## 5. SITE 79

#### The Shipboard Scientific Party<sup>1</sup>

## MAIN RESULTS

An apparently continuous stratigraphic section from Lower Miocene to Upper Pleistocene was discontinuously cored (41 per cent) in two holes. The deepest hole terminated in basalt at a depth of 414 meters below the sea floor. The basalt is overlain by a thin layer of baked sediment containing fossils indicative of the basal Miocene *G. kugleri* Zone. The estimated age of basement at this site is about  $21\pm1$  million years B.P. The baked sediment shows evidence of hydrothermal alteration with euhedral tridymite crystals lining the inside of foraminiferal tests. The average rate of deposition at this site is about 19 m/m.y. The accumulation rates are maximum in the middle Miocene.

The lithologies at this site are similar to those at previous sites consisting of siliceous calcareous ooze becoming chalk at depth interbedded with calcareous siliceous ooze. The section contains abundant coccoliths, foraminifera, Radiolaria and diatoms. Assuming the age of the basal sediments at Sites 77 and 79 approximate the basement age, then the distance between these sites suggests a spreading rate of about 8 cm/yr between Upper Eocene and Lower Miocene in this part of the Pacific.

#### INTRODUCTION

#### **Background and Objectives**

Site 79 is located on the crest of the equatorial Pacific sediment belt (Ewing and others, 1968) and is the westernmost of a series of sites (79, 81, 82 and 83) that follow the crest of this belt eastward to and across the crest of the oceanic ridge, locally known as the East Pacific Rise (Figure 1). The purpose of these sites is two-fold: 1) to study variations in biostratigraphy and sediment type from west to east across the Pacific

and 2) to paleontologically date basement and determine the rate of spreading of the Pacific plate since the time of deposition of the oldest sediments at Site 77. The drilling results at our previous two sites pointed toward additional objectives for this site beyond those prescribed by the JOIDES Pacific Panel. Two facts are apparent: 1) The sedimentation rates do not have a similar pattern in Sites 77 and 78 so the cause of these differing patterns is now an important question, and Site 79 should be used to study it more fully. 2) The contact with the basalt at each of the two previous sites shows alteration-probably thermal alteration-of the basal sediments indicating that the underlying basalt is a sill. An important objective of Site 79 is to recover the contact between the basalt and sediments to determine how widespread a phenomonen this baking is.

The dating of basement at this site will be essential in determining the amount of displacement, if any, and the sense of this displacement along the Clipperton Fracture Zone

## Operations

#### Site Survey

Between Site 78 and 79 the sediments thicken. The sediments are highly stratified in the vicinity of Site 79 with several prominent reflectors in the upper 0.1 second reflection time (Figure 2). As at Sites 77 and 78, the sediments are conformably draped over the basement topography. The sea floor relief is gentle, expressed as low hills usually less than 50 fathoms high. The sediments are of nearly uniform thickness about 0.4 second of reflection time. Because of the uniform nature of the sediments and the fact that Argo had previously surveyed the site, no site survey was conducted by the Challenger. When the location of the Argo survey was reached, the profiler record was closely monitored and a shallow valley selected for the site. One pass was made over the site, and the ship was turned around; a Burnett beacon was dropped when the site was reached.

#### Coring

When the beacon reached the bottom, we proceeded to lower the drill string. The seismic reflection record was poor at this location but it seemed to indicate about 0.4 second of sediment. Our plan at this site was to drill 55 meters and then core 9 meters, continuing this

<sup>&</sup>lt;sup>1</sup>J. D. Hays, Lamont-Doherty Geological Observatory, Palisades, New York; H. E. Cook, University of California, Riverside; D. G. Jenkins, University of Canterbury, Christchurch, New Zealand; F. M. Cook, independent; J. Fuller, Kennecott Exploration, Inc., San Diego, California; R. Goll, Lamont-Doherty Geological Observatory, Palisades, New York; E. D. Milow, Scripps Institution of Oceanography, La Jolla, California; W. Orr, University of Oregon, Eugene, Oregon.

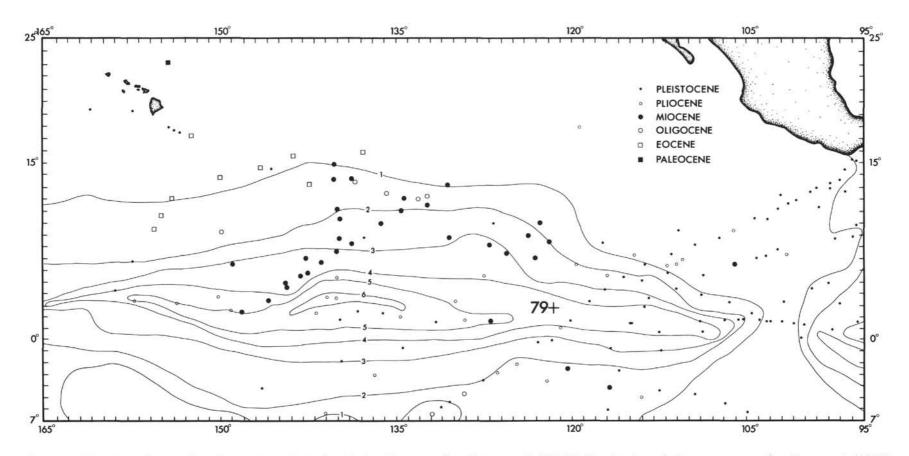


Figure 1. Location of Site 79; sediment isopachs in hundreds of meters after Ewing et al. (1968); distribution of piston core ages after Hays et al. (1969).

318

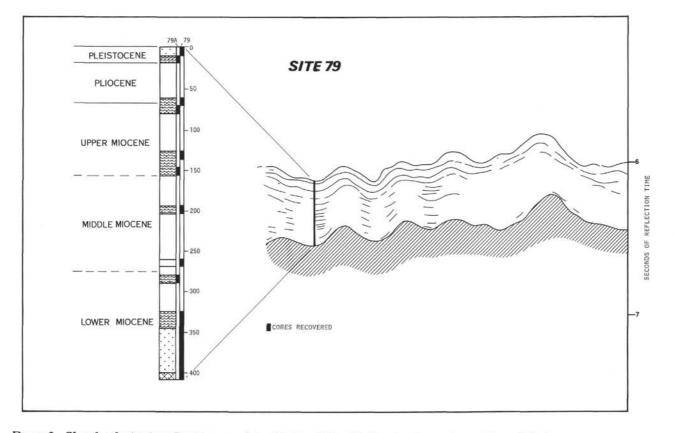


Figure 2. Sketch of seismic reflection record in vicinity of Site 79 showing interval cored in each hole.

319

procedure until we arrived within 30 meters of basement at which time we would continuously core until reaching basement. We followed this procedure until we reached a depth of 327 meters below the sea floor then continuously cored. We reached basement at a depth of 411 meters. After retrieving one-half meter of basalt, we pulled out of the hole and respudded (79A), cutting four cores ranging in depth from just below the sea floor to a depth of 288 meters at levels considered important for paleontological control.

Pertinent aspects of our drilling operations are presented in Tables 1 and 2.

## LITHOLOGY

At Site 79 two formations are present: the Clipperton Oceanic Formation (0 to 330 meters) which consists of an upper cyclic unit (0 to 45 meters) of interbedded orange calcareous and dark brown siliceous oozes and a lower varicolored unit (45 to 330 meters) of purple and green calcareous oozes and chalks; and the Marquesas Oceanic Formation (330 to 413.7 meters) which includes brown and gray calcareous chalks and oozes. Basement is interpreted to be intrusive basalt which has hydrothermally altered the overlying brown chalks of the Marquesas.

#### **Clipperton Oceanic Formation**

#### Cyclic Unit (0 to 45 meters)

As at other sites, the cyclic unit is characterized by its orange and brown colors, sharply defined beds which are about 1 to 10 centimeters thick, rapid variation in siliceous biota content, and high percentage of "red clay" (Figure 75).

The main lithologies are:

1. About 40 per cent is pale brown (5YR5/2) clay (5 to 10 per cent)-foraminiferal (15 to 20 per cent)-radiolarian (15 to 20 per cent)-calcareous nannofossil (50 to 60 per cent) ooze.

2. About 30 per cent is dark yellowish-brown (10YR4/2) calcareous nannofossil (15 to 25 per cent)-clay (20 to 30 per cent)-foraminiferal (20 to 30 per cent)-radiolarian (30 to 40 per cent) chalk ooze.

3. About 20 per cent is very pale orange (10YR8/2) clay (1 to 5 per cent)-foraminiferal (15 to 20 per cent)-radiolarian (20 to 25 per cent)-calcareous nannofossil (55 to 65 per cent) ooze.

4. About 10 per cent is medium bluish-gray (5B5/1) foraminiferal (15 to 25 per cent)-calcareous nannofossil (15 to 25 per cent)-clay (25 to 35 per cent)-radiolarian (25 to 35 per cent) ooze.

The boundary between the cyclic unit and varicolored unit was not cored; this boundary is tentatively placed at 45 meters based on the thickness of the cyclic unit at Site 77.

## Varicolored Unit (45 to 330 meters)

The varicolored unit at this site is characterized by interbedded and laminated siliceous and calcareous oozes that display brilliant shades of purples and greens (Figure 76). These colors serve to easily distinguish it from the overlying and underlying formations. Contacts between the different colors are sharp, and occasionally one can see one-millimeter thick laminations in the purple and green beds. The purple color is probably due to some manganese mineral(s) that coats the surfaces of radiolarians and which also occurs as individual grains disseminated through the beds.

1. About 60 per cent is pale greenish-yellow (10Y8/2) to light greenish-gray (5G8/1) foraminiferal (10 to 15 per cent)-radiolarian (30 to 40 per cent)-calcareous nannofossil (50 to 60 per cent)-ooze.

2. About 30 per cent is pale purple (5P6/2) to very dusky purple (5P2/2) manganese (?) (10 to 15 per cent)-foraminiferal (10 to 20 per cent)-calcareous nannofossil (30 to 40 per cent)-radiolarian (30 to 40 per cent) ooze.

3. About 10 per cent is white (N9) foraminiferal (10 to 15 per cent) radiolarian (30 to 40 per cent)-calcareous nannofossil (40 to 60 per cent) ooze.

The lower contact of the Clipperton Oceanic Formation was not cored and is placed midway between an uncored interval which separates the bluish-white chalks of the varicolored unit from the greenish-gray chalks of the Marquesas Oceanic Formation.

## Marquesas Oceanic Formation

This formation is generally well bedded in 5 to 75 centimeter-thick laminated beds that have fairly sharp upper and lower contacts.

#### Brown Unit (330 to 352.6 meters)

Pale orange (10YR7/2) and grayish-orange pink (5YR7/2) radiolarian (10 to 20 per cent)-calcareous nannofossil (80 to 90 per cent) chalk, mottled.

## Gray Unit (352.6 to 379.2 meters)

Bluish white (5B9/1) foraminiferal (5 to 10 per cent)-calcareous nannofossil (90 to 95 per cent) chalk.

#### Brown Unit (379.2 to 413.7 meters)

This unit is characterized by being massively bedded and consisting dominantly of very pale orange (10YR8/2) clay (1 to 2 per cent)-radiolarian (5 to 10 per cent)-foraminiferal (5 to 10 per cent)-calcareous nannofossil (80 to 90 per cent) chalk. The lowermost core contains a baked sediment-basalt contact. This

## TABLE 1 Site Operational Summary

#### Site 79

Latitude 02° 33.02'N; Longitude 121° 34.00'W. Time of arrival: 0045 hours, 12/31/69; Time of departure: 1140 hours, 1/3/70. Total time on site: 3 days, 10 hours, 55 minutes. Water depth: 4566 meters (corrected). Sediment thickness determined by drilling: 411 meters.

Acoustical thickness: 0.405? second.

Average sound velocity of sediments: 1.8 km/sec.

Hole	Penetration (m)	Cores Attempted	Cores Recovered	Per Cent Cored	Recovery (m)	Per Cent Recovered
79	414.2	17	17	32.1	120.0	90.2
79A	287.8	4	4	12.7	34.8	95.1
Totals: 2	Max. Penet. 414.2	21	21	41.2	154.8	91.2

baked sediment is a very pale orange (10YR8/2) to white (N9) foraminiferal (10 to 20 per cent)-calcareous nannofossil (80 to 90 per cent) chalk. This chalk shows hydrothermal alteration as exhibited by tridymite euhedra lining the interior of foraminifera tests and yellowish-green clay and brown iron oxides replacing the nannofossil chalk.

#### **Basaltic Basement**

Basement is a black, fine-grained, slightly vesicular basalt which is probably intrusive (Figure 77). The upper 2 to 5 millimeters of the basalt has a chilled isotropic glass rind with a refractive index of 1.59 to 1.60 suggesting a silica content of about 48 to 50 per cent.

## PHYSICAL PROPERTIES

#### Natural Gamma

Natural gamma readings at Site 79 ranged from 749 counts/75 second to 3836 counts.

The cyclic unit of the Clipperton Oceanic Formation yields readings from 826 to 2905 counts. The high readings are probably due to palagonite and potassic mica. The lower part of the cyclic unit was not tested because of a recorder malfunction.

The varicolored unit of the Clipperton Oceanic Formation yielded readings from 774 to 3836 counts with an average reading of about 900 counts. The single isolated, high count of 3836 was from an unopened section with no visible change in lithology seen through the plastic core liner. The cyclic unit can be distinguished from the varicolored unit at this site by the higher average readings in the cyclic unit (Figure 4).

Most of the Marquesas Oceanic Formation averages about 900 counts. Two notable exceptions occur, one at the contact with the overlying Clipperton Oceanic Formation where the Marquesas has readings up to 1526 counts, and one just above basaltic basement where readings of 1385 counts were recorded. These readings probably result from local concentrations of clay.

#### Porosity

Porosity at Site 79 ranges from 45 per cent in foraminiferal-calcareous nannofossil chalks to 91 per cent in foraminiferal-radiolarian-calcareous nannofossil oozes. However, there is no obvious correlation between lithology and porosity at this site. There does appear, however, to be a correlation between depth and porosity at this site (Figures 4, 6 and 8). The porosity is 87 per cent in Hole 79, Core 1 and decreases to 45 per cent in Core 16. This porosity decrease may be due to compaction and/or incipient cementation.

There is no GRAPE data in Core 8 and Cores 10 through 14 due to malfunctioning of the recorder.

# TABLE 2Hole Drilling Summary, Site 79(Latitude 02° 33.02'N, Longitude 121° 34.00'W, 4566 meters depth)

TT	1	1	-	2
H	oı	e	1	9

	l Below Floor			Corr	e Cut	Core Pa	covered	Drill Stem	Pump	Drilling Rate
(m)	(ft)	Drilled	Core	(m)	(ft)	(m)	(ft)	Rotated	Circ	(ft/min)
0.0-9.1	0-30.0		1	9.1	30.0	9.1	30.0	-	-	3.3
9.0-30.0	30-198.0									
60.4-69.5	198-228.0		2	9.1	30.0	9.1	30.0		—	1.9
69.5-126.8	228-416.0									
126.8-136.0	416-446.0		3	9.1	30.0	9.1	30.0	Cont	-	1.7
136.0-193.6	446-635.0									
193.6-202.7	635-665.0		4	9.1	30.0	9.1	30.0	Cont	Int	1.3
202.7-260.36	665-854.0									
260.36-269.5	854-884.0		5	9.1	30.0	9.1	30.0	Cont	Int	0.7
269.5-326.9	884-1072.0									
326.9-336.0	1072-1102.0		6	9.1	30.0	6.7	22.0	Cont	Int	0.6
336.0-334.0	1102-1127.0		7	7.7	25.0	7.7	25.0	Cont	Int	0.5
344.0-350.0	1127-1149.0		8	6.7	22.0	8.2	27.0	Cont	Int	0.4
350.0-355.8	1149-1167.0		9	5.5	18.0	4.5	15.0	Cont	Int	0.3
355.8-364.3	1167-1195.0		10	8.5	28.0	6.1	20.0	Cont	Cont	0.5
364.3-373.5	1195-1225.0		11	9.1	30.0	8.2	27.0	Cont	Cont	Blurred
373.5-380.5	1225-1248.0		12	7.0	23.0	8.5	27.0	Cont	Cont	1.0
380.5-389.6	1248-1278.0		13	9.1	30.0	8.5	28.0	Cont	Cont	0.6
389.6-398.8	1278-1308.0		14	9.1	30.0	9.1	30.0	Cont	Cont	0.7
398.8-406.1	1308-1332.0		15	7.4	24.0	2.4	8.0	Cont	Cont	0.6
406.1-413.7	1332-1357.0		16	7.7	25.0	4.0	12.0	Cont	Cont	Not Recorded
413.7-414.2	1357-1358.5		17	0.5	1.5	0.5	1.5	Cont	Cont	Not Recorded
Total 414.2	1358.5		17	436.5	120.0	393.5			_	
Hole 79A										
Interval	l Below Floor			Core	Cut	Core Re	covered	Drill Stem	Pump	Drilling Rate
(m)	(ft)	Drilled	Core	(m)	(ft)	(m)	(ft)	Rotated	Circ	(ft/min)
0.0-9.1	0-30									
9.1-18.3	30-60		1	9.1	30	7.4	24	_	-	
18.3-69.5	60-228									
69.5-78.6	228-258		2	9.1	30	9.1	30	-	-	
78.6-145.1	258-476									
145.1-154.3	476-506		3	9.1	30	9.1	30		Int	
154.3-278.7	506-914									

9.1

36.6

30

120

9.1

34.8

30

114

Int

4

4

278.7-287.8

Total 287.8

914-944

944

## Sonic Velocity

Sound velocities ranged from 889 m/sec to 1634 m/sec. The very low sound velocities of 888 m/sec in Core 3, Section 1 are probably due to large amounts of water in the sediments. This section was highly disturbed during coring and does not reflect the condition of the sediments *in situ*. In general the sound velocities increase downhole which is a trend expected because of compaction (Figures 4, 6 and 8). No obvious changes in sonic velocities are directly attributable to lithologic changes.

