5. SITE 497: MIDDLE AMERICA TRENCH UPPER SLOPE[1]

Shipboard Scientific Party[2]

HOLE 497

Date occupied: 1 June 1979

Date departed: 5 June 1979

Time on hole: 92.6 hours

Position: 12°59.23′N; 90°49.68′W

Water depth (sea level; corrected m, echo-sounding): 2347

Water depth (rig floor; corrected m, echo-sounding): 2357

Bottom felt (m, drill pipe): 2358

Penetration (m): 396.5

Number of cores: 42

Total length of cored section (m): 396.5

Total core recovered (m): 224.57

Core recovery (%): 56.6

Oldest sediment cored:
Depth sub-bottom (m): 396.5
Nature: Nannofossil mudstone
Age: Early Pliocene

Basement: Not reached

Principal results: As at Site 496, Site 497 was also abandoned about 500 meters short of the primary objective because of gas hydrates. Once again that objective was a landward-dipping reflector thought to represent an imbricate thrust slice. As at Site 496, Quaternary olive gray diatomaceous mud overlies a section of Pliocene sand, pebbly mud, limestone, and mudstone, and near-vertical, dark-colored veinlets occur in the lower, more lithified unit. The Pliocene section, however, is much thicker at Site 497 than at Site 496.

Quaternary and Pliocene microfossils are abundant at Site 497, and there are no unusual age discrepancies. The pebbly mudstones of the lower unit correspond to times of rapid sedimentation. Physical properties distinguish the three lithologic units cored at this site.

Gas hydrates necessitated that the site be abandoned. The methane/ethane ratio in pieces of frozen vitric sand were higher than at equivalent depths at Site 496. Variation of this ratio between sites and the variation of trace amounts of heavier hydrocarbons indicate local variability of hydrocarbon composition.

BACKGROUND AND OBJECTIVES

Site 497 is situated in the upper trench slope in about 2350 meters of water, 3650 meters above and 42 km from the trench axis (Fig. 1). The site was selected during the voyage to achieve objectives not met at Site 496, specifically the sampling of a landward-dipping horizon masking a high-velocity substance at depth. A similar landward-dipping reflection recorded in seismic record GUA-13 at about 1000 meters sub-bottom depth at Site 497 is thought to represent a horizon immediately overlying the target represented at Site 496. At no other locale along the Guatemala transect is the landward-dipping reflection within reach of the *Glomar Challenger* capability. In addition, it appears that the part of the slope apron not recovered at 496 is present at a shallower depth at 497. In short, the objectives at Site 497 were to document the chronology of development of the margin and to determine the rock and sediment types of which this margin is composed, to obtain well logs that might refine the interpretation of seismic reflection records, and to link the geology on land to the geology of the trench slope.

OPERATIONS

Glomar Challenger departed Site 496 on June 1 at 1455. Permission had been granted by radio only a few hours earlier to occupy Site 497. The beacon was dropped at 1642 during the first pass over Site 497. The drill string was lowered, and the first core was recovered on June 2 at 0136 (Table 1).

After coring to a sub-bottom depth of 396.5 meters, this hole was abandoned because of gas hydrate. Logging was partially successful; formation density and caliper and temperature logs were obtained. The hole was cemented prior to departure.

LITHOSTRATIGRAPHY

Introduction

Site 497, located 8 km seaward of Site 496, is on the midslope in water 2350 meters deep. Drilling penetrated 396.5 meters of lower Pliocene to Quaternary sediments. On the basis of the sedimentary characteristics, three units can be distinguished (Fig. 2). These units roughly correspond to the first unit drilled at Site 496.

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[1] Aubouin, J., von Huene, R., et al., Init. Repts. DSDP, 67: Washington (U.S. Govt. Printing Office).

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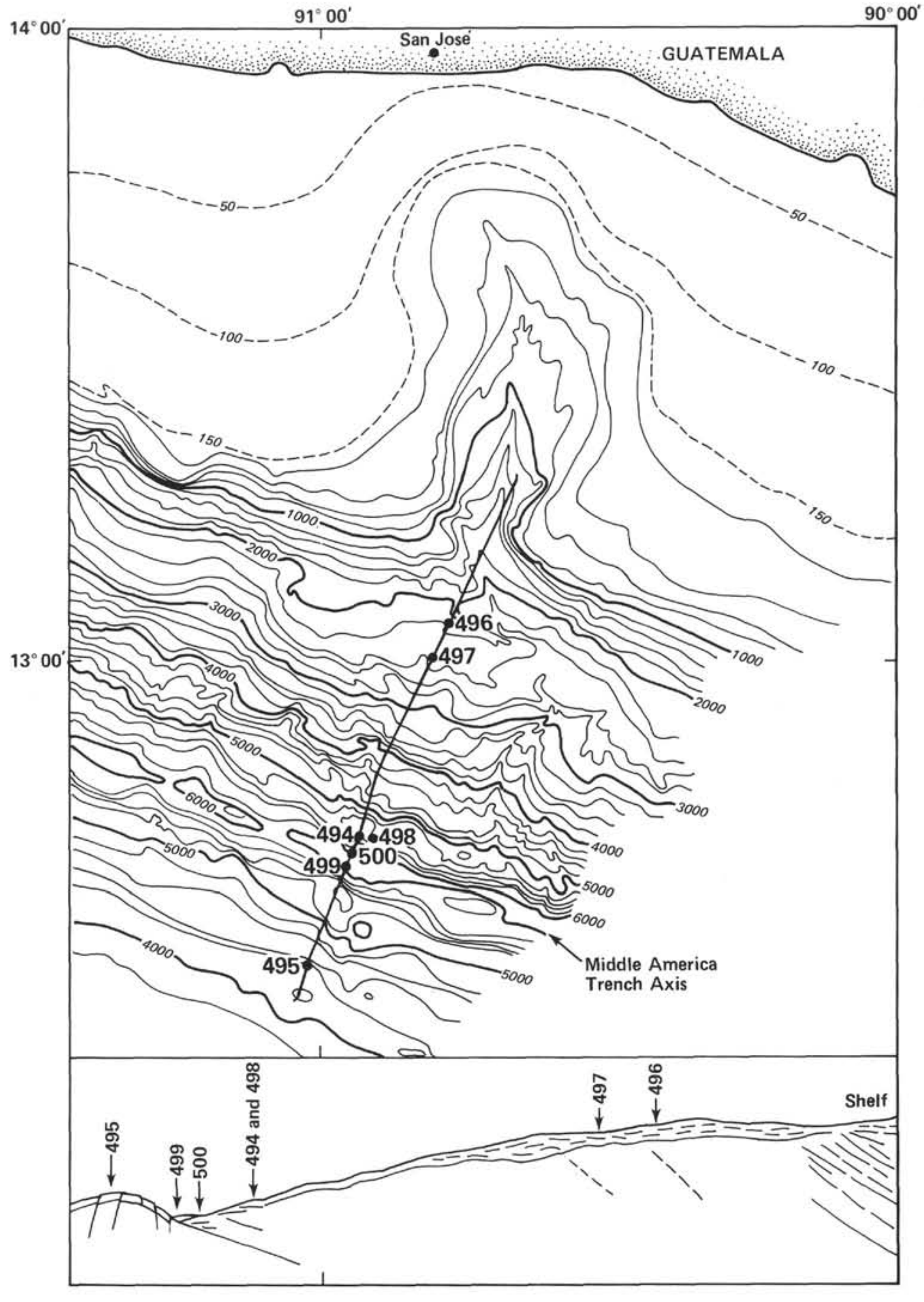


Figure 1. Location map and cross section showing position of Site 497.

Unit 1 (Cores 1 to 16; 0.0–149.5 m sub-bottom depth; Quaternary)

The sediments of Unit 1 are predominantly olive gray (5Y 3/2) mud with some lighter-shaded (5Y 4/2) parts and are soft enough throughout to have been swirled by drilling. Clay minerals and minor volcanic glass are the terrigenous and eolian components; nannofossils, diatoms, and other microfossils make up the biogenic component and may attain proportions up to 45%. The lighter-colored part seems slightly more glassy or diatomaceous and poor in clay minerals. Thin layers (0.5–2 cm) and patches (1–3 cm in size) of dark colored (N5, 5Y 2.5/1) ash, many deformed into irregular blobs by drilling, as well as glassy sand and glauconitic sand are interbedded in some cores (Cores 7, 9, 13, 14). Small spots (0.5–2 cm) of white, pale gray, or olive gray ash are also present in many of the cores of this unit. Shell fragments were found in mud of Cores 2, 7, and 9, a scaphopod (5 cm long) in Core 1, and a wood fragment in Core 15.

Disturbed sedimentary features are characteristic; the sediment is soupy in many cores, especially those cores

Table 1. Coring summary for Hole 497.

Core No.	Date (June, 1979)	Local Time (L)	Depth from Drill Floor (m; top–bottom)	Sub-bottom Depth (m; top–bottom)	Length Cored (m)	Length Recovered (m)	Recovery (%)
1	2	0136	2358.0–2365.0	0.0–7.0	7.0	6.65	95
2	2	0229	2365.0–2374.5	7.0–16.5	9.5	9.02	95
3	2	0313	2374.5–2384.0	16.6–26.0	9.5	4.05	43
4	2	0405	2384.0–2393.5	26.0–35.5	9.5	1.38	14
5	2	0454	2393.5–2403.0	35.5–45.0	9.5	4.64	49
6	2	0543	2403.0–2412.5	45.0–54.5	9.5	0.69	7
7	2	0638	2412.5–2422.0	54.5–64.0	9.5	7.95	84
8	2	0808	2422.0–2431.5	64.0–73.5	9.5	0.05	>1
9	2	0904	2431.5–2441.0	73.5–83.0	9.5	5.85	55
10	2	1005	2441.0–2450.5	83.0–92.5	9.5	5.25	50
11	2	1058	2450.5–2460.0	92.5–102.0	9.5	3.70	39
12	2	1154	2460.0–2469.5	102.0–111.5	9.5	8.46	89
13	2	1256	2469.5–2479.0	111.5–121.0	9.5	7.76	82
14	2	1400	2479.0–2488.5	121.0–130.5	9.5	3.16	33
15	2	1500	2488.5–2498.0	130.5–140.0	9.5	8.75	92
16	2	1607	2498.0–2507.5	140.0–149.5	9.5	9.25	97
17	2	1709	2507.5–2517.0	149.5–159.0	9.5	3.94	41
18	2	1814	2517.0–2526.0	159.0–168.5	9.5	6.21	65
19	2	1913	2526.0–2536.0	168.5–178.0	9.5	5.88	62
20	2	2015	2536.0–2545.5	178.0–187.5	9.5	5.18	54
21	2	2115	2545.5–2555.0	187.5–197.0	9.5	0.0	0
22	2	2220	2555.0–2564.5	197.0–206.5	9.5	0.0	0
23	2	2323	2564.5–2574.0	206.5–216.0	9.5	3.73	39
24	3	0047	2574.0–2583.5	216.0–225.5	9.5	5.00	53
25	3	0154	2583.5–2593.0	225.5–235.0	9.5	4.26	45
26	3	0305	2593.0–2602.5	235.0–244.5	9.5	3.94	41
27	3	0402	2602.5–2612.0	244.5–254.0	9.5	3.39	36
28	3	0508	2612.0–2621.5	254.0–263.5	9.5	7.96	84
29	3	0610	2621.5–2631.0	263.5–273.0	9.5	9.75	100
30	3	0719	2631.0–2640.5	273.0–282.5	9.5	10.03	100
31	3	0816	2640.5–2650.0	282.5–292.0	9.5	8.55	90
32	3	0923	2650.0–2659.5	292.0–301.5	9.5	1.49	16
33	3	1024	2659.5–2669.0	301.5–311.0	9.5	0.15	2
34	3	1149	2669.0–2678.5	311.0–320.5	9.5	3.90	41
35	3	1249	2678.5–2688.0	320.5–330.0	9.5	7.68	81
36	3	1416	2688.0–2697.5	330.0–339.5	9.5	8.42	89
37	3	1528	2697.5–2707.0	339.5–349.0	9.5	5.86	62
38	3	1640	2707.0–2716.5	349.0–358.5	9.5	7.40	78
39	3	1806	2716.5–2726.0	358.5–368.0	9.5	7.34	77
40	3	1907	2726.0–2735.5	368.0–377.5	9.5	6.82	72
41	3	2024	2735.5–2745.0	377.5–387.0	9.5	4.20	44
42	3	2145	2745.0–2754.5	387.0–396.5	9.5	6.91	73

from the upper part of this unit. Laminations and mottling are discernable. Degassing phenomena, such as bubbling and small tension cracks, are common on sliced surfaces of the cores, especially in the middle part of this unit.

Unit 2 (Cores 17 to 24, Section 1; 149.5–217 m sub-bottom depth; upper Pliocene and/or Quaternary)

This unit can be distinguished from Unit 1 by frequent intercalation of sandy and pebbly layers, higher induration of the muddy sediments recovered, and the appearance of veinlets.

Intraformational pebbly mud, more than 2 meters thick, is present in Core 23. That mud includes variably shaped clasts up to 4 cm in diameter. Drilling fragments of olive gray (5Y 4/2) semifirm mudstone are abundant in the much softer matrix of dark olive gray (5Y 3/2) mud. Some clasts are prolate and are well-rounded. A similar intraformational pebbly mud was recovered in Core 24, and the base of the pebbly mud layer is selected as the base of Unit 2. Pebbly mudstone may have been lost from Cores 21 and 22; both were recovered entirely void.

Coarse-grained sand layers include pecten valves, scaphopods, microgastropods, benthic foraminifers, pumice fragments, quartz grains, and pyrite. Benthic fossils contained in these sand layers, together with pebbly muds, indicate rapid transportation of terrigenous sediments from a shallow-water environment.

The muddy sediments of Units 1 and 2 are similar in color and constituents, except that nannofossil-rich sediments were not found in Unit 2, and the upper part of this unit is somewhat diatomaceous. Spots or small patches of white and light gray ash, and a black spot, rich in opaque minerals, occur in Unit 2. Core 19 includes a pebble of very fine-grained, altered, felsic, gray, volcanic rock, composed of K-feldspar, quartz, sericitic mica, and pyrite.

The character of disturbance in Unit 2 is somewhat different from that in Unit 1 because Unit 2 sediment is more indurated. Veinlets, features identical to those in Cores 30–37 of Site 496, first occur in Core 17, the uppermost core of Unit 2. Biscuits of dark olive gray (5Y 3/2) mudstone with anastomosing darker veinlets appear in Cores 17, 18, 19, 20, and 23, though some of them are poorly formed.

Unit 3 (Core 24, Section 1–Core 42; 217–396.5 m sub-bottom depth; lower to upper Pliocene)

The absence of coarse-grained layers distinguishes Unit 3 from Unit 2. This unit is dominated by a dark olive gray (5Y 3/2) and olive gray (5Y 4/2) semi-indurated mudstone that resembles mud of Units 1 and 2 in color and constituents. The mudstones in this unit are generally poor in fossils, but in some parts (Cores 26–29 and 40–42) are nannofossiliferous and somewhat lighter colored.

A variety of components are scattered throughout the unit. A hard, white to pale gray or pale olive gray (5Y 8/1), micritic limestone is intercalated in the upper and the lower parts of this unit (Cores 26 and 36). Several cores contain dark colored (5Y 4/1, N4, etc.) sandy

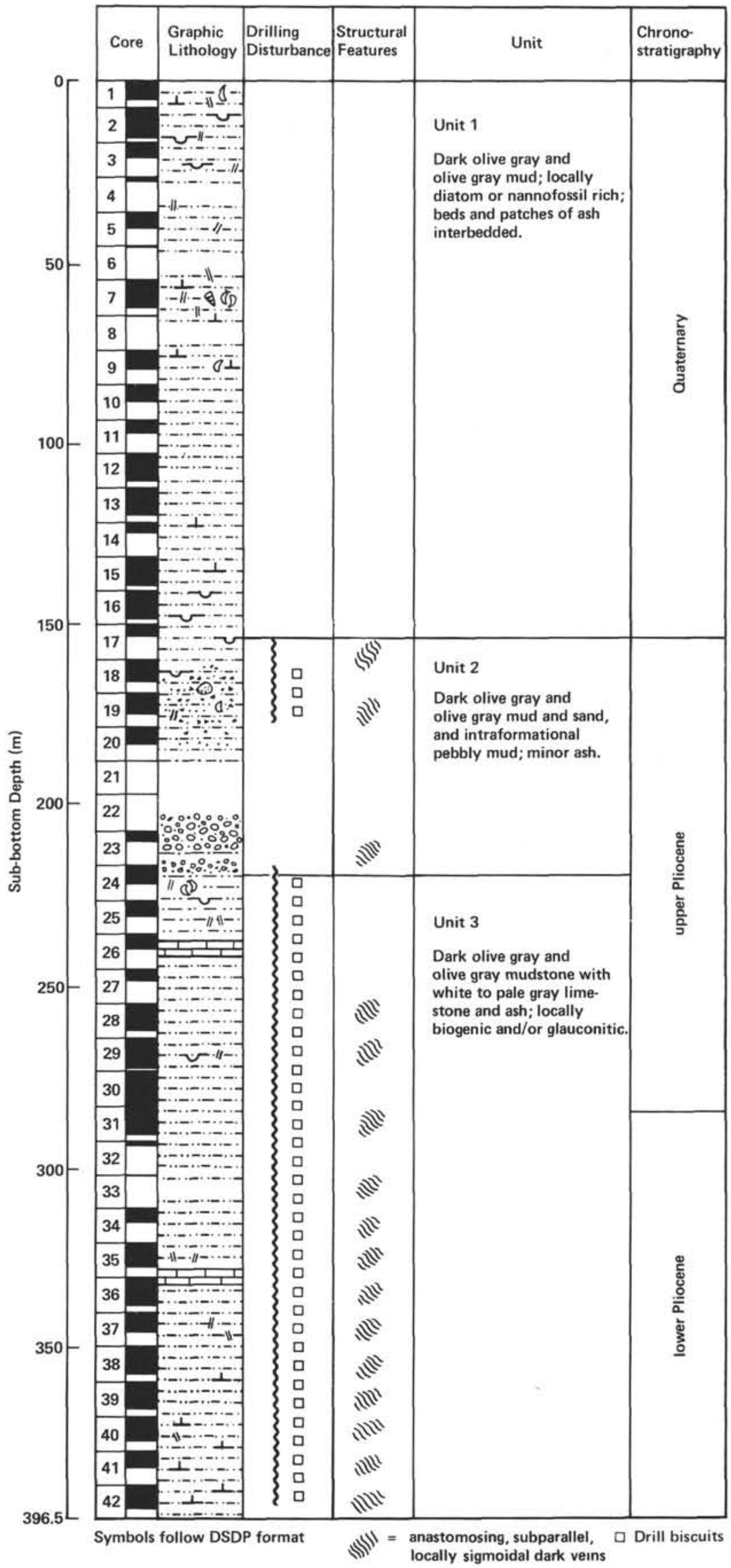


Figure 2. Summary lithologic column for Site 497.

layers, volcanic sand layers, and white patches of vitric ash. A few layers attain more than 10-cm thickness. The light color and layers and pebbly mud characteristic of Unit 2 are not found in Unit 3, except for local thin layers of very fine sand observed in some drilling biscuits. Other minor constituents include fragments of brown fibrous wood (2 × 3 cm) in Core 38 and scattered glauconite grains in the lowermost part of Unit 3 (Cores 35, 40, 41, and 42).

Summary

The dominant lithology of the cores at Site 497 is dark olive gray to olive gray hemipelagic to hemiterrigenous mud and mudstone, containing various microfossil groups. Three lithologic units are distinguished on the basis of the coarse-grained sediments in the middle part of the sequence.

Unit 1 is Quaternary; Unit 3 is lower to upper Pliocene, and Unit 2 is a product of rapid sedimentation in a very short period around the boundary between the Pliocene and Pleistocene.

Sets of parallel and sigmoidal dark veins, analogous to structure at Site 496, are abundant in and below Section 1 of Core 25. These are interpreted as dewatering conduits, and their consistent, approximately vertical orientation suggests they formed in a nonhydrostatic stress field.

PHYSICAL PROPERTIES

Bulk Density and Water Content

Bulk density (Fig. 3) generally increases with depth, with greatest variability in the gas-charged interval between 60 to 270 meters. Large numbers of voids and fissures indicate disturbance by the expansion of gas upon removal from *in situ* pressures and temperatures.

Bulk density reaches its maximum at 290 meters (Core 30) and remains relatively constant at 1.60 Mg/m^3 to the base of the hole. That maximum might mark a different sedimentary unit, however, the generalized stratigraphy indicates that a lithologic break occurs in Core 24, Section 1 at about 220 meters (Fig. 2). The position of this latter boundary is not clearly observed in the mass properties.

Water content decreases sharply from the surface down to 60 meters and then more gradually to the base of the hole. Considerable variation was seen in this parameter, generally attributable to the disturbing effects of the gas expansion in the sediment while in the core barrel.

The general effect of the gas was the creation of a wider variation in these bulk properties than normally attributable to lithologic changes and/or drilling disturbance. The "blurring" effect was especially noticeable on GRAPE records, causing difficulty in selecting a "best-fit" line of average density.

Sound Velocity

Although numerous attempts were made to measure sound velocity at the site, efforts were unsuccessful until

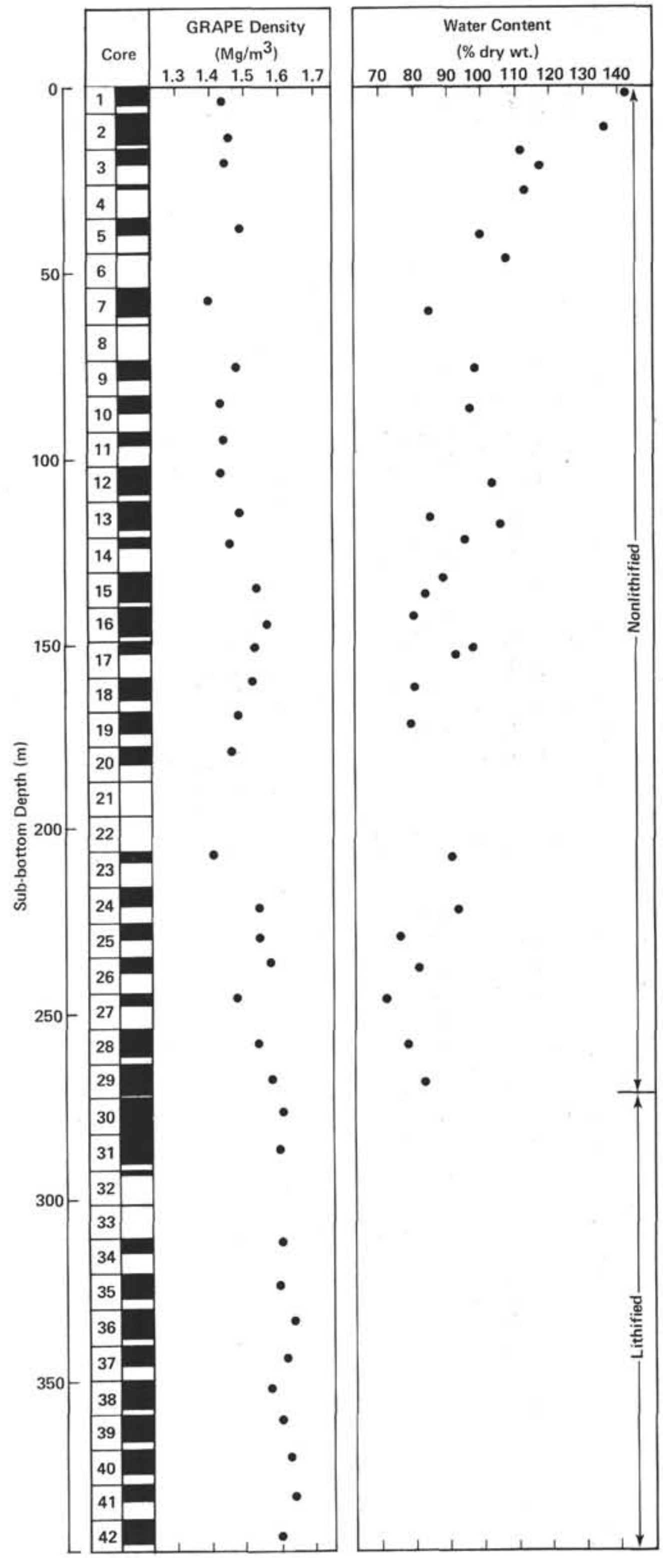


Figure 3. GRAPE density and water content profile for Site 497.

lithified rock was encountered. Four velocity measurements indicated the following:

Core	Section	Interval (cm)	V_p (km/s)
31	2	16	1.72
34	3	110	1.60
35	5	42	1.47
36	4	132	1.60

The above velocities are considered typical for the depth and sediment type.

The difficulty in obtaining velocity measurements is attributed to: (1) the gassy state of the sediments, particularly in the unlithified section, and (2) the fracturing and fissuring of the more lithified portion of the sediment column.

Shear Strength

Figure 4 shows that shear strength increases gradually with depth. The scatter of values is expected inasmuch as the interval from Core 10 (90 m) to Core 29 (275 meters) included highly gas-charged sediments.

Three zones are observed. Zone 1 (mud line to 90 m shows low shear strength (average 8.92 kPa) and little variation (s = 4.09). A gradual increase from 5.0 kPa to 15 kPa is observed. Zone 2 (90–274 m) shows an abrupt increase in shear strength (average 28.91 kPa) and considerable variation (s = 17.37). Zone 3 (285–315 m) resulted in a six-fold increase in shear strength (average = 323.2 kPa; s = 45.81) associated with a sharp increase in lithification. Below 315 meters, measurements were no longer possible.

Table 2 summarizes Site 497 physical properties.

