

## 13. SITE 182

The Shipboard Scientific Party<sup>1</sup>

### ABSTRACT

Site 182 is on the upper continental slope off Kodiak Island, at 57°52.96'N, 148°42.99'W in 1411 meters of water. Two holes were interval cored to a maximum depth of 166.5 meters. Recovery was very low (two cores and five core catchers). Correlation of lithologies with the seismic reflection record and the drilling record suggests an upper unit of poorly sorted clayey silt with erratic granules and pebbles down to somewhere above 95 meters, underlain by a unit of extensive sands with some interbedded silty clay containing erratics. The age of the section is undifferentiated Quaternary. Displaced shelf and upper bathyal benthonic foraminifers are found throughout the section. The objectives of this hole were not met because of rough weather and a lack of time.

### SITE SUMMARY

**Date Occupied:** 16-17 July 1971.

**Position (Satellite):**

	Hole 182	Hole 182A
Latitude:	57°52.96'N,	57°52.88'N,
Longitude:	148°42.99'W;	148°43.39'W.

**Number of Holes:** Two.

**Water Depth:**

Hole 182: 1411 meters;  
Hole 182A: 1434 meters.

**Penetration:**

Hole 182: 123 meters below sea floor;  
Hole 182A: 195 meters below sea floor.

**Number of Cores:**

Hole 182: 6;  
Hole 182A: 1.

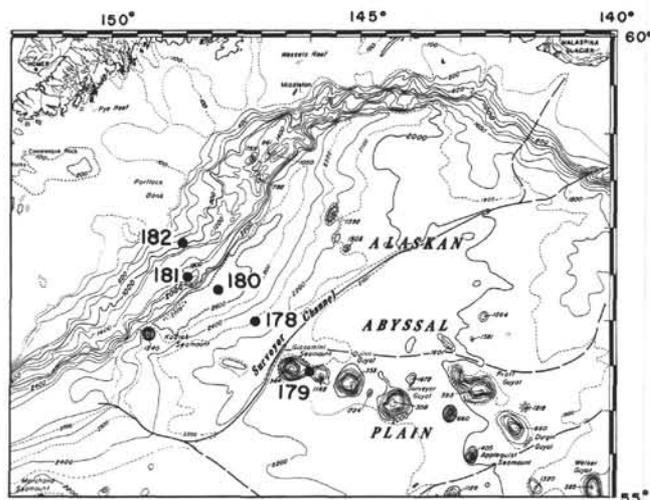
**Total Core Recovered:**

Hole 182: 11.5 meters, 21.3%;  
Hole 182A: core catcher, 0%.

**Age of Oldest Sediment:** Pleistocene.

**Acoustic Basement:** None

**Basement:** None.



### BACKGROUND AND OBJECTIVES

#### Site Description

Site 182 is upslope from Site 181 on the upper continental slope off Kodiak Island (Figure 1). It is just above a mid-slope terrace similar to the Aleutian Bench. Compared to the rest of the slope, the drilling site is in an area of moderate topographic roughness. The seismic reflection records indicate gentle folding of strata and reflectors of fairly uniform amplitude throughout the section. The section is thought to be of Neogene Age.

#### Site Objectives

The main objective of the site was to fill gaps in the biostratigraphic section for this region, particularly for

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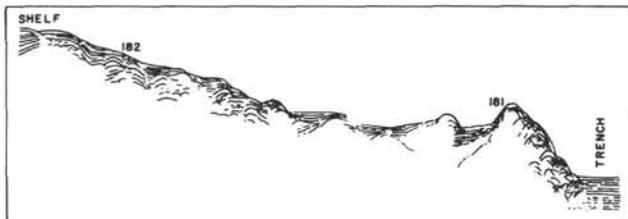


Figure 1. Diagrammatic section across the continental slope (after seismic reflection records) showing setting of Sites 181 and 182.

Pliocene and Miocene foraminifers and calcareous nannofossils. It was hoped that these calcareous fossils would be found in abundance, since the site is well above the carbonate compensation level.

A second objective concerned drilling technique. At Site 176, an attempt was made to drill in shallow water (193 meters) and test the capabilities of the dynamic positioning system; only 41 meters of sediment were penetrated before the drill string twisted off. Thus, the second objective of Site 182 was to test the drilling and positioning capabilities of the *Challenger* in somewhat deeper water (1419 meters).