## **Bulk Density**

Bulk densities at Site 79 ranged from 1.129 g/cc at the top to 1.960 g/cc at the bottom, and increased fairly uniformly downhole probably as a result of compaction (Figures 4, 6 and 8). The minor fluctuations are probably the result of excess water injected into the sediments during drilling. The sediments at 400 meters in Core 15, Section 2 recorded the highest densities on Leg 9. No reason for this high density reading was readily apparent.

## Penetrometer

Penetrometer readings at Site 79 range from 0.5 centimeter to 3.47 centimeters and show a general decrease downhole. The readings show a definite drop from 3.49 centimeters to 1.28 centimeters at about 125 meters. From 1 to 8 meters, 65 to 72 meters, and at 190 meters there are areas of erratically high readings of 3.0 centimeters and over due to coring disturbances. Minor real fluctuations in readings may be due to individual lithologic differences.

#### BIOSTRATIGRAPHY

## Foraminifera

Foraminiferal data derived from Site 79 were less than optima for a number of reasons. The hole was spot cored to within about 80 meters of basement where continuous coring was initiated. In the process of spot coring, only the Pliocene-Pleistocene boundary came within a cored interval and the Miocene-Pliocene boundary has been extrapolated. At Site 79 long intervals occurred in which some foraminiferal specimens had been partially or completely removed by solution. The entire foraminiferal fauna was completely destroyed in Hole 79A, Core 3, but in all other cores the remaining specimens were sufficient to establish a relative age in terms of the established planktonic foraminiferal zones.

As in previous holes (for example, Sites 77 and 78) the foraminiferal diversity fluctuates considerably. At Site 79, highest diversities are in the *P. obliquiloculata* to *G. plesiotumida* zonal interval. Below this interval diversity remains low with the exception of slightly higher

diversities in the *G. peripheroronda* to *G. kugleri* zonal interval. The low diversity intervals at Site 79 appear to correspond to intervals where the foraminifera display the effects of solution. Diversity trends may therefore all be secondary in origin.

Thermal alteration of the overlying sediments by the basalt encountered at 1355 feet was very evident from the preservation of the foraminiferal tests. Foraminiferal material recovered from the lowermost baked chalks included the zonal species *Globorotalia kugleri*.

## Radiolaria

Radiolaria are absent in Core 17. In all the remaining cores, Radiolaria are common to abundant and wellpreserved. Orosphaerid Radiolaria are common in Cores 6 through 16 and scarce in the higher portion of the section where diatoms become increasingly abundant.

The radiolarian assemblages at Site 77 range in age from lower Miocene (Lychnocanium bipes Zone) to Pleistocene (no zonal name). The large gaps between recovered intervals at this site preclude close comparison of the radiolarian stratigraphic ranges. The stratigraphic ranges of three species in Cores 6 through 16 need discussion. At Site 79, Calocycletta virginis does not occur until after the first appearance of Dendrospyris damaecornis, whereas the opposite is true at Site 77. At Site 79, Tholospyris mammilaris does not occur until after the first appearance of Stichocorys diploconus, while in Site 77, T. mammilaris appears simultaneously with Cyrtocapsella cornuta. At Site 79, Cyrtocapsella elongata does not occur until after the first appearance of Giraffospyris annulispina, whereas C. elongata appears simultaneously with Cyclampterium (?) leptetrum at Site 77. These anomalous occurrences are difficult to explain. Environmental conditions at Site 79 during the lower Miocene may have been sufficiently different from those at Site 77, so that at least the three species discussed above were unable to exist here. Alternatively, differential solution effects may be the answer to this problem.

#### DISCUSSION AND INTERPRETATION

The sediments at this site are similar to those at Sites 77 and 78. Here, as at Site 77, an apparently complete or nearly complete sequence is present from the sea floor to the underlying basaltic basement. As at Site 77 an upper tan layer of alternating siliceous and calcareous ooze occurs. This is underlain by a thick sequence of alternating blue white and green highly calcareous sediments which extends down into the middle Miocene. Below this lies a massive unit of blue white radiolarian foraminiferal nannofossil-chalk extending from the Upper middle Miocene. Below this, an alternating pink and green sequence overlies a massive

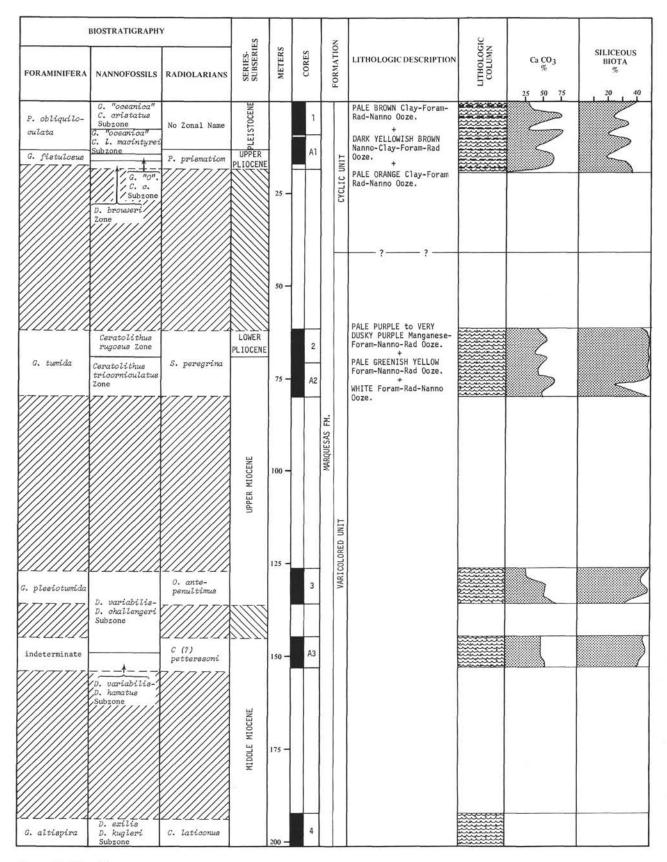


Figure 3. Site 79 summary.

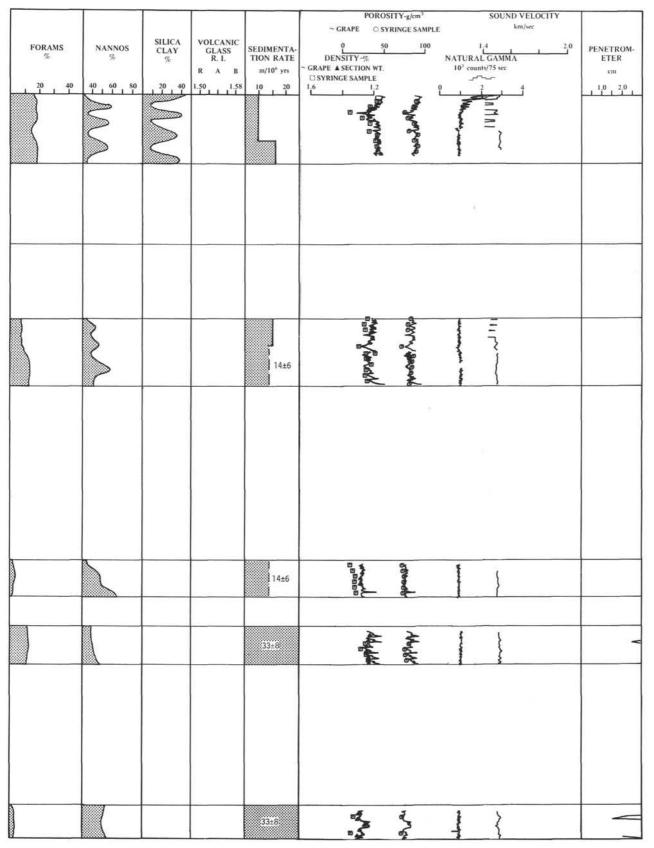


Figure 4. Site 79 summary.

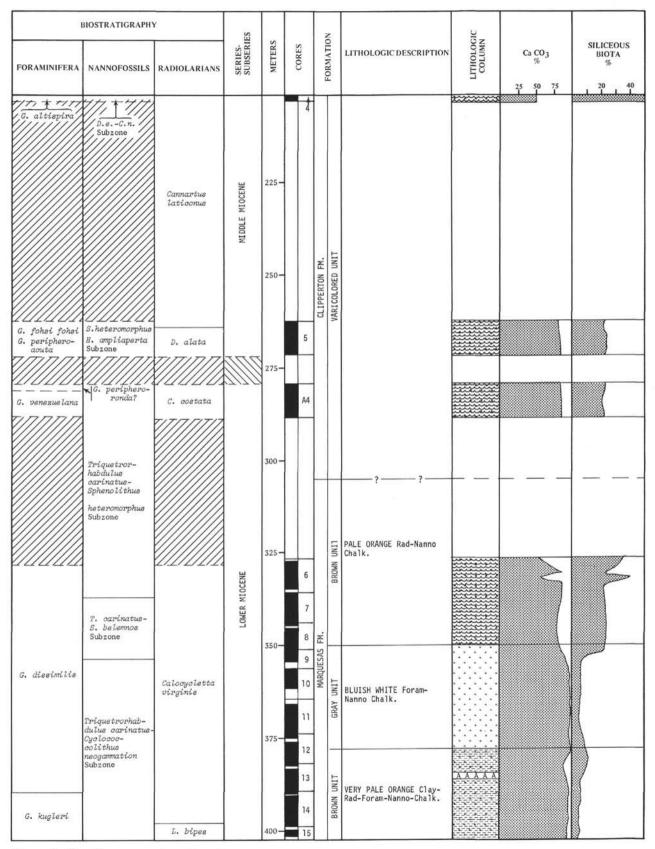


Figure 5. Site 79 summary (continued).

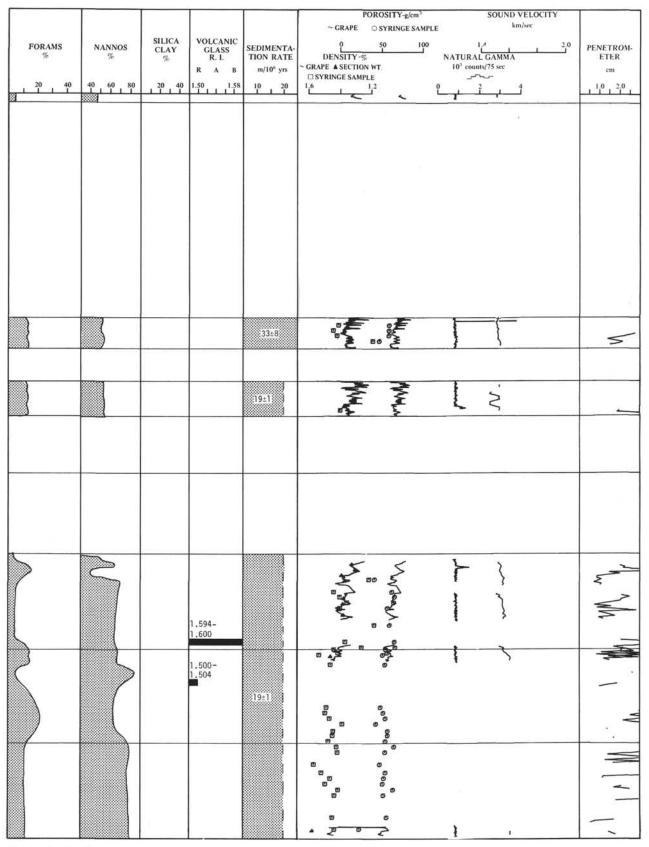


Figure 6. Site 79 summary (continued).

3	BIOSTRATIGRAPH	Y	S			z		2		
FORAMINIFERA	NANNOFOSSILS	RADIOLARIANS	SERIES- SUBSERIES	METERS	CORES	FORMATION	LITHOLOGIC DESCRIPTION	COLUMN	Ca CO 3 %	SILICEOUS BIOTA %
G. kugleri	T. carinatus C. neogammation Subzone	L. bipes	LOWER		15 16 17	1 1 5	BASALT			
				425—		MEN1 T.D. 413.9		T.D. 1355.5 ft.		
				450-						
				475 —						
				500-						
				525-						
				550-						
				575—						
				600 —						

Figure 7. Site 79 summary (continued).

FORAMS %	NANNOS % 40 60 80	SILICA CLAY %	VOLCANIC GLASS R. L R A B 1.50 1.58	SEDIMENTA- TION RATE m/10 <sup>6</sup> yrs 10 20	~ GRAPE Q DENSITY- ~ GRAPE & SECTIO D SYRINGE SAM 1.6 I	N WT.	SAMPLE 100 NATUI 10 <sup>3</sup> c	SOUND VELC km/sec I 4 AL GAMMA AAL GAMMA ounts/75 sec 2 4	2.0	PENETROM- ETER cm 10 20
}	{			19±1	≣ga⁄ <sup>L</sup>	P <sup>1</sup>	*	3		-
					- - -					

Figure 8. Site 79 summary (continued).

Geologic Interval	Duration Geologic Interval (m.y.)	Sediment Thickness (meters)	Accumulation Rate (m/10 <sup>6</sup> yrs)
Pleistocene	1.8	18	10
Pliocene	3.2	51	16
Upper Miocene	5.0	72 ± 30	$14 \pm 6$
Middle Miocene	4.0	133 ± 33	33 ± 8
Lower Miocene (to base of section estimated age $21 \pm 1$ m.y.)	7.0	137 ± 3	19 ± 1

TABLE 3 Rates of Sedimentation, Site 79

TABLE 4 Spreading Rates Between Sites 77, 78 and 79

Site	Age of Oldest Sediment	Longitude	Degrees of Longitude	Distance Be	etween Sites	Difference in Basal Sed Age	Spreading Rate
Site	× 10 <sup>6</sup> yr	at Site	Between Sites	Naut. Miles	Kilometers	(m.y.)	km/10 <sup>6</sup> yr
77	36	133.1	77-78 = 5.7	352	632	4	155.0
78	33	127.4	78-79 = 5.9	354	651	12	54.2
79	21	121.5	77-79 = 11.6	696	1273	16	79.5

pale orange radiolarian foraminiferal nannofossil-chalk which in turn overlies basement. The oldest unit is of lower Miocene age.

The spot coring at this site has permitted us to determine the depth to various paleontological boundaries and thereby compare the thickness of various units and their rates of accumulation with our previous sites.

Table 3 presents the relevant data. At Site 79 the accumulation rates are about 15 m/m.y., except in the Middle Miocene where they are more than double this rate. One explanation for the high rates indicated in the Middle Miocene part of the section is that the productivity in the Middle Miocene time was much greater than either before or since. This phenomenon was not noted at our previous sites, in fact, at Site 77 the rates in the Middle Miocene, Upper Miocene and Pliocene were uniformly high  $(18 \text{ m}/10^6 \text{ yrs})$  when compared with the Oligocene and Lower Miocene 9

 $m/10^6$  yrs). Another possibility is that some local effect, such as slumping during middle Miocene time, caused these high rates although no extraordinary amount of older mixed fossils was found in this part of the section.

The closest zonal boundary to the base of this site is the top of the *Globorotalia kugleri* planktonic foraminiferal zone at 26 meters above the basalt. The average sedimentation rate in the lower Miocene of this site is about 16 m/m.y. The age of the upper limit of the *G. kugleri* Zone has been estimated as about  $20\pm1$  million years B.P. This would put the age of the basal sediments at this site at between 21 and 22 million years B.P.

If we assume that the time lines in the basement are perpendicular to the major fracture zones in the region (Clipperton, Clarion, etc) roughly north-south, then it is possible to compare the age of the sediments immediately overlying basement at the sites drilled so far and calculate the rate of sea-floor spreading between these sites. Table 4 presents the pertinent data.

Using the ages of the oldest sediment at Sites 77 and 79 and the distance between these sites gives a spreading rate of 79.5 km/m.y. The spreading rates between Sites 77 and 78 and between Sites 78 and 79 are very different. Site 78 is north of the Clipperton Fracture Zone and the age of its oldest sediment relative to the distance between it and the longitude

lines of Sites 77 and 79 suggest this site has undergone a right lateral displacement relative to Sites 77 and 79 of about 380 kilometers.

#### REFERENCE

Ewing, J., Ewing, M., Aitken, T. and Ludwig, W. J., 1968. North Pacific sediment layers measured by seismic profiling. In The Crust and upper mantle of the Pacific area. Knopoff, L., Drake, C. L. and Hart, P. J. (Eds.), Am. Geophys. Union, Geophys. Mon. 12, 147.

SERIES	ZONES	DEPTH BELOW SEA FLOOR FT. M.	SECTIONS	BARRELS	SAMPLES		ТАХА
PLEISTOCENE	P. obliquiloculata	25	1 2 3 4 5 6 1 2	1	+ + + ++ .	niscen tumi	G. scitula – G. hirsuta – G. tosæents –
	G. fistulosus?	50	2 3 4 5		+	- G. tumida nunida - S. del dii - G. tumida - G. dii - O. universa - G.	alis – G. conglobatu
UPPER PLIOCENE					-	G. tun G. menardii G. sacculifer -	G. glutinata — G. glutinata — G. glutinata — G. venezuelana — G. vrilis — G. crasaeformis — G. hexagona — G. obliquus — G. hexagona — G. hexag
UPPER PL	• G. tumida	- 125 - 40 - - - - - - - - - - - - -					

BIOSTRATIGRAPHIC CHART FORAMINIFERA

Figure 9. Site 79 Biostratigraphic Chart Foraminifera (0 to 200 feet).

