9. SITE 273

The Shipboard Scientific Party[1]

SITE DATA

Date Occupied: 10 February 1973

Date Departed: 13 February 1973

Position: 74°32.29′S; 174°37.57′E

Water Depth: 491 corrected meters (echo sounding)

Water Depth (adopted): 495 meters (drill pipe from rig floor)

Total Penetration: 346.5 meters

Number of Cores: 38

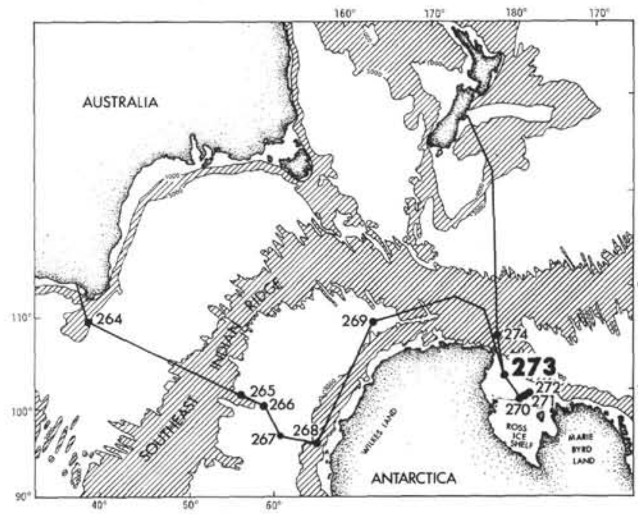
Total Section Cored: 332.5 meters

Total Section Recovered: 83.4 meters

Percentage Core Recovery: 25%

Oldest Sediment Cored:
Depth below sea floor: 346.5 meters
Lithology: Silty clay
Age: Early Miocene

Principal Results: The stratigraphic sequence penetrated at Site 273 is similar to those at Sites 270-272, the other Ross Sea sites. The post-Miocene portion of the section here is extremely condensed or more likely missing in large part and was probably removed by the same glacial erosion event (~3-5 m.y.) that truncated dipping beds at Sites 270-272. Lithified silty clay constitutes the predominant lithology and, as elsewhere, it is mostly unstratified and contains marine microfossils. The environment of deposition for these strata is accordingly considered to be a seaway which received icebergs from the adjacent land areas and probably from shelf ice. Clasts in the Miocene clays differ from those in the eastern Ross Sea and those of Pliocene age in that diabase and basement rock types are present which are characteristic of the rocks exposed in the Transantarctic Mountains. The fact that the sequence dates back to at least the middle Miocene indicates that ice has been eroding the Transantarctic Mountains from mid-Miocene to Pliocene time. A pronounced reflecting horizon lying at 0.3 sec subbottom appears to mark an earlier erosional or scoured surface and can be traced over many tens of miles and which must be pre middle Miocene in age. A sharp increase in the hardness and velocity of the silty clay was encountered at 276 meters subbottom and probably accounts for the seismic horizon. The significance of the geologic event giving rise to this erosional surface is not yet wholly known. Traces of methane and ethane were first detected at about 150 meters subbotton, but showed no systematic or significant increase downhole.



BACKGROUND

Site 273 is located in the west-central portion of the Ross Sea on the flank of an erosional valley which bounds the western edge of Pennell Bank (see Figure 1). The water depth at the site is 495 meters. The previous geophysical work of Houtz and Davey (1973) has been unsuccessful in determining the exact depth to basement at this site. However, extrapolation of nearby seismic sonobuoy data strongly indicates an excess of 2 km of low-velocity sediment in the vicinity of the site. Although the site was originally selected on the basis of an *Eltanin* 52 seismic profile, a higher resolution seismic profile was obtained from *Glomar Challenger* when it passed over the tentative site on a northwest-southeast traverse enroute to Site 270. This seismic profile is shown in Figure 2 along with the regional morphology. Gently dipping strata are truncated near the sea floor along the crest of the bank lying toward the northwest. Equivalent sediments appear to be missing in large part at Site 273, but similar flat-lying sediments appear to be truncated at the valley walls to the southeast of Site 273. A very pronounced reflecting horizon lies at a subbottom depth of about 0.3 sec (~250 m) and may represent a much older erosional valley nearly coincident with the

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Figure 1. *Location of Site 273 and bathymetry. Contours in meters (corrected). Solid line shows location of* Challenger *seismic profile across the site shown in Figure 2.*

present valley. A clear reversal in the dip of this horizon occurs near the central portion of the valley, and care was taken to ensure the site was not located near this structure.

The objectives at Site 273 were to sample down to 650 meters below the sea floor in order to contrast the history of sedimentation, glaciation, volcanism, and biostratigraphy, with that of the eastern Ross Sea.

OPERATIONS

Site 273 was approached on a heading of 002°. The beacon and a spar buoy were dropped while underway at 0508 on 10 February. After retrieving the towed geophysical gear, the ship returned to the buoy and positioned over beacon. Shallow water (491 m PDR corrected) and shifting winds and currents caused some difficulty in acquiring and maintaining a position directly over the beacon. Positioning in the automatic mode was not attained until 0857 hr.

While the drill string was being run and the hole spudded in, a sonobuoy record was obtained. Three clear reflecting horizons are found at 0.045, 0.16, and 0.30 sec (two-way travel time). These correlate well with horizons which are observed in the several profiler records and which can be followed for significant distances (Figure 2).

Hole 273 was spudded in at 1200 on 10 February and was cored continuously until 2030 hr when positioning problems caused by a failure of the ship's gyro compass required the bottom-hole assembly to be withdrawn and the hole abandoned. Total penetration was 76 meters. Nine cores were taken with an average recovery of 37% (see Table 1).

Following repairs to the ship's gyro compass, a second hole, 273A, was spudded in at 2300 hr. After delays of several hours, caused by unacceptably large (ca 100 ft) excursions of the ship off the beacon, Hole 273A was drilled to 80.5 meters subbottom and continuously cored (except for one drilled interval from 90-99.5 m) to a subbottom depth of 156.5 meters by early afternoon of 11 February (Table 1). Drilling and coring operations

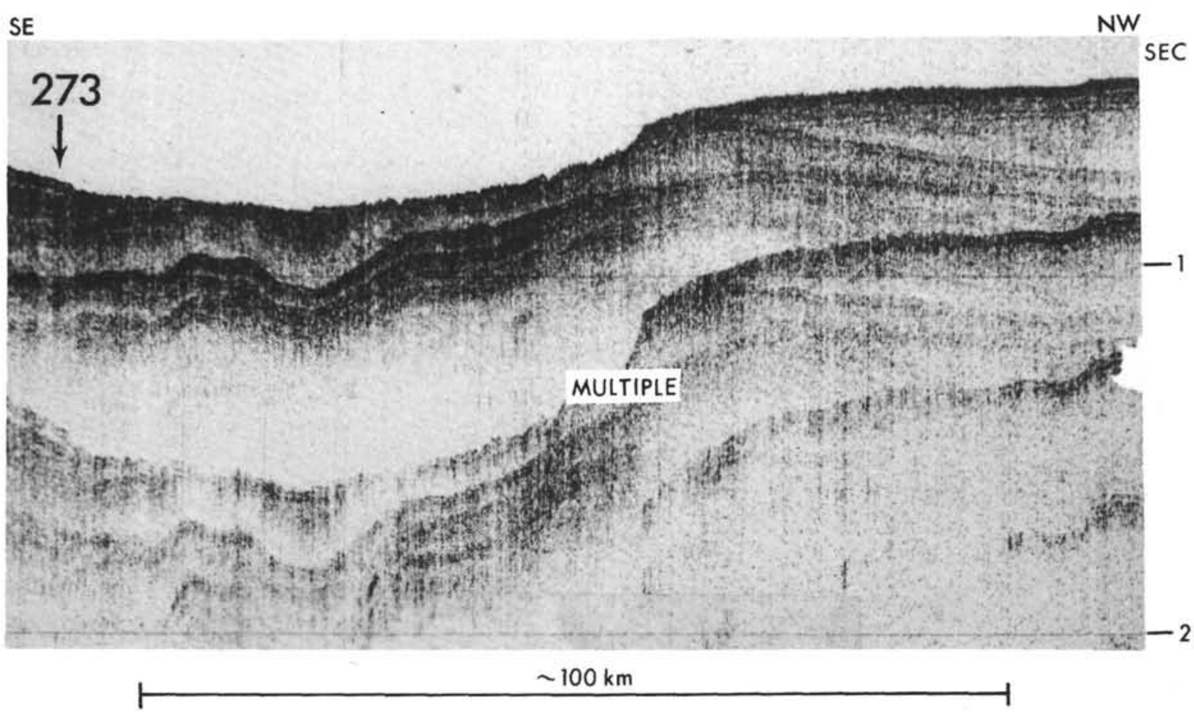

Figure 2. Glomar Challenger *acoustic reflection profile on approach to Site 273. Vertical scale is in seconds of two-way reflection time. Location of profile shown in Figure 1.*

TABLE 1
Coring Summary, Site 273

Core	Date (Feb. 1973)	Time	Depth From Drill Floor (m)	Depth Below Sea Floor (m)	Length Cored (m)	Length Recovered (m)	Recovery (%)
Hole 273							
1	10	1212	505.0-509.5	0.0-4.5	4.5	4.3	96
2	10	1304	509.5-519.0	4.5-14.0	9.5	5.1	54
3	10	1337	519.0-528.5	14.0-23.5	9.5	0.4	4
4	10	1412	528.5-538.0	23.5-33.0	9.5	2.2	23
5	10	1533	538.0-547.5	33.0-42.5	9.5	1.1	12
6	10	1703	547.5-557.0	42.5-52.0	9.5	2.0	21
7	10	1758	557.0-566.5	52.0-61.5	9.5	5.0	53
8	10	1937	566.5-576.0	61.5-71.0	9.5	5.0	53
9	10	2112	576.0-581.0	71.0-76.0	5.0	2.8	56
Subtotal					76.0	27.9	37
Hole 273A							
1	11	0635	585.5-595.0	80.5-90.0	9.5	1.2	12
2	11	0735	604.5-614.0	99.5-109.0	9.5	cc	–
3	11	0840	614.0-623.5	109.0-118.5	9.5	2.4	25
4	11	1021	623.5-633.0	118.5-128.0	9.5	2.0	21
5	11	1119	633.0-642.5	128.0-137.5	9.5	0.0	0
6	11	1212	642.5-652.0	137.5-147.0	9.5	2.1	22
7	11	1349	652.0-661.5	147.0-156.5	9.5	2.8	29
8	11	1826	661.5-671.0	156.5-166.0	9.5	6.4	67
9	11	1940	671.0-680.5	166.0-175.5	9.5	2.4	25
10	11	2115	680.5-683.5	175.5-178.5	3.0	2.8	93
11	12	0005	683.5-690.0	178.5-185.0	6.5	6.2	95
12	12	0110	690.0-699.5	185.0-194.5	9.5	0.6	6
13	12	0155	699.5-709.0	194.5-204.0	9.5	4.7	49
14	12	0335	709.0-718.5	204.0-213.5	9.5	2.4	25
15	12	0435	718.5-728.0	213.5-223.0	9.5	0.6	6
16	12	0520	728.0-737.5	223.0-232.5	9.5	1.7	18
17	12	0610	737.5-747.0	232.5-242.0	9.5	4.1	43
18	12	0700	747.0-756.5	242.0-251.5	9.5	0.4	4
19	12	0745	756.5-766.0	251.5-261.0	9.5	0.0	0
20	12	0910	766.0-775.5	261.0-270.5	9.5	0.0	0
21	12	1002	775.5-777.5	270.5-272.5	2.0	0.4	20
22	12	1125	777.5-785.0	272.5-280.0	7.5	4.0	53
23	12	1250	785.0-794.5	280.0-289.5	9.5	2.1	22
24	12	1421	794.5-804.0	289.5-299.0	9.5	0.6	6
25	12	1531	804.0-813.5	299.0-308.5	9.5	2.5	26
26	12	1648	813.5-823.0	308.5-318.0	9.5	0.6	6
27	12	1822	823.0-832.5	318.0-327.5	9.5	0.7	7
28	12	2007	832.5-842.0	327.5-337.0	9.5	cc	–
29	13	0745	842.0-851.5	337.0-346.5	9.5	1.8	19
Subtotal					256.5	55.5	22
Total					332.5	83.4	25

were then suspended for about 3 hr to thaw out frozen air lines. After Cores 8, 9, and part of 10 had been cut, nearby small drifting icebergs forced another temporary suspension in operations. Because there was no assurance that the USCG icebreaker *Burton Island* could or would deflect these icebergs, the hole was filled with mud, and the drill string pulled until only 20 meters of the bottom-hole assembly remained buried with the power-sub close to the rig floor. Shortly after this precaution was taken, the *Burton Island* attempted to and succeeded in pushing a small approaching iceberg off its "collision course" with *Glomar Challenger*.

Drilling and coring resumed at about 2300 on 11 February, and the remainder of Hole 273A was continuously cored to a subbottom depth of 337 meters by about 2000 on 12 February. At that time the sand line parted just after retrieving Core 28, and sending the barrel down for Core 29. The overshot and about 5 meters of wire rope fell to the bottom of the string. Core 29 was cut and about 3 hr were spent fishing for the overshot with no success. Drilling and coring were terminated, the hole filled with 11.4 lb/gal drilling mud from 346 to 130 meters subbottom and a cement plug from 130 meters subbottom to the mud line. The mud line was cleared at 0400 on 13 February, the drill string, bottom-hole assembly, and Core 29 were recovered, and the ship got underway at 0814 hr.

A total of 29 cores was taken at Hole 273A penetrating 256.5 meters and recovering 55.5 meters for an average recovery of about 22%. Recovery on individual cores exceeded 50% only twice. Poorest recovery occurred between about 250 and 275 meters subbottom in what was apparently unconsolidated sand. Significant traces of methane and ethane were found in many of the cored sediments and were carefully monitored.

LITHOLOGY

At Site 273, 346.5 meters of a sedimentary sequence were cored in two holes, with a recovery of 83.4 meters. The sequence was divided into two units on the basis of the degree of lithification of the sediments penetrated, and each of these units was further divided into two subunits (Table 2). Texture of sediments from Site 273 is shown in Figure 3 and size distribution in Figure 4.

Unit 1

This unit encompasses sediments which are soft to stiff; further subdivision is made on the basis of color, biogenic components, and clast content.

Subunit 1A: This 80-cm thick unit consists of soft, dusky yellow-green diatom silty clay. Its boundary with the underlying Subunit 1B is sharp, being marked by an abrupt color change and a change in lithification from soft to stiff. This thin uppermost unit contains up to 40% diatom frustules, and a small amount of sand, but no larger clasts. In color, texture, and composition it resembles the thin diatom-rich sequences which occur in the top meter of Sites 270 and 272. On the basis of its contained diatoms and fine-grained character it appears to correlate with units of similar lithology at Sites 270 and 272.

Sedimentation appears to have occurred at a rate of approximately 0.5 m/m.y. through Subunit 1A.

Subunit 1B: This unit has a maximum thickness of 41.7 meters. It lies between the base of the diatom-clay unit above and the base of Core 5, below which there is a sharp increase in lithification. The unit consists of soft to stiff pebbly sand-silt-clay throughout. Colors are mainly dark greenish-grays, although locally there is a gradational darkening to olive-black. No bedding is discernible within the unit.

Generally poor sorting of sediments classified in this unit is shown in size frequency histograms, where grain distributions are spread fairly evenly over a wide range of size classes. Three samples plotted on the accompanying textural diagram show that there is a considerable uniformity in texture.

