4. SITE 621[1]

Shipboard Scientific Party[2]

HOLE 621

Date occupied: 26 October 1983, 2316 LCT

Date departed: 29 October 1983, 0115 LCT

Time on hole: 2 days

Position: 26°43.86′N, 88°29.76′W

Water depth (sea level; corrected m, echo-sounding): 2481

Water depth (rig floor; corrected m, echo-sounding): 2491

Bottom felt (m, drill pipe): 2485

Penetration (m): 214.8

Number of cores: 33

Total length of cored section (m): 157.3

Total core recovered (m): 136.83

Core recovery (%): 87

Oldest sediment cored:
Depth sub-bottom (m): 214.8
Nature: Gravel
Age: Pleistocene (Ericson Zone Y)
Measured velocity (km/s): N/A

Basement: N/A

BACKGROUND AND OBJECTIVES

GLORIA side-scan sonar studies, conducted during February 1982, were the first observations that showed the presence of a sinuous channel at the apex of the middle fan area of the youngest fan lobe (Garrison et al., 1982). More detailed observations in this area were made during the precruise survey in December 1982 by *Conrad*. Racal-Decca, in conjunction with Louisiana State University's Coastal Studies Institute, ran a deep-towed EDO side-scan sonar high-resolution profiler over this area.

All observations unveiled a number of facts and led to several hypotheses. The sinuous channel in this area is the continuation of the large channel on the upper fan. However, on the upper fan it is only slightly sinuous and lacks major lateral overbank deposits. The change occurs at or near the base of the slope, where the gradient of the seafloor suddenly decreases. The width of the channel near Site 621 is about 3 km and its morphological depth is about 40 m. It is flanked by well-developed levees. The Sea MARC I side-scan sonar data taken during the *Conrad* cruise show indistinct channel-parallel lineations inside the channel and several features outside the channel that can best be interpreted as ridge and swale features. The EDO side-scan sonar, with its much higher resolution but narrower coverage in width, shows transverse bed forms on the channel bottom.

In the upper part of the channel fill, one notices on 3.5- and 4.5-kHz records reflectors that start at the inner side of the levees and dip toward the center of the channel. Penetration on those records is insufficient to follow those reflectors into the central part of the channel. Deeper-penetration seismic reflection profiles lack that type of high acoustical resolution; however, they vaguely show an asymmetric channel fill underlain by a slightly dipping set of high-amplitude reflectors. These reflectors dip away from under the present thalweg across the inner meander bend.

Several hypotheses were developed, ranging from a fluvial migratory channel concept to a debris flow interpretation to a semiconduit type channel transporting turbidity currents. Each of the hypotheses was able to explain most of the observed features but data were lacking to distinguish between them.

We drilled at Site 621 to satisfy the following objectives:

1. To obtain sedimentological, paleontological, geochemical, and geotechnical properties of the sediments that comprise a middle fan area channel fill,

2. To obtain a set of well logs to characterize this type of channel fill,

3. To obtain good paleontological dates to establish the age of the channel fill and depositional rates,

4. To identify the environments of the sediments in the source area,

[1] Bouma, A. H., Coleman, J. M., Meyer, A. W., et al., *Init. Repts. DSDP*, 96: Washington (U.S. Govt. Printing Office).

[2] Addresses: Arnold H. Bouma (Co-Chief Scientist), Gulf Research and Development Company, P.O. Box 37048, Houston, TX 77236, (present address: Chevron Oil Field Research Company, P.O. Box 36506, Houston, TX 77236); James M. Coleman (Co-Chief Scientist), Coastal Studies Institute, Louisiana State University, Baton Rouge, LA 70803; Audrey W. Meyer (Shipboard Science Representative), Deep Sea Drilling Project, Scripps Institution of Oceanography, La Jolla, CA 92093, (present address: Ocean Drilling Program, 500 University Drive West, Texas A&M University, College Station, TX 77843); James Brooks, Department of Oceanography, Texas A&M University, College Station, TX 77843; William R. Bryant, Department of Oceanography, Texas A&M University, College Station, TX 77843; Richard Constans, Paleontology Section, Chevron U.S.A. Inc., 935 Gravier Street, New Orleans, LA 70112; Michel Cremer, Département de Géologie et Océanographie, Université de Bordeaux I, Avenue des Facultés, 33405 Talence Cedex, France; Laurence I. Droz, Laboratoire de Géodynamique Sous-Marine, 06230 Villefranche-sur-Mer, France; Toshio Ishizuka, Ocean Research Institute, University of Tokyo, Tokyo 164, Japan; Mahlon C. Kennicutt II, Department of Oceanography, Texas A&M University, College Station, TX 77843; Barry Kohl, Chevron U.S.A. Inc., 935 Gravier Street, New Orleans, LA 70112; William R. Normark, Pacific Branch of Marine Geology, U.S. Geological Survey (MS-999), 345 Middlefield Road, Menlo Park, CA 94025; Suzanne O'Connell, Lamont-Doherty Geological Observatory of Columbia University, Palisades, NY 10964, (present address: Ocean Drilling Program, 500 University Drive West, Texas A&M University, College Station, TX 77843); Mary Parker, Department of Geology, Florida State University, Tallahassee, FL 32306, (present address: AMOCO Production Company, P.O. Box 50879, New Orleans, LA 70150); Kevin T. Pickering, Department of Earth Sciences, University of London, Goldsmith's College, London SE14 6NW, United Kingdom, (present address: Department of Geology, University of Leicester, Leicester LE1 7RH, United Kingdom); Claudia Schroeder, Department of Geology, Dalhousie University, Halifax, Nova Scotia B3H 3J5, Canada; Charles E. Stelting, Gulf Research and Development Company, P.O. Box 37048, Houston, TX 77236, (present address: Chevron Oil Field Research Company, P.O. Box 36506, Houston, TX 77236); Dorrik A. V. Stow, University of Edinburgh, Edinburgh EH9 3JW, Scotland, United Kingdom, (present address: Geology Department, University of Nottingham, Nottingham NG7 2RD, United Kingdom); William E. Sweet, Mineral Management Service, P.O. Box 7944, Metairie, LA 77010; Andreas Wetzel, Geologisches Palaeontologisches Institut der Universität, Sigwartstrasse 10, D7400 Tübingen, Federal Republic of Germany; and Jean K. Whelan, Chemistry Department, Woods Hole Oceanographic Institution, Woods Hole, MA 02543.

5. To test if the channel was migratory in nature,
6. To integrate this data with the observations made at Sites 622, 617, and 620, and
7. To identify the characteristics of the different acoustical reflectors with a special emphasis on the deeper high-amplitude ones.

OPERATIONS

Site 621 was located at the positioning beacon that had been emplaced on 17 October, concurrent with the Site 617 beacon. Two passes over the site coordinates were required to lock onto the acoustic signal. The beacon signal strength was found to be only about 10% of normal, but the pulse characteristics were satisfactory for positioning.

The hole was spudded at 2316 hr., 26 October, with a piston core that stroked to 2488.5 m. Core recovery was 3.5 m, making the water depth 2485.0 m (Table 1). Variable length hydraulic piston coring (VLHPC) operations continued in clay and mud, which became sandy below 135 m sub-bottom. The amount of sand increased with depth, with loose sand strata beginning around 200 m. Zones of coarse gravel were also cored and recovered with the sand. At that depth, hole trouble began almost immediately with torque and bottom fill. As there was little chance of reaching the projected 250-m target, coring was terminated to obtain well logs before serious hole difficulties could begin.

Table 1. Site 621 coring summary.

Core[a]	Date (Oct. 1983)	Time	Depth from drill floor (m)	Depth below seafloor (m)	Length cored (m)	Length recovered (m)	Amount recovered (m)
1H	26	2334	2485.0–2488.5	0.0–3.5	3.5	3.45	99
2H	27	0026	2488.5–2498.1	3.5–13.1	9.6	8.28	86
3H	27	0113	2498.1–2507.7	13.1–22.7	9.6	8.85	92
4H	27	0203	2507.7–2517.3	22.7–32.3	9.6	7.44	78
5H	27	0254	2517.3–2526.9	32.3–41.9	9.6	7.70	80
6H	27	0343	2526.9–2531.2	41.9–46.2	4.3	3.81	89
7H	27	0435	2531.2–2540.7	46.2–55.7	9.5	7.73	81
8H	27	0523	2540.7–2545.2	55.7–60.2	4.5	4.48	99
9H	27	0628	2545.2–2550.2	60.2–65.2	5.0	4.90	98
10H	27	0720	2550.2–2555.4	65.2–70.4	5.2	4.71	91
11H	27	0812	2555.4–2562.8	70.4–78.8	7.4	7.34	99
12H	27	0852	2562.8–2566.4	78.8–81.4	3.6	3.58	99
13H	27	1041	2566.4–2571.7	81.4–86.7	5.3	5.15	97
14H	27	1215	2571.7–2579.2	86.7–94.2	7.5	7.01	93
15H	27	1315	2579.2–2584.7	94.2–99.7	5.5	4.52	82
16H	27	1415	2584.7–2589.7	99.7–104.7	5.0	4.95	99
17H	27	1515	2589.7–2599.2	104.7–114.2	9.5	2.71	29
18H	27	1615	2599.2–2602.2	114.2–117.2	3.0	2.03	68
Wash	27		2602.2–2608.7	117.2–123.7	—	—	—
19H	27	1710	2608.7–2612.7	123.7–127.7	4.0	3.25	81
20H	27	1805	2612.7–2615.9	127.7–130.9	3.2	3.20	100
21H	27	1900	2615.9–2618.7	130.9–133.7	2.8	2.75	98
22H	27	2000	2618.7–2622.5	133.7–137.5	3.8	3.66	96
23H	27	2100	2622.5–2625.0	137.5–140.0	2.5	2.49	99
Wash	27		2625.0–2632.1	140.0–147.1	—	—	—
24H	27	2210	2632.1–2634.6	147.1–149.6	2.5	2.51	100
Wash	27		2634.6–2641.7	149.6–156.7	—	—	—
25H	27	2315	2641.7–2644.7	156.7–159.7	3.0	2.90	97
Wash	27		2644.7–2651.3	159.7–166.3	—	—	—
26H	28	0025	2651.3–2654.3	166.3–169.3	3.0	3.02	100
Wash	28		2654.3–2660.9	169.3–175.9	—	—	—
27H	28	0124	2660.9–2663.0	175.9–178.0	2.1	2.08	99
Wash	28		2663.0–2670.5	178.0–185.5	—	—	—
28H	28	0225	2670.5–2672.0	185.5–187.0	1.5	1.45	97
Wash	28		2672.0–2680.1	187.0–195.1	—	—	—
29H	28	0416	2680.1–2684.2	195.1–199.2	4.1	4.05	99
30H	28	0515	2684.2–2685.2	199.2–200.2	1.0	0.55	55
31H	28	0608	2685.2–2686.3	200.2–201.3	1.1	1.09	99
32H	28	0700	2686.3–2688.3	201.3–203.3	2.0	1.99	99
Wash	28		2688.3–2696.3	203.3–211.3	—	—	—
33H	28	0900	2696.3–2699.8	211.3–214.8	3.5	3.20	91
					157.3	136.83	87

[a] H following core number indicates hydraulic piston core.

The first logging run was with the long-spaced sonic/caliper/gamma-ray tool. The induction sonde normally run in this tool configuration was omitted in favor of the gamma-ray module at the bottom of the tool string. As usual, bridges and ledges in the washed-out hole impeded the logging tool's progress, but it was eventually worked down to just a few meters short of total depth. A good quality log was recorded and the cable was recovered to change logging sondes. The second run was made with the formation density/compensated neutron log/gamma ray (FDC/CNL/GR) tool. This time more trouble was encountered in getting down the hole. It was necessary to "spud" the tool to break through a bridge, and the cable was damaged at the cable head. The damaged conductors eliminated the neutron and gamma-ray curves completely. The formation density trace was later found to be out of calibration and useless.

The logging equipment was then rigged down and the pipe was pulled. *Glomar Challenger* departed the site for a short move to Site 622 at 0115 hr., 29 October.

SEISMIC STRATIGRAPHY AND ACOUSTIC FACIES

Site 621 is located in the most recent Mississippi Fan channel, in the thalweg of a channel bend. The channel is about 3 km wide and its floor is 15 to 35 m below the adjacent levee crests.

The channel bend was initially identified on GLORIA side-scan records (Garrison et al., 1982) and selected as a potential drill target. This area of the channel was studied in further detail as part of the December 1982 site survey (Kastens and Shor, 1985). The survey was conducted with a deep-towed instrument package, Sea MARC I side-scan sonar and 4.5-kHz acoustic profiler, a hull-mounted 3.5-kHz high-resolution profiler, and a single-channel seismic reflection profiling system with an 80-cm^3 water gun acoustic source. Additional seismic lines were collected by the *Kane* (1969), the U.S. Geological Survey (1981), and the University of Texas Geophysical Institute (1974). An additional deep-towed (side-scan sonar and 3.5-kHz sub-bottom profiler) line was collected during the summer of 1982 with an EDO system.

During the site survey, 25 parallel lines were run in a northeast–southwest direction with a line spacing of about 500 m. Four northwest–southeast cross lines were also run. Ship and Sea MARC I tracks are shown in Figure 1.

Seismic Stratigraphy

Three distinct reflectors that separate four seismic units have been identified within the channel fill at Site 621 (Fig. 2; Table 2). No distinct lithologic change can be seen near the depth of Reflector A (see Lithostratigraphy section, this chapter). Reflector B at 135 m sub-bottom depth appears to correspond to both a gradual increase in the number and the thickness of silt laminae

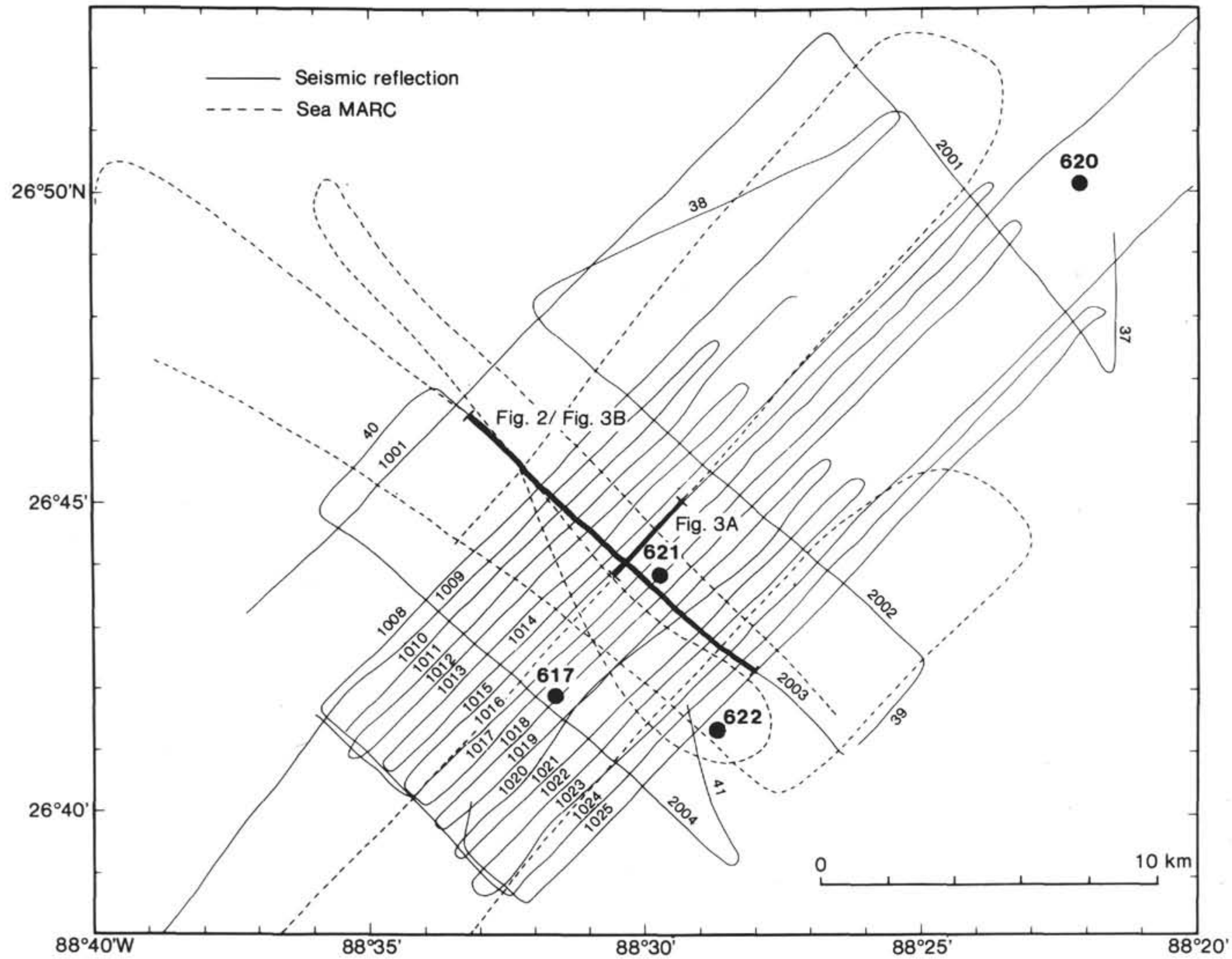

Figure 1. Map showing site survey tracklines from *Conrad* cruise with locations of midfan sites. Locations of Figures 2 and 3 are indicated with heavy lines.

and beds. The strongest reflector (C) at 185 m sub-bottom probably corresponds to an increase in sand as observed in Core 621-28.

The upper two seismic units (1 and 2) consist of clays and muds and silty muds. Seismic Unit 3 is generally coarser, with interbedded silt and sand. The high-amplitude reflectors of Seismic Unit 4 (below Reflector C) correspond to gravels and sands.

Acoustic Facies

The *Conrad* 3.5-kHz profiles and the deep-tow 4.5-kHz profiles (Fig. 3) show that the channel is filled with at least 40 m of acoustically transparent material. On some profiles, the western channel floor has a few areas of slightly hyperbolic echo returns. The exception to this uniform character of the reflectors is a single reflector that originates on the channel edges, roughly parallel to the channel surface but at a slightly steeper angle. The reflector dies out before reaching Site 621. If its position is extrapolated to the site, it would be located near 38 m sub-bottom. No lithologic change was encountered in the upper 50 m of the hole.