SERIES SUBSERIES	ZONES SUBZONES	DEPTH BELOW SEA FLOOR FT. M.	SECTIONS	BARRELS	SAMPLES									TA	XA		
LOWER PLIOCENE	G. tumida ZONE SUBZON		0LD38	2 2 2A	TAUNDA + + + + + + + + + + + +	- G. tumida tamida - G. bulloides - G. menardii - G. tumida tamida - G. bulloides - G. menardii - G. menardiii - G. menardii - G. menardii - G	G. secculterG. tumida flexuosaG. tumida flexuosa	G. acquilateralis	-G. glutinata -	G. venezuelana	G. pherosona - G. obliquits -	P. primalis	G altimiter S, subdehiscens		-0. bilobata	S. seminutina	- G. anfracta
UPPER MIOCENE																	

Figure 10. Site 79 Biostratigraphic Chart Foraminifera (200 to 400 feet).

BIOSTRATIGRAPHIC CHART FORAMINIFERA

SERIES SUBSERIES	ZONES	DEPTH BELOW SEA FLOO FT. M		BARRELS	SAMPLES											1	TAXA					
UPPER MIOCENE	G. plestotumida	425 130 450	0 1 2 3 4 5 6	3	+ + +	- G. menardii O. universa - G. socuulifer -				G. obliquus	G. hexagona				wnida	unida						
	Indeterminate		1 2 3	1	+++++	0 ml	G. aonulatoonis - G. aonulatoonis -	G. glutinata	- G. Intobus		S. subdehiscens -	G. altispira	. humorosu	- Semijurlina - O. bilobata -		G. acostaensis –						
MIDDLE MIOCENE					+				G. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10	U. FCREARGI				1 or 1								

BIOSTRATIGRAPHIC CHART FORAMINIFERA

Figure 11. Site 79 Biostratigraphic Chart Foraminifera (400 to 600 feet).

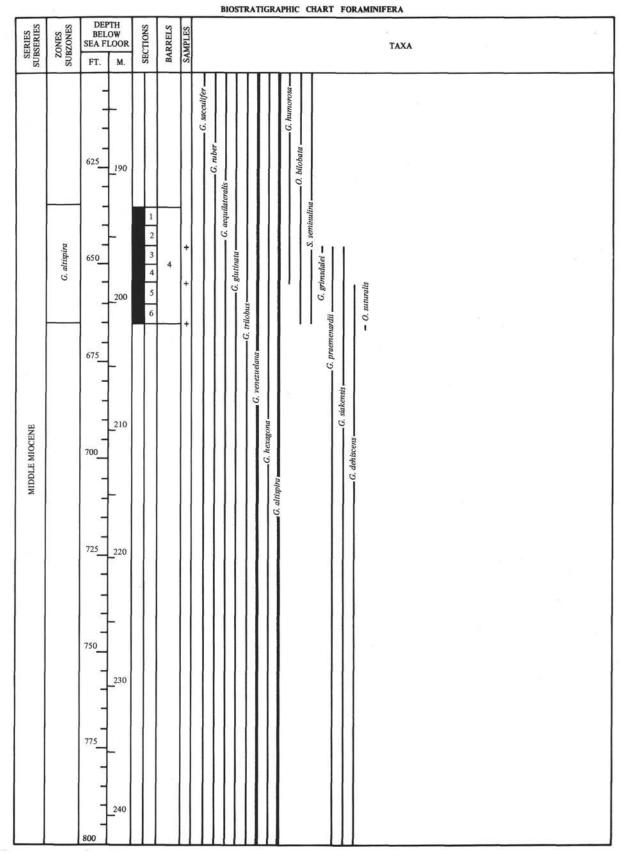


Figure 12. Site 79 Biostratigraphic Chart Foraminifera (600 to 800 feet).

SERIES	ZONES SUBZONES	DEPTH BELOW SEA FLOOR FT. M.	SECTIONS	BARRELS	SAMPLES	TAXA	
MIDDLE MIOCENE	G. fohsi fohsi G. peripheroacuta	- - - - - - - - - - - - - - - - - - -	1 2 3 4 5 6	5	+++++++++++++++++++++++++++++++++++++++	G. tritobus – G. aequitateralis – G. aequitateralis – G. tritobus – G. plutinata – G. aequitateralis – G. tritobus – G. aequitateralis – G. aequit	
	G. peripheronda?	- 270 			+	G. venezuelar G. hexagona G. praemenard G. peripheroacu	
	G, venezuelana	92 <u>5</u> 280	1 2 3 4 5 6	4A	+	G. altiquira G. altiquira G. peripheroronda G. insueta d. archaeomenardii	
LOWER MIOCENE		93 <u>0</u> 				G. an G. bradyiG. praescinila	

BIOSTRATIGRAPHIC CHART FORAMINIFERA

Figure 13. Site 79 Biostratigraphic Chart Foraminifera (800 to 1000 feet).

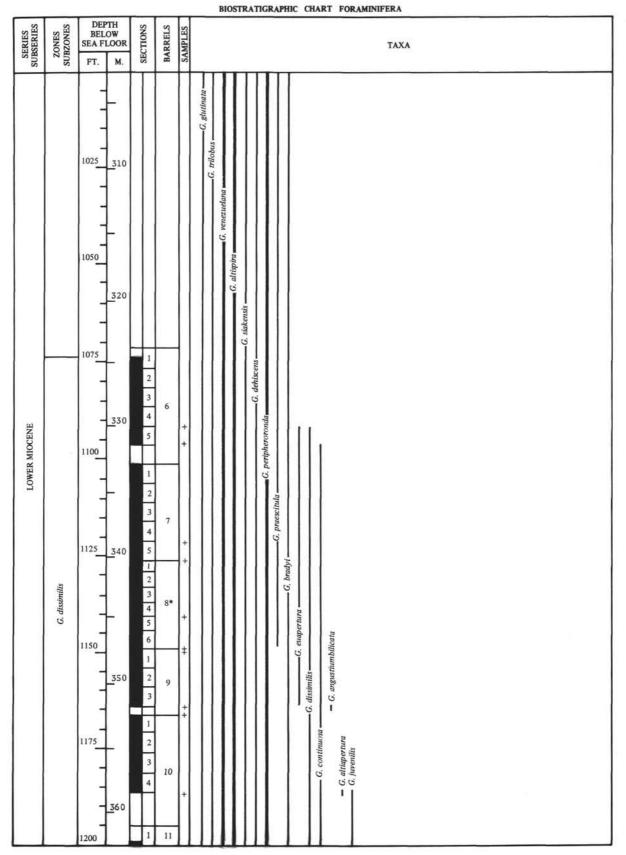
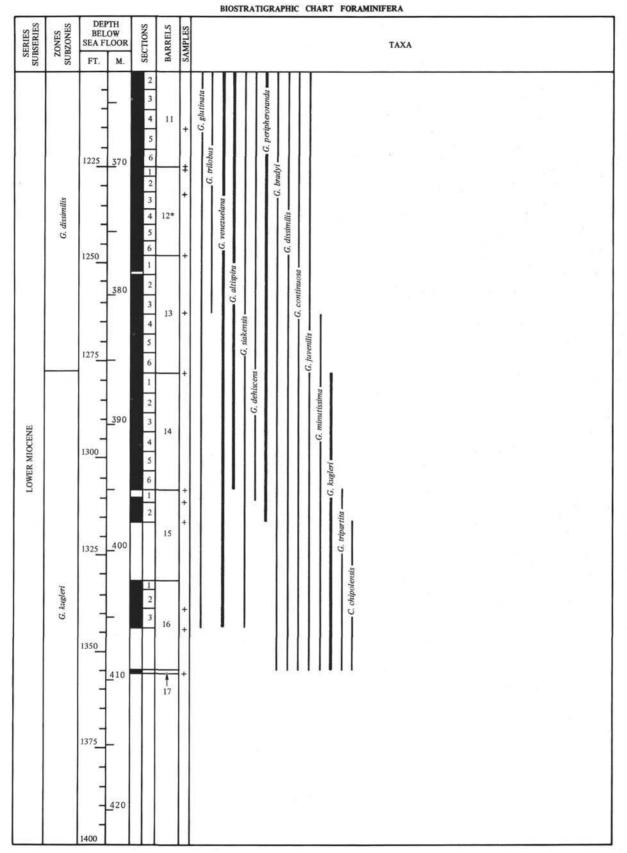
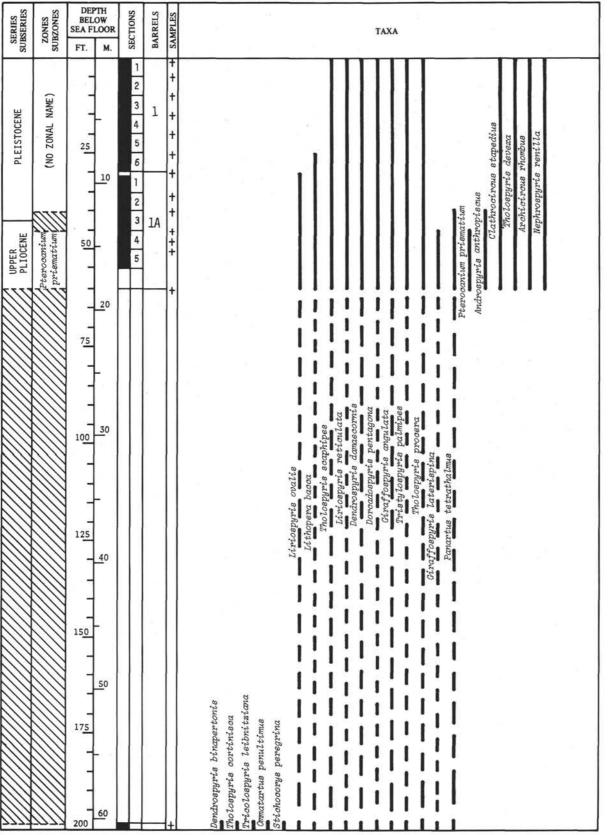


Figure 14. Site 79 Biostratigraphic Chart Foraminifera (1000 to 1200 feet).



## Figure 15. Site 79 Biostratigraphic Chart Foraminifera (1200 to 1400 feet).



BIOSTRATIGRAPHIC CHART RADIOLARIA

Figure 16. Site 79 Biostratigraphic Chart Radiolaria (0 to 200 feet).

SERIES SUBSERIES	ZONES SUBZONES	DEPTH BELOW SEA FLOOR FT. M.	SECTIONS	BARRELS	SAMPLES			GKAP				DIOLA	TA	XA								
LOWER PLIOCENE	Stichocorys peregrina	225 70	1 2 3 4 5 6 1	2	+++++++++++++++++++++++++++++++++++++++												Stichocorys peregrina	Tristylospyris palmipes	Tholospyris procera	Giraffospyris laterispina	Panartus tetrathalmus	
	Stichocory	250 - 80	1 2 3 4 5 6	2A	+++++++++++++++++++++++++++++++++++++++												Stichocor	Tristylos	hdso104L	Giraffospy	Panartus	
Э		275 - - - 90 300				Dendrospyris binapertonis	Tholospyris scaphipes	Tholospyris cortinisca	Liriospyris reticulata	Lithopera bacco	Dendrospyris damaecornis	Liriospyris ovalis	Tricolospyris leibnitziana	Dorcadospyris pentagona	Ommatartus penultimus	Giraffospyris angulata						
UPPER MIOCENE		- - - 325 - - - - - - - - - - - - - - - - - - -				Dendros		Thology	I I I I I I I I I I I I I I I I I I I		Dendros	I I Liri	Tricolos	Dorcado	Omnat	Girafi						
		- 350 - - 110 -				     																
		37 <u>5</u> - 120 400										       										

## BIOSTRATIGRAPHIC CHART RADIOLARIA

Figure 17. Site 79 Biostratigraphic Chart Radiolaria (200 to 400 feet).

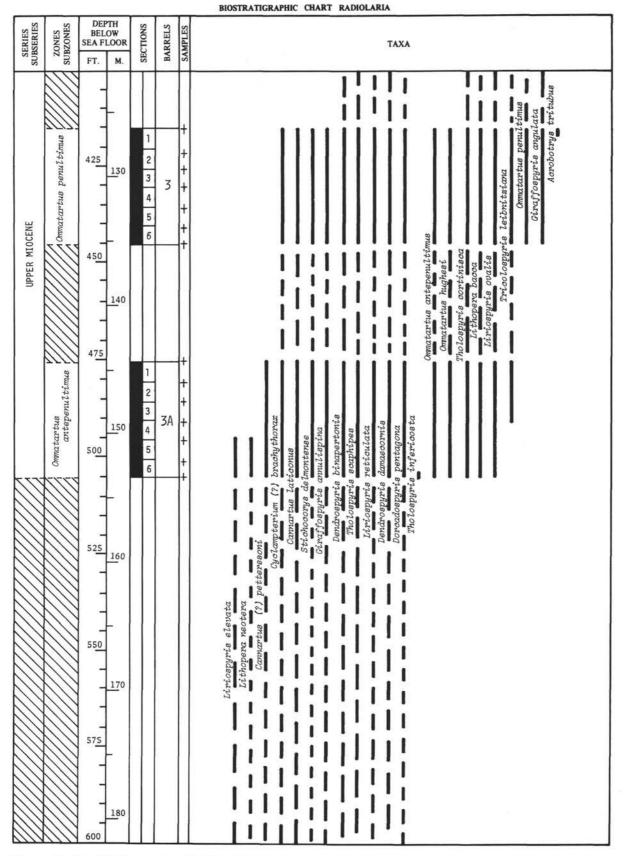


Figure 18. Site 79 Biostratigraphic Chart Radiolaria (0 to 200 feet).

IIIIIIIII Cannartue (?)		200	1 2 3 4 5 6	-++ ++ ++
	2  675 	<u>20</u> 0	3 4 4 5	1.1
	-			
	750	<u>2</u> 10 - <u>2</u> 20 -		

## BIOSTRATIGRAPHIC CHART RADIOLARIA

Figure 19. Site 79 Biostratigraphic Chart Radiolaria (600 to 800 feet).

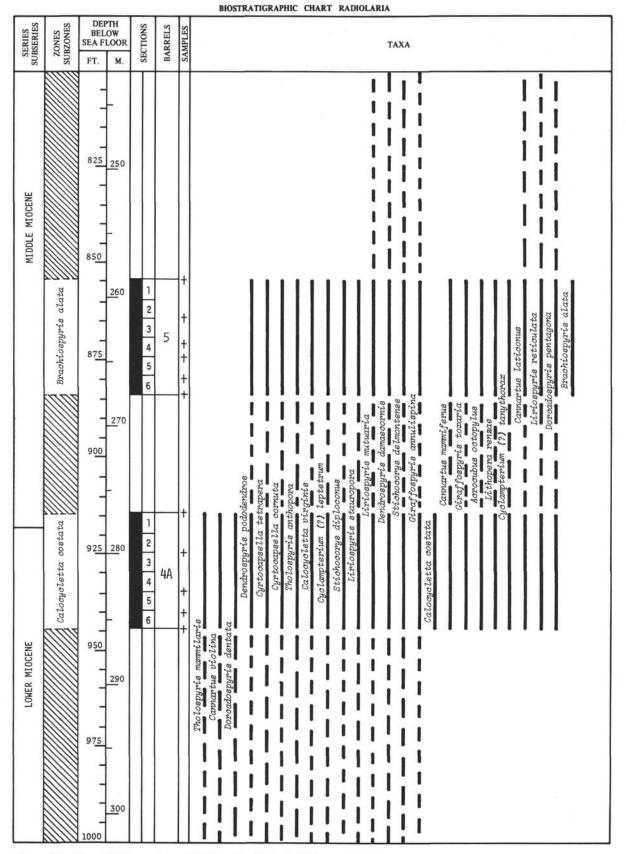


Figure 20. Site 79 Biostratigraphic Chart Radiolaria (800 to 1000 feet).

SERIES	ZONES	DEPTH BELOW SEA FLOOR FT. M.	SECTIONS	BARRELS	SAMPLES								т	AXA									
LOWER MIDCENE	Calooyoletta virginis	- 1025 310 - 1025 310 - 1050 - 320 - 1050 - 320 - 1075 - - 330 - 1100 - - - - - - - - - - - - -	1 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 5 1 2 3 3 4 5 1 2 3 3 4 5 1 2 3 3 4 5 5 1 2 3 3 4 5 5 1 2 3 3 4 3 4 5 5 1 2 3 3 4 4 5 5 1 2 3 3 4 4 5 5 1 2 3 3 4 4 5 5 1 2 3 3 4 4 5 5 1 2 3 3 4 4 5 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 5 1 2 3 3 4 4 5 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 4 5 1 2 3 3 4 5 1 2 3 3 4 1 2 3 3 4 4 5 1 2 3 3 4 1 2 3 3 4 4 5 1 2 3 3 4 1 2 3 1 2 3 1 2 1 2 3 1 2 3 1 2 3 3 4 1 2 1 2 3 1 2 1 2 3 1 2 1 2 3 1 2 3 1 2 1 2	9	+++++++++++++++++++++++++++++++++++++++	Brachiospyris simplex Lydrinocarium bipes	Dipodospyris forcipata Tympanidium binoctonum	Camartus prismaticus	Gorgospyris schizopodia	Dendrospyris pododendros	Cyrtocapsella tetrapera	Cyrtocapsella cormuta	Tholospyris anthopora	Litrospyris mutuaria	Calooyeletta virginis	Cyolampterium (?) leptetrur	Stichocorys diplocomus	Tholospyris mannitaris	Stichocorys delmontense	Circifospyris anulispina	Cyrtocapsella elongata Dorcadospyris dentata	Liriospyris stauropora	

## BIOSTRATIGRAPHIC CHART RADIOLARIA

Figure 21. Site 79 Biostratigraphic Chart Radiolaria (1000 to 1200 feet).