Diatoms are the chief biogenic component, but concentrations of frustules only locally exceed 10%. Micarb is present throughout, usually in concentrations of less than 1%. In Core 5, two beds of yellowish-green diatom silty clay, each about 20 cm thick, occur interbedded with gray silty clays. Paleontological evidence (from diatom studies) suggests that the age relationship of the diatom-rich beds to those above and below is anomalous; the possibility that these beds have been emplaced by slumping must therefore be considered. There is also some indication of grading within the beds; preliminary examination shows their bases to consist of spicule-rich silts, which pass upwards into diatom clays

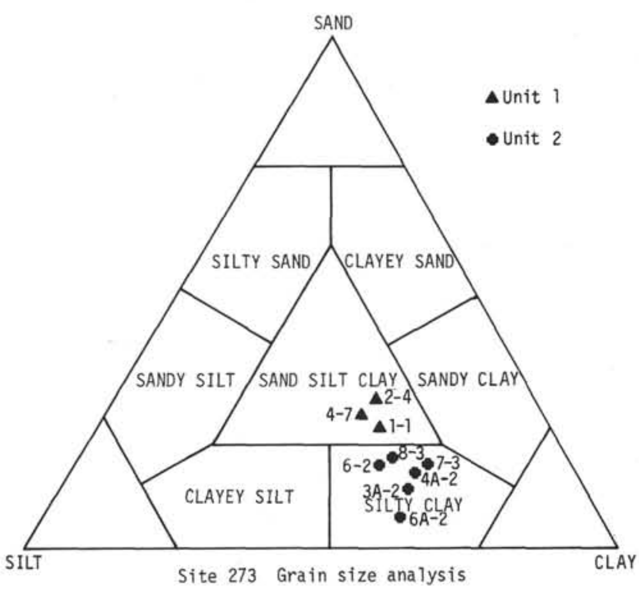

Figure 3. *Grain size analyses from lithologic Units 1 and 2 at Site 273. Numbers next to symbols refer to core and section.*

TABLE 2
Lithologic Units, Site 273

Unit	Lithology	Subbottom Depth (m)	Thickness (m)	Age
1A	Soft, diatom silty clay	0.0-0.8	0.8	Recent to Gauss or Younger
1B	Soft to stiff, diatom-bearing pebbly sand-silt-clay, unbedded	0.8-42.5	41.7	
2A	Semilithified, pabbly silty clay, diatom bearing sparsely bedded	42.5-166.0	143.5	Lower most upper Miocene to mid-Miocene
2B	Semilithified pebbly silty clay, some diatom bearing, unbedded	166.0-346.5	180.5+	Mid to ? early Miocene

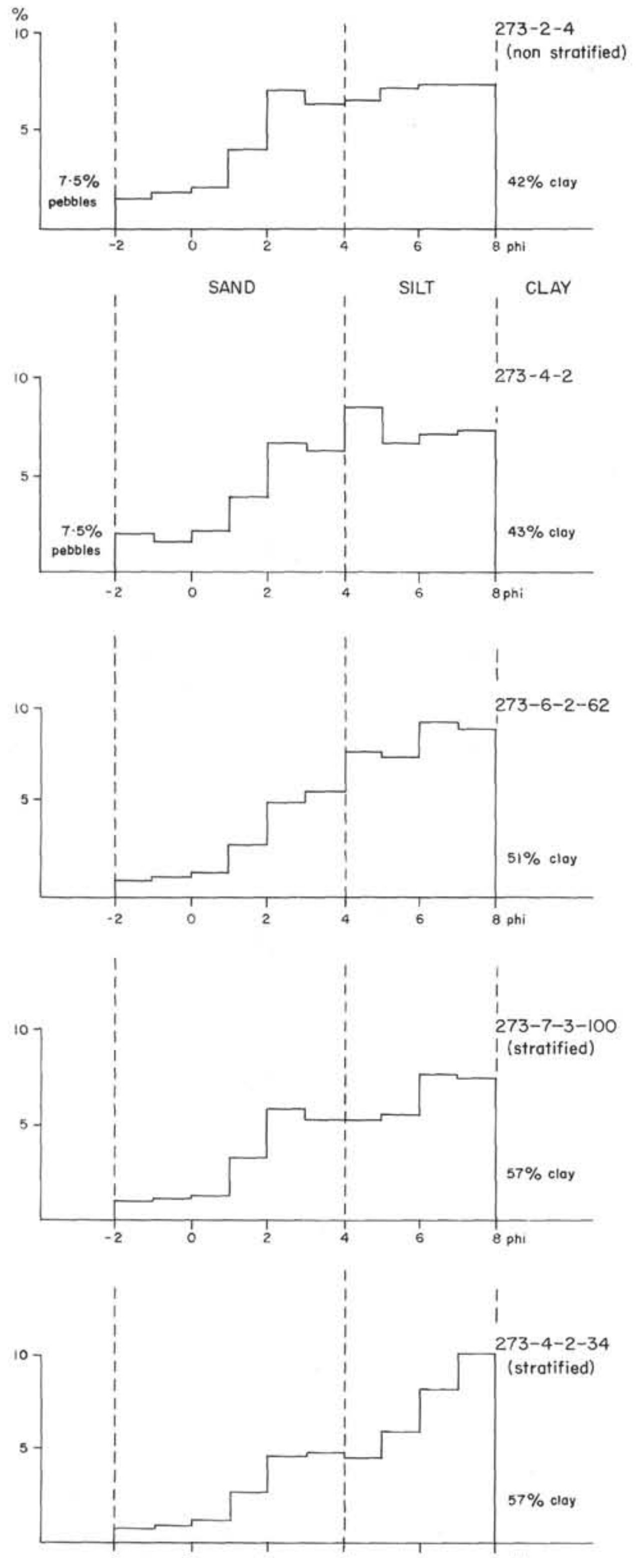

Figure 4. *Sediment size distribution at Site 273.*

at the top. This suggests a sedimentary, rather than a deformation origin.

Granules and larger clasts are present throughout the subunit. Clast density averages less than 1% throughout the interval, but rises to an estimated maximum of 3%-5% in Sections 3 and 4 of Core 2. Clasts with a maximum diameter greater than 10 mm occur in densities of 2 to 8 per meter of core, without any systematic changes in concentration throughout. Metamorphic and igneous rock types dominate the clasts, with granites, gneisses, basalts and reddish-gray quartzites being the most common lithologies. Diabases are rare in the unit. The sedimentary rock suite includes lithified poorly sorted sandy silty claystone, dark gray argillites, and rare sandstones. Subsequent study of the pebbles from the working half of the core shows that schist is also an important lithology.

Sedimentation rates have been estimated at approximately 31 m/m.y. for Subunit 1B.

Unit 2

The top of Unit 2 marks a change from stiff to semilithified silty clays, a change which probably coincides with the upper of two prominent reflectors in the seismic profile for the site. Lithologically, the unit is relatively uniform throughout, and the subdivision into two subunits has been made, somewhat tentatively, on the presence of poorly developed bedding in the upper part.

The whole unit consists of predominantly greenish-gray silty claystones which are mainly semilithified, but which contain thin (avg 20 cm thick) lithified intervals. Granules and pebbles occur scattered throughout, and sand is a consistent component, occurring in quantities ranging up to 18%.

The sediments of Unit 2 are consistently slightly finer and more clay-rich than those of Unit 1. This situation parallels that at Site 270, where early Miocene and late Oligocene sediments, i.e., those below a suspected regional unconformity, are finer than those above, and fall into a silty claystone category (Barrett, this volume). At present age control is not by itself sufficient to establish that the lithification break at Site 273 represents the same unconformity as at Sites 270-272.

Diatoms are present throughout the unit, most commonly occurring in proportions estimated to be about 3%-4%, but reaching an estimated 35% in silty clays of Core 6A. A second zone of above-average diatom concentration (6%-8%) occurs through Cores 17-22A. Carbonate is present in trace amounts through most of the sequence, and three (thin) intervals, in Cores 7, 7A, and 24A are calcareously cemented through 20-cm-thick zones; in the latter, $CaCo_3$ content reaches 31%. Small broken shell fragments are very rare and have been recorded only from Cores 4A and 17A.

The distribution of pebbles and granules throughout Unit 2 does not show any readily discernible pattern. Clasts more than 4 mm maximum diameter range in estimated abundance from less than 1%, to a maximum of 2%-3% in Core 22A. Similarly, the density of larger clasts, i.e., those above 10 mm maximum diameter, is relatively constant throughout. These number 2 per meter on the average throughout Subunit 2A, and slightly under 3 per meter in 2B. In Core 22A the concentrations reach 12 per meter. Clasts above 4 mm are absent from the diatom silty clays of Core 6, but are present in most of the bedded intervals (except in the top of Core 9).

The most common clast lithologies include quartz-diorites, diabases, quartzites, and granites; clasts of sedimentary origin are fewer, but include argillites, rare silty limestones, poorly sorted sandstones, and a single clast of glauconitic sandstone.

Bedding occurs in thin intervals throughout Subunit 2A; no bedded interval exceeds 30 cm in thickness, however, and the sequences are widely separated by massive, uniform sections. Most commonly, bedding is indicated only by slight color differences, as lighter greenish-gray lenticular areas discernible within a darker gray sequence. Suggestions of grading occur in one 20-cm-thick bedded interval in Core 8, Section 4; here, darker gray laminae 2 mm thick are separated by interbeds 2 cm thick, which appear in some to be distinctly coarser near their bases. This feature is not consistently present, however, and cannot be seen in each interbed. Neither was it clear whether the coarse areas of the interbeds extended across the width of the core or whether the distribution of coarse material was in essentially random patches with gradational margins.

Histograms of grain-size frequency distributions from both the stratified and nonstratified intervals in Subunit 2A show that sorting within the subunit is generally poor. The analyses are too few to demonstrate any relationship between sorting and stratification, although one of the stratified intervals (4A-2, 34) shows a well-developed mode in the fine silt class.

In Cores 1A, 6A, and 17A of Unit 2, there are also structures which resemble bedding, but which are almost certainly due to drilling deformation. These consist of 2-3 mm thick, dark, clayey laminae 2-4 cm apart, which are down-bent at the core margins. These structures are confined to localized sections of sediment which have a stiff, rather than a semilithified consistency.

Bedding surfaces in Cores 9, 4A, and 9A show dips of 5°-10°. In Core 7, Section 2 there is clear evidence of bedding disturbance around a dropped pebble; bedding surfaces are distorted downwards below the clast, and those adjacent to it are sharply truncated against the clast—probably through loading deformation. The same core section, 50 cm below, displays possible load casts with attendant soft-sediment clasts identifiable by their color differences.

Bedding in Subunit 2B is extremely rare. There is, however, an interval of fine sand which was recovered in Core 21A, below a 2-core interval of fine sand which was recovered in Core 21A, below a 2-core interval of no recovery. The sand overlies a 30-cm-thick intervalof lithified bedded claystone in Core 22, which again, shows vague soft-sediment deformation. The position of the sand bed coincides roughly with the lower of two pronounced reflectors seen in the seismic profiles from this site. Below Core 22, Subunit 2B is generally uniform and unbedded, although there are intervals 10-20 cm thick which show pronounced fissility, a feature which reflects differing degrees of competence and may or may not be related to the development of bedding planes.

Sedimentation rates average approximately 28 m/m.y. throughout Unit 2.

Interpretation

Deposition of terrigenous sediment is interpreted as having occurred within a marine environment at this site since probably early Miocene times, although not necessarily continuously. The marine nature of the environment is inferred from the constant presence of marine diatoms in generally low, but fluctuating, abundances throughout. Marine foraminifera are also present throughout (see Biostratigraphic Summary), which further supports such an interpretation.

Coarse debris, consisting of sand, granules, pebbles, and cobbles, is present throughout the sequence, and was presumably introduced by ice rafting. The general uniformity and lack of sedimentary structures through most of Subunit 2B suggests little interruption to a process involving a steady rain of terrigenous material of diverse size and composition. There is little evidence of bottom current activity strong enough to affect significant sorting of the deposits. The sand bed in Core 21A is an exception and might have resulted from winnowing out of fine material, possibly on a local (or even regional) elevated area. The sparse bedding in Subunit 2A probably results from the sporadic generation of bottom currents, possibly associated with ice-shelf freezing and increased bottom-water production. The limited soft-sediment deformation observed has probably resulted from local slumping. The dips observed in some beds may be primary, but are more likely to result from small-scale slumps.

Subunit 1B shows no evidence of current activity. Examination of bottom topography and of seismic profiles for the site suggests that this unit was probably slumped in from high areas to the southeast. Paleontological evidence is in accord with such a suggestion; throughout Unit 1 Recent diatoms are mixed with those of late to middle Miocene age. The diatom-rich beds at the base of the unit, which show evidence of grading, may have been deposited from turbidity currents associated with slumping of local sediment piles.

Subunit 1A, the soft, apparently pebble-free thin diatomaceous unit at the top seems to indicate a lessening of ice rafting, with a correspondingly high contribution of pelagic detritus, although the regional extent and significance of this thin bed cannot be evaluated at present.

Preliminary examination of clasts suggests that most have been derived from the west, although precise matching of lithologies with those known to crop out in adjacent areas of the Antarctic continent has not yet been affected. One feature which is noteworthy is the abundance of diabase clasts in Unit 2 and their rarity in Unit 1, indicating a marked change in the sediment supply. The diabases probably represent those of the Ferrar Group of the Transantarctic Mountains, and if this is so, their rare occurrence in the younger units could be attributed either to erosion into basement by outlet glaciers, or to the termination of East Antarctic ice coming directly through the mountains near Site 273. Either event may be associated with increasing elevation of the Transantarctic Mountains.

PHYSICAL PROPERTIES

Sonic-velocity and wet-bulk density measurements were made on nearly all cores from this site. Representative data are plotted in Figure 5 adjacent to the lithologic description. The bulk density values have been determined from the analog GRAPE records assuming a linear interpolation between the "in liner" calibration traces for 2.6-in. diameter distilled water (ρ = 1.00 g/cc) and 2.6-in. diameter aluminum (ρ = 2.60 g/cc). No corrections for varying diameters have been applied to the bulk density data, so the values plotted should be considered minimal. Sonic-velocity measurements for Cores 1-5 were made on split and unsplit sections. The measurements for Cores 6-9 and 1A-27A were made on chunks of stiff, semilithified, and lithified sediment.

The observed downhole variation in bulk density is minimal with no clear overall trend. Densities generally lie between 1.70 and 1.90 g/cc (nominal). Notable exceptions are found in Cores 5, 7A, and 22A and are related to occurrences of cobbles (Core 5), a carbonate lithified zone (Core 7A), and a zone of clayey silt with a high pebble concentration (Core 22A).

The velocity data suggest a slight general increase with depth of about 0.35 km/sec in the 350 meters of penetration. Although this gradient fits well with the gradient of 0.90 sec^{-1} determined by Houtz and Davey (1973) from sonobuoy data, it corresponds to only the uppermost 15% of the depth range fro which their data apply. This general trend is quite subdued in relation to the rather large variability found in seismic velocities from core to core and within individual sections of cores. Anisotropy in sonic velocities at this site is also quite variable and appears to show some changes with depth. In comparison with previous sites, the velocity anisotropy observed in Hole 273A is unique in that for more than half of the measurement pairs, velocities parallel to the core axis (normal to the bedding) are equal to or greater than those normal to the core axis (parallel to the bedding).

Two strong subbottom reflectors at 0.045 and 0.30 sec (two-way travel time) are observed on the seismic records. The shallowest of these clearly corresponds with the lithologic boundary between Units 1B and 2A at about 40 meters (bottom of Core 5 and/or top of Core 6). The deeper reflector must correspond closely to the base of the sand layer in Core 21A and the substantial density and velocity changes found in Core 22A. The two-way travel time calculated from the velocity measurements on the cored sediments is almost exactly 0.30 sec at the base of Core 21A. A third, rather weak reflector, is found at about 0.16 sec of two-way travel time and appears to correlate clearly with the significant increase in velocity found in Core 7A at about 150 meters subbottom. The calculated two-way travel time to the top of Core 7A is 0.165 sec.

BIOSTRATIGRAPHIC SUMMARY

Site 273 contains foraminifera and diatoms in good abundance with trace recordings of Radiolaria, but no nannofossils.

The stratigraphic sequence at this site will be divided into two paleontologic subdivisions. Each unit will be discussed separately with summary remarks to follow.

Cores 1-5

Foraminifera: Core catchers contain an abundant and well-preserved foram fauna consisting of planktonic and benthonic species; an age of Pleistocene/Pliocene is indicated.

Radiolaria: An age of (Brunhes?) Pleistocene is indicated by the radiolarian fauna in Core 1.

Diatoms: The diatom flora for this interval contains species previously recorded only from upper Miocene sediments with others of unknown stratigraphic range. A Recent to upper Miocene age is assigned.

Sample 5, CC through Core 29A

Foraminifera: A fauna is recorded consisting of 10-21 species contrasting markedly with those above in that they are small, thin walled, deformed, and are stained brown. The five dominant taxa show a close affinity to various Arctic faunas and also to some Ross Sea faunas. A determination of the depth of deposition is difficult based on the assemblage, but would indicate water depths of 100-300 meters with some exceptions, but probably none greater than 500 meters. The stratigraphic ranges for most of these taxa extend through this section with the exception of *Trochoelphidiella onyxi*, which occurs in the late Pliocene of the McMurdo Sound area.