BIOSTRATIGRAPHY AND SEDIMENTATION RATES

Biostratigraphy

The section penetrated in Hole 621 is Quaternary, correlating with the planktonic foraminifer Zone N23 and the calcareous nannofossil Zone NN21. The interval includes the Holocene Epoch (Ericson Zone Z; Ericson and Wollin, 1968) and the late Wisconsin glacial (Ericson Zone Y) (Fig. 4). The warm interstadial of the Wisconsin glacial (Ericson Zone X or *Globorotalia flexuosa* Zone) was not encountered to a depth of 214.8 m (see Explanatory Notes, this volume).

Zone Y contains a mixed displaced fauna with common shallow neritic and rare upper bathyal benthic foraminifers. This interval includes predominantly reworked Cretaceous calcareous nannofossils and a poorly devel-

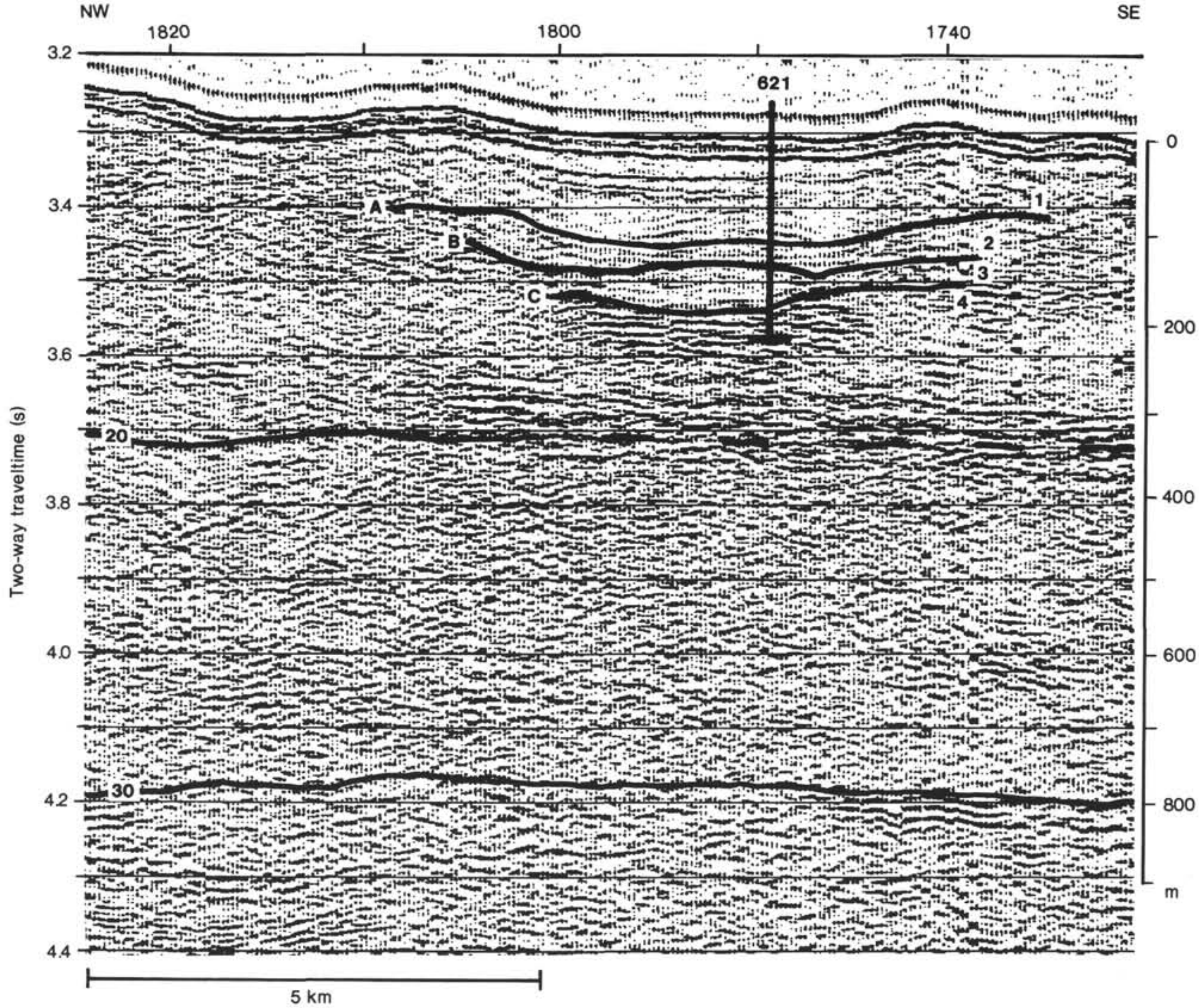

Figure 2. Water-gun reflection profile (*Conrad*, Line 2003) near Site 621 showing major channel-fill Reflectors A, B, and C that separate Seismic Units 1–4. Seismic Horizon "30" is visible on the record while seismic Horizon "20" was cut by the channel. (See Introduction and Principal Results chapter, this volume, for an explanation of seismic horizons.) Location of water gun profile shown in Figure 1.

Table 2. Reflectors and seismic units observed at Site 621.

Sub-bottom depth (m)	Sub-bottom depth (ms)	Reflector[a]	Seismic unit[a]
0–110	0–140		1
110	140	A	
110–135	140–171		2
135	171	B	
135–185	171–232		3
185	232	C	
>185	>232		4

[a] Reflectors and seismic units are shown on Figure 2.

oped planktonic foraminifer fauna containing rare Cretaceous foraminifers.

Foraminifers

Foraminifers from Site 621 are Quaternary, Zone N23 (Blow, 1969). A warm-water, high-diversity planktonic foraminiferal ooze occurs in the upper portion of Section 621-1-1. This Holocene (Ericson Zone Z) fauna contains abundant *Globorotalia menardii* and common *G. tumida*, along with the associated bathyal foraminifers *Cibicides wuellerstorfi* and *C. kullenbergi*.

The remainder of the hole is late Wisconsin glacial (Zone Y) and is composed of homogeneous muds with fine sand and silt laminae (Cores 621-1 through 621-32). The foraminiferal fauna is dominated by common shallow-water benthic ones such as *Ammonia breccarii, Hanzawaia concentrica, Elphidium* spp., *Florilus* spp., and miliolids. Planktonic foraminifers are rare, indicating a very high deposition rate for this interval.

The tests of many of the shallow-water benthic taxa are abraded, which suggests a high energy environment for the origin of the sediments. The occurrence of rare bathyal species, *Oridorsalis umbonatus, Bulimina aculeata*, and *Gyroidinoides soldanii*, indicates transport of mixed upper bathyal and neritic sediments into the abyssal environment.

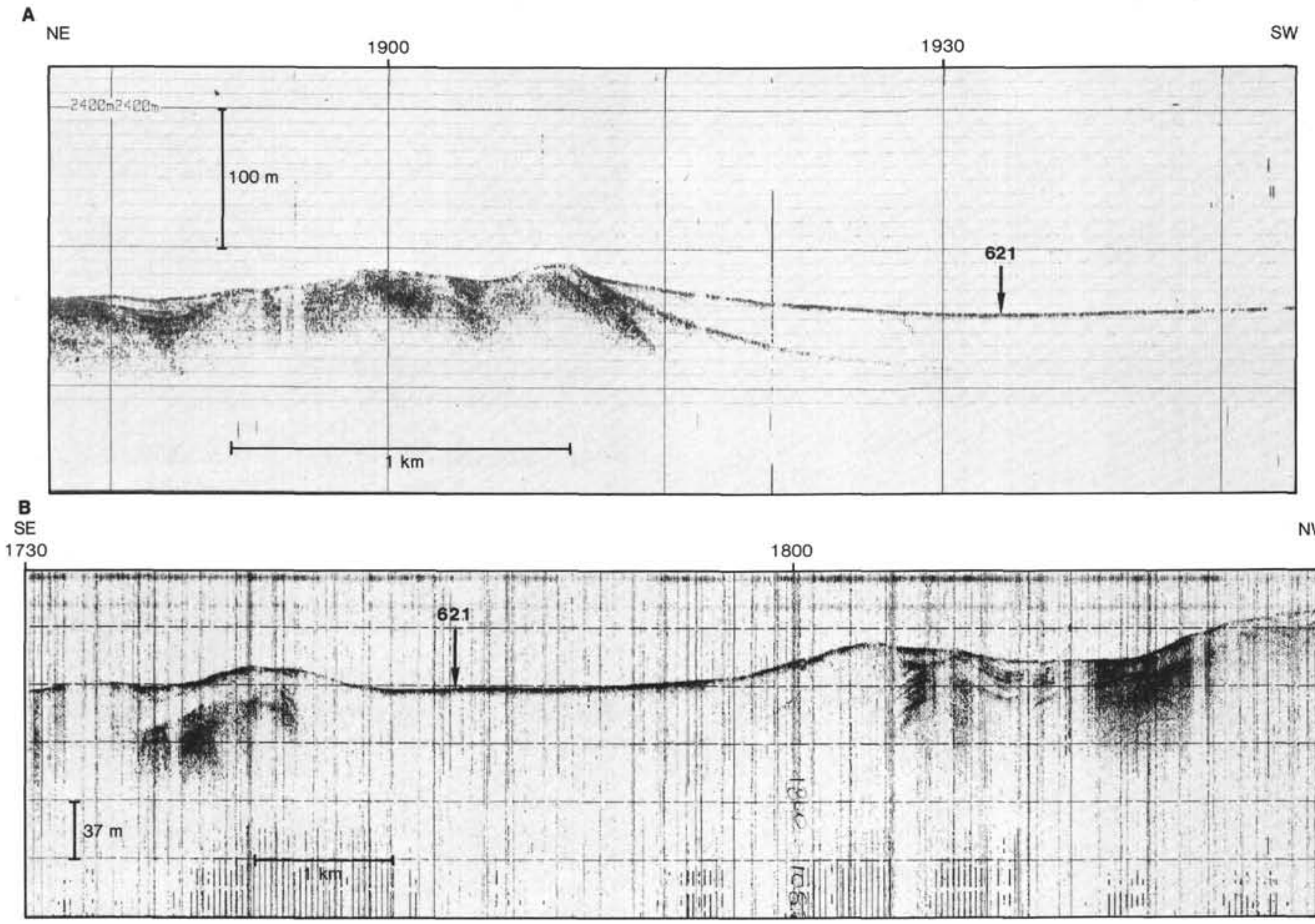

Figure 3. A. Sea MARC I, 4.5-kHz profile across the channel near Site 621. B. 3.5-kHz profile (*Conrad*, Line 2003) near Site 621. Both profiles show an acoustically transparent channel fill with a single reflector dipping inward from the channel levee. (See Figure 1 for location of profiles).

The diverse neritic benthic fauna is well developed in Core 621-2 through Sample 621-17,CC and decreases in abundance from Cores 621-18 to 621-32. Core 621-33 contains coarse sand and gravel with only rare reworked Cretaceous foraminifers.

The Wisconsin interstadial (Ericson Zone X) was not reached at the total depth of 214.8 m.

Calcareous Nannofossils

All cores recovered from this site are interpreted to be in the *Emiliania huxleyi* Zone (NN21) of Martini (1971). The marly foraminiferal ooze of Holocene age contains very abundant, well-preserved Quaternary calcareous nannofossils. Reworked Cretaceous nannofossils are either absent or very rare. Small coccoliths that are tentatively identified as *E. huxleyi* dominate this nannofossil assemblage. Below the ooze, the sediment contains few calcareous nannofossils and the assemblage is dominated by reworked Cretaceous species. Pleistocene species, when present, are rare to the total depth of this hole at 214.8 m.

Sedimentation Rates

The sedimentation rates are based on two datums. An age of 0.012 Ma is used for the Holocene/Pleistocene boundary (Z/Y zonal boundary) and 0.085 Ma for the Y/X zonal boundary (see Explanatory Notes, this volume).

A sedimentation rate of 12.5 cm/1000 yr. is calculated for the Holocene. This is a minimum rate assuming complete Holocene recovery (Fig. 5). By using a seismic projection to the top of the X Zone (781 m for seismic Horizon "30"; see introductory chapter, this volume), a projected minimum sedimentation rate of 1068 cm/1000 yr. is computed for the Y Zone. These calculations are based on nondecompacted sediment thicknesses.

LITHOSTRATIGRAPHY

The cores collected from Site 621 show a generally fining-upward sequence of sediments ranging from gravelliferous at the bottom to fine clay near the top. The coarser material may represent a lag deposit left behind during an active period of sediment transport, whereas the very fine material represents a more or less passive fill.

Core recovery at Site 621 was approximately 95%. Two lithologic units are recognized in the 214.8 m of section drilled (Fig. 4, Table 3).

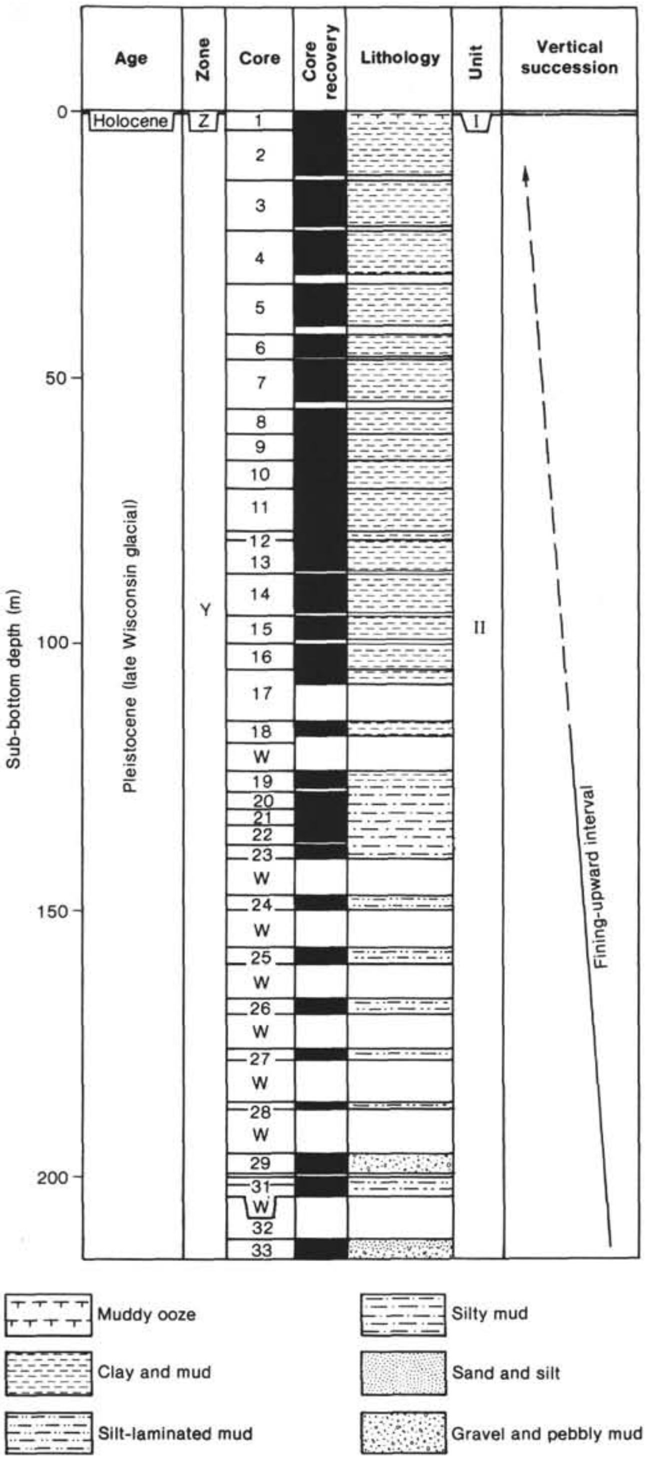

Figure 4. Lithostratigraphic summary for Site 621 showing age, core recovery, graphic lithology, and lithologic units and sequences. W = washed interval (see Table 1).

Lithologic Unit I: Muddy Ooze

A 25-cm-thick brown to dark brown muddy ooze occurs from 0 to 25 cm sub-bottom depth. Texturally, the ooze is composed of 30% sand, 20% silt, and 50% clay. Foraminifers form as much as 40% of the unit and comprise the entire sand fraction and part of the silt fraction. The rest of the silt fraction is angular-to-subangular quartz.

Lithologic Unit II: Muds, Silts, Sands, and Gravels

This unit forms about 99% of the drilled section at Site 621 and contains four facies: (1) clays and muds, (2) silt-laminated muds, (3) sands and silts, and (4) gravels.

Clay and Mud Facies

This facies consists of dark gray, nearly structureless muds with rare, very thin silt laminae. Despite some gas disruption, microscopic evaluation indicates that this facies is laminated on a millimeter scale. Locally, individual horizontal brown, red brown, and olive green–gray color banding is developed, with individual bands up to a few centimeters thick.

This facies appears to be poorly sorted, with silt content typically from 30 to 50% and clay content from 50 to 70%. Quartz, mica, and carbonate are the main silt-sized components. Displaced, diverse, neritic benthic foraminifers predominate over planktonic foraminifers.

Silt-Laminated Mud Facies

This facies consists of mud with abundant silt laminae and silt beds up to 5 cm thick. Some horizons of silt lenses are present. This facies accounts for approximately 90% of the section between 147 and 187 m sub-bottom and constitutes the entire section from 199 to 203 m sub-bottom. The silt laminae are normally graded. Parallel and low-angle cross-lamination is commonly visible above a scoured and loaded base. Individual silt laminae within beds are generally less than 1 mm thick.

The silt-laminated muds contain 2–10% very fine-grained sand, 45–88% silt, and as much as 65% clay. Quartz is the main constituent, and lignite is common (1–3%) in the sand fraction in clasts up to 0.5 cm in diameter. Microfauna are considerably less abundant than in the clays and muds, and displaced neritic shelf faunas seem to predominate over planktonic faunas.

Sand and Silt Facies

Sands and silts account for approximately 50% from 166 to 175 m sub-bottom (Section 621-26-1), 60% between 175 and 187 m sub-bottom (Section 621-27-1 through Sample 621-28,CC), and 80% from 211 to 214 m sub-bottom (Sections 621-33-1 through 621-33-2). Medium to fine-grained sands and silts occur in units up to 60 cm thick and appear structureless.

The non-clay part of the sediment consists of 95% sand-sized quartz and about 5% silt. The grains generally are rounded to subrounded.