	<b></b>	Dimen	r	<u> </u>	-	BIOSTR	ATIG	RAPHIC	CHA	RT F	ADIO	OLAR	IA	_	_								
SUBSERIES	ZONES	DEPTH BELOW SEA FLOOR FT. M.	SECTIONS	BARRELS	SAMPLES								TAX	(A									
LOWER MIDCENE	Indeterminant	$\begin{array}{c} - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - $	2 3 4 5 6 1 2 3 4 5 5 6 1 2 3 4 5 5 6 1 2 3 4 5 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 5 6 1 2 3 4 5 5 6 1 2 3 4 5 5 6 1 2 3 4 5 5 6 1 2 3 4 5 5 6 1 2 3 4 5 1 2 3 4 5 5 1 2 3 4 5 5 1 2 3 1 2 5 1 2 3 1 2 5 1 2 3 1 2 5 1 2 3 1 2 5 1 2 3 1 2 1 2 3 1 2 1 2 1 2 1 2 1 2 1 2	11 12* 13 14	++++++++++++++++++++++++++++++++++++++	Hexaspyris papilio Denårospyris pamosa	Lychnocarium bipes	Dipodospyris foreipata	Dendrospyris pododendros	Cyrtocapsella tetrapera	Cyrtocapsella cormuta	Tholospyris arthopora	Cyclampterium (?) pegetrum	Brachtiospyris simplex	Cannartus prismaticus	Liriospyris mutuaria	Dendrospyris damaecornis	Calooyoletta virginis	Cyclampterium (?) leptetrum	Gorgospyris schizopodia	Stichocorys diploconus	Tholospyris mammilaris	

Figure 22. Site 79 Biostratigraphic Chart Radiolaria (1200 to 1400 feet).

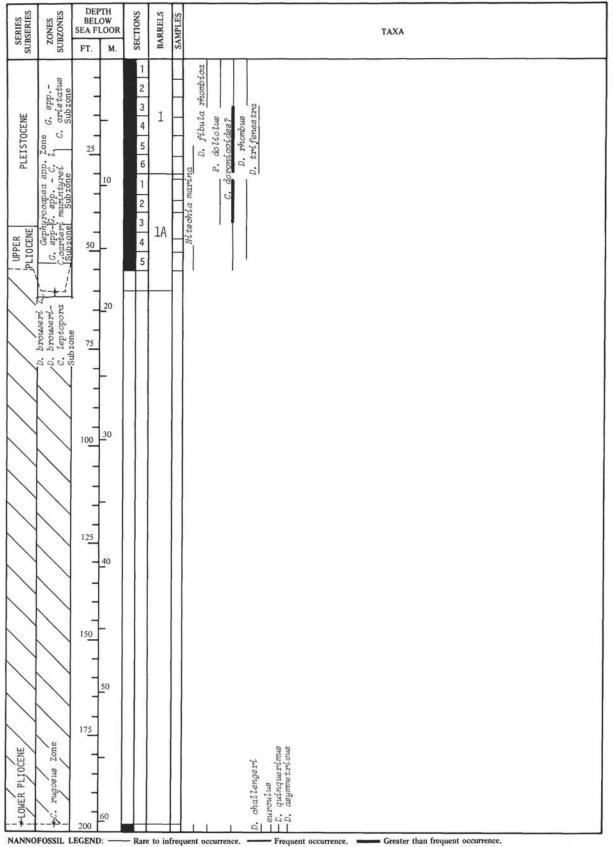


Figure 23. Site 79 Biostratigraphic Chart Nannofossils (0 to 200 feet).

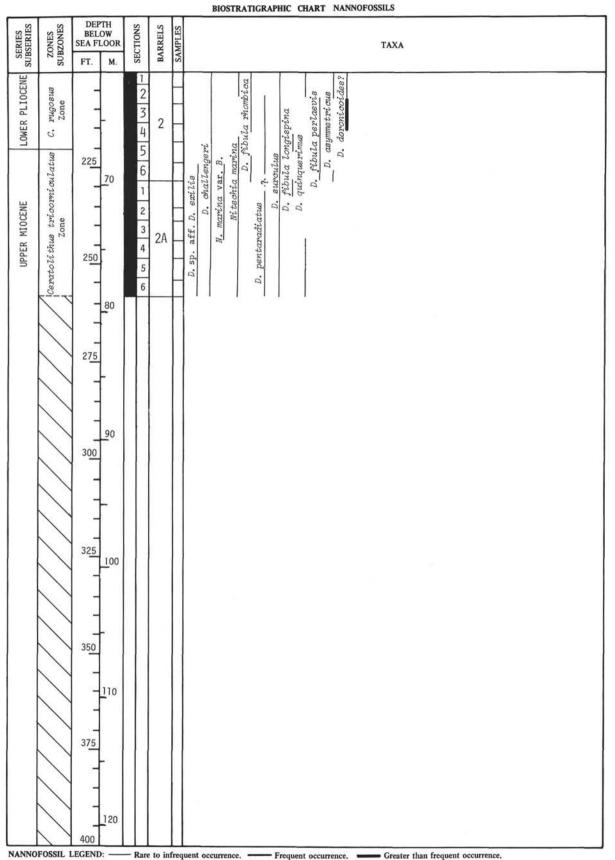


Figure 24. Site 79 Biostratigraphic Chart Nannofossils (200 to 400 feet).

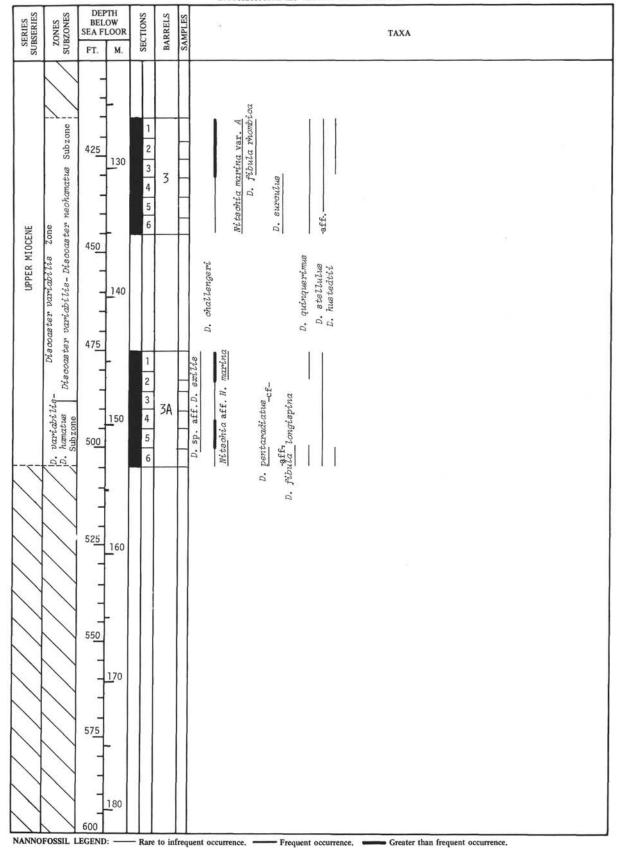
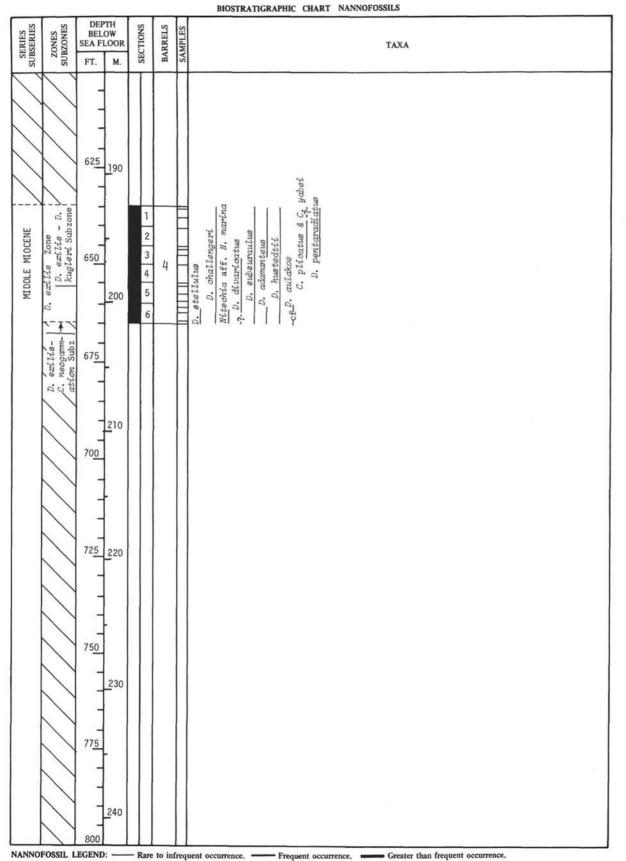


Figure 25. Site 79 Biostratigraphic Chart Nannofossils (400 to 600 feet).



SERIES SUBSERIES ZONES SUBZONES	DEPTH BELOW SEA FLOOR FT. M.	SECTIONS BARRELS	SAMPLES	BIOSTRATIGRAPHIC CHART NANNOPOSSILS
MIDDLE MIOCENE Sphenolithus heteromorphus Zone S. heteromorphus - H. selliti Suhr	825 250 825 250 - 850 - 260 - 875 - 270 900	1 2 3 4 5 6		t D. a. obtueue D. adamenteue D. entetlengeri D. vhallengeri
LOWER MIOCENE Tréquetrormabdulus carénatus Zone T. carénatus - S. heteromorphus Subzone		1 2 3 4 5 6	Ħ	0. sipenroulus <u>D. aubeurroulus</u> <u>D. aubeurroulus</u> <u>D. aerroulus</u> <u>D. aerroulus</u> <u>D. aerroulus</u> <u>D. aerroulus</u> <u>D. aerroulus</u> <u>D. aerroulus</u>

NANNOFOSSIL LEGEND: ----- Rare to infrequent occurrence, ----- Frequent occurrence, ----- Greater than frequent occurrence.

Figure 27. Site 79 Biostratigraphic Chart Nannofossils \*800 to 1000 feet).

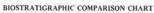
Jongin Michael         Andreating         Torpication         Torpication
Fi H     360       I     1       NANNOFOSSIL     LEGEND:

war et obside selosition and to miniquem occurrence. — Prequem occurrence. — Greater than requem oc

Figure 28. Site 79 Biostratigraphic Chart Nannofossils (1000 to 1200 feet).

SERIES SUBSERIES	ZONES SUBZONES	DEPTH BELOW SEA FLOOR FT. M.	SECTIONS BARREI S	SAMPLES			RT NANNOF	TAXA		
		- - 1225 370 -	2 3 4 5 6 1 2 3 4 12 5 6 1							
	Subzone	1250	3 4 12 5 6	2*						
LOWER MIOCENE	Triquetrorhabäulus carinatus Zone abäulus carinatus – Discoaster äruggii	- <u>380</u> 	2 3 4 5 6	3	w. trinidadensis D. w. nephados D. a. obtusus	D. divaricatus D. adamarteus				
LOWER	Triquetrorhabdulus carinatus -	- - <u>390</u> - 1300 -	1 2 3 4 5 6	4	D.					
	Triqu	- - 1325 400	2	5	D. w. lidzii	ļ				
		1350	1 2 3 1	6						
		- <u>4</u> 10 - -	1	7	1 1	1				
		13 <u>75</u>								
		1400								

NANNOFOSSIL LEGEND: ----- Rare to infrequent occurrence. ----- Frequent occurrence, ----- Greater than frequent occurrence.



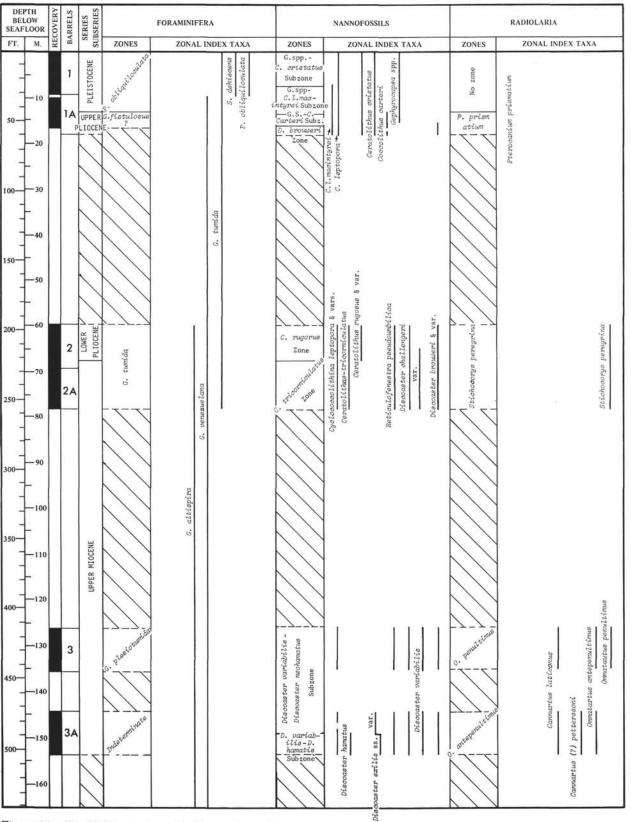


Figure 30. Site 79 Biostratigraphic Comparisons Chart.

DEPTH BELOW SEAFLOOR	RECOVERY	BARRELS	SERIES SUBSERIES	FORAMINIFER/	۸.		NANNOFOSSILS		RADIOLARIA
FT. M.	REC	BA	SIB	ZONES ZONAL IN	DEX TAXA	ZONES	ZONAL INDEX TAXA	ZONES	ZONAL INDEX TAXA
550 			/ /			//	s. tia		
650 		4		. altiopira	D.a C.	D. exilis - D. kugleri Subzone . neoganmatic	<u>ă C. leptopora 6 vars.</u> Discoaster kugleri 6 vars. Discoatter exilis 6 var. Reticulotenestr <u>a pseudoumb</u> ilica	C-101 Batterson	Carmontus (?) pettermant
700			ENE				Di		8 8 8
750			MIDDLE MIOCENE				-94		
850-260 		5	G. G.	schart fohsi partpheroasuta	а. <u>рет</u> фриемоданка со			B. alata	ita Brachio epyris alata Camartus tatioonus
900		4A		peripharoronda venenuelana		tue -	Cyalcococotithus leptoporus Sphenoitthus heteromorphus Sphenoitthus heteromorphus Heticopontosphaeru arpliquerta Cyalcocococitthus neogarmation Cyalcocococitthus neogarmation	C. costata	Calooyoletta ooetata Braa
			LOWER MIOCENE	G. peripheroronda		Tréquetrorhabálulus carénatus Sphenolíthua heteromorphus Subzone	Cyclos Sphemo Friquetrorhabáulus ocrinctus G		Calooyoletta virgiris
		6	-	dissímilis			Triquetro		catoayole

BIOSTRATIGRAPHIC COMPARISON CHART

Figure 31. Site 79 Biostratigraphic Comparisons Chart (continued).

DE BE SEAI	PTH LOW FLOOR	RECOVERY	BARRELS	SERIES SUBSERIES		FO)	RAMI	NIFEF	A			NANNOFOSSILS		RADIOLARIA
FT.	М.	REC	BA	SUB	ZONES		zo	NAL I	NDEX TAXA	ZON	ES	ZONAL INDEX TAXA	ZONES	ZONAL INDEX TAXA
1100-			6 7 8 9						S.	I. continatus - Setemnos - S. belemnos	inatus morph one auozquo	ZONAL INDEX TAXA       ZONAL INDEX TAXA       sequence       ashydromo.reg.ay       sequence       sequenc		
1200-			) 10 11 12	LOWER MIOCENE	dioeimi iie		sáa			÷	Subzone		Calocycletta virginis	lyðnacantum bíþea Calayciatta virginia
1250-			13 14 15		G. kuglerê G.	G. kugleri		G. venezuelana G. venezuelana		Triquetrorhabdulue carinatue	D. druggii	Sphenolithus sp. aff. belemnos Triquetrorhabdulus carhinius Cyalosocolithus mogamention Coccolithus mogamention	L. bîpas	
1350			16 17						I					
- 1450- - - - 1500- - - - - - - - - - - - - - - - - - -														
1550- - - - 1600- -														

## BIOSTRATIGRAPHIC COMPARISON CHART

Figure 32. Site 79 Biostratigraphic Comparisons Chart (continued).

355

SERIES- SUBSERIES	METERS	SEC TIONS	LITH COLUMN	SMEAR	% <b>CaCo</b> 3 25 50 75	LITHOLOGIC DESCRIPTION
		1				CLIPPERTON FORMATION Cyclic Unit Interbedded in 1 to 10 cm. thick beds with sharp
	2 111	2		*		upper and lower contacts. About 40% is DARK YELLOWISH BROWN (10YR4/2), calcareous nannofossil (10%-20%) - clay (20%-30%) - foraminiferal (20%-30%) - radiolarian (30%-40%) chalk ooze. About 40% is PALE BROWN (5YR5/2), clay (5%-10%) - foraminiferal (15%-20%) - calcareous nannofossil
Е	-3 -3 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	3		*		(50%-60%) ooze. About 20% is VERY PALE ORANGE (10YR8/2), foraminiferal (15%-20%) - radiolarian (20%-30%) - calcareous nanno- fossil (50%-70%) ooze.
EISTOCEN	4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
ΡL	° 6	4		*		
	7					
	8	6				

Figure 33. Hole 79, Core 1 (1 to 9.1 m).

