9. SITE 218

The Shipboard Scientific Party[1]

ABSTRACT

Situated in the central Bengal Fan in 3749 meters of water, Site 218 was drilled to 773 meters in a turbidite sedimentary sequence. The stratigraphic column, which was only partly penetrated, comprises several sedimentary units which include silts, sandy silts, and clayey silts, interbedded with nannofossil ooze layers. These range in age from Quaternary down to middle Miocene at the bottom of the hole. On the basis of dominant grain sizes of the terrigenous sediments and the distribution of pelagic material, four distinct "pulses" of turbidity current activity resulting in coarse sediments are tentatively recognized. One of these occurs in the middle Miocene, two in the upper Miocene-lower Pliocene, and one in the Pleistocene. The youngest "pulse" is overlain by several meters of pelagic ooze, suggesting postglacial cessation of turbidity current activity in the area of the site.

SITE DATA

Date Occupied: 1 Mar 72 (1030)

Date Departed: 4 Mar 72 (1030)

Time on Site: 72 hours

Position:
lat 08°00.42′N
long 86°16.97′E

Water Depth (to rig floor);
3737 meters (Echo sounding)
3759 meters (Drill pipe)

Penetration: 773 meters

Number of Holes: 1

Number of Cores: 27

Total Length of Cored Section: 251 meters

Total Core Recovered: 59.4 meters

Acoustic Basement:
Depth: ? meters
Nature: Unknown

Age of Oldest Sediment: Middle Miocene

Basement: Not reached

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BACKGROUND AND OBJECTIVES

This site was chosen on the basis of Curray and Moore's (1971) identification of two prominent unconformities between the sediment units of the Bengal Fan, which were called W, Y, and O, in order of increasing age. These unconformities were interpreted in the authors' working hypothesis as being associated with the last two epochs of major Himalayan orogeny in the Plio-Pleistocene and Middle Miocene. Correlation of unconformities led the authors to believe that the Y section was uplifted and outcropped both on the northern end of the Ninetyeast Ridge and on a small knoll just south of Site 218. The continuous chalk section at Site 217 is clearly not a Bengal Fan turbidite, and the similarity between it and the acoustic records from the knoll suggested that the sediments from the knoll could also have been a continuous calcareous pelagic sequence. This possibility could be tested by following the original proposal to sample the upper W section through the upper unconformity and drill as deeply as possible.

The depth of the sediment was estimated at 3.5 to 4.0 kms from seismic refraction profiles. This and a basement age of 80 m.y. give an estimate of 50 m/m.y. for a uniform sedimentation rate. A realistic estimate of the maximum possible depth of drilling was 1000 m. It was hoped that we would be able to sample part or all of the products of the Neogene denudation of the Himalayas.

OPERATIONS

Site 218 was drilled in a turbidite sequence on the Bengal Fan, in a water depth of 3759 meters (drill pipe to rig floor). The site was occupied on 1 Mar 1972 at 1030 hours.

A Smith, 4-cone chizzel-tooth bit was used, and three cores were taken continuously at the top in medium-grained silty sands. From a sediment depth of 23 meters, one core was taken for every 28.5 meters of drilling down to 450 meters. Continuous coring was carried out between 450 meters and 507 meters, after which spot coring every 28.5 meters was again employed to the bottom of the hole at 773 meters.

No serious drilling difficulties were encountered, despite the fact that the hole was drilled through a major turbidite sequence. The clay and silt content of the sands and the clayey and pelagic ooze and chalk interbeds apparently supported the hole.

Drilling was terminated at a sediment depth of 773 meters within the turbidite sequence due to shortage of time. A total of 251 meters of sediment was cored, with a recovery of 59.4 meters, representing 24% recovery (Table 1).

LITHOLOGIC SUMMARY

The stratigraphic section penetrated at Site 218 consists principally of a turbidite sequence of interbedded and interlaminated sandy silt, clean silt, and clayey silt ranging in age from Quaternary to middle Miocene (Figure 2). Relatively minor amounts of silty sand and silty clay were found. Near the surface and at several depth intervals, pelagic nannofossil ooze occurs interbedded with the turbidites.

Because of the discontinuity of coring, poor recovery, and general similarity of the sediments throughout much of the hole, no well-defined lithologic units are distinguishable. A textural zonation of possible significance is apparent in the section, however, when various sediment types are grouped as follows and their distribution plotted as a function of depth: (1) Silty sand, sandy silt, and clean silt; (2) Silty clay and clayey silt; and (3) Pelagic sediment, principally clay-rich nannofossil ooze. The percentage, based on thickness, of each of these groups in each core was determined in very rudimentary fashion and plotted at depths corresponding to the midpoints of appropriate cores (Figure 2). The textural plot indicates that the section is divided into several zones of relatively coarse terrigenous sediments (identified as "pulses") which are separated by zones of finer terrigenous sediments interbedded with pelagic oozes. General lithologic units based primarily on this zonation are outlined and discussed below. Interpretation of the zones is discussed in the Summary and Conclusions.

Unit 1 (Cores 1, 2)

This unit consists principally of olive gray to dark greenish gray, silt-clay-rich nannofossil ooze. Nannofossils constitute from 40% to 70% of the sediment, while terrigenous silt and clay typically average 10% to 20%. Other common constituents include foraminifera, Radiolaria, and diatoms. Interbeds of olive gray nannofossil-bearing clayey silt up to 1 meter thick occur in the section.

Unit 2 (Cores 2-4)

Olive gray nannofossil-bearing clayey silt with graded interbeds of silty sand and sandy silt characterize the upper parts of Unit 2. Lower in the unit (Cores 3 and 4), clean, dark gray silt with sandy silt laminations predominates. Occasional mottles (clasts?) of clay-rich nannofossil ooze occur in one 70-cm silt bed. The principal mineral constituents of the silts and sandy silts include feldspar and quartz (50%-75%), undifferentiated clay (10%-25%), mica (5%-15%), calcite (1%-3%), and heavy minerals (1%-5%). Particularly common among the heavy minerals are hornblende, epidote, opaques, garnet, pyroxene, and tourmaline (see Chapter 38). The prevalent sand size is either very fine or fine, but ranges up to medium.

Unit	Depth Below Sea Floor (m)	Lithology	Age	Cores
1	0-9	Clay silt-rich nanno ooze with interbeds of silty clay	Quaternary	1,2
2	9-70	Silt with interbeds of sand, sandy silt, and clayey silt	Quaternary	2,4
3	70-225	Nanno-rich clayey silt and silty clay with interbeds of nanno ooze	Quaternary-Pliocene	5-9
4	225-350	Silt with interbeds of silty sand and clayey silt	Pliocene-upper Miocene	9-12
5	350-470	Clayey silt and silty clay with occasional interbeds of nanno ooze and sandy silt	Upper Miocene	13-16
6	470-600	Interlaminated clean silt, clayey silt, and sandy silt with occasional interbeds of mottled nanno ooze	Upper Miocene	17-22
7	600-650(?)	Interlaminated clayey silt, silty clay, and sandy silt with interbeds of nanno ooze	Upper Miocene	23,24
8	650-773	Interlaminated clean silt, sandy silt, and clayey silt	Middle Miocene	24-27

Units 3, 5, 7 (Cores 5-9, 13-16, 23, 24)

These are relatively fine-grained units (see Figure 1) in which the predominant lithologies are olive gray to dark gray clayey silt and gray silty clay. Both lithologies, which most commonly occur in beds the order of 30 to 70 cm thick, contain thin (generally <10 cm) graded beds of sandy silt and clean silt. Occasional interbeds of greenish gray to yellow green clay bearing nannofossil ooze occur interstratified in these sections. The ooze layers, which range in thickness from 10 to 50 cm, commonly show lithologic mottling and disturbed lamination resulting from extensive burrowing. Nannofossil content ranges from 50% to 90% in the ooze layers with undifferentiated clay (10%-50%), Radiolaria (2%-7%), foraminifera (1%-5%), diatoms (0%-3%), and terrigenous silt (1%-5%) comprising the remainder.

TABLE 1
Coring Summary, Hole 218

Core	Date (Mar)	Time	Depth from Drill Floor (m)	Depth Below Sea Floor (m)	Cored (m)	Recovered (m)	Recovery (%)
1	1	1930	3759.0-3763.0	0-4.0	4.0	1.5	37
2	1	2040	3763.0-3772.5	4.0-13.5	9.5	8.1	85
3	1	2200	3772.5-3782.0	13.5-23.0	9.5	2.4	25
4	1	2345	3800.5-3810.0	41.5-51.0	9.5	2.3	24
5	2	0140	3829.0-3838.5	70.0-79.5	9.5	4.2	44
6	2	0325	3867.0-3876.5	108.0-117.5	9.5	2.0	21
7	2	0519	3905.0-3914.5	146.0-155.5	9.5	0.1	1
8	2	0726	3943.0-3952.5	184.0-193.5	9.5	4.2	44
9	2	0915	3981.0-3990.5	222.0-231.5	9.5	0.6	6
10	2	1115	4019.0-4028.5	260.0-269.5	9.5	0.9	10
11	2	1314	4057.0-4066.5	298.0-307.5	9.5	1.8	19
12	2	1525	4095.0-4104.5	336.0-345.5	9.5	0.3	3
13	2	1735	4133.0-4142.5	374.0-383.5	9.5	2.4	25
14	2	2005	4171.0-4180.5	412.0-421.5	9.5	0.8	8
15	2	2215	4209.0-4218.5	450.0-459.5	9.5	1.3	14
16	2	2334	4218.5-4228.0	459.5-469.0	9.5	1.8	19
17	3	0106	4228.0-4237.5	469.0-478.5	9.5	3.3	35
18	3	0221	4237.5-4247.0	478.5-488.0	9.5	1.1	12
19	3	0336	4247.0-4256.5	488.0-497.5	9.5	2.0	21
20	3	0446	4256.5-4266.0	497.5-507.0	9.5	1.2	13
21	3	0730	4294.5-4304.0	535.5-545.0	9.5	2.9	30
22	3	1005	4332.5-4342.0	573.5-583.0	9.5	2.9	30
23	3	1235	4370.5-4380.0	611.5-621.0	9.5	3.0	31
24	3	1513	4408.5-4418.0	649.5-659.0	9.5	2.1	22
25	3	1730	4446.5-4456.0	687.5-697.0	9.5	1.7	18
26	3	2230	4484.5-4494.0	725.5-735.0	9.5	2.2	23
27	4	0120	4522.5-4532.0	763.5-773.0	9.5	2.3	24
Totals					251.0	59.4	24

Note: Echo sounding depth (to drill floor) = 3737 meters; drill pipe length to bottom = 3759 meters.

Units 4, 6, 8 (Cores 9-12, 17-22, 24-27)

These units differ from the previous (Units 3, 5, 7) primarily in their greater abundance of clean silt and sandy silt layers and the relative paucity of nannofossil ooze. Unit 4 is characterized by successive beds of clean silt, sandy silt and silty, very fine sand the order of 20 to 60 cm thick. Grading is apparent in some beds, but others appear homogeneous. The minor layers of silty clay and clayey silt which occur in this unit commonly contain thin clean silt laminations. Units 6 and 8 differ from the above in that lamination becomes typical. Layers (beds?) up to 40 cm thick which are predominantly either clean silt or sandy silt are apparent; however, these almost invariably exhibit laminations of sandy silt, silt, clayey silt, and silty clay at scales ranging from a few millimeters up to several centimeters. Grading still is apparent in many of the beds, superimposed on the lamination. In terms of composition, the silts and sands appear similar to those of Unit 2; quartz and feldspar predominate (80% to 90%), with mica, calcite, heavy minerals, and rock fragments constituting most of the remainder.