Gravel and Pebbly Mud Facies

Gravel-sized clasts occur in a unit at least 4 m thick of pebbly mud (Sections 621-29-1 through 621-29-3), and about 60 cm of pebbles and granules were retrieved from below 214 m sub-bottom (Section 621-33-2). Cores 29 through 33 correspond to the upper part of the acoustic-

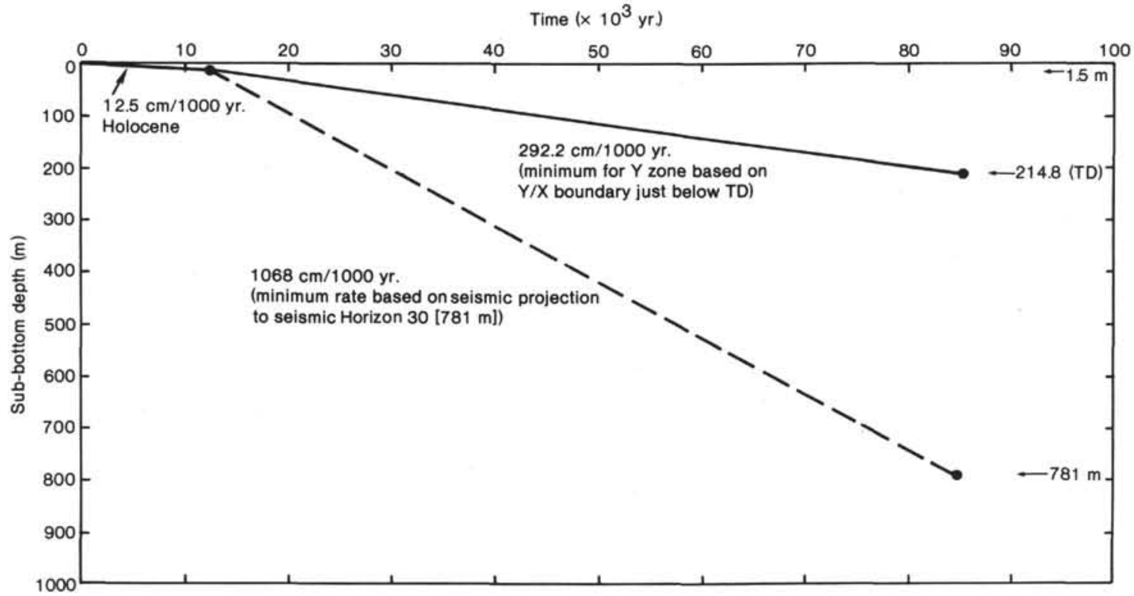

Figure 5. Site 621 sedimentation rates.

Table 3. Site 621 lithologic units.

Lithologic unit	Sediment	Cored interval	Sub-bottom depth (m)
I	Muddy ooze	621-1-1, 0-25 cm	0-0.25
II	Muds, silts, sands, and gravels	621-1-1, 25 cm-621-33,CC	0.25-214.8

al high-amplitude zone and it may be assumed that this entire zone is high in sand and pebble content.

The pebbly mud (Core 621-29) is very poorly sorted with clasts up to 3.4 cm in dimension (Fig. 6A). The pebble and granule fraction makes up from 5 to 20% of the sediment. The clasts are matrix-supported in a mud consisting of 45% silt and 55% clay.

The underlying pebbly zone (Core 621-33) contains little or no sand, which may have been washed out during core retrieval. The pebbles and granules range in size from about 2 mm to 2.5 cm (Fig. 6B, C). Clasts are rounded to subrounded, and show an abrupt grading over a few centimeters into the overlying silt and sand facies. Clast composition is approximately 45% brown chert, 25% black chert, 15% monocrystalline quartz, 5% mudstone, 3% jasper, 2% shell fragments, and 5% miscellaneous minor components.

Vertical Succession

From the lithologic and wireline logging one generally fining-upward interval is observed (Fig. 4). The fining-upward sequence contains the following main facies distribution from the bottom to the top: (1) gravel and pebbly mud facies (214.8-206 m sub-bottom); (2) sand and silt facies, silty mud facies, silt-laminated mud facies, and some gravel and pebbly mud facies (206-155 m sub-bottom), and (3) clay and mud facies, silty mud and silt-laminated mud facies (156 m-25 cm sub-bottom).

GEOCHEMISTRY

Organic Geochemistry

The scientific goals of the organic geochemistry program for Deep Sea Drilling Project (DSDP) Leg 96 are multifaceted. The areas of investigation addressed in the second part of this volume include: (1) the geochemistry and distribution of gaseous (C_1/C_7), liquid (C_5/C_{30}), and higher molecular weight organic compounds in marine sediments, (2) the effect of glacial events on sedimentary organic geochemistry, (3) the early diagenesis of organic matter in marine sediments in general; (4) the study of standard organic geochemical parameters in deep-sea fans and intraslope basin sediments (with particular reference to the type and amount of organic matter, its maturity, and its petroleum-generating potential), (5) a comparative study of the sedimentary organic geochemistry of an anoxic basin (Orca) versus that of an oxic basin (Pigmy) in the intraslope region, (6) the detection of microbial activity in recent marine sediments; and (7) the chemistry of pore water in relation to the surrounding mineral matrix and early cementation and diagenesis of sediments.

The analytical nature of the geochemistry program, the complexity of the sampling, and time and personnel constraints dictated primarily shore-based analytical effort. As such, only obvious gas shows (collected in vacutainers and analyzed by standard DSDP methods; see Explanatory Notes, this volume) were analyzed on board the *Glomar Challenger*.

Gulf of Mexico slope and continental shelf sediments obtained by standard shallow piston cores are often very gassy because of shallow microbial production of methane (and possibly other light hydrocarbon gases) and the upward migration of deeper sourced and reservoired petrogenic or thermogenic gases. In shallow marine sediments it has also been suggested that small amounts of

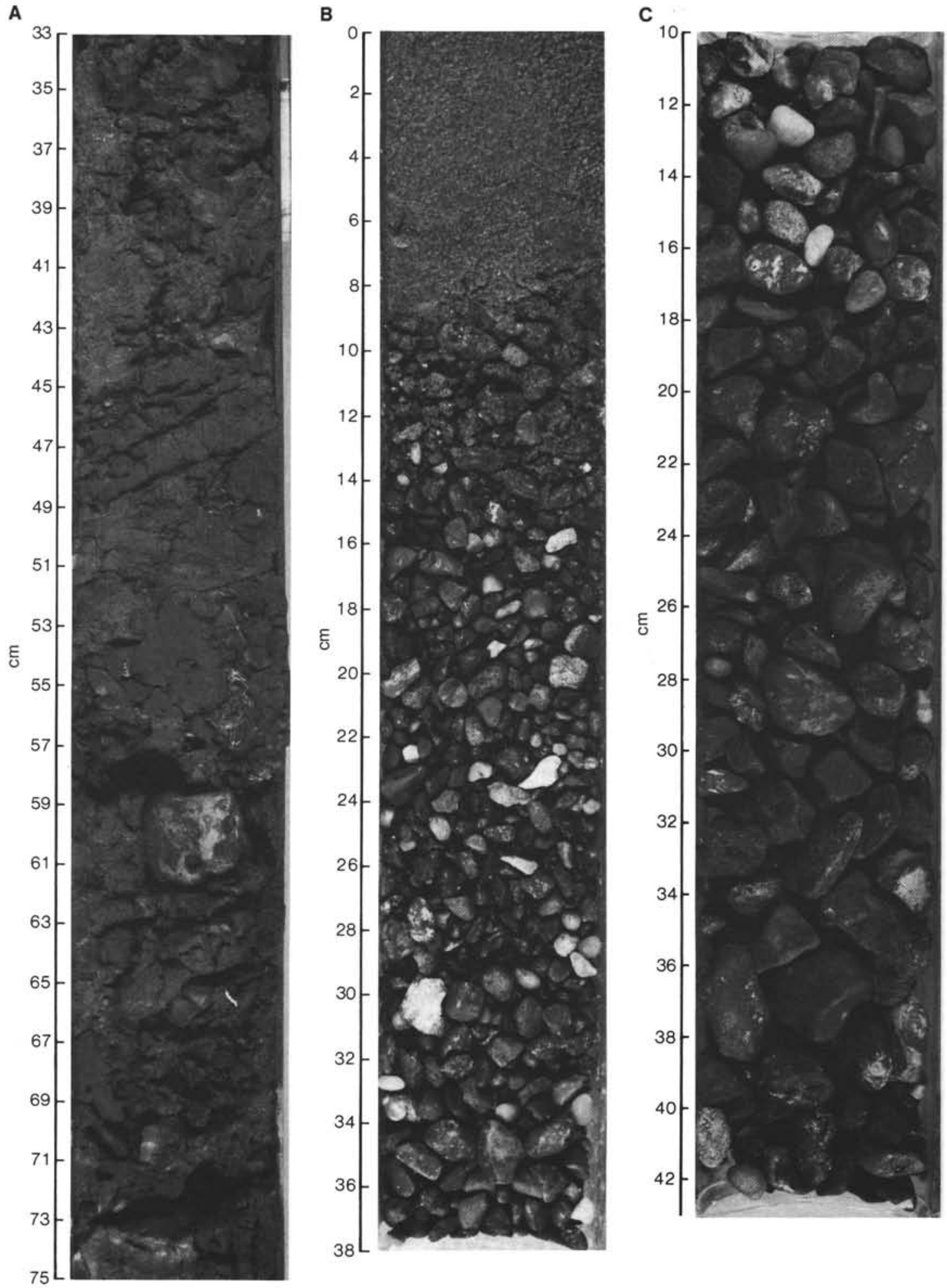

Figure 6. Photographs of characteristic facies in Lithologic Unit II. A. Pebbly mud (Core 621-29-1, 33–75 cm). B. Gradation from sand to gravel (Core 621-33-2, 0–38 cm). C. Basal part of pebble interval with clasts up to 3.5 cm in size (Core 621-33,CC).

low-molecular-weight hydrocarbon gases can be generated during the early diagenesis of sedimentary organic matter (less than 50°C). The absence or near absence of gaseous hydrocarbons in most of the cores recovered at the Mississippi Fan sites may result from several factors:

1. Rapid rates of sedimentation could dilute nonrefractory (biodegradable) organic matter (from overlying water or riverine inputs) with clays or refractory organic matter (derived from slumped or continentally derived organic matter).

2. The coarse-grained sediments encountered near the sediment/water interface at the time of deposition could permit the rapid loss of any produced methane to the overlying water column.

3. The temperature and pressure regime at these holes could cause a suppression of the metabolic activity of microorganisms that produce methane as compared to shallower and warmer intraslope and continental margin sediments.

4. The supply of organic matter may be too low or too refractory to support microorganisms.

5. Early thermal diagenesis of organic matter producing gaseous hydrocarbons could be low level because of the relatively low temperature and low geothermal gradient in this area.

6. No significant deeper reservoired petroleum-condensate-gas occurs in this vicinity or no adequate pathway or conduit to surface sediments is available.

7. The presence of microbial sulfate reduction, which has been widely observed to preclude the large microbiological methane production that occurs in the sulfate-free zone.

One, or more likely a combination, of these parameters could result in the low level of gaseous hydrocarbons observed at Site 621 and at other sites examined on this leg that show little or no gas. Slow deposition rates that can cause aerobic microbial degradation of organic matter at the time of sediment deposition were not observed at any Leg 96 sites. Interstitial water sulfate levels remained near seawater values (see Presley et al., Ishizuka, Kawahata, et al.; and Ishizuka, Ittekkot, et al., all this volume) throughout this hole, so that a sulfate-free zone where methanogenic bacterial activity might have occurred was never observed.

Gas pressure in end caps of sectioned cores collected at Site 621 began in Core 621-3 and continued through Core 621-7 (Table 4). Only traces of methane and carbon dioxide (454 and 377 ppm, respectively) were present in Core 621-3. The remaining gas is either nitrogen (caused by nitrate-reducing microorganisms) or, more probably, air (presumably caused by degassing of air dissolved in pore space). The shipboard gas chromatograph did not separate nitrogen from oxygen to distinguish between these two possibilities.

No sulfide odor was observed when the cores were brought on deck, although black sediments (iron sulfides) were common. A strong hydrogen sulfide odor was observed later, when the cores were squeezed to obtain interstitial water samples. The percentage of methane in the core gas increases with depth and reaches a maximum (70%) in Section 621-5-2, followed by a decrease to 7 and 9% in Sections 621-6-2 and 621-7-2, respectively (Table 4). In all cases, the amount of gas present was insufficient to cause extrusion of cores from the liners, although numerous gas cracks were observed in the split cores. In Cores 621-3 through 621-6, which are all muds, gas expansion cracks were so small that the gas was difficult to sample without clogging the sampler. A good gas pocket, indicating the presence of more gas than in Cores 3–6, was found in Core 621-7.

Gas pressures high enough to cause bulging of end caps in sectioned cores were observed only sporadically in the rest of the hole: once in Section 621-19-1 (123.7 m sub-bottom depth; 37% methane) and once again in Section 621-27-1 (175.9 m sub-bottom depth; 14% methane) (Table 4). In both of these cases, methane was associated with cores containing sand or silt layers, so that biogenic methane may have migrated into these two sections.

Note that the depth of the gas sample from Section 621-5-2 (~35 m sub-bottom), which showed a methane maximum, corresponds to a mysterious "bright spot" on the seismic record which is not explicable by any lithologic change. However, the quantities of gas detected in this core appear insufficient to have caused bubble formation at subsurface *in situ* pressures. No evidence for clathrates was observed in the core. It is possible that the seismic bright spot is caused by other localized areas of higher biogenic gas content in the surrounding sediments. In this area of very high deposition rates, it is likely that localized small pockets of biogenic methane that have not yet had time to diffuse out of the fine-grained muds may form.

The higher C_1/C_2 ratio, the low interstitial water sulfate levels (<5 m*M* below 10 m sub-bottom), and the relatively high alkalinities (about 10-20 mEq/L) from 10 to 100 m sub-bottom (Ishizuka, Kawahata, et al., this volume) are all consistent with a microbiological source for the methane.

Table 4. Site 621 Carle gas data from gas pressure in end caps.

Core[a]	Section	Methane (%)	Ethane (%)	C_1/C_2	CO_2 (%)
3H	6	0.045	>0.02		(377 ppm)
4H	2	26.0	<0.02		0.20
5H	2	70.0	>0.02	<3500	0.24
6H	2	7.2	<0.02		0.040
7H	2	8.9	<0.02		0.43
19H	1	36.7	>0.02	<1800	0.86
27H	1	14.0	<0.02		0.076

[a] H following core number indicates hydraulic piston core.

Inorganic Geochemistry

Black sediments occur at this site from Cores 621-3 to 621-14. These sediments had a strong hydrogen sulfide odor at the time they were squeezed to obtain interstitial water. The black color changed to dark brown after exposure to air for some time. These observations suggest that there is greigite and mackinawite in the sediments of those core sections. These minerals are iron sulfides and are very unstable.

Results of interstitial water analyses can be summarized as follows:

1. The pH value ranges between 6.7 and 7.7 and averages 7.2.

2. Total alkalinity shows highest value in Core 621-2 (22.4 mEq/L), decreases with depth to Core 621-5 (8.1 mEq/L), then increases with depth to Core 621-10 (16.0 mEq/L), then again decreases with depth to Core 621-17 (8.8 mEq/L). Total alkalinity value is constant (5.0 mEq/L) between Cores 621-19 and 621-27 (fine sand).

3. Salinity, as a whole, decreases with depth from 33.9 to 31.0‰.

Interstitial water results are discussed more fully in other chapters of this volume (Presley et al.; Ishizuka, Kawahata, et al.; Ishizuka, Ittekkot, et al., this volume).

PHYSICAL PROPERTIES

The sediments at Site 621 suffered from core disturbance because of gas expansion between depths of 10 and 50 m and below 90 m sub-bottom. Futhermore, scattering of data results from changes in the amount of sand and silt present. Sections containing gravel and coarse sand were not sampled.

Wet-bulk density increases from a low of 1.54 g/cm^3 at the seafloor to a high of 2.03 g/cm^3 at the 199-m interval (Fig. 7A). The gradient of bulk density increase with depth ranges from 0.002 $g/cm^3 \cdot m$ in the upper portions of Site 621 to 0.0007 $g/cm^3 \cdot m$ in the section below 70 m sub-bottom depth. The low gradient observed in the upper sediment sections is the result of disturbance and the presence of gas in the sediment.

Wet water content decreases with depth from 48% at the seafloor to 20% at 199 m sub-bottom depth, at a rate of 0.084%/m (Fig. 7B). High gradients were not encountered near the seafloor as is normally the case. This is attributed to core disturbance and the presence of free gas in the pore spaces.

Porosity of the seafloor sediments is approximately 72%. Porosity decreases downhole at a steady rate of 0.0667%/m. In general, no large gradients in porosity near the seafloor are present, except in a limited number of samples (Fig. 7D).

The gradient of void ratio with depth is 0.0052 units/m. The lowest void ratio determined was 0.63 at 212 m sub-bottom depth.

Grain density varies from an average of 2.66 g/cm^3 in the upper 60 m to 2.73 g/cm^3 in the lower 140 m. Since the majority of sediments at Site 621 sampled for physical properties were clays, the grain density measured in the upper section appears to be low. This could be attributed to either gas in the pore spaces, coring disturbance, or an increase in silt content.

Undrained shear strength increases at a rate of 1.29 kPa/m in the upper 70 m and 1.15 kPa/m in the interval between 70 and 212 m. Zones of high shear strength are found at the 80 to 95 m interval and at the 199 to 212 m interval (Fig. 7E). A calculation of the relationship between undrained shear strength and overburden pressure indicates that most sediments of Site 621 are very likely highly underconsolidated except for one interval at 80 to 95 m sub-bottom depth.

The lowest good sonic velocity value measured was 1.451 km/s and the highest was 1.778 km/s (Fig. 7F). It was impossible to obtain velocities of the sediment in the 9 to 53 m interval and in most of the 91 to 199 m interval because of gas in the pore spaces. The velocities obtained exhibited a large range over a fairly short interval with a large and conflicting acoustic anisotropy.

SUMMARY AND CONCLUSIONS

Hole 621 was drilled in the thalweg of the middle fan channel in a water depth of 2481 m. The channel–levee complex on the youngest fan lobe consists of a 3-km-wide sinuous, asymmetrical channel bounded by prominent levees that have relief of up to 35 m above the present channel floor. The sinuosity of the channel is well developed in this area. This channel extends from the mouth of the Mississippi Canyon at the shelf edge to a water depth of about 3400 m, a distance of over 600 km.