### LITHOLOGIC SUMMARY

#### General Statement

Although recovery at this site was very low, two distinct lithologies can be recognized; the first is clayey silt and the second is sand.

#### Lithologic Units

The section is considered as a single unit with the following lithologies:

1) Clayey silt, often coarse or even sandy, with mottles of medium and fine sand (rarely mixed with some ash), and common erratic pebbles and granules. Medium gray (N4) clayey silt is found interbedded with dark greenish gray (5 GY 4/1) clayey silt in Core 1 of Hole 182, and with olive gray (5 Y 3/2) clayey silt in Core 3. The amount of erratic granules and pebbles varies from about 0.1 percent to 5 percent in the cores recovered; several core catchers recovered little but erratic pebbles. Biogenous components sometimes comprise up to 4 percent of the clayey silts.

2) Well sorted fine sand with no erratics, recovered from the core catcher of Core 4 of Hole 182. Much of the section below this depth drilled like sand. The sand is sufficiently well sorted to suggest some form of current was responsible for its deposition.

### PALEONTOLOGIC SUMMARY

#### Introduction

The short sequence (123 meters) of sandy and gravelly muds recovered in Hole 182 and a single core catcher in Hole 182A contain generally well-preserved calcareous nannofossils, diatoms, foraminifera, and radiolarians in varying abundances. All faunas and floras indicate this sequence is Quaternary in age. The oldest sediment recovered falls within North Pacific Diatom (NPD) Zone III and

within the *Axoprunum angelinum* radiolarian zone indicating a maximum age of 1.3 m.y. for the entire section penetrated.

Displaced upper bathyal and neritic species of benthonic foraminifera are common throughout the entire sequence. Rare to poorly preserved specimens of Pliocene foraminifera are also present representing reworked material from exposures of Neogene sediments on the slope and adjacent shelf.

#### Calcareous Nannofossils

Calcareous nannofossils are sparse in Cores 1 through 6 (0 to 123 meters) of Hole 182 except in Sample 182-3-1 (130cm) which is shown by electron microscopy to contain abundant *Emiliania huxleyi*. This Upper Pleistocene marker may indicate contamination or tectonic disturbance of the section. *Gephyrocapsa* sp. is present in Cores 1 and 3 whereas *Coccolithus pelagicus* is found in all cores down to the base of the hole. Because nannofossils are present in all cores, material penetrated at Site 182 is thought to have been above the calcium carbonate compensation level during the entire interval represented.

#### Diatoms

Diatoms are found in varying abundance and in a good to poor state of preservation throughout Holes 182 and 182A. A single warm interval is indicated by diatom biofacies present at 62.6 meters (182-3-1, 53-55 cm) within NPD Zone II.

The base of Pleistocene NPD Zone I is at 9.5 meters (182-1, CC) and the base of NPD Zone II at 63 meters (182-3-2, 109-111 cm). The base of NPD Zone III was not found although the oldest diatom-bearing sediment present in Holes 182 and 182A (182A-1, CC; 166.5 meters) falls within this zone. Correlations of NPD Zone III with the paleomagnetic-radiometric time scale indicate that this latter horizon is younger than 1.3 m.y.

#### Planktonic Foraminifera

Well-preserved planktonic foraminifera are present in all cores recovered from Holes 182 and 182A with abundance varying from few to common. Sinistral coiling populations of *Globigerina pachyderma* dominate all faunas with lesser percentages of *G. bulloides* (and variants), *G. quinqueloba*, and *Globigerinita uvula*. This species group is indicative of the Holocene-Upper Pleistocene interval in this region. A few large, discolored, filled, and broken dextral coiling specimens of *Globigerina pachyderma* s.l. were found at the base of Core 6 in Hole 182. These specimens are interpreted as reworked Pliocene elements eroded from exposures of Pliocene sediments known to underlie portions of the shelf adjacent to Site 182.