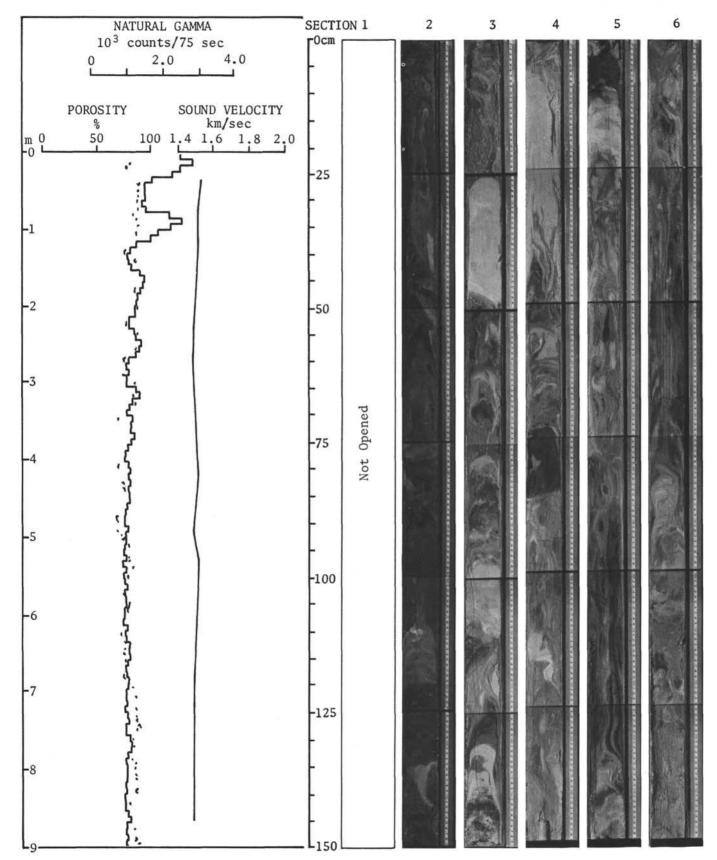


Figure 34. Hole 79, Core 1, Sections 1-6, Physical Properties.

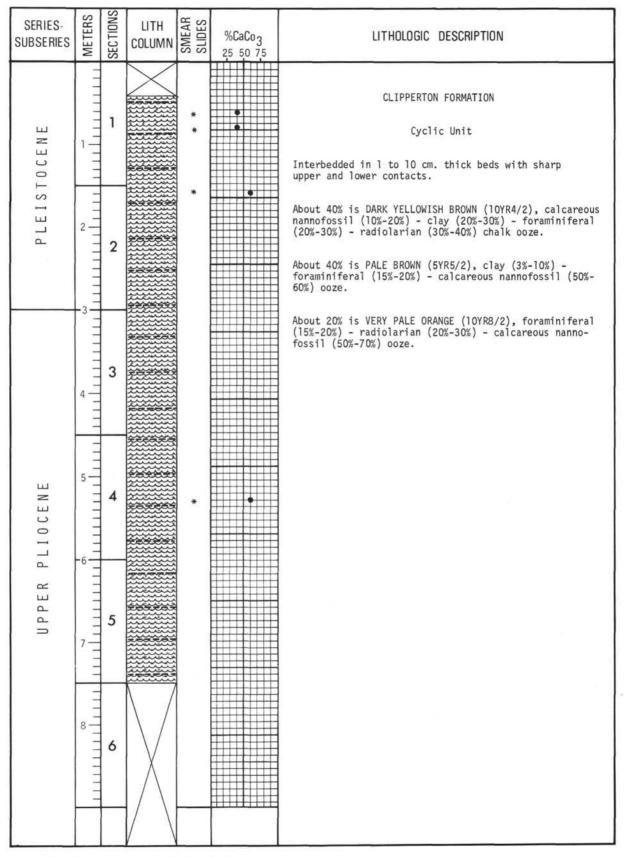


Figure 35. Hole 79A, Core 1 (9.1 to 18.3 m).

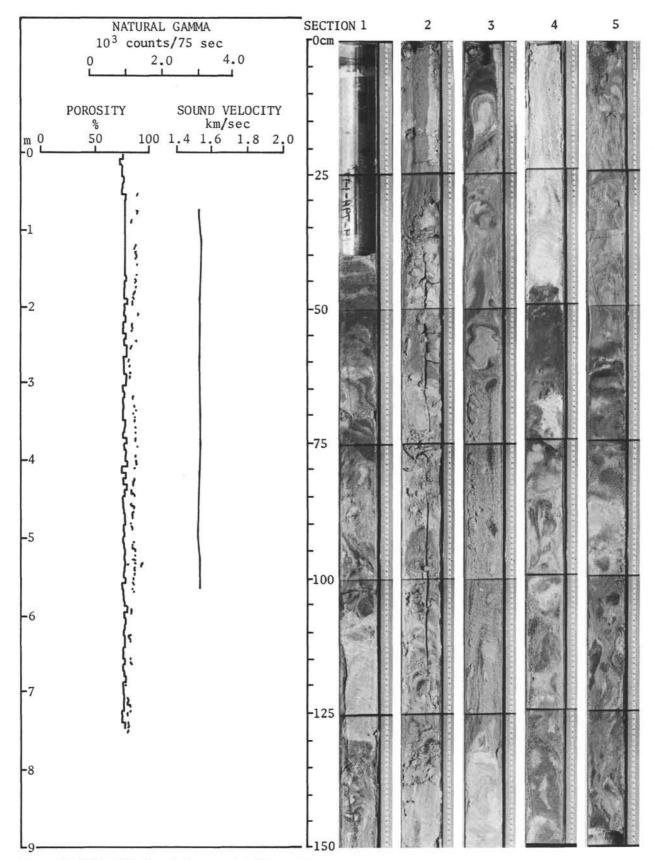


Figure 36. Hole 79A, Core 1, Sections 1-5, Physical Properties.

SERIES- SUBSERIES	METERS	SEC TIONS	LITH COLUMN	SMEAR	% <b>CaCo</b> 3 25 50 75	LITHOLOGIC DESCRIPTION
	1111111	1		* *		TOP CLIPPERTON FORMATION Varicolored Unit
Е	2	2		*		Moderately to intensely disturbed. Interbedded colors in beds 1 to 20 cm. thick that occassionally have nondisturbed horizontal laminations 1 to 2 mm. thick. About 60% is PALE GREENISH YELLOW (10YR8/2) to LIGHT GREENISH GRAY (568/1), radiolarian (30%-40%) - calcareous nannofossil (50%-60%) ooze with foraminifers
0 C E N	-3					5%-10%. About 30% is PALE PURPLE (5P6/2) to VERY DUSKY PURPLE (5P2/2), manganese (10%-40%) - calcareous nannofossil (30%-40%) - radiolarian (30%-40%) ooze with foraminifers 5%-10%.
LOWER	4 1 1	3				About 10% is WHITE (N9), foraminiferal (10%-15%) - radiolarian (30%-40%) - calcareous nannofossil (40%- 60%) ooze.
	5	4				
N E	7	5		*		
UPPER MIOCE	8 11 11 11 11	6		*		

Figure 37. Hole 79, Core 2 (60.3 to 69.5 m).

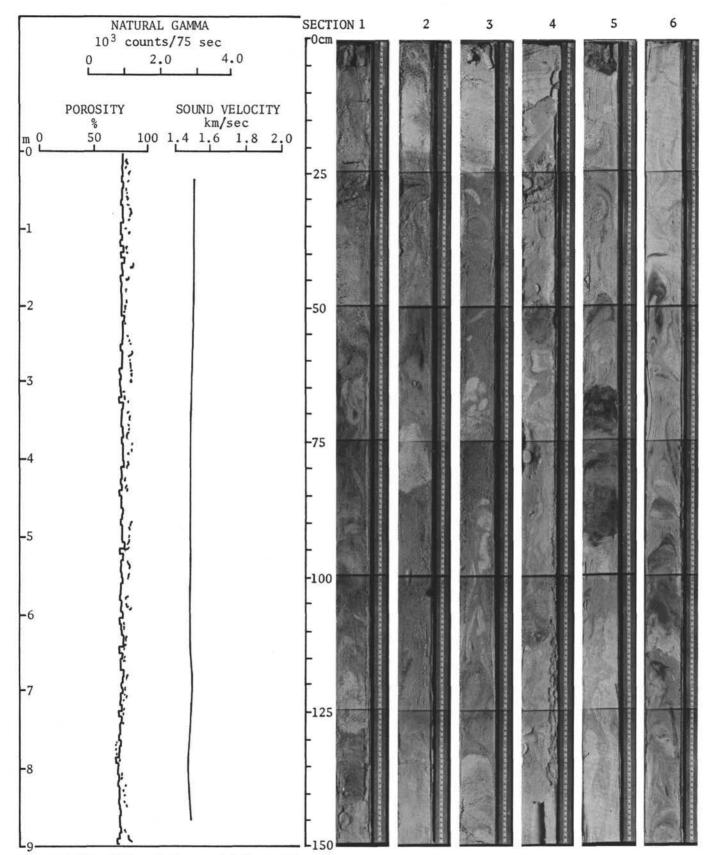


Figure 38. Hole 79, Core 2, Sections 1-6, Physical Properties.

SERIES- SUBSERIES	METERS	SECTIONS	LITH Column	SMEAR	% <b>CaCo</b> 3 25 50 75	LITHOLOGIC DESCRIPTION
	111111111	1		*		CLIPPERTON FORMATION Varicolored Unit Interbedded in 2 mm. to 2 cm. thick beds with sharp
	2	2				contacts. About 60% is PALE GREENISH YELLOW (10YR8/2) to LIGHT GREENISH GRAY (568/1), radiolarian (30%-40%) - calcareous nannofossil (50%-60%) ooze with foraminifers (5%-10%). About 30% is PALE PURPLE (5P6/2) to VERY DUSKY PURPLE
0 C E N E	-3 111111111111111111111111111111111111	3		*		<pre>(5P2/2), manganese (10%-40%) - calcareous nannofossil (30%-40%) - radiolarian (30%-40%) ooze with foraminifers 5%-10%. About 10% is WHITE (N9), foraminiferal (10%-15%) - radiolarian (30%-40%) - calcareous nannofossil (40%- 60%) ooze.</pre>
UPPER MI(	5	4				
	7	5				
	» «	6		*		

Figure 39. Hole 79A, Core 2 (69.5 to 78.6 m).

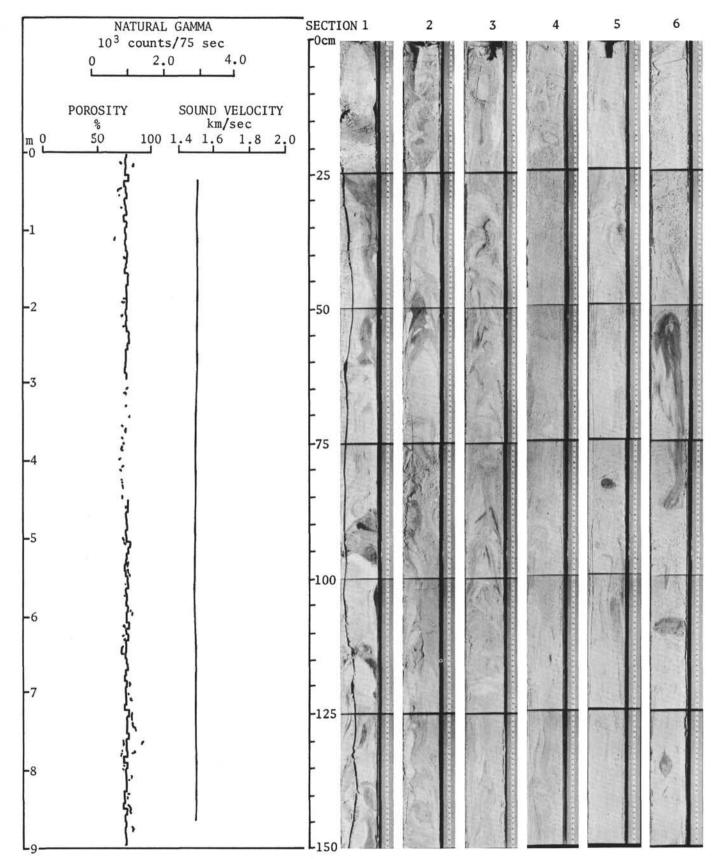


Figure 40. Hole 79A, Core 2, Sections 1-6, Physical Properties.

SERIES- SUBSERIES	METERS	SEC TIONS	LITH COLUMN	SMEAR	% <b>CaCo</b> 3	LITHOLOGIC DESCRIPTION
UPPER MIDCENE 2002 2 KIE2	J 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1		* <sup>8</sup> *		CLIPPERTON FORMATION Varicolored Unit Intensely to moderately disturbed. Interbedded colors in 2 mm. to 20 cm. thick beds with both sharp and gradational color contacts. About 70% is LIGHT BLUISH GRAY (587/1), radiolarian (30%-40%) - calcareous nannofossil (60%-70%) ooze with about 5% foraminifers. About 20% is LIGHT GREENISH GRAY (568/1), calcareous nannofossil (30%-40%) - radiolarian (50%-60%) ooze with about 5% foraminifers. About 10% is PALE PURPLE (5P6/2) to VERY DUSKY PURPLE (5P2/2), manganese (10%-30%) - calcareous nannofossil (30%-40%) ooze with about 5% foraminifers. Rare VERY PALE ORANGE (10YR8/2), radiolarian (30%-40%) - calcareous nannofossil (60%-70%) ooze.

Figure 41. Hole 79, Core 3 (126.8 to 135.9 m).

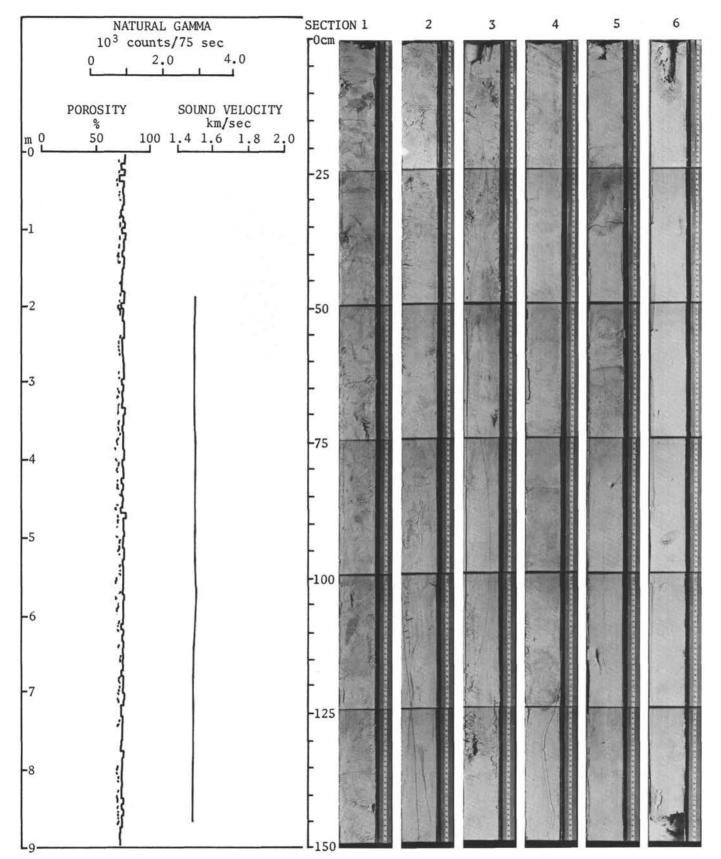


Figure 42. Hole 79, Core 3, Sections 1-6, Physical Properties.

SERIES- SUBSERIES	METERS	SEC TIONS	LITH COLUMN	SMEAR SLIDES	% <b>CaCo</b> 3 25 50 75	LITHOLOGIC DESCRIPTION
		1		*		CLIPPERTON FORMATION Varicolored Unit
				*		About 70% is LIGHT BLUISH GRAY (5B7/1), radiolarian (30%-40%) - calcareous nannofossil (60%-70%) ooze with about 5% foraminifers.
	2	2				About 20% is LIGHT GREENISH GRAY (5G8/1), calcareous nannofossil (30%-40%) - radiolarian (50%-60%) ooze with about 5% foraminifers.
	-3					About 10% is PALE PURPLE (5P6/2) to VERY DUSKY PURPLE (5P2/2), manganese (10%-30%) - calcareous nannofossil (30%-40%) - radiolarian (30%-40%) ooze with about 5% foraminifers.
CENE	4	3		*		Rare VERY PALE ORANGE (10YR8/2), radiolarian (30%-40%) - calcareous nannofossil (60%-70%) ooze.
ER MIO						
U P P I	5	4				P
	<sup>-6</sup>	5				
	8	6				
	-					

Figure 43. Hole 79A, Core 3 (145.1 to 154.2 m).