GEOPHYSICS

We drilled at Site 497 to achieve some of the objectives not met at Site 496, which was abandoned for safety reasons. The principal target at Site 496, a landward dipping reflector at the top of a presumed slab of igneous rock, is not present at Site 497. However, an equivalent of the rock immediately overlying the igneous body appears to occur at Site 497 at a depth shallow enough to be readily drilled by the *Glomar Challenger*. Study of seismic records suggests that the Miocene and older units would be shallower at Site 497 than at Site 496.

The seismic line made by the *Challenger* from Sites 496 to 497 shows a lower reflective sequence apparently continuous from one site to the other (Fig. 5; reflector [X]). The section above this sequence is much thinner at 497 than at 496. The Miocene section drilled at 496 should have been penetrated within 240 meters at 497, however, at Site 497, we bottomed at 397 meters still in Pliocene rock, 157 meters beyond the seismically determined Miocene boundary.[3]

BIOSTRATIGRAPHY

At Site 497, 200 meters (Cores 1–22) of biogenic and hemiterrigenous mud and 170 meters (lower part of Core 24–Core 42) of biogenic mudstone were cored, with about 15 meters of pebbly mudstone (Cores 23 and the top of Core 24) separating the upper from the lower unit. Both major sediment types are rich in microfossils, including diatoms, radiolarians, calcareous nannoplankton, and planktonic and benthic foraminifers; fecal pellets occur down to Core 19, and ostracodes were observed occasionally down to Core 10.

Biostratigraphic markers delineating late Pleistocene through Pliocene (ca. 4.0 Ma) are common throughout the cores, and no unusual age discrepancies were ob-

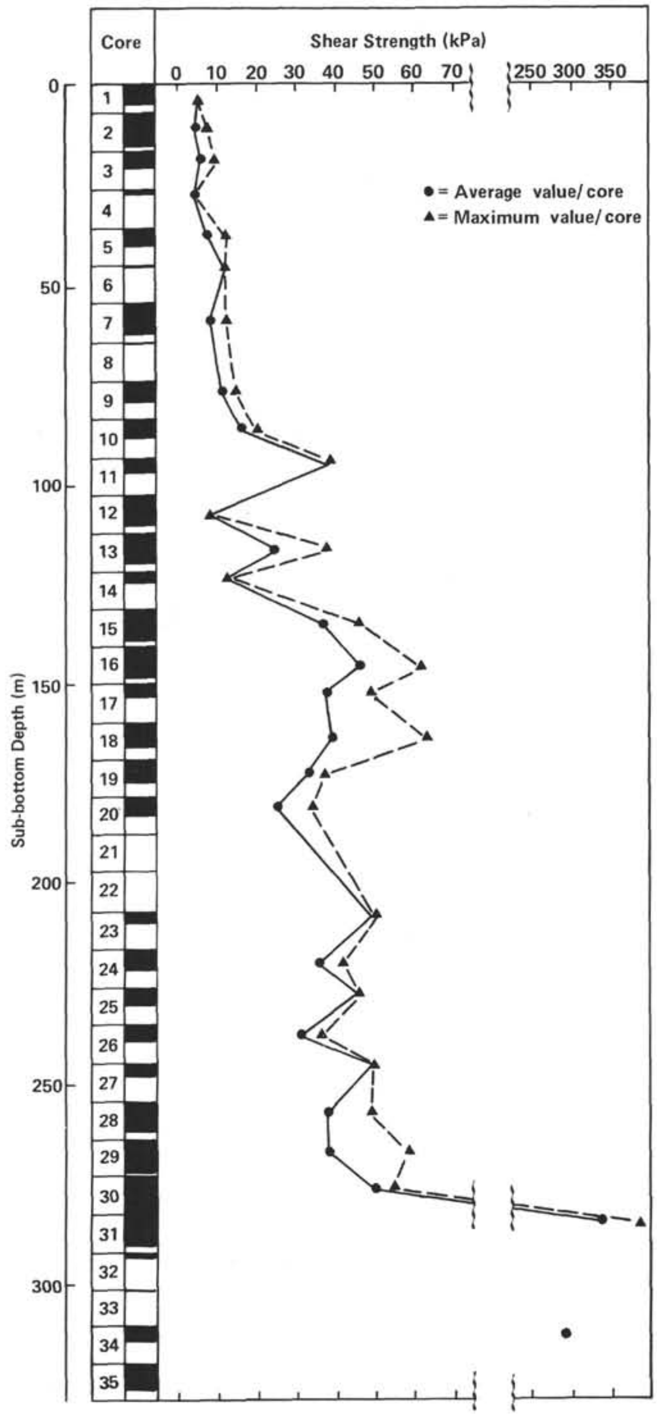


Figure 4. Shear strength of sediments at Site 497.

[3] Since this report was written, the record has been reprocessed; the dark boundary appears to be a reflection from the base of the gas hydrate zone at least to point [X].

Table 2. Physical properties, Site 497.

Sample (core-section, interval [cm])	GRAPE Wet-Bulk Density (Mg/m^3)	*P*-Wave Velocity (km/s)	Acoustic Impedance ($\times 10^5$ $g/cm^2 \cdot s$)	Shear Strength (kPa)	Water Content (% dry wt.)	Porosity (vol. %)
1-1, 98–102	1.44	—	—	5.55	142.4	78.6
1-4, 48–50	—	—	—	4.60	—	—
2-1, 138–140	—	—	—	5.74	136.5	77.9
2-4, 115–118	1.43	—	—	5.74	—	—
2-6, 112–114	—	—	—	6.32	111.5	74.3
3-3, 60–64	1.42	—	—	6.13	—	—
3-3, 80–82	1.43	—	—	6.70	116.9	75.2
4-1, 110–112	—	—	—	5.27	113.0	74.5
5-1, 80–84	1.46	—	—	11.11	—	—
5-3, 80–84	—	—	—	7.28	100.3	72.2
6-1, 45–47	—	—	—	12.64	107.3	73.1
7-1, 130–132	—	—	—	6.13	—	—
7-4, 100–102	1.50	—	—	12.26	85.1	73.6
9-2, 14–16	1.50	—	—	13.41	—	—
9-3, 20–22	—	—	—	9.19	96.8	71.5
10-2, 60–62	1.48	—	—	13.41	—	—
10-4, 30–32	1.50	—	—	18.77	96.5	71.5
11-1, 142–144	—	—	—	38.30	—	—
12-6, 76–78	—	—	—	35.91	103.5	72.9
13-4, 92–94	1.43	—	—	20.10	84.7	68.6
13-7, 118–120	—	—	—	36.39	105.0	73.2
14-3, 63–65	1.48	—	—	12.06	95.7	71.3
15-1, 134–136	1.45	—	—	41.17	—	—
15-2, 133–135	1.45	—	—	44.05	88.8	69.8
15-5, 131–133	1.55	—	—	28.73	—	—
15-6, 140–142	—	—	—	44.05	83.8	68.4
16-2, 129–131	1.56	—	—	61.29	80.0	67.4
16-4, 89–91	1.55	—	—	33.52	—	—
16-6, 78–80	1.54	—	—	54.58	—	—
16-8, 30–32	—	—	—	33.52	96.3	71.4
17-1, 140–142	—	—	—	38.30	—	—
17-2, 50–52	1.55	—	—	47.88	—	—
17-3, 50–52	—	—	—	28.73	92.4	70.5
18-1, 99–101	1.50	—	—	19.15	—	—
18-3, 68–70	—	—	—	62.24	80.0	66.7
18-6, 40–42	—	—	—	33.52	—	—
19-2, 123–125	1.50	—	—	32.56	—	—
19-4, 113–115	1.55	—	—	36.39	79.6	67.3
20-3, 12–14	—	—	—	33.52	126.4	76.7
20-5, 90–92	1.47	—	—	19.15	—	—
23-3, 10–14	—	—	—	49.79	90.6	70.2
24-2, 70–72	1.55	—	—	39.26	—	—
24-4, 50–54	1.56	—	—	33.52	—	—
25-1, 90–92	1.51	—	—	44.05	—	—
25-4, 32–34	—	—	—	45.96	—	—
26-1, 100–102	—	—	—	33.52	—	—
26-3, 100–102	1.53	—	—	28.73	—	—
27-1, 80–82	1.57	—	—	49.79	72.0	65.1
27-2, 130–132	1.55	—	—	47.88	—	—
28-1, 130–132	1.50	—	—	47.88	—	—
28-3, 130–132	1.52	—	—	23.94	78.5	66.4
28-5, 30–32	1.54	—	—	38.30	—	—
29-2, 70–72	—	—	—	57.46	—	—
29-4, 95–97	—	—	—	28.73	—	—
29-6, 68–70	1.58	—	—	26.81	—	—
30-2, 80–82	—	—	—	53.62	—	—
30-4, 83–85	—	—	—	51.71	84.0	67.8
30-6, 123–125	1.60	—	—	44.05	—	—
31-2, 98–100	—	—	—	383.04	—	—
31-4, 26–28	—	—	—	335.16	—	—
31-8, 26–28	—	—	—	287.28	—	—
34-2, 129–131	—	—	—	287.28	—	—

served (Fig. 6). The Pliocene/Pleistocene boundary is placed at Core 17, Section 3, 22–30 cm on the basis of nannofossil evidence.

Radiolarian assemblages below Core 18 through Core 42 all belong to the Pliocene *Spongaster pentas* Zone. Foraminiferal faunas contain species that range across the Miocene/Pliocene boundary, however, index species of the uppermost Miocene such as *Globorotalia plesiotumida* are not present. Nannofossils, on the other hand, indicate that the Miocene/Pliocene boundary lies between Cores 36 and 37.

The shape of the sedimentation rate curve is similar to that seen at Site 496—both have very high rates during the Quaternary and both show an inflection at about 220 meters; Site 496 shows a slower rate below this depth for the Pliocene, whereas Site 497 continues at the Quaternary rate (Fig. 7). The accumulation curves vary greatly at sites just 4 miles apart.

Foraminifers

The foraminifers at Site 497 resemble those seen at 496, which is not unexpected considering the proximity of the two sites. The planktonic assemblage is composed of abundant *Neogloboquadrina* (*N. eggeri* in the Quaternary; its ancestral form *N. humerosa* in the Pliocene) along with common *Globerinoides ruber, G. sacculifer*, and *Orbulina*. The benthic foraminiferal fauna includes the lower bathyal (1600–3000 m) taxa *Hoeglundina elegans, Globobulimina, Bulimina barbata, B. pagoda, Uvigerina peregrina, U. senticosa, U. hispida, Pyrgo, Sphaeroidina bulloides, Pullenia bulloides, Nodosaria, Stilostomella, Martinottiella, Eggerella*, and *Melonis*. The sequence of benthic assemblages suggests a gradual increase in water depth from the Pliocene to the present day (Fig. 8).

Several planktonic species provide useful biostratigraphic markers. The disappearance of pink-pigmented *Globerinoides ruber* in Core 3, Section 3 indicates an approximate age of 125,000 yr. for this level. *Neogloboquadrina humerosa* disappears between Core 11, Section 1 and Core 12, Section 3, a level dated at about 1.1 Ma. *Globigerinoides fistulosus* becomes extinct in Core 18, whereas *N. eggeri* appears also in Core 18, the overlap serving to locate the Pliocene/Pleistocene boundary. The Pliocene extinction of *Globoquadrina altispira* provides an average date of 2.8 Ma. Rare occurrences of *Globoquadrina venezuelana, Globigerina nepenthes*, and *Pulleniatina praepulleniatina* in Cores 39 to 41 indicate proximity to the Miocene/Pliocene boundary.

Radiolarians

Radiolarian assemblages at Site 497 are moderately well preserved but for the most part very diluted with terrigenous sediment. The species present and their abundances change very little throughout the sequence.

The last occurrence of *Axoprunum angelinum*, which indicates an age of 400,000 years, was noted between Cores 7 and 9. Although there are some very rare occurrences of *Anthocyrtidium angulare* (an indicator of the oldest Quaternary zone) in Cores 15, 16 and 18, the Pliocene/Pleistocene boundary cannot be placed with confidence because the marker species, *Pterocanium prismatium*, does not occur at this site.

The top of the *Spongaster pentas* Zone, which is marked by the last occurrence of *Stichocorys peregrina*, is between Cores 25 and 26. The evolutionary transition between *Didymocyrtis penultima* and *D. avita* between Samples 497-36-8, 35–37 cm and 497-35-2, 41–43 cm is an event that also belongs to the Pliocene *S. pentas* Zone. In contrast to the nannofossil evidence that deposition of Cores 38 to 42 took place in the late Miocene, the sparse radiolarian assemblages of Cores 38 and 39 and the more abundant ones of 41 and 42 all belong to the Pliocene *S. pentas* Zone.

Nannoplankton

A sequence of Quaternary through upper Miocene deposits was recovered from cores at Site 497. Nannoplankton are well preserved and range in abundance from few to common.

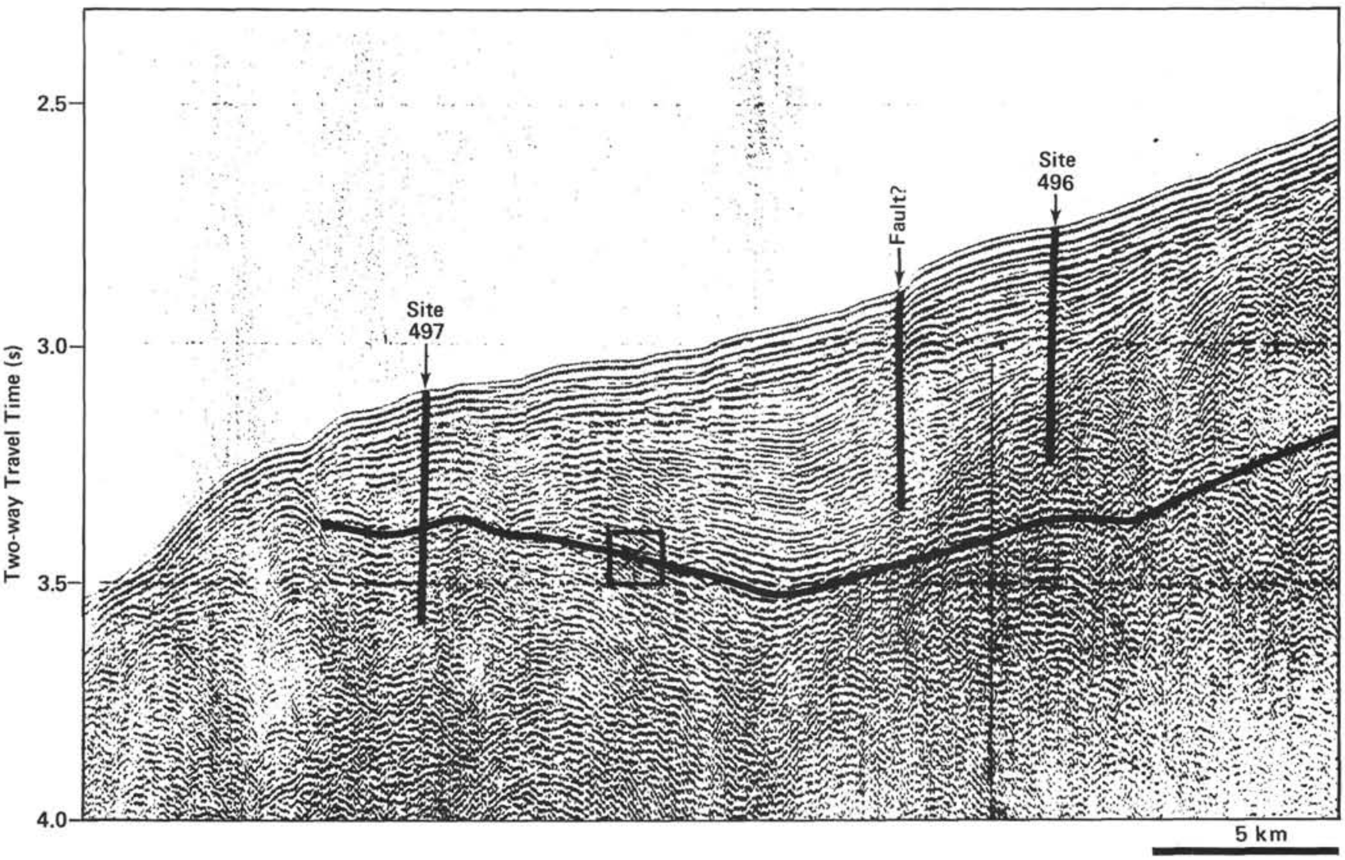


Figure 5. Seismic reflection profile across Site 497.

Series	Sample (hole-core)	Approximate Sub-bottom Depth of Boundary(m)	Basis for Boundary Position
Quaternary	497-1 → 17	159	Top of *D. brouweri* Zone
upper Pliocene	497-18 → 30	282.5	Top of *Sphaeroidinellopsis* Top of *R. pseudoumbilica* Zones
lower Pliocene	497-31 → 37	349	Radiolarians: *Spongaster pentas* Zone to 497-42
lower Pliocene/ upper Miocene	497-38 → 42	T.D. 396.5	Lower part of *A. tricorniculatus* Zone

Figure 6. Stratigraphic series at Site 497.

Core 1 to Core 17, Section 3, 30–32 cm, contain Pleistocene nannoplankton. In Core 18 to Sample 497-23,CC very rare specimens of *Discoaster brouweri* were found together with *Gephyrocapsa* sp. and other undetermined small coccoliths. This interval may belong to the Pliocene.

Typical upper Pliocene assemblages of the *Discoaster brouweri* Zone are contained in Sections 497-24-4 to 497-32-1: *D. brouweri, D. pentaradiatus, D. asymmetricus*, and *D. decorus*.

Ceratoliths are practically absent in the hole. Nevertheless the occurrence of *Ceratolithus acutus* in Sample

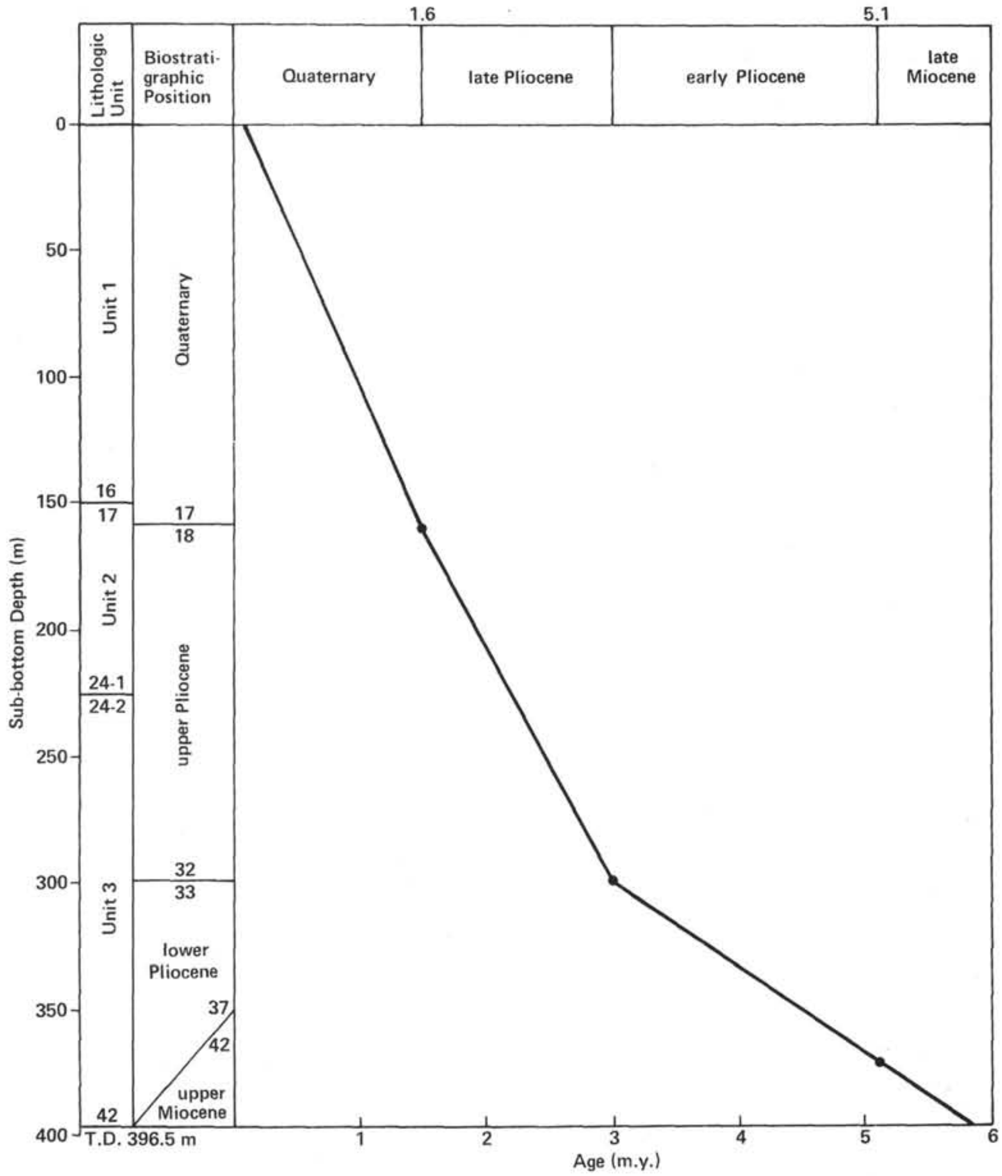


Figure 7. Sedimentation rate at Site 497. (Numbers shown at the boundary lines in the Lithologic Unit and Biostratigraphic Position columns indicate cores and sections of Hole 497.)

497-36-6, 46–48 cm determines its age and the age of underlying samples as not younger than the *Ceratolithus acutus* Subzone. *Amaurolithus amplificus*, found in Sample 497-42-2, 25–27 cm, occurs from the *Triquetrorhabdulus rugosus* Subzone of the *Amaurolithus tricorniculatus* Zone to the *Ceratolithus primus* Subzone of the *Discoaster quinqueramus* Zone. As the zonal form of the last zone was not recorded in the site section, it is most likely that the hole ends in the *Amaurolithus tricorniculatus* Zone (lower Pliocene to upper Miocene).

GEOCHEMISTRY

Organic Geochemistry

Site 497 is situated only about 4 miles from Site 496 and thus was subject to the same hydrocarbon monitoring program. Gas chromatographs, the Imco fluoroscope, and the Rock-Eval were used as described for Site 496.

Figure 9 shows the progressive decrease in the methane/ethane ratios with depth. Drilling was terminated at about 400 meters because of excessive pressure in the core barrel and because clathrates were being cored and recovered. Several lines of evidence document the presence of clathrates. Temperature data obtained from wireline tools indicate a bottom-hole temperature of about 8°C; estimates of pressure conditions suggest that pressures are in the 250 to 275 atmosphere range. These *P–T* (pressure–temperature) conditions are well within the stability field of methane-ethane-CO_2 clathrates. The pressure of expanding gas ejected pieces of the ice interbedded with sediment from the core barrel. Finally, pieces of recovered clathrate, allowed to come to ambient temperature in a pressure vessel fitted with a gauge, gen-

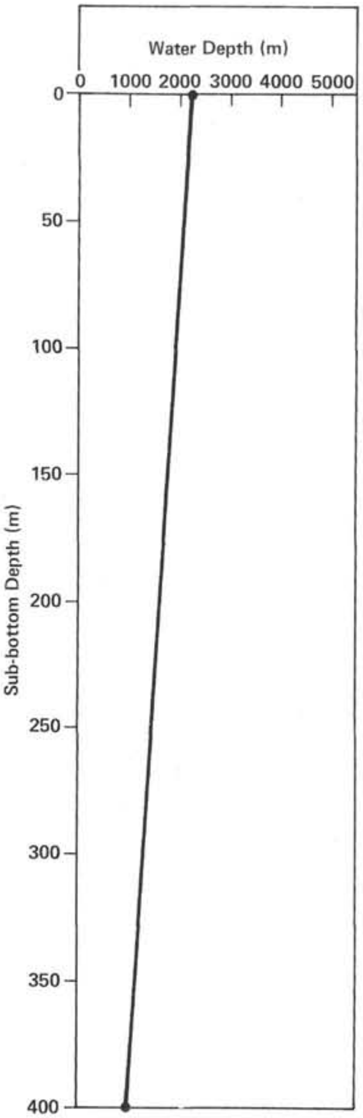


Figure 8. Paleobathymetry at Site 497 based on benthic foraminifers.

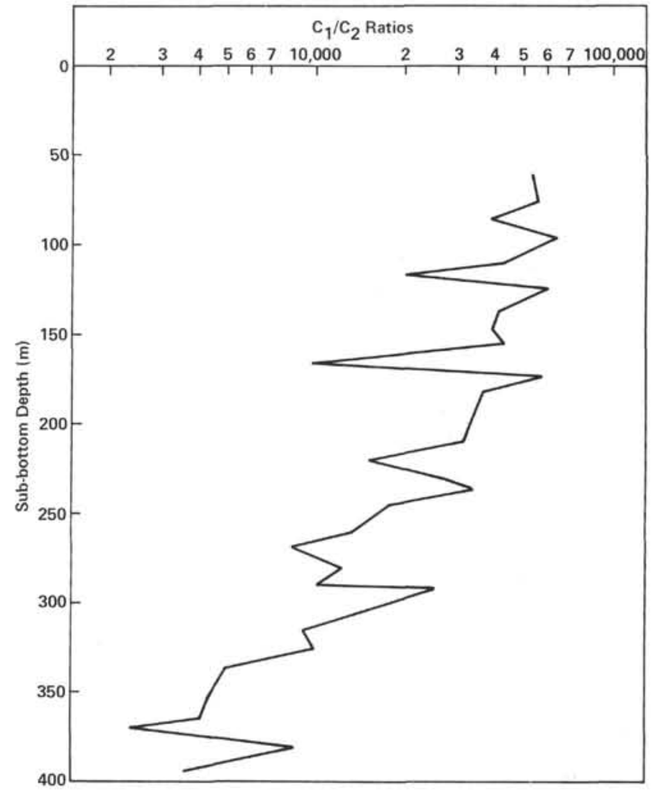


Figure 9. Methane/ethane ratios at Site 497.