#### Benthonic Foraminifera

Few to common, well to moderately well preserved benthonic foraminifera are present in all cores recovered in Holes 182 and 182A. These faunas are dominated by species displaced from upper bathyal and shelf-edge environments and include broken specimens of *Elphidium*, *Buccella*, and *Trifarina* as well as *Cassidulina californica*, *C.*

*translucens*, *Uvigerina auberiana*, *Uvigerina peregrina*, *Nonionella labradorica*, and *Cibicides fletcheri*. In situ middle bathyal species present include *Uvigerina hispidocostata*, *Epistominella pacifica*, *Bolivina argentea*, *Valvulineria araucana*, and *Globobulimina spinea*. A few broken and filled specimens of *Bulimina straita mexicana* and *Uvigerina* likely represent reworked material from Pliocene deposits exposed on the shelf and slope.

#### Radiolaria

Radiolarians are rare to few and moderately well preserved in most of the cores from Site 182. Core 1 (0 to 9.5 meters) contains several extant species but lacks *Druppatractus acquiloni* and *Stylatractus universus* and is referred to the Upper Pleistocene - Holocene *Artostrobium miralestense* (= *Eucyrtidium tumidulum*) Zone of Hays (1970) with a paleomagnetic-radiometric age range of 0.4 m.y. to the present.

Core 2 of Hole 182 recovered very little fine material and was not examined. Core 3 of this hole (59.9 to 69 meters) contains *Druppatractus acquiloni* and *Stylatractus universus* along with several extant species. It is referred to the *Stylatractus universus* zone which has a paleomagnetic-radiometric age range of 0.4 to 1.0 m.y. (Hays, 1970). Cores below Core 3 of Hole 182 and the single sample from Hole 182A lack age diagnostic species.

#### Spores and Pollen

Samples examined at Site 182 were found to be almost barren of spores and pollen. All woody fragments and palynomorphs found were oxidized beyond recognition.

## PHYSICAL PROPERTIES

Physical properties were measured in the same manner as at previous sites. Only two cores (1 and 3 in Hole 182) recovered material suitable for sonic velocity and GRAPE measurements; no syringe porosities were determined. Core 3 was very gassy, with small gas voids permeating the whole core, which probably accounts for the lower sonic velocity and higher GRAPE porosity in this core than in Core 1. The four sets of sonic velocity determinations show a gradual decrease in velocity downsection.

## CORRELATION BETWEEN REFLECTION RECORDS AND THE STRATIGRAPHIC COLUMN

Site 182 was chosen on the basis of the precruise seismic record illustrated in Figure 2. A record made by *Challenger* in a predrilling site survey is shown in Figure 3. A series of low-amplitude, slightly discontinuous reflectors occur from 0 to 0.15 seconds below the bottom. They correspond to the clayey silt with common erratic pebbles and granules found in the upper part of the section. Higher amplitude, continuous and parallel reflectors occur between 0.15 and 0.3 seconds. This part of the section is probably dominantly sand, suggested by the drilling characteristics and the small amounts of material recovered.

## SUMMARY AND CONCLUSIONS

Two holes were drilled (182 and 182A) on the upper continental slope off Kodiak Island just above a mid-slope terrace which is similar to the Aleutian Bench. Compared to the rest of the slope, the drilling site is a relatively

