.), 1994, Descriptions of sediment recovered by the R/V Polar Duke, Cruise III, United States Antarctic Program, 1988. Sedimentology Research Laboratory Contribution No. 59, Department of Geology, Florida State University, Tallahassee, 43 p.

Jeffers, J.D., 1987, Preliminary results of marine geological and geophysical investigations in the Bransfield Strait, Antarctic Peninsula. Antarctic Journal of the United States 22(5):131-134.

Jeffers, J.D., 1988, Tectonic and sedimentary evolution of the Bransfield Basin, Antarctica. Master of Arts thesis, Rice University, Houston, 143 p.

Jeffers, J.D., and Anderson, J.B., 1986, Sedimentation and tectonics in the Bransfield Strait--A preliminary report. Antarctic Journal of the United States 21(5):141-143.

Jeffers, J.D., and Anderson, J.B., 1990, Sequence stratigraphy of the Bransfield Basin, Antarctica: Implications for tectonic history and hydrocarbon potential. In: St.John, B., (ed.), Antarctica as an Exploration Frontier--Hydrocarbon Potential, Geology, and Hazards. American Association of Petroleum Geologists Studies in Geology no. 31, pp. 13-29.

Jeffers, J.D., Anderson, J.B., and Lawver, L.A., 1991, Evolution of the Bransfield basin, Antarctic Peninsula. In: Thomson, M.R.A., Crame, J.A., and Thomson, J.W., (eds.), GeologicalEvolution of Antarctica. Cambridge University Press, pp. 481-485.

Jones, S.C., 1980, ARA ISLAS ORCADAS Cruise 1578 sediment descriptions. Sedimentology Research Laboratory Contribution No. 48, Florida State University, Tallahassee, 162 p.

Kaharoeddin, F.A., 1978, ARA ISLAS ORCADAS Cruise 1176 sediment descriptions. Contribution No. 46, Sedimentology Research Laboratory, Florida State University, Tallahassee, 124 p.

Kaharoeddin, F.A., Eggers, M.R., Graves, R.S., Goldstein, E.H., Hattner, J.G., Jones, S.C., Ciesielski, P.F., 1979, ARA ISLAS ORCADAS Cruise 1277 sediment descriptions. Sedimentology Research Laboratory Contribution No. 47, Florida State University, Tallahassee, 108 p.

Kaharoeddin, F.A., Graves, R.S., Bergen, J.A., Eggers, M.R., Harwood, D.M., Humphreys, C.L., Goldstein, E.H., Jones, S.C., Watkins, D.K., 1982, ARA ISLAS ORCADAS Cruise 1678 sediment descriptions. Sedimentology Research Laboratory Contribution No. 50, Florida State University, Tallahassee, 172 p.

Kaharoeddin, F.A., Graves, R.S., Bergen, J.A., Knuttel, S., and Ciesielski, P.F., 1983, USCGC Glacier Operation Deep Freeze 1981, Bransfield Strait and Eastern Amundsen Sea, Piston Core Descriptions. Sedimentology Research Laboratory Contribution No. 51, Florida State University, Tallahassee, 172 p.

Kaharoeddin, F.A., Knuttel, S., Weigand, G.E., Lang, T.H., Graves, R.S., Humphries, C.L., and Ciesielski, P.F., 1984, USCGC Glacier: Operations Deep Freeze 1982 and 1983 Sediment Descriptions. Sedimentology Research Laboratory Contribution No. 52, Department of Geology, Florida State University, Tallahassee, 242 p.

Kaharoeddin, F.A., Russell, M.D., Weiterman, S.D., Cooper, C.R., Lang, T.H., Clark, D.R., Covington, J.M., Firth, J.V., Applegate, J.L., Knuttel, S., Breza, J.R., 1988, The United States Antarctic Research Program in the western Ross Sea, 1979-1980: The sediment descriptions. Sedimentology

Research Laboratory Contribution No. 53, Department of Geology, Florida State University, Tallahassee, 230 p.