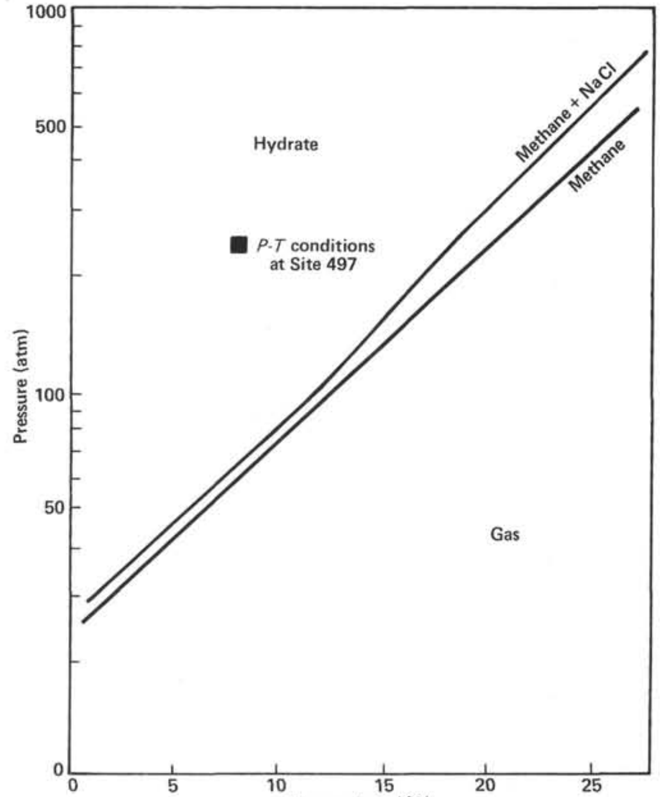


Figure 10. Pressure-temperature (*P–T*) stability field of hydrates and *P–T* conditions at Site 497.

erated pressures of 18 to 19 psi. These pressures were generated from approximately 4 cm^3 of ice and from a mixture of methane with minor amounts of ethane (the minimum C_1/C_2 ratio was 2365). Figure 10 indicates that the estimated and measured *P–T* conditions in effect at Site 497 are well within the stability field for clathrates.

In Figure 11, methane is shown in volume percent of gas sampled and ethane in ppm. As at previous sites, methane concentrations are fairly uniform over the entire section penetrated, averaging about 78%. Ethane concentrations are less than 50 ppm from 0 to 210 meters sub-bottom depth (with a single exception of 99 ppm at 166.6 m). From 210 meters to T.D. (total depth), ethane concentrations get progressively greater with depth. Higher ethane values in the interval between 360 and 395 meters affected the methane/ethane ratios so that four out of the last five determinations had ratios in the 2300 to 4300 range.

Figure 12 shows the distribution of neopentane and isobutane. Concentrations of isobutane are greater than

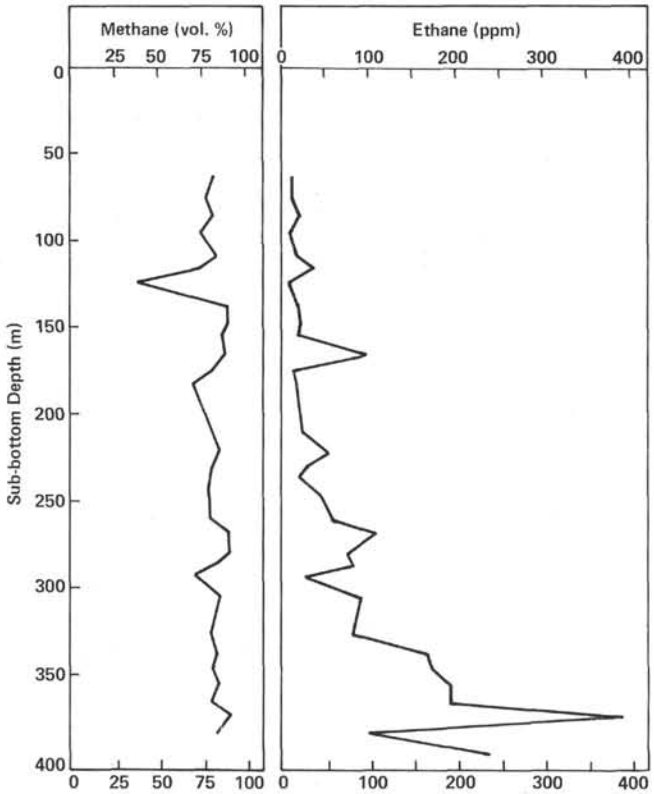


Figure 11. Methane and ethane concentrations at Site 497.

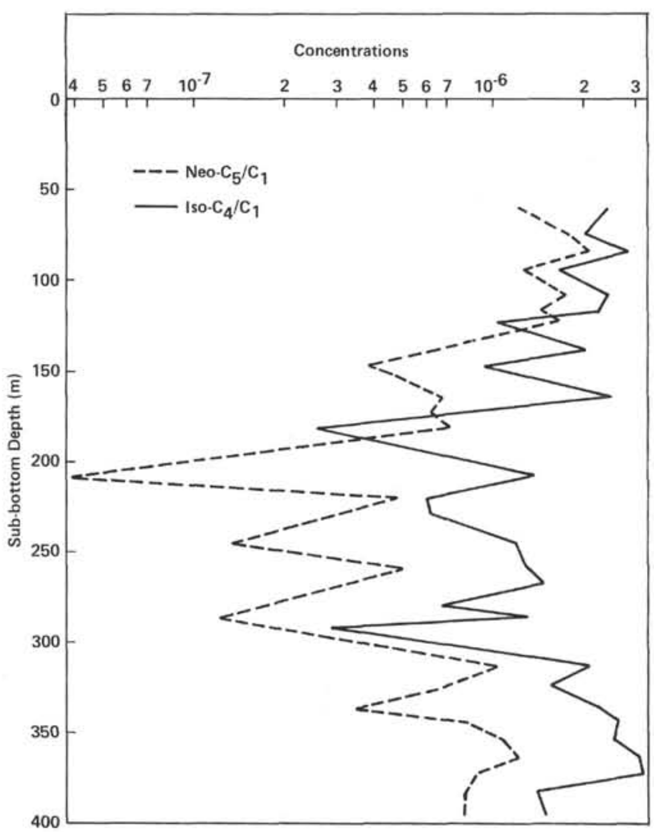


Figure 12. Neopentane and isobutane concentrations at Site 497.

those of neopentane in 30 of the 32 samples analyzed. The possible diagenetic relation proposed on the basis of Site 494 data does not appear to be supported by data obtained at other sites.

Results from the shipboard interstitial water program are presented in Figure 13. The data are remarkably similar to that obtained at Site 496. Salinity, chlorinity, and magnesium values all show a regular decrease with increasing depth. The *p*H measurements are relatively constant and are in the 7.5 to 8.0 range throughout the entire section penetrated. As at Site 496, alkalinity values increase in the upper part of the penetrated section and then decrease in the lower portion. Calcium values also show the same pattern as that obtained at Site 496. Calcium content decreases in the first two samples and then remains constant to total depth.

SUMMARY AND CONCLUSIONS

The primary objective of drilling at Site 497 was to sample a landward-dipping reflective horizon that may represent an imbricate slice. However, the site was abandoned about 500 meters short of the primary objective because of gas hydrate. The dominant lithology is olive gray mud, with varying minor biogenic and vitric tuffaceous constituents. A short interval of rapidly deposited sandy mud and pebbly mudstone occurs at 206 to 218 meters. Near-vertical, dark colored veinlets, probably associated with dewatering and synsedimentary tectonism, occur in the lower, more lithified part of the section.

Quaternary and Pliocene microfossils are generally abundant in the section, and there are no unusual age discrepancies. Age increases linearly with depth except in an interval of pebbly mudstone where the rate of deposition was high, and immediately beneath it, where for an interval the rates of deposition were exceptionally low.

Physical properties measurements show a clear difference between the upper soft mud and the lower semi-lithified mudstone. The effects of gas and perhaps gas hydrates are evident in the small change of void ratio with depth.

Seismic records between Sites 496 and 497 indicate a thinning of the Neogene section toward 497. Drilling shows that the Pleistocene is thinner and the Pliocene much thicker at 497 than at 496. The unconformity suggested in seismic record GUA-13 may help explain the discrepancy between the seismic interpretation and drilling results.

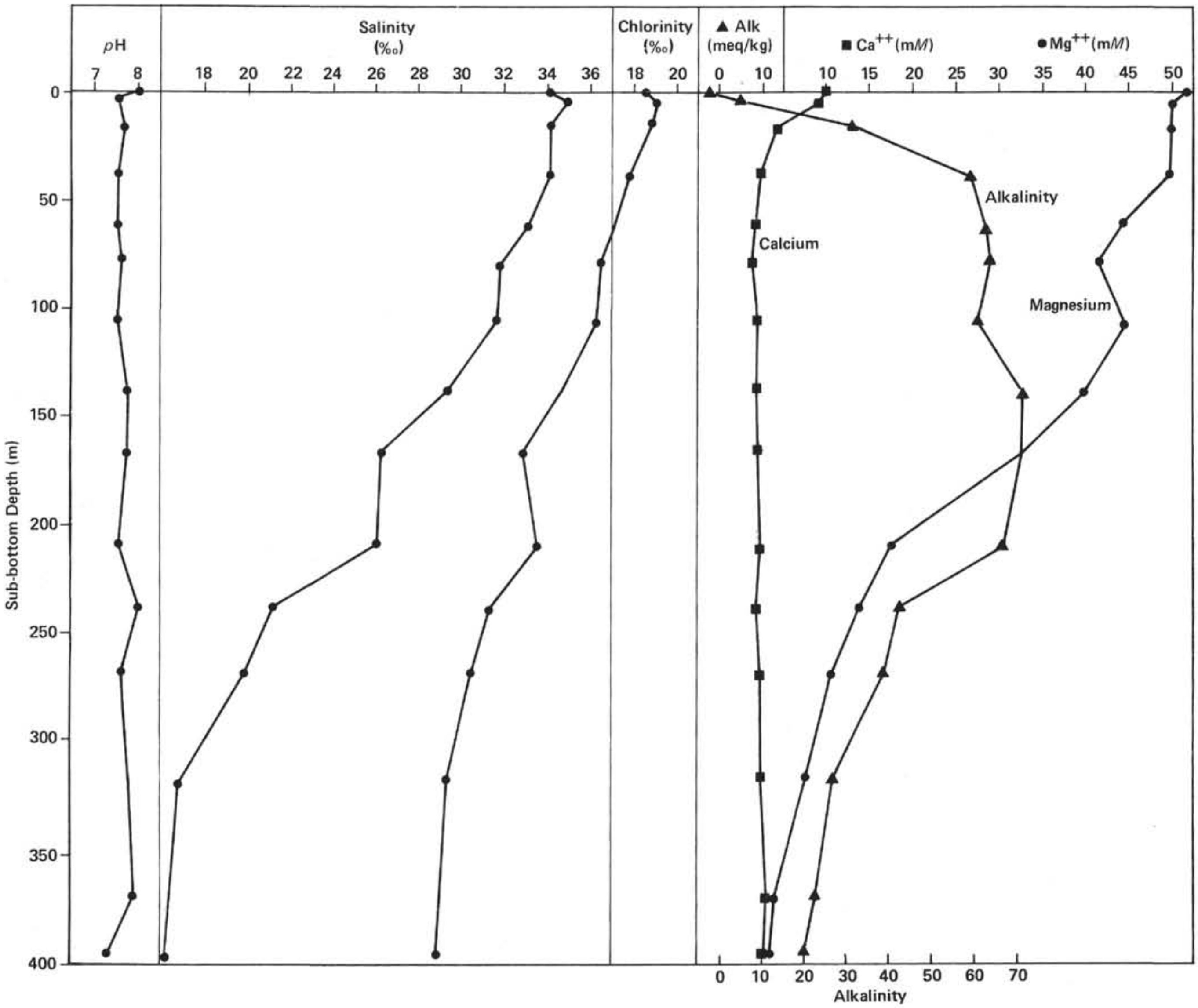
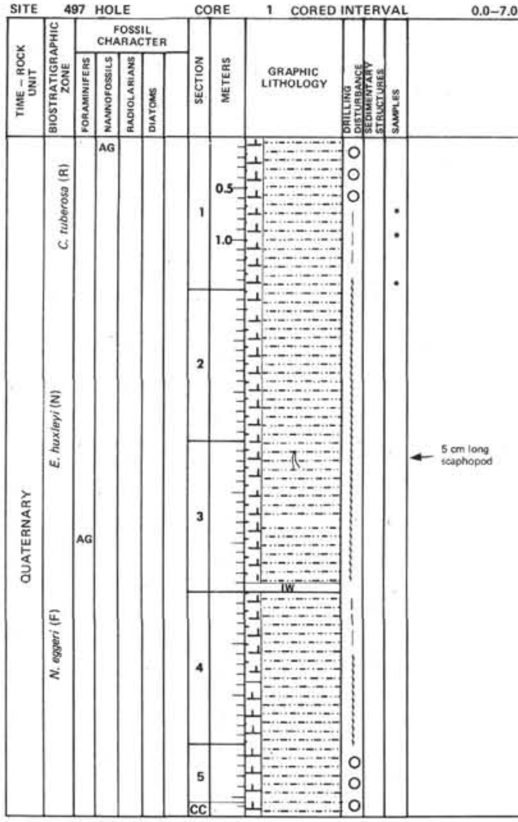


Figure 13. Interstitial water data at Site 497.

SITE 497 HOLE CORE 1 CORED INTERVAL 0.0–7.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MUD

Very soft (biogenic sand fracture), dark olive (5Y 3/2). H_2S odor with slightly greener (2.5Y 3/2) layer (65–80 cm and 128–150 cm) in Section 1. 0–55 cm (Section 1) soupy drilling slurry. Some darker ashy patches. Section 4 same as above but with light gray (5Y 5/1) patches within vitric ash. Section 5 and Core-Catcher are badly disturbed.

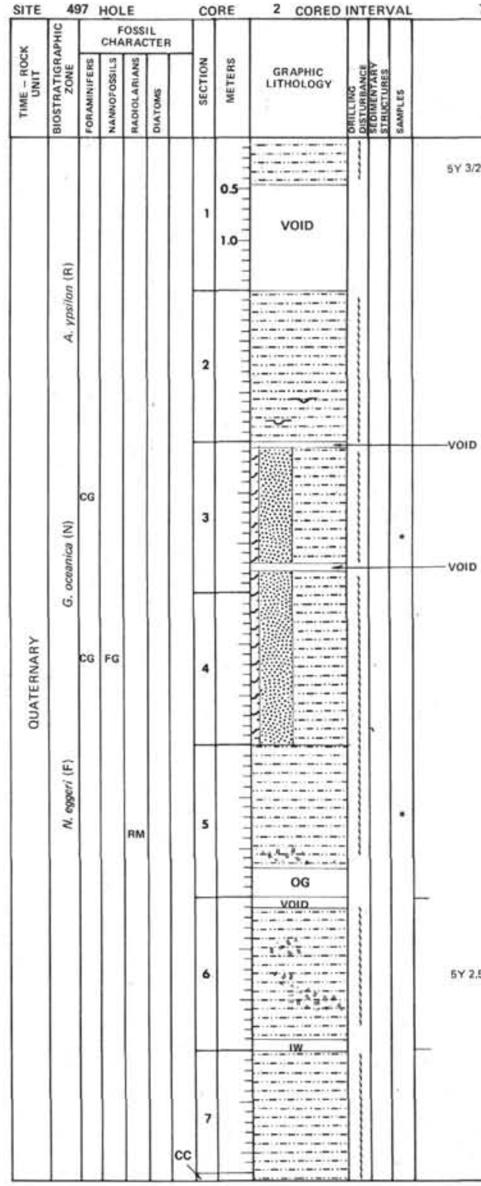
SMEAR SLIDE SUMMARY

	1-70	1-97	1-142
TEXTURE:			
Sand	40	25	15
Silt	20	40	35
Clay	40	35	50
COMPOSITION:			
Quartz	5	5	5
Feldspar	5	2	1
Pyrite	3	2	3
Other heavy minerals	2	5	–
Clay minerals	25	15	25
Volcanic glass	10	30	15
Glauconite	2	3	2
Zeolite	–	3	5
Calc.-Dolo.-Arag.	–	2	1
Foraminifers	15	3	10
Calc. nannofossils	25	15	20
Diatoms	5	5	5
Radiolarians	–	3	3
Sponge spicules	–	–	3
Others	3	7	2

CARBON-CARBONATE (%)

	3, 92–96
Organic Carbon	2.89
Total Carbonate	4

SITE 497 HOLE CORE 2 CORED INTERVAL 7.0–16.5 m



LITHOLOGIC DESCRIPTION

TUFFACEOUS SANDY MUD

Very soft, dark olive gray (5Y 3/2), strong H_2S odor. Section 2: sporadic patches of gray black (N2) ash-rich mud. Section 3: small clods (1–2 mm) of white ash. Section 4: has small patches of white ash. Section 5: Degassing bubbles with patches of vitric ash. Section 6: patches of vitric ash 5Y 5/3.

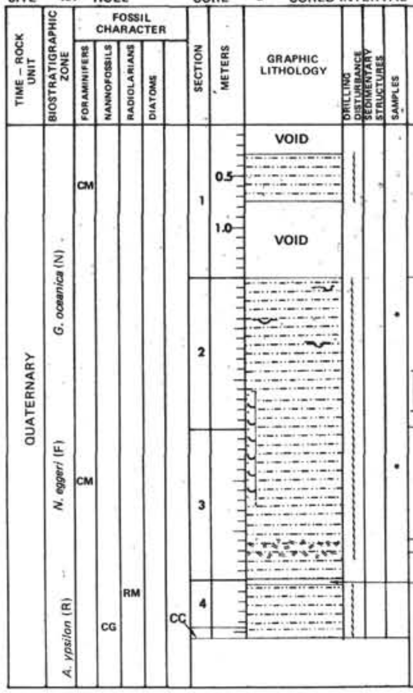
SMEAR SLIDE SUMMARY

	3-96	5-66
TEXTURE:		
Sand	35	30
Silt	40	50
Clay	25	20
COMPOSITION:		
Quartz	10	3
Feldspar	10	2
Pyrite	5	3
Other heavy minerals	2	2
Clay minerals	25	15
Volcanic glass	20	60
Glauconite	1	2
Zeolite	5	2
Calc.-Dolo.-Arag.	2	2
Foraminifers	2	2
Calc. nannofossils	2	1
Diatoms	10	3
Radiolarians	2	1
Sponge spicules	1	–

CARBON-CARBONATE (%)

	2, 36–38	4, 36–38
Organic Carbon	3.3	2.91
Total Carbonate	2.91	1

SITE 497 HOLE CORE 3 CORED INTERVAL 16.5–26.0 m



LITHOLOGIC DESCRIPTION

DIATOMACEOUS MUD

Section 1: olive gray (5Y 4/2) (diatomaceous) with ash mud patches and stringers. Small degassing voids throughout.
Section 2: dark olive gray (5Y 3/2) tuffaceous mud.
Section 3: dusky yellow green (5GY 5/2) diatomaceous mud mottled with dark olive gray specks. Medium gray (N5) ash layer at 109–120 cm.
Core-Catcher: Same as Section 3.

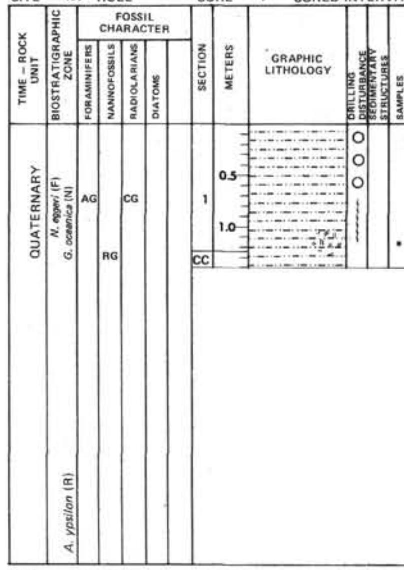
SMEAR SLIDE SUMMARY

	2-35	3-41
TEXTURE:		
Sand	25	2
Silt	35	30
Clay	40	68
COMPOSITION:		
Quartz	2	3
Feldspar	2	1
Pyrite	2	1
Other heavy	1	1
minerals	40	59
Volcanic glass	35	3
Glauconite	1	1
Zeolite	2	–
Calc.-Dolo.-Arag.	1	4
Foraminifers	5	2
Calc. nannofossils	1	8
Diatoms	5	15
Radiolarians	1	1
Sponge spicules	–	1
Others	2	–

CARBON-CARBONATE (%)

	2, 32–36
Organic Carbon	3.15
Total Carbonate	0.5

SITE 497 HOLE CORE 4 CORED INTERVAL 26.0–35.5 m



LITHOLOGIC DESCRIPTION

HEMI-TERRIGENOUS MUD

Dark olive gray (5Y 3/2), H_2S odor and degassing cracks and patch of light colored ash.

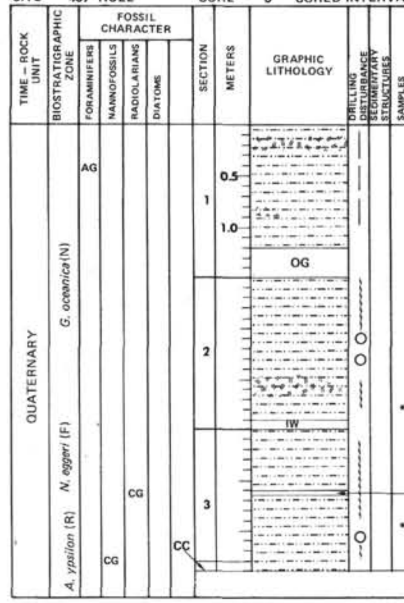
SMEAR SLIDE SUMMARY

	1-115
TEXTURE:	
Sand	10
Silt	20
Clay	70
COMPOSITION:	
Quartz	5
Feldspar	2
Pyrite	3
Other heavy minerals	1
Clay minerals	70
Volcanic glass	5
Glauconite	1
Zeolite	3
Foraminifers	1
Calc. nannofossils	1
Diatoms	3
Others	4

CARBON-CARBONATE (%)

	1, 60–63
Organic Carbon	2.86
Total Carbonate	2.5

SITE 497 HOLE CORE 5 CORED INTERVAL 35.5–45.0 m



LITHOLOGIC DESCRIPTION

HEMI-TERRIGENOUS MUD

Dark olive gray with light gray ash patches. Degassing voids and H_2S odor throughout.

SMEAR SLIDE SUMMARY

	2-128	3-90
TEXTURE:		
Sand	5	5
Silt	95	40
Clay	–	55
COMPOSITION:		
Quartz	3	2
Feldspar	4	–
Pyrite	–	2
Other heavy minerals	1	1
Clay minerals	–	70
Volcanic glass	90	5
Glauconite	1	2
Zeolite	–	2
Calc.-Dolo.-Arag.	TR	–
Foraminifers	–	2
Calc. nannofossils	TR	5
Diatoms	–	5
Sponge spicules	–	1
Others	1	3

CARBON-CARBONATE (%)

	3, 52–56
Organic Carbon	2.93
Total Carbonate	4

SITE 497 HOLE CORE 6 CORED INTERVAL 45.0–54.5 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
QUATERNARY	*A. ypsilon* (R); *N. eggeri* (F) *G. oceanica* (N)	FM	RG	FM		1	0.5

GRAPHIC LITHOLOGY

LITHOLOGIC DESCRIPTION

HEMI-TERRIGENOUS MUD

Dark olive gray (5Y 3/2) with light colored ash patches.

CARBON-CARBONATE (%)

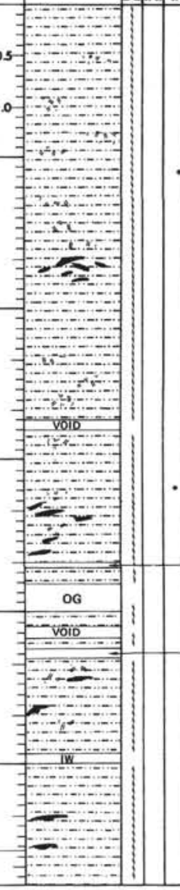
	1, 53–55
Organic Carbon	3.02
Total Carbonate	0

SITE 497 HOLE CORE 7 CORED INTERVAL 59.5–64.0 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION
QUATERNARY	*A. ypsilon* (R); *N. eggeri* (F) *G. oceanica* (N)	AG	AG	CG		1, 2, 3, 4, 5, 6, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY



LITHOLOGIC DESCRIPTION

5Y 4/4

5Y 3/2

Shell fragments

VOID

VOID

NANNOFOSSIL MUD

Dark olive gray (5Y 3/2). Degassing cracks scattered throughout. Ash layers deformed into blebs by drilling.

SMEAR SLIDE SUMMARY

	2-13	4-25
TEXTURE:		
Sand	5	10
Silt	25	25
Clay	70	65
COMPOSITION:		
Quartz	2	3
Feldspar	–	2
Pyrite	2	1
Other heavy minerals	3	–
Clay minerals	53	53
Volcanic glass	15	10
Glauconite	1	2
Calc.-Dolo.-Arag.	2	–
Foraminifers	2	3
Calc. nannofossils	15	20
Diatoms	2	2
Radiolarians	1	1
Sponge spicules	–	1
Others	2	2

CARBON-CARBONATE (%)

	2, 122–126
Organic Carbon	2.75
Total Carbonate	1

SITE 497 HOLE CORE 8 CORED INTERVAL 64.0–73.5 m

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

Section: CC

NANNOFOSSIL MUD

Dark olive gray (5Y 3/2).

