11. SITE 41

The Shipboard Scientific Party[1]

SITE BACKGROUND

Site 41 marks the transition from the North Pacific gyral to the Equatorial Current System. The JOIDES Pacific Advisory Panel selected a site at this latitude along the longitudinal profile of 140°W in order to obtain information on the history of migrations of these current systems.

As the site survey by *Argo* had indicated a sediment section at Site 41 of comparable thinness to that at Sites 37, 38 and 39, the site was ranked as a secondary priority to Site 40 with its thicker section. Time was available, however, to core at Site 41, which was located only 15 kilometers from Site 40. Site 41 may well be more regionally representative of the sediments.

The site is located in an area of abyssal hills having 80 to 150 meters relief and a regional north-south lineation, according to the site survey by *Argo*. The upper flank of an abyssal hill at 5337 meters depth was selected for the site. The site is, therefore, about 150 meters deeper than Site 40 (Figure 1). The seismic reflection profile made aboard *Glomar Challenger* while at the site is shown in Figure 2. The section of 0.05-second transparent sediment represents a relatively thick sequence for the abyssal hills.

The site survey charted the magnetic lineations to have a north-northwest trend and an amplitude of approximately 100 gammas. Site 41 is located on the flank of the major positive anomaly in the survey area. This anomaly appears to be Anomaly 27 (67 million years) when compared to the magnetic anomaly chart of Hayes and Pitman (in press).

Location

Site 41 is located at latitude 19° 51.25′N, longitude 140° 02.88′W on the upper flank of an abyssal hill.

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OPERATIONS

The drilling summary of Site 41 is presented in Table 1. The sediment was continuously cored to a depth of 34 meters below the sea floor. The rate of penetration was high in Cores 1 and 2. Stiffer sediment was encountered during the coring for Core 3; and, when the core barrel was recovered, the plastic liner was discovered to have been broken and twisted. The lower 15 feet (4.6 meters) of the barrel contained a core with no liner and the upper 15 feet (4.6 meters) was jammed with the broken liner. The core was extruded into oversized liners. Because of this, the barrel for Core 4 was run without a liner, and the core had to be extruded. Basement was encountered at the bottom of Core 4; however, an attempt to obtain a core of the basement with Core 5 failed, when no penetration could be made.

LITHOLOGY

At Site 41.0, continuous coring recovered 26 meters of sediment between the sea floor and the bottom of the hole at 34 meters. Four cores were recovered, but only two were cut and described. However, smear slides were studied from the bottoms of the unopened sections. Cores were moderately to greatly deformed by the coring operations so that bedding and most sedimentary structures were destroyed.

Two sedimentary units can be distinguished between the sea floor and basement. A zeolitic "red" clay-"red" clay unit occurs in the first 18 meters (Cores 1 and 2), and a radiolarian ooze is dominant between 18 meters and the basement (Cores 3 and 4). Colors of the zeolitic "red" clay-"red" clay unit range from dark yellow-brown to grayish-brown. Zeolitic "red" clay is the dominant lithology in the 18-meter interval, but "red" clay occurs between 5 and 9 meters. The color of the radiolarian ooze is moderate brown. Radiolarians comprise from 85 to 95 per cent of the sediment. Additional admixtures are other siliceous fossils, clays, and hematitic iron oxides. "Red" clays may form thin interbeds in the ooze. No basement was recovered in an attempted core (Core 5), but eight small round pebbles of manganese-coated glassy basalt were recovered from the drill bit.

Major authigenic components are zeolites and manganese nodules. Zeolites are mostly phillipsite. Manganese nodules were observed in Section 4 of Core 1; and, high gamma readings in Sections 1, 5 and 6 of Core 1 also suggest the presence of manganese nodules.