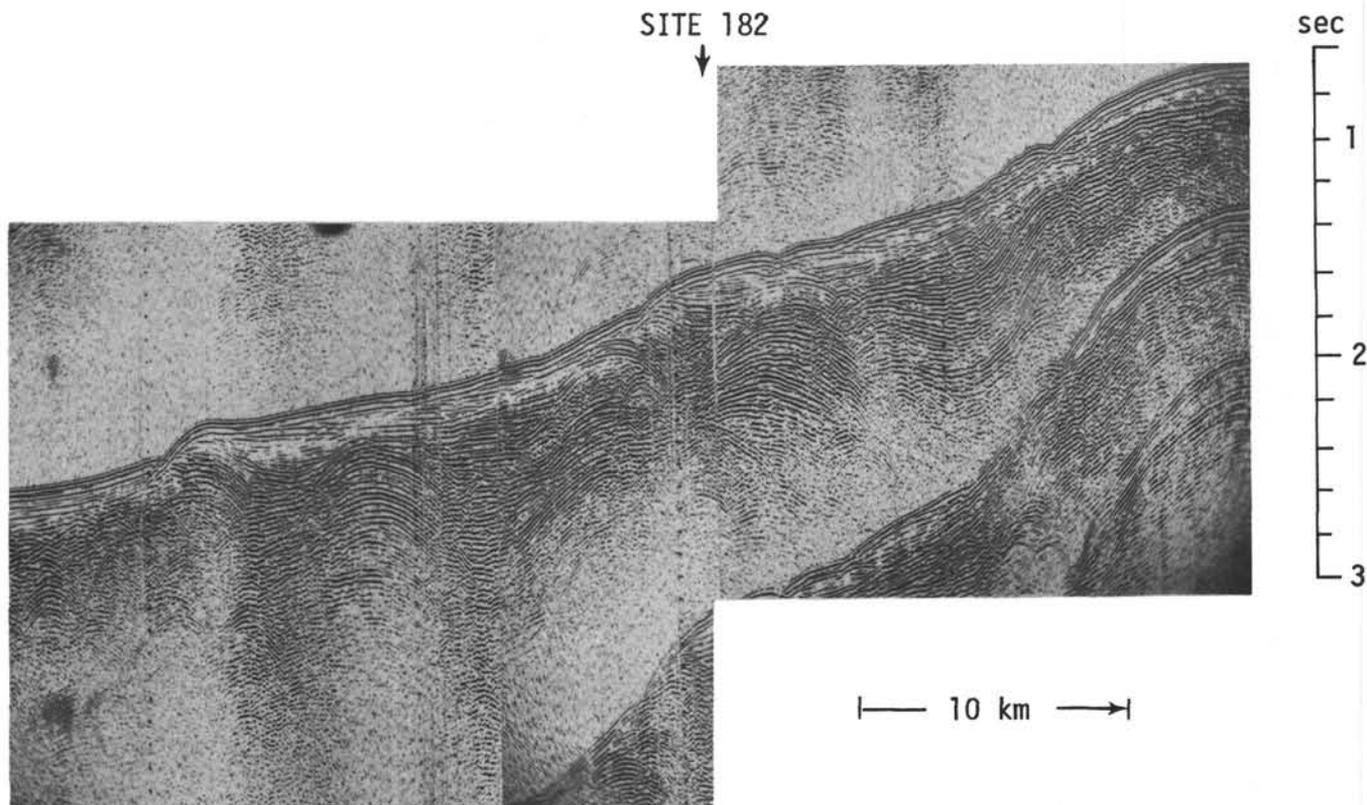


Figure 2. Seismic record across the upper continental slope off Kodiak.



featureless area, and seismic reflection records show at least 0.6 seconds of gently folded sediment.

An attempt was made to obtain a biostratigraphic section above the calcium carbonate compensation depth for this high-latitude region. After two days of slow drilling *Glomar Challenger* was unable to hold position in bad weather and the site was abandoned.

A rough stratigraphic column was constructed from the small amount (11.5 meters) of core recovered from the 195-meter interval penetrated. All sediments were poorly sorted clayey silts with some sand and pebbles (glacial erratics), except for one core catcher containing a well-sorted fine sand. Detailed correlation with seismic reflection records suggest that the pebbly muds make up the upper 95 meters of the section whereas extensive sands are present below. Based upon poor to well-preserved microfossils, the oldest sediment encountered is from 0.92 to 1.3 m.y. old. Displaced shelf-edge and upper bathyal benthonic foraminifers are found throughout the section as well as in situ middle bathyal species. Pliocene planktonic and benthonic specimens reworked from exposures on the adjacent shelf were found near the bottom of Hole 182.

The tectonic significance of findings at this site include the possible age of acoustic basement (Pliocene-late Miocene) and the vigorous erosion of a shelf break arch in early Pleistocene time.

#### REFERENCE

Hays, J. D., 1970. Stratigraphy and evolutionary trends of Radiolaria in North Pacific deep sea sediments. *In* Geological Investigations of the North Pacific. J. D. Hays (Ed.). Geol. Soc. Am. Mem. 126. 186.

#### APPENDIX A. OPERATIONS

##### Pre-drilling Survey

A brief pre-drilling site survey was made at Site 182 to locate a well-defined sedimentary section on the seismic reflection records. This site lies on the continental slope in 1411 meters of water. It was approached along course 340° T at a speed of 10 knots (Figure 3). The seismic recorder was set at a 4-second sweep and fire rate. At 1836 hours, the speed was reduced to 6 knots. A suitable site was located on the first pass over the area and a course change was made to 160° T from 1850 to 1900. At 1920, the course was changed to 070°, then at 1930 to 340°. Speed was reduced to 4 knots at 1943 and the beacon was dropped.