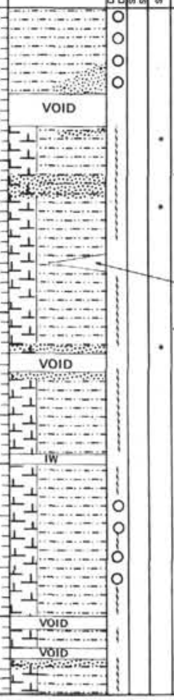
SITE 497 HOLE CORE 9 CORED INTERVAL 73.5–83.0 m

TIME – ROCK UNIT: QUATERNARY

BIOSTRATIGRAPHIC ZONE: *A. ypsilon* (R); *N. eggeri* (F)

FOSSIL CHARACTER: AG (Foraminifers); AG (Nannofossils); CG (Radiolarians)

Sections: 1 (0.5, 1.0), 2, 3, 4, 5, CC



5Y 2.5/1, ash color

Scattered voids

VOID

Lots of foraminifera

Glauconitic sand-size pellets, olive gray (5Y 4/2–7/1)

Shells, 5Y 2/1

5Y 3/2

Rare glauconite sand patches

Sand layers

5Y 3/2

NANNOFOSSIL MUD

Section 1, 0–85 cm: totally disturbed.

SMEAR SLIDE SUMMARY

	1-129	2-43	3-39
TEXTURE:			
Sand	5	93	90
Silt	25	5	7
Clay	70	2	3
COMPOSITION:			
Quartz	3	20	20
Feldspar	2	30	17
Mica	–	–	TR
Pyrite	2	2	5
Other heavy minerals	2	2	2
Clay minerals	40	–	–
Volcanic glass	–	–	2
Glauconite	2	10	28
Zeolite	3	–	–
Calc.-Dolo.-Arag.	2	15	15
Foraminifers	3	15	4
Calc. nannofossils	30	–	–
Diatoms	5	–	–
Sponge spicules	1	–	–
Silicoflagellates	1	–	–
Organic matter	2	–	–
Aggregates	–	6	–
Igneous rock fragments	–	–	7

CARBON-CARBONATE (%)

	3, 102–106
Organic Carbon	1.99
Total Carbonate	7

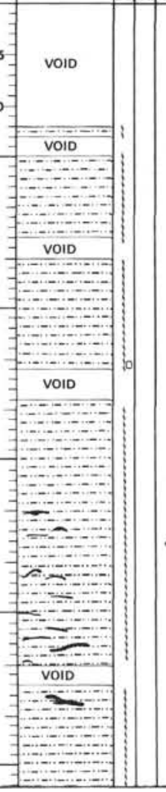
SITE 497 HOLE CORE 10 CORED INTERVAL 83.0–92.5 m

TIME – ROCK UNIT: QUATERNARY

BIOSTRATIGRAPHIC ZONE: *G. oceanica* (N); *N. eggeri* (F); *A. ypsilon* (R)

FOSSIL CHARACTER: AM (Foraminifers); AG (Nannofossils)

Sections: 1 (0.5, 1.0), 2, 3, 4, 5, CC



5Y 3/2

Many voids – pull-aparts formed by cheese-wire

HEMIPELAGIC MUD

SMEAR SLIDE SUMMARY

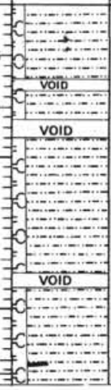
	4-76
TEXTURE:	
Sand	10
Silt	30
Clay	60
COMPOSITION:	
Quartz	TR
Pyrite	3
Clay minerals	57
Volcanic glass	13
Glauconite	2
Calc.-Dolo.-Arag.	5
Foraminifers	3
Calc. nannofossils	7
Diatoms	6
Radiolarians	1
Sponge spicules	2
Plant debris	1

CARBON-CARBONATE (%)

	3, 21–25
Organic Carbon	3.03
Total Carbonate	6.5

SITE 497 HOLE CORE 11 CORED INTERVAL 92.5–102.0 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
QUATERNARY	*N. eggeri* (F) / *A. ypsilon* (R)	AG		CG		1, 2, 3, CC	0.5, 1.0				*	



5Y 3/2

← Ash layer

HEMIPELAGIC BIOGENIC MUD

SMEAR SLIDE SUMMARY

	1-102
TEXTURE:	
Sand	3
Silt	47
Clay	50
COMPOSITION:	
Quartz	3
Feldspar	1
Mica	1
Pyrite	2
Clay minerals	50
Volcanic glass	10
Calc.-Dolo.-Arag.	10
Foraminifers	3
Calc. nannofossils	5
Diatoms	5
Radiolarians	3
Sponge spicules	5
Silicoflagellates	1

CARBON-CARBONATE (%)

	3, 41–46
Organic Carbon	2.88
Total Carbonate	1.5

SITE 497 HOLE CORE 12 CORED INTERVAL 102.0–111.5 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
QUATERNARY	*G. oceanica* (N) / *N. eggeri* (F) / *A. ypsilon* (R)	AG	CG			1, 2, 3, 4, 5, 6, CC	0.5, 1.0				*	

5Y 3/2

Scattered voids

VOID

IW

Scattered voids

Pull-aparts by cheese-wire

BIOGENIC MUD

Both nannofossils and diatoms abundant.

SMEAR SLIDE SUMMARY

	1-22†	6-60††	6-135†††
TEXTURE:			
Sand	68	5	40
Silt	30	21	28
Clay	2	74	32
COMPOSITION:			
Quartz	20	6	25
Feldspar	–	–	10
Pyrite	2	2	5
Other heavy minerals	3	–	5
Clay minerals	–	36	18
Volcanic glass	73	7	10
Glauconite	–	TR	–
Foraminifers	–	TR	–
Calc. nannofossils	–	27	2
Diatoms	–	16	2
Radiolarians	–	1	–
Sponge spicules	–	3	3
Fecal pellets	2	–	20
Silicoflagellates	–	1	–

† White ash

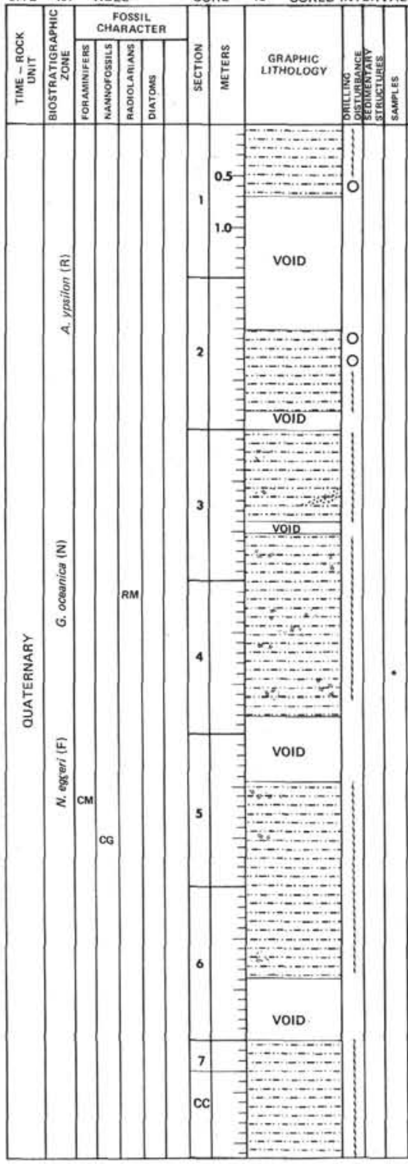
†† Groundmass

††† lack ash = glauconitic sand

CARBON-CARBONATE (%)

	3, 110–115
Organic Carbon	2.42
Total Carbonate	6

SITE 497 HOLE CORE 13 CORED INTERVAL 111.5–121.0 m



LITHOLOGIC DESCRIPTION

5Y 3/2

Degassing voids

BIOGENIC MUD

Dark olive gray (5Y 3/2). Foraminifera visible with hand lens. Scattered ash layers in Sections 3, 4, and 5. In upper portion of Section 4, 35 cm of glauconitic sand. Black sandy, glauconitic patch at 80 cm in Section 4.

SMEAR SLIDE SUMMARY

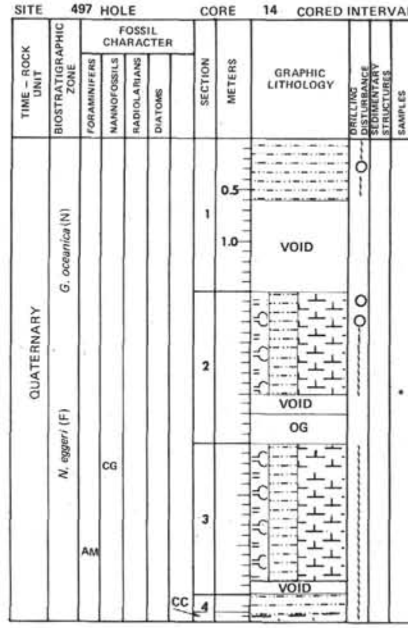
	4-83
TEXTURE:	
Sand	20
Silt	15
Clay	65
COMPOSITION:	
Quartz	18
Feldspar	TR
Pyrite	2
Other heavy minerals	TR
Clay minerals	60
Volcanic glass	5
Glauconite	6
Foraminifers	1
Calc. nannofossils	4
Diatoms	2
Sponge spicules	1

CARBON-CARBONATE (%)

	3, 29–34
Organic Carbon	2.23
Total Carbonate	7

5Y 3/2
Small pull-apart voids

SITE 497 HOLE CORE 14 CORED INTERVAL 121.0–130.5 m



LITHOLOGIC DESCRIPTION

5Y 3/2

Degassing cracks

NANNOFOSSIL BIOGENIC MUD

Foraminifera visible with hand lens.

SMEAR SLIDE SUMMARY

	2-95
TEXTURE:	
Sand	3
Silt	47
Clay	50
COMPOSITION:	
Quartz	2
Pyrite	2
Other heavy minerals	2
Clay minerals	10
Volcanic glass	2
Glauconite	1
Calc.-Dolo.-Arag.	2
Foraminifers	3
Calc. nannofossils	52
Diatoms	15
Radiolarians	2
Sponge spicules	2
Fecal pellets	2

Scattered voids

CARBON-CARBONATE (%)

	4, 10–15
Organic Carbon	2.68
Total Carbonate	5

Firmer sediment

SITE 497 HOLE CORE 15 CORED INTERVAL 130.5–140.0 m

TIME – ROCK UNIT: QUATERNARY

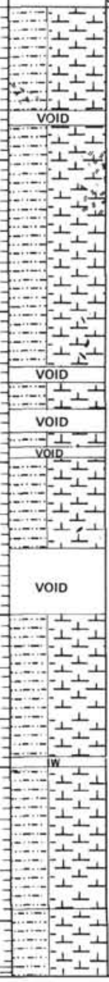
BIOSTRATIGRAPHIC ZONE: *A. angulare* (R); *N. eggeri* (F)

FOSSIL CHARACTER: FORAMINIFERS CM; RADIOLARIANS CG; CC

SECTION: 1, 2, 3, 4, 5, 6, 7

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY



DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES

5Y 3/2–5Y 5/4

← Grayish white ash

← Wood fragments

← Wood fragment

First biscuits

5Y 3/2

LITHOLOGIC DESCRIPTION

NANNOFOSSIL MUD

Degassing cracks scattered throughout.

SMEAR SLIDE SUMMARY

	5-100
TEXTURE:	
Sand	3
Silt	32
Clay	65
COMPOSITION:	
Quartz	4
Pyrite	5
Other heavy minerals	2
Clay minerals	10
Volcanic glass	4
Glauconite	2
Foraminifers	2
Calc. nannofossils	63
Diatoms	3
Radiolarians	1
Sponge spicules	2
Fecal pellets	1

CARBON-CARBONATE (%)

	3, 94–96
Organic Carbon	2.51
Total Carbonate	0.5

SITE 497 HOLE CORE 16 CORED INTERVAL 140.0–149.5 m

TIME – ROCK UNIT: QUATERNARY

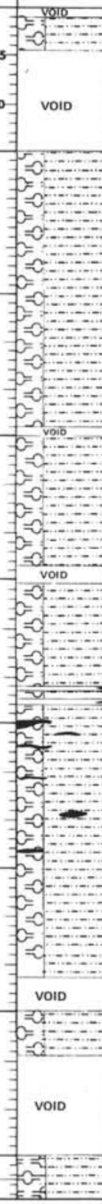
BIOSTRATIGRAPHIC ZONE: *A. angulare* (R); *N. eggeri* (F)

FOSSIL CHARACTER: FORAMINIFERS CM; NANNOFOSSILS CG

SECTION: 1, 2, 3, 4, 5, 6, 7, 8, 9, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY



DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES

5Y 3/2

5Y 3/2

changes gradationally to

5Y 4/2

5Y 3/2

15 cm: miliolid foraminifera

LITHOLOGIC DESCRIPTION

DIATOMACEOUS MUD

Dark olive gray, very homogeneous, disturbed by drilling, locally diatomaceous and ashy. Sections 5 and 6: sporadic 1–2 cm voids probably due to degassing. Very rare < 1% fragments 1–2 mm hard white pumice throughout.

SMEAR SLIDE SUMMARY

	6-114
TEXTURE:	
Sand	10
Silt	75
Clay	15
COMPOSITION:	
Quartz	2
Pyrite	2
Clay minerals	47
Volcanic glass	10
Glauconite	2
Zeolite	5
Calc.-Dolo.-Arag.	1
Foraminifers	1
Diatoms	20
Radiolarians	5
Sponge spicules	4
Silicoflagellates	1

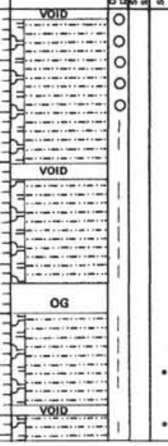
CARBON-CARBONATE (%)

	3, 60–62
Organic Carbon	2.56
Total Carbonate	0

SITE 497 HOLE CORE 17 CORED INTERVAL 149.5–159.0 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
QUATERNARY	*C. doronicoides* (N)			CG		1	0.5, 1.0
	N. eggeri (F)	CM	FG			2	
	A. angulare (R)					3	
						CC	

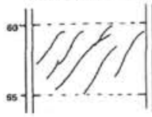
GRAPHIC LITHOLOGY / DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES



5Y 3/2

LITHOLOGIC DESCRIPTION

DIATOMACEOUS MUD/SANDY MUD
Section 3, 54 cm:
Veinlets: filled by finer-grained sediments



These are features identical to those in Cores 30–37, Site 496.

Section 3, 111 cm: Very soft, very fine-grained muddy sand, 5Y 3/2, 20% heavy minerals, diatomaceous.

SMEAR SLIDE SUMMARY

	3-54	3-111
TEXTURE:		
Sand	5	50
Silt	50	15
Clay	45	35
COMPOSITION:		
Quartz	2	15
Feldspar	–	8
Pyrite	2	1
Other heavy minerals	–	20
Clay minerals	33	27
Volcanic glass	3	2
Glauconite	1	8
Zeolite	10	–
Foraminifers	7	1
Calc. nannofossils	1	3
Diatoms	10	15
Radiolarians	5	–
Sponge spicules	5	–
Fecal pellets	20	–
Silicoflagellates	1	TR

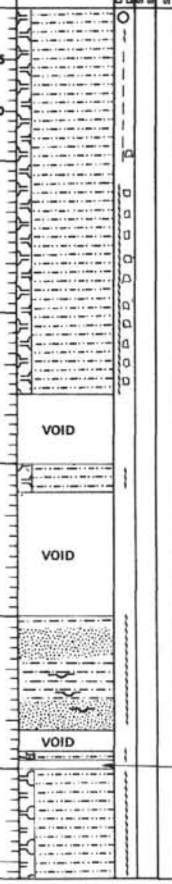
CARBON-CARBONATE (%)

	3, 52–57
Organic Carbon	2.92
Total Carbonate	0

SITE 497 HOLE CORE 18 CORED INTERVAL 159.0–168.5 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
	D. brouweri/*C. doronicoides* (N)		CG			1	0.5, 1.0
						2	
		AG				3	
	N. eggeri (F)					4	
						5	
	A. angulare (R)					6	
						CC	

GRAPHIC LITHOLOGY / DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES



IW

5Y 3/2

Benthic foraminifers

LITHOLOGIC DESCRIPTION

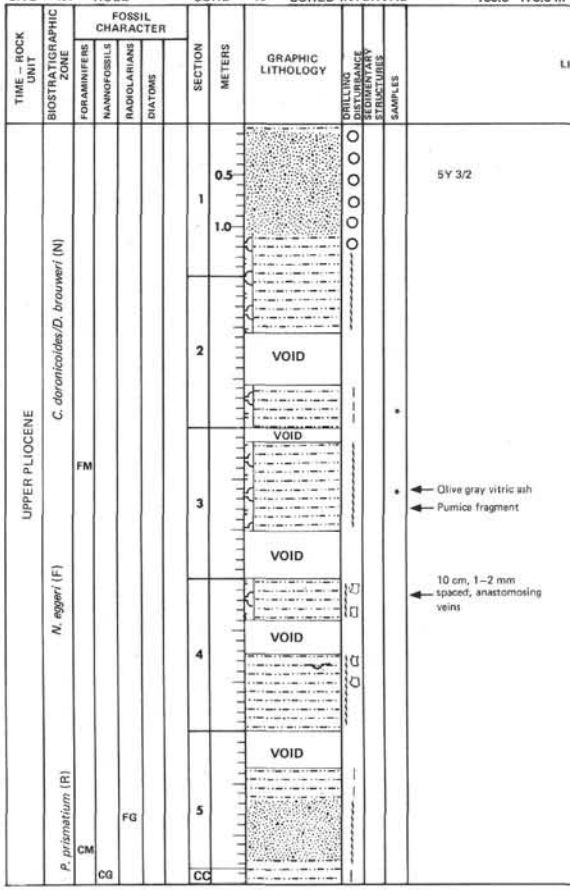
DIATOMACEOUS MUD WITH SANDY LAYERS
At Section 2, 76 cm – soft sediment clasts.

HEMIPELAGIC MUD AND COARSE GRAINED SAND
From Section 5–base of core: 5Y 3/2, swirled, drilling induced colors. Sand layers include: pectin, micro-gasteropod, benthic foraminifers, pumice fragments, quartz sand and pyrite. Some fragments of white pumice in Section 6.

CARBON-CARBONATE (%)

	3, 48–53
Organic Carbon	2.28
Total Carbonate	9

SITE 497 HOLE CORE 19 CORED INTERVAL 168.5–178.0 m



LITHOLOGIC DESCRIPTION

DIATOMACEOUS MUD/SANDY MUD
Section 1, 115 cm: Thin Section of 1 cm rounded pebble-gray, altered felsic igneous rock; K-feldspar, quartz, sericite, pyrite. Very fine-grained.
Section 2, 12 cm: shell fragments.

SMEAR SLIDE SUMMARY

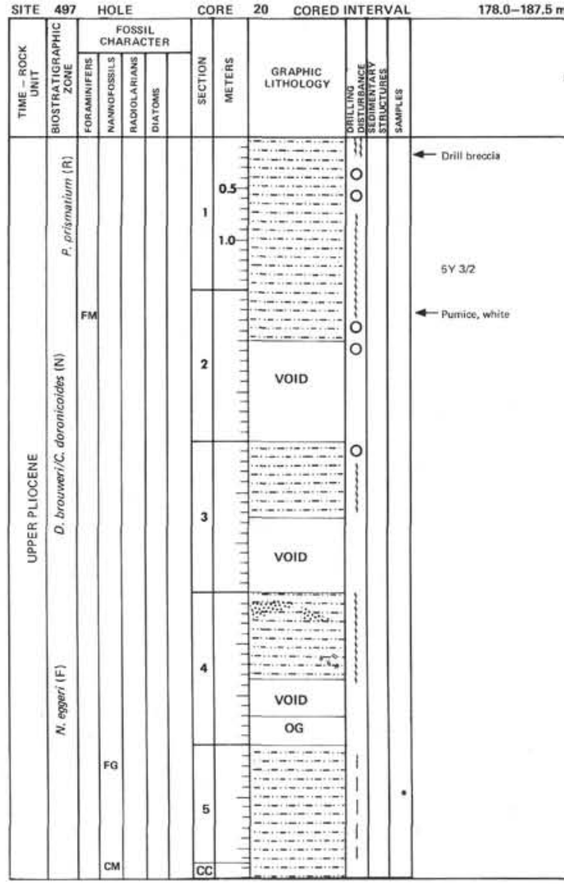
	2-131†	3-68††
TEXTURE:		
Sand	5	2
Silt	55	73
Clay	40	25
COMPOSITION:		
Quartz	5	1
Feldspar	–	1
Pyrite	2	2
Other heavy minerals	1	–
Clay minerals	34	25
Volcanic glass	10	59
Glauconite	1	TR
Zeolite	34	–
Calc.-Dolo.-Arag.	–	2
Calc. nannofossils	–	TR
Diatoms	5	10
Radiolarians	2	TR
Sponge spicules	5	–
Fecal pellets	1	–

† Groundmass
†† Light green ash layer

CARBON-CARBONATE (%)

	3, 59–64
Organic Carbon	2.30
Total Carbonate	0

SITE 497 HOLE CORE 20 CORED INTERVAL 178.0–187.5 m



LITHOLOGIC DESCRIPTION

HEMIPELAGIC MUD
Color: 5Y 3/2.

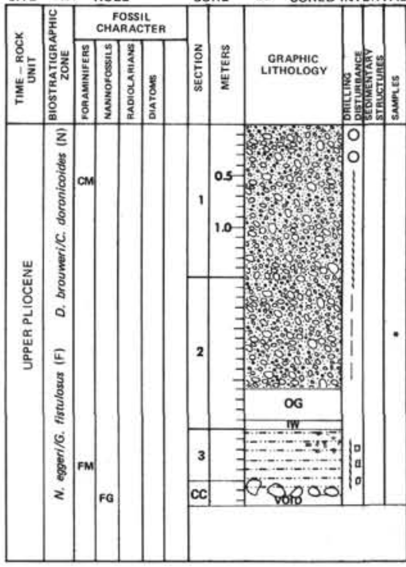
SMEAR SLIDE SUMMARY

	5-46
TEXTURE:	
Sand	10
Silt	30
Clay	60
COMPOSITION:	
Quartz	3
Feldspar	2
Pyrite	2
Clay minerals (aggregates)	60
Volcanic glass	15
Zeolite	5
Calc.-Dolo.-Arag.	2
Foraminifers	1
Diatoms	3
Radiolarians	2
Sponge spicules	1
Silicoflagellates	1

CARBON-CARBONATE (%)

	3, 30–35
Organic Carbon	4.04
Total Carbonate	0

SITE 497 HOLE CORE 23 CORED INTERVAL 206.5–216.0 m



LITHOLOGIC DESCRIPTION

SITE 497, CORE 21, 187.5–197.0 m: NO RECOVERY.
SITE 497, CORE 22, 197.0–206.5 m: NO RECOVERY.

INTRAFORMATIONAL PEBBLY MUDSTONE

Up to 4 cm variably shaped clasts and drilling fragments of firm mudstone (generally 5Y 4/2) in much softer matrix of 5Y 3/2 mud. Some clasts have prolate cross-sections and are well-rounded. Section 2, 50–60 cm: 5 mm clast is hard light gray micritic carbonate pebble. Section 3: drilling biscuits of very firm 5Y 3/2 mudstone with well-developed anastomosing darker veinlets 1–2 mm thick. Small patch of medium gray (N5) soft ash. Core-Catcher: Void except for pieces, mud 5Y 3/2.

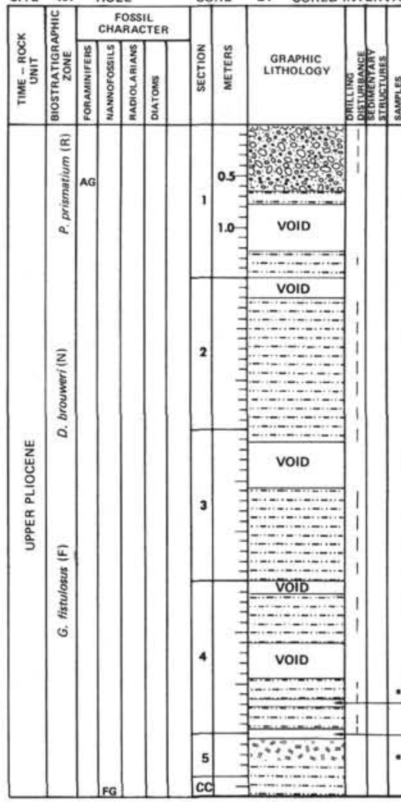
SMEAR SLIDE SUMMARY

	2-54
TEXTURE:	
Clay	100
COMPOSITION:	
Calc.-Dolo.-Arag.	98
Others	2

CARBON-CARBONATE (%)

	3, 9–11
Organic Carbon	4.54
Total Carbonate	1

SITE 497 HOLE CORE 24 CORED INTERVAL 216.0–225.5 m



5Y 3/2 soft sandy mud, weakly fissile

Homogeneous, dark olive gray (5Y 3/2)

Scattered voids

Shell fragment, 4 mm, broken

VOID

VOID

LITHOLOGIC DESCRIPTION

INTRAFORMATIONAL PEBBLY MUDSTONE

Elongate rounded clasts of dark gray (5Y 2/1) and dark olive gray (5Y 3/2) mudstone matrix: sandy tuffaceous mud typical of the remainder of the core.

HEMIPELAGIC MUDSTONE AND MUD

Section 2–base of core. Section 3: softer mud. Section 4: Forming very well to moderately well developed drilling biscuits (of former mudstone separated by remolded mud). Section 5, 5–23 cm: 5Y 4/2 vitric ash.