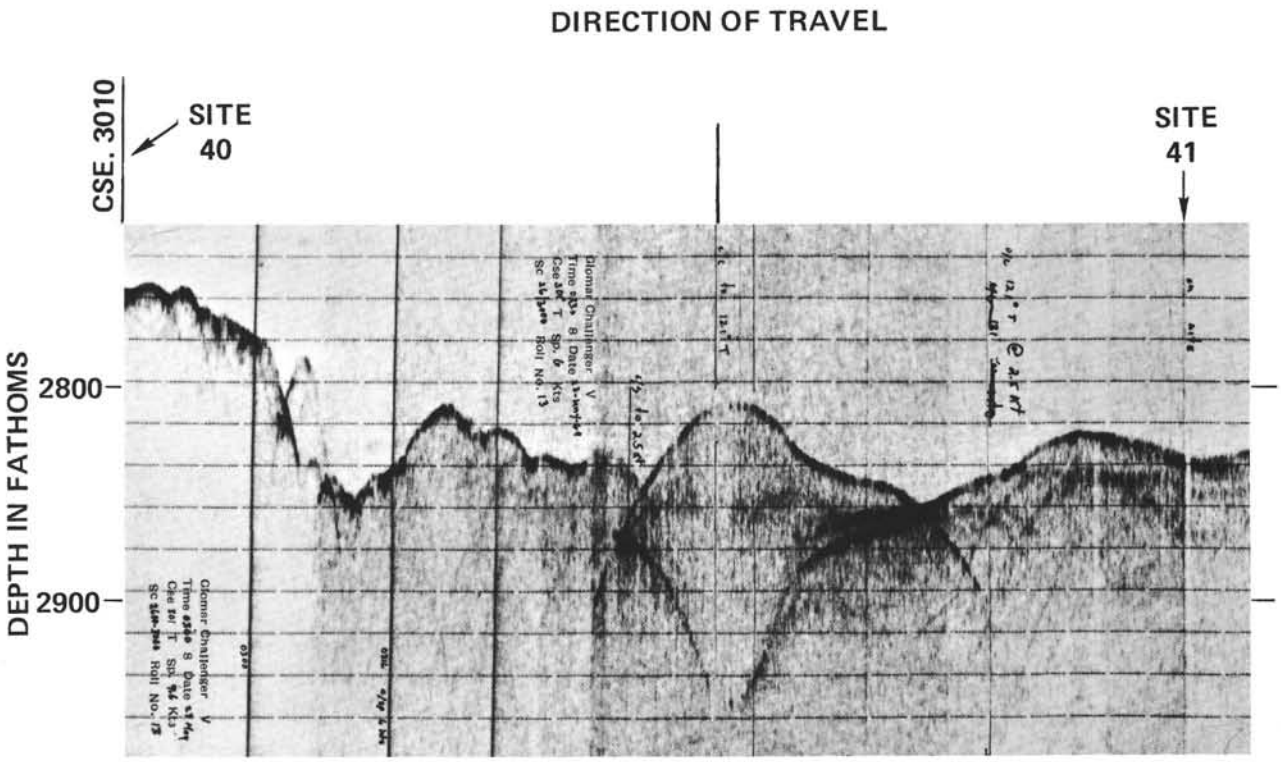

Figure 1. *Echo sounding record from Site 40 (just beyond left edge of record) to Site 41. Several speed and course changes were made but the general relationship between the sites is apparent.*

TABLE 1
Drilling Summary of Leg 5, Site 41

Date	Core	Depth Below Sea Floor (m)	Depth Below Rig Floor (ft)	Core Cut (ft)	Core Cut (m)	Core Recovered (ft)	Core Recovered (m)	Per Cent Recovered
23 May	1	0-9	17,574-17,604	30	9.1	30	9.1	100
	2	9-18	17,604-17,634	30	9.1	20	6.1	67
	3[a]	18-27	17,634-17,664	30	9.1	15	4.6	50
24 May	4	27-34	17,664-17,684	20	6.1	20	6.1	100
	5[b]	34	17,684	0	0.0	0	0.0	–
			Totals	110	33.4	85	25.9	77

[a]Plastic liner was twisted and broken in Core 3. Core was extruded.
[b]Core 5 was attempted in basement. No penetration.

Note: Sonic water depth (corrected): 5337 meters, 17,515 feet; 2919 fathoms.
Driller's depth: 17,574 feet.

Figure 2. *On-site seismic profiler record of Site 41. (5 second sweep).*

PALEONTOLOGY

Nannofossils

Nannofossils are not found in any samples from Site 41.

Foraminifera

Foraminifera are not found in any samples from Site 41.

Radiolaria

Cores 3 and 4 contain abundant well-preserved Radiolaria of Eocene age. In Core 1, Radiolaria are sparse in their occurrence, and Eocene species constitute approximately 95 per cent of the faunule. The remaining five per cent are poorly-preserved late Tertiary species. Core 2 was not opened on the ship, and was not examined for Radiolaria. Additional species, which were identified in Cores 3 and 4 but not included on the Biostratigraphy Chart, are listed below:

Liriospyris clathrata
Liriospyris spinulosa
Dorcadospyris argisca
Dorcadospyris confluens
Giraffospyris didiceros
Giraffospyris haeckelii
Dendrospyris inferispina
Dendrospyris stylophora.

SUMMARY

At Site 41, thirty-four meters of sediment cover the basement rocks. Fossils are Middle and Late Eocene in age in Cores 2, 3 and 4. Basement rock is black glassy basalt.

The sediment column is divided into two units (Table 2): a radiolarian ooze and a "red" clay. Radiolarian ooze occurs between 18 meters and basement, and is very similar to the radiolarian ooze recovered at Site 40. Some thin beds of "red" clay may alternate with the radiolarian ooze. Except for a 4-meter section, the overlying "red" clay unit is zeolitic. Colors of the "red" clays are gray-brown and yellow-brown. Upper Tertiary fossils occur in the upper part of this unit, and Upper Eocene fossils occur in the lower part.

This site probably provided a sediment section that is more typical of this part of the Pacific than the section recovered at Site 40. The sites are only 15 kilometers apart, yet three significant differences are apparent. Neither calcareous ooze nor chert occurs at Site 41. Also, the ages of the oldest sediments differ. Again, as at Site 40, the change from radiolarian ooze to "red" clay (Upper Eocene) indicates changing oceanic conditions.

TABLE 2
Stratigraphic Units at Site 41

Unit	Depth (m)	Cores	Age	Description
1	0-18	1-2	Upper Miocene or younger and Upper Eocene	Zeolitic "red" clay-"red" clay (dark yellow-brown and grayish-brown). Manganese nodules scattered throughout Core 1. Red clay (zeolite content 5 to 10 per cent) from 5 to 9 meters.
2	18-34	3-4	Upper Eocene Middle Eocene	Radiolarian ooze (moderate brown). Upper Eocene-Middle Eocene boundary at approximately 25 meters. May have thin interbeds of red clay.
	34			Black glassy basalt.

REFERENCE

Hayes, D. E. and Pitman III, W. C., (in press). Magnetic lineations in the North Pacific. *Geol. Soc. Am. Memoir.*

THE CORES RECOVERED FROM SITE 41

The following pages present a graphic summary of the results of drilling and coring at Site 41. Fig. 3, a summary of Site 41 is at the back of the book. Figures 4 to 8 are summaries of the individual cores recovered. A key to the lithologic symbols is given in the Introduction (Chapter 1).