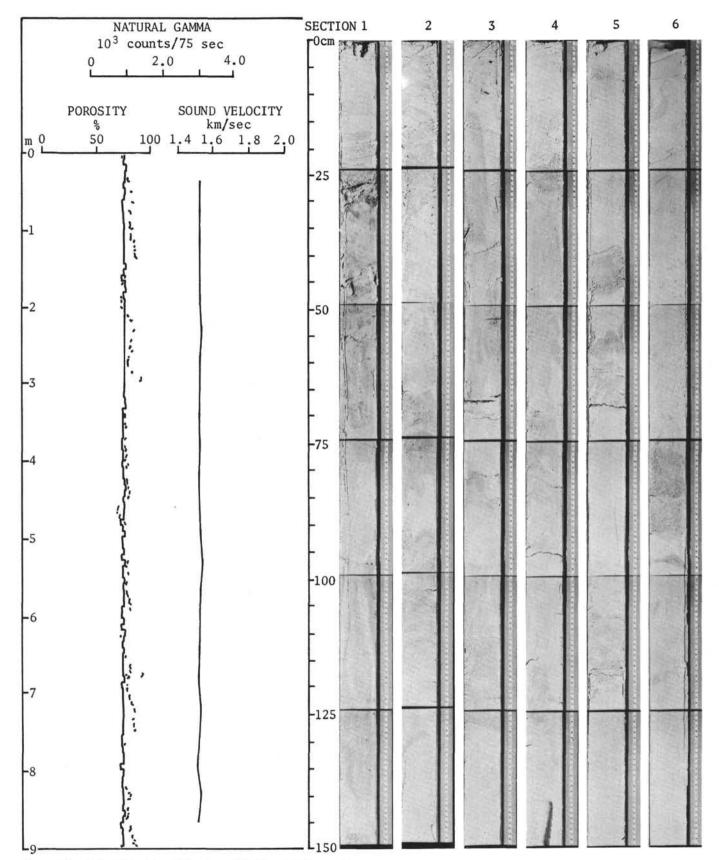


Figure 44. Hole 79A, Core 3, Sections 1-6, Physical Properties.

SERIES- SUBSERIES	METERS	SEC TIONS	LITH COLUMN	SMEAR	%CaCo <sub>3</sub> 25 50 75	LITHOLOGIC DESCRIPTION
	111111111111	1		*		CLIPPERTON FORMATION Varicolored Unit Moderately disturbed. Massive appearing with sugges- tions of laminations but core too deformed to be
	2			*		certain. About 95% is BLUISH WHITE (5B9/1) to LIGHT BLUISH WHITE (5B9/1) to LIGHT BLUISH GRAY (5B7/1), radiolarian (30%-40%) - calcareous nannofossil (50%-60%) ooze chalk with minor amounts of foraminifers. About 5% is GREENISH GRAY (5G6/1), radiolarian - calcareous nannofossil ooze chalk.
MIOCENE	-3 -1 4 -1	3		*		carcareous namorossir ouze chark.
MIDDLE M	5 5 5	4		*		
	-6	5				
	8 8 11111111	6		*		

Figure 45. Hole 79, Core 4 (193.5 to 202.7 m).

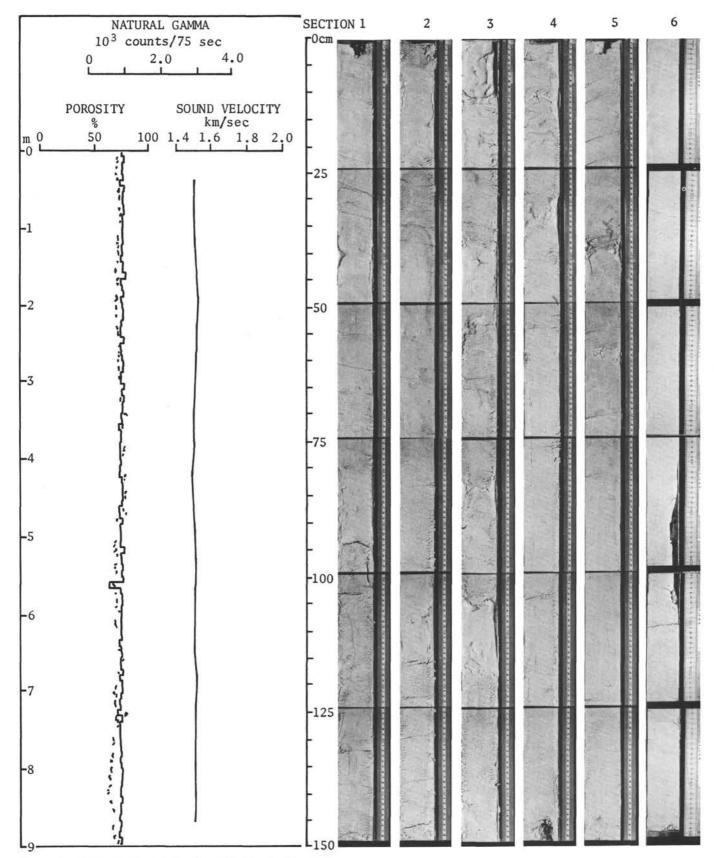


Figure 46. Hole 79, Core 4, Sections 1-6, Physical Properties.

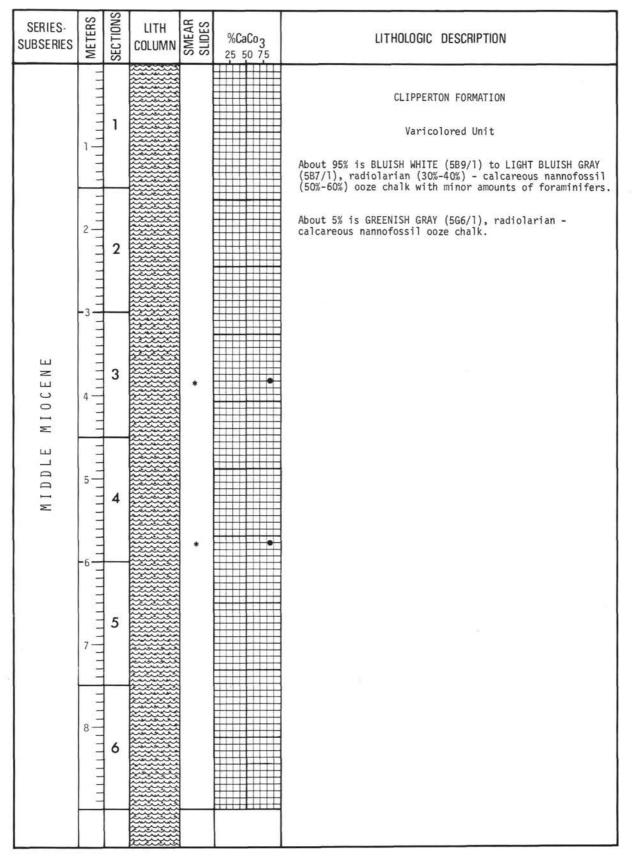


Figure 47. Hole 79, Core 5 (260.3 to 269.4 m).

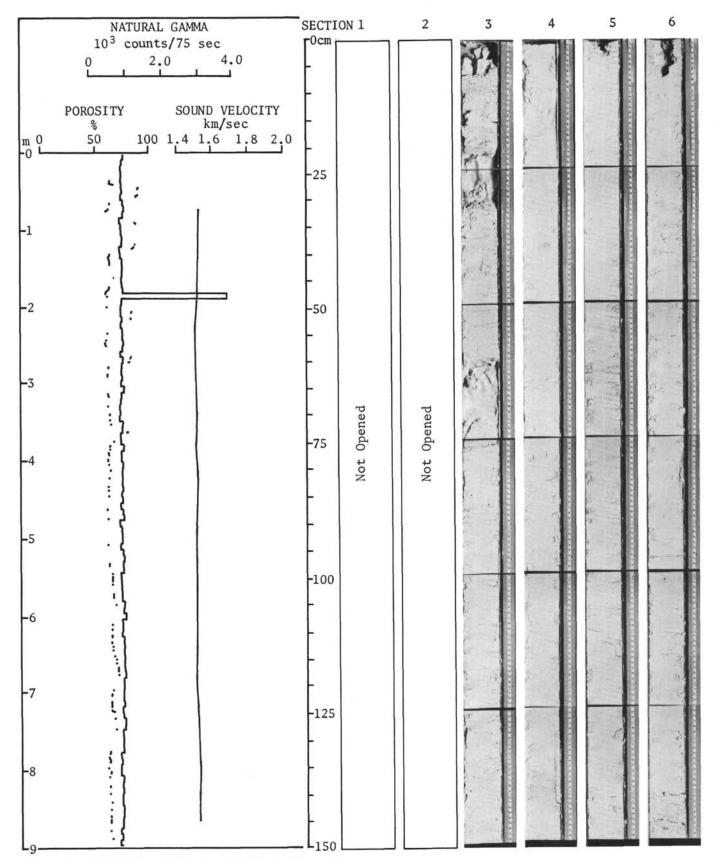


Figure 48. Hole 79, Core 5, Sections 1-6, Physical Properties.

SERIES- SUBSERIES	METERS	SEC TIONS	LITH Column	SMEAR SLIDES	% <b>CaCo</b> 3 25 50 75	LITHOLOGIC DESCRIPTION
	111111	1				CLIPPERTON FORMATION Varicolored Unit About 95% is BLUISH WHITE (5B9/1) to LIGHT BLUISH GRAY (5B7/1), radiolarian (30%-40%) - calcareous nannofossil (50%-60%) ooze chalk with minor amounts of foraminifers.
	2					(50%-60%) ooze chaik with minor amounts of foraminiters. About 5% is GREENISH GRAY (5G6/1), radiolarian - calcareous nannofossil ooze chalk.
IOCENE	-3           4	3				
LOWER M	5 1111111	4				
	7	5				
	8	6		*		

Figure 49. Hole 79A, Core 5 (278.6 to 287.7 m).

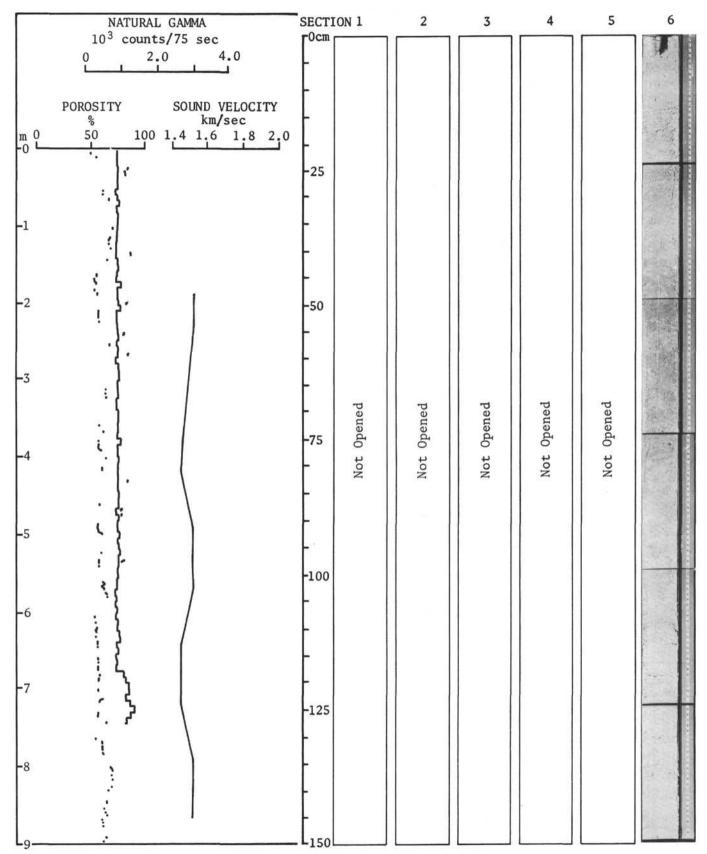


Figure 50. Hole 79A, Core 4, Sections 1-6, Physical Properties.

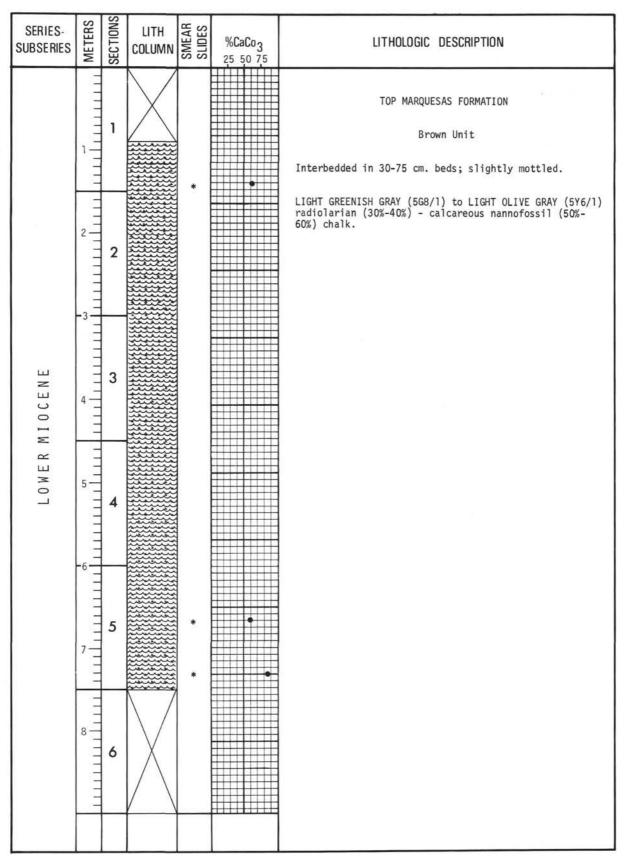


Figure 51. Hole 79, Core 6 (326.7 to 335.9 m).

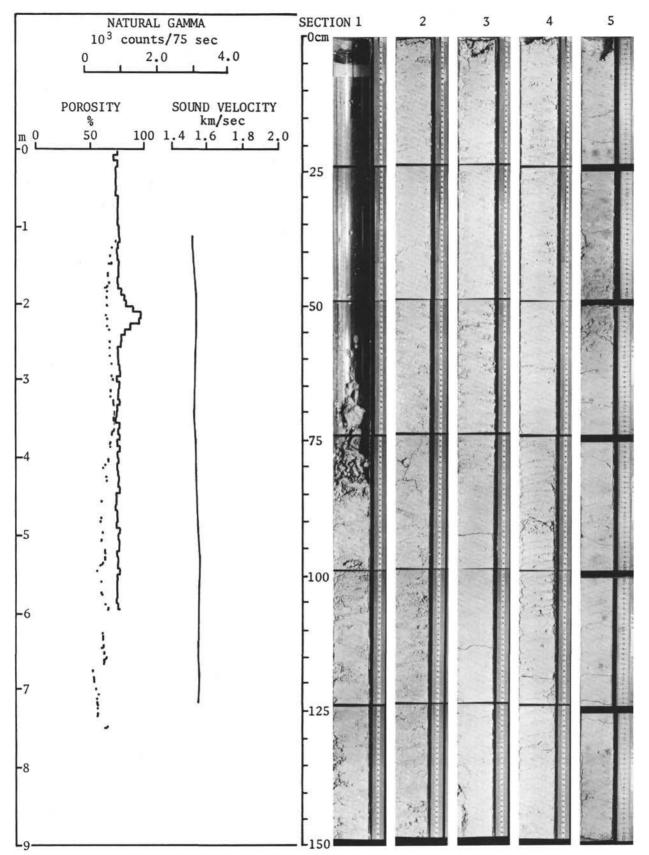


Figure 52. Hole 79, Core 6, Sections 1-5, Physical Properties.

SERIES- SUBSERIES	METERS	SEC TIONS	LITH COLUMN	SMEAR	%CaCo3	LITHOLOGIC DESCRIPTION
	1111111	1				MARQUESAS FORMATION
	1			*		Brown Unit Bedded in 15-30 cm. thick beds with color contacts
	2	2		*		gradational over 5-10 mm. intervals. PALE ORANGE (10YR7/2), radiolarian (15%) - calcareous nannofossil (80%) chalk.
	<b>1</b> 3					VERY PALE ORANGE (10YR8/2), foraminiferal (15%) - radiolarian (25%) - calcareous nannofossil (60%) chalk with trace of clay.
	Ē					GRAYISH ORANGE PINK (10R8/2), radiolarian - calcareous nannofossil chalk with about 1% clay.
IOCENE	4	3				
LOWER M	ص 1111111111111	4				
	-6					×
	7	5				
	8	4	NOT			
		6	CORED			

Figure 53. Hole 79, Core 7 (335.9 to 345.0 m).

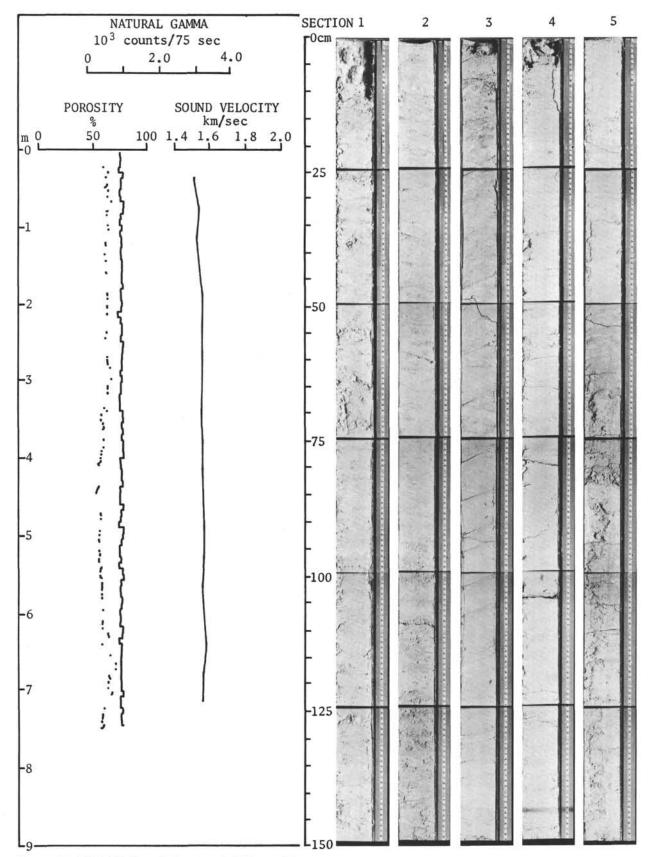


Figure 54. Hole 79, Core 7, Sections 1-5, Physical Properties.