General Observations on Sedimentary Textures and Structures

In the upper section (down to about Core 12) the silty sand and sandy silt beds are thicker than below (up to 50 cm), poorly sorted, and show clear grading. The silt-sized grains are usually angular, but some sand grains are subrounded. In places (e.g., Core 10) some of these graded beds have sharp lower and upper contacts, suggesting some erosion of earlier beds prior to or during the deposition of younger beds. Some sandy silt and clayey silt laminations were seen, but their distribution is sporadic.

In the middle section (Cores 13 to 19) the sandy beds become thinner. Interbeds are commonly only 5 cm thick, and in some instances sandy silt laminae less than 1 cm

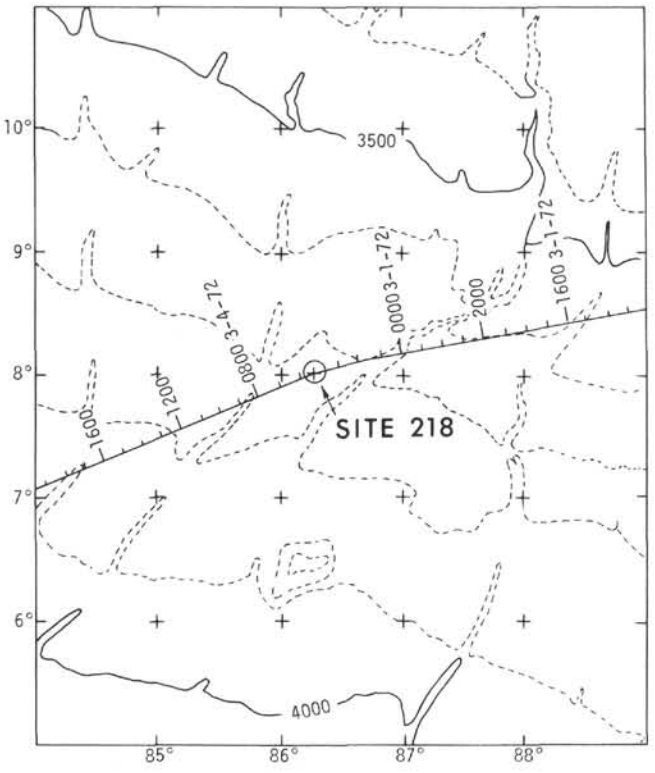


Figure 1. *Bathymetry in vicinity of Site 218.*

thick begin to appear with a certain regularity. Some well-sorted thin silt laminae also appear. The most distinctive feature of this section is the presence of semi-indurated pelagic beds of nannofossil chalk, e.g., a 65-cm-thick bed in Core 18 and a 40-cm-thick one in Core 19. These chalks show an intense degree of burrowing and mixing activity by bottom dwelling organisms. The following structures are present in abundance: burrows, mottling, worm tubes, and faecal pellets. Also present, but far less commonly, were structures of a nonorganic origin such as lamination and in two places minor folding. Rare sediment intraclasts were also seen in this middle section.

The lower section (Cores 20 to 27) is distinguished by its well-developed cyclicity of sedimentary features. Somewhat thinner (<15 cm) and finer-grained graded sandy silt beds occur with regularity. Some laminae of clean silt occur both singly and as multiples up to 2 cm thick. A few zones of cross-lamination of this silt were also observed. The remainder of the interval is typically clayey silt. However, one of the most characteristic features of this section is the occurrence of darker laminae (<1 mm thick) of more clay-rich silt (extremely fine grained) at regular intervals with an average spacing of about 2 cm. This clear pattern is superimposed on all other gross sedimentary structures—even throughout graded sandy silt beds!

CHEMICAL PROPERTIES

Twenty samples were collected and squeezed for interstitial water at this site. This hole was the deepest penetration into the sediment on Leg 22, and these samples provide excellent coverage from 4 to 773 meters. While recoveries were comparatively low, 10-cm minicores were

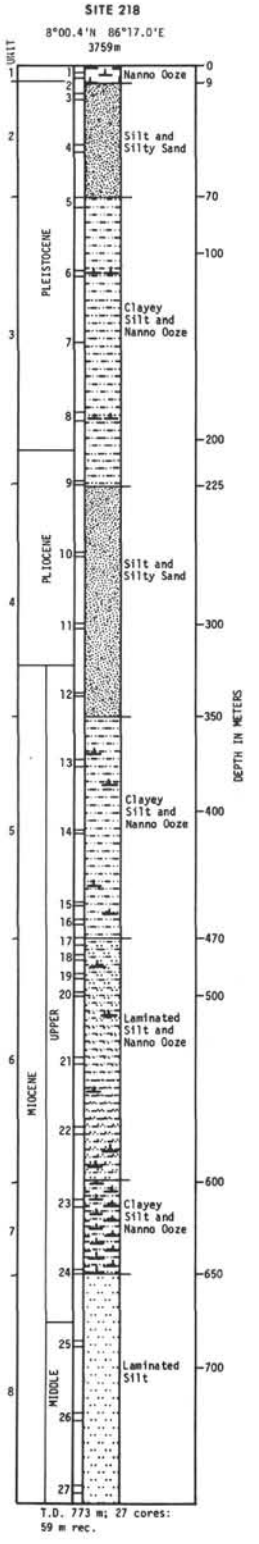


Figure 2. *Lithologic units at Site 217.*

obtained in most instances. In the other cases smaller portions were obtained either by removing loose lumps from the top of the first section or by obtaining some of the sediment removed from the core catcher. Four samples from Cores 2, 3, 5, and 11 were soft enough to permit punch-in pH measurements. Eighteen 20-cm minicores were

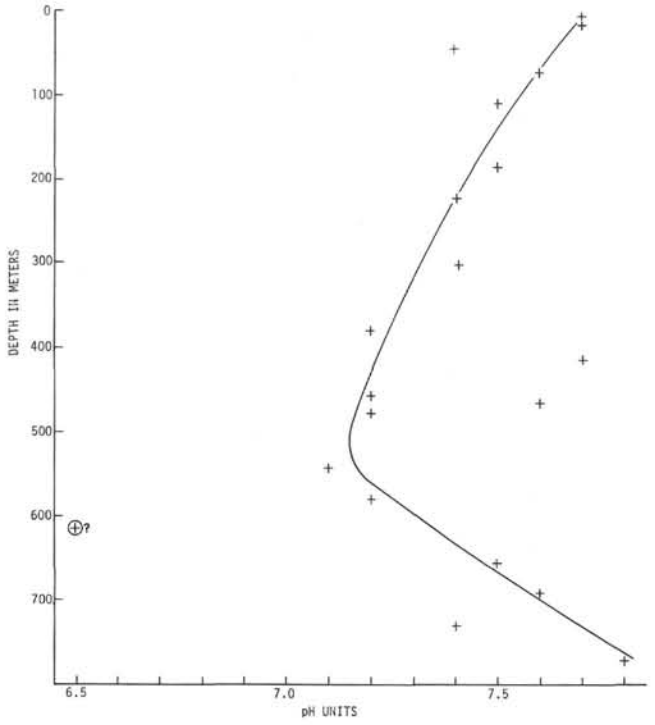


Figure 3. *Pore water pH data.*

taken and frozen for the organic geochemistry program. Samples for this program were obtained from every core having a recovery of one section or more (150 cm).

All four punch-in measurements were made on minicores which were precooled in an ice bath and allowed to warm to room temperature. Special care was taken in making flow-through pH measurements to wait until a constant value was reached for both pore water samples and buffers. In some instances, 20 to 30 minutes were required. Temperature coefficients and pH value, obtained by both methods and corrected to pore water temperatures, are given below:

Sample	Slope mv/°C	pH (punch-in)	pH (flow-through)	Temperature
218-2-4	0.88	7.25	7.97	24.0
218-3-2	0.68	7.44	7.91	26.0
218-5-2	1.29	7.17	7.79	26.2
218-11-2	1.57	7.12	7.60	25.0

Pore water pH values (Figure 3), with a few exceptions, appear to be systematically decreasing with depth to ~500 meters, then increasing between 500 and 773 meters (maximum depth). The most notable departure is the pH 6.5 recorded for the ~615-meter depth. A cursory inspection of the lithologic description for this core provided no clues to this behavior. Possibly, this is an artifact of sample handling as it was necessary to squeeze this sediment an unusually long time. However, a loss of CO_2 resulting in a higher pH would seem more likely if squeezing had altered the sample.

BIOSTRATIGRAPHIC SUMMARY

General

The sediments drilled at Site 218 are entirely of Neogene age ranging from the late Pleistocene-Holocene *Emiliania huxleyi* Zone to the middle Miocene *Catinaster coalitus* Zone at the base of Core 26. Datable calcareous fossils, either nannofossils or foraminifera or both, were recovered from all cores. Radiolaria were recovered only in Core 1. The sediments consist chiefly of detrital material and this has diluted the normal pelagic constituents throughout most of the section, although a large proportion of pelagic constituents in some part of the section indicates that for certain short periods pelagic sedimentation dominated. The preservation is uneven, generally poorest in coarser sediments, and best in layers of pelagic ooze or fine detrital sediments.

Foraminifera

The foraminiferal content of core-catcher samples varied markedly through the section, and the main factor controlling this variation presumably is the sampling position within a turbidite-pelagic unit. Also, however, there is evidence of transport and redeposition. Shallow water benthonics (*Ammonia beccarii, Pseudorotalia* aff. *schroeteriana, Elphidium*) are found sporadically and always rarely down to Core 27. Deeper water benthonics give no evidence on this point. The distribution and numbers of planktonic specimens indicate mixing. Thus, in the relatively rich assemblages in Core 1 (1, 24-26 cm; CC) the robust, keeled *Globorotalia* are strongly corroded or even eaten away except for the keel, whereas some of the more delicate tests are preserved quite well; there are also staining and other preservational clues to allochthonous derivation. More obvious mixing is seen in the presence of early Tertiary planktonic species in Cores 8 and 9. In the numerous core-catcher samples where only scattered specimens occur, it can be assumed that they are redeposited and that any age is maximum rather than actual.

Core 1: Zone N.23, late Quaternary.

Cores 2 to 7: Evidence for Zone N.23.

Core 8: Pliocene species present, but taken as Pleistocene on rare, early *G. truncatulinoides.*

Core 9: Paleocene species.

Core 10: Pliocene; Core 11: Zone N.19 or N.20, Pliocene.

Core 12: ?; Core 13: upper Miocene.

Core 14: Core catcher, no planktonics; extended barrel, upper Miocene "pelagic," probably Zone N.16.

Core 15: No useful data; Core 16: Zone N.16, upper Miocene.

Cores 17 to 27: Planktonics rare to absent, of Miocene aspect. A maximum age of middle Miocene (Zone N.13) for Core 26.

Nannofossils

Some calcareous nannofossils were recovered from throughout the interval cored at Site 218, and these indicate an age range from the late Pleistocene-Holocene at

the top of the section to late middle Miocene at the bottom.

The Pleistocene extends from Cores 1 through 8. Core 9 yielded only a few reworked Tertiary forms, and Core 10 contains early Pliocene species. The early Pliocene assemblage continues through Core 11, but Core 12 is assignable to the late Miocene. The late Miocene continues through Core 23 possibly Core 24 (the latter yielded no age diagnostic nannofossils). The section terminates in the late middle Miocene with Cores 25 through 27.

The nannofossil assemblages are generally sparse, except in pockets or isolated layers where small amounts of ooze were recovered. The preservation in general is not very good, most specimens being not more than large fragments. Reworked Tertiary and Cretaceous specimens are not uncommon but do by no means dominate the nannofossil assemblages, and, consequently, the age determinations made on nannofossils at this site can be considered quite reliable.