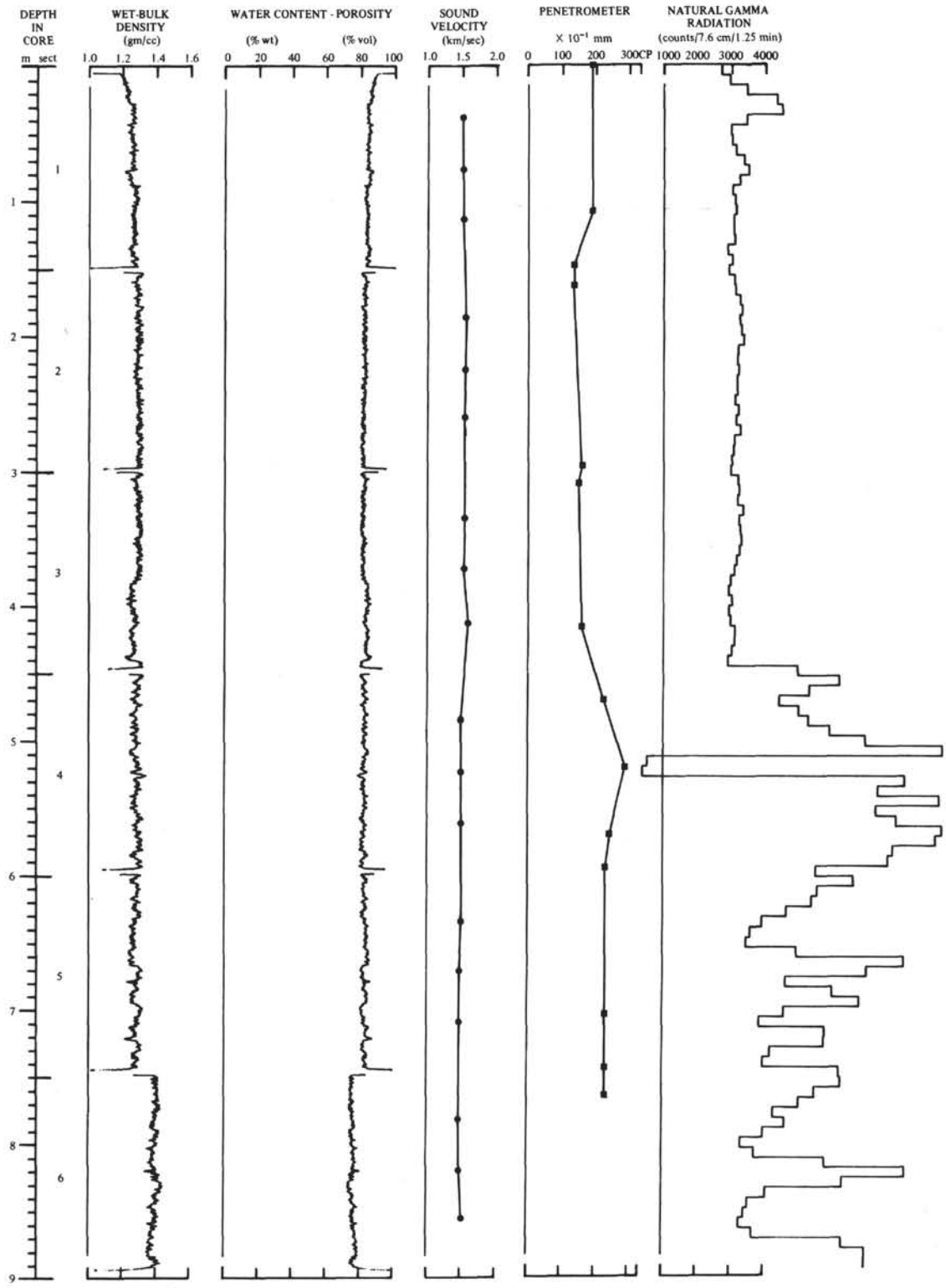

Figure 4A. *Physical Properties of Core 1, Hole 41*

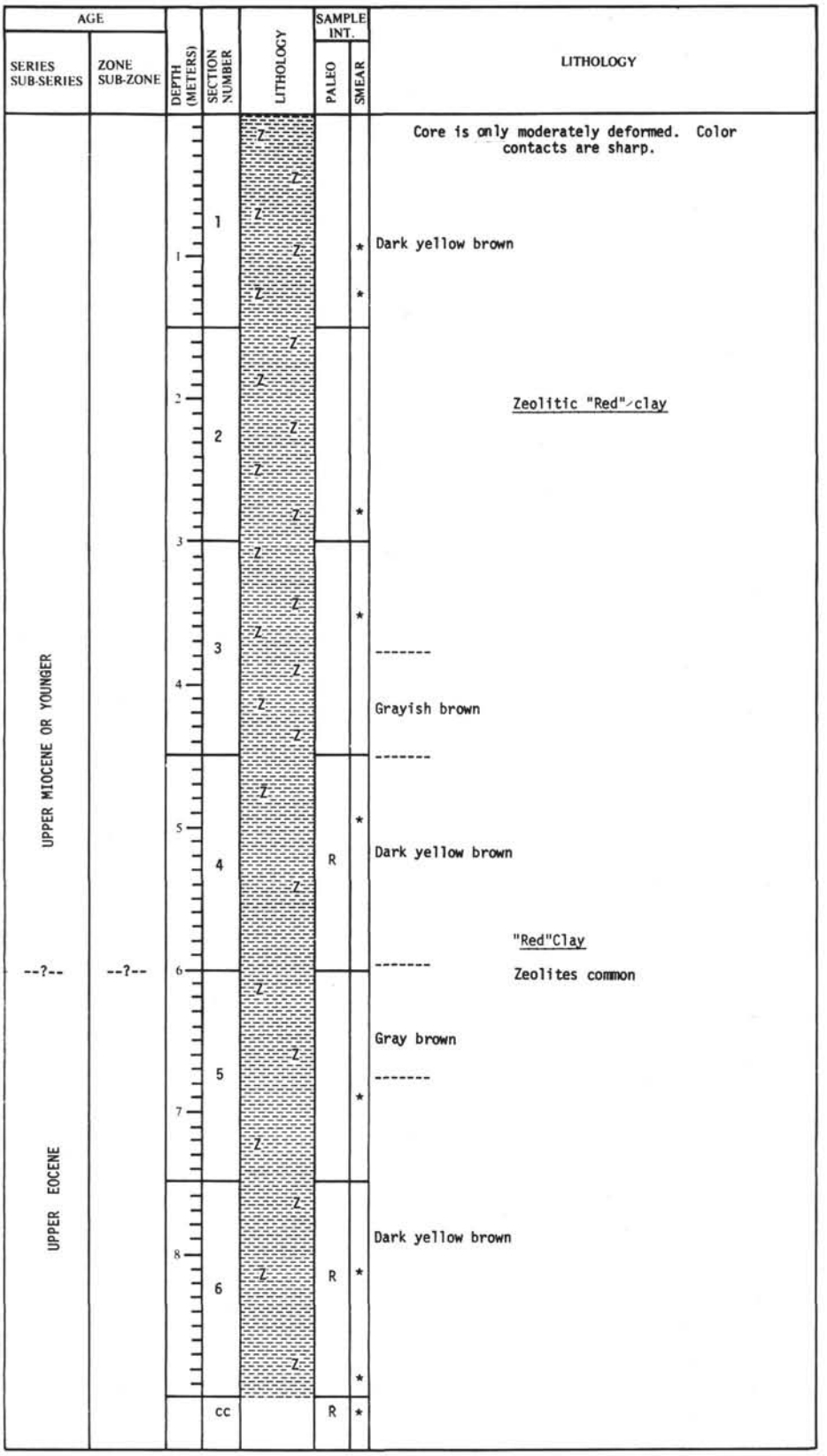