Kellogg, T.B., and Kellogg, D.E., Melanson, K.R., and Austin, K.G., 1981, USCGC Glacier 1976 and 1978 Cruises, Ross Sea, Antarctica--Sediment Descriptions. Department of Geological Sciences and Institute for Quaternary Studies, University of Maine at Orono, 76 p.

Kennedy, D.S., 1988, Modern sedimentary dynamics and Quaternary glacial history of Marguerite Bay, Antarctic Peninsula. Master of Arts thesis, Rice University, Houston, 203 p.

Kennedy, D.S., and Anderson, J.B., 1989, Glacial-marine sedimentation and Quaternary glacial history of Marguerite Bay, Antarctic Peninsula. Quaternary Research 31:255-276.

Lawver, L.A., and Villinger, H., 1989, North Bransfield Basin: R/V Polar Duke cruise PD VI-88. Antarctic Journal of the United States 24(5):117-11.

Lawver, L.A., 1989, USAP 1989 Cruise IV R/V Polar Duke, Cruise Report Institute for Geophysics, University of Texas, Austin, TX, 41 p.

McGinnis, L.D., 1979, The Dry Valley Drilling Project--an exercise in international cooperation-- viewpoint from the United States. In: Nagata, T. (Ed.), Proceedings of the Seminar III on Dry Valley Drilling Project, 1978. Memoirs of National Institute of Polar Research, Special Issue No. 13:1-21. Tokyo, Japan.

Myers, N.C., 1982, Marine geology of the western Ross Sea: Implications for Antarctic glacial history. Unpublished masters thesis, Rice University, Houston, Texas.

Pyne, A.R., Robinson, P.H., Barrett, P.J., 1985, Core log, description and photographs, CIROS 2, Ferrar Fjord, Antarctica. Antarctic Data Series No. 11. Victoria University of Wellington, New Zealand, 80 p.

Robinson, P.H., 1983, Preliminary report on the lithostratigraphy and sedimentary history of the near surface glacigenic drill-core sediment of eastern Taylor Valley, Antarctica. New Zealand Geological Survey Report No. G77, Department of Scientific and Industrial Research, Lower Hutt, New Zealand, 26 p.

Robinson, P.H., 1985, A record of Ross Ice Sheet glaciations from eastern Taylor Valley drill cores, Antarctica. New Zealand Antarctic Record (special supplement) 6:32-39.

Robinson, P.H., and Jaegers, A, 1984, The lithologic logs of eastern Taylor Valley (ETV) cores 2 to 13, South Victoria Land, Antarctica. New Zealand Geological Survey Report No. G89, Department of Scientific and Industrial Research, Lower Hutt, New Zealand, 34 p.

Robinson, P.H., Elston, D.P., and Rieck, H.J., 1984, Drilling eastern Taylor Valley, Antarctica, 1982-83: some preliminary results. Polar Record 22(136):73-78.

Robinson, P.H., Pyne, A.R., Hambrey, M.J., Hall, K.J., Barrett, P.J., 1987, Core log, photographs and grain size analysis from the CIROS-1 drillhole, western McMurdo Sound, Antarctica. Antarctic Data Series No. 14, Victoria University of Wellington, New Zealand, 241 p.

Schermerhorn, L.J.G., 1974, Late Precambrian mixtites: Glacial and/or nonglacial? American Journal of Science 274:673-824.

Taviani, M., Reid, D.E., and Anderson, J.B., 1993, Skeletal and isotopic composition and paleoclimatic significance of Late Pleistocene carbonates from banks in the Ross Sea, Antarctica. Journal of Sedimentary Petrology 63(1):84-90

Terry, R.D., and Chilinger, G.V., 1955, Summary of "concerning some additional aids in studying sedimentary formations" by M.S. Shvetsov. Journal of Sedimentary Petrology 25:229-234.

Torii, T., 1981, A review of the Dry Valley Drilling Project, 1971-76. Polar Record 20(129):533-541.