Radiolaria

Radiolaria at Site 218 are common and well preserved only in the topmost part of Core 1 (Sample 218-1-1, 24-26 cm). This sample contains well-preserved specimens of *Theocorythium trachelium, Euchitonia elegans, Pterocanium praetexum, Amphirhopalum ypsilon, Collosphaera tuberosa*, and *Ommatartus tetrathalamus*, indicating a Quaternary age. Within Core 1 there is a transition from pelagic, mostly biogenous material near the top of the core to terrigenous debris at the base. This transition may coincide approximately with the Holocene/Pleistocene boundary, corresponding to a transition from predominantly turbidite deposition to predominantly pelagic deposition. At the base of Core 1 (Sample 218-1, CC) a few Quaternary Radiolaria are present, but the degree of preservation has declined markedly. Below Core 1 there are scattered light-colored, carbonate-rich layers within a predominantly turbidite unit. Radiolaria are absent in all samples obtained from the turbidite, and a few poorly preserved radiolarian fragments are present in some samples (e.g., 218-18-1, 60-62 cm) from the carbonate-rich layers. These fragments are insufficient in number and in preservation for age assignments.

CORRELATION OF REFLECTION PROFILE AND STRATIGRAPHIC COLUMN

Site 218 is situated in a typically flat area in the central Bengal Fan in a water depth of 3749 meters. The site is situated between two large, leveed fan valleys, the nearest of which lies about 5 miles away.

The seismic reflection profile shows a unit at least 1 sec thick of parallel, closely spaced reflecting horizons which presumably represent turbidite sediments and interbedded pelagics (Figure 4). These reflectors become less distinct below 1 sec, but may extend down to 1.5 sec. A distinct reflector occurs at 1.5 sec, flat-lying below the region of the site, and onlapping a basement protuberance 20 miles to the northwest on the *Argo* CIRCE III seismic record.

Sediments recovered from the surface down to a total depth of 773 meters are dominantly turbidite sandy silts and clayey silts in graded beds up to 70 cm thick, interbedded with clay nannofossil ooze layers. No obvious correlations exist between these and reflectors in the seismic profile.

SUMMARY AND CONCLUSIONS

Situated in the central Bengal Abyssal Fan in 3749 meters of water, Site 218 was drilled in a turbidite sedimentary sequence. The actual drilling area is on a typically flat portion of the fan, approximately 18 km west of a major fan valley, where the seismic reflection profile of the area indicates a sedimentary sequence in excess of 2 sec thickness.

The stratigraphic column was mostly spot cored at about 20-meter intervals to a total depth of 773 meters. The entire sequence, ranging in age from upper Quaternary to middle Miocene is composed of interbedded clean silts, sandy silts, clayey silts, and silty clays of turbidite origin with occasional layers of clay-rich nannofossil ooze. This rules out the possibility that the section at this site could be pelagic as was encountered at Site 217. Discrete sedimentary units are not recognizable in most of the section; however, zones of relatively coarse terrigenous sediments appear to alternate with zones of relatively fine terrigenous materials interbedded with nannofossil ooze layers (Figure 5). These zones indicate pulsating turbidite deposition at the site. Four time intervals, one in the middle Miocene, two in the upper Miocene-lower Pliocene, and one in the Pleistocene, are characterized by relative abundance of coarse sediment and reflect periods of more intense turbidity current activity. These active periods were separated by lulls during which principally finer silts and clays were deposited. Terrigenous sedimentation rates were apparently lower at these times; hence, pelagic components formulate a significant proportion of the deposited sequence. Evidence of intense burrowing activity by bottom organisms is common in and near the pelagic segments of the cores, supporting the contention of lower depositional rates.

Variations in the frequency and intensity of turbidity currents to any one site such as this could be effected by at least three obvious mechanisms: (1) shifting of the main current action to channel systems at varying distances from the site; (2) climatic variations and associated sea-level changes which affect the rate of sediment input to submarine valleys feeding the fan; (3) tectonic activity in the Himalayas and attendant erosive output of the Ganges-Brahmaputra River system which feeds sediment to the fan from the north (Curray and Moore, 1971). Relating the apparent pulses shown in Figure 5 to the above mechanisms is perhaps premature considering the sparseness of the data; nevertheless, some speculation seems appropriate.

The uppermost Pleistocene pulse, wherein occur the sandiest and coarsest (up to medium sand) of the sediments drilled, seems most logically attributable to influx of terrigenous material during maximum glaciation and lowering of sea level in the late Pleistocene. Uplift and consequent increased erosion due to late Pliocene and Pleistocene orogeny in the Himalayas presumably aided in producing this intense turbidite phase as proposed by Curray and Moore (1971). Abrupt drop-off of turbidity

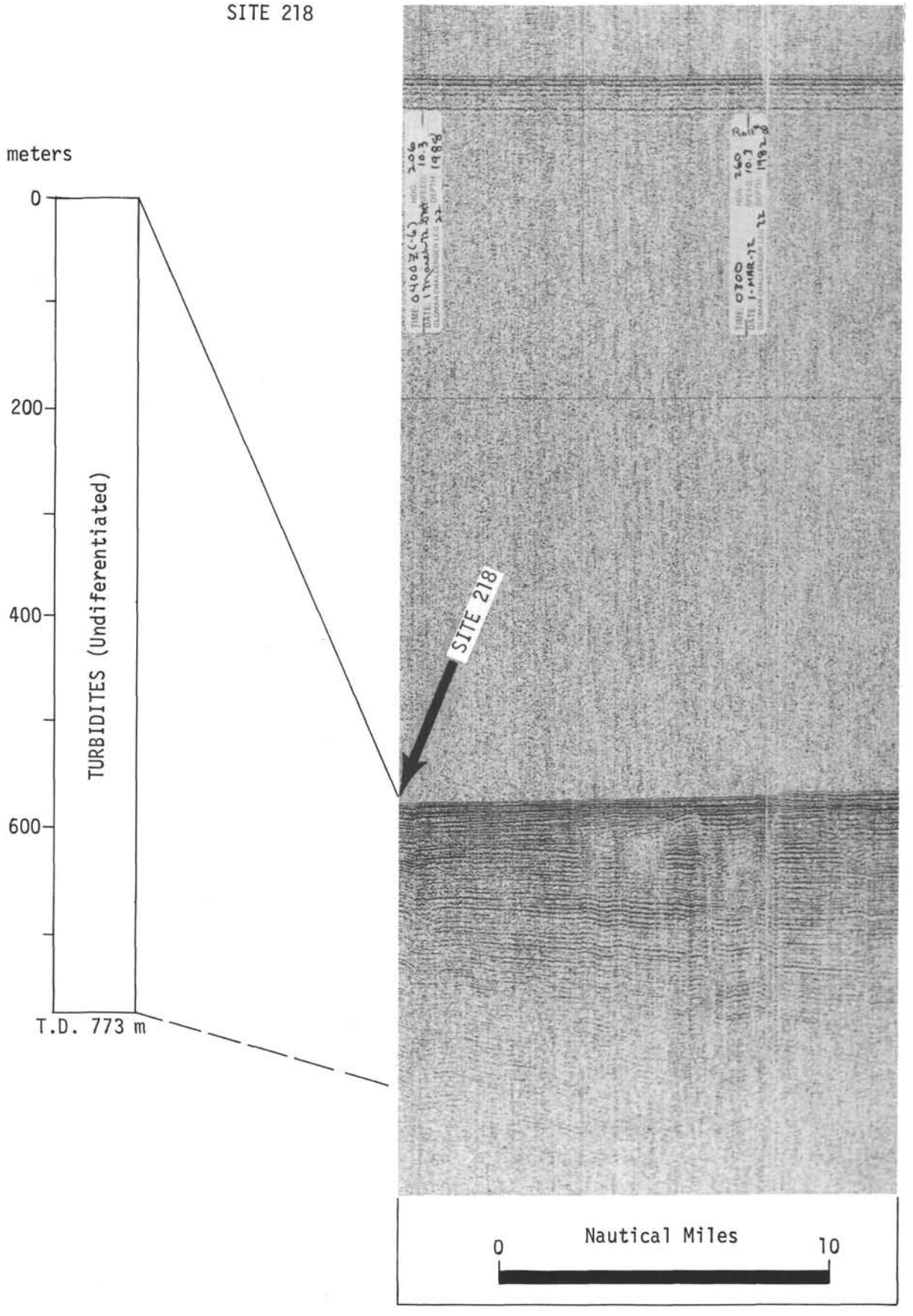


Figure 4. *Correlation of reflection profile and stratigraphic column at Site 218.*

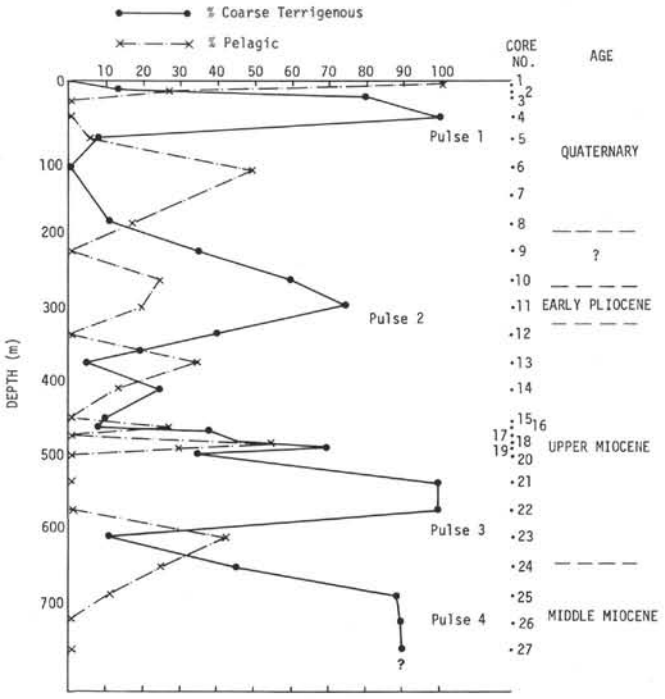


Figure 5. *Distribution of sediment types with depth.*

current activity, indicated by the predominance of nannofossil ooze in the upper 8 meters of the sediment column, probably relates primarily to deglaciation and submergence during the Holocene, but may also reflect shifting of maximum sediment dispersal to a more remote channel system.

Interpretation of the older pulses is more tenuous. The youngest of these may reflect late-Miocene orogeny in the Himalayas as suggested by Curray and Moore (1971), the older pulses being accounted for by the vagaries of the channel system.

Heavy minerals examined from Site 218 cores (Chapter 38) indicate derivation of these sediments from a complex acid igneous and metamorphic terrane and thus support the interpretation of Curray and Moore (1971) which stipulates the Himalayas as the principal source.

Stratigraphic equivalents to onlapped beds marking the upper unconformity of Curray and Moore (1971) were found to be late Miocene where sampled in Site 218. These strata lie near the base of a section of silt and silty sand (pulse number 2 of the series) which could reflect orogeny in the Himalayas coeval to that forming the mid fan upper unconformity.

REFERENCE

Curray, J. R. and Moore, D. G., 1971. Growth of the Bengal deep-sea fan and denudation in the Himalayas: Geol. Soc. Am., v. 82, p. 563-572.