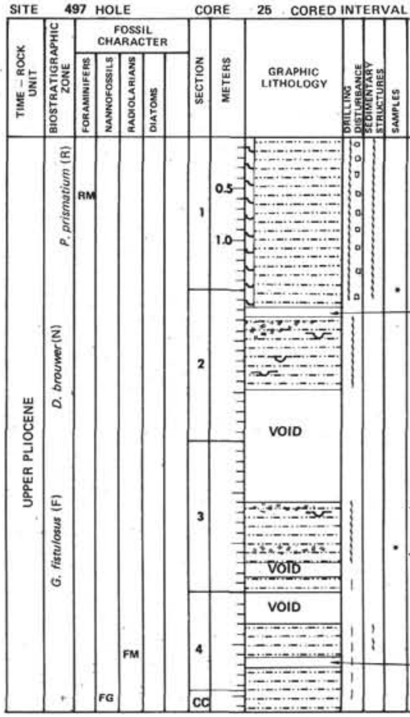
SMEAR SLIDE SUMMARY

	4-106	5-20
TEXTURE:		
Sand	25	10
Silt	25	85
Clay	50	5
COMPOSITION:		
Quartz	3	4
Feldspar	5	2
Pyrite	2	3
Other heavy minerals	2	2
Clay minerals	45	1
Volcanic glass	25	80
Glauconite	1	–
Calc.-Dolo.-Arag.	3	3
Foraminifers	2	–
Calc. nannofossils	3	1
Diatoms	5	3
Radiolarians	1	–
Sponge spicules	2	–
Others	1	1

CARBON-CARBONATE (%)

	2, 62–66
Organic Carbon	2.54
Total Carbonate	18.5

SITE 497 HOLE CORE 25 CORED INTERVAL 225.5–235.0 m



LITHOLOGIC DESCRIPTION

DIATOMACEOUS TUFFACEOUS MUDSTONE
Dark olive gray (5Y 3/2), consisting of biscuits which display dark sigmoidal fractures, spaced at 1–2 mm. Biscuits separated by remolded softer mud.
Section 2: soft drilling-disturbed sandy mud, 5Y 3/2.

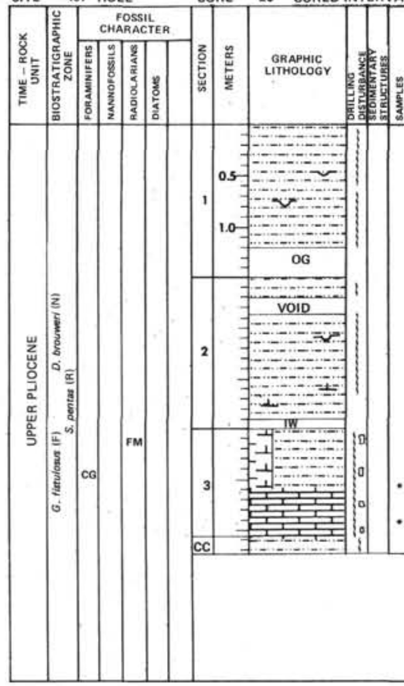
SMEAR SLIDE SUMMARY

	1-142	3-107
TEXTURE:		
Sand	2	95
Silt	38	5
Clay	60	–
COMPOSITION:		
Quartz	3	–
Feldspar	3	20
Pyrite	3	10 (opaques)
Other heavy minerals	–	30
Clay minerals	55	–
Volcanic glass	10	40
Glauconite	2	–
Zeolite	5	–
Calc.-Dolo.-Arag.	2	–
Calc. nannofossils	5	–
Diatoms	10	–
Sponge spicules	2	–

CARBON-CARBONATE (%)

	2, 52–55
Organic Carbon	1.63
Total Carbonate	3

SITE 497 HOLE CORE 26 CORED INTERVAL 235.0–244.5 m



LITHOLOGIC DESCRIPTION

SILICEOUS MUDSTONE
Sections 1 and 2: dark olive gray (5Y 3/2–4/2).

NANNOFOSSIL MUDSTONE
Section 3, 0–69 cm and Core-Catcher: dark olive gray (5Y 3/2) with biscuit structure.
Section 3, 69–90 cm: micritic limestone (5Y 4/2) with darker (5Y 3/2) top (turbidite?).

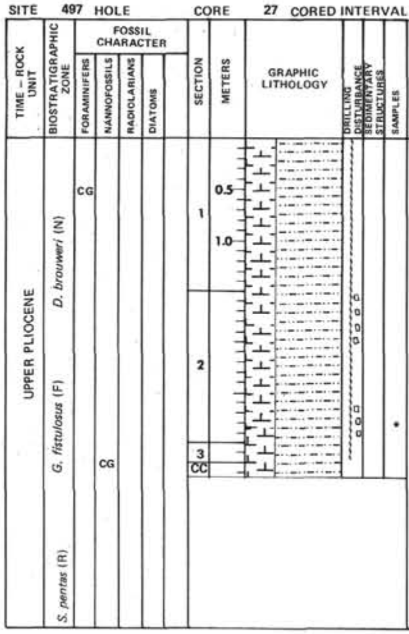
SMEAR SLIDE SUMMARY

	3-61	3-90
TEXTURE:		
Sand	5	–
Silt	20	1
Clay	75	99
COMPOSITION:		
Quartz	–	1
Feldspar	3	–
Pyrite	1	–
Other heavy minerals	1	–
Clay minerals	50	–
Volcanic glass	3	–
Glauconite	1	–
Zeolite	2	–
Calc.-Dolo.-Arag.	3	98
Foraminifers	1	–
Calc. nannofossils	25	1
Diatoms	5	–
Radiolarians	2	–
Sponge spicules	1	–
Others	2	–

CARBON-CARBONATE (%)

	3, 30–32
Organic Carbon	2.01
Total Carbonate	5.5

SITE 497 HOLE CORE 27 CORED INTERVAL 244.5–254.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MUD AND MUDSTONE

Dark olive gray to olive gray (5Y 3/2–3/4) nannofossil mud. Section 2: same as Section 1 but mudstone and mud; 0–14 cm: glauconite. Section 3 and Core-Catcher: Same as Section 2. Same as Section 2.

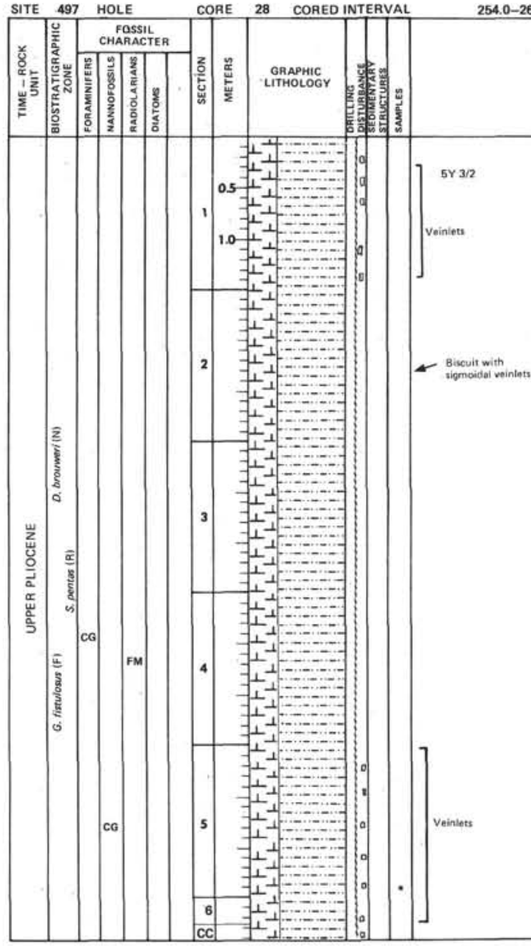
SMEAR SLIDE SUMMARY

	2-122
TEXTURE:	
Sand	2
Silt	18
Clay	80
COMPOSITION:	
Quartz	1
Feldspar	1
Pyrite	1
Other heavy minerals	1
Clay minerals	50
Volcanic glass	3
Glauconite	1
Foraminifers	1
Calc. nannofossils	30
Diatoms	8
Radiolarians	1
Others	2

CARBON-CARBONATE (%)

	2, 92–94
Organic Carbon	2.99
Total Carbonate	3

SITE 497 HOLE CORE 28 CORED INTERVAL 254.0–263.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL-RICH MUD AND MUDSTONE

Dark olive gray (5Y 3/2).

SMEAR SLIDE SUMMARY

	5-139
TEXTURE:	
Sand	15
Silt	20
Clay	65
COMPOSITION:	
Quartz	4
Feldspar	3
Pyrite	2
Other heavy minerals	1
Clay minerals	40
Volcanic glass	15
Glauconite	1
Calc.-Dolo.-Arag.	2
Foraminifers	1
Calc. nannofossils	30
Sponge spicules	1

CARBON-CARBONATE (%)

	2, 32–36
Organic Carbon	3.25
Total Carbonate	8

SITE 497 HOLE CORE 29 CORED INTERVAL 263.5–273.0 m

TIME – ROCK UNIT: UPPER PLIOCENE
BIOSTRATIGRAPHIC ZONE: *S. pentas* (R)
FOSSIL CHARACTER: FORAMINIFERS; NANNOFOSSILS CP; RADIOLARIANS RM; DIATOMS
SECTION: 1, 2, 3, 4, 5, 6, 7, 8, CC
METERS: 0.5, 1.0
GRAPHIC LITHOLOGY: VOID, VOID, VOID, VOID, VOID, VOID, OG, VOID, VOID, VOID, VOID
DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES

LITHOLOGIC DESCRIPTION

5Y 3/2

DIATOMACEOUS MUD AND MUDSTONE
From top of core through Section 6.
Biscuits with sigmoidal veinlets at 51–58 cm of Section 2:

HEMIPELAGIC MUD AND MUDSTONE
Section 7 through Core-Catcher:
Dark olive gray (5Y 3/2). Core-Catcher is long because it was caught in extra length of core liner as gas ejected it from regular liner.

5Y 3/2 to 5Y 4/2

VOID

VOIDS

5Y 3/2 to 4/2

5Y 3/2

SMEAR SLIDE SUMMARY

	4-67	CC-36 †
TEXTURE:		
Sand	6	5
Silt	16	10
Clay	78	85
COMPOSITION:		
Quartz	5	6
Feldspar	TR	TR
Pyrite	4	1
Clay minerals	71	84
Volcanic glass	3	6
Glauconite	TR	TR
Calc.-Dolo.-Arag.	–	TR
Foraminifers	–	TR
Calc. nannofossils	1	1
Diatoms	15	–
Radiolarians	–	TR
Sponge spicules	1	1

† Firm biscuit

CARBON-CARBONATE (%)

	3, 39–41
Organic Carbon	1.83
Total Carbonate	1.5

SITE 497 HOLE CORE 30 CORED INTERVAL 273.0–282.5 m

TIME – ROCK UNIT: UPPER PLIOCENE
BIOSTRATIGRAPHIC ZONE: *G. fistulosus* (F); *S. pentas* (R); *D. brouweri* (N)
FOSSIL CHARACTER: FORAMINIFERS CM; NANNOFOSSILS AG; RADIOLARIANS RM; DIATOMS
SECTION: 1, 2, 3, 4, 5, 6, 7, 8, CC
METERS: 0.5, 1.0
GRAPHIC LITHOLOGY: VOID, VOID, VOID, VOID, VOID, VOID, VOID
DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES

LITHOLOGIC DESCRIPTION

5Y 3/2

HEMIPELAGIC MUDSTONE AND MUD
Dark olive gray (5Y 3/2–4/2). Veinlets in biscuits.

5Y 3/2–4/2

5Y 4/2

5Y 4/2

5Y 4/2

SMEAR SLIDE SUMMARY

	3-138	4-120	CC-100 (biscuit)
TEXTURE:			
Sand	3	2	5
Silt	17	13	9
Clay	80	85	86
COMPOSITION:			
Quartz	3	3	5
Feldspar	3	2	TR
Pyrite	2	1	2
Other heavy minerals	–	1	TR
Clay minerals	80	85	84
Volcanic glass	5	3	4
Glauconite	1	1	TR
Zeolite	2	1	–
Calc.-Dolo.-Arag.	1	–	TR
Foraminifers	1	–	–
Calc. nannofossils	–	–	2
Diatoms	2	1	1
Radiolarians	–	–	TR
Sponge spicules	–	1	1
Silicoflagellates	–	1	–

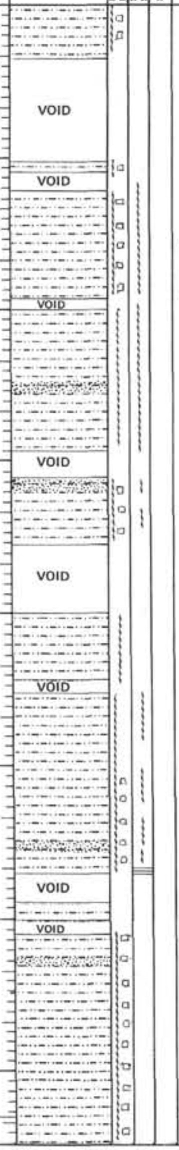
CARBON-CARBONATE (%)

	3, 46–50
Organic Carbon	1.71
Total Carbonate	7

SITE 497 HOLE CORE 31 CORED INTERVAL 282.5–292.0 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
LOWER PLIOCENE	*G. altispira* (F) / *D. brouweri* (N)	CM	FG			1, 2, 3, 4, 5, 6, 7, 8, CC	0.5, 1.0

GRAPHIC LITHOLOGY / DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES



LITHOLOGIC DESCRIPTION

5Y 4/2

5Y 4/2
Veinlets

← Veinlets

Veinlets

Veinlets

5Y 3/2–4/2

5Y 3/2

HEMIPELAGIC MUD AND MUDSTONE
Section 6: Biscuits with sigmoidal veinlets (0–20 cm).

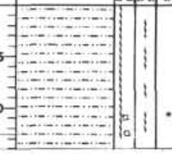
CARBON-CARBONATE (%)

	3, 25–29
Organic Carbon	1.18
Total Carbonate	6

SITE 497 HOLE CORE 32 CORED INTERVAL 292.0–301.5 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
LOWER PLIOCENE	*G. altispira* (F) / *S. pentas* (R)	CM				1, CC	0.5, 1.0

GRAPHIC LITHOLOGY / DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES



LITHOLOGIC DESCRIPTION

5Y 3/2

NANNOFOSSIL-RICH HEMIPELAGIC MUDSTONE AND MUD
Section 1 and Core-Catcher: light olive gray (5Y 6/2) at top. At 110 cm (Section 1) biscuit with healed fractures.

SMEAR SLIDE SUMMARY

	1-103
TEXTURE:	
Sand	6
Silt	10
Clay	84
COMPOSITION:	
Quartz	7
Feldspar	1
Pyrite	2
Clay minerals	74
Volcanic glass	4
Glauconite	1
Foraminifers	1
Calc. nannofossils	10
Radiolarians	TR

CARBON-CARBONATE (%)

	1, 101–105
Organic Carbon	1.26
Total Carbonate	3

SITE 497 HOLE CORE 33 CORED INTERVAL 301.5–311.0 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
LOWER PLIOCENE	*G. altispira* (F) *S. pentas* (R)	CP	CG	RM		CC	

GRAPHIC LITHOLOGY / DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES

LITHOLOGIC DESCRIPTION

HEMIPELAGIC MUD AND MUDSTONE
5Y 3/2 to 5Y 4/2, biscuits with sigmoidal veinlets.

SITE 497 HOLE CORE 34 CORED INTERVAL 311.0–320.5 m

TIME-ROCK UNIT: LOWER PLIOCENE

BIOSTRATIGRAPHIC ZONE: *R. pseudoumbilica* (N); *S. pentas* (R); *G. altispira* (F)

FOSSIL CHARACTER: FORAMINIFERS: FP, FG; NANNOFOSSILS; RADIOLARIANS: CM; DIATOMS

SECTION: 1, 2, 3, 4, CC — METERS: 0.5, 1.0 — GRAPHIC LITHOLOGY: VOID; IW — DRILLING DISTURBANCE — SEDIMENTARY STRUCTURES — SAMPLES

LITHOLOGIC DESCRIPTION

5Y 3/2

← Veinlets

Veinlets

DIATOMACEOUS MUDSTONE

Brittle fracturing in top of Section 2.

Section 2, 103–122 cm:

Veinlets:

SMEAR SLIDE SUMMARY

	4-17
TEXTURE:	
Sand	6
Silt	18
Clay	76
COMPOSITION:	
Quartz	7
Feldspar	TR
Pyrite	3
Clay minerals	72
Volcanic glass	5
Glauconite	1
Calc. nannofossils	TR
Diatoms	9
Radiolarians	1
Sponge spicules	2

CARBON-CARBONATE (%)

	3, 32–37
Organic Carbon	1.48
Total Carbonate	0

SITE 497 HOLE CORE 35 CORED INTERVAL 320.5–330.0 m

TIME-ROCK UNIT: LOWER PLIOCENE

BIOSTRATIGRAPHIC ZONE: *R. pseudoumbilica* (N); *S. pentas* (R); *G. altispira* (F)

FOSSIL CHARACTER: FORAMINIFERS: FP, FG; NANNOFOSSILS; RADIOLARIANS: RM; DIATOMS

SECTION: 1, 2, 3, 4, 5, 6, 7, CC — METERS: 0.5, 1.0 — GRAPHIC LITHOLOGY: VOID; OG — DRILLING DISTURBANCE — SEDIMENTARY STRUCTURES — SAMPLES

LITHOLOGIC DESCRIPTION

5Y 3/2 to 5Y 4/2

Veinlets

5Y 3/2 to 5Y 4/2

Veinlets

5Y 3/2

Veinlets

5Y 7/2

Veinlets

Veinlets

5Y 3/2 to 4/2

HEMIPELAGIC MUDSTONE AND MUD

Biscuits with sigmoidal veins in Section 1.

Glauconite produces black and green patches in Sections 2 and 4.

SMEAR SLIDE SUMMARY

	3-99†	3-106††	3-108†††
TEXTURE:			
Sand	10	15	5
Silt	85	80	40
Clay	5	5	55
COMPOSITION:			
Quartz	4	2	13
Feldspar	1	–	–
Pyrite	2	1	2
Other heavy minerals	1	–	2
Clay minerals	5	5	40
Volcanic glass	81	90	5
Glauconite	1	1	TR
Zeolite	–	–	15
Calc.-Dolo.-Arag.	TR	1	2
Foraminifers	–	–	1
Calc. nannofossils	2	TR	2
Diatoms	2	–	4
Radiolarians	–	–	2
Sponge spicules	1	–	2
Fecal pellets	–	–	10

† Mixed ash layer, gray (5Y 6/1–5/1)

†† Ash layer, light gray (5Y 7/2)

††† Mud, 5Y 3/2

CARBON-CARBONATE (%)

	3, 89–94
Organic Carbon	1.72
Total Carbonate	1.5

SITE 497 HOLE CORE 36 CORED INTERVAL 330.0–339.5 m

TIME – ROCK UNIT: LOWER PLIOCENE

BIOSTRATIGRAPHIC ZONE: G. altispira (F); S. pentas (R); R. pseudoumbilica (N)

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

SECTION: 1, 2, 3, 4, 5, 6, 7, 8, 9, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY: VOID; VOID; VOID; VOID; VOID; VOID; VOID

DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES

Micrite (limestone) taken from cobble

5Y 3/2

Veinlets

Veinlets

Fractured by drilling

Veinlets

5Y 3/2

Fracture within biscuit

Ash layer

Veinlets

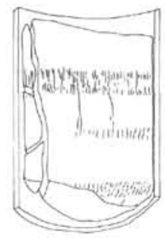
LITHOLOGIC DESCRIPTION

MUDSTONE

Section 3: Lots of fracture within biscuits.

Section 1, 63–68 cm:

Section 4, 132–143 cm: Veinlets:



SMEAR SLIDE SUMMARY

	1-38	5-70
TEXTURE:		
Sand	2	10
Silt	1	17
Clay	97	73
COMPOSITION:		
Quartz	1	13
Feldspar	TR	TR
Pyrite	1	3
Other heavy minerals	TR	TR
Clay minerals	–	70
Volcanic glass	1	6
Glauconite	–	TR
Zeolite	TR	–
Calc.-Dolo.-Arag.	97	–
Calc. nannofossils	–	5
Diatoms	–	1
Radiolarians	–	TR
Sponge spicules	–	1

CARBON-CARBONATE (%)

	3, 70–75
Organic Carbon	3.03
Total Carbonate	0

SITE 497 HOLE CORE 37 CORED INTERVAL 339.5–349.0 m

TIME – ROCK UNIT: LOWER PLIOCENE

BIOSTRATIGRAPHIC ZONE: G. altispira (F); S. pentas (R); R. pseudoumbilica (N)

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

SECTION: 1, 2, 3, 4, 5, 6, 7, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY: VOID; VOID; VOID; VOID; VOID

DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES

5Y 3/2

Veinlets

Veinlets

Veinlets

Veinlets

VOID

LITHOLOGIC DESCRIPTION

DIATOMACEOUS MUDSTONE AND MUD

Sections 1 through 6.

HEMIPELAGIC MUDSTONE AND MUD

Section 7 and Core-Catcher.

SMEAR SLIDE SUMMARY

	6-117
TEXTURE:	
Sand	2
Silt	58
Clay	40
COMPOSITION:	
Quartz	4
Pyrite	5
Clay minerals	36
Volcanic glass	15
Glauconite	16
Zeolite	10
Calc.-Dolo.-Arag.	2
Calc. nannofossils	1
Diatoms	8
Radiolarians	3

CARBON-CARBONATE (%)

	2, 132–137
Organic Carbon	1.96
Total Carbonate	4

SITE 497 HOLE CORE 38 CORED INTERVAL 349.0–358.5 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
UPPER MIOCENE TO LOWER PLIOCENE	*S. pentas* (R); *R. pseudoumbilica* (N); *G. altispira* (F)	CM	RG			1, 2, 3, 4, 5, 6, 7, 8, CC	0.5, 1.0					

5Y 3/2

Veinlets

Veinlets

Veinlets

Wood fragment

Veinlets

Veinlets

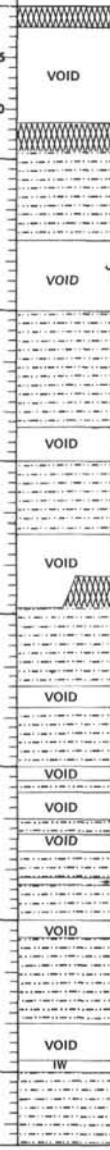
HEMIPELAGIC MUDSTONE AND MUD
Drilling breccia in parts of Sections 2, 3, 4, and 5. Biscuits in lower part of Section 3. Core-Catcher: 1 cm.

CARBON-CARBONATE (%)

	3, 79–84
Organic Carbon	1.97
Total Carbonate	0

SITE 497 HOLE CORE 39 CORED INTERVAL 358.5–368.0 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
UPPER MIOCENE TO LOWER PLIOCENE	*R. pseudoumbilica* (N); *S. pentas* (R); *G. altispira* (F)	CG, CM	FM			1, 2, 3, 4, 5, 6, 7, 8	0.5, 1.0					



5Y 3/2

Veinlets

Veinlets

VOID

HEMIPELAGIC MUDSTONE AND MUD
Dark olive gray (5Y 3/2). Drilling breccia in Section 1 and part of Section 4. Veinlets in biscuits in Sections 2 and 3.

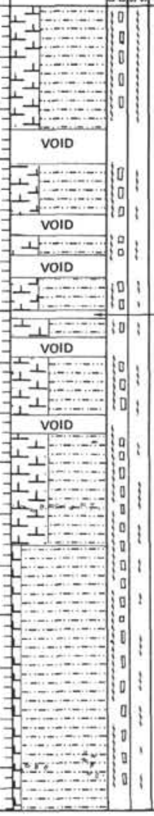
CARBON-CARBONATE (%)

	3, 26–31
Organic Carbon	2.16
Total Carbonate	3

SITE 497 HOLE CORE 40 CORED INTERVAL 368.0–377.5 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
UPPER MIOCENE TO LOWER PLIOCENE	*S. pentas* (R)	CM				1	0.5, 1.0
						2	
	R. pseudoumbilica (N)					3	
						4	
			RG			5	
		CM				6	
						CC	

GRAPHIC LITHOLOGY / DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES



LITHOLOGIC DESCRIPTION

5Y 3/2 to 5Y 4/2

5Y 4/2 to 5Y 3/2

VOID

5Y 3/2 to 5Y 4/2

5Y 3/2

5Y 4/2

5Y 3/2

5Y 3/2 to 5Y 4/2

5Y 4/2

NANNOFOSSIL MUDSTONE
Sigmoidal veins, bioturbation, and glauconite throughout.

SMEAR SLIDE SUMMARY

	2-147	4-74
TEXTURE:		
Sand	5	5
Silt	20	20
Clay	75	75
COMPOSITION:		
Quartz	3	3
Feldspar	2	3
Pyrite	2	2
Other heavy minerals	1	1
Clay minerals	40	35
Volcanic glass	5	5
Glauconite	1	1
Zeolite	5	5
Calc.-Dolo.-Arag.	1	1
Foraminifers	1	–
Calc. nannofossils	35	40
Diatoms	1	–
Radiolarians	1	1
Sponge spicules	1	–
Organic matter	1	1
Palagonite	–	1

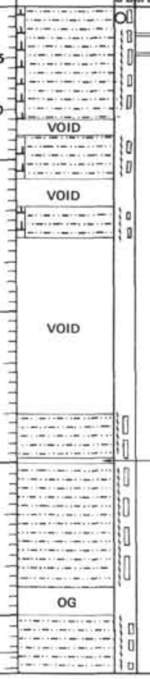
CARBON-CARBONATE (%)

	5, 97–100
Organic Carbon	1.68
Total Carbonate	11

SITE 497 HOLE CORE 41 CORED INTERVAL 377.5–387.0 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
UPPER MIOCENE TO LOWER PLIOCENE	*S. pentas* (R)					1	0.5, 1.0
				FM		2	
						3	
						4	
						5	
						CC	

GRAPHIC LITHOLOGY / DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES



LITHOLOGIC DESCRIPTION

5Y 3/2

VOID

NANNOFOSSIL MUDSTONE
Dark olive gray (5Y 3/2). Sigmoidal veins, bioturbation, and glauconite throughout.