The coring was completed to a depth of 214.8 m with the hydraulic piston corer; recovery was excellent and the cores displayed little disturbance until near the bottom of the hole. The hole bottomed within channel fill deposits but the base of the youngest fan lobe was not penetrated; seismically the base of the fan lobe can be projected to the site and is located at a depth of 317 m. The channel sequence displays a fining-upward trend, commencing with coarse gravel at total penetration depth and ending with fine-grained clays capped by a thin marly foraminiferal ooze. The coarser-grained sediments (sands and gravel) extend upward from the bottom of the hole to a depth of 182 m, which comprises a minimum of 32-m thickness. The sandy units vary in thickness from 2 to 5 m and generally display sharp bases. A few thin silty muds, generally less than 1 m thick, are present. These coarser-grained sediments grade upward into interbedded sands and silts with the sands rarely exceeding 1-m thickness. The silty units are poorly sorted and often exhibit little internal structure; they range in thickness from 1 to over 4 m. The interbedded sands and silts extend to a penetration of 150 m (a thickness of 32 m) and grade upward into silty and sandy muds that contain a few silt beds. Laminated and structureless muds up to 10 m thick are present without any apparent silt interbeds. At approximately 94-m penetration, the sediments grade into dark gray homogeneous muds containing only a few color laminations and abundant transported organic debris. Most of these sediments are structureless and most are slightly disturbed by the presence of methane gas. These muds continue to near the seafloor where they are capped by the marly foraminiferal ooze. A few alternating thin black and red bands are present beneath the ooze. The mud section is approximately 94 m thick.

This fining-upward channel sequence represents deposits that were laid down both during the active channel phase and during the waning or passive filling stage. According to seismic data, the base of the channel is located at a sub-bottom depth of 317 m. It is highly probable that the coarser sediments were laid down during or directly after low sea level, when the channel was acting as a major conduit to deliver sediments downslope, and that the upper finer-grained sediments represent the abandonment stage during the subsequent rise of sea level.

The major conclusions are

1. The channel fill sequence displays a fining-upward trend, commencing with gravel (of unknown thickness as the base was not penetrated) grading upward into alternating sands, silts, and thin-bedded muds, and finally into thick-bedded muds. The channel fill is capped by a thin foraminiferal ooze.

2. The sediments comprising the channel fill contain few fauna consisting predominantly of reworked shallow-water microfauna; bathyal benthic and planktonic fauna are very sparse.

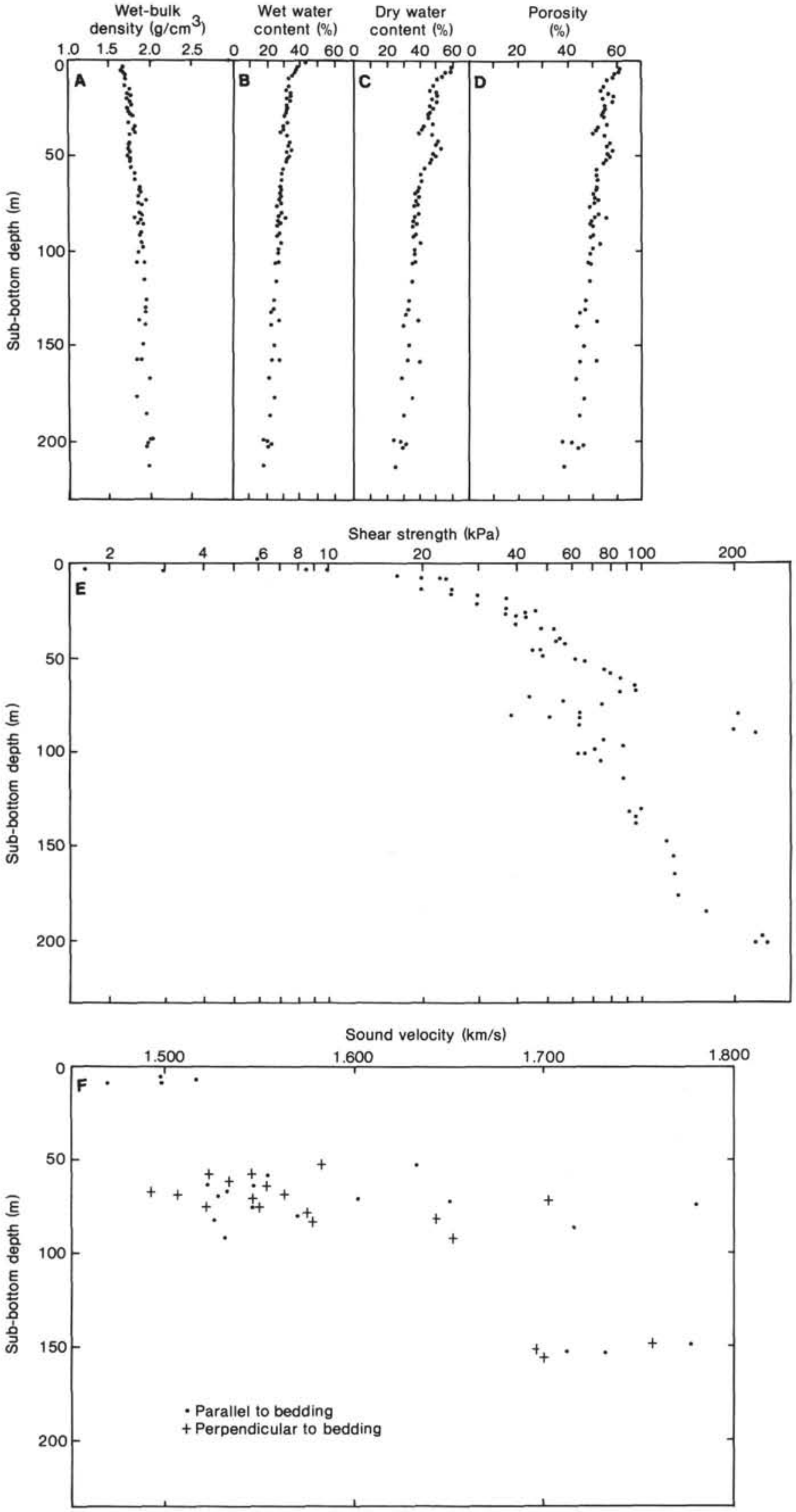

Figure 7. Mass physical properties of Site 621 sediments. A. Wet-bulk density. B. Water content related to weight of wet sediment. C. Water content related to weight of dry sediment. D. Porosity. E. Undrained shear strength. F. Sound velocity.

3. Interpreting the lower coarser-grained sediments to represent the active phase of the channel results in a minimum channel depth (from levee crest to thalweg) of 221 m. Such channel relief must have been sufficient to contain the coarse material of the sediment flows within the channel and allowed the finer-grained components to be transported over the levee to form the marginal overbank deposits.

4. The finer-grained upper part of the channel fill must have been deposited rapidly, since few bathyal benthic fauna are present and displaced shallow-water forms are rare. The thinly laminated clays are probably deposited by low-concentration density flows carrying only fine-grained sediments.

5. Computed sedimentation rates were 12.5 cm/1000 yr. for the Holocene (Ericson Zone Z) and 1068.0 cm/1000 yr. for the late Wisconsin glacial period (Zone Y), using a laterally correlated seismic reflector for the base of this zone.

6. Although only 34 m of the coarser-grained channel fill was cored, seismic data (high-amplitude reflectors) indicate that the base of the channel fill lies at a depth of 317 m. Thus, the interpreted coarser-grained channel deposits could be as thick as 136 m.

7. The sands on the gamma log generally display sharp bases and rather abrupt tops.

8. The nearest source of graveliferous deposits is on the shelf near the head of the present Mississippi Canyon. These deposits are late Pleistocene in age. Coring and seismic studies from the area near the head of the canyon show that the base of the canyon floor lies below the graveliferous deposits, indicating a high probability that the coarser-grained material was derived from this shelf region. The transport distance from the source to Site 621 is approximately 220 km.

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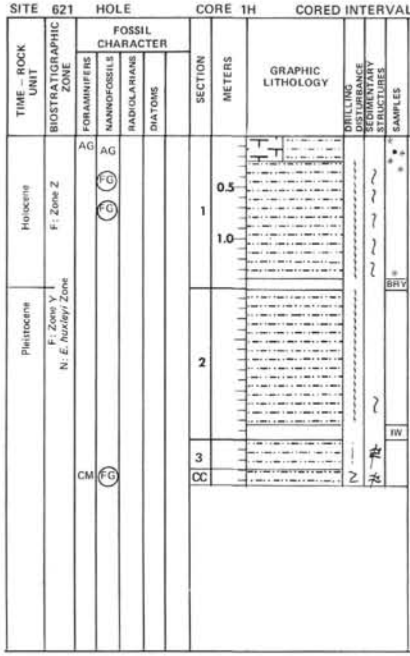
SITE 621 HOLE CORE 1H CORED INTERVAL 2485.0–2488.5 mbsl; 0.0–3.5 mbsf



LITHOLOGIC DESCRIPTION

Section 1, 0–25 cm: MARLY FORAMINIFERAL OOZE. Brown (10YR 5/3) from 0–12 cm; olive brown (2.5Y 4/4) from 12–18 cm; olive (5Y 4/3) from 18–25 cm.

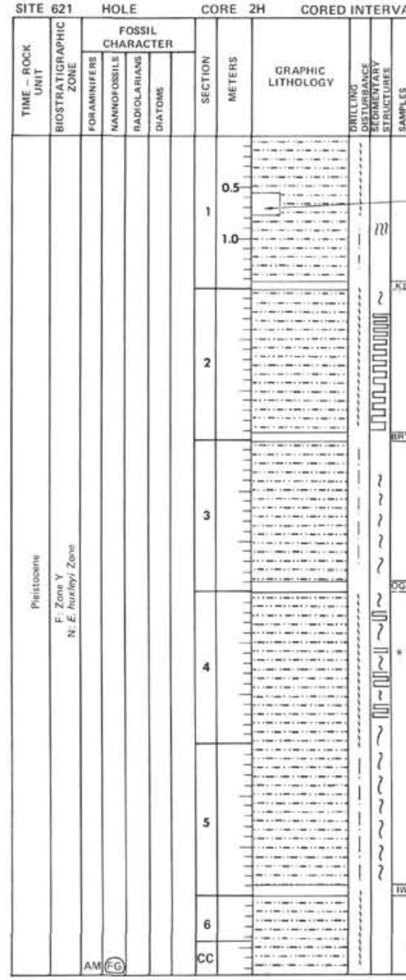
Section 1, 25 cm–Core Catcher: MUD. Dark gray (5Y 4/1) in Section 1; very dark gray (5Y 3/1) at Section 2, 0–90 cm; dark olive gray (5Y 3/2) at Section 2, 90–135 cm; very dark gray (5Y 3/1) in Sections 3 and Core Catcher. Core is mottled and homogeneous, with very indistinct color bands at Section 2, 0–85 cm and Section 3 and Core Catcher.

SMEAR SLIDE SUMMARY (%):

	1, 2	1, 19	1, 20	1, 37	1, 138
	D	M	D	D	D
Texture:					
Sand	30	2	T	1	0
Silt	20	78	35	49	35
Clay	50	20	65	50	65
Composition:					
Quartz	10	50	10	25	16
Feldspar	—	—	T	T	T
Mica	—	5	2	—	2
Heavy minerals	—	1	1	—	5
Clay	40	32	65	50	65
Opaques	1	3	5	3	—
Micronodules	—	—	1	—	—
Carbonate unspec.	5	8	8	5	T
Foraminifers	30	1	2	T	1
Calc. nannofossils	10	—	5	T	1
Sponge spicules	—	—	1	—	T
Plant debris	—	—	—	2	—
Altered minerals	4	—	—	15	

CARBONATE BOMB DATA:
*1, 19–21 cm = 0%

SITE 621 HOLE CORE 2H CORED INTERVAL 2488.5–2498.1 mbsl; 3.5–13.1 mbsf



LITHOLOGIC DESCRIPTION

MUD/CLAYEY MUD.

Section 1 is dark olive gray (5Y 3/2) with black (5Y 2/1) reduction zones and organic-rich zones.

Section 2 and 4 are very dark gray (5Y 3/1) with very deformed dark gray (5Y 4/1) and black (5Y 2/1) MUD color bands.

Section 3 is black (5Y 2/1) and dark olive gray (5Y 3/2) mottled MUD.

Section 5, 6, and Core Catcher contain very dark grayish brown (10YR 3/2) and black (5Y 2/2), extensively mottled, color-banded MUD.

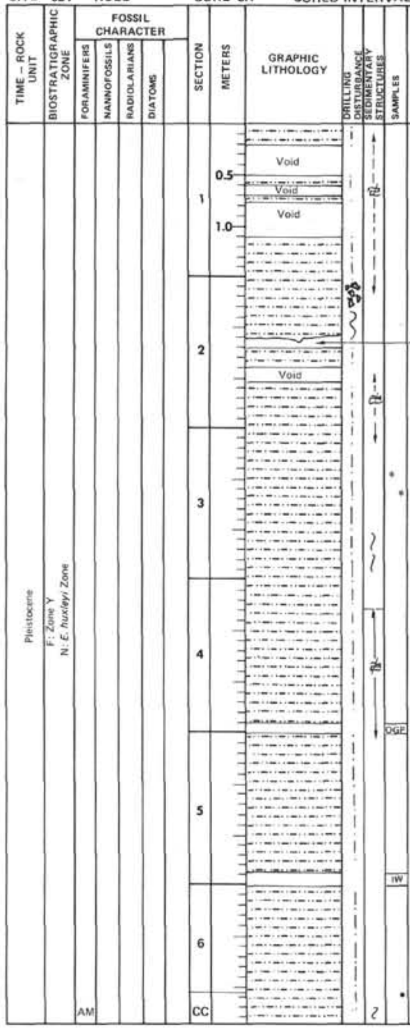
SMEAR SLIDE SUMMARY (%):

	4, 60
	D
Texture:	
Sand	1
Silt	25
Clay	74
Composition:	
Quartz	20
Feldspar	T
Heavy minerals	2
Clay	74
Volcanic glass	T
Carbonate unspec.	T
Foraminifers	1
Calc. nannofossils	T
Sponge spicules	T
Plant debris	2
Altered minerals	1

CARBONATE BOMB DATA:
*CC, 11–13 cm = 2%

Information on core description sheets, for ALL sites, represents field notes taken aboard ship under time pressure. Some of this information has been refined in accord with post-cruise findings, but production schedules prohibit definitive correlation of these sheets with subsequent findings. Thus the reader should be alerted to the occasional ambiguity or discrepancy.

SITE 621 HOLE CORE 3H CORED INTERVAL 2498.1–2507.7 mbsl; 13.1–22.7 mbsf



LITHOLOGIC DESCRIPTION

MUD.

Section 1 and Core Catcher are very dark gray (5Y 3/1); Section 2 is dark gray (2.5Y 4/0); Sections 2–6 are dominantly dark olive gray (5Y 3/2) with dark gray (5Y 4/1) color bands.

The MUD is faintly laminated to homogeneous; gas disruption is extensive.

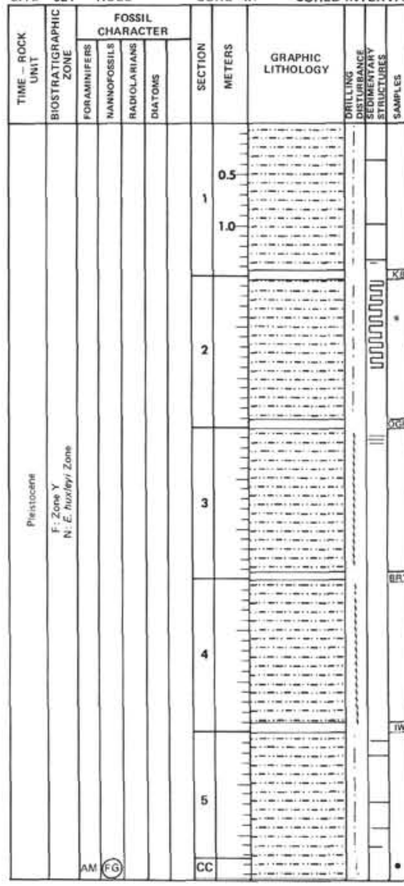
Section 4 contains one very thin SILT laminae at 75 cm.

SMEAR SLIDE SUMMARY (%):

	3, 49	3, 68
	D	D
Texture:		
Sand	0	2
Silt	35	38
Clay	65	60
Composition:		
Quartz	15	25
Heavy minerals	5	–
Clay	65	60
Volcanic glass	T	–
Opaques	–	3
Carbonate unspec.	4	2
Foraminifers	T	–
Calc. nannofossils	1	T
Plant debris	–	T
Altered minerals	10	10

CARBONATE BOMB DATA:
•CC, 4–6 cm = 3%

SITE 621 HOLE CORE 4H CORED INTERVAL 2507.7–2517.3 mbsl; 22.7–32.3 mbsf



LITHOLOGIC DESCRIPTION

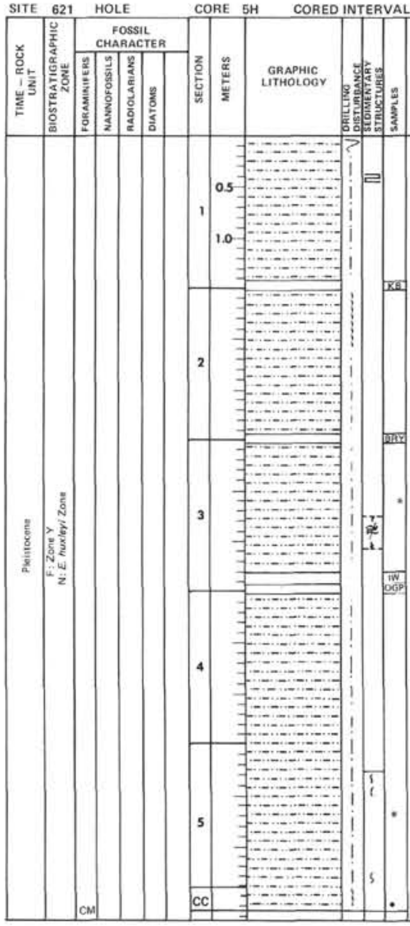
MUD. Dominantly black (5Y 2.5/2–5Y 2.5/1) with minor dark gray (5Y 4/1) and dark olive gray (5Y 3/2) layers. Section 2, 0–90 cm contains inclined color-band MUD laminae. Core contains gas bubble "pockets" and cracks.