Site 218 Hole Core 1 Cored Interval: 0-4.0 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	Emiliania huxleyi Zone	F R	C C	F G	1	0.5 1.0			20 100	gradational contact-burrowing **IRON OXIDE RICH NANNO OOZE** olive gray (5Y5/4) Nannos 64% Opaques (iron oxide) 11% Forams 7% Rads 5% Calcite 5% Feldspar 3% Other: 5% Diatoms Sponge spic. Silicoflag.
					2					dark greenish gray (5GY4/1) **CLAY SILT RICH NANNO OOZE** Nannos 67% Feldspar 11% Opaques 10% Undiff. clay 5% Carb. fragments 3% Forams 3% Other: 1% Diatoms Rads Sponge spic.
					3					Texture of TERRIGENOUS Sand 5% Silt 40% Clay 55%
		N F R	C C F	G F P	Core Catcher					

Explanatory notes in Chapter 1

Site 218 Hole Core 2 Cored Interval: 4-13.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	Gephyrocapsa oceanica Zone				1	0.5 1.0	EMPTY		100	dark olive gray (5Y3/2) light gray (5Y6/1) **CALCITE FORAM CLAY DIATOM RICH NANNO OOZE** Nannos 37% Siliceous biog. 23% Terrigenous 19% Forams 10% Calcite 10% Other 1%
					2				130 70 137 148	olive gray (5Y4/2) sand. lamin. light gray (5Y6/1) dark greenish gray (5G4/1) light olive gray (5Y6/2) light gray (5Y7/1) **SILT RICH NANNO OOZE** Nannos 78% Terrigenous 17% Calcite 3% Other: 2% Micronodules Forams Glass **CLAYEY SILT** Silt 70-80% Feldspar 60% Clay 20-30% Clay 25% Mica 5% Heavies 7% Other: 3% Calcite Chlorite
					3		EMPTY		40 55 113	interbedded light gray (5Y7/1) olive gray (5Y4/2) dark gray (5Y4/1) olive gray (5Y4/2) **FORAM CLAY RICH NANNO OOZE** Nannos 70% Clay 10% Forams 10% Other: 10% Calcite Rads Diatoms Sponge spic. Silicoflag.
					4		EMPTY		85	gradational olive gray (5Y4/2) Mainly **FORAM DIATOM CLAY RICH NANNO OOZE** with layers of less biogenous sections
					5		EMPTY		145	**CLAYEY SILT** **SILTY SAND** (graded) olive gray (5Y4/2) **CLAYEY SILT** Silt 65% Feldspar 59% Clay 35% Clay 30% Heavies 5% Nannos 3% Calcite 2% Other 1%
					6				100	dark olive gray (5Y3/2) olive gray (5Y4/2) dark olive gray olive gray (5Y4/2) **SANDY SILT** (graded) top bottom Sand 25% 40% Silt 60% 50% Clay 15% 10% Feldspar 78% Quartz 3% Rock Fragments 7% Heavies 5% Calcite 2% Mica 4% Other: 1% green balls! **CLAYEY SILT** Silt 55% Feldspar 50% Clay 45% Clay 39% Opaques 5% Calcite 3% Nannos 3%
		N F	R R	P	Core Catcher					

Explanatory notes in Chapter 1

Site 218 Hole Core 3 Cored Interval: 13.5-23.0 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	Gephyrocapsa oceanica Zone				1	0.5	EMPTY		74	dark gray (5Y4/1) — CLAYEY SILT: Silt 65%, Clay 35%
						1.0				
					2		EMPTY	?	133	dark olive gray (5Y3/2) — Sand 15%, Silt 75%, Clay 10%; SILT: Sand 10%, Silt 70%, Clay 20%; Feldspar 53-74%, Quartz 1-2%, Rock fragments Tr.-3%, Mica 2-6%, Clay 10-20%, Heavies 10-15%: Opaques, Hornblende, Epidote, Zircon, Sphene, Chlorite
									130	very dark gray (5Y3/1)
		F	R	P	Core Catcher					as above
		N	R							

Site 218 Hole Core 4 Cored Interval: 41.5-51.0 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	Gephyrocapsa oceanica Zone				1	0.5	EMPTY			mottles of CLAY RICH NANNO OOZE
						1.0			118	dark gray (5Y4/1) — Silt 90%, Clay 10%
					2		GEOCHEM SAMPLE		148	sandy silt laminations (very dark gray, 5Y3/1) — SILT (graded): Feldspar 70%, Quartz 1%, Mica 5%, Clay 8%, Calcite 3%, Heavies: 12%, Opaques 5%, Others 7%
									105	very dark gray (5Y3/1) — Sand 7%, Silt 83%, Clay 10%
		F	R	P	Core Catcher					dark gray (5Y4/2) laminations as above
		N	R							

Explanatory notes in Chapter 1

Site 218 Hole Core 5 Cored Interval: 70.0-79.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	Pseudoemiliania lacunosa Zone				1	0.5	EMPTY		53	very dark gray (5Y3/1) interlaminated very dark gray (5Y3/1) slightly SANDY CLAYEY SILT — SILTY SAND: Sand 55%, Silt 45%; Feldspar 66%, Mica 3%, Heavies 30%, Opaques 10%, Others: 20% (Zircon, Garnet, Tourmaline, Sphene, Epidote)
						1.0				
					2		GEOCHEM SAMPLE		100	dark gray (5Y4/1) CLAYEY SILT — NANNO RICH CLAYEY SILT: Silt 65%, Clay 35%; Feldspar 43%, Nannos 30%, Clay 15%, Heavies 5%, Calcite 4%, Other 3% (Quartz, Opaques)
					3				110	dark greenish gray (5GY4/1) — CHLORITE RICH SILT: mottles of (5G4/1) up to ~5% chlorite
										dark gray (5Y4/1) — NANNO RICH SILT: Silt 80%, Clay 20%
		F	R	P	Core Catcher				132	gray (5Y5/1) — NANNO OOZE: Nannos 76%, Rads 7%, Clay 7%, Diatoms 3%, Calcite 3%, Feldspar 2%, Sponge spic. 1%
		N	F	F						

Site 218 Hole Core 6 Cored Interval: 108.0-117.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	Pseudoemiliania lacunosa Zone				1	0.5	EMPTY			NANNO OOZE
						1.0			115	light gray (5Y6/1) — SILTY CLAY: Clay 69%, Heavies 10%, Calcite 10%, Nannos 7%, Others: 4% (Feldspar, Mica, Rads)
					2		GEOCHEM SAMPLE		144	dark gray (5Y4/1) very dark gray (5Y3/1) gray (5Y5/1) light gray (5Y6/1) very dark gray light gray (5Y6/1) olive gray (5Y4/2) — NANNO OOZE: Nannos 69%, Clay 6%, Forams 5%, Rads 3%, Calcite 15%, Others 2%
									93	
									140	
					Core Catcher				146	SILTY CLAY: Feldspar 30-35%, Clay 50-55%, Calcite 2-10%, Opaques 5%, Others: (Nannos, Forams, Heavies)

Explanatory notes in Chapter 1

Site 218 Hole Core 7 Cored Interval: 146.0-155.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE		F N	R F	P F	Core Catcher					Core Catcher sample very dark gray (5Y3/1) CLAYEY SILT Silt 70% Clay 30% Feldspar 80% Opaques 3% Heavies 7% Calcite 5% Others: 5% Quartz Mica Nannos Rads Sponge spic.

Site 218 Hole Core 8 Cored Interval: 184.0-193.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	Pseudoemiliania lacunosa Zone				1	0.5 1.0	EMPTY			CLAY RICH NANNO OOZE Nannos 57% Calcite 5% Clay 24% Forams 3% Rads 2% Heavies 5%
									110 very dark gray (5Y3/1) 130 gray (5Y4/1)	
					2				gray (5Y4/1) 80 very dark gray (5Y3/1) 110 120 light gray (5Y7/1) gray (5Y4/1)	CLAYEY SILT Feldspar 69% Clay 25% Calcite 2% Nannos 3% Forams 1% SILTY CLAY CLAY RICH NANNO OOZE
					3		GEOCHEM SAMPLE		92	SILTY ASH Glass (acidic-intermediate) 60% Feldspar 31% Calcite 3% Heavies 4% Mica 1% CLAYEY SILT
		F N	R R	P	Core Catcher					SILTY CLAY (dark gray 2.5YN4) with interbeds of SILT (lt. gray 5Y6/1)

Explanatory notes in Chapter 1

Site 218 Hole Core 9 Cored Interval: 222.0-231.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
?					1	0.5 1.0	EMPTY		110 dark gray (5Y4/1) 130 very dark gray (5Y3/1)	SANDY SILT Sand 40% Silt 50% Clay 2% Feldspar 84% Mica 7% Quartz 1% Calcite 3% Others: 5% Rock fragments Heavies Hornblende Zircon Epidote
		F N	R R	P	Core Catcher					CLAYEY SILT Finely laminated Silt 75% Clay 25% Feldspar 60% Clay 25% Opaques 8% Calcite 5% Heavies 2%

Site 218 Hole Core 10 Cored Interval: 260.0-269.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
EARLY PLIOCENE					1	0.5 1.0	EMPTY		73 dark gray 2.5YN4 76 gray (5Y5/1) 85 olive gray (5Y4/2) 118 dark gray (5Y4/2)	SILTY CLAY with laminations (<1 mm) of SILT (5Y6/1) Silt 35% Clay 65% Silt 97% Clay 3% SILTY NANNO OOZE Nannos 60% Silt and Clay 32% Calcite 5% Others 3%
		F N	R -	P -	Core Catcher		SILT ?			SILTY SAND Sand 70% Silt 25% Feldspar 87% Heavies 7% Mica 5% Calcite 1% Graded SAND → CLAYEY SILT contacts S sharp G gradational

Explanatory notes in Chapter 1

Site 218 Hole Core 11 Cored Interval: 298.0-307.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
EARLY PLIOCENE					1	0.5	EMPTY			SAND silty near top
						1.0				CLAYEY SAND gray (5Y5/1) ↑ olive gray (5Y4/1) dark gray (5Y4/1) SANDY SILT Silt 60% Feldspar 90% Sand 30% Heavies 5% Clay 10% Mica 2% Calcite 2% Micronodules 1%
					2		GEOCHEM SAMPLE		102	
									137	dark gray (2.5YN/4) gray (2.5Y5/1) NANNO OOZE Terrig. frac. Silt 60% Nannos 71% Clay 40% Feldspar 9% Forams 7% Clay 7% Calcite 2% Opaques 2% Others 2%
		F	R	P	Core Catcher		SILT ?			
		N	C	F						SANDY SILT with very fine sand laminae at base

Site 218 Hole Core 12 Cored Interval: 336.0-345.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE	Discoaster quinqueramus Zone				1	0.5	EMPTY			
						1.0			138	dark gray (2.5YN/4)
									141	↑ gray (5Y5/1)
		F	R	P	Core Catcher		SILT ?			
		N	F	F						SILTY SAND grading upward to CLAYEY SILT sandy silt Feldspar 78% Calcite 6% Mica 5% Heavies 5% Opaques 3% Chlorite 3%

Explanatory notes in Chapter 1

Site 218 Hole Core 13 Cored Interval: 374.0-383.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE	Discoaster quinqueramus				1	0.5	EMPTY		72	NANNO CLAY and CLAY RICH NANNO OOZE
						1.0			82	gray (5Y6/1) ↑ grading
									88	very dark gray (5Y3/1)
										CLAYEY SILT
									144	light gray (5Y6/1)
					2		GEOCHEM SAMPLE			NANNO CLAY with layers of nanno ooze and clayey silt Clay 50% Nannos 43% Calcite 5% Others: 2% Opaques Heavies Feldspar
									59	
									84	gray (5Y5/1)
									131	SANDY Sand 20% Silt 75% Clay 5%
		F	R	P	Core Catcher					NANNO OOZE grayish olive green (5GY3/2) Nannos 69% Clay 25% Calcite 6%
		N	F	F						(5Y5/1)
										CLAYEY SILT with occasional lamination and mottle of clean silt and sandy silt

Site 218 Hole Core 14 Cored Interval: 412.0-421.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE	Discoaster quinqueramus Zone				1	0.5	EMPTY			SAND (gray 5Y4/1) grading up to SILTY CLAY (2.5YN/4) Feldspar 80% Calcite 15% Heavies 3% Others: 2% Opaques Rock fragments Mica
						1.0			99	sharp contact dark gray (2.5YN/4)
		F	R	P	Core Catcher					CLAY with pockets of silt and very fine sand
		N	F	F						interlaminated SILT and SAND gray (2.5YN/6, 5Y5/1)
			C	P-E.B						mixed sand and clay
										Extended core barrel: NANNO OOZE mottled dark greenish gray (5GY4/1) and light gray (N7). CLAYEY SILT-SILTY CLAY olive gray (5Y4/1)