Radiolaria: Only fragments were recorded.

Diatoms: Diatoms contained in this interval indicate a Miocene age with occurrences of some species which may prove useful in subdividing the sedimentary sequence. These possible subdivisions are based on land sections in California (Temblor), Maryland (Calvert), and Indonesia (Wonosari). Their abundances are indicative of the age of the formation. An exception is diatom 28, as yet a problematical taxon, which occurs in the mid-Miocene sediment of Site 269.

On the basis of diatoms, Cores 6-5A appear to be middle to upper Miocene; Cores 6A-18A are mid Miocene, and the cores below are (lower?) Miocene.

Concluding Remarks

An obvious discrepancy exists between the assigned ages based on foraminifera and diatoms. A portion of this problem derives from the inadequacy at the present time to discriminate Miocene from younger sediments. There also exists a distinct possibility that Antarctic diatoms cannot be directly correlated to distant land sections.

When considering the age assignments shown by foraminifera, it is important to recognize that a single species was used as the basis for the determination. It is hoped that further study will resolve this problem.

Foraminifera

Late Pliocene-Quaternary (1-4, CC)

Abundant and well-preserved foraminifera were extracted from the top four core catchers. The following taxa were noted in Sample 4, CC: *Textularia* sp., *Nodosaria* sp., *Trifarina earlandi*, *Ehrenbergina glabra*, *Cassidulina neocarinata*, *Islandiella porrecta*, *Globocassidulina biora* (dominant taxon), *Cibicides* sp., *Globigerina pachyderma*, and *G. megastoma*. Ostracodes, sponge spicules, and Radiolaria commonly accompany this fauna.

The size and preservation of foraminiferal tests in this interval contrasts markedly with that of tests in the underlying ?Miocene-Pliocene. The latter are generally small and thin walled and sometimes deformed and are often light brown to dark brown, whereas those of 1-4, CC are three to five times larger, are thick shelled, and have a bright white color with a high luster. The fauna in 1-4, CC has a late Pliocene-Quaternary character. If *Globocassidulina biora* (Crespin) is confined to Gauss sediments, as proposed by Fillon, these sediments may be late Pliocene rather than Quaternary. It is noteworthy that the genus *Ehrenbergina* is present in these very young sediments, but apparently not in the Oligocene, Miocene, and Pliocene sediments at Sites 270, 272, and 273. This is unexplained, for the genus is well represented in the New Zealand middle-upper Tertiary.

?Miocene-Pliocene (5, CC-9, CC; 1A-29A)

Ten samples from this thick and monotonous secession were examined, four from Samples 5, CC; 6, CC; 7, CC; and 8, CC and six from the lowermost 100 meters (17, CC; 18, CC; 22, CC; 25, CC; 28, CC; 29, CC). Foraminifera occur abundantly in most samples and preservation is generally good. Diversities are consistently in the range of 10 to 21 species.

The following taxa are present in the 10 samples listed above: Rhizamminidae, *Lagena* spp., *Fissurina* spp., *Pseudonodosaria* sp., *Quinqueloculina* sp., *Bolivina* sp., *Trifarina* sp., *Uvigerina* sp., *Astrononion* sp., *Elphidium* sp., *Trochoelphidiella* sp., *Nonionella* sp., *Epistominella* sp., *Globocassidulina* sp., *Sphaeroidina* sp., *Pullenia* spp., *Rosalina* sp., *Buccella* sp., *Patellina* sp., *Eponides* sp., *Melonis* sp., *Cibicides* sp., and *Anomalinoides* sp. In addition, a probable planktonic foraminifer of as yet undetermined genus and species was seen in Cores 17 and 18. It most closely resembles *Candeina zeocenica*, though this species is restricted to the Eocene of New Zealand, while at the present site it occurs in sediments otherwise dated as Miocene. It also closely resembles a form described by Krasheninnikov and Hoskins (1973).

Dominant taxa are *Elphidium*, *Trochoelphidiella*, *Uvigerina*, *Trifarina*, *Astrononion*, and *Globocassidulina*. The faunas show a close affinity to late Miocene/Pliocene faunas of various Arctic regions and also to some Ross Sea faunas. An interpretation of the depth of deposition is difficult. The abundance of members of the Elphidiidae suggests water depths in the region of 100 to 300 meters although the high count for *Uvigerina* and *Trifarina* points to slightly deeper water, but probably no greater than 500 meters.

Most taxa range through the interval 5-29, CC and no useful biostratigraphic subdivisions appear possible from this initial work. These sediments are also difficult to date with any accuracy. A range of middle Miocene to Pliocene is proposed with the following possible refinement. The taxon *Trochoelphidiella onyxi* Webb occurs in the Pliocene of the McMurdo Sound area, and the occurrence of a closely comparable suite in several samples at Site 273 suggests that the 5-29, CC interval might have a Pliocene rather than Miocene age.

Nannofossils

Very rare coccoliths were found in sedimentological smear slides from Cores 6-1, 12-1, and 12, CC in Hole 273A, but the low numbers and poor preservation made identification and age assignment impossible.

Radiolaria

Sediments similar to the sediments at Sites 270 to 272 contain no or only traces of unidentifiable Radiolaria. However, some identifiable Radiolaria are present at the following horizons:

Core 1: common and well-preserved Radiolaria (*Antarctissa denticulata*, *A. strelkovi*, *Theocalyptra bicornis*, and *Lithelius nautiloides*): the *Antarctissa denticulata* Zone.

Sample 3-1, 120-124 cm: rare and well-preserved Radiolaria (*Antarctissa denticulata*, *A. strelkovi*, *Theocalyptra bicornis*, and *Lithelius nautiloides*); the *Antarctissa denticulata* Zone.

Sample 5-1, 78-81 cm: rare and well-preserved Radiolaria (*Antarctissa ewingi*, *Lithelius nautiloides*, and *Antarctissa denticulata*); Pliocene?

Diatoms

Diatom abundance and preservation is fair to good at this site. Cores 1 through 5 contain a mixture of diatoms comprising the *Coscinodiscus lentigenosus* Zone with the *Denticula antarctica* Zone. Core 6 through 21A-1-145 contains a portion of the *Denticula antarctica* Zone. Below this point it is unzoned, but shows a characteristic similar to Site 272 in that *Coscinodiscus apiculatus* is present.

Silicoflagellates

Sediments at this site generally contain low abundances and low diversity assemblages of silicoflagellates. The silicoflagellates from this site are well preserved and usually highly ornamented. A high degree of morphological variability makes a precise taxonomic placement of Site 273 silicoflagellates difficult. The taxonomic assignments made herein are therefore considered *sensu strictu*.

Core 1 contains many skeletal morphotypes of *Distephanus speculum* which have varying apical ring widths and spine lengths. No age assignment for the sediment of Core 1 is possible.

Samples 2, CC, 3, CC, and 6, CC are barren of silicoflagellates. Core 5 contains rare specimens of *Distephanus speculum s.l.* Silicoflagellates are fairly common in Sample 6A-1, 120-122 cm which contains the following silicoflagellate assemblage, suggesting a Miocene age: *Distephanus quinquangellus*, *D.* cf. *crux*, *D.*

cf. *boliviensis*, *D. speculum*, and *D.* cf. *longispinus*. This assemblage also contains a variety of intraspecific morphotypes and a number of aberrant forms with incomplete skeletons.

Core 8A through Sample 28A, CC contain low abundances of *Distephanus speculum s.l.* No age assignment is possible for this interval of sediment.

SUMMARY AND CONCLUSIONS

The sedimentary sequence of the western Ross Shelf was sampled to a depth of 346.5 meters in two holes at Site 273. Marine sediments containing abundant clasts derived from icebergs characterize the sequence, which ranges in age from Quaternary to possibly early Miocene. Traces of methane and ethane occur from about 150 meters subbottom to the bottom of the hole.

Two lithologic units, each divided into two subunits, are distinguished at Site 273. Unit 1 is about 42 meters thick and at the top consists of 0.8 meters of distinctive yellow-green, diatom silty clay (Subunit 1A), closely similar to topmost sediments at Sites 270 and 272. The age of Unit 1 is uncertain, probably being in the range Recent to middle-Pliocene (Gauss). The presence of reworked mid-Miocene fossils makes definitive correlation with other sites difficult. Subunit 1B consists of soft to stiff pebbly silty clay with 20-cm-thick beds of yellowish-green diatom silty clay near the base. The latter show some indication of size grading. Clasts (pebbles and granules) include quartz diorites, diabases, granites, basalts, quartzites, argillites, and sandstones.

Unit 2 (324 m thick) marks a change to semilithified and some lithified silty clays with sand (up to 15%) and clasts. This change is apparent on the seismic profiles in the form of a prominent reflector at 0.05 sec. The geometry of the sequence above this reflector as well as the presence of reworked material indicate a sizable slump from the elevated area to the southeast. Another reflector, at 0.16 sec, apparently corresponds to an irregularly lithified sequence showing calcareous cementation in Core 7A.

Stratification is present in thin intervals throughout Subunit 2A (42.5-166 m subbottom) and includes color banding and possible graded bedding. Subunit 2B is generally unstratified, but contains a sand interval (Core 21A, 270.5-272.5 m) which overlies lithified bedded claystone (Core 22). The base of the sand corresponds approximately to a prominent seismic reflector at ~0.3 sec, which appears to truncate older beds further south. Clasts in Unit 2 include a plutonic type (approximating quartz diorite), diabases, quartzites, granites, argillites, silty limestones, and sandstones.

The age of Unit 2 is not certainly established at present. Foraminifera suggest a maximum age of early Pliocene for the oldest sediments at Site 273. However, they have been assigned a mid to ?early Miocene age on the basis of a more extensive diatom flora.

Given the age uncertainties and probably slumping at Site 273, it is difficult to compare the stratigraphic section for the western Ross Sea with the eastern part, except that glacial marine sedimentation occurred in both areas in the Neogene. An advance of shelf ice very probably beveled sediments here, as well as at Sites 270, 271, and 272. The abrupt increase in lithification between Units 1 and 2 is similar to that observed at Sites 270 and 272. The regional configuration of the 0.3 sec and a deeper reflector suggests that the topographic valley in which Site 273 is located is quite an ancient feature, perhaps the locus along which earlier ice tongues or thick shelf ice advanced. One or more of these advances may have caused deep erosion of relatively hard sediment. It is probable that the valley floor near Site 273 was eroded in the interval 3-5 m.y. ago, as in the eastern Ross Sea.

The largely nonstratified lithofacies at this site can be attributed to deposition at most times when bottom circulation was restricted. The stratified lithofacies in Subunit 2A indicates active bottom currents and some slumping, but the apparent absence of burrowing suggests that bottom waters were not highly oxygenated.

Preliminary examination of clasts suggests that most have been derived from the west. The abundance of diabase clasts in Unit 2, and their relative absence from Unit 1, indicate a marked change in the sediment supply. It is probable that the diabases represent those of the Ferrar Group of the Transantarctic Mountains. The absence of these rock types from higher units within the glacial sequence could be associated with increasing elevation of the Transantarctic Mountains leading to erosion into basement by outlet glaciers, or to the damming of East Antarctic ice by the mountains.

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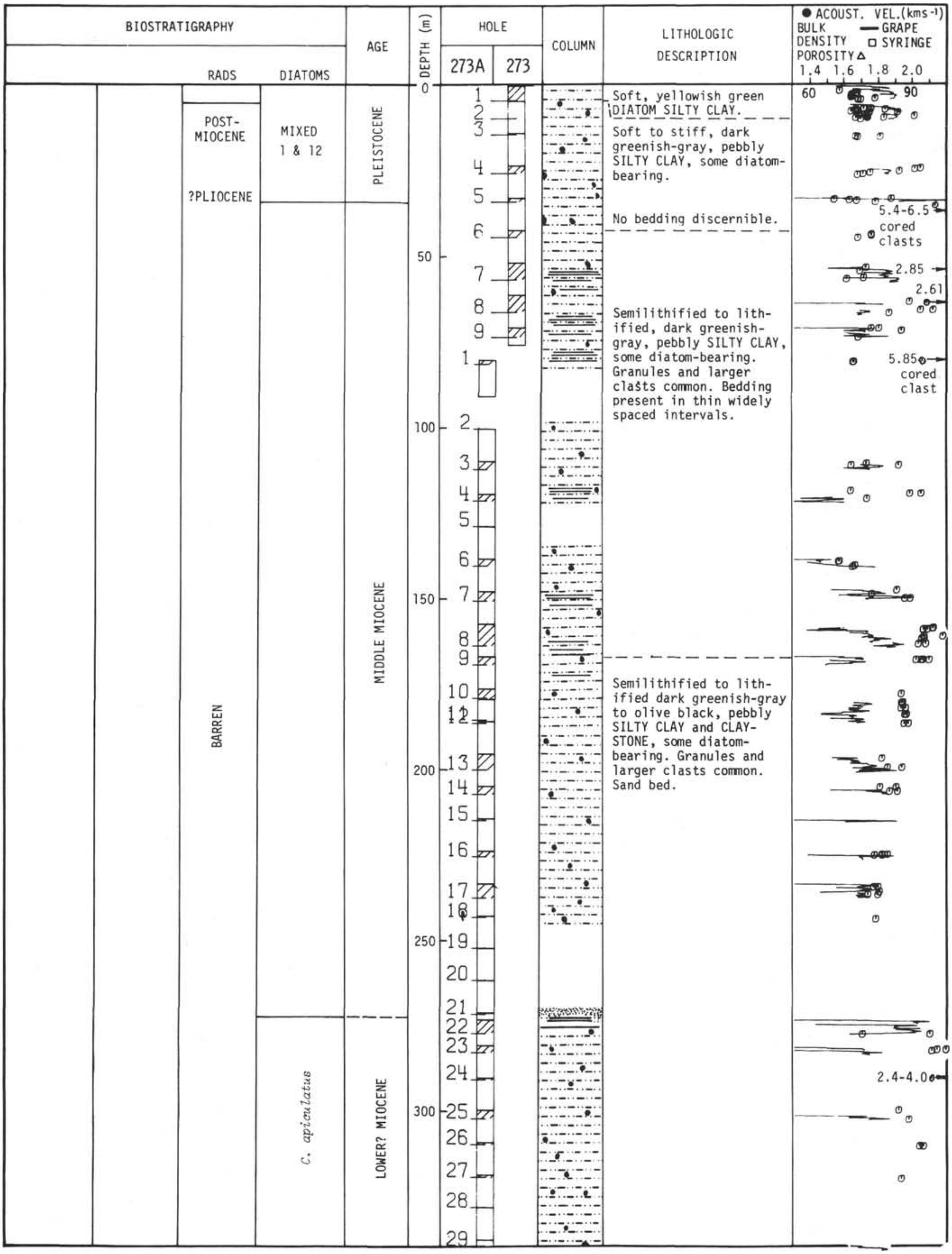


Figure 5. *Graphic hole summaries, Site 273.*

Site 273 Hole Core 1 Cored Interval: 0-4.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	
QUATERNARY/PLIOCENE					1	0.5 / 1.0	VOID		GZ * CC	59% clay 40% silt 55% 1% sand 40% diatoms	Soft, dusky yellow green (5GY 5/2) DIATOM SILTY CLAY, sharp color boundary at 82 cms.
										70% clay 25% silt 76% 5% sand 10% diatoms	Soft, slightly stiffer than above, dark greenish gray (5GY 4/1), DIATOM-BEARING SILTY CLAY with pebbles. No bedding visible.
					2				* *	60% clay 33% silt 95% 7% sand 3% diatoms	Density of pebbles ±1% throughout, max. size pebbles 58 mm, av. size (above 4 mm) = 15 mm.
					3				*	70% clay 26% silt 94% 4% sand 4% diatoms 2% micarb	Soft, dark greenish-gray DIATOM-BEARING SILTY CLAY, with pebbles and granules. No bedding visible.
QUATERNARY(?) ?					Core Catcher				*	70% clay 25% silt 97% 5% sand 2% diatoms 1% micarb	Soft, olive gray SILTY CLAY; some sand, low concentration of pebbles and granules. 8mm ?basalt.