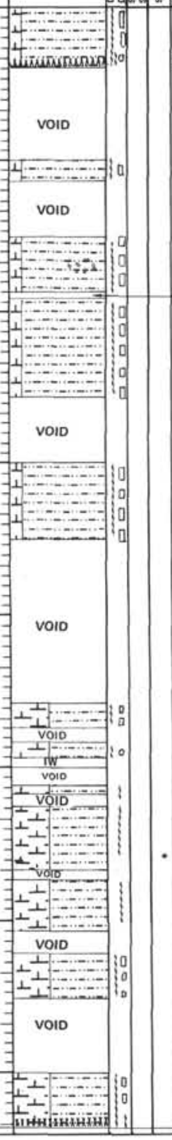
CARBON-CARBONATE (%)

	3, 125–130
Organic Carbon	2.14
Total Carbonate	0

SITE 497 HOLE CORE 42 CORED INTERVAL 387.0–396.5 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
LOWER PLIOCENE	*R. pseudoumbilica* zone (N) *S. pentas* (R)	CM	FG	FM		1, 2, 3, 4, 5, 6, 7, 8	0.5, 1.0

GRAPHIC LITHOLOGY / DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES



LITHOLOGIC DESCRIPTION

5Y 3/2

← Drilling breccia

5Y 3/2 to 5Y 4/2

VOID

5Y 4/2

5Y 3/2 to 5Y 4/2

5Y 3/2

5Y 3/2 to 5Y 4/2

← Drilling breccia

NANNOFOSSIL MUDSTONE

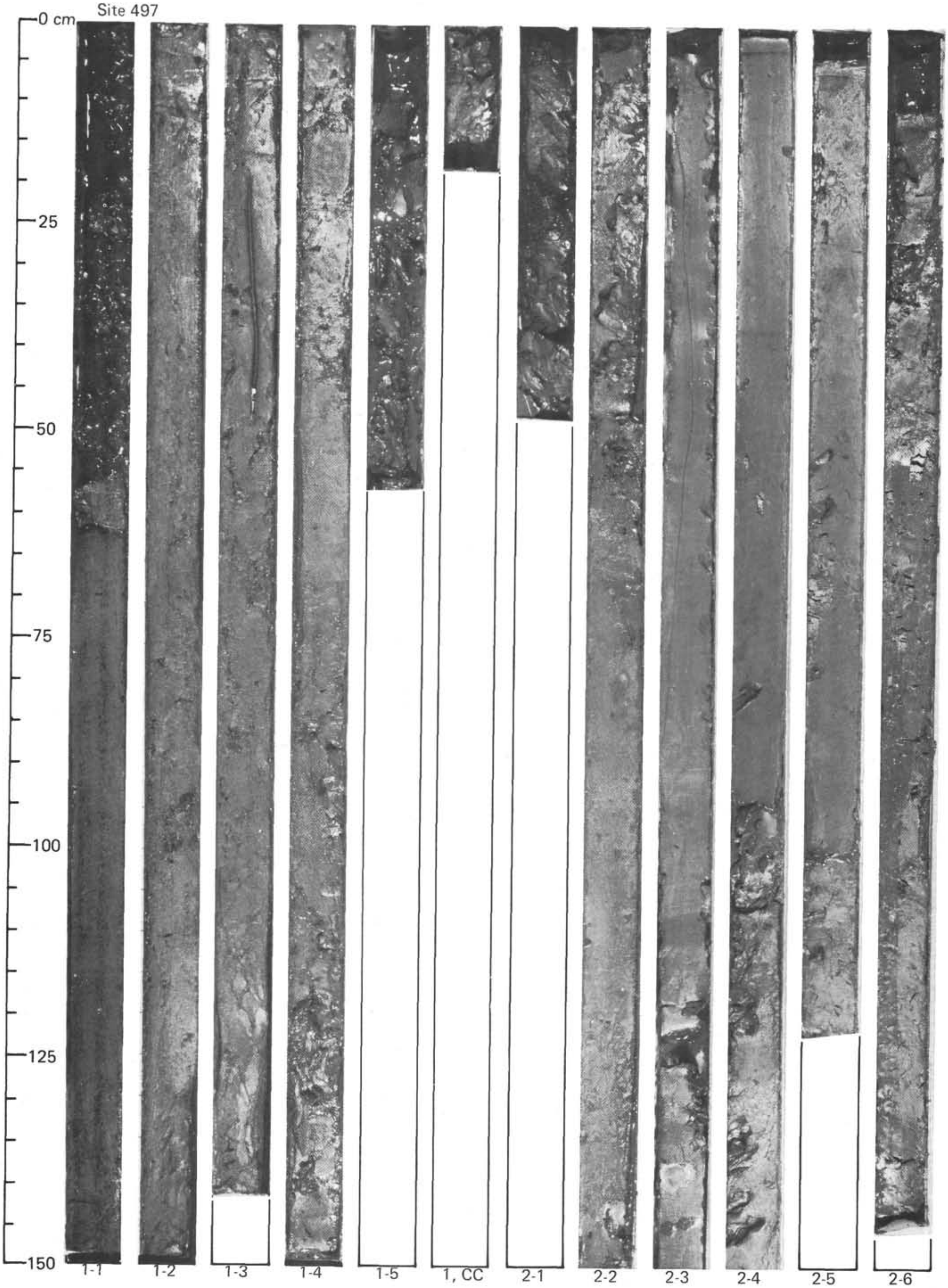
Sigmoidal veins, bioturbation, and glauconite.
May be initial lamination in some biscuits.

SMEAR SLIDE SUMMARY

	6-84
TEXTURE:	
Sand	10
Silt	10
Clay	80
COMPOSITION:	
Quartz	3
Feldspar	2
Pyrite	2
Other heavy minerals	1
Clay minerals	40
Volcanic glass	2
Glauconite	1
Zeolite	2
Calc.-Dolo.-Arag.	2
Foraminifers	1
Calc. nannofossils	40
Radiolarians	1
Sponge spicules	1
Organic matter	1
Palagonite	1

CARBON-CARBONATE (%)