Explanatory notes in Chapter 1

Site 218 Hole Core 15 Cored Interval: 450.0-459.5 m

AGE	ZONE	FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE	Discoaster quinqueramus Zone				1	0.5	EMPTY		50	dark gray 5YN/4
						1.0			93	CLAYEY SILT-SILTY CLAY with sandy silt laminations mainly at intervals of 5-10 cm.
		F N	R R	F	Core Catcher					prominent SANDY SILT layers grade upward to CLAYEY SILT-SILTY CLAY Sand 35% Silt 65%

SANDY SILTS

Feldspar	70-80%
Calcite	10-15%
Heavies	2- 7%
Others:	8%
Mica	
Iron oxide	
Clay	

CLAYEY SILT-SILTY CLAY (as above)

Site 218 Hole Core 16 Cored Interval: 459.5-469.0 m

AGE	ZONE	FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE	Discoaster neohamatus Zone				1	0.5	EMPTY			CLAYEY SILT (dark gray 2.5YN/4) with SANDY SILT (gray 2.5YN/5) laminations and interbeds. Silts 3-5 cm thick, spaced at 10 cm intervals. Sharp base to sandy beds, gradational tops.
						1.0				
					2		EMPTY			
							AS ABOVE ?		55	gray 5Y6/1 5Y5/1
									65	as top
		F N	V F	F F	Core Catcher					dark gray 2.5YN/4

SILTS

Sand 35%	Feldspar	82%	
Silt 60%	Calcite	5%	
	Heavies	4%	
	Others:	8%	
	Mica		
	Opaques		
	Rock fragments		
	Clay		

CLAY RICH NANNO OOZE

Nannos	45%
Clay	10%
Calcite	3%
Others:	3%
Forams	
Opaques	
Mica	
Iron oxide	

Explanatory notes in Chapter 1

Site 218 Hole Core 17 Cored Interval: 469.0-478.5 m

AGE	ZONE	FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE					1	0.5	EMPTY			CLAYEY SILT (very dark gray, 5Y3/1) with lainations of clean silt (light gray 5Y7/1) and interbeds of sandy silt (5Y3/1)
						1.0			122	Silt 70% Clay 30%
					2				21	Feldspar 83-92% Heavies 2- 7% Calcite 3- 5% Others: Nannos Chlorite Opaques
										Sand 1% Silt 94% Clay 5% contorted lamination
										SANDY SILT poorly sorted subangular grains very fine
					3				30	Sand 20% Silt 73% Clay 7%
										SILT (very dark gray 5Y3/1) with laminations of clayey silt. Clay content decreases toward base and sandy silt layers occur. Silt 90% Clay 10%
		F N	R F	F F	Core Catcher				125	

Site 218 Hole Core 18 Cored Interval: 478.5-488 m

AGE	ZONE	FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE					1	0.5	VOID		67	dark gray (2.5YN/4) SILT
						1.0				CLAY RICH NANNO OOZE burrow mottled, feacal pellets, laminae with folded structure. Clay fraction increases with depth.
										dark gray SILT
		F N	R F	F F	Core Catcher					SILT

Nannos 80%
Calcite 3%
Forams 1%
Opaques 1%
Clay up to 15%

Explanatory notes in Chapter 1

Site 218 Hole Core 19 Cored Interval: 488-497.5 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE					1	0.5	VOID			
						1.0	GEOCHEM SAMPLE			dark gray (2.5YN/4) CLAY
					2					SILT
										NANNO OOZE mottled with large burrows
										abundantly laminated zone FINE SANDY SILT
									140	SILT laminated throughout; dark gray (2.5YN4)
		F N	R R	F F	Core Catcher					SANDY SILT Sand 25% Silt 75% Feldspar 80% Rock clasts 6% Heavies 2% Opaques 10% Calcite 1%; SILT

Site 218 Hole Core 20 Cored Interval: 497.5-507 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE					1	0.5	VOID		40	CLAYEY SILT grading to SANDY SILT Silt 80% Clay 20%
						1.0				very dark gray (5Y3/1) abundantly laminated Feldspar 89% Mica 1% Heavies 8%
										clayey silt grading to sandy silt
										clayey silt abundantly laminated
										silt

Site 218 Hole Core 21 Cored Interval: 535.5-545 m

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE					1	0.5	VOID			
						1.0				dark gray (2.5YN4) SILT laminated (1-2 mm thick) of CLAYEY SILT and sandy silt (=10 mm thick)
					2		GEOCHEM SAMPLE			Feldspar 84% Calcite 10% Fe-oxide 2% Opaques 2% Heavies 2%
										Regularly interbedded laminae are 1-2 cm apart.
									120	Silt 90% Sand 5% Clay 5% SILT
		F N	R F	F F	Core Catcher					

Explanatory notes in Chapter 1

Site 218 Hole Core 22 Cored Interval: 573.5-583 m

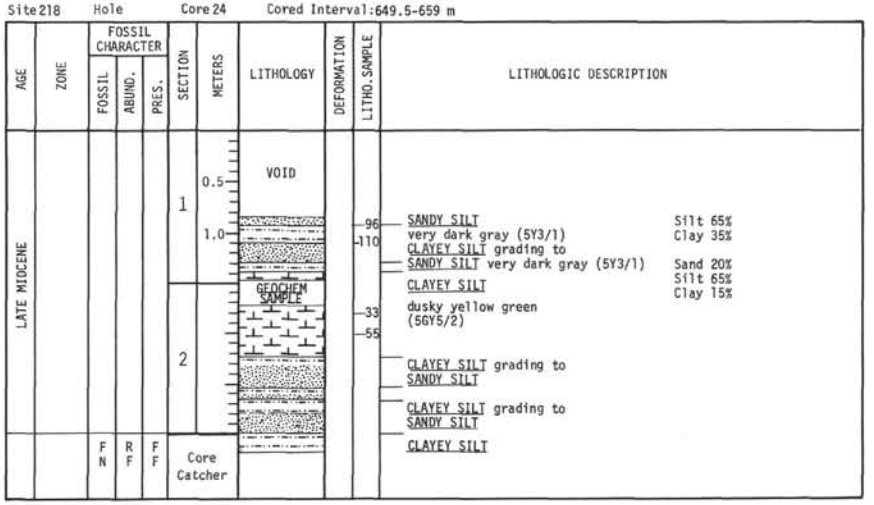
AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE					1	0.5			50	dark gray (2.5YN4) SILT interlaminated with FINE SAND and CLAYEY SILT
						1.0				
					2		GEOCHEM SAMPLE		60	SANDY SILT
										SILT interbedded with fine sand (5-10 mm thick).

Site 218 Hole Core 23 Cored Interval: 611.5-621.0 m

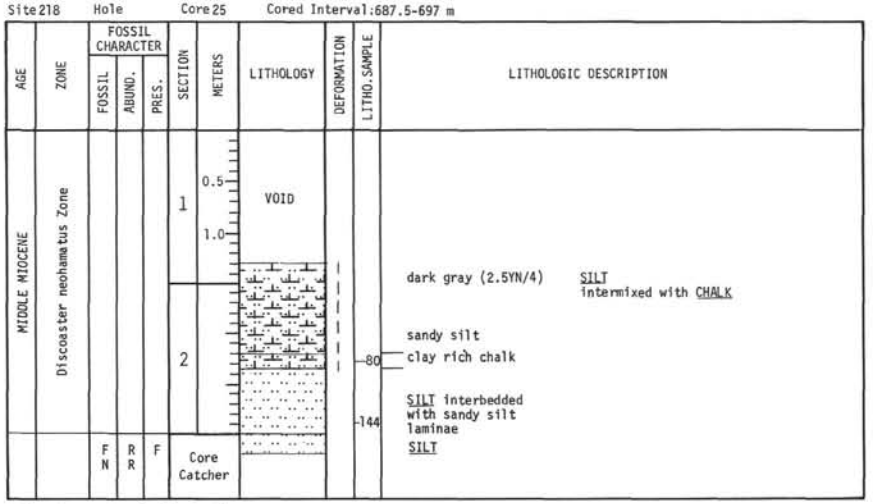
AGE	ZONE	FOSSIL CHARACTER: FOSSIL	ABUND.	PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LATE MIOCENE	Discoaster neohamatus Zone				1	0.5			100	very dark gray (5Y3/1) CLAYEY SILT grading to SANDY SILT Silt 73% Clay 27% Opaques 3% Heavies 5% Calcite 7% Feldspar 85%
						1.0				CLAYEY SILT grading to SANDY SILT
										CLAYEY SILT abundantly laminated with SANDY SILT
					2		GEOCHEM SAMPLE			dusky yellow green (5GY5/2)
									100	
		F N	R F	F F	Core Catcher				C/C	