SMEAR SLIDE SUMMARY (%):

	2, 40
	D
Texture:	
Sand	T
Silt	45
Clay	55
Composition:	
Quartz	35
Clay	55
Opaques	3
Carbonate unspec.	2
Altered minerals	5

CARBONATE BOMB DATA:
•CC, 11–13 cm = 3%

SITE 621 HOLE CORE 5H CORED INTERVAL 2517.3–2526.9 mbsl; 32.3–41.9 mbsf



LITHOLOGIC DESCRIPTION

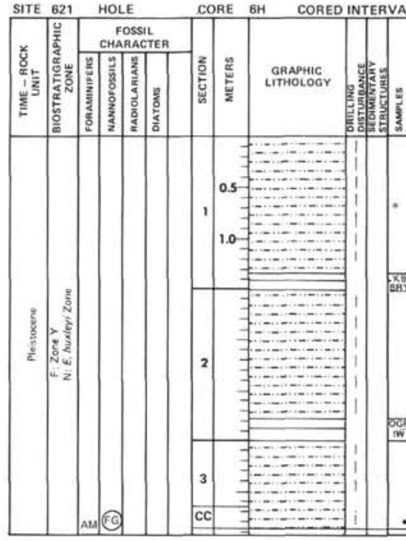
MUD. Extremely dark gray (5Y 2.5/1) to Section 5, 24 cm; dark olive gray (5Y 3/2) from Section 5, 24 cm–Core Catcher. MUD is homogeneous. Section 1, 25–38 cm contains some inclined color-banded MUD. Section 2 contains possible FLOW-IN from 0–50 cm. Rare shell debris and wood fragments occur in Section 2 and 3. Section 3, 75–105 cm contains very subtly color-banded MUD. Section 5, 24–49 cm and 127–136 cm are mottled.

SMEAR SLIDE SUMMARY (%):

	3, 65	5, 70
	D	D
Texture:		
Sand	0	0
Silt	35	30
Clay	65	70
Composition:		
Quartz	27	25
Feldspar	1	2
Mica	–	T
Heavy minerals	1	1
Clay	65	70
Volcanic glass	T	1
Carbonate unspec.	1	T
Foraminifers	1	T
Calc. nannofossils	T	T
Plant debris	T	T
Altered minerals	4	1

CARBONATE BOMB DATA:
• CC, 21–23 cm = 3%

SITE 621 HOLE CORE 6H CORED INTERVAL 2526.9–2531.2 mbsl; 41.9–46.2 mbsf



LITHOLOGIC DESCRIPTION

MUD. Dark olive gray (5Y 3/2) and homogeneous. Abundant gas bubble "pockets" and cracks.

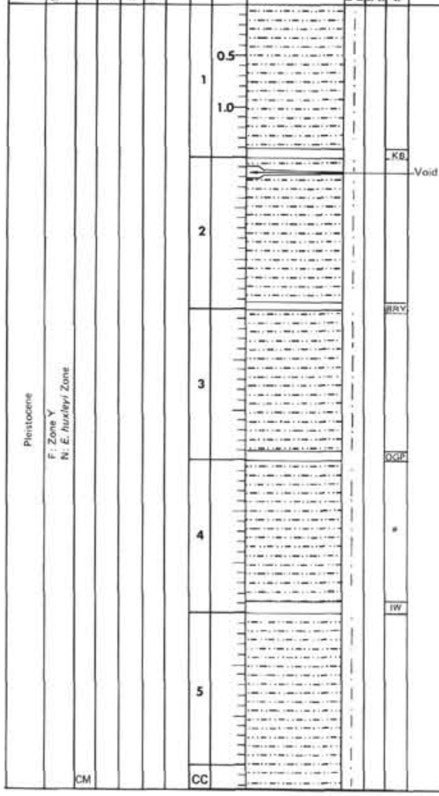
SMEAR SLIDE SUMMARY (%):

	1, 70
	D
Texture:	
Sand	0
Silt	25
Clay	75
Composition:	
Quartz	20
Clay	75
Volcanic glass	T
Carbonate unspec.	T
Calc. nannofossils	T
Altered minerals	5

CARBONATE BOMB DATA:
• CC, 21–23 cm = 3%

SITE 621 HOLE CORE 7H CORED INTERVAL 2531.2–2540.7 mbsl; 46.2–55.7 mbsf

TIME – ROCK UNIT | BIOSTRATIGRAPHIC ZONE | FOSSIL CHARACTER: FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS | SECTION | METERS | GRAPHIC LITHOLOGY | DRILLING DISTURBANCE | SEDIMENTARY STRUCTURES | SAMPLES | LITHOLOGIC DESCRIPTION



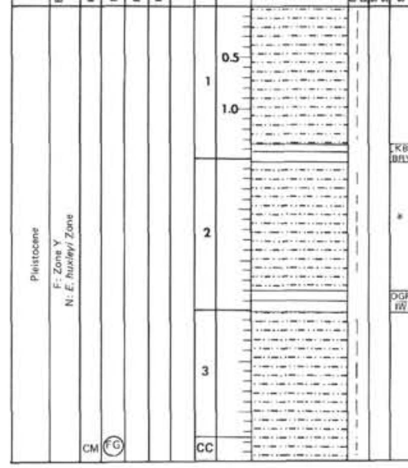
MUD. Dark olive gray (5Y 3/2) in Sections 1–3; very dark gray (5Y 3/1) in Section 4, 5, and Core Catcher. MUD is homogeneous and contains gas bubble "pockets" and fractures.

SMEAR SLIDE SUMMARY (%):

	4, 70
	D
Texture:	
Sand	0
Silt	30
Clay	70
Composition:	
Quartz	22
Feldspar	T
Mica	1
Heavy minerals	3
Clay	70
Carbonate unspec.	1
Foraminifers	1
Calc. nannofossils	T
Altered minerals	2

SITE 621 HOLE CORE 8H CORED INTERVAL 2540.7–2545.2 mbsl; 55.7–60.2 mbsf

TIME – ROCK UNIT | BIOSTRATIGRAPHIC ZONE | FOSSIL CHARACTER: FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS | SECTION | METERS | GRAPHIC LITHOLOGY | DRILLING DISTURBANCE | SEDIMENTARY STRUCTURES | SAMPLES | LITHOLOGIC DESCRIPTION



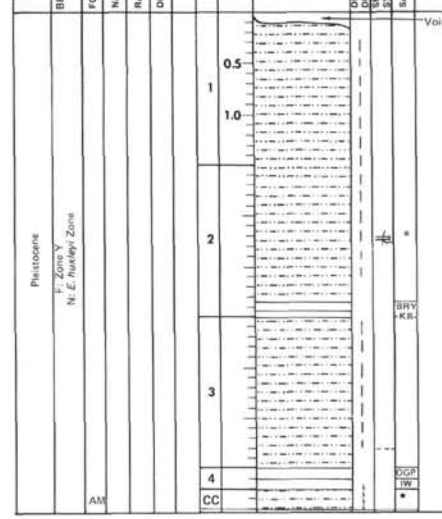
MUD. Extremely dark gray (5Y 2.5/1) and extremely homogeneous.

SMEAR SLIDE SUMMARY (%):

	2, 60
	D
Texture:	
Sand	0
Silt	30
Clay	70
Composition:	
Quartz	20
Clay	70
Volcanic glass	2
Opaques	2
Carbonate unspec.	1
Calc. nannofossils	T
Altered minerals	5

SITE 621 HOLE CORE 9H CORED INTERVAL 2545.2–2550.2 mbsl; 60.2–65.2 mbsf

TIME – ROCK UNIT | BIOSTRATIGRAPHIC ZONE | FOSSIL CHARACTER: FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS | SECTION | METERS | GRAPHIC LITHOLOGY | DRILLING DISTURBANCE | SEDIMENTARY STRUCTURES | SAMPLES | LITHOLOGIC DESCRIPTION



MUD. Extremely dark gray (5Y 2.5/1) and homogeneous. Minor, very subtle color laminae occur at Section 2, 76–77 cm.

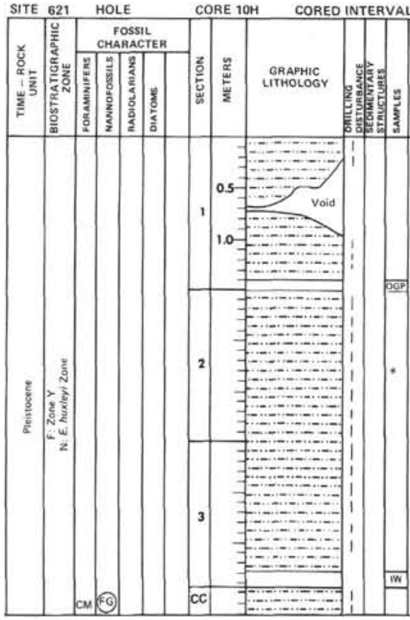
SMEAR SLIDE SUMMARY (%):

	2, 70
	D
Texture:	
Sand	0
Silt	35
Clay	65
Composition:	
Quartz	26
Feldspar	1
Mica	T
Heavy minerals	2
Clay	65
Volcanic glass	1
Carbonate unspec.	1
Foraminifers	2
Calc. nannofossils	T
Altered minerals	2

CARBONATE BOMB DATA:

•CC, 11–13 cm = 3%

SITE 621 HOLE CORE 10H CORED INTERVAL 2550.2–2555.4 mbsl; 65.2–70.4 mbsf



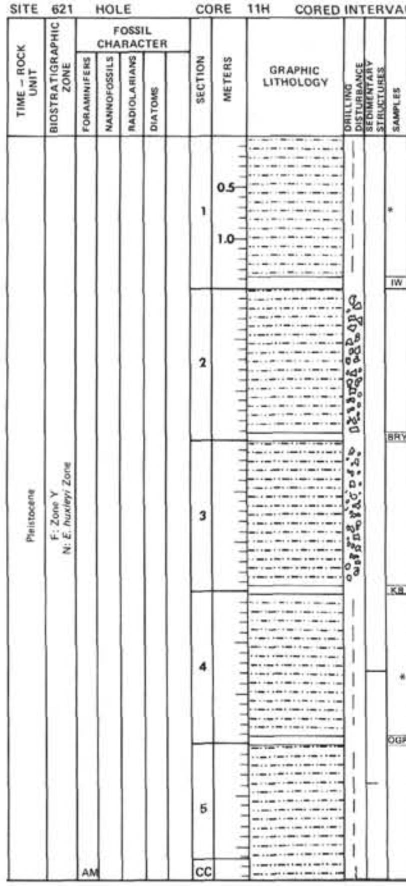
LITHOLOGIC DESCRIPTION

MUD. Extremely dark gray (5Y 2.5/1) and homogeneous.

SMEAR SLIDE SUMMARY (%):

	2, 80
	D
Texture:	
Sand	0
Silt	35
Clay	65
Composition:	
Quartz	24
Heavy minerals	T
Clay	65
Carbonate unspec.	2
Foraminifers	1
Calc. nannofossils	2
Sponge spicules	T
Fish remains	T
Plant debris	4
Altered minerals	2

SITE 621 HOLE CORE 11H CORED INTERVAL 2555.4–2562.8 mbsl; 70.4–77.8 mbsf



LITHOLOGIC DESCRIPTION

MUD. Extremely dark gray (5Y 2.5/1) and homogeneous. Dark gray–very dark gray (5Y 3.5/1) MUD color-bands occur at Section 4, 80–85 cm and Section 5, 35 cm.

SMEAR SLIDE SUMMARY (%):

	1, 75	4, 84
	D	D
Texture:		
Sand	0	0
Silt	40	25
Clay	60	75
Composition:		
Quartz	23	21
Feldspar	–	T
Heavy minerals	4	2
Clay	60	75
Volcanic glass	–	T
Carbonate unspec.	T	1
Foraminifers	2	1
Calc. nannofossils	1	T
Sponge spicules	T	–
Plant debris	5	T
Altered minerals	5	–

SITE 621 HOLE CORE 12H CORED INTERVAL 2562.8–2566.4 mbsl; 77.8–81.4 mbsf

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
Pleistocene	F: Zone Y N: *E. huxleyi* Zone	CM	FG			1, 2, 3, CC	0.5, 1.0				*, IW, OGP, •	

MUD. Extremely dark gray (5Y 2.5/1) and homogeneous.

SMEAR SLIDE SUMMARY (%):

	2, 30
	D
Texture:	
Sand	1
Silt	44
Clay	55
Composition:	
Quartz	35
Mica	T
Heavy minerals	3
Clay	55
Carbonate unspec.	1
Foraminifers	1
Calc. nannofossils	T
Plant debris	3
Altered minerals	2

CARBONATE BOMB DATA:
*CC, 1–3 cm = 4%

SITE 621 HOLE CORE 13H CORED INTERVAL 2566.4–2571.7 mbsl; 81.4–86.7 mbsf

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
Pleistocene	F: Zone Y N: *E. huxleyi* Zone	AM				1, 2, 3, 4, CC	0.5, 1.0				IW, OGP, BRY, KRJ, *	

MUD. Extremely dark gray (5Y 2.5/1) and homogeneous. Section 3, 95 cm–Core Catcher contains abundant gas bubble "pockets".

SMEAR SLIDE SUMMARY (%):

	3, 60
	D
Texture:	
Sand	0
Silt	40
Clay	60
Composition:	
Quartz	28
Feldspar	T
Mica	T
Heavy minerals	2
Clay	60
Volcanic glass	T
Carbonate unspec.	1
Foraminifers	3
Calc. nannofossils	1
Plant debris	T
Altered minerals	5

SITE 621 HOLE CORE 14H CORED INTERVAL 2571.7–2579.2 mbsl; 86.7–94.2 mbsf

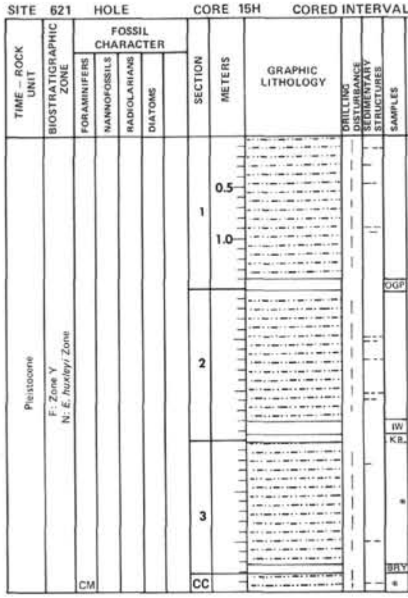
TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
Pleistocene	F: Zone Y N: *E. huxleyi* Zone	CM	FM			1, 2, 3, 4, 5, CC	0.5, 1.0	Void; Void			*, OGP, IW, KRJ, BRY	

MUD. Extremely dark gray (5Y 2.5/1), homogeneous, and very deformed by drilling.

SMEAR SLIDE SUMMARY (%):

	1, 15
	D
Texture:	
Sand	0
Silt	40
Clay	60
Composition:	
Quartz	30
Mica	5
Heavy minerals	2
Clay	57
Pyrite and opaques	1
Carbonate unspec.	5
Calc. nannofossils	1
Sponge spicules	T
Plant debris	T

SITE 621 HOLE CORE 15H CORED INTERVAL 2579.2–2584.7 mbsl; 94.2–99.7 mbsf



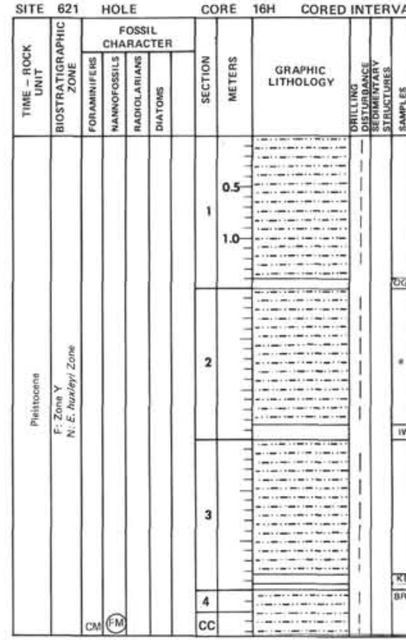
LITHOLOGIC DESCRIPTION

MUD. Extremely dark gray (5Y 2.5/1) and homogeneous with lots of gas bubble "pockets" and cracks. Core has subtle, minor color-banding; locations of color bands shown in "Sedimentary Structures" column.

SMEAR SLIDE SUMMARY (%):

	CC, 14	3, 60
	D	D
Texture:		
Sand	0	1
Silt	50	40
Clay	50	59
Composition:		
Quartz	40	35
Feldspar	3	3
Mica	2	3
Heavy minerals	2	1
Clay	45	53
Opaques	1	2
Carbonate unspec.	3	2
Plant debris	3	1

SITE 621 HOLE CORE 16H CORED INTERVAL 2584.7–2589.7 mbsl; 99.7–104.7 mbsf



LITHOLOGIC DESCRIPTION

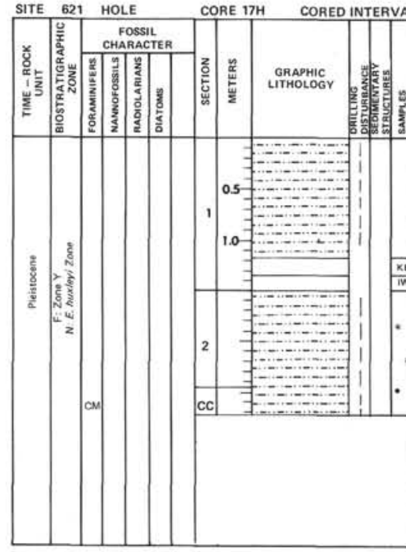
MUD. Very dark gray (5Y 3/1) and homogeneous. Entire core contains tiny gas cavities. Section 2 has rare dispersed coarse silt blebs and very fine sand grains.

Very faint laminae and layers >1 cm thick are visible in slab cut at Section 1, 88–116 cm. These are not observable in the archive core half.

SMEAR SLIDE SUMMARY (%):

	2, 70
	D
Texture:	
Sand	T
Silt	40
Clay	60
Compotition:	
Quartz	28
Mica	3
Heavy minerals	T
Clay	59
Pyrite and opaques	2
Micronodules	T
Carbonate unspec.	5
Calc. nannofossils	2
Plant debris	1

SITE 621 HOLE CORE 17H CORED INTERVAL 2589.7–2599.2 mbsl; 104.7–114.2 mbsf



LITHOLOGIC DESCRIPTION

MUD. Section 1 is very dark gray (2.5Y 3/0); Section 2 is dark olive gray (5Y 3/2); Core Catcher is dark olive gray (5Y 2.5/2). MUD is homogeneous with some gas bubble "pockets" and cracks.