##### Drilling Program

The vessel was offset 183 meters north and 61 meters east of the beacon. A water depth of 1419 meters was calculated for Site 182 using the Matthews tables (Area 44) and adding one-half of the "Hawaii factor" (i.e.,  $1406 + 7 + 6 = 1419$  meters). The length of drill pipe to bottom was 1411 meters.

Hard beds were encountered on the surface, but the drill broke through after a few minutes of drilling. This site was drilled and cored to a total depth of 123 meters below the sea floor. Sand occurred in Core 4 and only a core catcher

sample was recovered. Eight meters of sand caving took place after this core was pulled from the hole.

The drill pipe was pulled out of the hole at 1830 hours, 16 July, when it was decided that the Reed bit was worn out because of the drilling in sand deposits (see following section for details).

Six cores were taken in a 123-meter interval, yielding a poor 21.3 per cent recovery rate for the hole.

On Hole 182A, the vessel was offset 213 meters to the west of the beacon. The drill pipe was lowered to the sea floor the morning of 17 July, after the bit was changed and the electrical problems with the stern thruster were solved. Large excursions of up to 91 meters were experienced when the pipe was pulled out of Hole 182.

Weather conditions became marginal at Hole 182A on 17 July. On the morning of 18 July, the sea conditions were unfavorable for continued drilling and the drill string was pulled to the surface. A large excursion of 61 meters occurred during the preceding evening and sand began to cave into the hole, which influenced the final decision to abandon the hole. *Challenger* proceeded to Kodiak on 18 July, 36 hours early, because of the inclement weather and a forecast for worse conditions, and the lack of time to drill again to the Pliocene beds before the end of the scheduled cruise period at 0600 hours, 20 July. Hole 182A was drilled to a depth of 195 meters below the sea floor. One core was taken from Hole 182A and only a core catcher sample was obtained. This sample was not included as recovered core. See Table 1 for the coring summary.

##### Drilling Specifications

Hole 182 is located in 1411 meters of water. This hole was cored and drilled to a total depth of 1544 meters for a subbottom penetration of 123 meters. Of this depth, 69 meters was drilled, 54 meters cored, and 11.5 meters recovered for a 21.2 percent recovery. Total time on site was 26.75 hours; of this time 5.50 hours were spent drilling, 10.50 hours coring, and 10.75 hours tripping drill pipe.

The only change in the bottom hole assembly was a 9-7/8-inch Reed mill tooth core bit, which was used here for the first time on Leg 18. The 3 and 4 cone button bits had not been very successful in penetrating the gray clay in

TABLE 1  
DSDP Site 182 Coring Summary

Core	Cored Interval Below		Cored (%)	Recovered	
	Derrick Floor (m)	Bottom (m)		(m)	(%)
182-1	1421.0-1430.5	0-9.5	9.5	8.5	89.5
2	1471.0-1480.5	50.0-59.5	9.5	CC	-
3	1480.5-1490.0	59.5-69.0	9.5	2.5	26.3
4	1518.5-1528.0	97.5-107.0	9.5	CC	-
5	1528.0-1537.5	107.0-116.5	9.5	CC	-
6	1537.5-1544.0	116.5-123.0	6.5	0.5	7.7
	Total		54.0	11.5	21.3
182A-1	1603.0-1610.5	159.0-166.5	7.5	CC	-

the Gulf of Alaska so it was thought that the mill tooth bit would cut a smoother, less disturbed core.

Firm clay at the mud line necessitated rotation of the drill pipe to core the first 9 meters. Sticky gray clay and fine sand was encountered to total depth. Occasionally, ice-rafted erratics would lodge in the core catchers. This would result in no core recovery.

Because of poor core recovery, the expectant short bearing life of the bit, and caving of the hole, it was necessary to trip the drill pipe and change bits. The hole was filled with mud. Before the bottom-hole assembly was clear of the mud line, *Challenger* moved 300 feet off location, this excursion was caused by a faulty relay in one of the stern thrusters. The excursion caused no damage to the drill string.