Figure 4B. *Core 1, Hole 41 (0-9 m Below Seabed)*

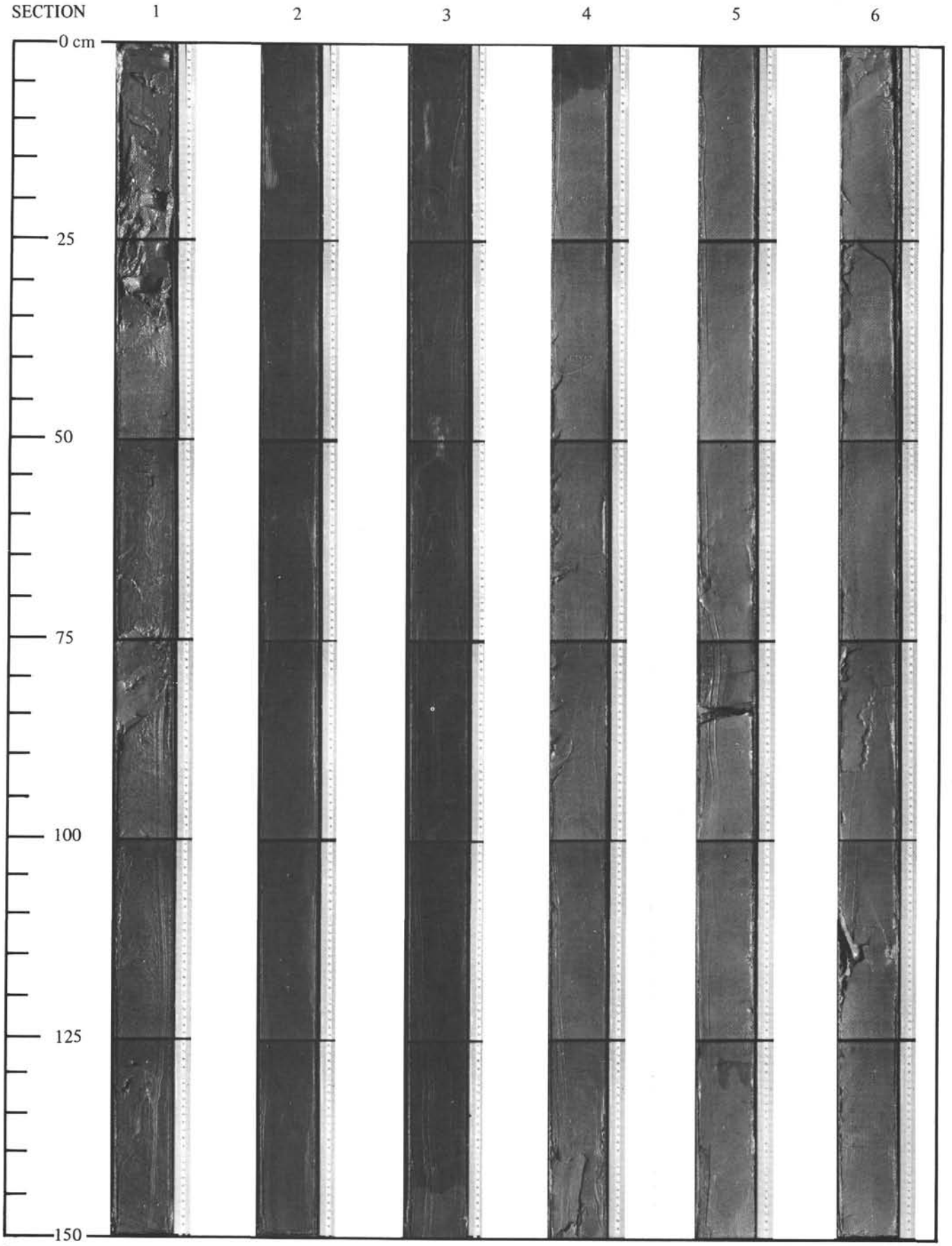

Plate 1. *Core 1, Hole 41*