Webb, P.N., 1978, Initial reports on geological materials collected at RISP Site J9, 1977-78. RISP Technical Report 78-1, Ross Ice Shelf Project Management Office, University of Nebraska, Lincoln, 46 p.

Webb, P.N., 1979, Initial reports on geological materials collected at RISP Site J9, 1978-79. RISP Technical Report 79-1, Ross Ice Shelf Project Management Office, University of Nebraska, Lincoln, 127 p.

SAMPLE DISTRIBUTION POLICY

Antarctic Research Facility
Department of Geology
Florida State University
Tallahassee, FL 32306
(904) 644-2407 / (904) 644-4214 fax
email: curato@geomag.gly.fsu.edu

The Antarctic Research Facility (ARF) at Florida State University is funded by the Division of Polar Programs, National Science Foundation, and is a national depository for antarctic and subantarctic marine geological materials recovered by U.S. research vessels. The ARF also houses a variety of drill cores and other materials pertaining to polar geology. The collection includes piston, trigger, and Phleger cores, grab and trawl samples, and various other materials recovered from the following expeditions:

USNS *Eltanin*/ARA *Islas Orcadas* Circumpolar Survey
Deep Freeze (*Glacier*) cruises 76, 78, 79, 80, 81, 82, 83, 85, 86, 87
International Weddell Sea Oceanographic Expeditions (IWSOE)
Dry Valley Drilling Project (DVDP)
Eastern Taylor Valley (ETV) Project
Cenozoic Investigations of the western Ross Sea (CIROS 1&2)
Ross Ice Shelf Project
R/V *Polar Duke* Expeditions (cruises 86, 88, 89, 90, 91, 92)
R/V *Nathanial B. Palmer* (cruises 93, 94)
Assorted grab, trawl, and dredge rock specimens obtained by the USNS *Eltanin* (appx. 4200 kg) and several hundred specimens recovered by the research vessels *Anton Brun*, *Robert Conrad*, *Hero*, and *Vema*

Published descriptions are available for most of this material and are sent to perspective ARF users and libraries upon request to the curator. Additional core description volumes are being prepared by the ARF staff. These publications are generally used as a guide to detailed sampling.

Investigators are invited to visit the ARF or to write the curator for sample requests. Samples requested by NSF funded investigators are automatically approved. Samples are released to non-NSF funded scientists upon approval by a small panel of antarctic marine geoscientists appointed by the curator. Approval is based on the merit of the project and the demonstration that funds exist to complete the research.

Investigators using ARF material are responsible for the following:

(1) prompt publication of significant results with acknowledgment of the Antarctic Research Facility as the source of materials
(2) submittal of reprints of published works to the curator for the ARF library
(3) notification to the curator of any proposed changes in the research stated in the original request

All inquiries should be sent to the Curator at the above address.

RESEARCH PROPOSAL AND SAMPLE REQUEST FORM

Antarctic Research Facility
Department of Geology
Florida State University
Tallahassee, FL 32306
(904) 644-2407 / (904) 644-4214 fax
email: curator@geomag.gly.fsu.edu

Investigator(s):

Project Title:

Funding for project (indicate source and grant number):

Summary of proposed research:

Sample Request: Indicate **cruise**, **core**, **type**, **interval**, and **volume** (please use attached form). We will adhere to this request as best as possible but actual sample distribution may differ due to availability and/or core condition.

Signature______________________________ **Date** ____________________

Title ______________________________ **phone** ____________________

Address ____

____

____

SAMPLE REQUEST INVENTORY

Antarctic Research Facility

Name	*Page* *of*
Date of Request	*Number of Samples Requested*

CRUISE ship/year	CORE or SAMPLE ID (eg. DF79-08)	TYPE	INTERVAL (cm) top	bottom	VOLUME (cc)	COMMENTS

FOR ARF USE ONLY

technician	date sampled	total	shipped via
NSF Grant Number or ARF Review Panel		Request ID Number	