Explanatory notes in Chapter 1

Site 218 Hole Core 24 Cored Interval: 649.5-659 m

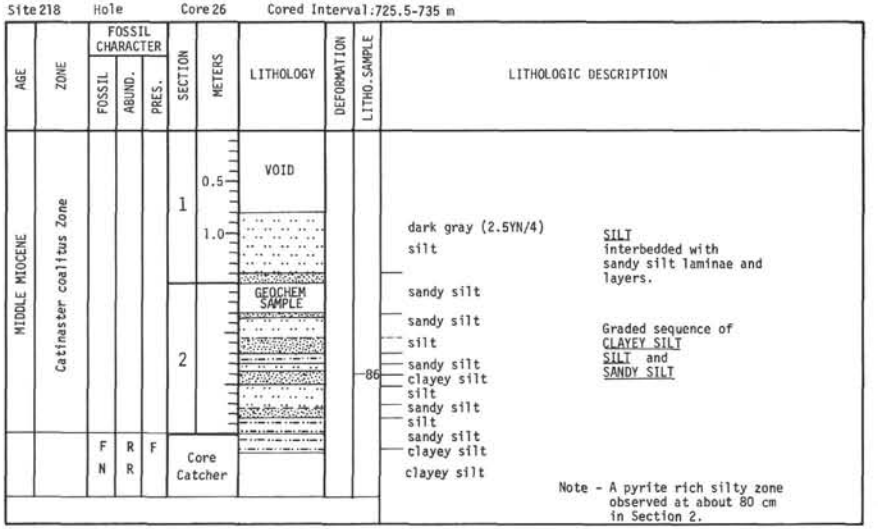


Site 218 Hole Core 25 Cored Interval: 687.5-697 m

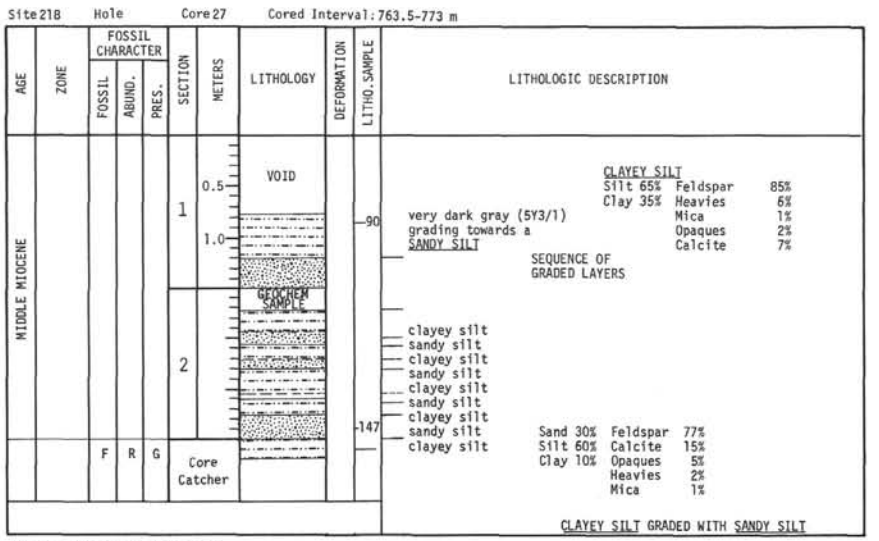


Explanatory notes in Chapter 1

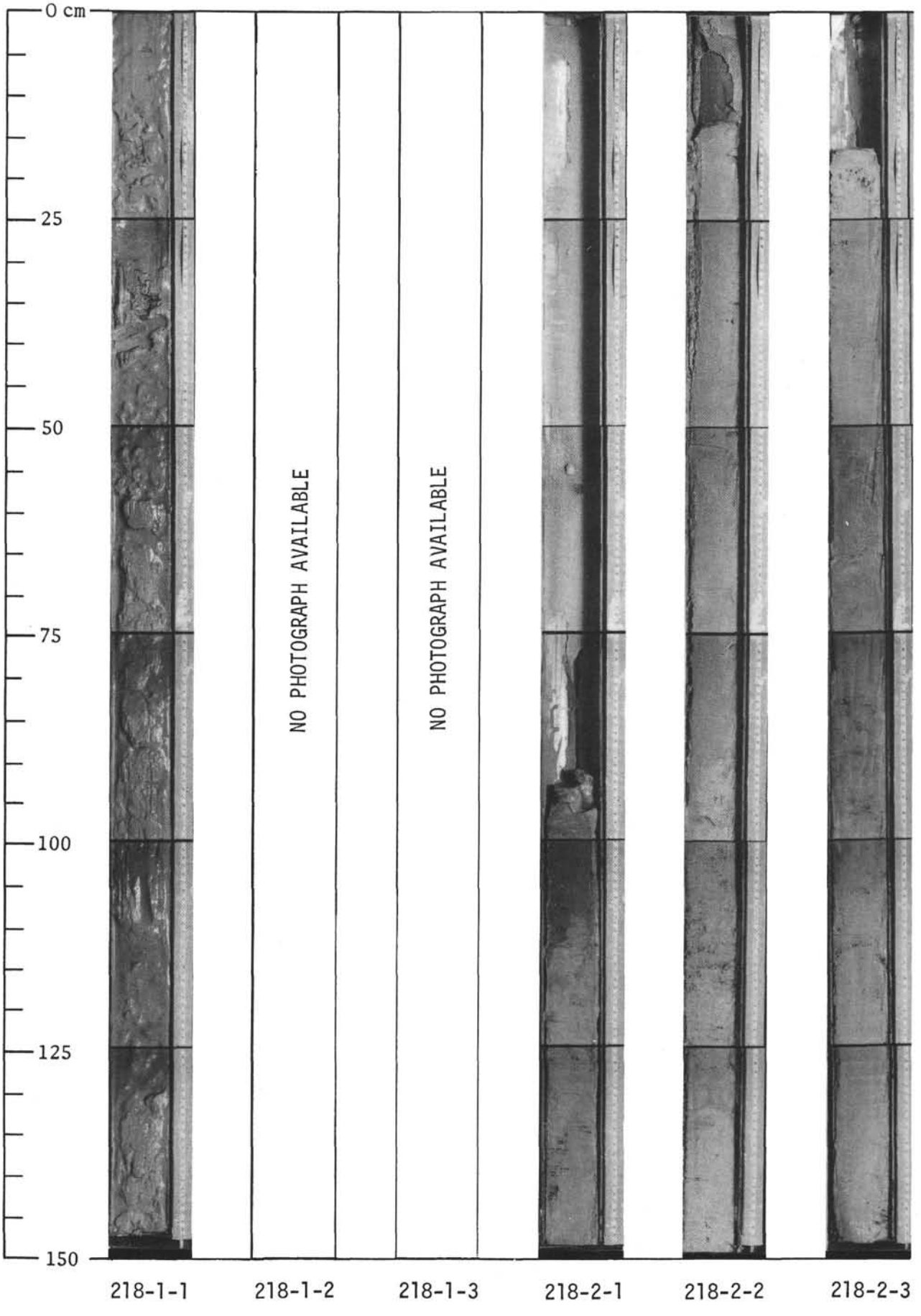
Site 218 Hole Core 26 Cored Interval: 725.5-735 m