SMEAR SLIDE SUMMARY (%):

	2, 30	2, 70
	D	D
Texture:		
Sand	0	1
Silt	30	49
Clay	70	50
Composition:		
Quartz	35	40
Feldspar	3	–
Mica	2	3
Heavy minerals	T	1
Clay	55	46
Opaques	1	3
Carbonate unspec.	3	5
Foraminifers	T	–
Calc. nannofossils	1	–
Plant debris	T	2

CARBONATE BOMB DATA:
• CC, 1–3 cm = 4%

SITE 621 HOLE CORE 18H CORED INTERVAL 2599.2–2602.2 mbsl; 114.2–117.2 mbsf

TIME – ROCK UNIT: Pleistocene
BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone
FOSSIL CHARACTER (FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS): CM FM
SECTION: 1, 2, CC
METERS: 0.5, 1.0
GRAPHIC LITHOLOGY
DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES: BRY OGP, *, *

LITHOLOGIC DESCRIPTION

MUD. Very dark olive gray (5Y 2.5/2) and homogeneous with gas bubble "pockets" and cracks.

Core Catcher contains three graded, laminated SILT beds at Core Catcher, 18–19 cm, 21–24 cm, and 24–32 cm.

SMEAR SLIDE SUMMARY (%):

	2, 10	CC, 2
	D	M
Texture:		
Sand	1	25
Silt	45	65
Clay	54	10
Composition:		
Quartz	30	50
Feldspar	–	5
Mica	3	1
Heavy minerals	2	4
Clay	55	10
Pyrite and opaques	1	3
Micronodules	T	–
Carbonate unspec.	7	27
Calc. nannofossils	T	–
Plant debris	2	T

SITE 621 HOLE CORE 19H CORED INTERVAL 2608.7–2612.7 mbsl; 123.7–127.7 mbsf

TIME – ROCK UNIT: Pleistocene
BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone
FOSSIL CHARACTER (FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS): FM
SECTION: 1, 2, 3, CC
METERS: 0.5, 1.0
GRAPHIC LITHOLOGY: CC given to Paleo.
DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES: *, KB OGP, BRY IW, Void

LITHOLOGIC DESCRIPTION

Section 1, 0 cm–Section 2, 44 cm: MUD. Very dark gray (5Y 3/1). Section 2, 0–44 cm contains some SILT blebs and laminae and some color banding.

Section 2, 44 cm–Section 3: SILTY MUD. Very dark gray (5Y 3/1).

SMEAR SLIDE SUMMARY (%):

	1, 50
	D
Texture:	
Sand	3
Silt	60
Clay	37
Composition:	
Quartz	50
Feldspar	6
Mica	3
Heavy minerals	1
Clay	32
Opaques	2
Carbonate unspec.	4
Foraminifers	1
Calc. nannofossils	T
Radiolarians	1
Plant debris	T

SITE 621 HOLE CORE 20H CORED INTERVAL 2612.7–2615.9 mbsl; 127.7–130.9 mbsf

TIME – ROCK UNIT: Pleistocene
BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone
FOSSIL CHARACTER (FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS): FM FM
SECTION: 1, 2, CC
METERS: 0.5, 1.0
GRAPHIC LITHOLOGY
DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES: *, BRY IW, KB OGP, *

LITHOLOGIC DESCRIPTION

SILTY MUD. Very dark gray (5Y 3/1). Silty mud contains SILT blebs and dispersed very fine- to fine-grained SAND grains and tiny, disseminated lignite. No laminae or layers visible.

SMEAR SLIDE SUMMARY (%):

	1, 70
	D
Texture:	
Sand	10
Silt	50
Clay	40
Composition:	
Quartz	37
Feldspar	4
Mica	3
Heavy minerals	1
Clay	40
Pyrite and opaques	1
Micronodules	T
Carbonate unspec.	10
Calc. nannofossils	T
Sponge spicules	T
Plant debris	4

CARBONATE BOMB DATA:
*CC, 1–3 cm = 3%

SITE 621 HOLE CORE 21H CORED INTERVAL 2615.9–2618.7 mbsl; 130.9–133.7 mbsf

TIME – ROCK UNIT: Pleistocene
BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone
FOSSIL CHARACTER (FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS): FM
SECTION: 1, 2, CC
METERS: 0.5, 1.0
GRAPHIC LITHOLOGY
DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES: *, KB IW

LITHOLOGIC DESCRIPTION

SILTY MUD. Very dark gray (5Y 3/1), with very subtle color variations at Section 1, 100–105 cm. Subtle changes in percentage of coarse grains; slightly coarser-grained intervals occur at Section 1, 30–34, 58–60, 106–113, and 135–140 cm; and Section 2, 0–50 cm. Wood and lignite fragments are common.

SMEAR SLIDE SUMMARY (%):

	2, 45
	D
Texture:	
Sand	5
Silt	45
Clay	50
Composition:	
Quartz	35
Feldspar	[illegible]
Mica	
Heavy minerals	2
Clay	44
Opaques	2
Carbonate unspec.	5
Foraminifers	T
Calc. nannofossils	T
Plant debris	1

SITE 621 HOLE CORE 22H CORED INTERVAL 2618.7–2622.5 mbsl; 133.7–137.5 mbsf

TIME – ROCK UNIT: Pleistocene

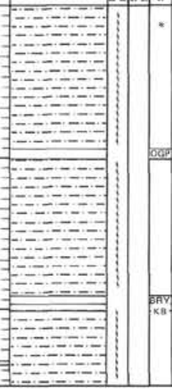
BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone

FOSSIL CHARACTER: FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS — FM, FG

SECTION: 1, 2, 3, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY



DRILLING DISTURBANCE; SEDIMENTARY STRUCTURES; SAMPLES: *, OGP, BRY, KB

LITHOLOGIC DESCRIPTION

SILTY MUD. Very dark gray (5Y 3/1), homogeneous, and very deformed by drilling. Areas of less coarse sediment (i. e. MUD) occur at Section 1, 27–43, 81–83, and 110 cm; Section 2, 90, 115–134 cm; and Section 3 10 and 15 cm.

SMEAR SLIDE SUMMARY (%):

	1, 20
	D
Texture:	
Sand	5
Silt	50
Clay	45
Composition:	
Quartz	30
Feldspar	2
Mica	5
Heavy minerals	2
Clay	45
Pyrite and opaques	3
Carbonate unspec.	12
Foraminifers	T
Calc. nannofossils	T
Plant debris	1

SITE 621 HOLE CORE 23H CORED INTERVAL 2622.5–2625.0 mbsl; 137.5–140.0 mbsf

TIME – ROCK UNIT: Pleistocene

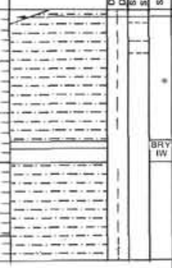
BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone

FOSSIL CHARACTER: FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS — FM

SECTION: 1, 2, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY



Void

DRILLING DISTURBANCE; SEDIMENTARY STRUCTURES; SAMPLES: *, BRY IW

LITHOLOGIC DESCRIPTION

SILTY MUD. Very dark gray (5Y 3/1) with minor SILT blebs and common gas bubble "pockets" and cracks. Common wood and lignite. Section 1, 0–40 cm contains grain-size variations: Section 1, 7–14 and 29–38 cm contain fewer coarse grains.

SMEAR SLIDE SUMMARY (%):

	1, 70
	D
Texture:	
Sand	2
Silt	50
Clay	48
Composition:	
Quartz	40
Feldspar	5
Mica	3
Heavy minerals	2
Clay	46
Opaques	2
Micronodules	T
Zeolite	1
Plant debris	1

SITE 621 HOLE CORE 24H CORED INTERVAL 2632.1–2634.6 mbsl; 147.1–149.6 mbsf

TIME – ROCK UNIT: Pleistocene

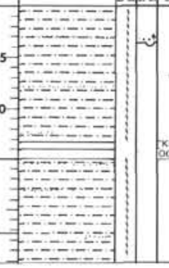
BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone

FOSSIL CHARACTER: FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS — CM, FG

SECTION: 1, 2, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY



DRILLING DISTURBANCE; SEDIMENTARY STRUCTURES; SAMPLES: *, KB, OGP

LITHOLOGIC DESCRIPTION

SILTY MUD with minor, thin SAND laminae.

MUD is very dark gray (5Y 3/1) and very deformed by both drilling and gas disruption. Thin, very fine- to fine-grained SAND laminae and layers occur at Section 1, 30–31, 78–80, and 127 cm; Section 2, 5 and 27–31 cm; and Core Catcher, 1 cm. Core contains common lignite fragments up to 2 mm in diameter.

SMEAR SLIDE SUMMARY (%):

	1, 70
	D
Texture:	
Sand	8
Silt	50
Clay	42
Composition:	
Quartz	35
Mica	5
Heavy minerals	3
Clay	40
Pyrite and opaques	1
Micronodules	T
Carbonate unspec.	15
Calc. nannofossils	T
Plant debris	1

SITE 621 HOLE CORE 25H CORED INTERVAL 2641.7–2644.7 mbsl; 156.7–159.7 mbsf

TIME – ROCK UNIT: Pleistocene

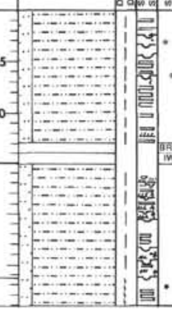
BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone

FOSSIL CHARACTER: FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS — FM

SECTION: 1, 2, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY



DRILLING DISTURBANCE; SEDIMENTARY STRUCTURES; SAMPLES: *, *, BRY IW, •

LITHOLOGIC DESCRIPTION

MUD with SILT laminae.

MUD is dominantly very dark gray (10YR 3/1) with minor dark reddish gray (10R 3/1) color-banded.

SILT laminae are gray (10YR 5/1). Many are graded, have scoured bases, lenticular bedding, and/or micro-cross-laminations. Many SILT laminae include granules of iron sulphide.

SMEAR SLIDE SUMMARY (%):

	1, 35	1, 68
	M	D
Texture:		
Sand	2	0
Silt	88	45
Clay	10	55
Composition:		
Quartz	73	30
Feldspar	T	–
Mica	1	1
Heavy minerals	5	3
Clay	10	55
Volcanic glass	–	T
Carbonate unspec.	T	1
Foraminifers	1	3
Calc. nannofossils	T	T
Plant debris	–	3
Altered minerals	10	4

CARBONATE BOMB DATA:
•CC, 14–16 cm = 5%

SITE 621 HOLE CORE 26H CORED INTERVAL 2651.3–2654.3 mbsl; 166.3–169.3 mbsf

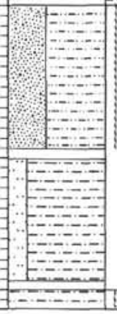
TIME – ROCK UNIT: Pleistocene

BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone

FOSSIL CHARACTER (FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS): FM (FG)

SECTION: 1, 2, CC — METERS: 0.5, 1.0

GRAPHIC LITHOLOGY — DRILLING DISTURBANCE — SEDIMENTARY STRUCTURES — SAMPLES: OGP, KB



LITHOLOGIC DESCRIPTION

Section 1: MUD with SANDY SILT zones. MUD is very dark gray (10YR 3/1). Oxidized, very dark grayish brown (10YR 3/2) MUD intervals occur at Section 1, 100–110 and 115–120 cm. SANDY SILT "layers" are very dark gray (5Y 3/1), inclined, and deformed.

Section 2 and Core Catcher: SILTY MUD with SILT laminae. SILTY MUD is very dark gray (5Y 3/1–5Y 3/1.5). SILT laminae are dark gray to very dark gray (5Y 4/1–5Y 3/1), deformed, and inclined. Rare SAND blebs.

SMEAR SLIDE SUMMARY (%):

	1, 48	2, 58
	M	D
Texture:		
Sand	40	3
Silt	50	47
Clay	10	50
Composition:		
Quartz	70	30
Feldspar	1	–
Heavy minerals	5	–
Clay	10	50
Opaques	–	5
Carbonate unspec.	–	7
Altered minerals	14	7

CARBONATE BOMB DATA:
*1, 112–114 cm = 0%

SITE 621 HOLE CORE 27H CORED INTERVAL 2660.9–2663.0 mbsl; 175.9–178.0 mbsf

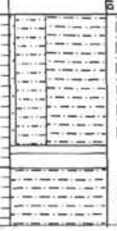
TIME – ROCK UNIT: Pleistocene

BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone

FOSSIL CHARACTER (FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS): RM

SECTION: 1, 2 — METERS: 0.5, 1.0

GRAPHIC LITHOLOGY — DRILLING DISTURBANCE — SEDIMENTARY STRUCTURES — SAMPLES: BRY IW



LITHOLOGIC DESCRIPTION

Section 1: MUD with interbedded MUDDY SAND beds and SILT laminae and blebs. MUD is very dark gray (5Y 3/1); MUDDY SAND is very dark gray (5Y 3/1); SILT is very dark gray to olive gray (5Y 3/1–5Y 4/2). MUDDY SAND beds and SILT laminae are inclined and contorted.

Section 2: MUDDY SAND/SANDY MUD. Very dark gray (5Y 3/1) and very dark grayish brown (10YR 3/2). Minor beds of deformed MUD or SILTY MUD at Section 2, 10–16 cm.

SMEAR SLIDE SUMMARY (%):

	2, 30
	D
Texture:	
Sand	25
Silt	30
Clay	45
Composition:	
Quartz	40
Feldspar	T
Mica	1
Heavy minerals	3
Clay	45
Carbonate unspec.	T
Calc. nannofossils	1
Plant debris	3
Altered minerals	7

SITE 621 HOLE CORE 28H CORED INTERVAL 2670.5–2672.0 mbsl; 185.5–187.0 mbsf

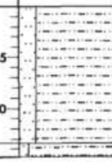
TIME – ROCK UNIT: Pleistocene

BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone

FOSSIL CHARACTER (FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS): RM (FG)

SECTION: 1, CC — METERS: 0.5, 1.0

GRAPHIC LITHOLOGY — DRILLING DISTURBANCE — SEDIMENTARY STRUCTURES — SAMPLES



LITHOLOGIC DESCRIPTION

Interlaminated SILT and MUD. Dominant color is dark gray (5Y 4/1). Section 1, 50–120 cm is very finely-laminated.

SMEAR SLIDE SUMMARY (%):

	1, 29
	D
Texture:	
Sand	T
Silt	35
Clay	65
Composition:	
Quartz	20
Clay	65
Volcanic glass	T
Opaques	2
Carbonate unspec.	5
Calc. nannofossils	T
Altered minerals	8

CARBONATE BOMB DATA:
*1, 4–6 cm = 3%

SITE 621 HOLE CORE 29H CORED INTERVAL 2680.1–2684.2 mbsl; 195.1–199.2 mbsf

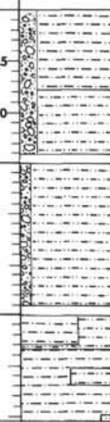
TIME – ROCK UNIT: Pleistocene

BIOSTRATIGRAPHIC ZONE: F: Zone Y; N: *E. huxleyi* Zone

FOSSIL CHARACTER (FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS): RP

SECTION: 1, 2, 3, CC — METERS: 0.5, 1.0

GRAPHIC LITHOLOGY — DRILLING DISTURBANCE — SEDIMENTARY STRUCTURES — SAMPLES: KB, OGP



CC given to Paleo.

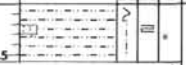
LITHOLOGIC DESCRIPTION

PEBBLY MUD. Dark olive gray (5Y 3/2) with a SANDY MUD matrix from Section 1, 0–77 cm; very dark gray (5Y 3/1–10YR 3/1) with a MUDDY matrix from Section 1, 77 cm to end of core. This is a very disorganized, very deformed, very poorly sorted PEBBLY MUD. Particles range from clay- to pebble-sized (<4 μm–3.4 cm). Gravel-sized fraction makes up 15–20% of the visible cut surface, decreasing downcore. Section 2 and 3 contain common SILTY and SANDY blebs.

SMEAR SLIDE SUMMARY (%):

	1, 30	1, 110	3, 101
	D	D	M
Texture:			
Sand	15	T	2
Silt	20	45	24
Clay	65	55	74
Composition:			
Quartz	17	39	20
Feldspar	1	T	–
Mica	1	–	–
Heavy minerals	2	3	–
Clay	65	55	74
Volcanic glass	–	T	–
Opaques	–	–	2
Carbonate unspec.	2	T	2
Foraminifers	1	2	–
Calc. nannofossils	2	T	T
Plant debris	2	–	–
Altered minerals	7	1	2

SITE 621 HOLE CORE 30H CORED INTERVAL 2684.2–2685.2 mbsl; 199.2–200.2 mbsf

TIME-ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
Pleistocene	F: Zone Y; N: *E. huxleyi* Zone	FM	FG			1	0.5				*	MUD with SILT laminae. Very dark gray (5Y 3/1) and moderately to very deformed by drilling. Common SILT laminae at Section 1, 20–30 cm.

SMEAR SLIDE SUMMARY (%):

	1, 35
	M
Texture:	
Sand	0
Silt	35
Clay	65
Composition:	
Quartz	25
Clay	64
Volcanic glass	T
Carbonate unspec.	6
Foraminifers	T
Calc. nannofossils	1
Altered minerals	4

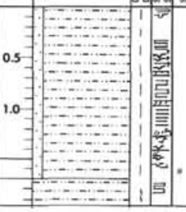
SITE 621 HOLE CORE 31H CORED INTERVAL 2685.2–2686.3 mbsl; 200.2–201.3 mbsf

TIME-ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
Pleistocene	F: Zone Y; N: *E. huxleyi* Zone	FM				1; CC	0.5; 1.0				*	MUD. Dominantly very dark gray (5Y 3/1) laminated with numerous subtle color bands. Whole core is very deformed by drilling. Section 1, 70–87 cm and the Core Catcher contain rare thin SILT laminae. SILT laminae are dark gray (10YR 4/1).

SMEAR SLIDE SUMMARY (%):

	1, 46
	D
Texture:	
Sand	0
Silt	30
Clay	70
Composition:	
Quartz	25
Clay	70
Carbonate unspec.	3
Calc. nannofossils	T
Altered minerals	2

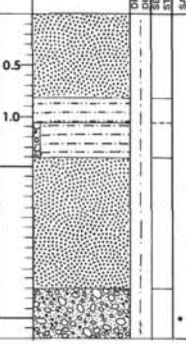
SITE 621 HOLE CORE 32H CORED INTERVAL 2686.3–2688.3 mbsl; 201.3–203.3 mbsf

TIME-ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
Pleistocene	F: Zone Y; N: *E. huxleyi* Zone	RM	FG			1; 2; CC	0.5; 1.0				*	LAMINATED MUD. Dominantly very dark gray (5Y 3/1). Laminae are both color-banded MUD and SILT laminae. Folds are defined by laminae at Section 1, 0–9, 32–40, 60–68, and 100–105 cm.