By the time the drill string was completely out of the hole, the wind was blowing 25 to 30 miles per hour and gale warnings were out for our area. It was decided to suspend drilling operations until the thruster could be repaired and weather conditions improved.

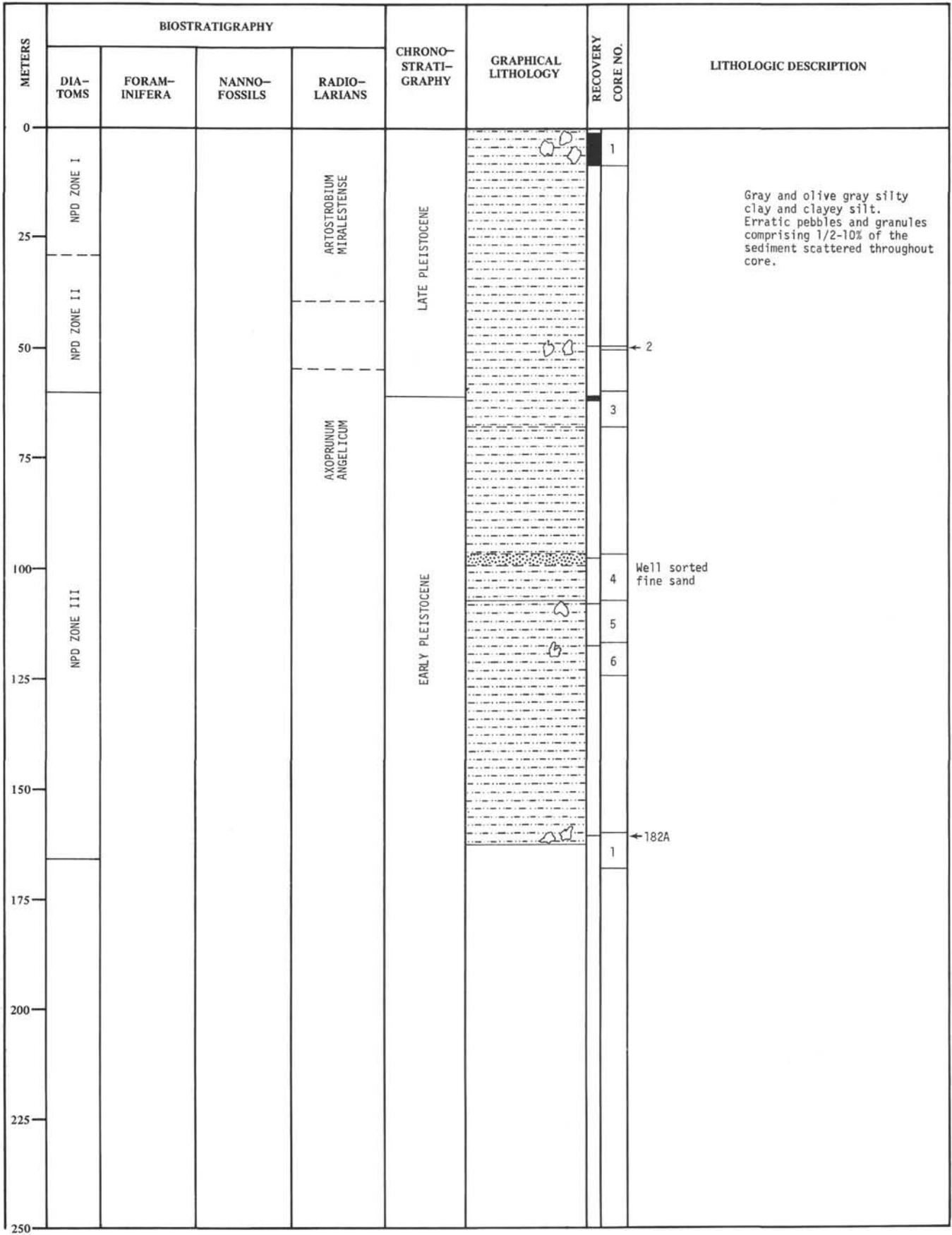
Hole 182A was a 1660-foot offset west of Hole 182. Water depth was 1444 meters. This hole was cored and drilled to 1639 meters. Of this depth, 187.5 meters were drilled and 7.5 meters cored with only a trace recovered.