Site 218 Hole Core 27 Cored Interval: 763.5-773 m



Explanatory notes in Chapter 1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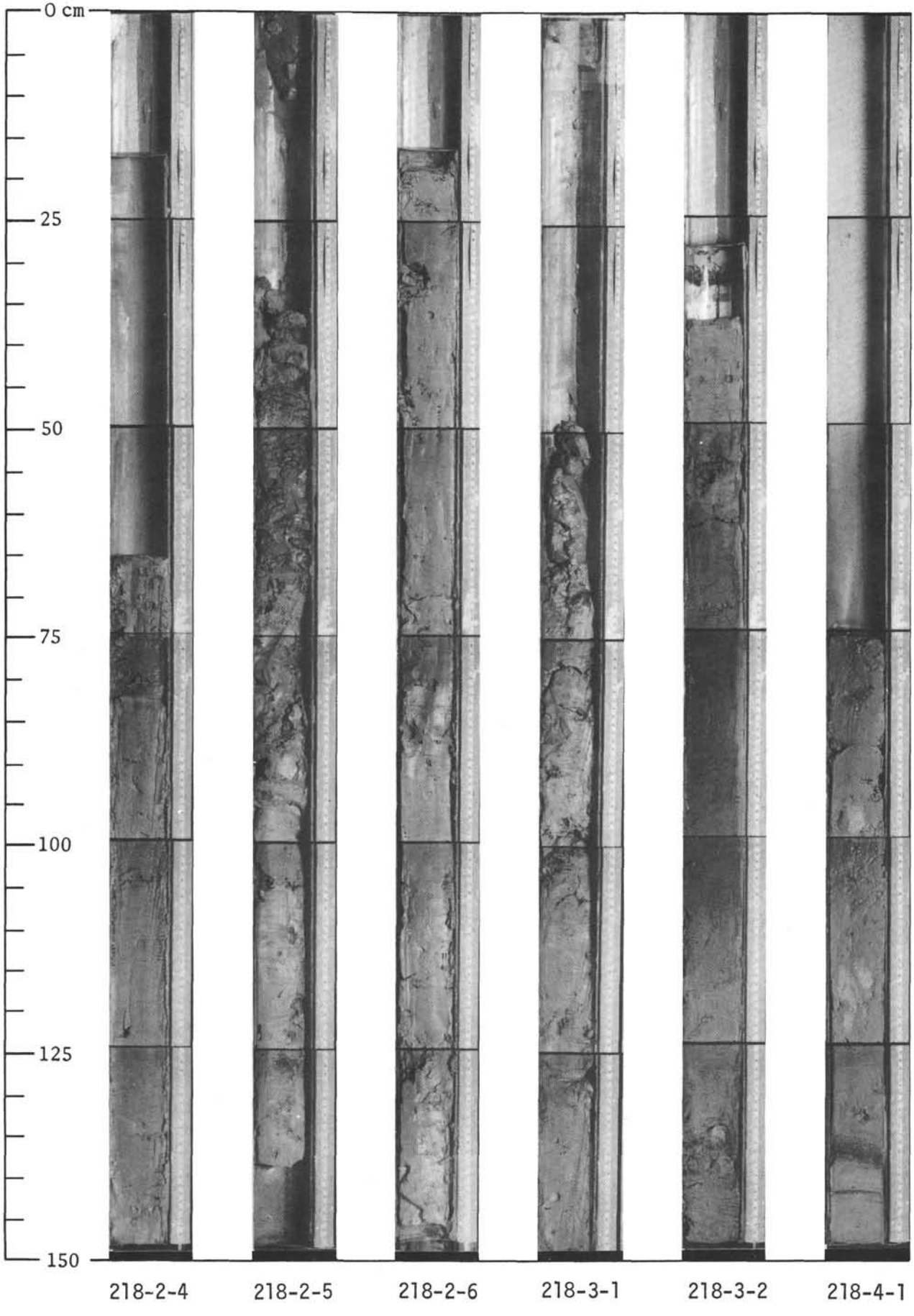
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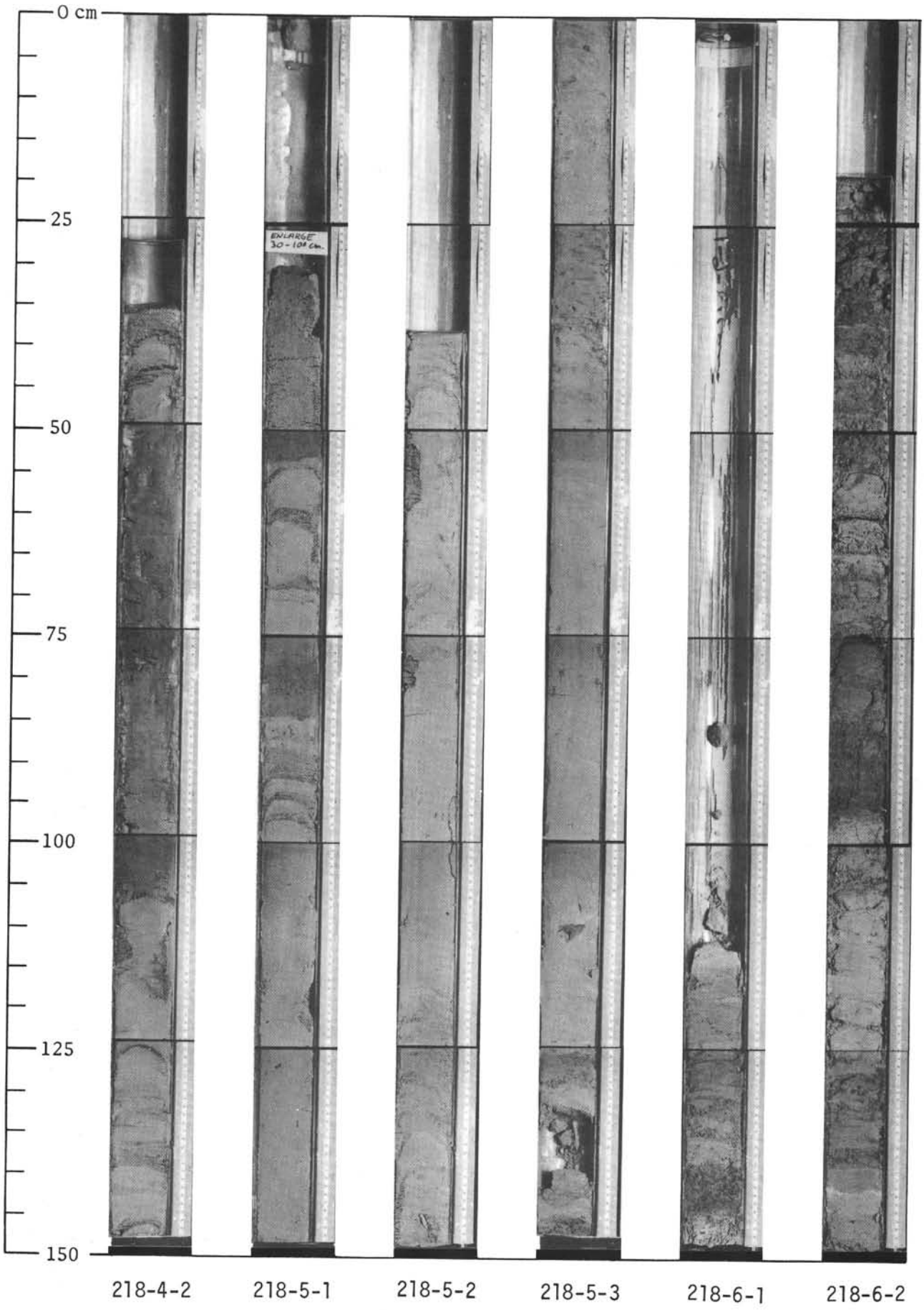
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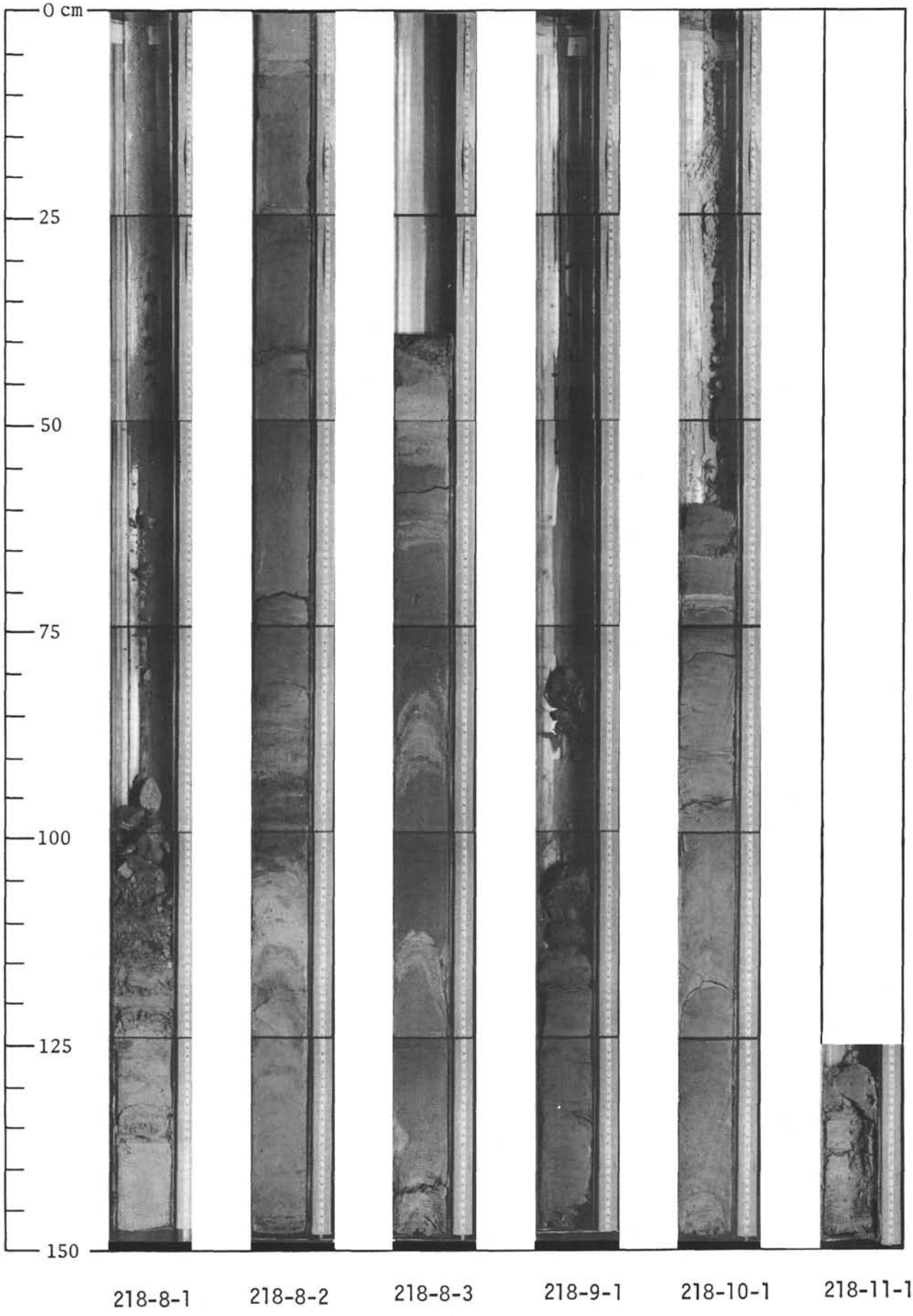
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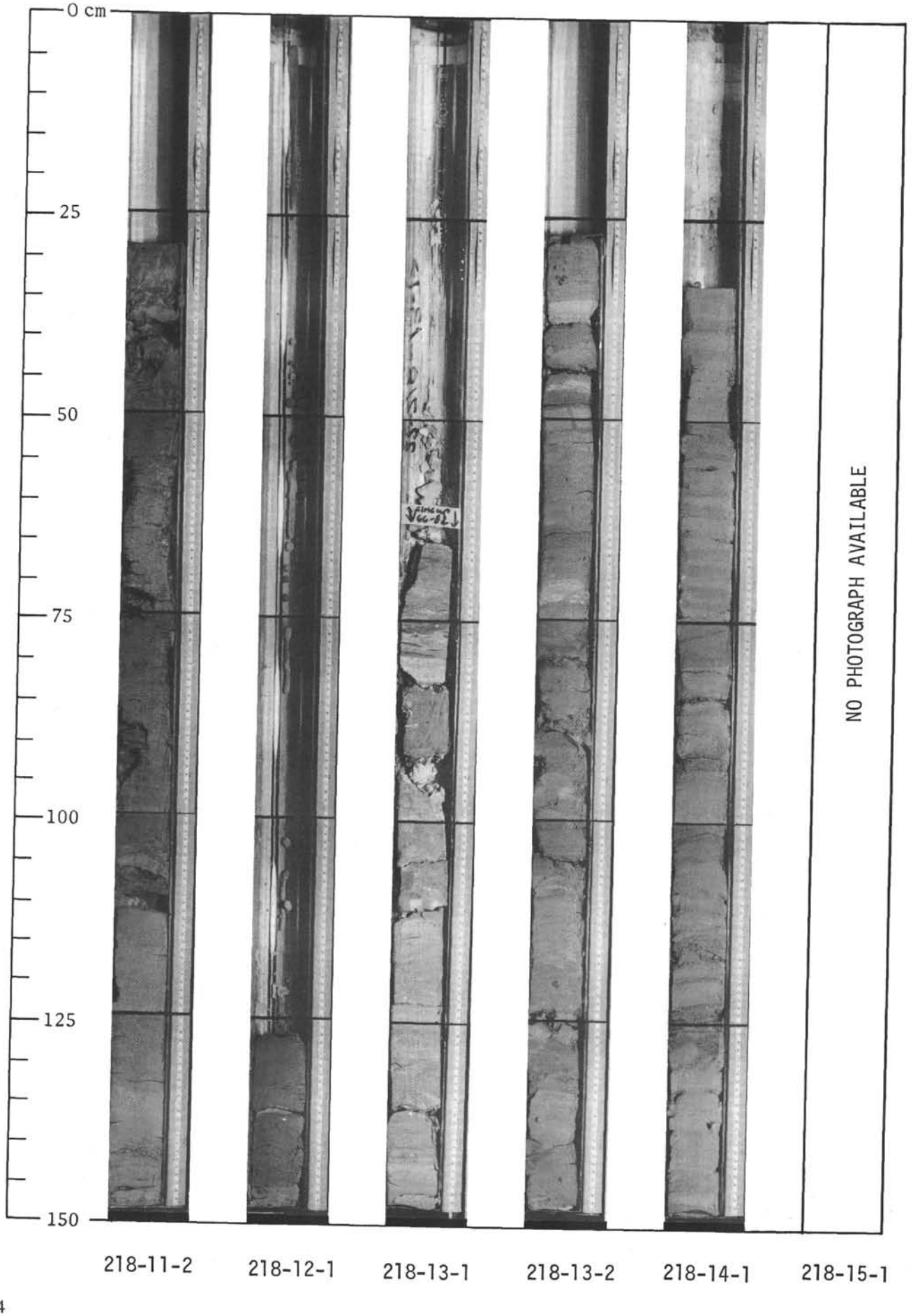
75
100
125
150
218-8-1
218-8-2
218-8-3
218-9-1
218-10-1
218-11-1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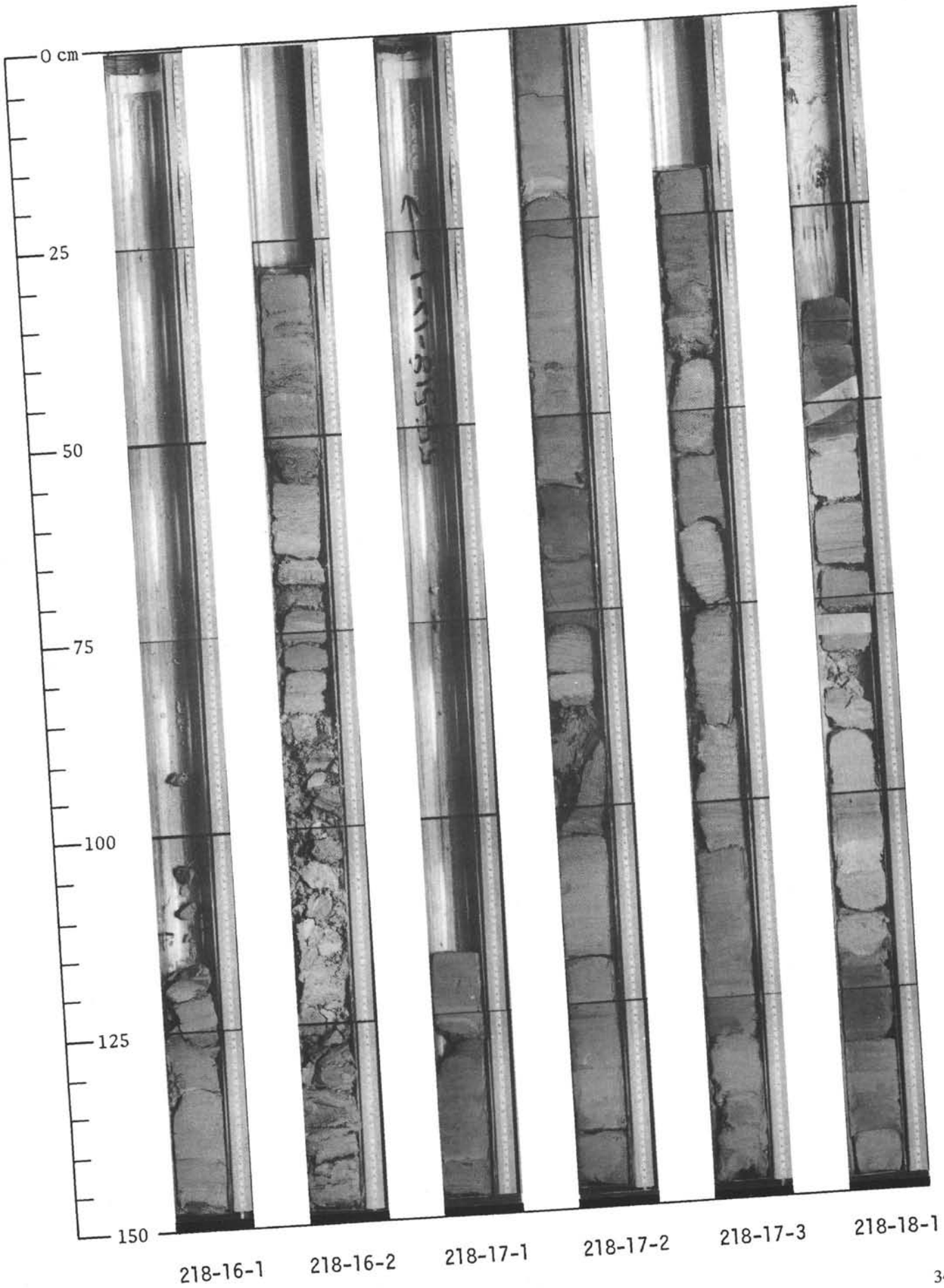
NO PHOTOGRAPH AVAILABLE
218-11-2
218-12-1
218-13-1
218-13-2
218-14-1
218-15-1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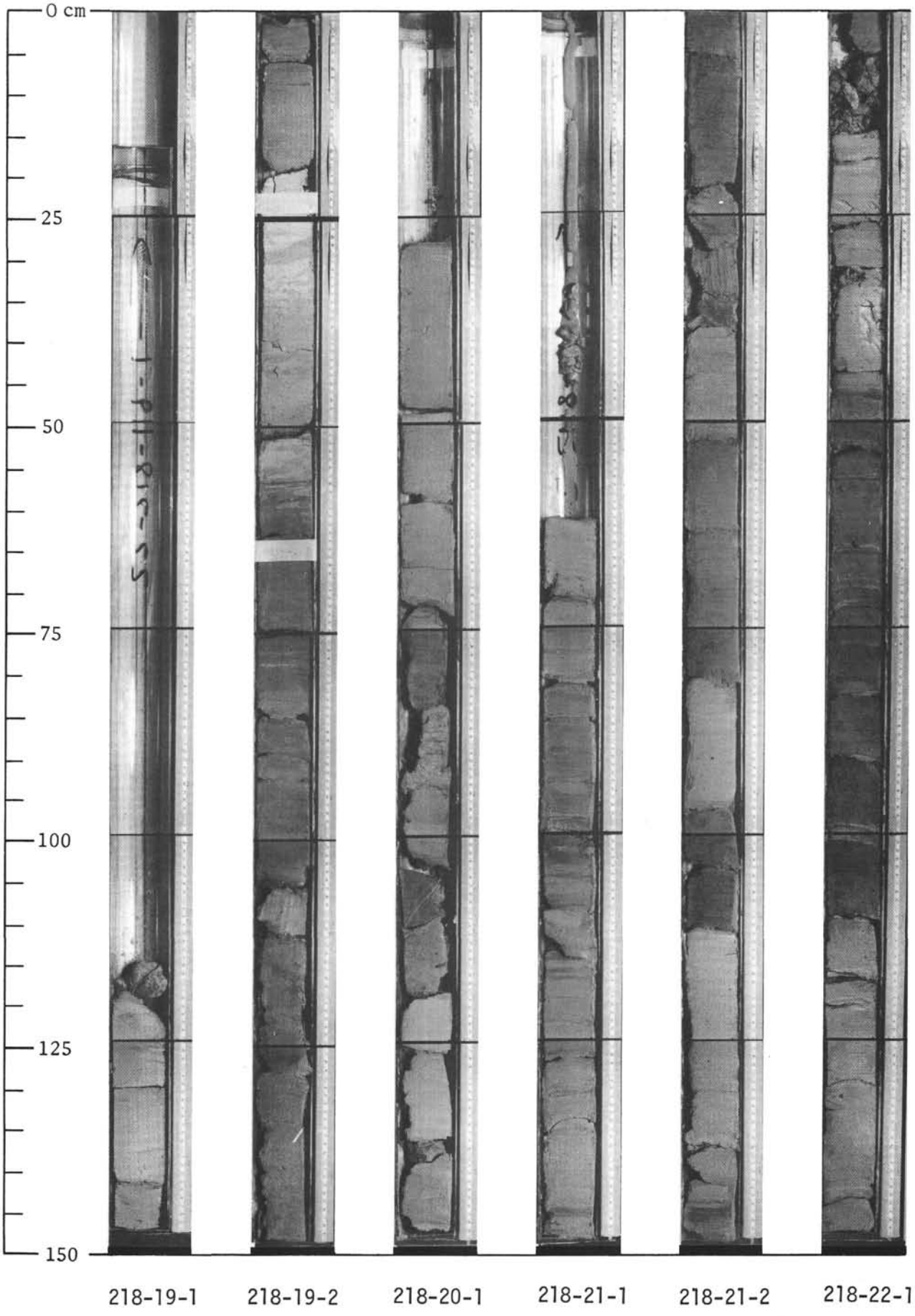
218-16-1
218-16-2
218-17-1
218-17-2
218-17-3
218-18-1