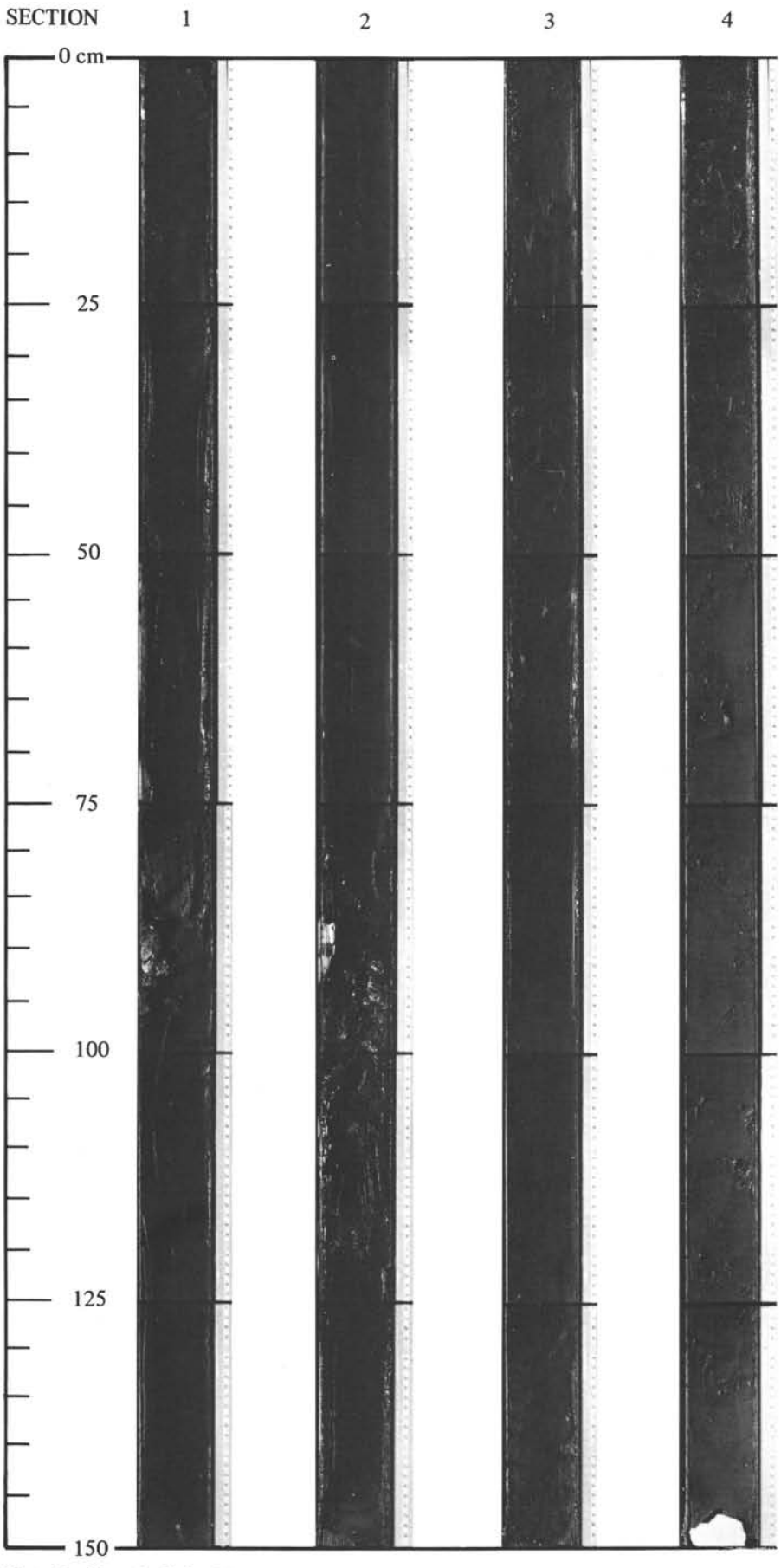

Plate 2. *Core 2, Hole 41*

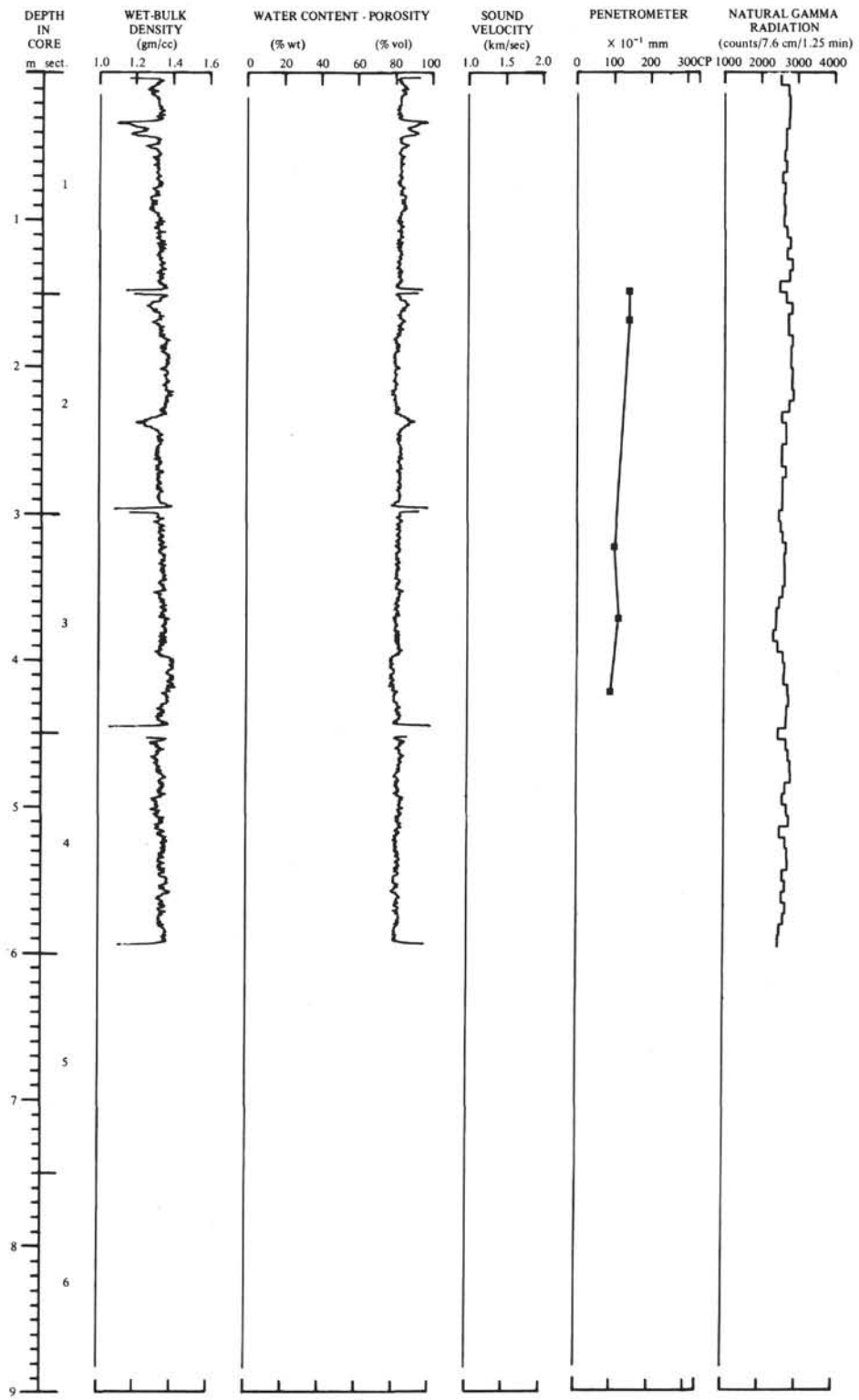

Figure 5A. *Physical Properties