	3, 50–53
Organic Carbon	1.55
Total Carbonate	14.5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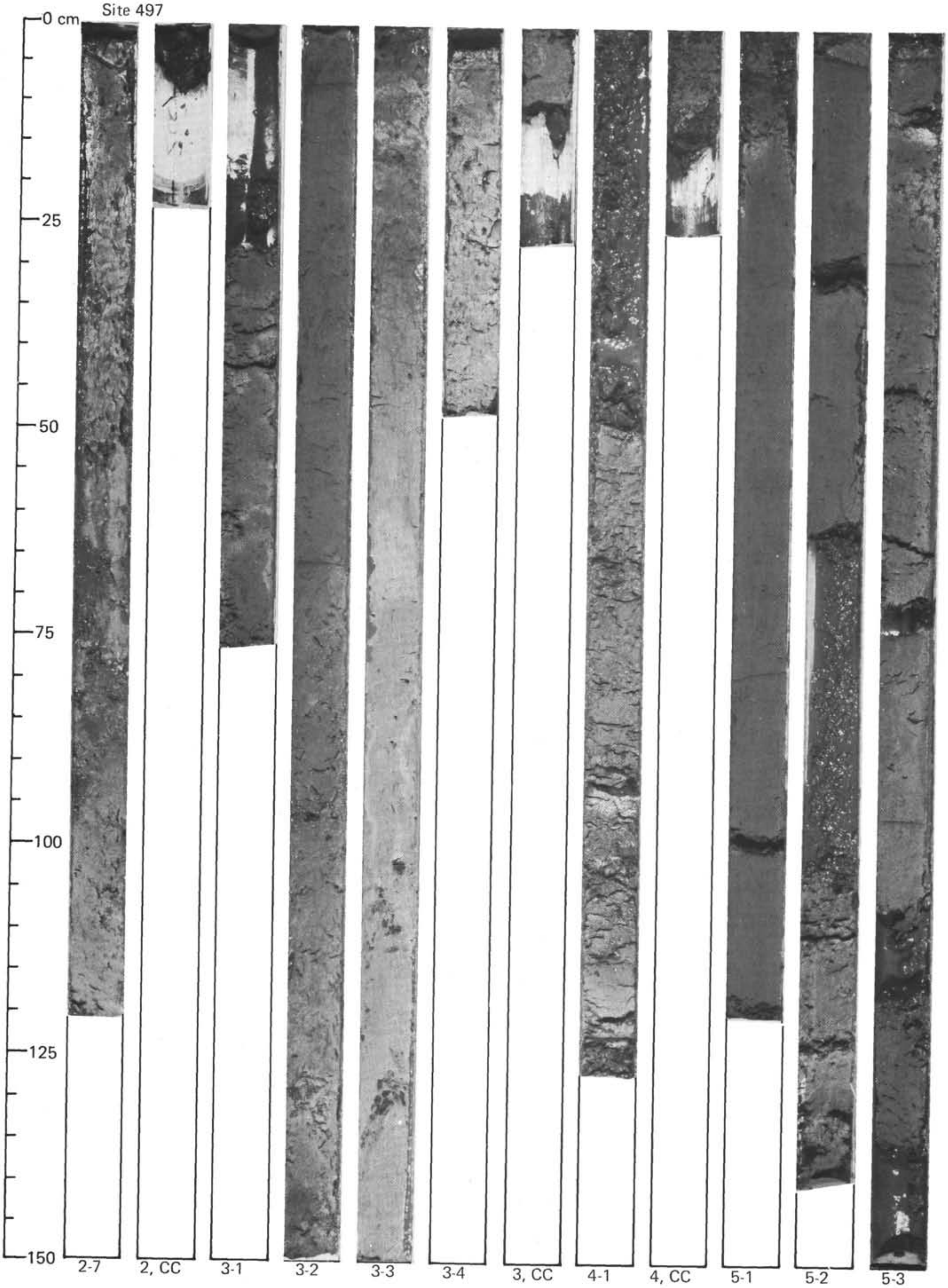
2-6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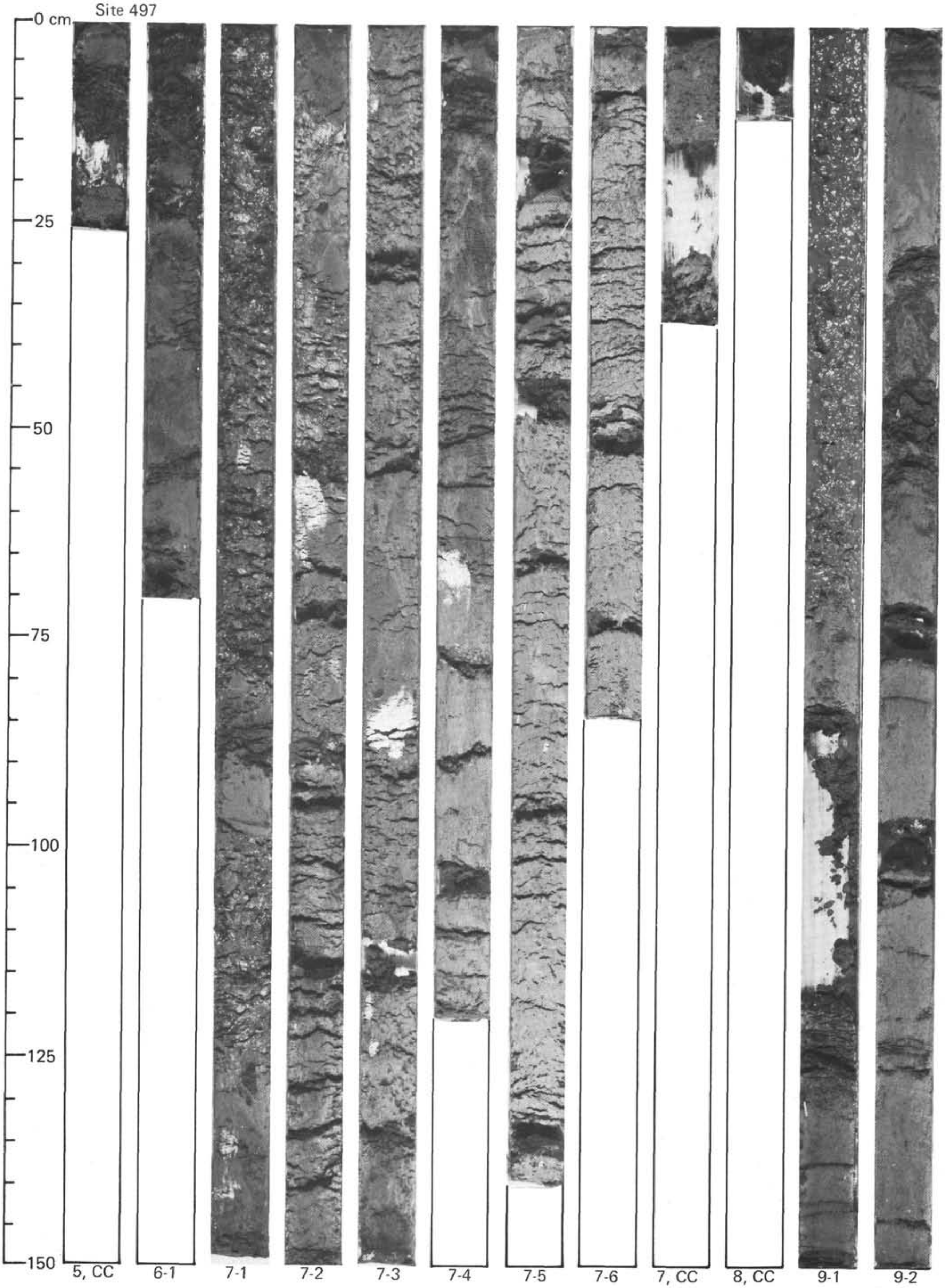
5-3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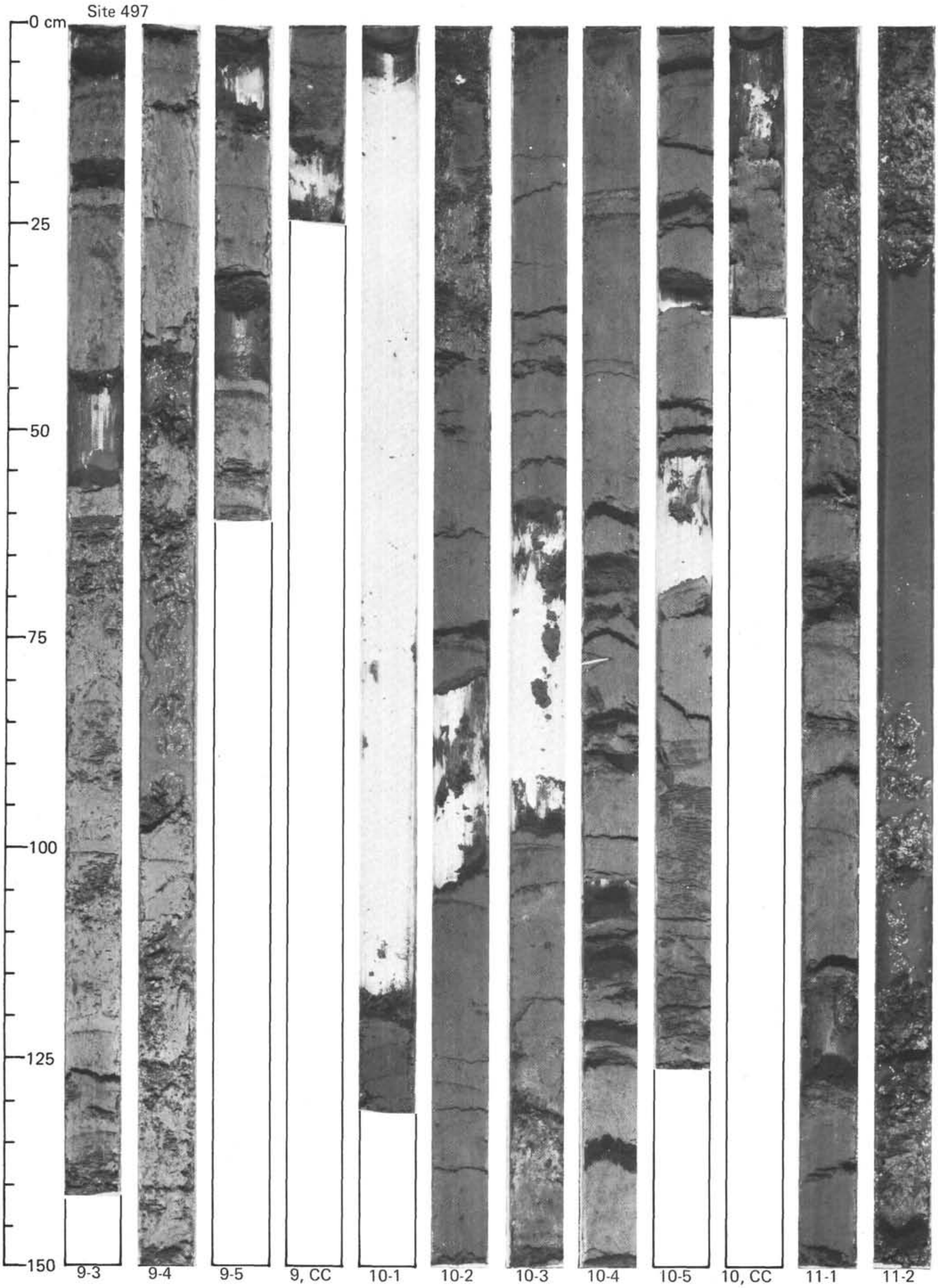
9-2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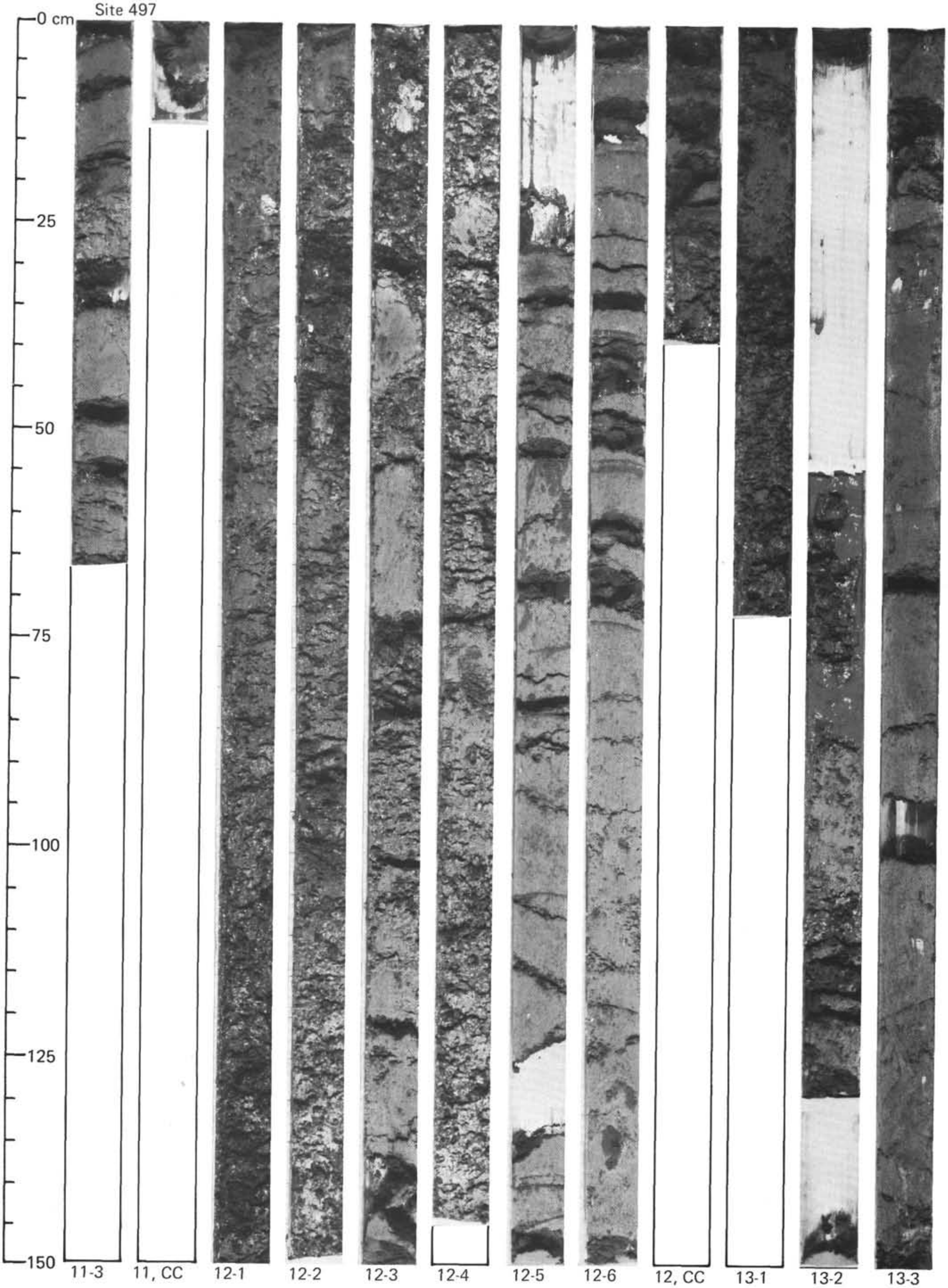
11-2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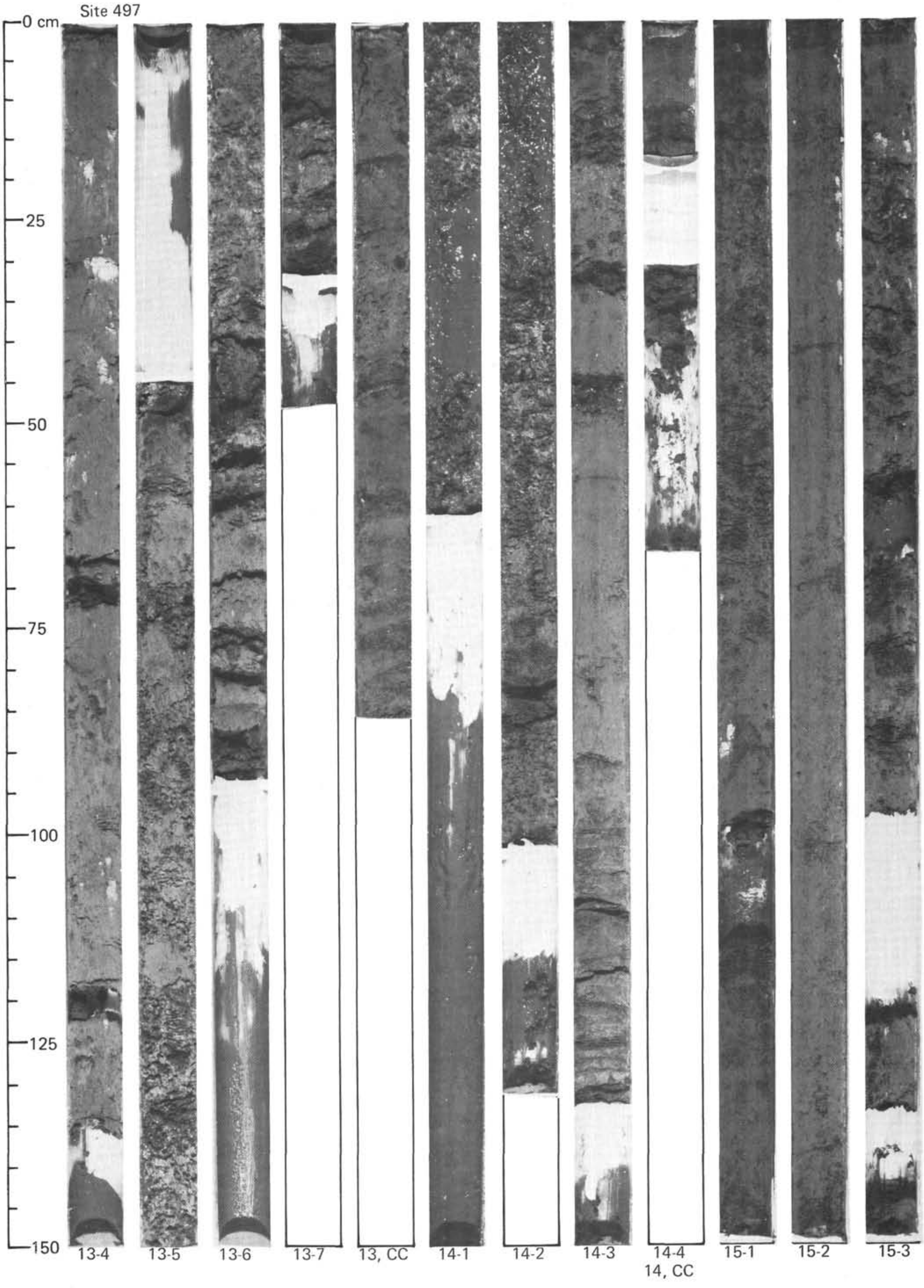
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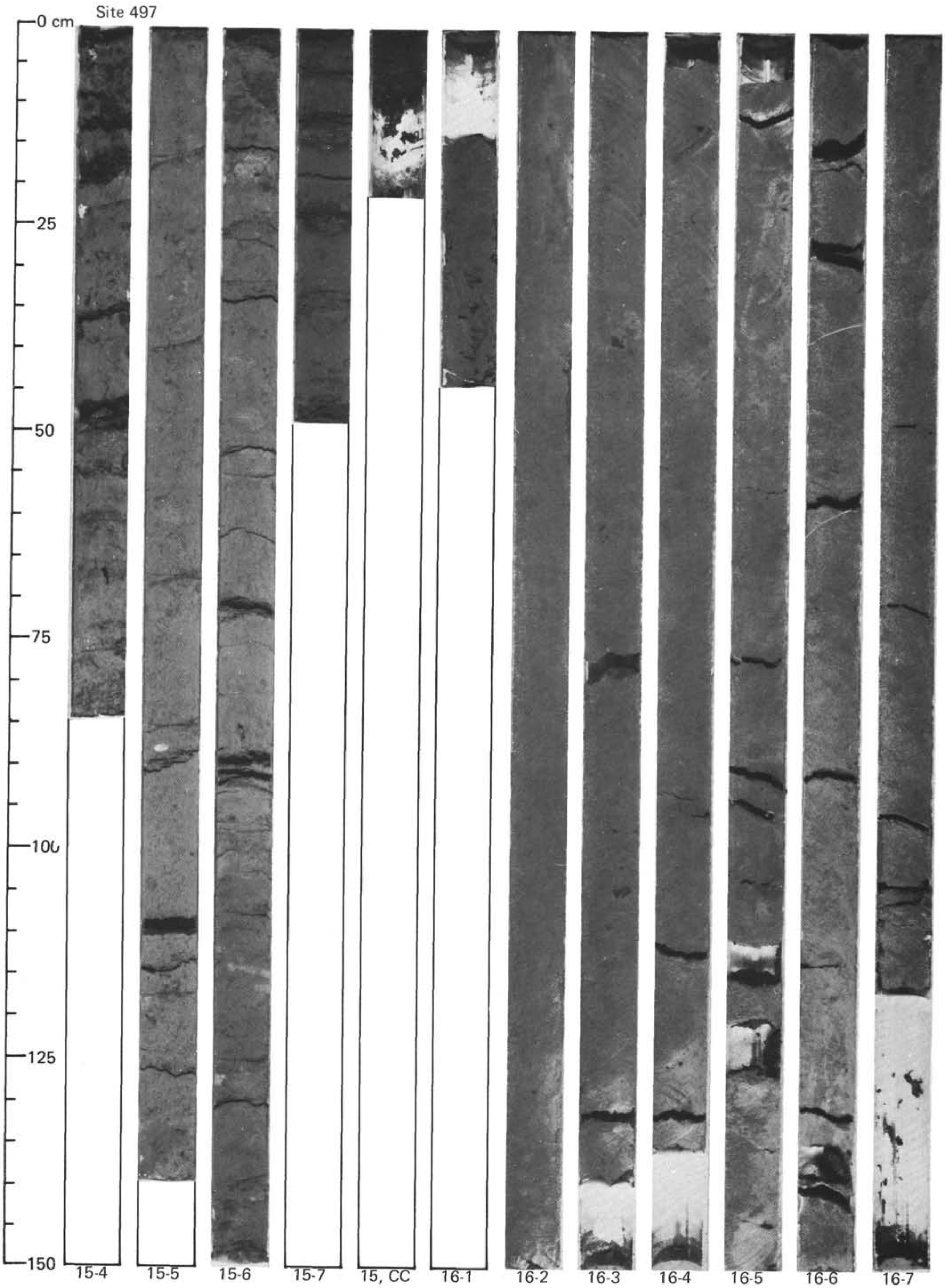
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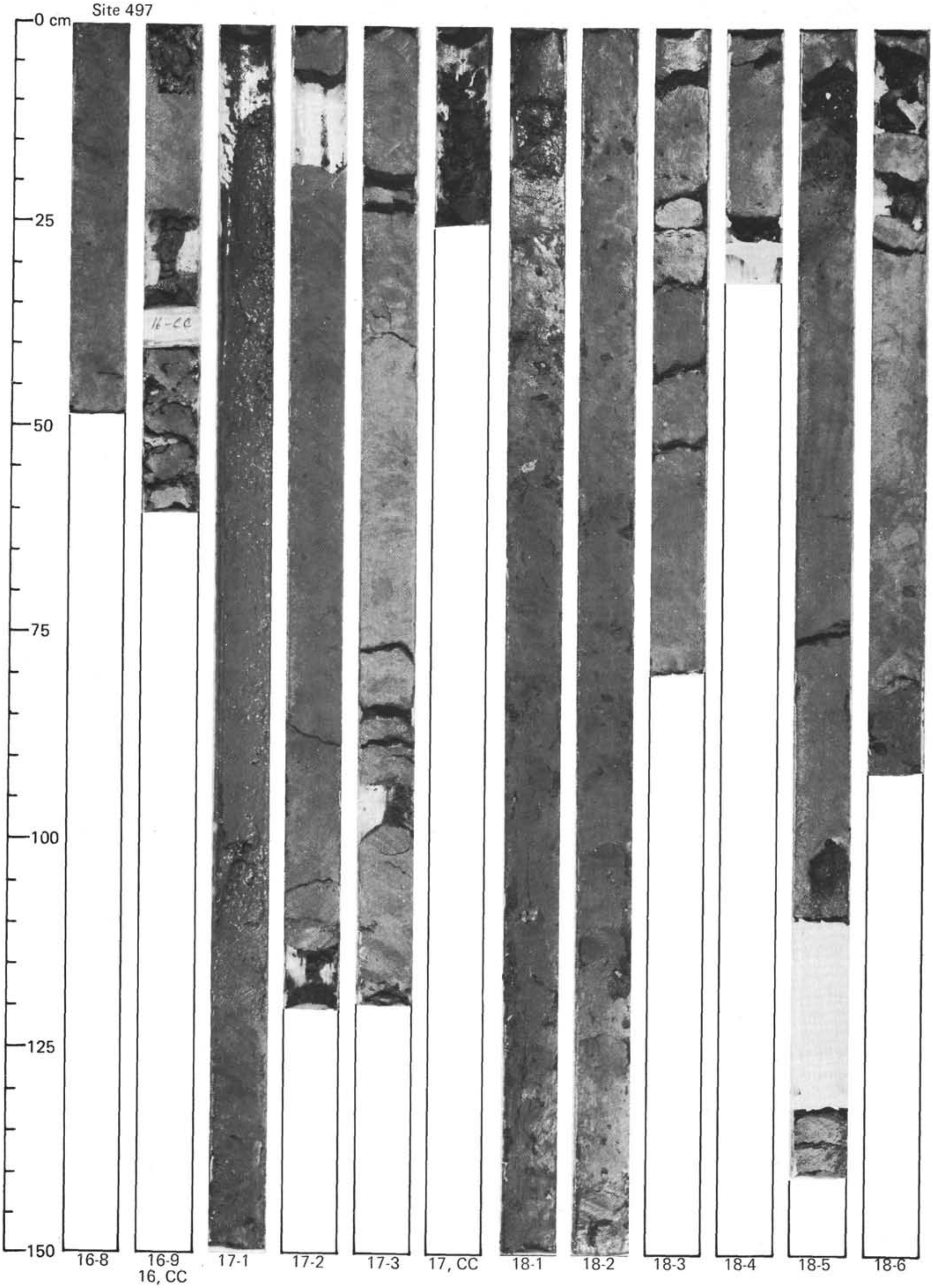
16-7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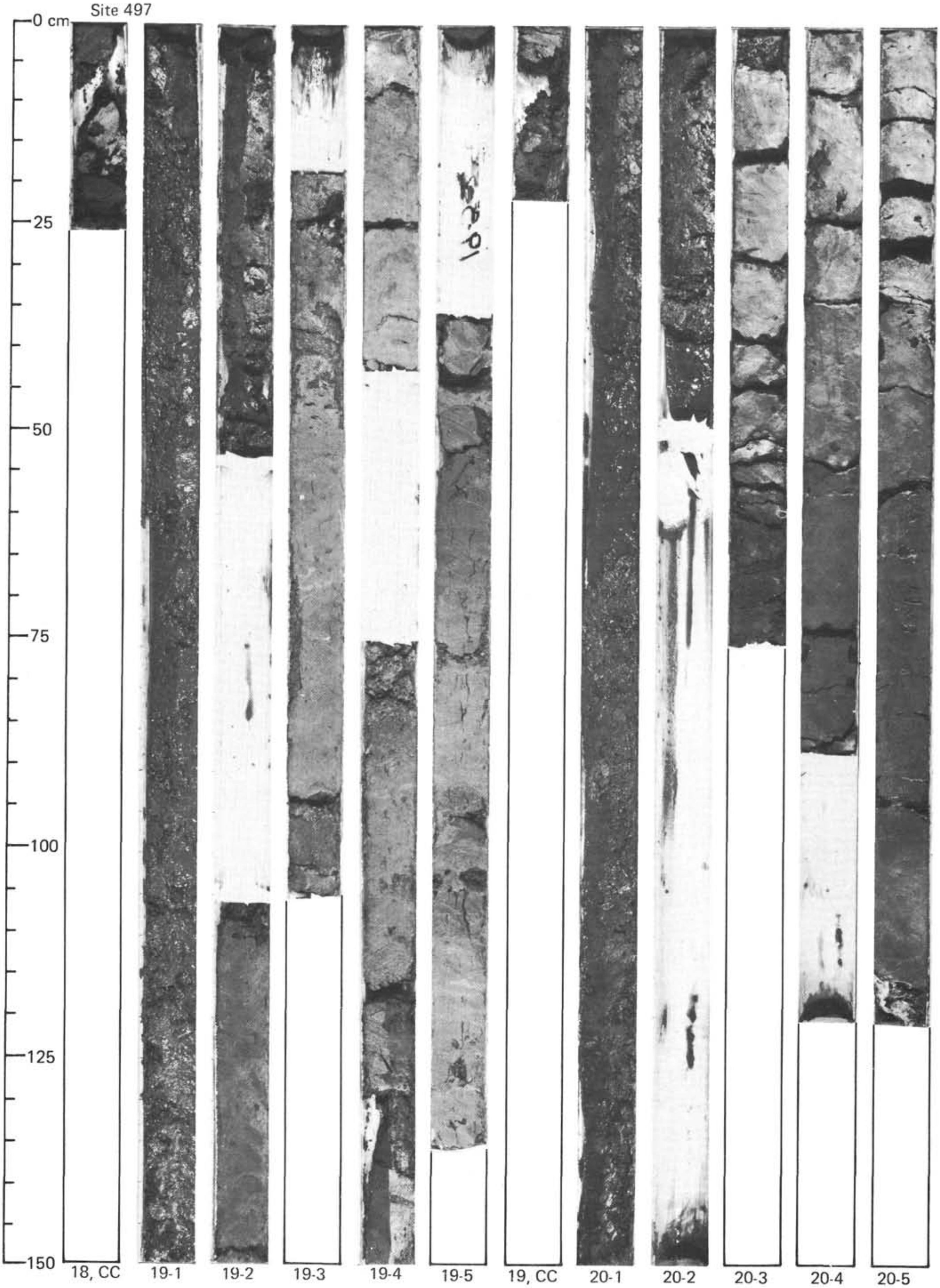
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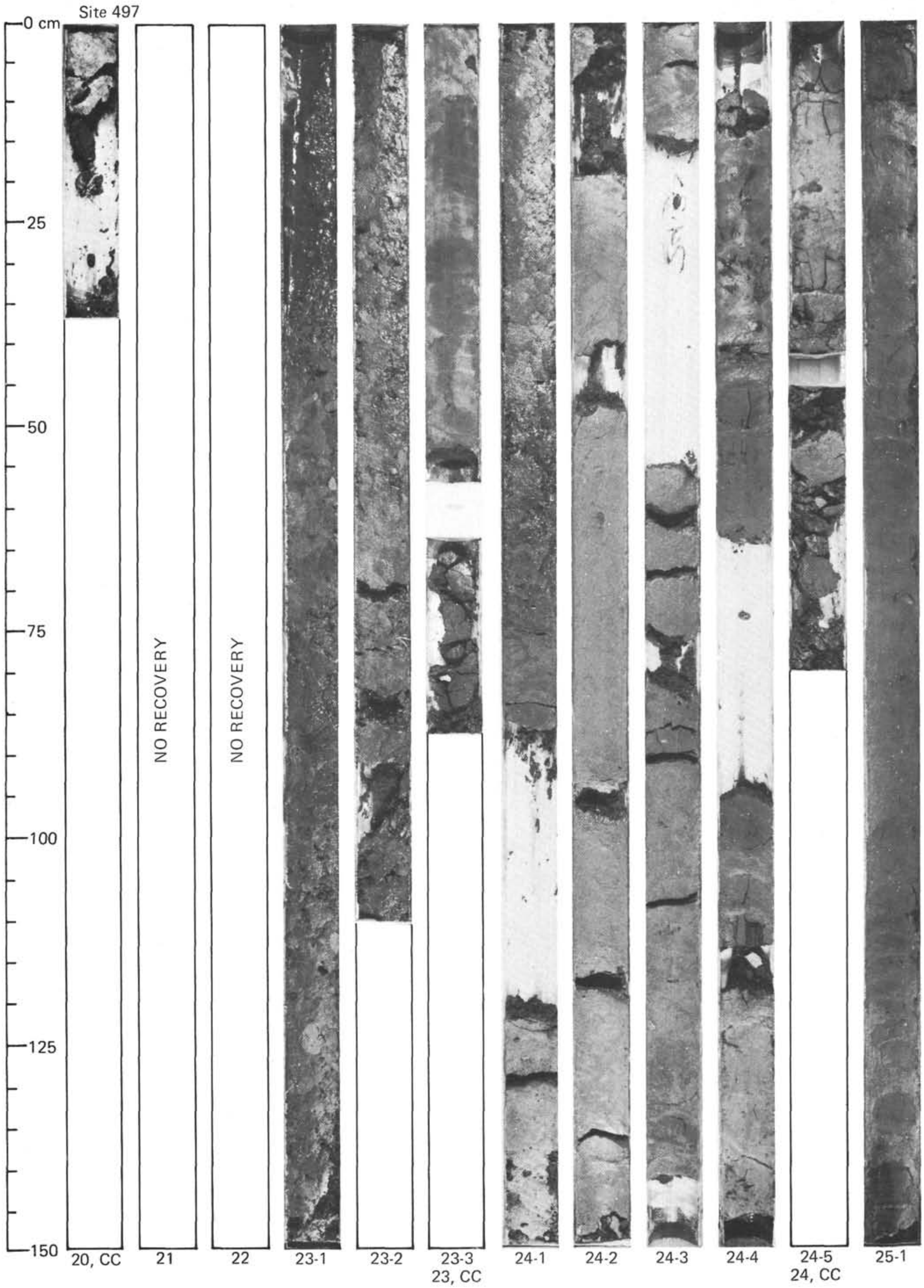
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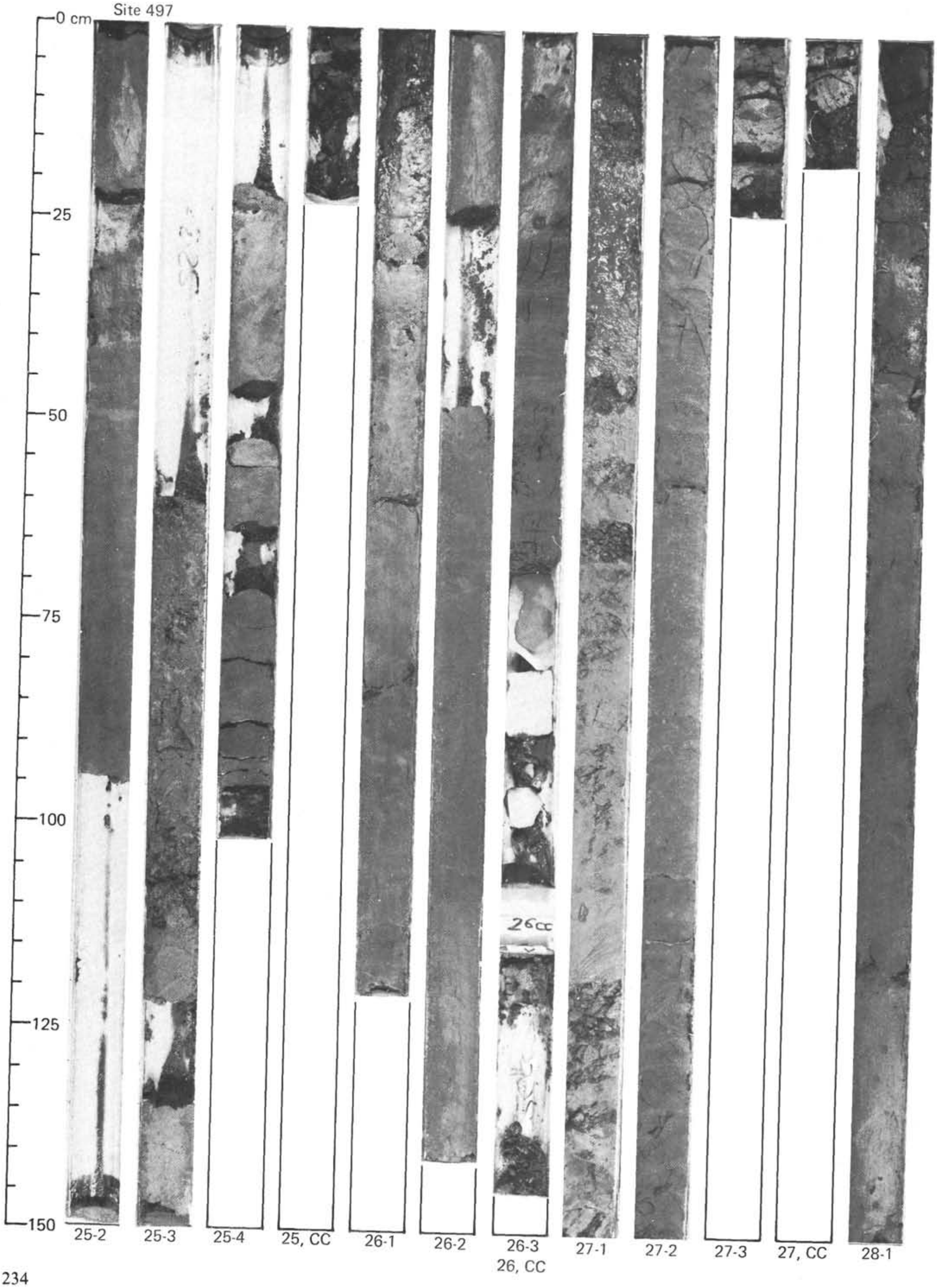