Site 273 Hole Core 2 Cored Interval: 4.5-14 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	
QUATERNARY/PLIOCENE					1	0.5 / 1.0	VOID		*	60% clay 39% silt 94% 1% sand 2% diatoms 1% micarb	Soft to semi-stiff, dark greenish-gray (5GY 4/1) SILTY CLAY with pebbles. No bedding visible. Density of pebbles 1-2%, max. pebble diam. 40 mm, Av. pebble size (above 4 mm) = 1 mm.
					2				*	60% clay 37% silt 95% 3% sand 2% diatoms 1% micarb	
					3				*	55% clay 40% silt 97% 5% sand 1% diatoms 1% micarb	Soft to semi-stiff, dark greenish-gray SILTY CLAY. Density of pebbles 3-5%, max. pebble diam. 21 mm, av. pebble diam. (over 4 mm) = 9.5 mm.
					4				*XM GZ CC	66% clay 30% silt 94% 4% sand 3% diatoms 2% micarb	Soft to semi-stiff, DIATOM-BEARING SILTY CLAY. No bedding visible.
					Core Catcher				*		

Bulk X-ray (9.9 m):

Amorph.	- 51.6%
Ident.	- 48.4%
Quar.	- 38.2%
K-Fe.	- 16.0%
Plag.	- 20.6%
Mica	- 23.2%
Chlo.	- 2.0%

Site 273 Hole Core 3 Cored Interval: 14-23.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	
QUATERNARY/PLIOCENE					1	0.5 / 1.0	VOID		*	60% clay 36% silt 4% sand 3% diatoms	Soft, dark greenish-gray SILTY CLAY. Density of pebbles <1% max. pebble diam. 7 mm, av. pebble diam. 6 mm.
					Core Catcher				*	67% clay 30% silt 95% 3% sand 3% diatoms 2% micarb	Soft, dark greenish-gray DIATOM-BEARING SILTY CLAY with pebbles, inc. 39 mm dark gray ultramafic, with sulphides.

Explanatory notes in Chapter 1

Site 273 | Hole | Core 4 | Cored Interval: 23.5-33 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
U. MIOCENE/PLIOCENE					1	0.5, 1.0	VOID; D M		* GZ CC	65% clay 34% silt 97% 1% sand 2% diatoms 1% micarb Soft, possibly brecciated, dark greenish-gray SILTY CLAY. No bedding visible. Pebble density <1% max. diam. 42 mm.
					2		D M		* XM	58% clay 40% silt 96% 2% sand 2% diatoms 1% micarb Semi-stiff, dark greenish gray SILTY CLAY. No bedding. Pebble density 2-3% max. diam. 29 mm, av. pebble diam. = 11 mm.
					Core Catcher		D M		*	65% clay 32% silt 96% 3% sand 2% diatoms 1% micarb Soft to semi-stiff, dark greenish-gray SILTY CLAY with pebbles.

Bulk X-ray (26.1 m):

Amorph.	- 49.9%
Ident.	- 50.1%
Quar.	- 39.7%
K-Fe.	- 11.9%
Plag.	- 21.8%
Mica	- 20.1%
Chlo.	- 1.9%
Mont.	- 1.1%
Gyps.	- 3.5%

Site 273 | Hole | Core 5 | Cored Interval: 33-42.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
U. MIOCENE					1	0.5, 1.0	VOID; M D		****** *	54% clay 40% silt 55% 6% sand 40% diatoms 4% sponge spicules 75% silt 15% sand 65% 10% clay 20% sponge spicules 15% diatoms 77% clay 20% silt 97% 2% sand 1% diatom 60% clay 36% silt 97% 4% sand 2% diatoms 1% micarb
					Core Catcher		M D		*	DIATOM SILTY CLAY; alteration of grayish-olive green DIATOM SILTY CLAYS (10-15 cms thick), with bluish-gray SILTY CLAYS, passing down to stiff, olive black (5Y 2/1) CLAY. Diatom-rich clays appear graded. Pebbles in gray and black clays only. 25% in basal 90 cms, max. diam. 93 mm. DIATOM SPICULE-RICH SILT. Stiff, olive-black CLAY. Stiff, dark greenish-gray to greenish-black (5GY 3/1) SILTY CLAY with pebbles.

Site 273 | Hole | Core 6 | Cored Interval: 42.5-52 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MID/UPPER MIOCENE					1	0.5, 1.0	VOID		*	60% clay 37% silt 98% 3% sand 2% diatoms Olive black, stiff to semi-lithified SILTY CLAY with pebbles. No bedding visible. Pebble density <1% throughout, max. pebble diam. 36 mm, av. pebble diam. 15 mm.
					2		D; D M		XM CC GZ *	53% clay 45% silt 97% 2% sand 2% diatoms 1% micarb Semi-lithified olive-black SILTY CLAY.
					Core Catcher		M D		*	65% clay 32% silt 96% 3% sand 2% diatoms 1% micarb Dark gray (N3), stiff, slightly calcareous SILTY CLAY.

Bulk X-ray (44.5 m):

Amorph.	- 56.8%
Ident.	- 43.2%
Quar.	- 41.1%
K-Fe.	- 10.9%
Plag.	- 21.6%
Mica	- 19.1%
Chlo.	- 2.5%
Mont.	- 2.3%
Pyri.	- 1.1%
Gyps.	- 2.4%

Explanatory notes in Chapter 1

Site 273 Hole Core 7 Cored Interval: 52-61.5 m

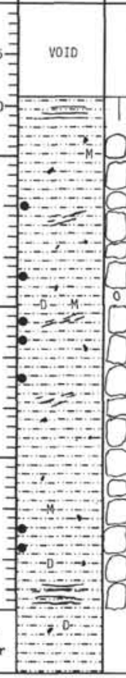
AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
MIDDLE/UPPER MIOCENE					1, 2, 3, 4, Core Catcher	0.5, 1.0	VOID		*, *, *, GZ * CC, *, *

LITHOLOGIC DESCRIPTION

60% clay 37% silt 3% sand 1- 2% micarb	96%	Semi-lithified, olive black SILTY CLAY. Very hard, brittle, calcareous dark greenish-gray (5GY 4/1) CALCAREOUS SILTY CLAY, 20-30 cms.
60% clay 40% silt 3% sand 35% micarb 1% diatom	64%	Pebble density <1%, max. pebble diam. 37 mm, av. pebble diam. = 21 mm.
60% clay 37% silt 3% sand 2% diatoms 1% micarb	97%	Very faint bedding traces.
65% clay 32% silt 3% sand 3% diatoms 1% micarb	95%	Olive-black, semi-lithified SILTY CLAY. Very faint bedding - 2 cm thick intervals show hardness differences and faint color differences. Max. pebble density <1%, max. pebble diam. 68 mm, av. pebble diam. 17 mm.
65% clay 33% silt 2% sand 3- 4% diatoms TR micarb	96%	Dark greenish-gray, semi-lithified, slightly calcareous SILTY CLAY. No bedding in base of core.
65% clay 33% silt 2% sand 6% diatoms 1% micarb	93%	Dark greenish-gray (5GY 4/1), semi-lithified SILTY CLAY (diatom-bearing).

Site 273 Hole Core 8 Cored Interval: 61.5-71 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
MIDDLE/UPPER MIOCENE					1, 2, 3, 4, Core Catcher	0.5, 1.0	VOID		*, *, *, *, CC * GZ, *, **, *



LITHOLOGIC DESCRIPTION

60% clay 40% silt 3% diatoms 1- 2% micarb	95%	Olive black, semi-lithified SILTY CLAY, very faintly laminated above 103 cm., massive below.
45% clay 40% silt 15% sand 30% micarb	?%	Pebbles <1%; rare granules along irregular erosion surface at 103 cm. Pebbles 5-7%, max. diam. 7 mm, av. diam. = 5 mm.
75% clay 25% silt 3% sand 4% diatoms 1% micarb	95%	Dark greenish-gray to olive black semi-lithified DIATOM-BEARING SILTY CLAY. Mainly massive, but includes some zones of fissility, up to 20 cm thick.
70% clay 22% silt 8% sand 4% diatoms 1% micarb	95%	Pebbles and granules <1%, max. diam. 60 mm, av. pebble diam. = 14 mm.
73% clay 25% silt 2% sand 2% diatoms 1% micarb	97%	Dark gray (N3) to dark greenish-gray SILTY CLAY with pebbles.
60% clay 36% silt 4% sand 1% diatoms	99%	Bedding developed below 125 cm, 2 mm thick darker gray, sharp-based fine laminae separated by 2 cm thick silt beds; suggestion of grading. Pebbles absent in bedded interval.
80% clay 20% silt TR sand 3% diatoms 1% micarb	96%	Olive black, passing downwards into dark greenish gray, CLAY. Lower part of catcher shows distinct fine bedding, also hair-like calcite veins parallel to beds.

Site 273 Hole Core 9 Cored Interval: 71-76 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
MIDDLE/UPPER MIOCENE					1, 2, Core Catcher	0.5, 1.0	VOID		*, *, *, *

LITHOLOGIC DESCRIPTION

60% clay 40% silt TR sand 15% opaques 5% diatoms	80%	Bedding distinct in top 30 cm. Dark gray, fine beds 2 cm thick, alternate with coarser grayish-green intervals. Beds dip 8-10° to core axis.
60% clay 38% silt 2% sand 2% diatoms	98%	No pebbles or granules in bedded interval.
74% clay 25% silt 1% sand 3% diatoms	96%	Massive, semi-lithified dark greenish gray (5GY 4/1) SILTY CLAY. Pebbles <1%, max. pebble size 17 mm, av. pebble diam. = 7 mm. Granules 1-2%.
58% clay 40% silt 2% sand 2- 3% diatoms		Below 125 cm dark gray laminae present, 1-2 mm thick, 2-6 cm apart, downbent at core margin.

Explanatory notes in Chapter 1

Site 273 Hole A Core 1 Cored Interval: 80.5-91 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MID/U. MIOCENE					1; Core Catcher	0.5; 1.0	VOID		* *	

65% clay
33% silt 97%
2% sand
3% diatoms
TR micarb

Dark greenish-gray (5GY 4/1) semi-lithified, slightly calcareous DIATOM-BEARING SILTY CLAY. Olive-black laminae 1-2 mm thick, 1-4 cm apart, downbent at core margins.

Pebbles ~10%, max. pebble diam. 100 mm, av. diam. = 39 mm. Granule density <1%.

65% clay
35% silt
TR sand
2% diatoms
TR micarb

Drilled quartz, diorite cobble, 70 mm.

Stiff, dark greenish-gray SILTY CLAY; pebble and boulder bearing.

Site 273 Hole A Core 2 Cored Interval: 100.5-110 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MID/U. MIOCENE					Core Catcher				*	

62% clay
35% silt 95%
3% sand
1% micarb
4% diatoms

Stiff, dark greenish-gray (5GY 3/1) DIATOM-BEARING SILTY CLAY, with pebbles.

Pebbles angular to sub-rounded; max. diam. 50 mm.

Site 273 Hole A Core 3 Cored Interval: 110-119.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MID/UPPER MIOCENE					1; 2; Core Catcher	0.5; 1.0	VOID		* CC GZ * *	

65% clay
34% silt 95%
1% sand
3% diatoms
1% micarb

Dark greenish-gray, stiff to semi-lithified DIATOM-BEARING SILTY CLAY. Very faint bedding traces.

Pebble density ~ 3%, max. diam. 49 mm, av. pebble diam. = 16 mm.

Granules very rare.

80% clay
20% silt 95%
TR sand
5% diatoms
TR micarb

Dark greenish-gray SILTY CLAY; alternating stiff and semi-lithified intervals. No other indications of bedding.

Pebble density ~1%, max. diam. 30 mm, av. pebble diam. = 12 mm. No pebbles below 90 cm.

60% clay
38% silt 97%
2% sand
2- 3% diatoms
1% micarb

Stiff, dark greenish-gray SILTY CLAY with pebbles.

Max. pebble diam. 31 mm.

Site 273 Hole A Core 4 Cored Interval: 119.5-129 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MID/UPPER MIOCENE					1; 2; Core Catcher	0.5; 1.0	VOID		* CC GZ * *	

70% clay
30% silt 97%
TR sand

Dark greenish-gray to olive black pebbly SILTY CLAY. Irregular bedding above 110 cm; lensoid pale greenish gray beds poorly defined. Beds dip 7-8°

Pebbles and granules ~3%, max. diam. 26 mm, av. pebble diam. = 12 mm.

60% clay
35% silt 97%
5% sand
2% diatoms
TR micarb

Dark greenish-gray SILTY CLAY. No bedding visible. Rare shell fragments.

Pebbles and granules <1%, max. diameter 25 mm.

70% clay
30% silt 97%
TR sand
2% diatoms
1% micarb

Dark greenish-gray semi-lithified SILTY CLAY with pebbles.

Max. pebble diam. 18 mm.

Site 273A Core 5 - 129-138.5 m: NO RECOVERY

Site 273 Hole A Core 6 Cored Interval: 138.5-148 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE					1; 2; Core Catcher	0.5; 1.0	VOID		** * * GZ CC XM WC *** *	

60% clay
40% silt 70%
30% diatoms

Stiff, dusky yellow green (5GY 4/2) to grayish-olive green (5GY 4/2), homogeneous DIATOM SILTY CLAY. No bedding. Thin (1-2 mm) dark gray laminae 1-3 cm apart. Downbent at core margins.

Pebbles and granules <1%.

60% clay
40% silt 65%
TR sand
35% diatoms

Dusky yellow green (5GY 4/2) DIATOM SILTY CLAY.

No pebbles or granules.

70% clay
30% silt 80%
TR sand
20% diatoms

1 cm-thick, stiff, grayish olive green DIATOM-RICH SANDY SILT at 120 cm. Dark greenish-gray (5GY 4/1) SILTY CLAY.

55% clay
44% silt 95%
1% sand
5% diatoms

No pebbles or granules.

60% clay
35% silt
5% sand
3% diatoms
TR micarb

Dark greenish-gray, semi-lithified SILTY CLAY. No pebbles observed.

Bulk X-ray (139.9 m):

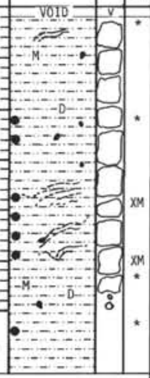
Amorph.	- 72.8%
Ident.	- 27.2%
Quar.	- 32.8%
K-Fe.	- 11.5%
Plag.	- 23.9%
Mica	- 25.1%
Chlo.	- 2.6%
Pyri.	- 2.8%
Gyps.	- 1.4%

Explanatory notes in Chapter 1

Site 273 Hole A Core 7 Cored Interval: 148-157.5 m

AGE: MIDDLE MIOCENE

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
MIDDLE MIOCENE					1	0.5, 1.0	VOID, M, D	V	*, *
					2		M, D		XM, XM, *, *
					Core Catcher				



LITHOLOGIC DESCRIPTION

53% clay
45% silt 90%
2% sand
8% diatoms
1% micarb

55% clay
44% silt 95%
1% sand
4% diatoms
1% micarb

Medium-dark gray (N3) to dark greenish-gray DIATOM-BEARING SILTY CLAY. Semi-lithified above 56 cm, stiff below. Dark laminae 1-2 mm thick, 1-3 cm apart, occur between 56 cm in Sec. 1 and 35 cm in Sec. 2. Bedding deformation distinct around dropped pebble at 35 cm.

Pebbles and granules <1%, max. pebble diam. >25 mm, av. pebble diam. = 7 mm.

Pebbles and granules 3-5%, max. pebble diam. 17 mm, av. pebble diam. = 7 mm.

55% clay
45% silt 95%
1% sand
4% diatoms

Lithified, CALCAREOUS SILTY CLAYSTONE, with pebbles. Wisps and irregular darker gray clay lenses present. Possible load casts and soft sediment deformation.

58% clay
40% silt 96%
2% sand
3% diatoms
TR micarb

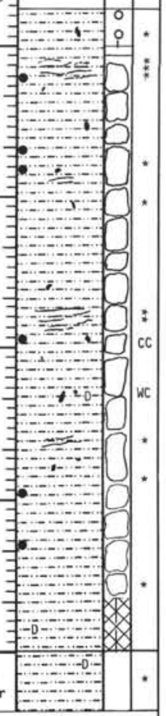
Dark greenish-gray, stiff DIATOM-BEARING SILTY CLAY with pebbles.

Max. pebble diam. 54 mm.