SMEAR SLIDE SUMMARY (%):

	2, 10
	D
Texture:	
Sand	0
Silt	50
Clay	50
Composition:	
Quartz	40
Mica	1
Heavy minerals	2
Clay	50
Volcanic glass	T
Carbonate unspec.	T
Foraminifers	1
Calc. nannofossils	2
Altered minerals	4

SITE 621 HOLE CORE 33H CORED INTERVAL 2696.3–2699.8 mbsl; 211.3–214.8 mbsf

TIME-ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
Pleistocene	F: Zone Y	RM				1; 2; CC	0.5; 1.0				*; •	See below

Section 1, 0–79 cm: SAND. Olive gray (5Y 4/2) and homogeneous.

Section 1, 79–105 cm: MUD with SILT laminae and blebs. Dark gray (5Y 4/1).

Section 1, 105–140 cm: SILTY MUD with minor GRAVEL. Dark olive gray (5Y 3/2).

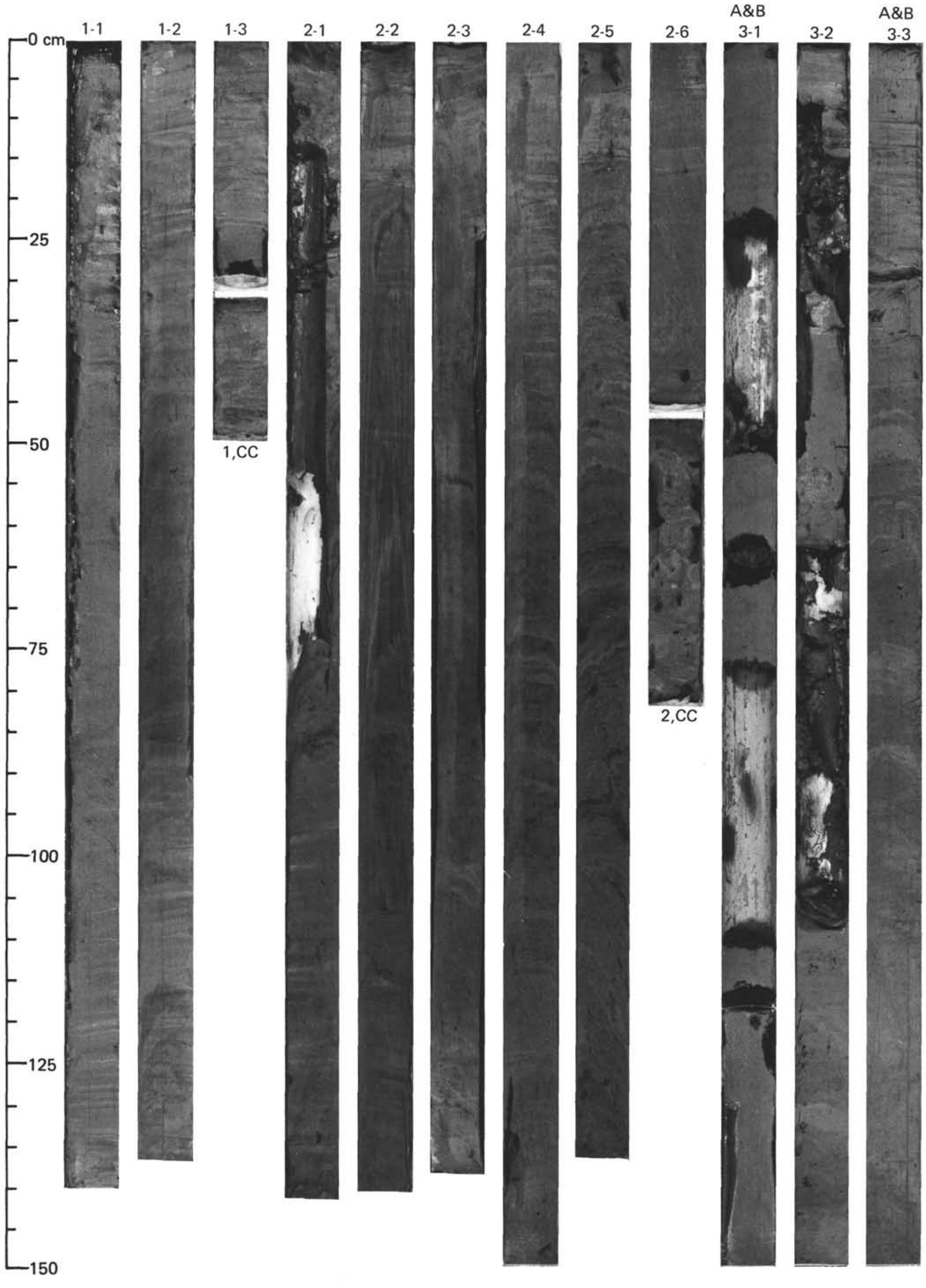
Section 1, 140 cm–Section 2, 120 cm: SAND. Olive gray (5Y 4/2), structureless, and medium-grained.

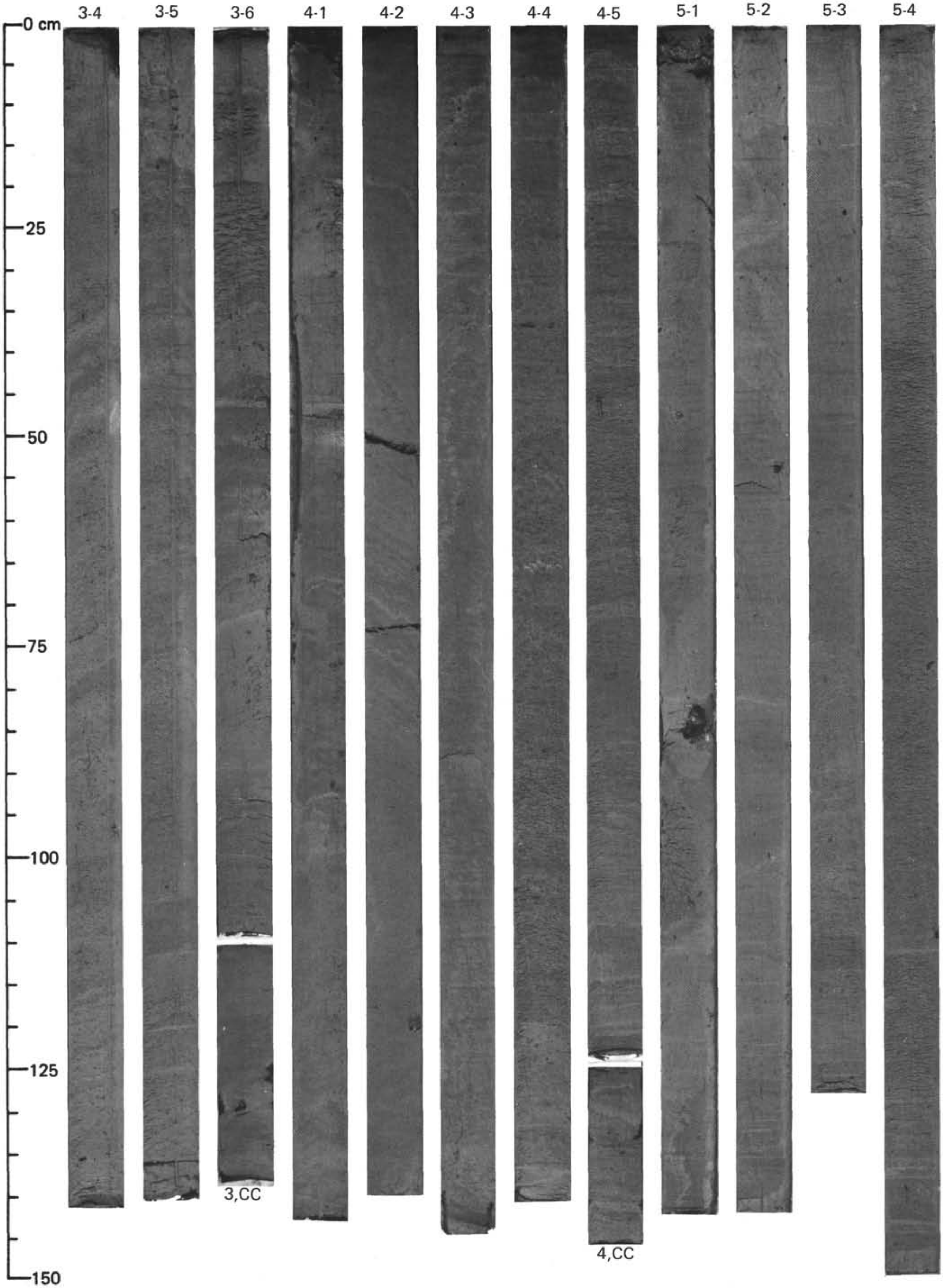
Section 2, 120 cm–Core Catcher: GRAVEL, ~ 2 mm through 2.15 cm in diameter. Composed of 45% brown chert, 25% black chert, 5% mudstone, 3% jasper, 15% quartz, 2% shell fragments, and 5% miscellaneous.

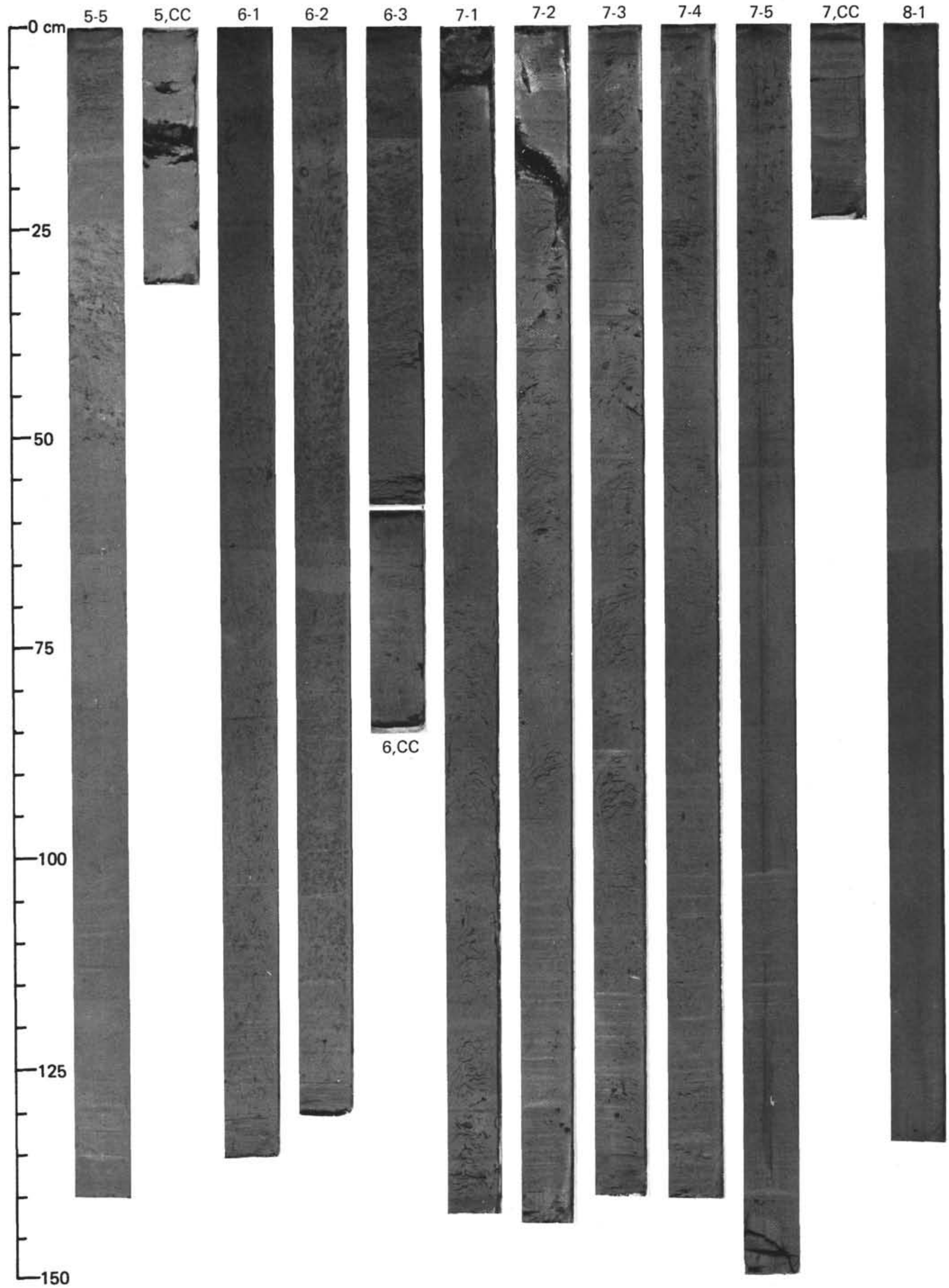
SMEAR SLIDE SUMMARY (%):

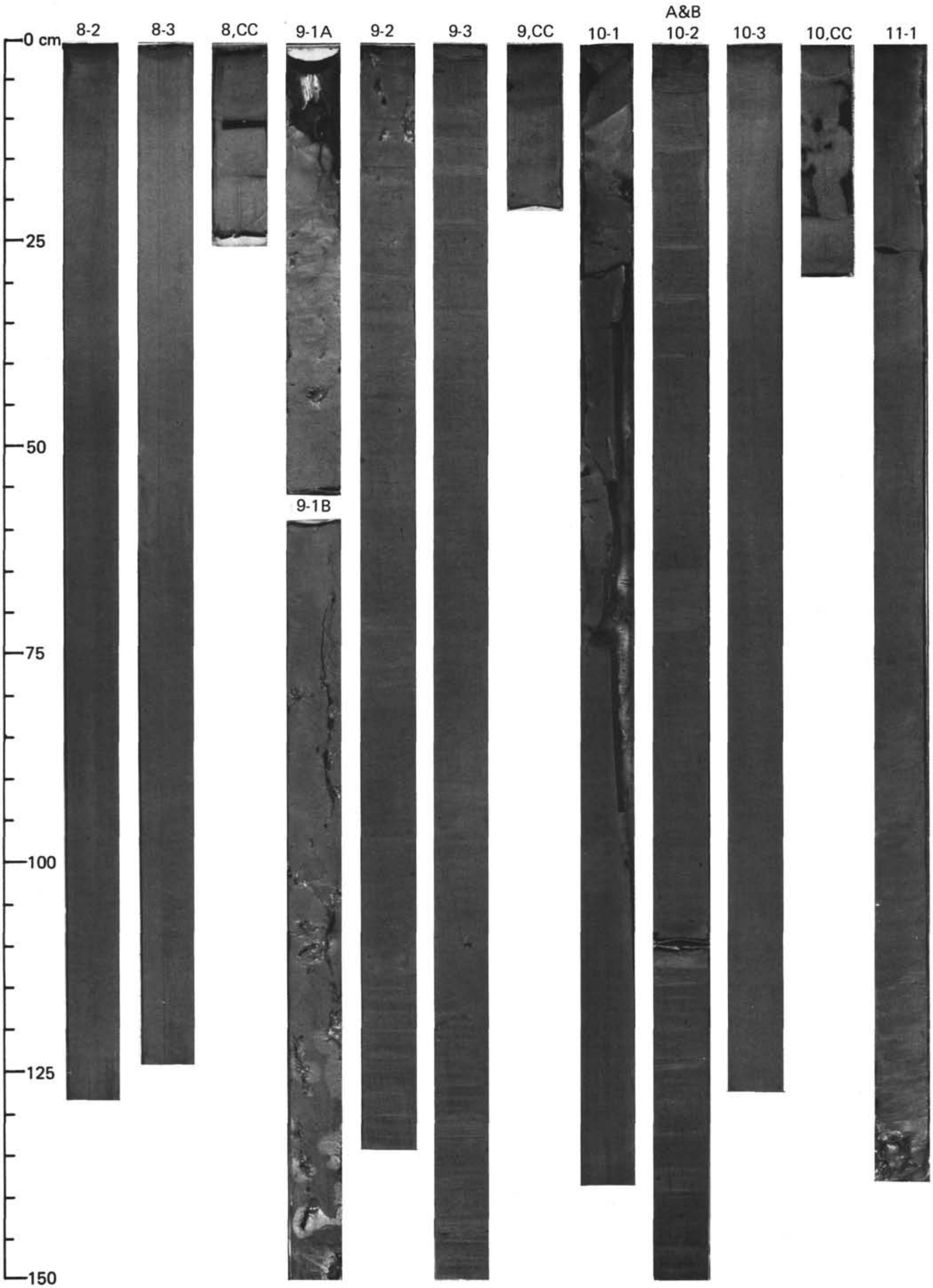
	2, 75
	D
Texture:	
Sand	95
Silt	5
Clay	0