of Core 2, Hole 41*

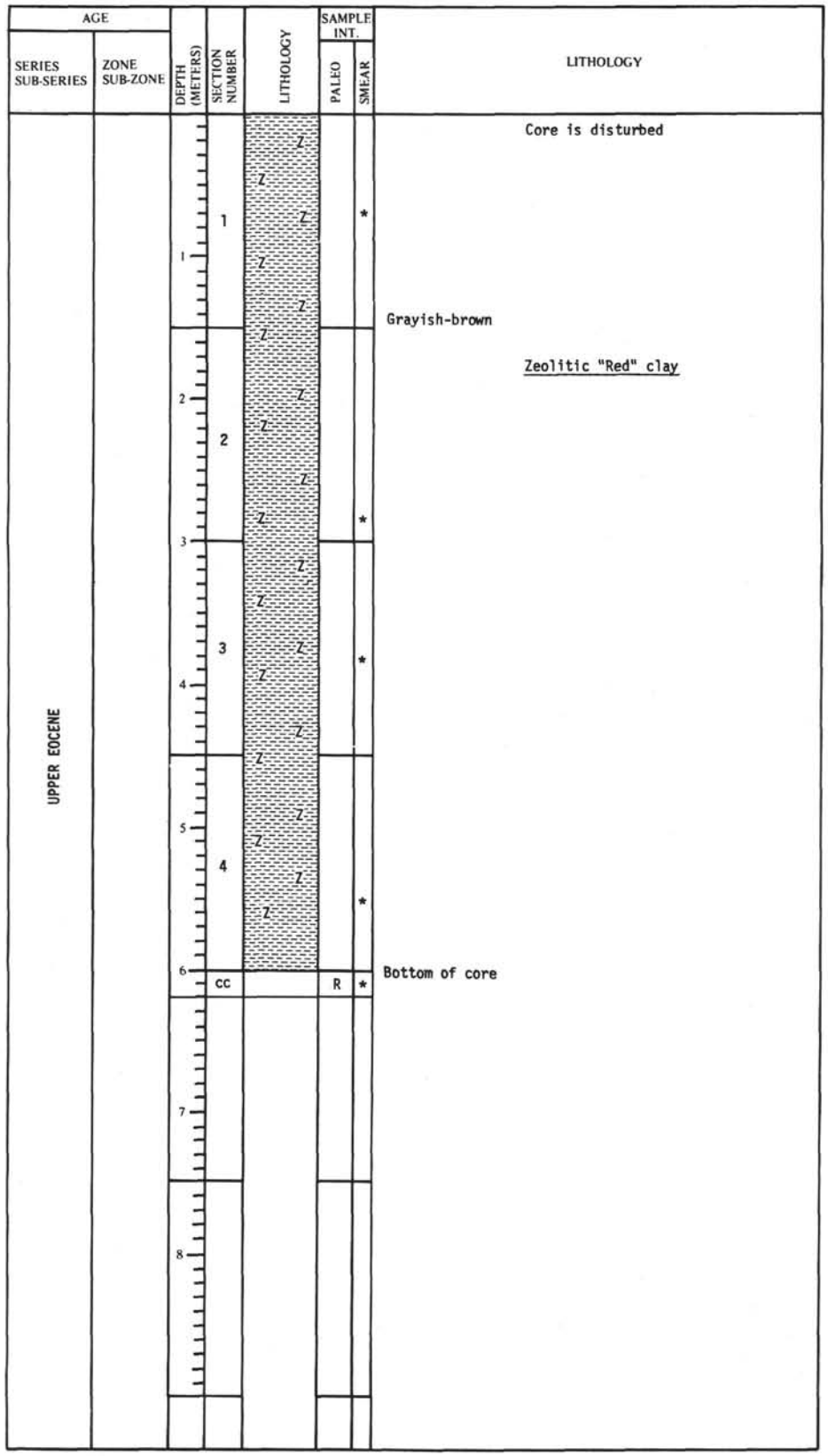

Figure 5B. *Core 2, Hole 41 (9-18 m Below Seabed)*