Bulk X-ray (149.0 m):		Bulk X-ray (149.5 m):	
Amorph.	- 53.7%	Amorph.	- 55.1%
Ident.	- 46.3%	Ident.	- 44.9%
Calc.	- 4.4%	Quar.	- 40.4%
Dolo.	- 30.3%	K-Fe.	- 14.0%
Quar.	- 28.2%	Plag.	- 26.7%
K-Fe.	- 10.5%	Mica	- 14.6%
Plag.	- 18.8%	Chlo.	- 1.6%
Mica	- 6.9%	Pyri.	- 1.7%
Chlo.	- 0.9%	Amph.	- 1.0%

Site 273 Hole Core 8 Cored Interval: 156.5-166 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
MIDDLE MIOCENE					1	0.5, 1.0	VOID		*
					2				***, *, *
					3				**, CC
					4		D		WC, *, *
					5		D		*
					Core Catcher		D		*



LITHOLOGIC DESCRIPTION

56% clay
40% silt 96%
4% sand
3% diatoms
1% micarb

Dark gray (N3) - dark greenish-gray semi-lithified SILTY CLAY. Bedding traces clear above 35 cm. Dark gray clay-rich beds 2 cm thick alternate with silty, paler gray beds. Contacts sharp but irregular. Rare shell fragments.

52% clay
45% silt 97%
3% sand
3% diatoms

Pebbles and granules <1%, max. pebble diam. 45 mm, av. pebble diam. = 11 mm.

Olive-black (5Y 2/1) semi-lithified SILTY CLAY witn pebbles. Gritty throughout. Irregular bedding developed at 110-130 cm. Beds include DIATOM-RICH CLAYEY SILTS.

70% silt
28% clay 83%
2% sand
15% diatoms

Dark greenish-gray to olive black, gritty, semi-lithified DIATOM-BEARING CLAYEY SILT. Faint bedding at 85 cm.

Pebbles and granules <1%, max. pebble diam. 15 mm, av. pebble diam. = 5 mm.

50% silt
47% clay 93%
3% sand
6% diatoms
1% micarb

Semi-lithified, olive black, gritty SILTY CLAY with DIATOM-BEARING pebbles.

60% clay
39% silt 97%
1% sand
1% micarb

Very dark greenish-gray (5GY 3/1) pebbly SILTY CLAY - semi-lithified. Pebbles and granules sparse.

Explanatory notes in chapter 1

Site 273 Hole A Core 9 Cored Interval: 166-175.5 m

AGE	ZONE	FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE					1	0.5, 1.0	VOID, -D-		*, XM, *	
					2		-D-		CC, *	
					Core Catcher				*	

55% clay
41% silt 97%
4% sand
3% diatoms
TR micarb

Olive black, semi-lithified gritty-looking DIATOM-BEARING SILTY CLAY. No bedding visible, but intervals of greater fissility are developed.

55% clay
40% silt 95%
5% sand
4% diatoms
TR micarb

Pebbles and granules <1%, max. pebble diam. 29 mm, av. pebble diam. = 10 mm.

55% clay
40% silt 95%
5% sand
7% diatoms
TR micarb

Olive-black semi-lithified, gritty DIATOM-BEARING SILTY CLAY. No bedding discernible.

55% clay
43% silt 97%
2% sand
2% diatoms
1% micarb

Dark greenish-gray to olive black, stiff to semi-lithified SILTY CLAY.

Max. pebble diam. 78 mm.

Bulk X-ray (166.9 m):

Amorph.	- 53.7%
Ident.	- 46.3%
Quar.	- 38.1%
K-Fe.	- 18.6%
Plag.	- 25.6%
Kaol.	- 1.0%
Mica	- 13.9%
Chlo.	- 1.6%
Mont.	- 1.2%

Site 273 Hole A Core 10 Cored Interval: 175.5-178.5 m

AGE	ZONE	FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE					1	0.5, 1.0	VOID	O, O, O, O, O, |	*	
					2			V, O, O, O, O, O, O	*	

Drilling sludge - dark greenish-gray (5GY 3/1) SILTY CLAY, abundant pebbles.

55% clay
44% silt 98%
1% sand
2% diatoms
TR micarb

Pebble density ~10%, max. pebble diam. 48 mm, av. pebble diam. = 14 mm.

Pebbles and granules <1%, max. pebble diam. 12 mm, av. pebble diam. = 7 mm.

50% clay
46% silt 98%
4% sand
2% diatoms
TR micarb

Grayish-green to olive black semi-lithified, gritty-looking SILTY CLAY. No bedding visible. Fissile interval 105-120 cm.

Site 273 Hole A Core 11 Cored Interval: 178.5-185 m

AGE	ZONE	FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE					1	0.5, 1.0	VOID	O, O	*	
					2		-D-		*	
					3		-D-		CC, *, XM	
					4		-D-		*	
					5		-D-		*	

58% clay
40% silt 98%
2% sand
2% diatoms

Dark greenish-gray (5GY 3/1) semi-lithified SILTY CLAY.

64% clay
35% silt 97%
1% sand
2% diatoms
TR micarb

Olive-black, semi-lithified, gritty-looking SILTY CLAY; angular granules common. Rare pebbles. No bedding visible. Slight fissility around 110 cm. Uniform lithology.

Pebbles and granules <1% throughout, max. pebble diam. 29 mm, av. pebble diam. = 9 mm.

65% clay
34% silt 97%
1% sand
2% diatoms
TR micarb

65% clay
33% silt 97%
2% sand
2% diatoms
TR micarb

Dark greenish-gray to olive-black, semi-lithified, gritty-looking SILTY CLAY with pebbles. Intense fracturing (?fissility) through 10 cm thick intervals.

55% clay
43% silt 98%
2% sand
1% diatoms
TR micarb

Site 273 Hole A Core 12 Cored Interval: 185-194.5 m

AGE	ZONE	FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE					1	0.5, 1.0	VOID, -D-		*	
					Core Catcher		-D-		*	

Olive-black, semi-lithified SILTY CLAY. No bedding visible.

60% clay
37% silt 95%
3% sand
4% diatoms
TR micarb

Pebbles and granules <1%.

59% clay
40% silt 95%
1% sand
3% diatoms
1% micarb
1% nannofossils

Very dark greenish-gray, stiff to semi-lithified SILTY CLAY. Granules and small pebbles rare.

Max. pebble diam. 42 mm.

Explanatory notes in Chapter 1

Site 273 Hole A Core 13 Cored Interval: 194.5-204 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE					1	0.5, 1.0	VOID			
									*	60% clay, 38% silt, 2% sand, 3- 4% diatoms, TR micarb — 96% — Very dark greenish-gray (5GY 3/1), semi-lithified DIATOM-BEARING SILTY CLAY with pebbles. Bivalve mold.
					2				*	57% clay, 42% silt, 1% sand, 1% diatoms, TR micarb — 98% — No bedding. Pebbles and granules <1% throughout, max. pebble diam. 60 mm, av. pebble diam. = 10 mm.
					3				*, XM CC	55% clay, 43% silt, 2% sand, 1- 2% diatoms, TR micarb — 97% — Very dark greenish-gray (5GY 3/1) gritty-looking, semi-lithified SILTY CLAY with pebbles. Uniform lithology.
					4				*	55% clay, 43% silt, 2% sand, 2% diatoms, TR micarb — 97% — Very dark greenish-gray, gritty-looking SILTY CLAY. Bedding absent.
					Core Catcher				*	65% clay, 32% silt, 3% sand, 3% diatoms, 1% micarb — 96% — Very dark greenish-gray, semi-lithified SILTY CLAY with pebbles.

Bulk X-ray (198.8 m):

Amorph.	- 53.1%
Ident.	- 46.9%
Quar.	- 38.5%
K-Fe.	- 14.2%
Plag.	- 24.4%
Mica	- 15.2%
Chlo.	- 2.2%
Mont.	- 3.6%
Gyps.	- 1.9%

Site 273 Hole A Core 14 Cored Interval: 204-213.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE					1	0.5, 1.0	VOID			
									*	56% clay, 40% silt, 4% sand, 3% diatoms, TR micarb — 96% — Very dark greenish-gray (5GY 3/1) semi-lithified, gritty-looking, pebbly SILTY CLAY. Rare shell fragments. No bedding discernible.
					2				CC XM, *	60% clay, 40% silt, TR sand, 2% diatoms, TR micarb — 98% — Pebbles and granules ~1% throughout. Max. pebble diam. 50 mm, av. pebble diam. = 10 mm.
					Core Catcher				*	60% clay, 39% silt, 1% sand, 3% diatoms, 1% micarb — 95% — Very dark greenish-gray (5GY 3/1) semi-lithified, pebbly SILTY CLAY. Rare shell fragments. Max. pebble diam. 23 mm.

Site 273 Hole A Core 15 Cored Interval: 213.5-223 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE					1	0.5, 1.0	VOID			Mainly an aggregate of apparently well-sorted pebbles. Some greenish-gray mud. Pebble sample shows size range 4-16 mm (Mean 10 mm). Subangular to subrounded.
					Core Catcher				*	69% clay, 30% silt, 1% sand, 3% diatoms, TR micarb — 96% — Greenish-gray SILTY CLAY with abundant pebbles. Max. pebble diam. 54 mm.

Explanatory notes in Chapter 1

Site 273 Hole A Core 16 Cored Interval: 223-232.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MID MIOCENE					1	0.5, 1.0	VOID		*	
					2				*	
					Core Catcher				*	

64% clay
35% silt 95%
1% sand
4% diatoms
TR micarb

60% clay
39% silt 97%
1% sand
3% diatoms
TR micarb

55% clay
43% silt 95%
2% sand
5% diatoms
TR micarb

Dark greenish-gray (5GY 3/1), gritty-looking, semi-lithified DIATOM-BEARING SILTY CLAY with pebbles. No bedding discernible.

Density pebbles and granules ~1%, max. pebble diam. 74 mm, Av. pebble diam. = 15 mm.

Very dark greenish-gray, semi-lithified, pebbly DIATOM-BEARING SILTY CLAY.

Site 273 Hole A Core 17 Cored Interval: 232.5-242 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE					1	0.5, 1.0	VOID		*	
					2				*, XM	
					3				CC	
					Core Catcher					

64% clay
35% silt 93%
1% sand
6% diatoms
TR micarb

66% clay
33% silt 92%
1% sand
6% diatoms
1% micarb

Bulk X-ray (234.8 m):

Amorph.	- 57.7%
Ident.	- 42.3%
Quar.	- 37.8%
K-Fe.	- 17.7%
Plag.	- 22.3%
Mica	- 18.5%
Chlo.	- 2.7%
Mont.	- 1.0%

Traces dark (1-2 mm) laminae with downbent edges; 80-90 cms. Faint bedding traces at 110 cm - irregular lenses gritty and silty material.

Semi-lithified blebs SILTY CLAY in stiff sludge. Sludge shows thin dark laminae to core edge.

Dark greenish gray (5GY 3/1), semi-lithified, pebbly SILTY CLAY. ?Bedding at 130 cm. Faint lenses gritty material in silty matrix. Downbent dark laminae in slude between harder core sections. Very rare small shell fragments.

Pebbles and granules much less than 1% throughout core. Max. diam. 53 mm, av. diam. = 13 mm.

Site 273 Hole A Core 18 Cored Interval: 242-251.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE					1	0.5, 1.0	VOID		*	
					Core Catcher					

59% clay
40% silt 92%
1% sand
8% diatoms
TR micarb

Brecciated to drilling sludge throughout. One whole-diameter core piece is greenish-gray SILTY CLAY.

No pebbles observed.

Site 273A Core 19 - 251.5-261 m: NO RECOVERY
Site 273A Core 20 - 261-270.5 m: NO RECOVERY

Site 273 Hole A Core 21 Cored Interval: 270.5-272.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
?LOWER MIOCENE					1	0.5, 1.0	VOID		*, *	
					Core Catcher					

80% sand
15% silt
5% clay

80% sand
15% silt
5% clay

Very fine sand only.

Coarse gray sand above 130 cm. Very strong gaseous smell. Below this is dark greenish-gray mud with rare pebbles.

Pebbles very rare. Max. diam. 65 mm.

Explanatory notes in Chapter 1

Site 273 Hole A Core 22 Cored Interval: 272.5-280 m

AGE: ?LOWER MIOCENE

Sections: 1, 2, 3, Core Catcher (VOID at top of section 1)

LITHO. SAMPLE: CC XM * (Section 1); * (Section 2); * (Section 2); * * (Section 3)

LITHOLOGIC DESCRIPTION

54% silt
45% clay
1% sand
TR diatoms
TR micarb

Very dark greenish-gray, semi-lithified, gritty looking, pebbly CLAYEY SILT. Bedding absent.

58% clay
40% silt 99%
2% sand
1% diatoms

Dark greenish-gray, semi-lithified, pebbly SILTY CLAY. Very faint bedding traces - dark gray clayey lenses around 110 cm.

Pebbles and granules 2-3%, max. clast diam. 55 mm, av. pebble diam. = 11 mm.

50% clay
48% silt 99%
2% sand

No bedding above 120 cm. Core lithified below 120 cm, clay-rich, pebbles and granules absent. Dusky-brown and olive gray lenses show possible soft sediment deformation, clay clasts etc. in this interval. Probable bedding surfaces have 5°-6° dip.

65% clay
35% silt
TR sand
4% diatoms

Pebbles and granules <1%.

65% silt
35% clay
8% diatoms

Bulk X-ray (273.3 m):

Amorph.	- 30.3%
Ident.	- 69.7%
Quar.	- 31.5%
K-Fe.	- 25.0%
Plag.	- 22.5%
Mica	- 19.6%
Chlo.	- 1.4%

Site 273 Hole A Core 23 Cored Interval: 280-289.5 m

AGE: ?LOWER MIOCENE

Sections: 1, 2, Core Catcher (VOID at top of section 1)

LITHO. SAMPLE: * (Section 1); CC * (Section 2)

LITHOLOGIC DESCRIPTION

58% clay
40% silt 97%
2% sand
2% diatoms
1% micarb

Very dark greenish-gray (5GY 3/1) to olive black, semi-lithified, gritty looking, pebble SILTY CLAY. Bedding absent.

Pebbles and granules 1-2%, max. clast diam. 65 mm, av. pebble diam. = 9 mm.

58% clay
40% silt 98%
2% sand
1% micarb
1% diatoms

60% clay
40% silt 95%
TR sand
3% diatoms
2% micarb

Dark greensih-gray, semi-lithified pebbly SILTY CLAY.

Site 273 Hole A Core 24 Cored Interval: 289.5-299 m

AGE: ?LOWER MIOCENE

Sections: 1, Core Catcher (VOID at top of section 1)

LITHO. SAMPLE: XM CC *

LITHOLOGIC DESCRIPTION

57% clay
40% silt 70%
3% sand
?30% micarb

Lithified, very dark greenish-gray (5GY 3/1), pebbly SILTY CLAY. Cement calcareous in patches.

Pebbles and granules ~1%, max. pebble diam. 14 mm, av. pebble diam. = 8 mm.

58% clay
40% silt
2% sand
3% micarb
1% diatoms

Dark greenish-gray, lithified, pebbly MICARB-BEARING SILTY CLAY.

Max. pebble diam. 65 mm.

Site 273 Hole A Core 25 Cored Interval: 299-308.5 m

AGE: ?LOWER MIOCENE

Sections: 1, 2, Core Catcher (VOID at top of section 1)

LITHO. SAMPLE: * * (Section 1); CC XM (Section 2)

LITHOLOGIC DESCRIPTION

55% clay
42% silt 98%
3% sand
1% micarb
1% diatoms

Very dark greenish-gray, semi-lithified, gritty-looking, pebbly SILTY CLAY. Very rare shell fragments. No bedding visible, though may be obscured by intense fracturing in some intervals.

60% clay
39% silt 99%
1% sand
1% micarb
TR diatoms

Pebbles and granules <1% throughout. Max. clast diam. 10 mm, av. pebble diam. = 7 mm.

70% clay
30% silt 97%
TR sand
2% diatoms
1% micarb

Dark greenish-gray, semi-lithified, pebble SILTY CLAY.

Max. clast diam. 50 mm.