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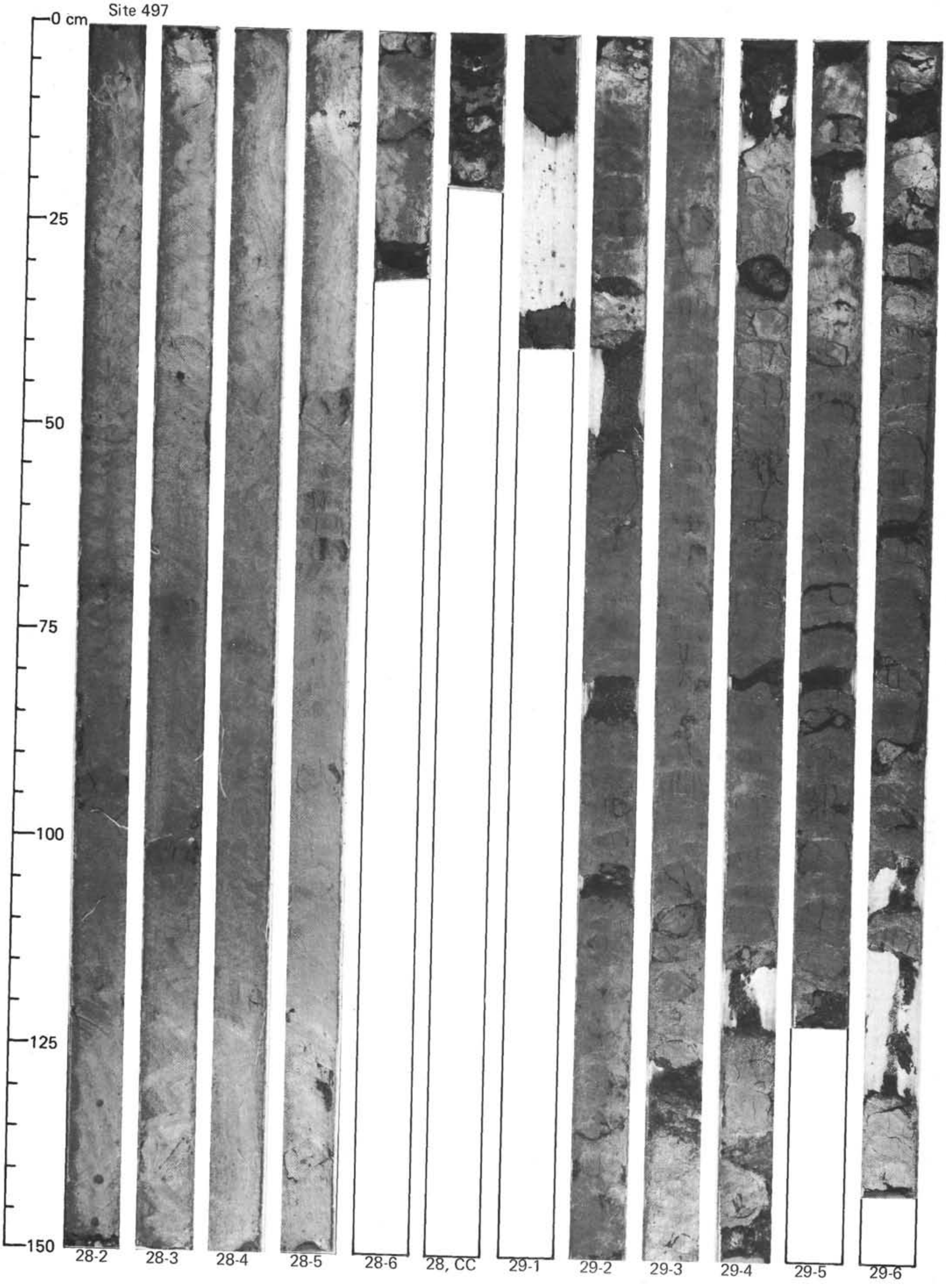
27-3
27, CC
28-1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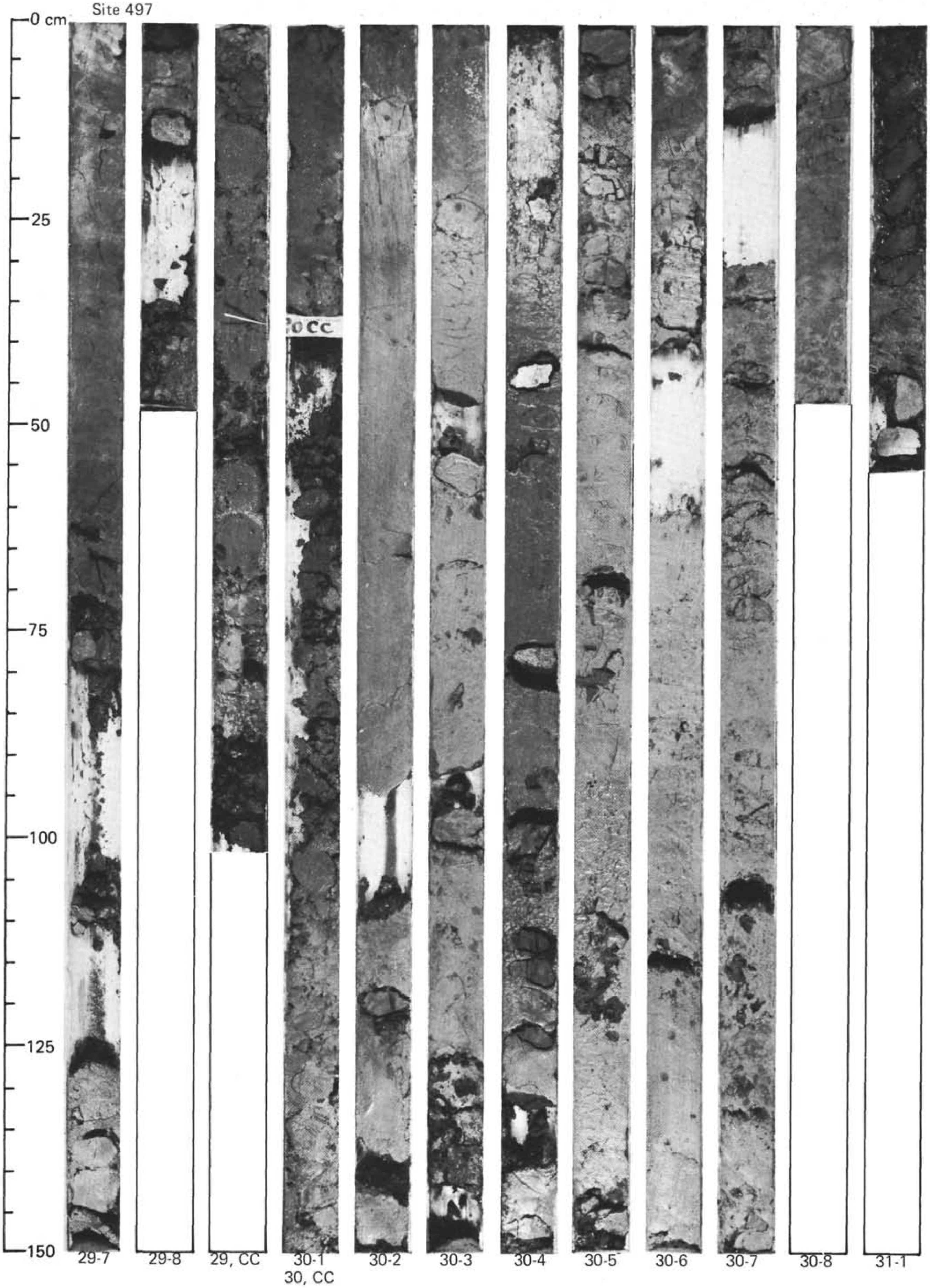
28-2
28-3
28-4
28-5
28-6
28, CC
29-1
29-2
29-3
29-4
29-5
29-6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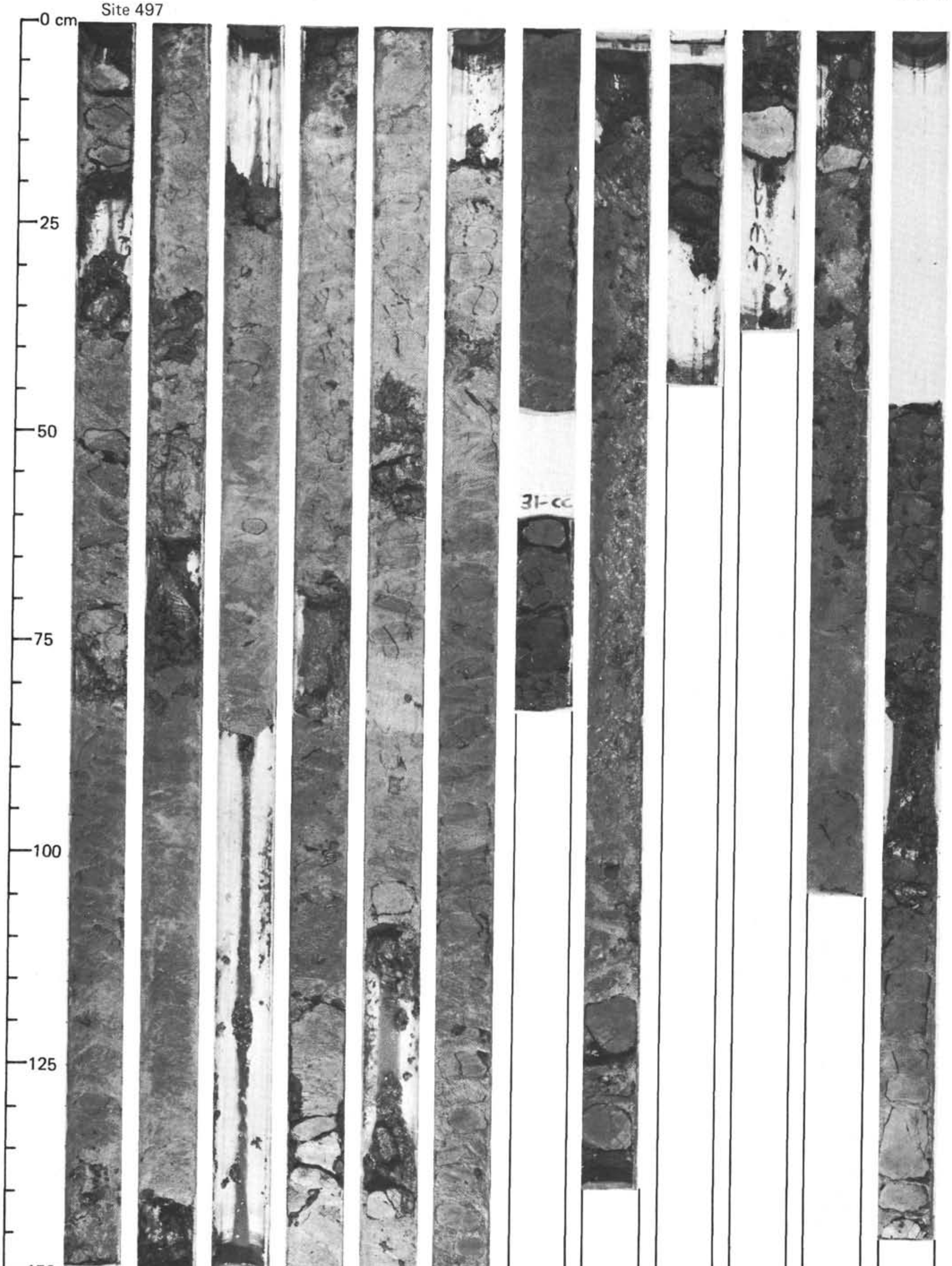
31-1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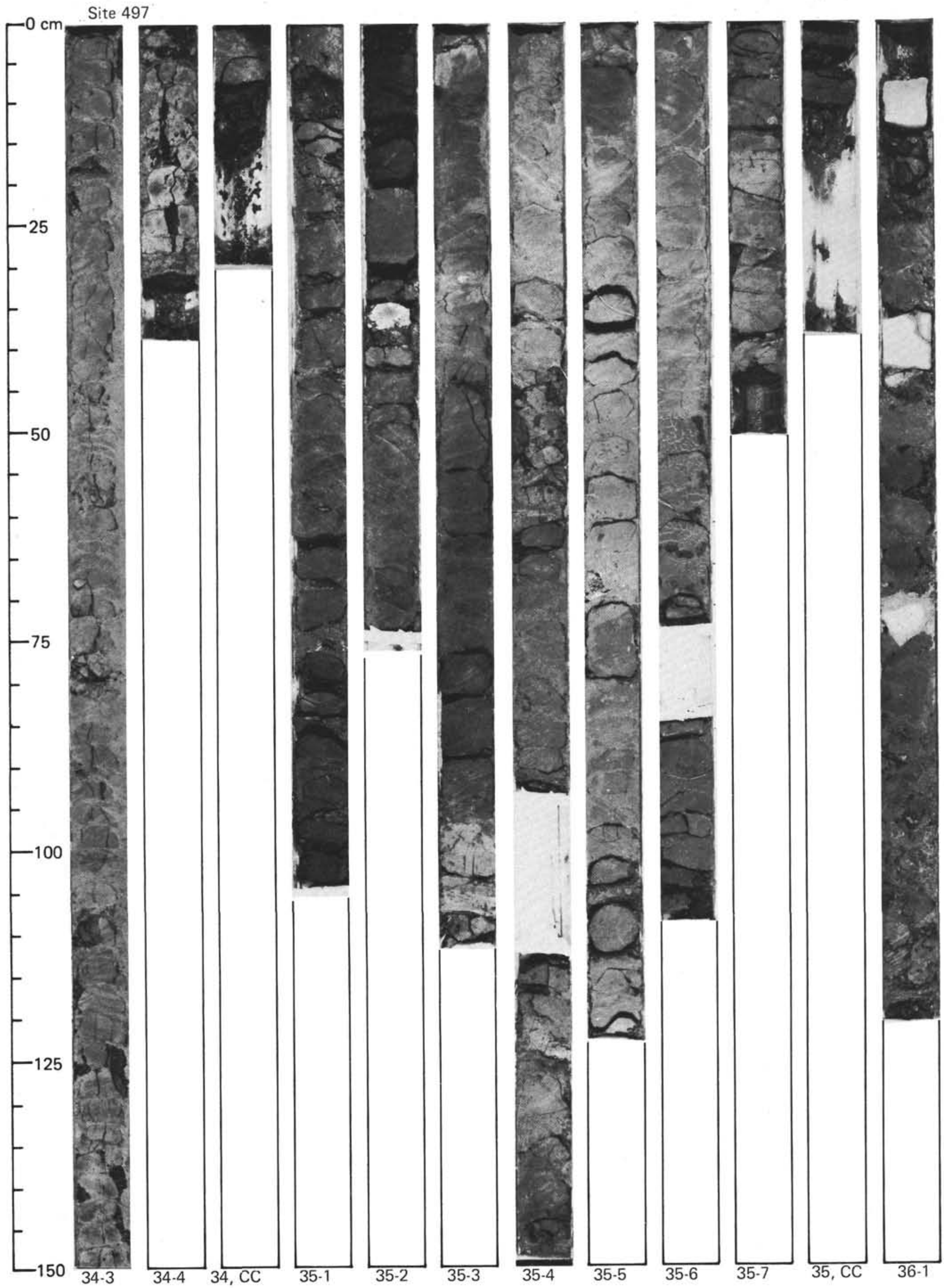
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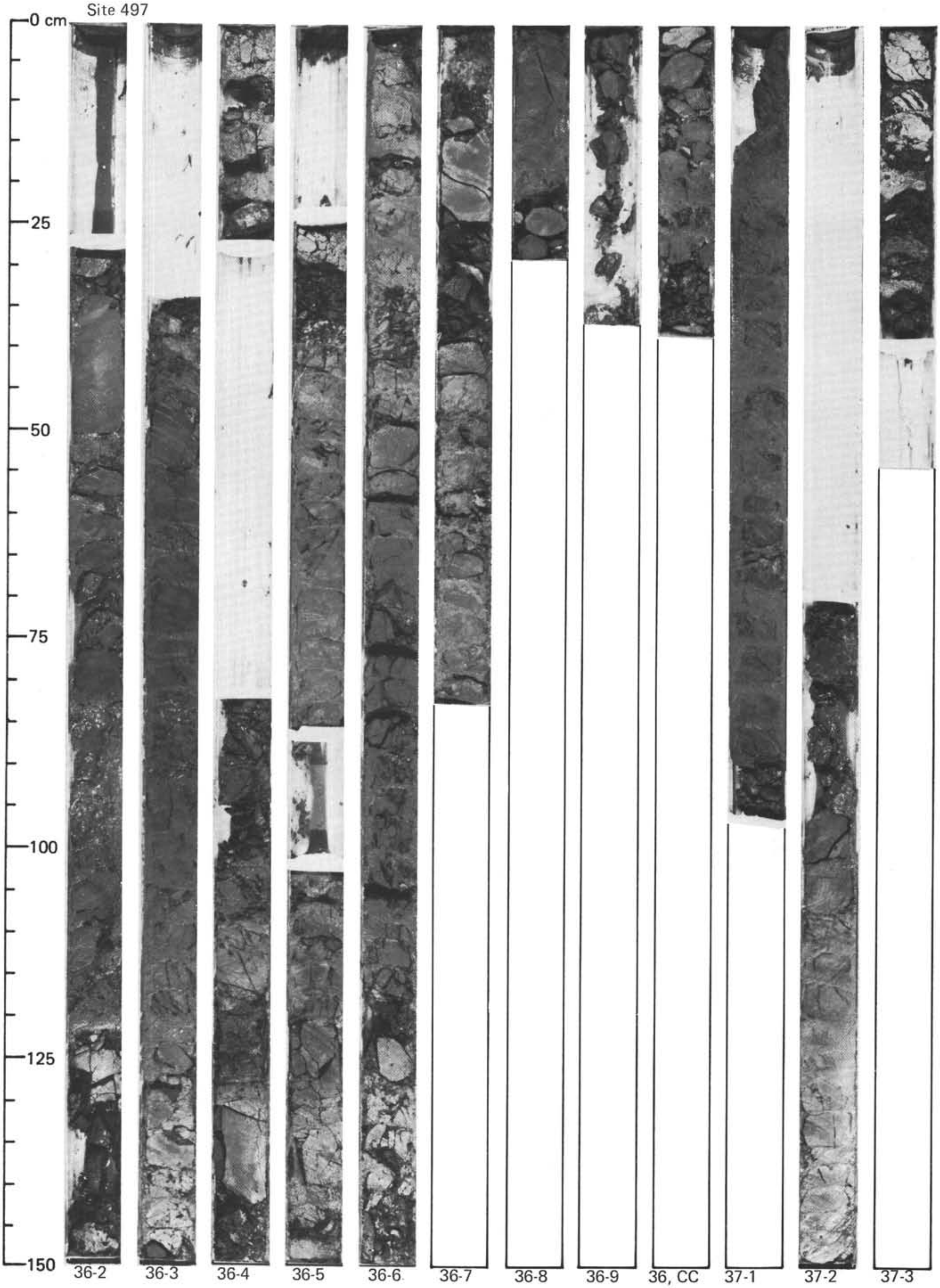
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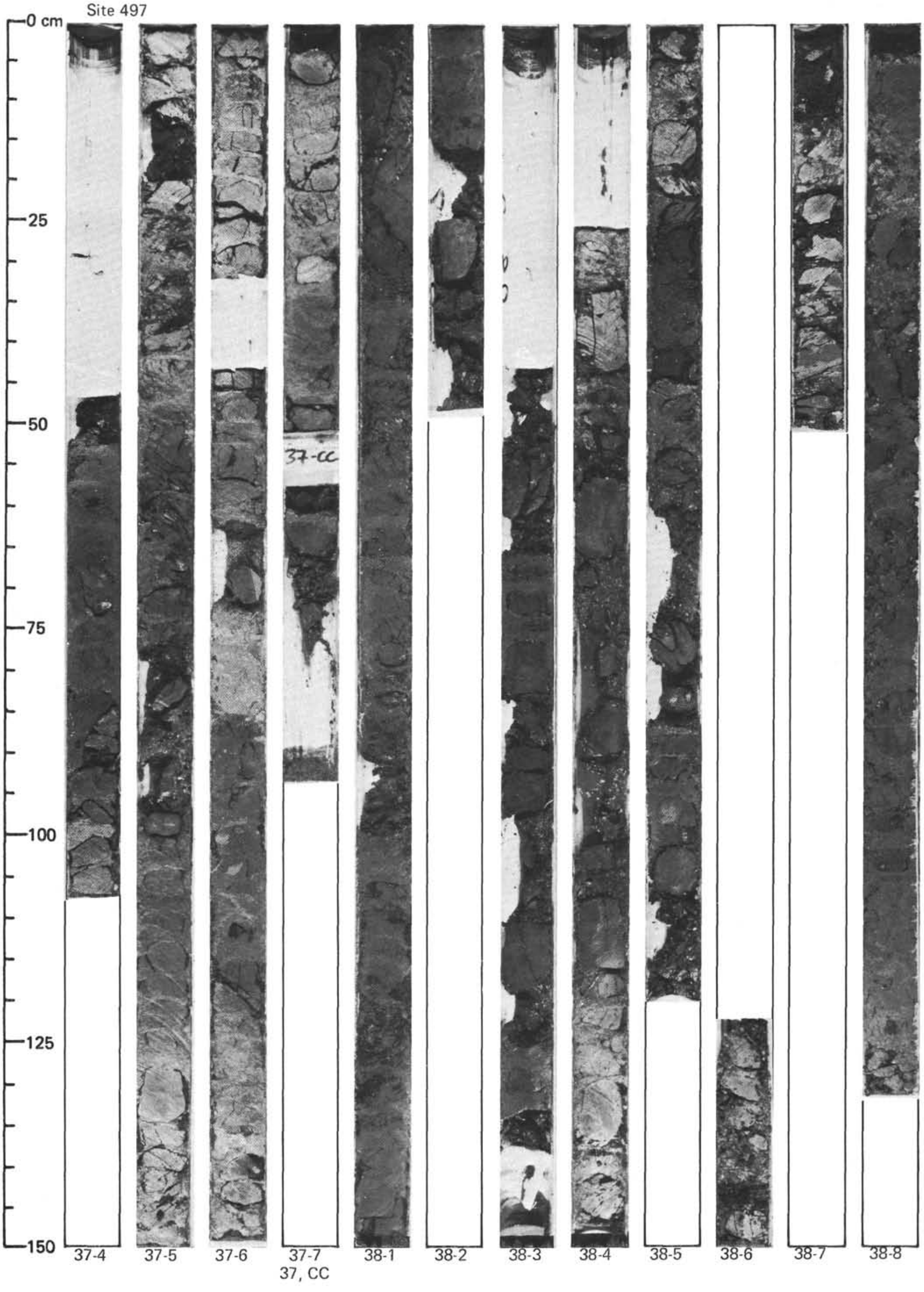
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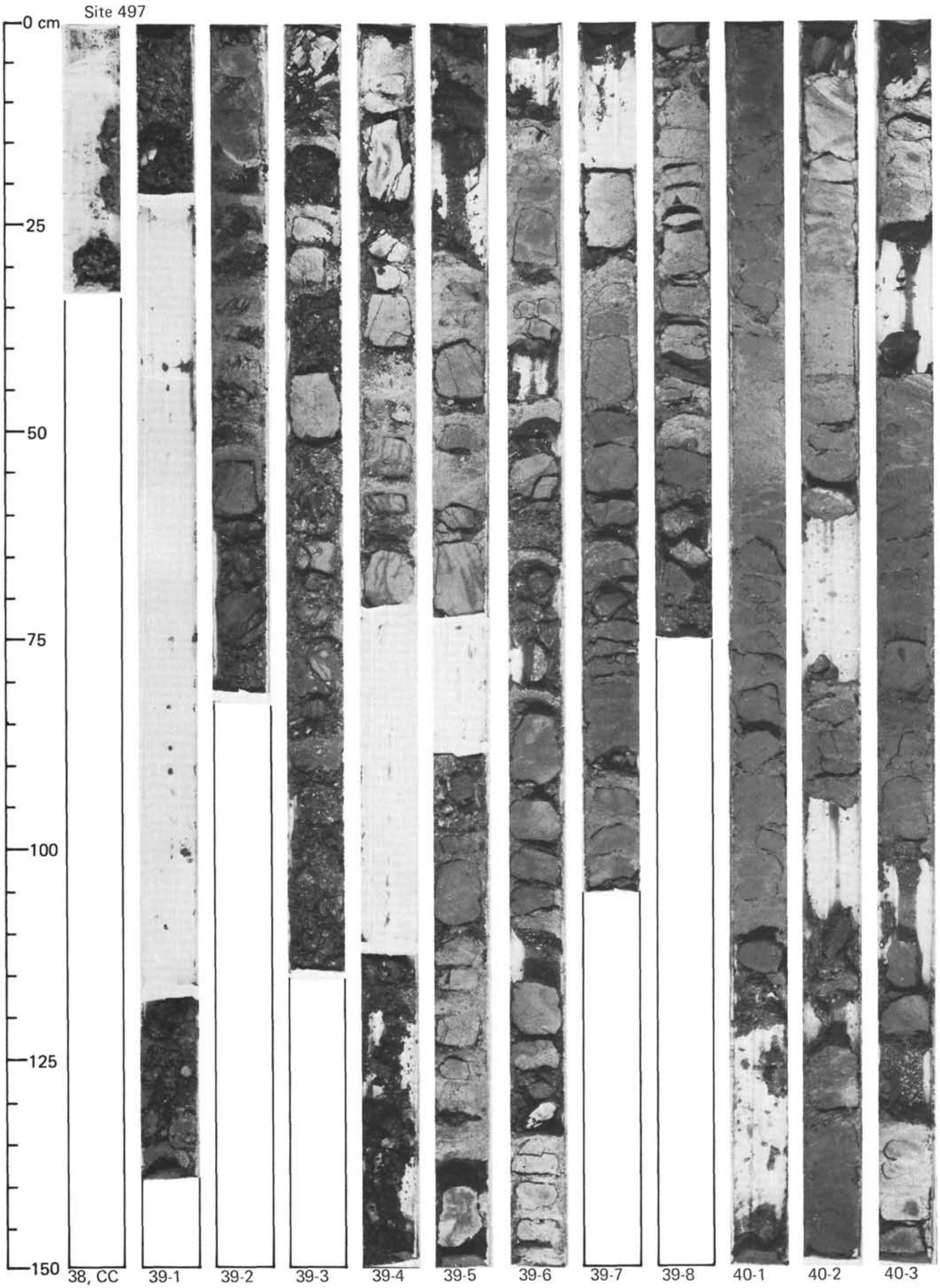
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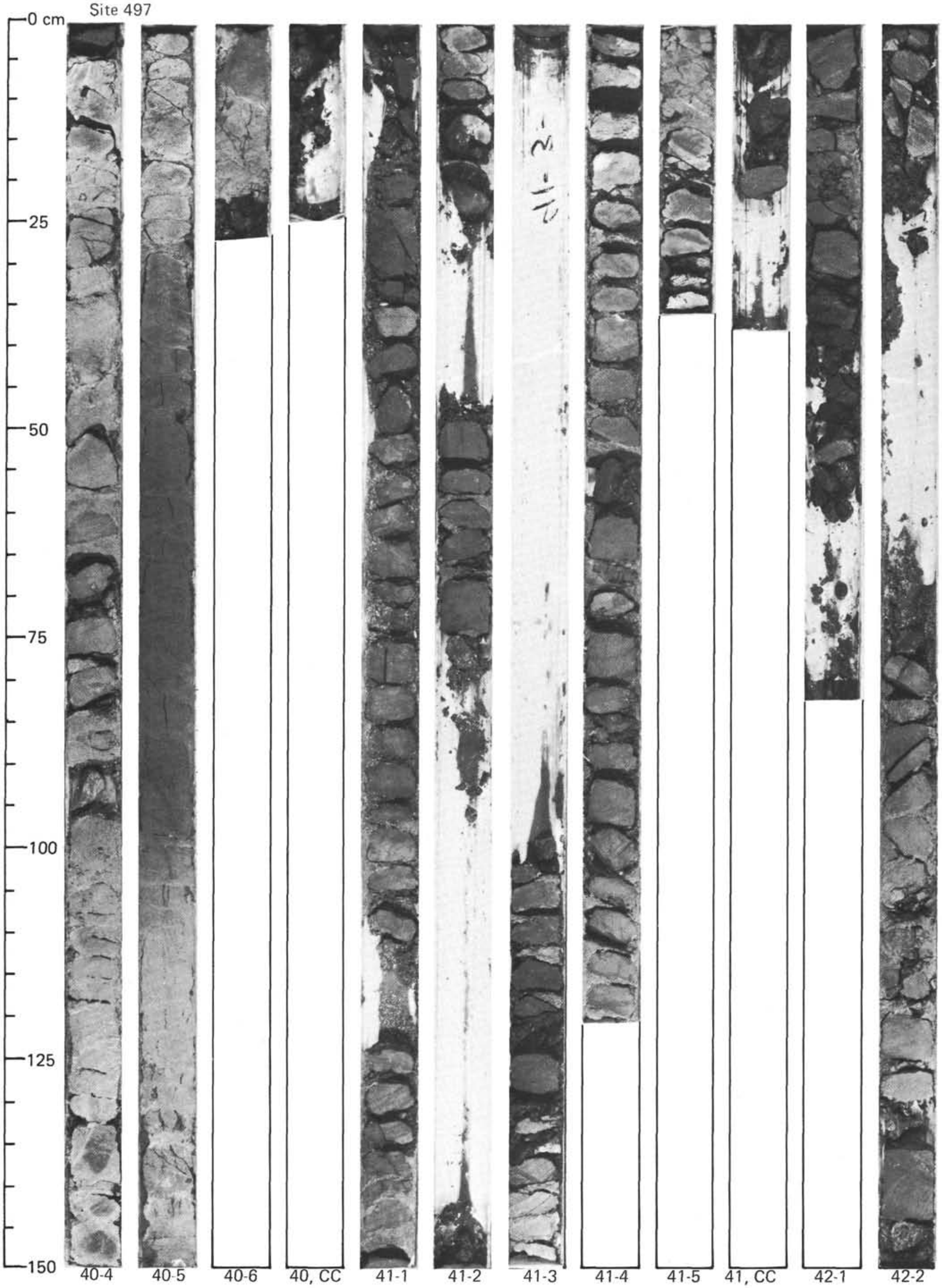
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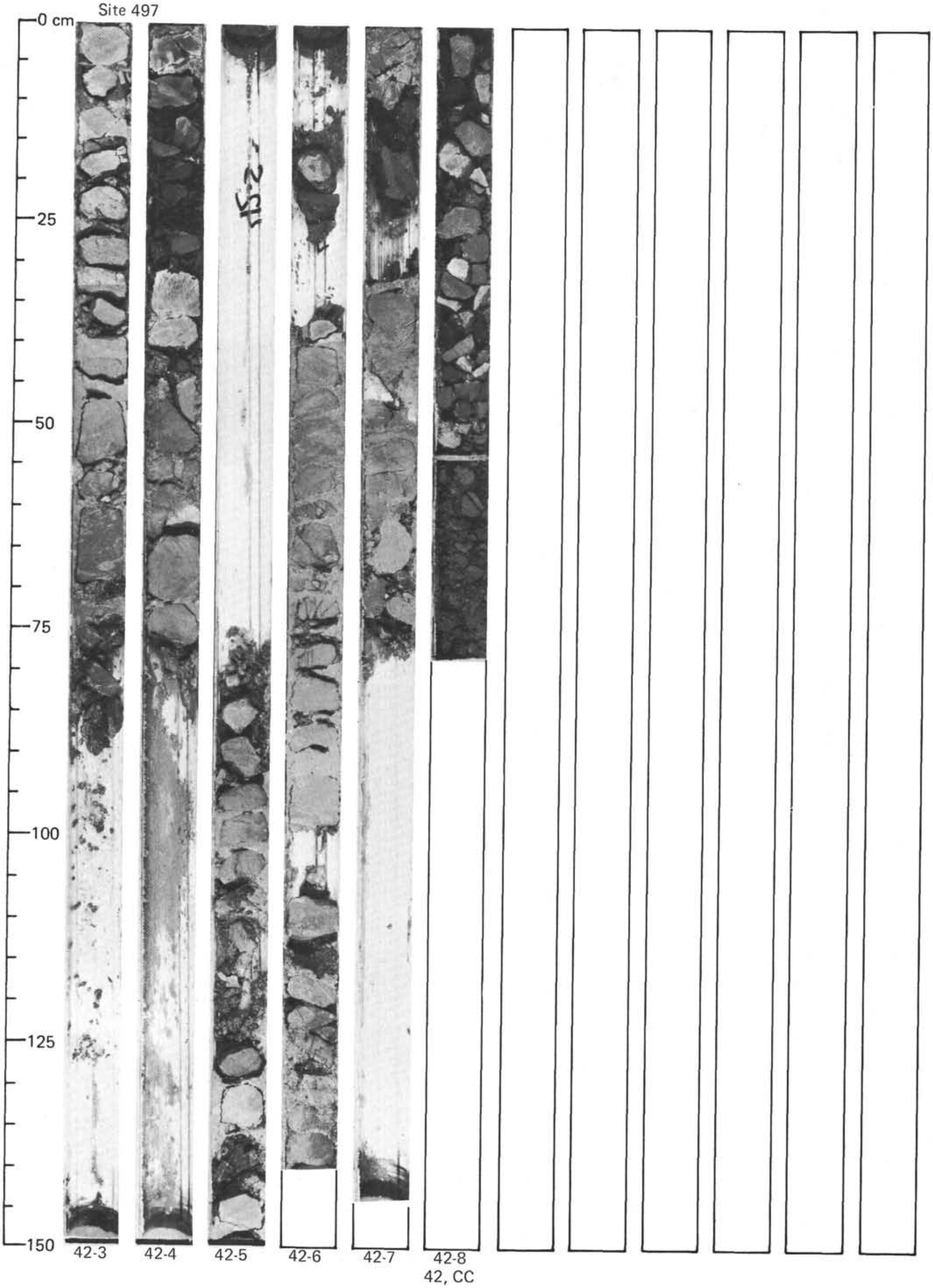
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