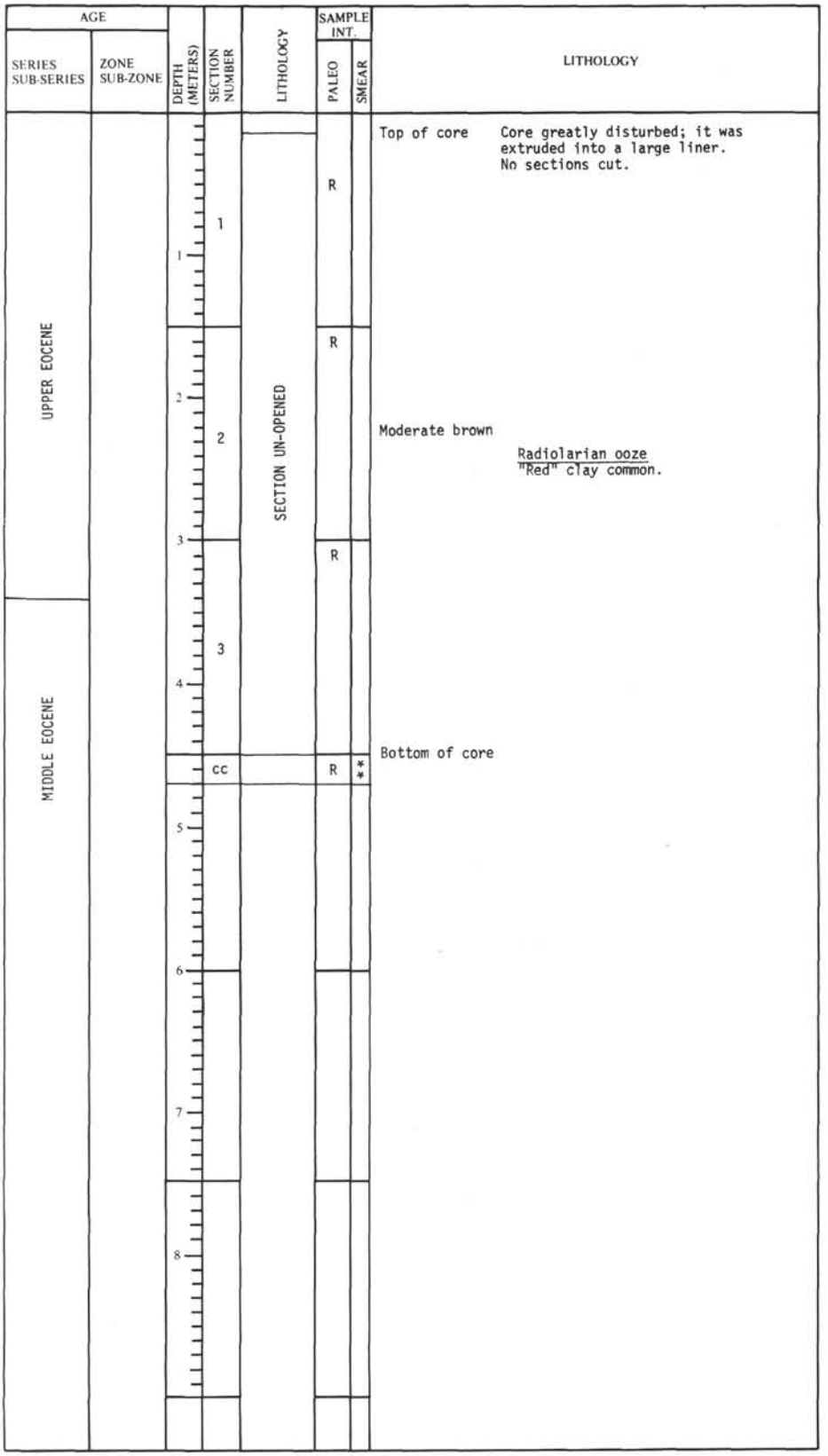

Figure 6. *Core 3, Hole 41 (18-27 m Below Seabed)*

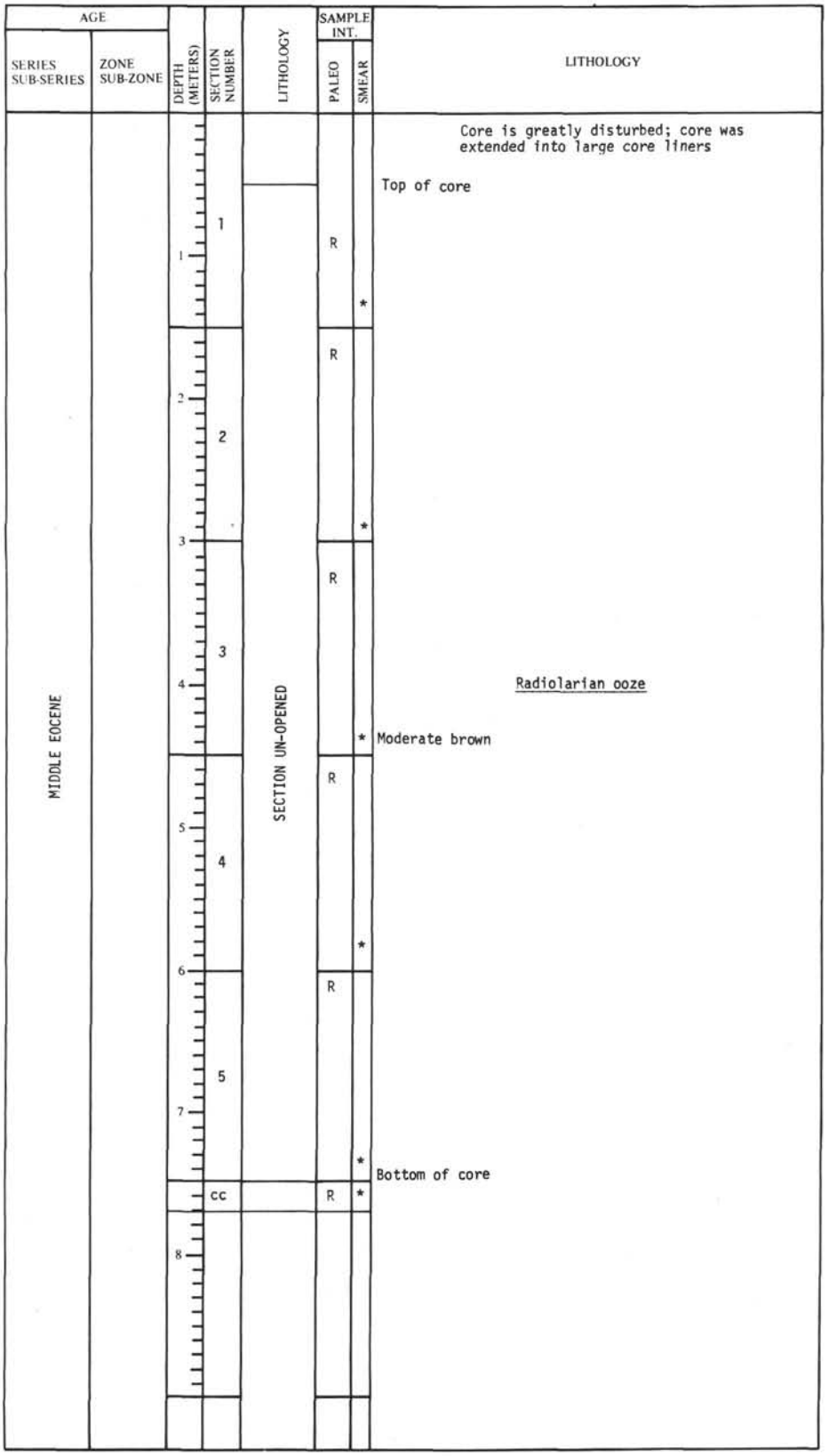