Bulk X-ray (301.6 m):

Amorph.	- 51.7%
Ident.	- 48.3%
Calc.	- 1.6%
Dolo.	- 0.8%
Quar.	- 40.2%
K-Fe.	- 10.2%
Plag.	- 23.9%
Mica	- 20.2%
Chlo.	- 1.9%
Amph.	- 1.1%

Explanatory notes in Chapter 1

Site 273 Hole A Core 26 Cored Interval: 308.5-318 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
?LOWER MIOCENE					1	0.5	VOID			
						1.0	D		* CC *	59% clay, 40% silt 97%, 1% sand, 1- 2% diatoms, 1% micarb; 75% clay, 25% silt, 4% diatoms. Semi-lithified, bery dark greenish-gray (5GY 3/1), gritty-looking SILTY CLAY. Trace bedding in deformed soft SILTY CLAY at base of core; irregular dark greenish-gray and olive-black layers 2-3 mm thick interbedded. Pebbles and granules <1%, max. diam. 53 mm, av. diam. pebbles = 23 mm.
					Core Catcher					70% clay, 29% silt, 1% sand, 2% diatoms, TR micarb. Dark greenish-gray (5GY 4/1), pebbly SILTY CLAY. Some darker streaks (5GY 3/1). Max. pebble diam. 38 mm.

Site 273 Hole A Core 27 Cored Interval: 318-327.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
?LOWER MIOCENE					1	0.5	VOID			
						1.0	D, D		CC *	58% clay, 40% silt 98%, 2% sand, 1% diatoms, TR micarb. Very dark-greenish gray, semi-lithified, gritty looking SILTY CLAY. Pebbles and granules 2-3%, max. clast diam. 60 mm, av. pebble diam. = 30 mm.
					Core Catcher					60% clay, 38% silt 98%, 2% sand, 2% diatoms, TR micarb. Semi-lithified, dark greenish-gray pebble SILTY CLAY. Max. pebble diam. 47 mm.

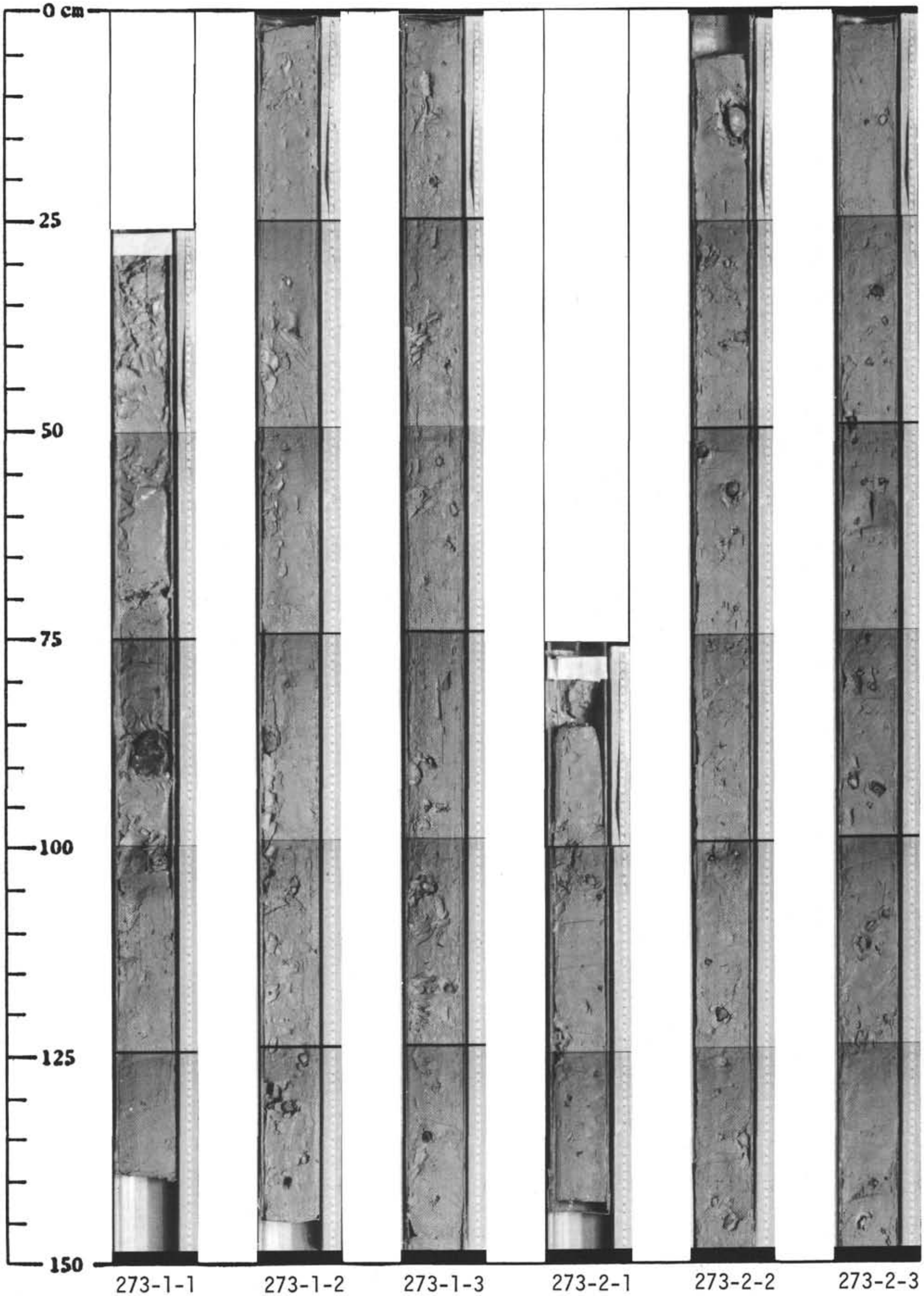
Site 273 Hole A Core 28 Cored Interval: 327.5-337 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LOWER MIOCENE					Core Catcher				*	60% clay, 40% silt 96%, TR sand, 3% diatoms. Dark greenish-gray, stiff SILTY CLAY. Max. clast diam. 72 mm.

Site 273 Hole A Core 29 Cored Interval: 337-346.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
?LOWER MIOCENE					1	0.5	VOID			Dark greenish-gray to olive black semi-lithified gritty-looking SILTY CLAY with pebbles. No bedding visible. Density of pebbles 1-2%, max. size pebbles >50 mm, av. pebbles size = 16 mm.
						1.0			* *	65% clay, 35% silt 98%, TR sand, 2% diatoms
					2		D		*	75% clay, 25% silt 99%, TR sand, 1% diatoms; clast-silty limestone
							DM, M		*	60% clay, 39% silt 98%, 1% sand, 2% diatoms, TR micarb. Pebble density <1%, max. pebble size 9 mm.
					Core Catcher					

Explanatory notes in Chapter 1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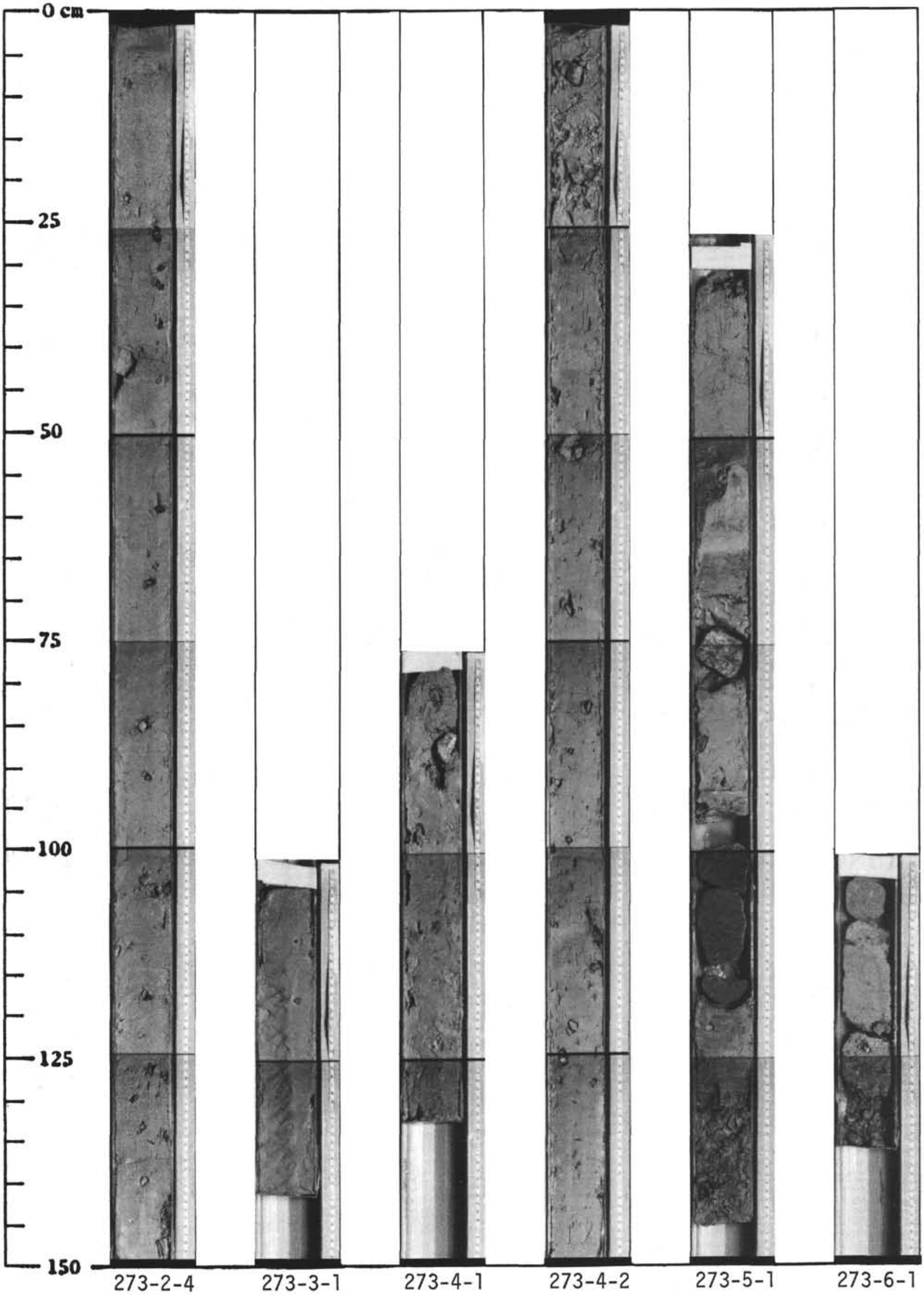
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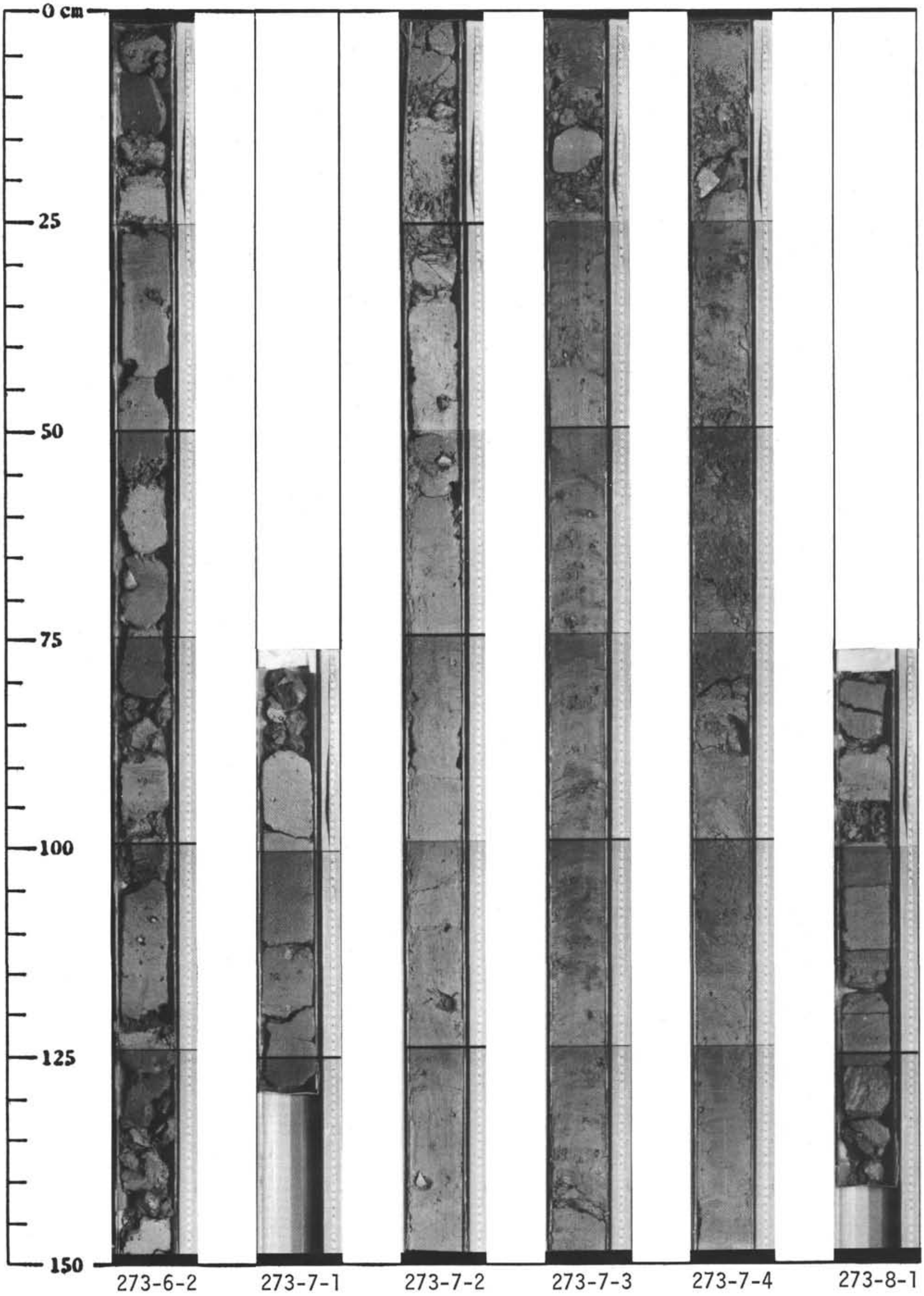
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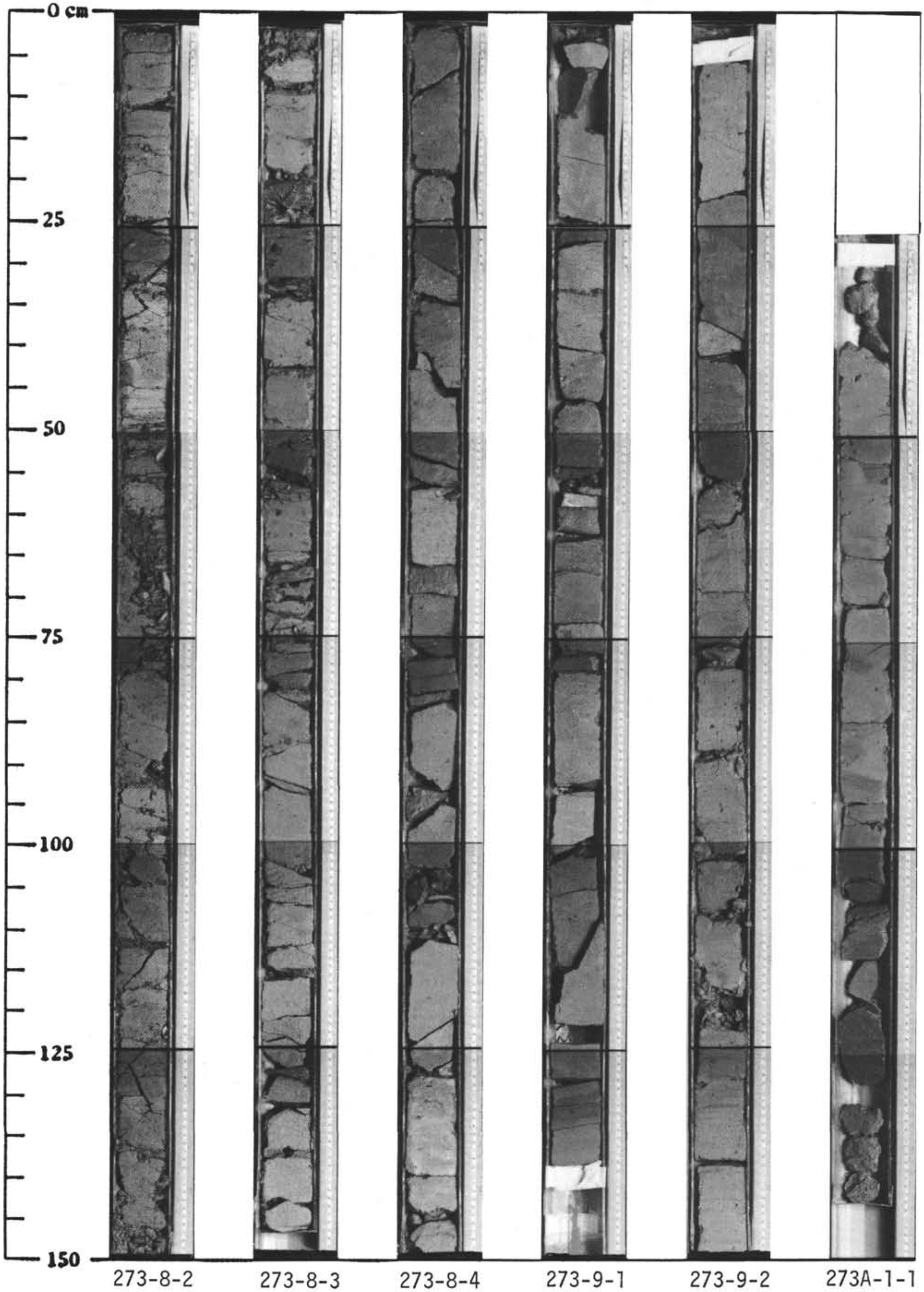
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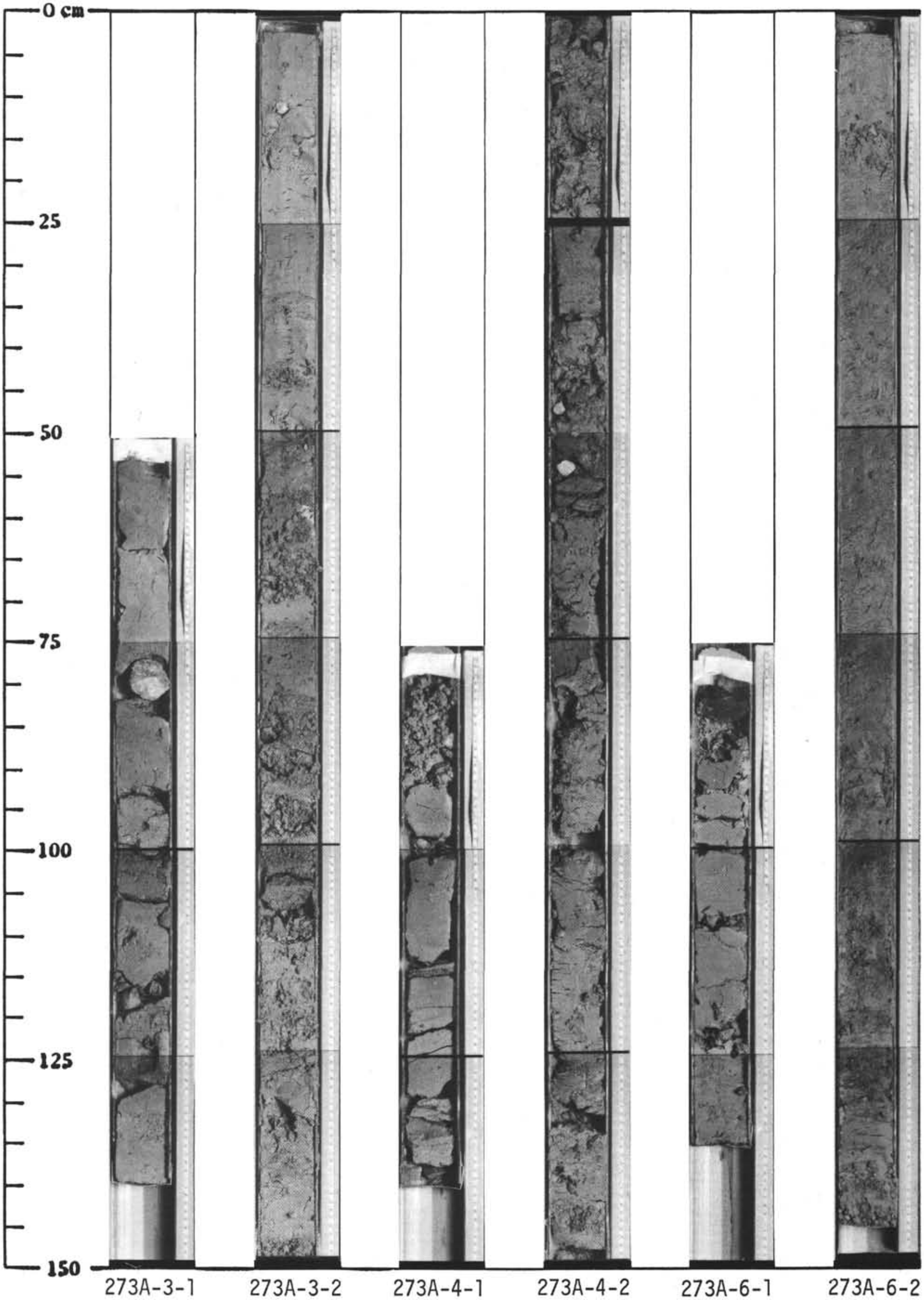
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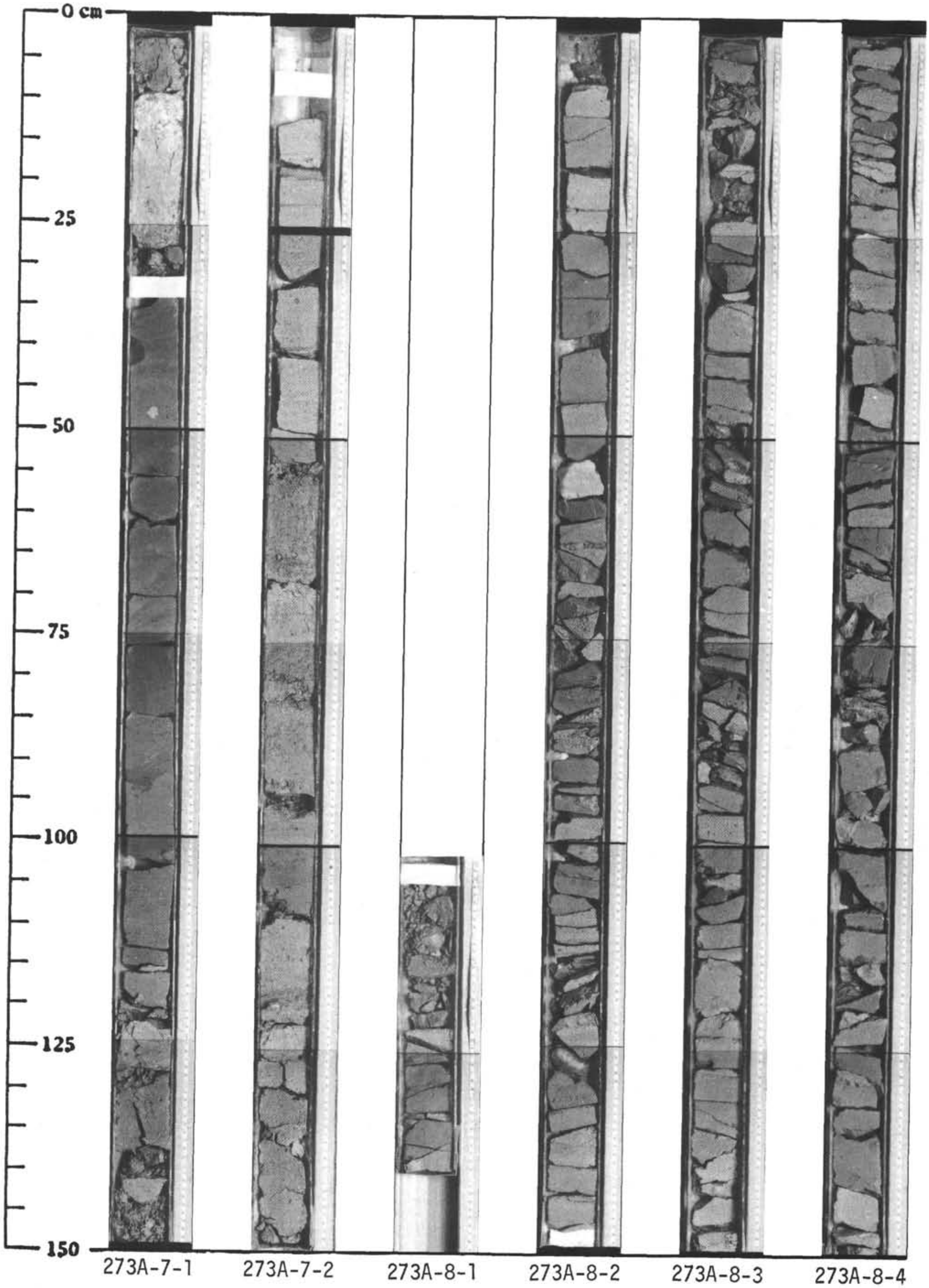