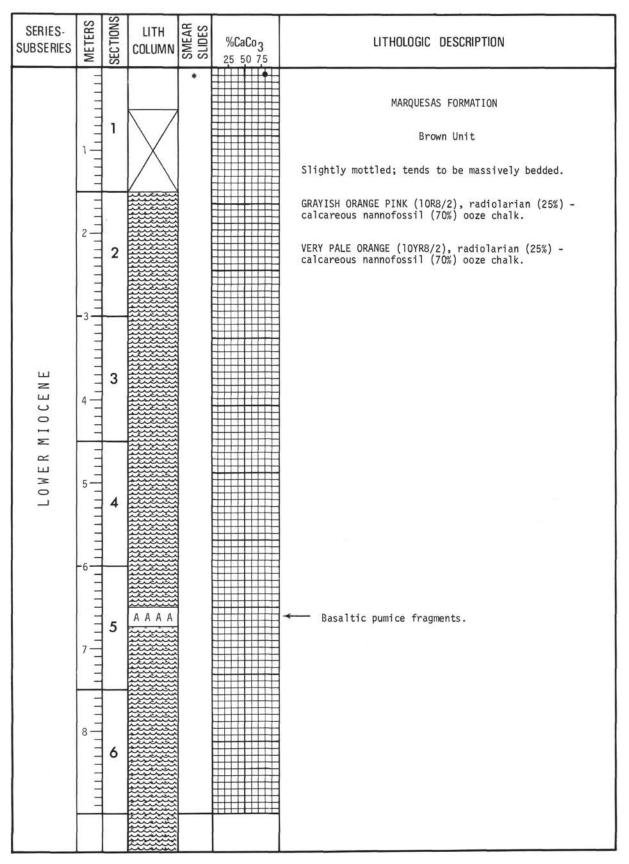


Figure 55. Hole 79, Core 8 (345.0 to 352.6 m).

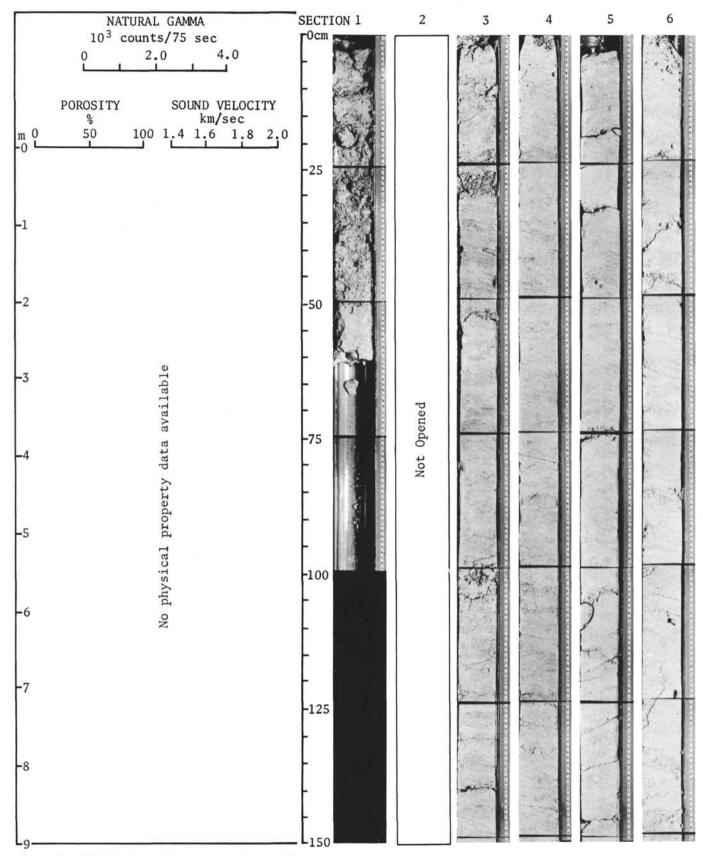


Figure 56. Hole 79, Core 8, Sections 1-6, Physical Properties.

METERS	SEC TIONS	LITH COLUMN	SMEAR	%CaCo3	LITHOLOGIC DESCRIPTION
	1		*		MARQUESAS FORMATION Gray Unit Slightly mottled in 5 to 27 cm. thick beds of:
2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2				LIGHT GREENISH GRAY (5G8/1), foraminiferal (15%-20%) - calcareous nannofossil (70%-75%) chalk with radiolarians usually less than 10% of sediments.
4 1 1 1	3				
5 1111111	4				
7	5	NOT CORED			
8 1 1 1 1 1 1	6	•			
		2 2 2 3 4 3 4 3 4 3 4 3 4 3 4 5 4 5 7 5 7	2 2 2 2 2 2 3 3 4 4 5 4 5 4 NOT CORED 7 5 NOT CORED 7 5	2 2 2	1

Figure 57. Hole 79, Core 9 (350.1 to 355.7 m).

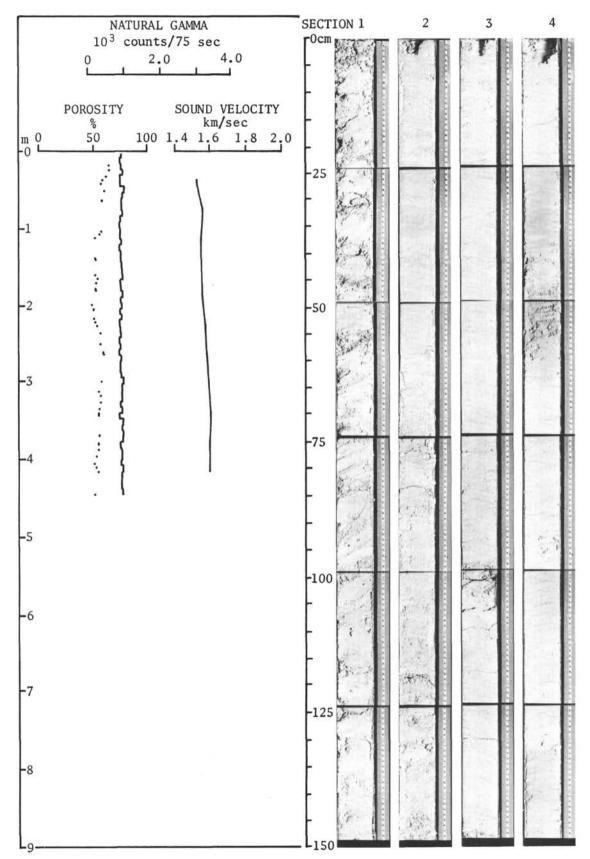


Figure 58. Hole 79, Core 9, Sections 1-4, Physical Properties.

SERIES- SUBSERIES	METERS	SEC TIONS	LITH COLUMN	SMEAR SLIDES	% <b>CaCo</b> 3	LITHOLOGIC DESCRIPTION
	THEFT THE	1				MARQUESAS FORMATION Gray Unit Slightly mottled in 5-30 cm. thick beds.
	2			*		BLUISH WHITE (5B9/1) to LIGHT BLUISH GRAY (5B7/1), foraminiferal (10%) - calcareous nannofossil (85%) chalk. VERY PALE PURPLE (5P7/2) to LIGHT BLUISH GRAY (5B7/1), foraminiferal (10%) - calcareous nannofossil (80%) chalk.
MIOCENE	-3					LIGHT GREENISH GRAY (568/1), foraminiferal (10%) - calcareous nannofossil (85%) chalk.
LOWER	5 5 6	4		*	•	
	7	5				
	8 1 1 1 1 1 1	6				

Figure 59. Hole 79, Core 10 (355.7 to 364.2 m).

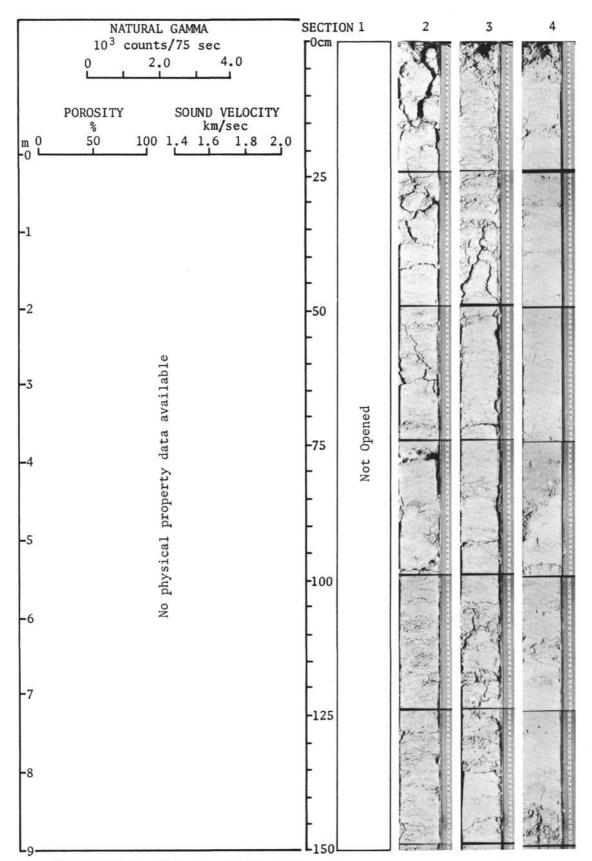


Figure 60. Hole 79, Core 10, Sections 1-6, Physical Properties.

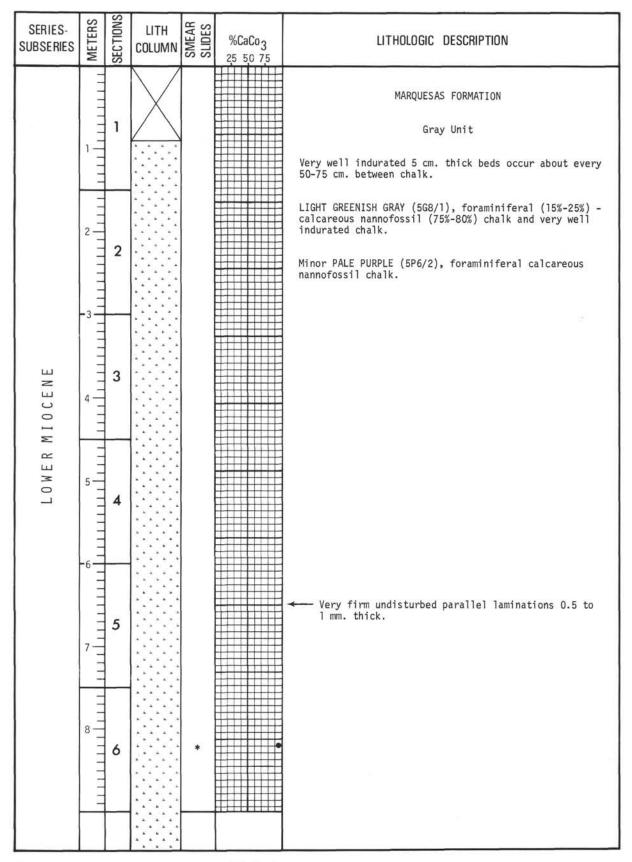


Figure 61. Hole 79, Core 11 (364.2 to 373.4 m).

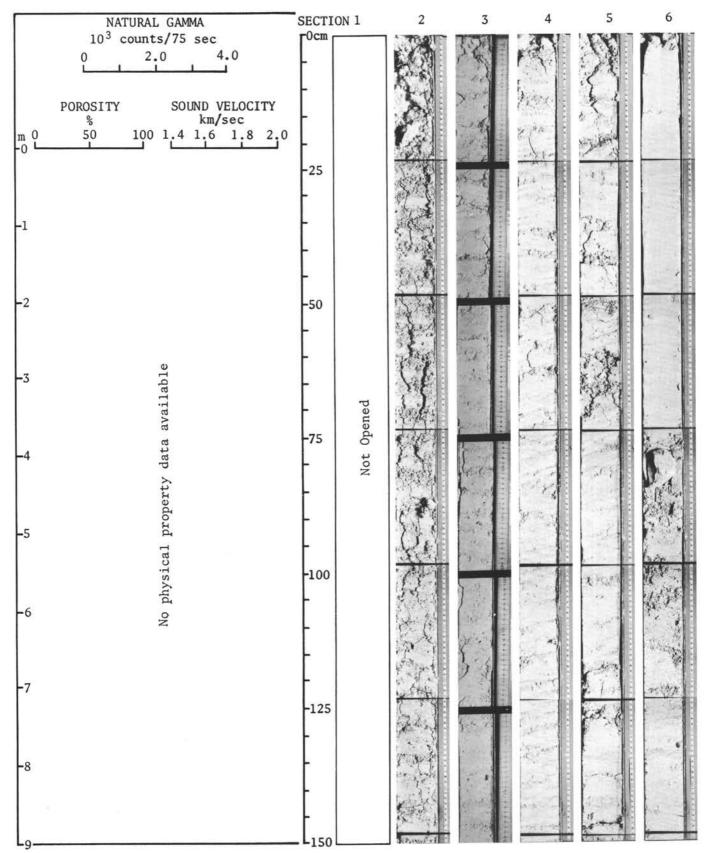


Figure 62. Hole 79, Core 11, Sections 1-6, Physical Properties.

SERIES- SUBSERIES	METERS	SEC TIONS	LITH Column	SMEAR	% <b>CaCo</b> 3 25 50 75	LITHOLOGIC DESCRIPTION
	THE THEFT		$\times$	*		MARQUESAS FORMATION Gray Unit LIGHT GREENISH GRAY (5G8/1), foraminiferal (15%-25%) - calcareous nannofossil (75%-80%) chalk and very well
	2					Minor PALE PURPLE (5P6/2), foraminiferal calcareous nannofossil chalk.
MIOCENE	4	3				
LOWER	5 1111111	4		*	•	
	7	5				TOP MARQUESAS FORMATION Brown Unit Massive with no obvious bedding features. VERY PALE ORANGE (10YR8/2), radiolarian (10%-15%) -
	8	6				foraminiferal (10%-15%) - calcareous nannofossil (70%- 80%) chalk with traces of red clay.

Figure 63. Hole 79, Core 12 (373.4 to 380.4 m).

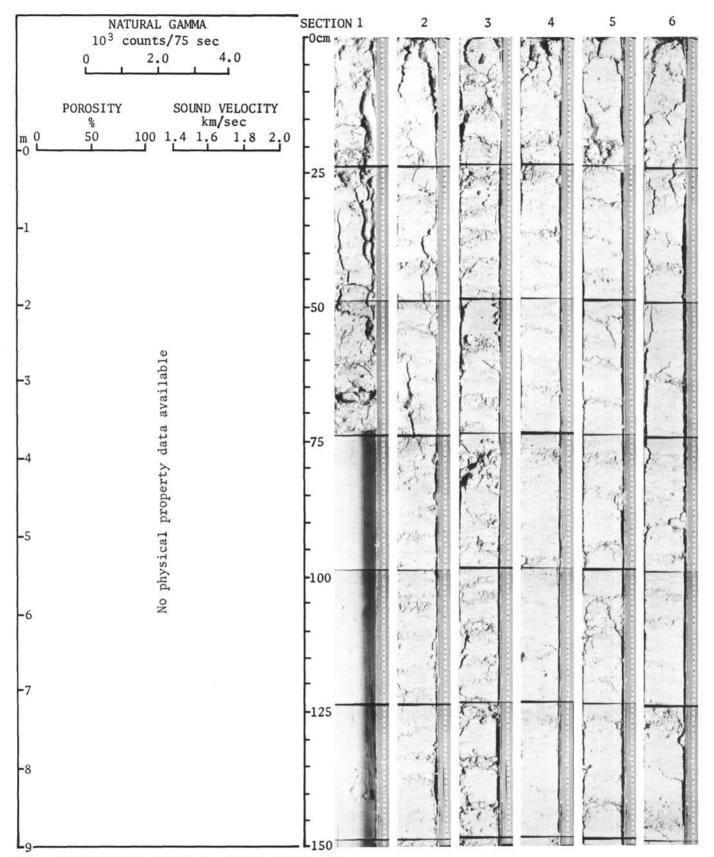


Figure 64. Hole 79, Core 12, Sections 1-6, Physical Properties.

SERIES- SUBSERIES	METERS	SECTIONS	LITH Column	SMEAR	% <b>CaCo</b> 3 25 50 75	LITHOLOGIC DESCRIPTION
SUBSERIES		1 2 3 4	LITH COLUMN	* * SMEAR SUEAR		LITHOLOGIC DESCRIPTION MARQUESAS FORMATION Brown Unit Interbedded well indurated chalk and chalk ooze in 5-10 cm. beds in about equal amounts. VERY PALE ORANGE (10YR8/2), foraminiferal (10%) - calcareous nannofossil (85%) chalk ooze and well indurated chalk. ← Basaltic pumice fragments. ← Basaltic pumice fragments.
	8	6		*		

Figure 65. Hole 79, Core 13 (380.4 to 389.5 m).