Figure 7. *Core 4, Hole 41 (27-34 m Below Seabed)*

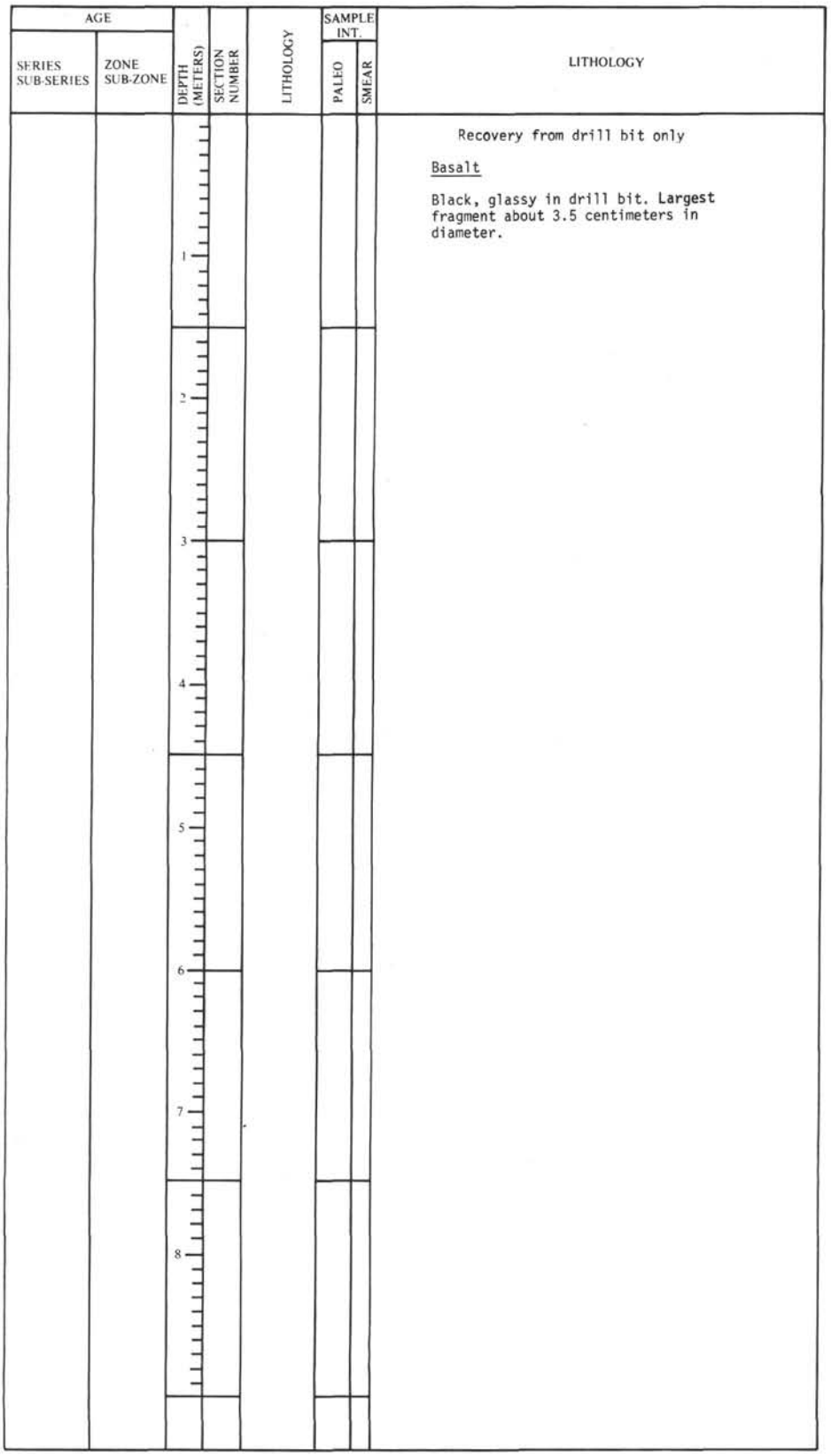

Figure 8. *Core 5, Hole 41 (34-34 m Below Seabed)*