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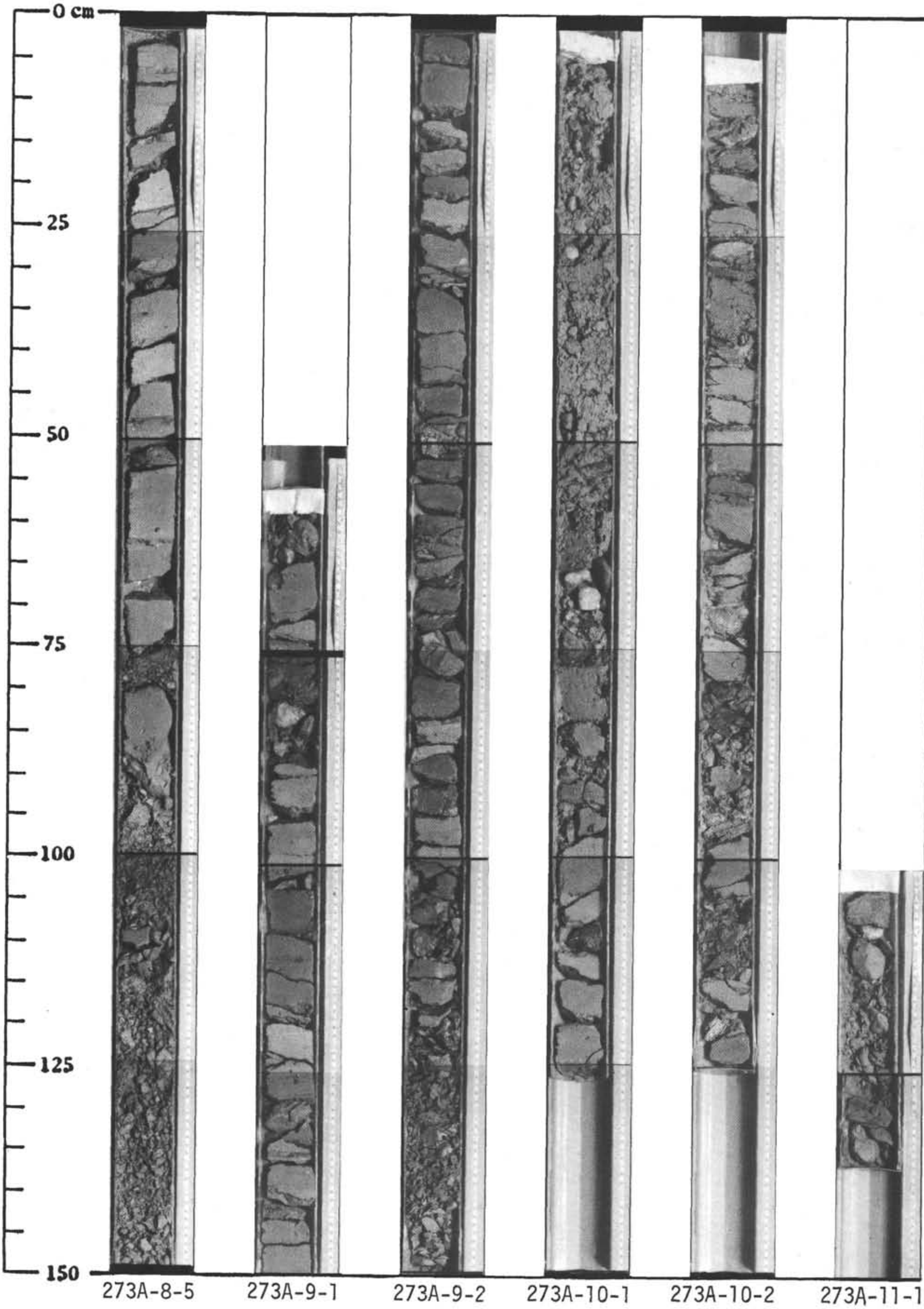
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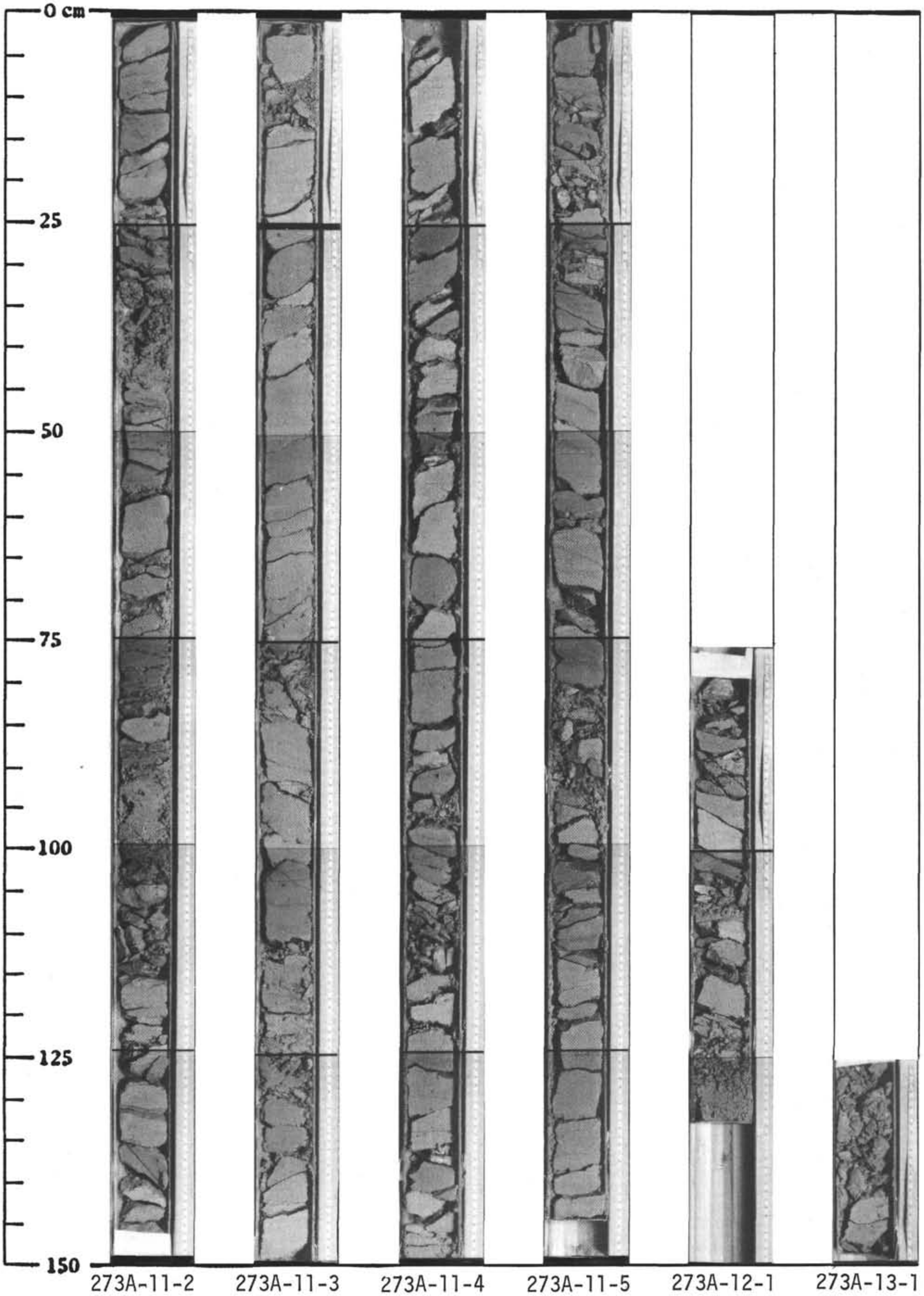
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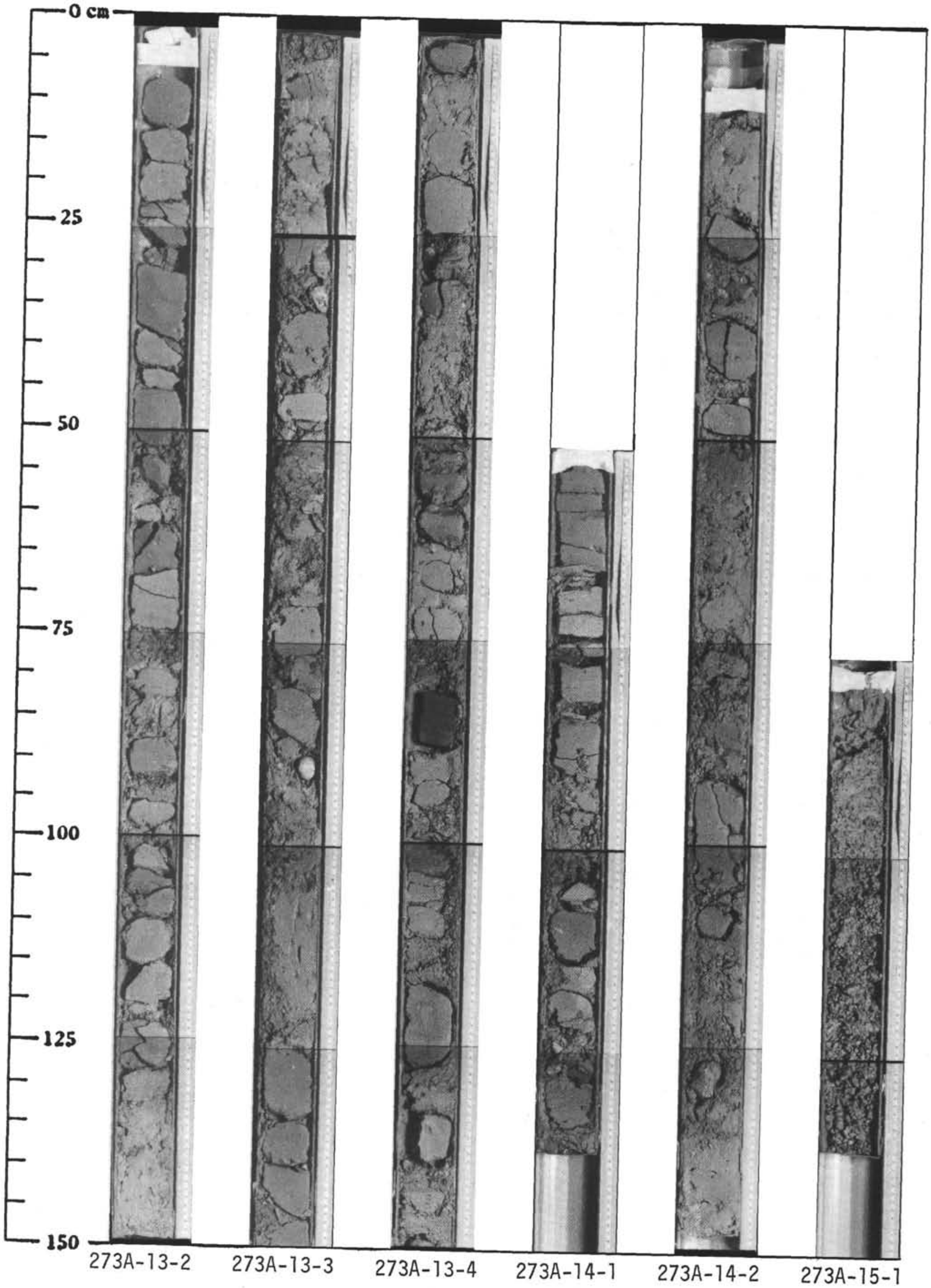
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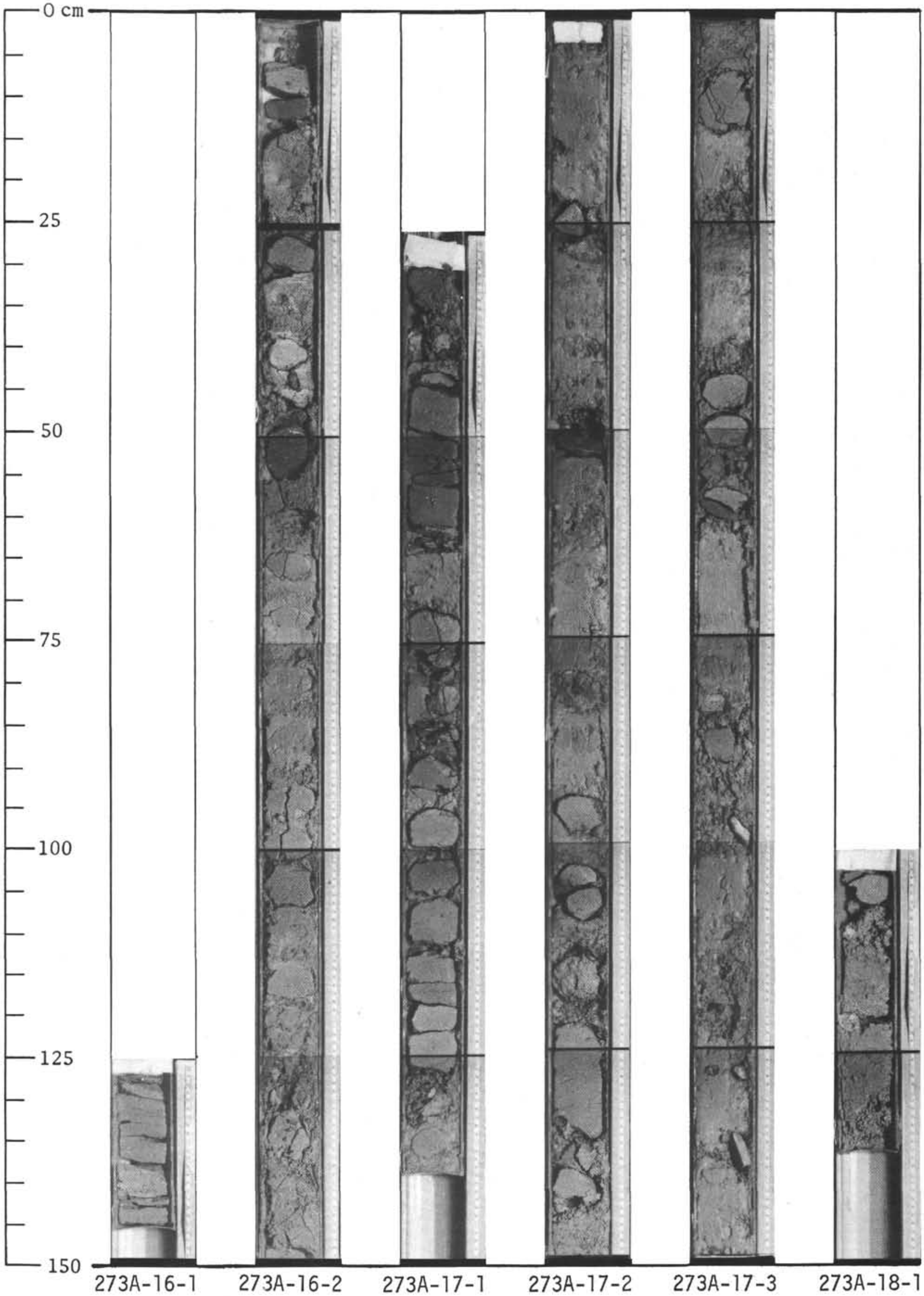
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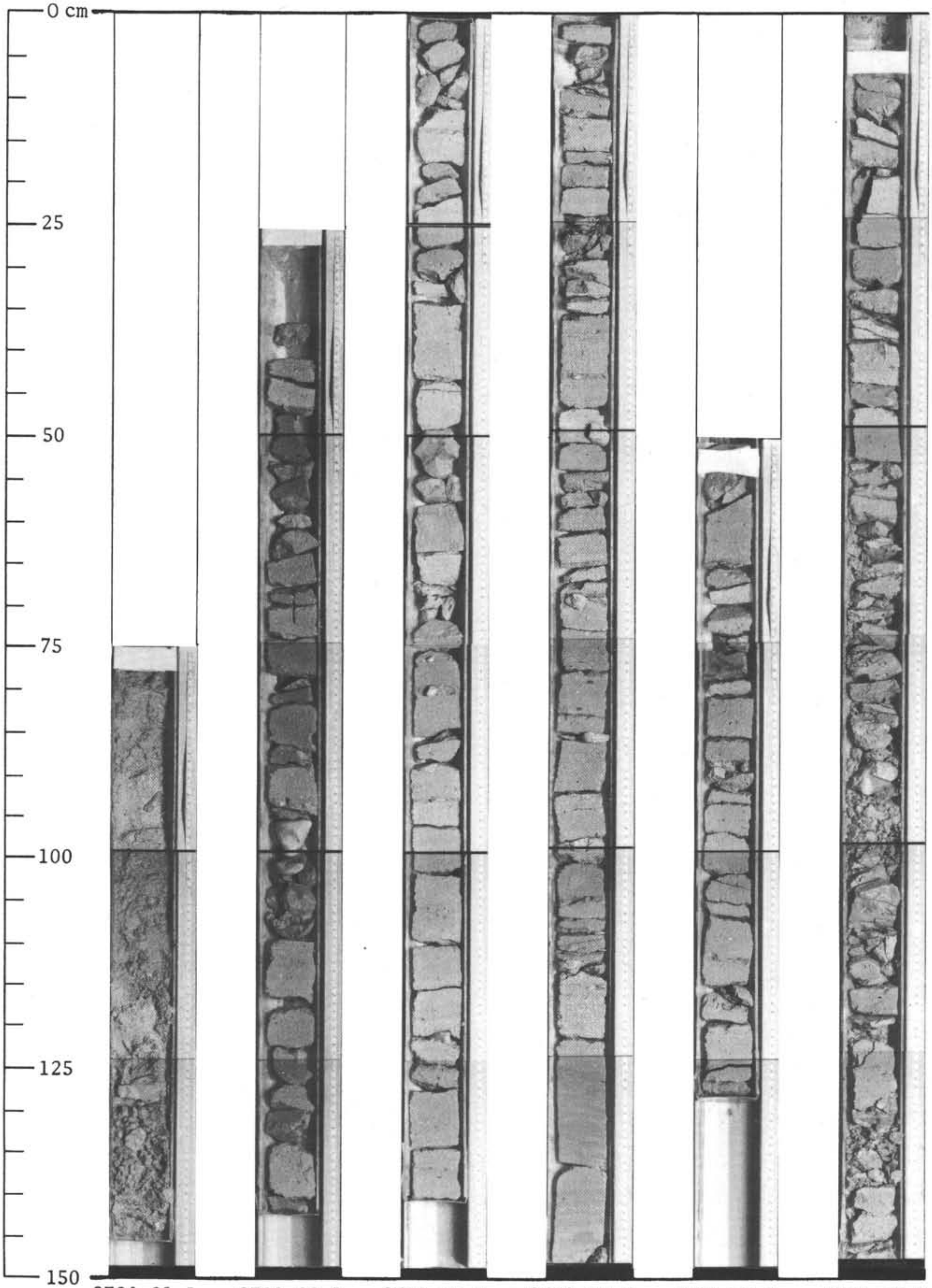