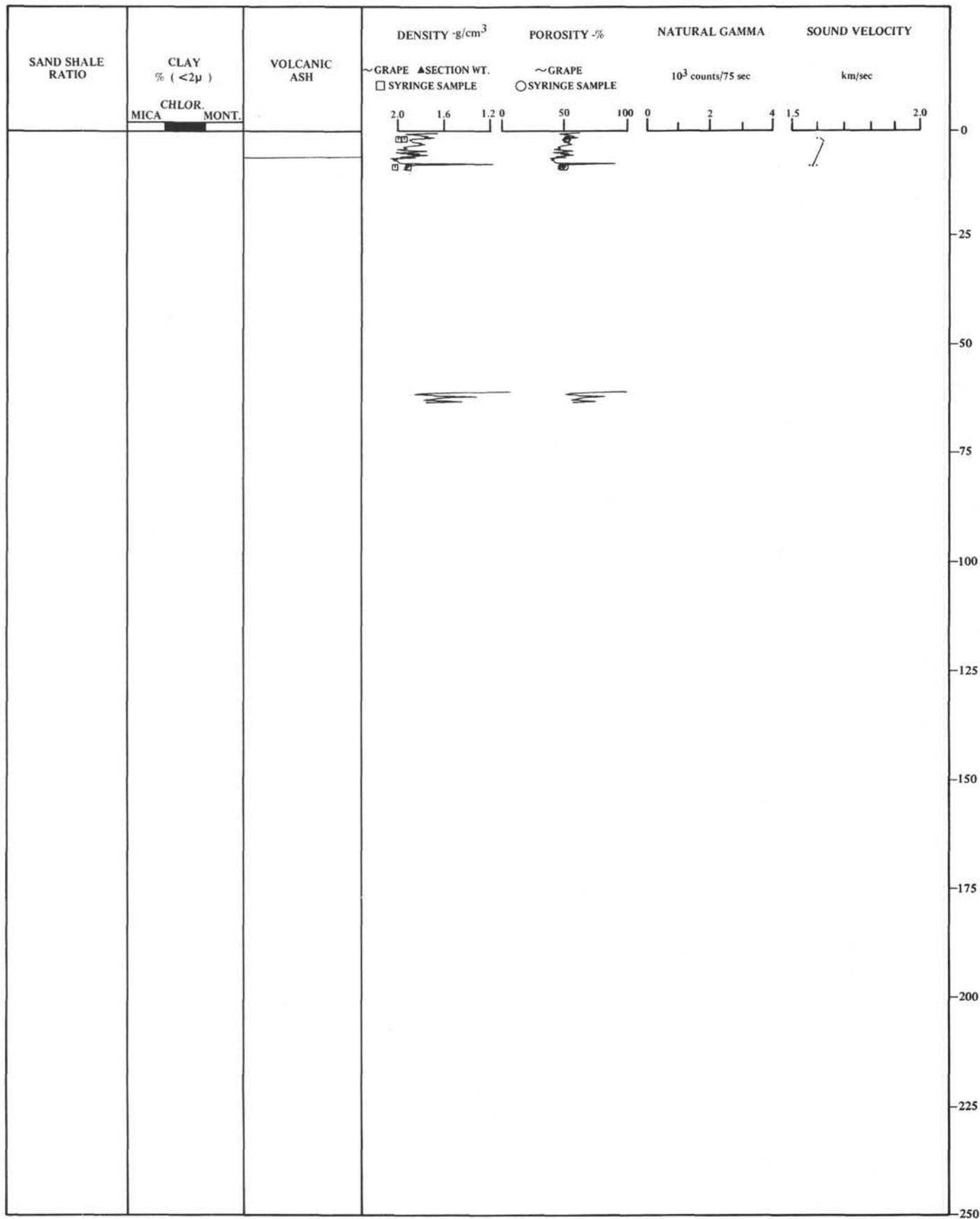
The bottom-hole assembly was the same as used on Hole 182 with a Smith 3 cone button bit.