0 cm
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75
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125
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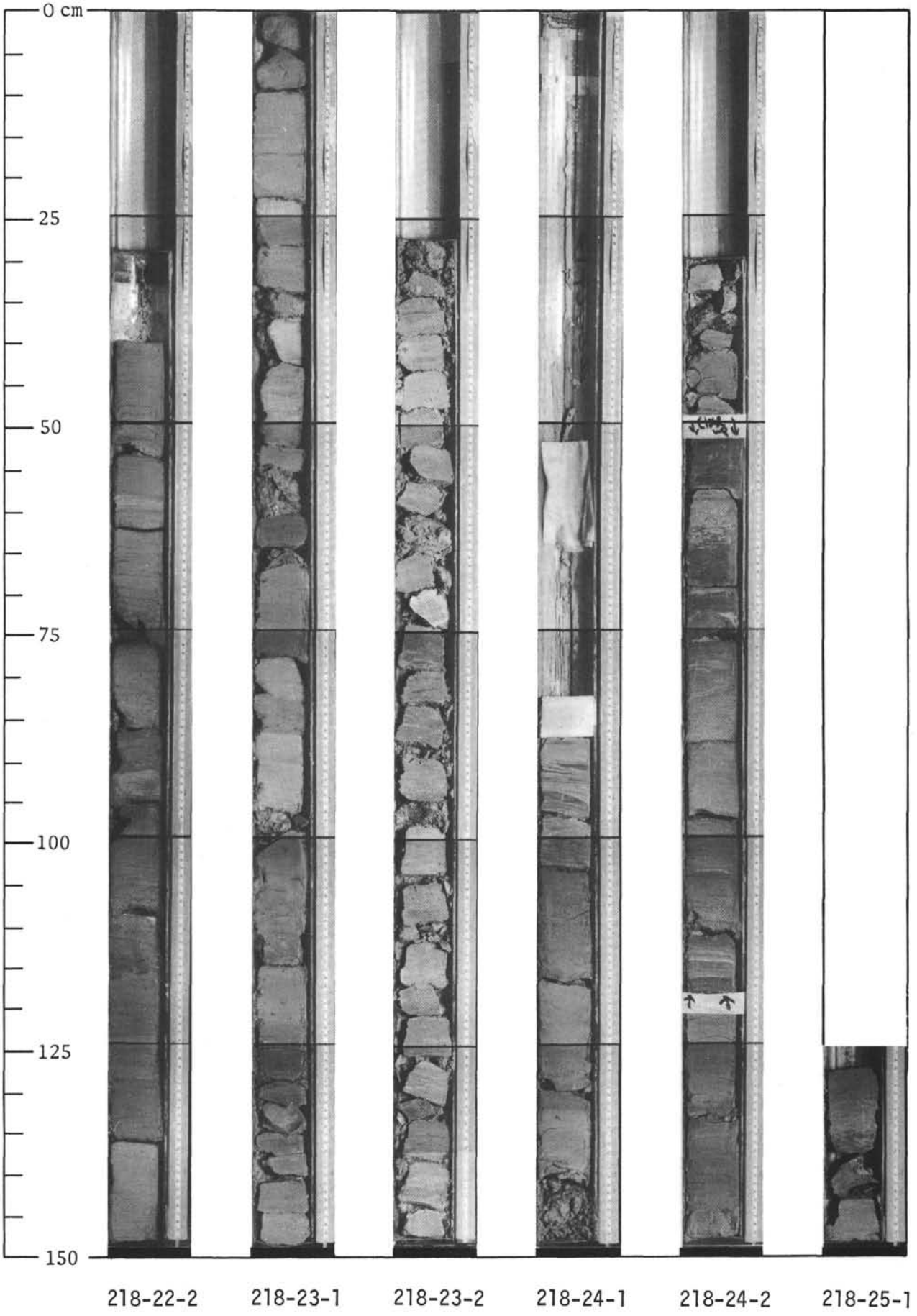
218-19-1
218-19-2
218-20-1
218-21-1
218-21-2
218-22-1


0 cm
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75
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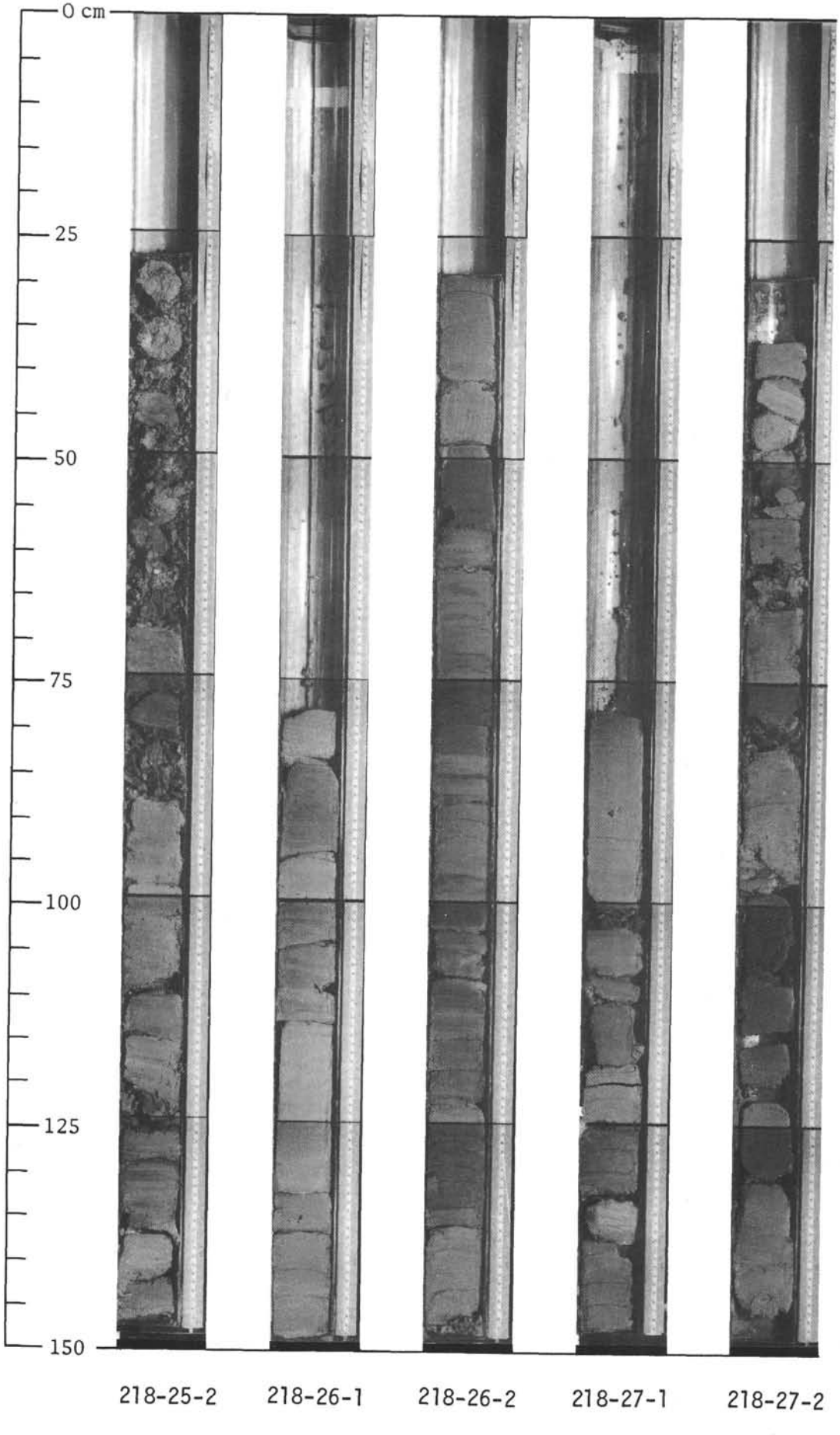
125
150
218-22-2
218-23-1
218-23-2
218-24-1
218-24-2
218-25-1


0 cm
25
50
75
100
125
150
218-25-2
218-26-1
218-26-2
218-27-1
218-27-2