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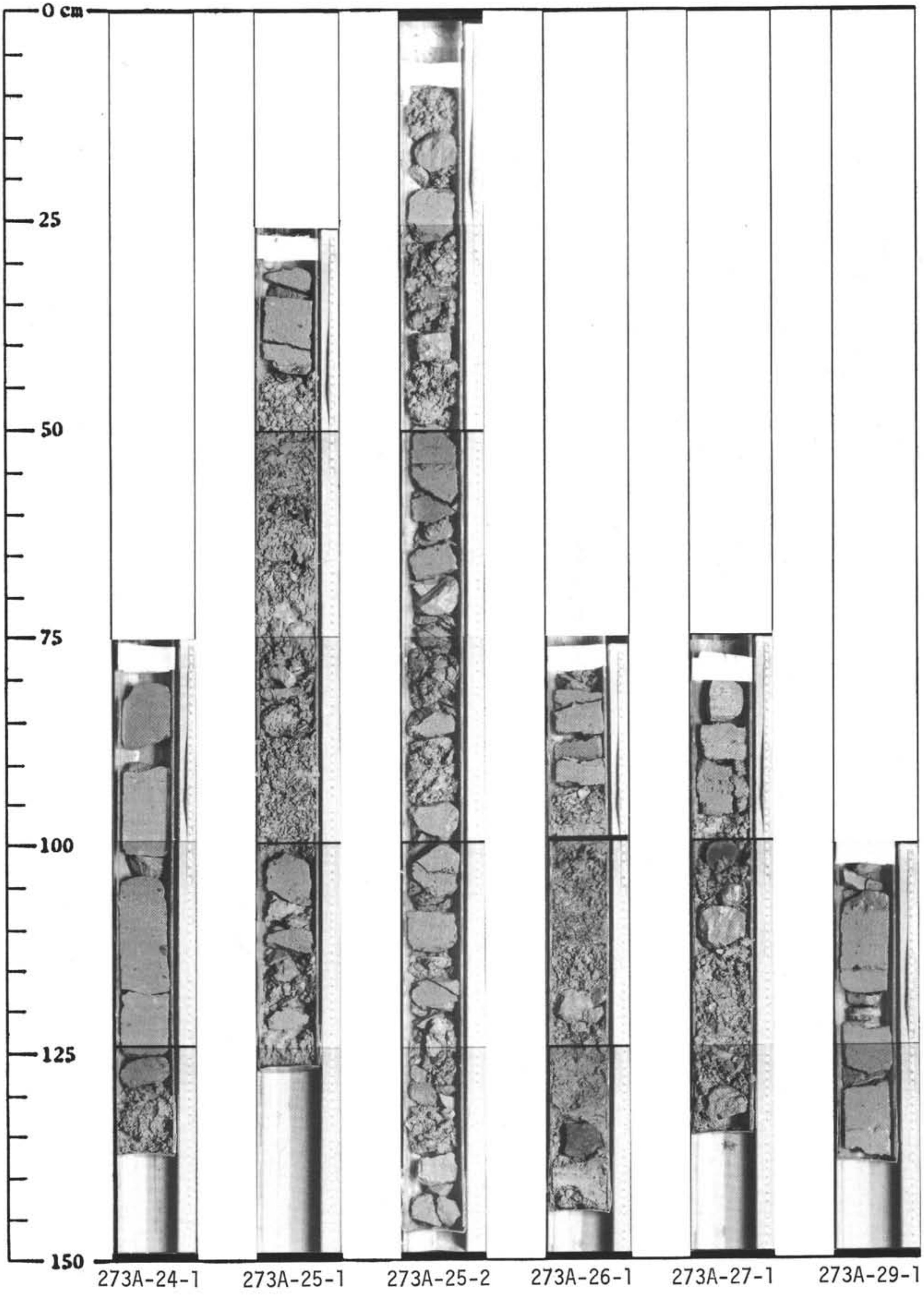
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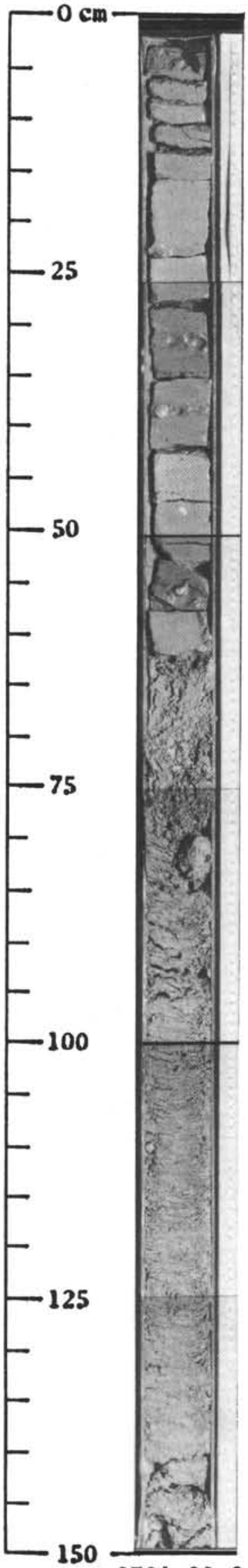

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