After waiting for favorable weather for 8 hours, the drill pipe was run. The section was drilled from the mud line (1444 meters) to 1603, then 25 barrels of mud was circulated to clean the hole. Core was taken from 1603 to 1610.5 meters with only a trace for recovery. Drilling took place from 1610.5 to 1639, but during the makeup of a connection, 4 or 5 meters of sand filled the hole. The sands and glacial erratics were falling in on the bit and causing serious hole problems. The bit plugged once which necessitated pulling three stands of pipe before unplugging the bit.

The hole was filled with mud and the drill pipe was pulled out of the hole. *Challenger* was using maximum thrust for positioning because of wind and swift currents.







Site 182		Hole		Core 1		Cored Interval: 0-9.5 m			
AGE	ZONE	FOSSIL CHARACTER			SECTION METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		FORAM*	NANNO	RAD					
LATE PLEISTOCENE N22/23 Artostrobium mralesense North Pacific Diatom Zone I	C/G				B	VOID			Gray SILTY CLAY and CLAYEY SILT
						0.5			
	A/M	B				2	Scattered pebbles and granules, generally <1%, but 2% in section 3, 5% in section 4. (Only pebbles >2.5 cm indicated in lithology column).		Especially in lower part of core, <2% 4-8 mm medium sand mottles
							1.0		
	A/M	B				3	2 cm thick bed of ash-bearing sand-silt-clay		
							1.0		
	A/M	B				4			
							1.0		
	A/G	B				5			
							1.0		
	A/G	B				6			
							1.0		
							Core Catcher		

Explanatory notes in chapter 1  
\*PLANKTONIC FORAMINIFERA

Site 182		Hole		Core 2		Cored Interval: 50.0-50.9 m			
AGE	ZONE	FOSSIL CHARACTER			SECTION METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		FORAM	NANNO	RAD					
E. PLEIST.	N22/23 NPD II	R/G	C/G			Core Catcher			Trace of SILTY CLAY, with two erratic pebbles

Site 182		Hole		Core 3		Cored Interval: 59.5-69.0 m				
AGE	ZONE	FOSSIL CHARACTER			SECTION METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	
		FORAM	NANNO	RAD						DIATOM
E. PLEIST.	LATE PLEIST. N22/23 Stylatractus universus NPD III North Pacific Diatom Zone II	C/G	A/M			VOID			Olive gray SILTY CLAY and CLAYEY SILT	
						0.5				
		C/G	A/M				1	VOID		Mainly olive gray 5Y3/2.
								1.0		
		C/G	A/M				2	VOID		Rare scattered granules and pebbles (<1/2 %), commoner in lower part of core.
								1.0		
		C/G	A/M				2	Mainly med. gy. N4. Some 2-3 cm olive gy. 5Y3/2 beds.		Some small mottles or disturbed 5 mm beds of poorly sorted fine sand.
								1.0		
								Core Catcher		

Site 182		Hole		Core 4		Cored Interval: 97.5-107.0 m			
AGE	ZONE	FOSSIL CHARACTER			SECTION METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		FORAM	NANNO	RAD					
E. PLEIST.	N22/23 NPD III	F/M	R/G	R/M	R/P	Core Catcher			Well sorted FINE SAND

Explanatory notes in chapter 1

Site 182 Hole Core 5 Cored Interval: 107.0-116.5 m

AGE	ZONE	FOSSIL CHARACTER				SECTION METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		FORAM	NANNO	RAD	DIATOM					
PLEIST.	NZ2/Z3 NPD III	R/G	R/P	B	0	Core Catcher				SILTY CLAY and CLAYEY SILT Some erratic granules and pebbles

Site 182 Hole Core 6 Cored Interval: 116.5-123.0 m

AGE	ZONE	FOSSIL CHARACTER				SECTION METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		FORAM	NANNO	RAD	DIATOM					
PLEIST.	NZ2/Z3 NPD III	F/G	R/G	R/M	R/M	Core Catcher				Gray CLAYEY SILT with 10% erratic granules and pebbles

Site 182 Hole A Core 1 Cored Interval: 159.0-166.5 m

AGE	ZONE	FOSSIL CHARACTER				SECTION METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		FORAM	NANNO	RAD	DIATOM					
PLEIST.	NZ2/Z3 NPD III	R/G	R/G	R/M	R/P	Core Catcher				Trace of gray CLAYEY SILT with several erratic pebbles

Explanatory notes in chapter 1