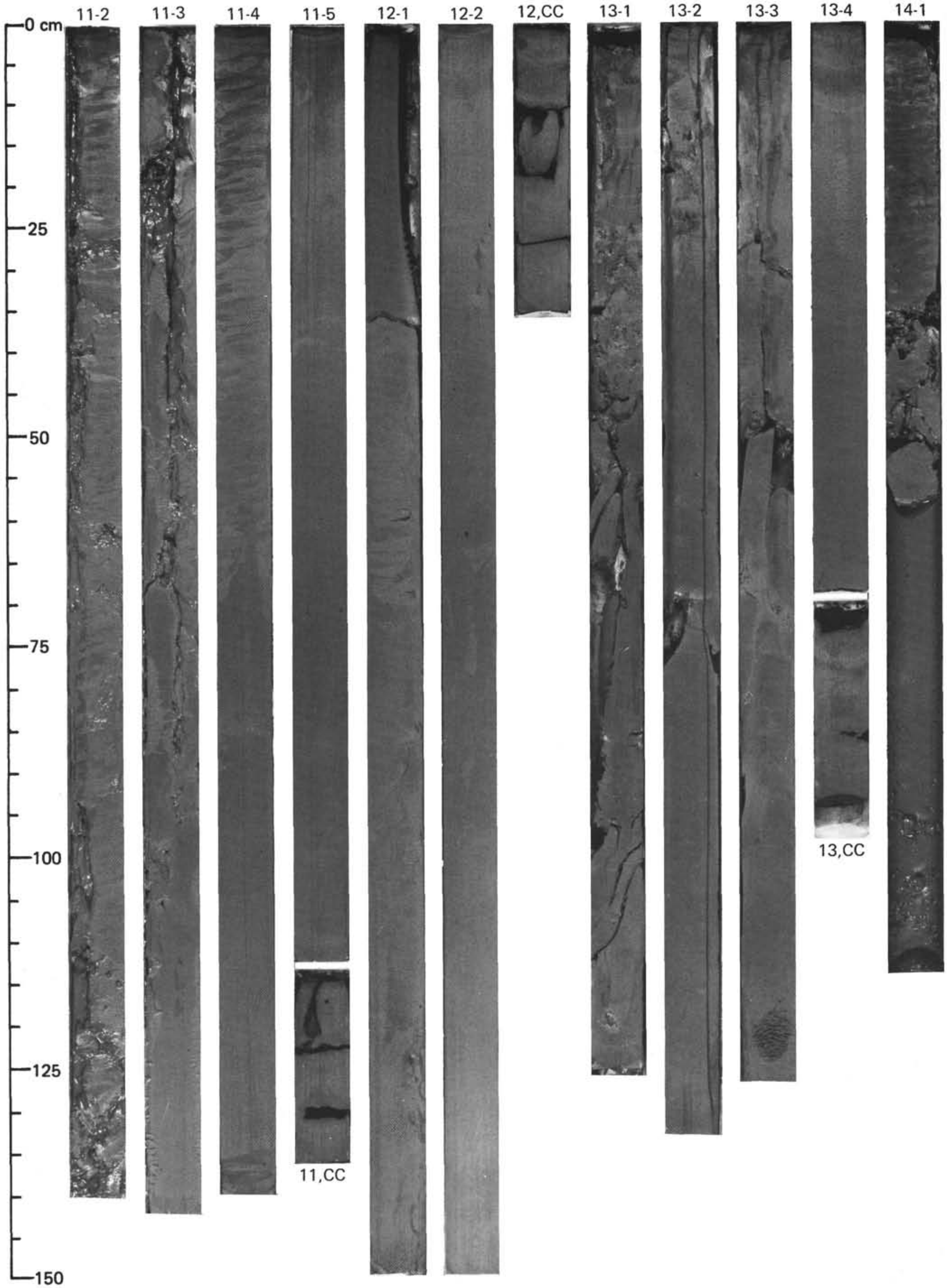
CARBONATE BOMB DATA:
• CC, 3–5 cm = 6%

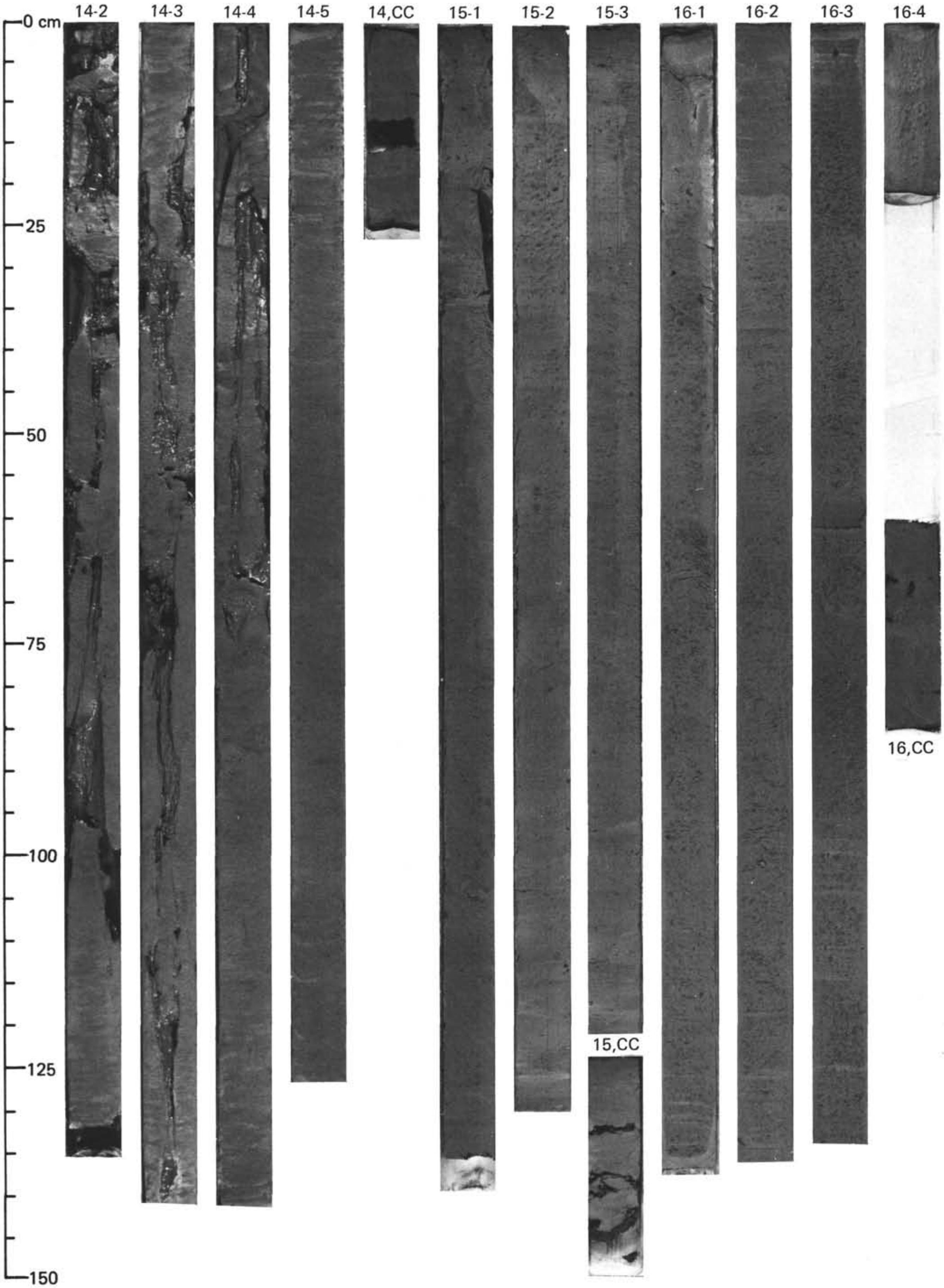

0 cm
25
50
75
100
125
150
1-1
1-2
1-3
1,CC
2-1
2-2
2-3
2-4
2-5
2-6
2,CC
A&B
3-1
3-2
A&B
3-3


3-4
3-5
3-6
4-1
4-2
4-3
4-4
4-5
5-1
5-2
5-3
5-4
0 cm
25
50
75
100
125
150
3,CC
4,CC


5-5
5,CC
6-1
6-2
6-3
7-1
7-2
7-3
7-4
7-5
7,CC
8-1
6,CC
0 cm
25
50
75
100
125
150


0 cm
25
50
75
100
125
150
8-2
8-3
8,CC
9-1A
9-1B
9-2
9-3
9,CC
10-1
A&B
10-2
10-3
10,CC
11-1


11-2
11-3
11-4
11-5
12-1
12-2
12,CC
13-1
13-2
13-3
13-4
14-1
0 cm
25
50
75
100
125
150
11,CC
13,CC


0 cm
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14-2
14-3
14-4
14-5
14,CC
15-1
15-2
15-3
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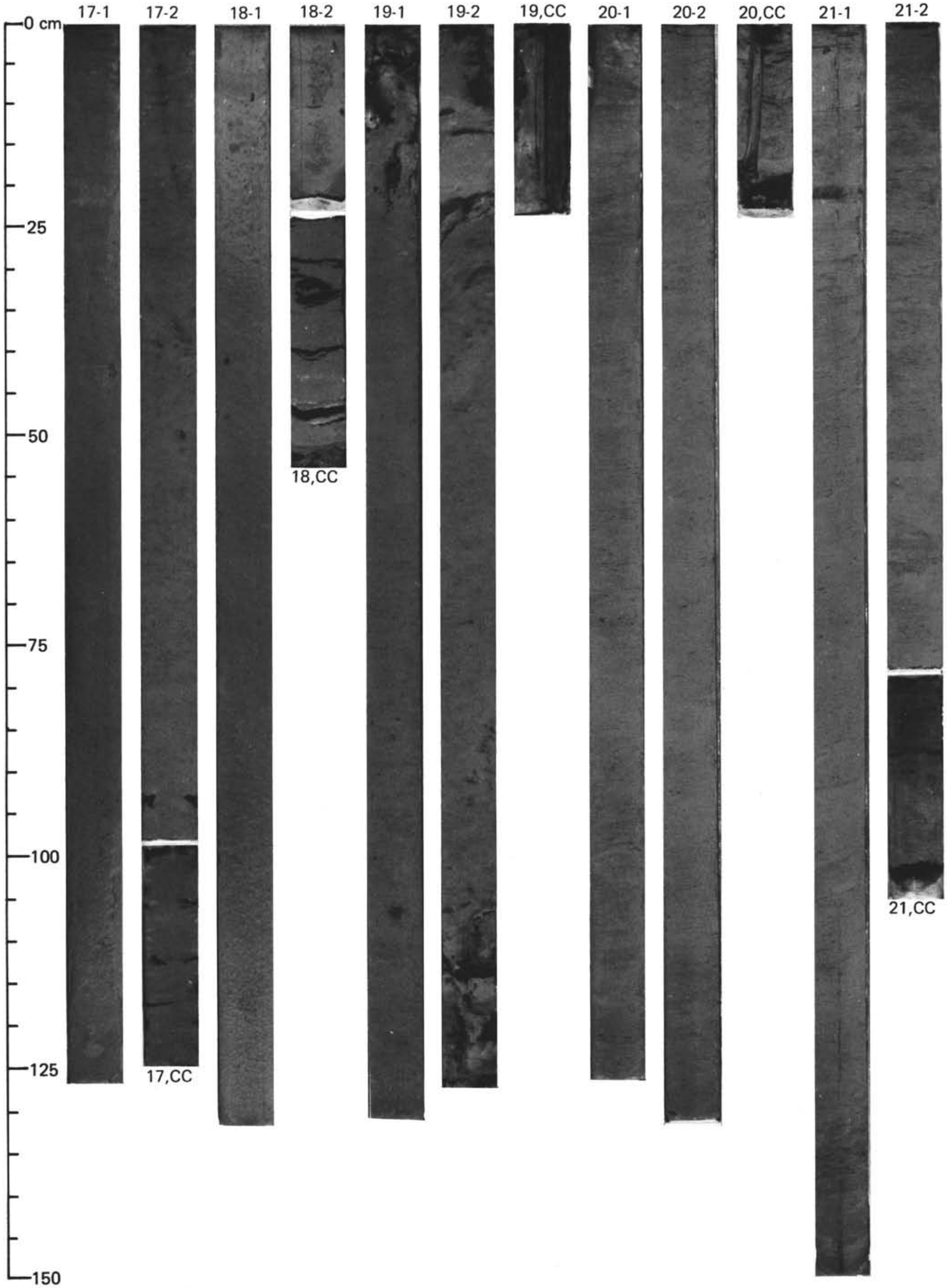
16-1
16-2
16-3
16-4
16,CC


17-1
17-2
18-1
18-2
19-1
19-2
19,CC
20-1
20-2
20,CC
21-1
21-2
0 cm
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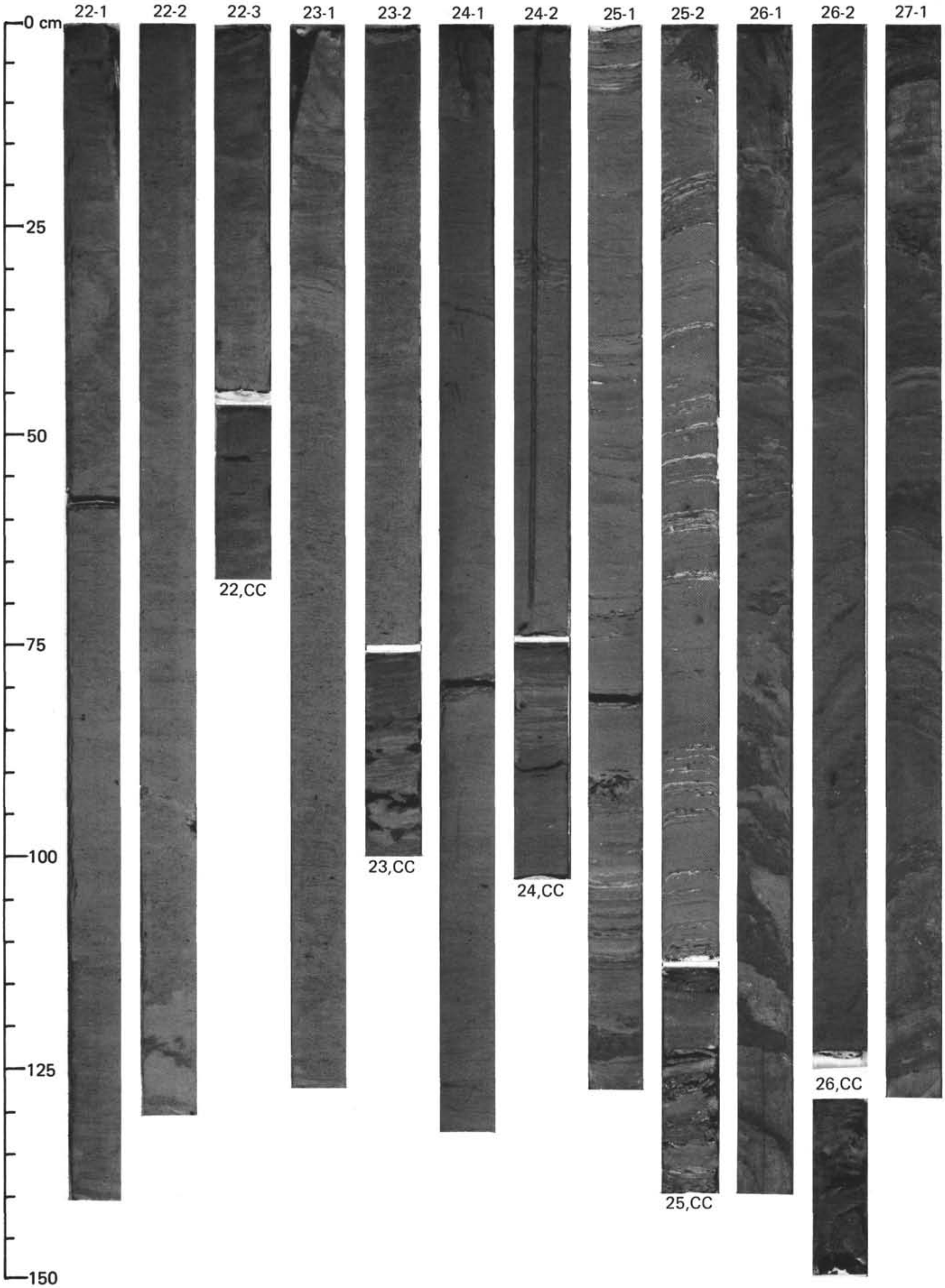
18,CC
17,CC
21,CC


0 cm
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22-1
22-2
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22,CC
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23-2
23,CC
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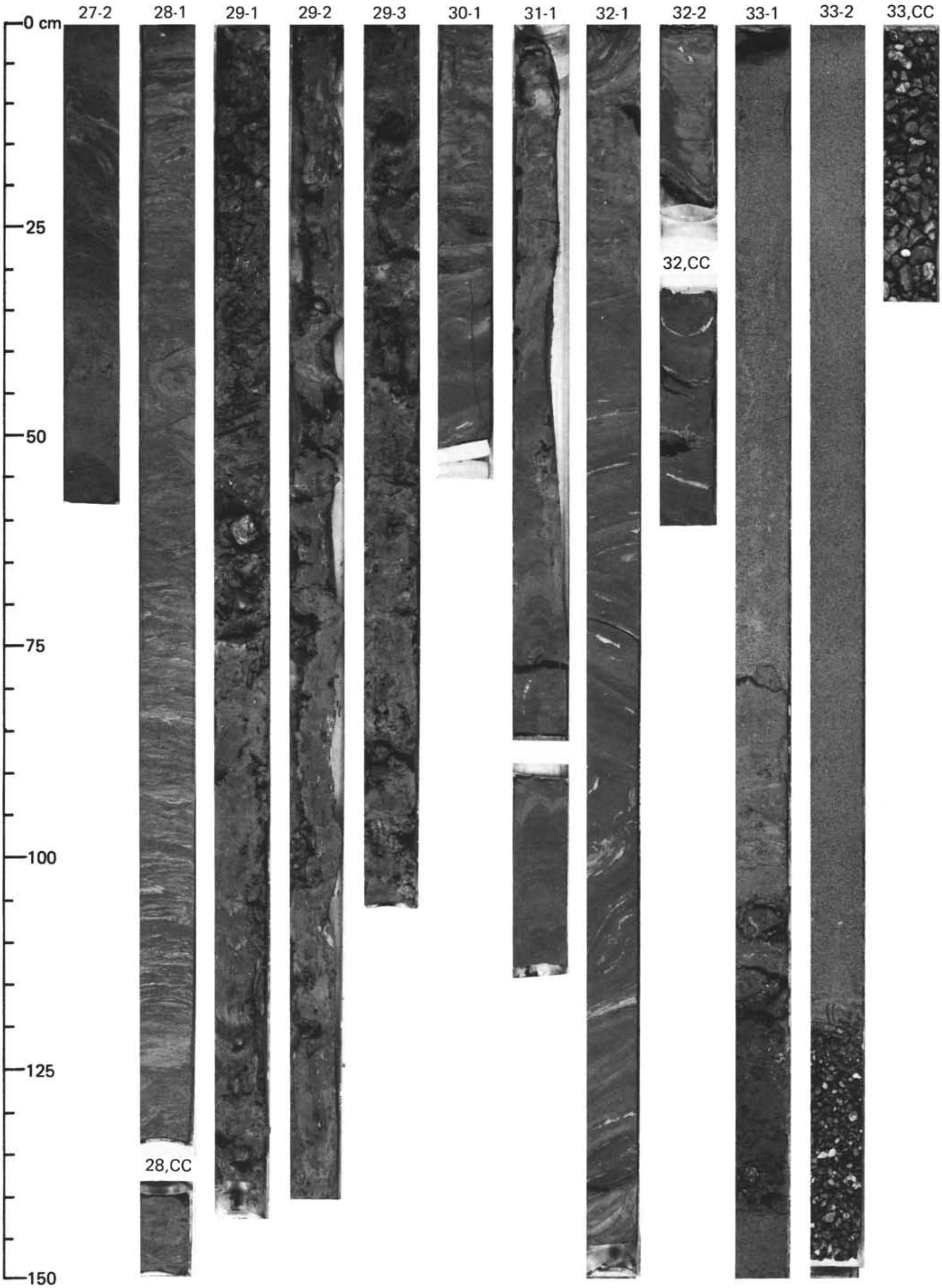
26-2
26,CC
27-1


0 cm
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125
150
27-2
28-1
28,CC
29-1
29-2
29-3
30-1
31-1
32-1
32-2
32,CC
33-1
33-2
33,CC