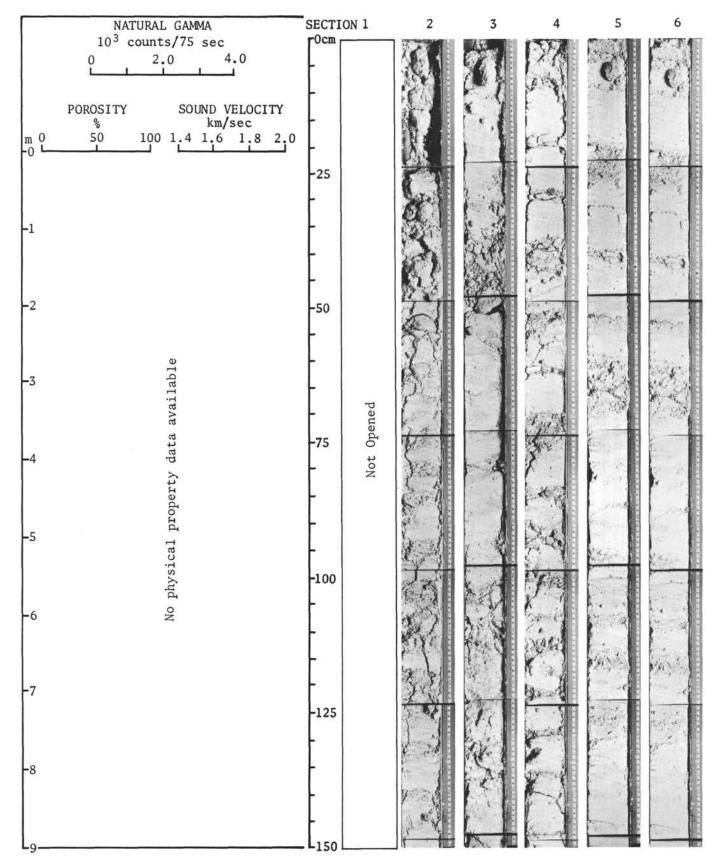


Figure 66. Hole 79, Core 13, Sections 1-6, Physical Properties.

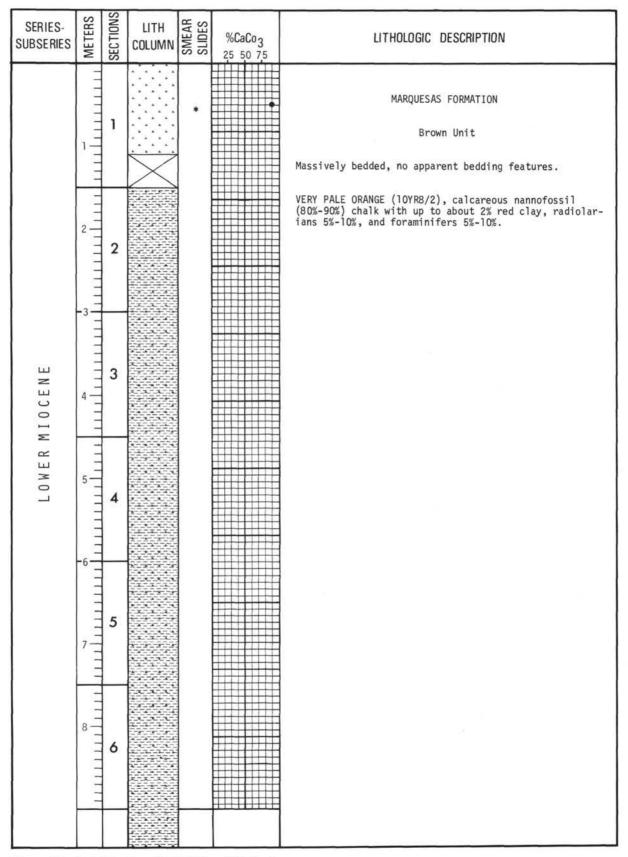


Figure 67. Hole 79, Core 14 (389.5 to 398.7 m).

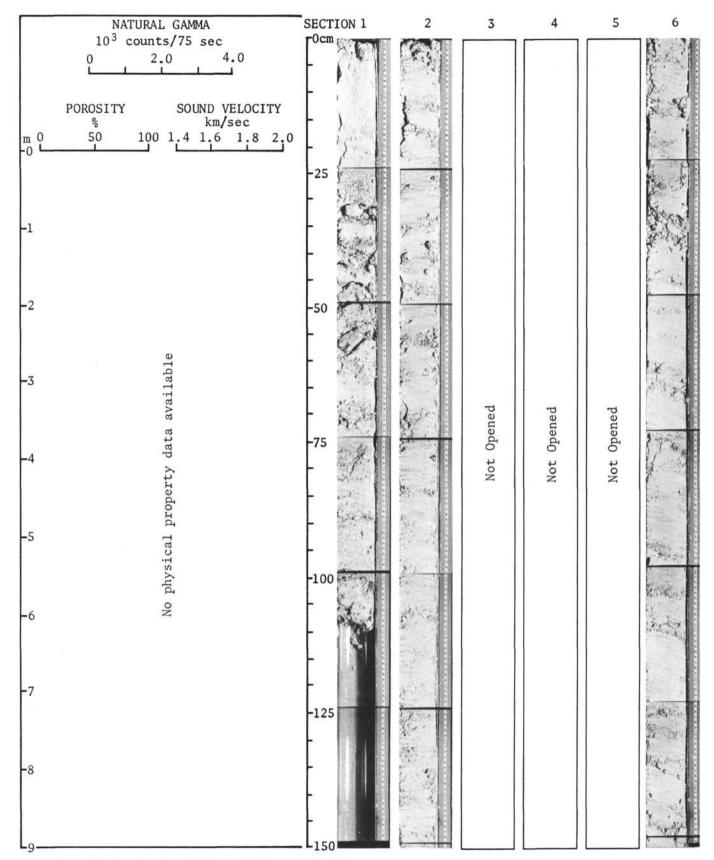


Figure 68. Hole 79, Core 13, Sections 1-6, Physical Properties.

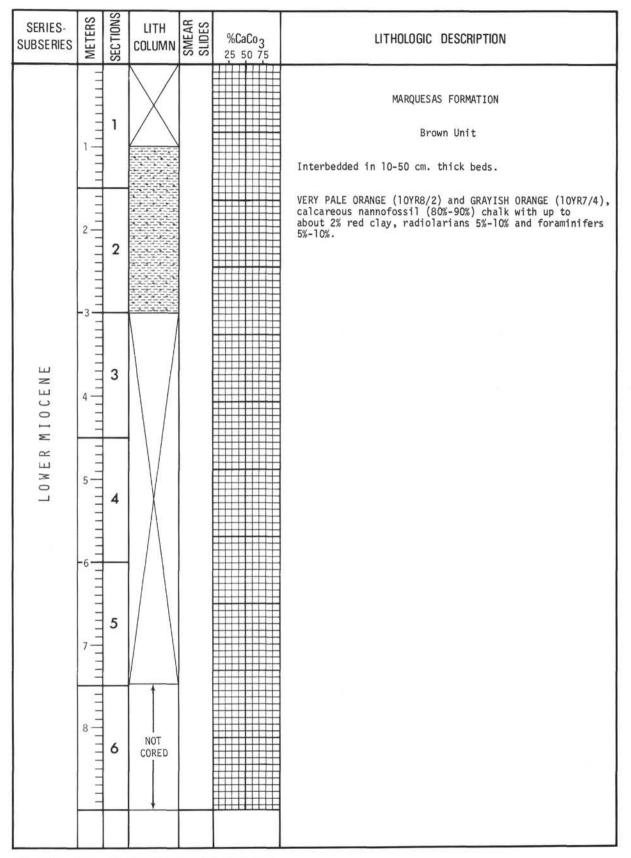


Figure 69. Hole 79, Core 15 (398.7 to 406.0 m).

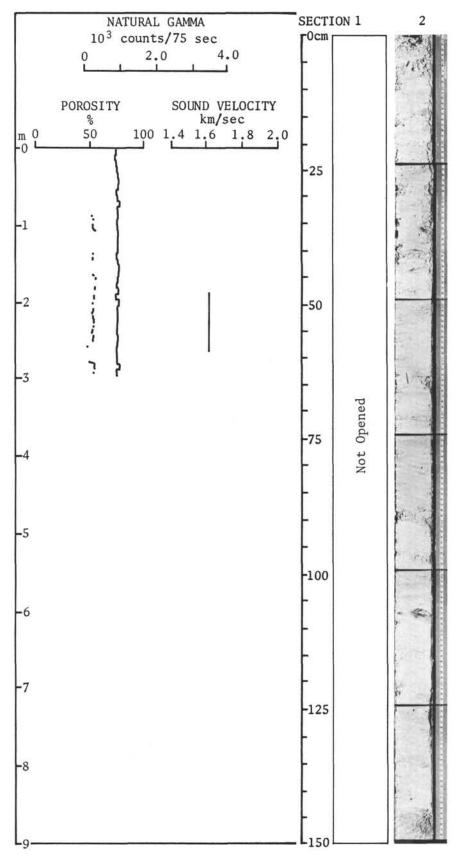


Figure 70. Hole 79, Core 15, Section 1 and 2, Physical Properties.

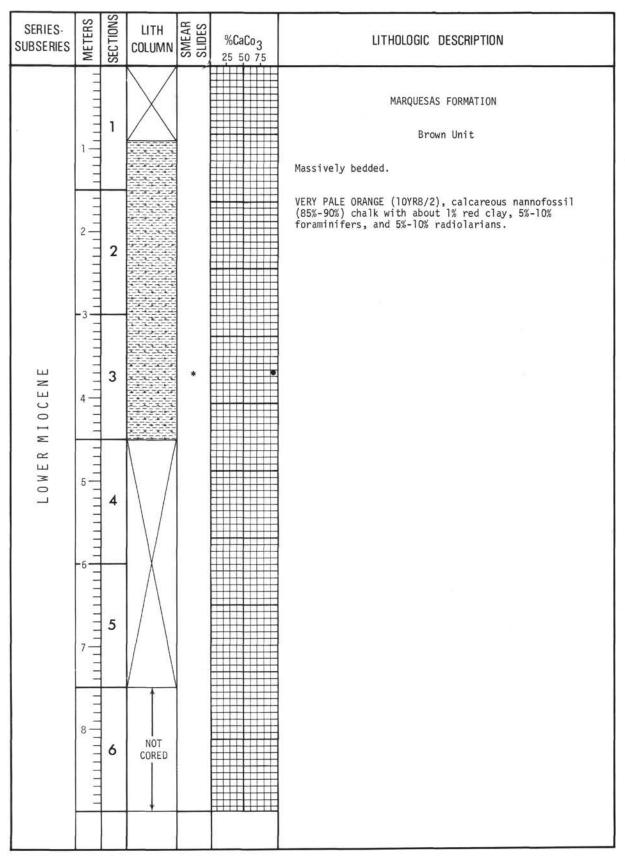


Figure 71. Hole 79, Core 16 (406.0 to 413.6 m).

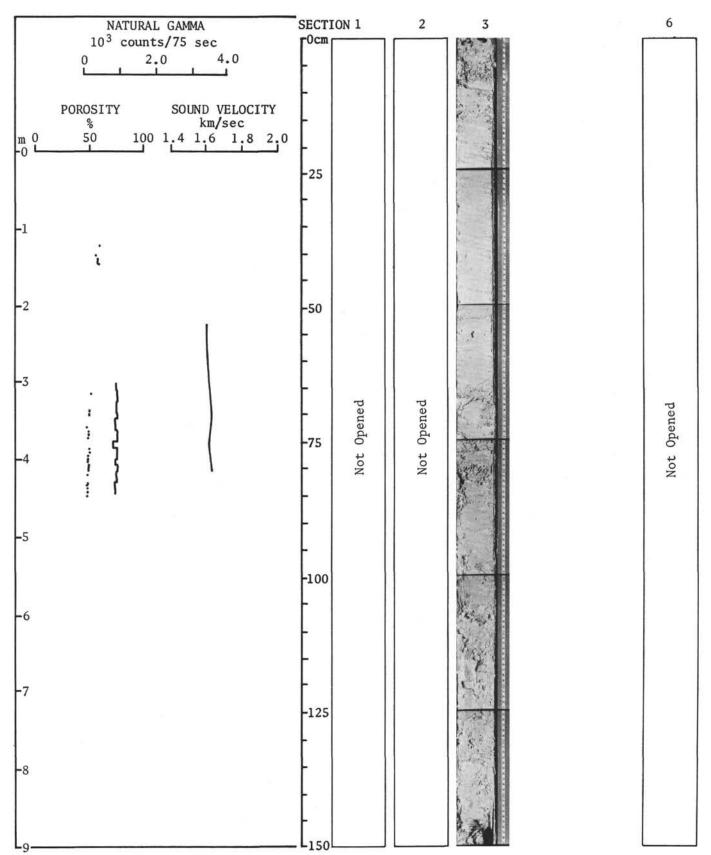


Figure 72. Hole 79, Core 16, Sections 1, 2, 3, 6, Physical Properties.

395

AMAQUESAS FORMATION Brown Unit Baked VERY PARE DRAWE(1090, hyperbolic) forwarintferal - calcarrous namefors) to HUITE (19), forwarintferal - calcarrous namefors) to chalk evidenced by tridymite crystals lining forwarintferal tests, yellowish green clay and from oxides replacing fossil constituents. BLACK very fine grained basalt with rim of chilled glass at contact. BUACK very fine grained basalt with rim of chilled glass at contact.	SERIES- SUBSERIES	METERS	SECTIONS	lith Column	SMEAR SLIDES	LITHOLOGIC DESCRIPTION
	OWER MIOCEN	1 2 -3 4 -6 7	1 2 3 4 5	1 1 1 1 1 7 1 7 7 1 1 1 7 1 7 7 1 1 1 7 1 7 7 1 1 1		Brown Unit Baked VERY PALE ORANGE (10YR8/2) to WHITE (N9), foraminiferal - calcareous nannofossil chalk. Hydrothermal alteration of the chalk evidenced by tridymite crystals lining foraminiferal tests, yellowish green clay and iron oxides replacing fossil constituents. BAKED CONTACT

Figure 73. Hole 79, Core 17 (413.6 to 413.9 m).

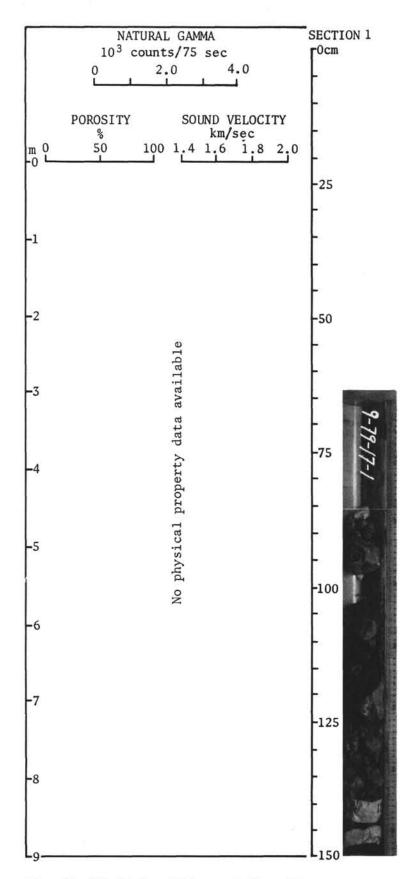
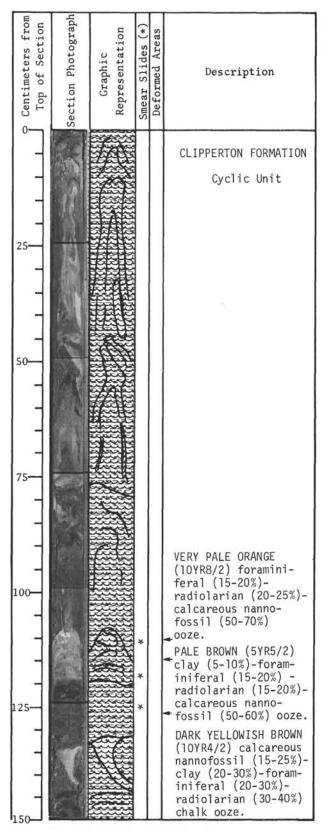


Figure 74. Hole 79, Core 17, Section 1, Physical Properties.



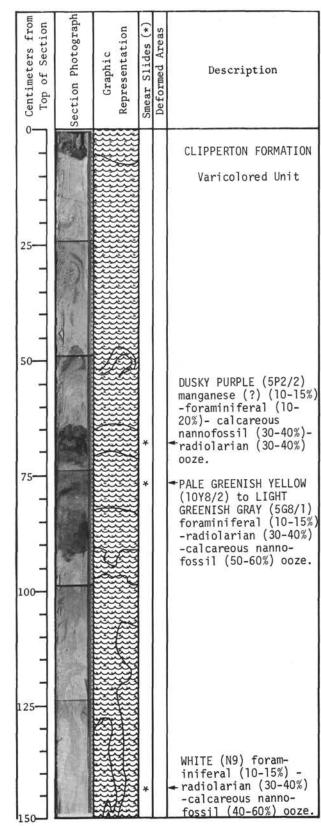


Figure 75. Hole 79, Core 1, Section 2.

Figure 76. Hole 79, Core 2, Section 5.

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
					MARQUESAS FORMATION Brown Unit Basement Contact
		* * *			<pre>VERY PALE ORANGE (10YR8/2) to WHITE (N9) clay (1-5%) foraminiferal (10-15%) -calcareous nanno- fossil (80-90%)chalk. Chalk is baked and exhibits hydrothermal alteration in the form of green clay and iron oxides part- ly replacing the chalk and tridymite euhedra lining the interior of foraminifera tests. Chilled basaltic glass contact directly next to overlying chalk. Glass 5 to 10 mm thick Retractive index of nonderitrified, iso- tropic glass is 1.59-1.60. Very fine-grained BLACK Basalt.</pre>

Figure 77. Hole 79, Core 17, Section 1.