7. SITE 72

Shipboard Scientific Party¹

SITE DATA

Occupied: November 12-15.

Position: Latitude 00° 26.49'N. Longitude 138° 52.02'W.

Water Depth: 4326 meters.

Hole Depth: 345 meters, ending in Eocene cherty limestone.

Holes Drilled: Three holes, including heat flow hole.

Cores Taken: Seventeen cores, continuous 0 to 69 meters and 312 to 345 meters; spot cores at 106, 150, 211 and 226 meters.

RESULTS

Intermittent coring resulted in the recovery of a complete section from Quaternary at the sea floor down into the upper Miocene, an incomplete section through the Miocene and the Oligocene, and a continuous section of the lower portion of the hole ranging from Oligocene into the upper Eocene. The hole was drilled on a flank of a buried hill over which the sediments are compressed particularly towards the base of the column (as shown by reflection profiles). Thicknesses and sediment accumulation rates in Oligocene sediments are probably not representative for the area.

BACKGROUND

Site 72 is one of the sites along the N-S line drilled during Leg 8 to investigate the east-west trending accumulation of sediments centered about 2°N near 140°W. It lies about 260 miles south of Site 71 and 170 miles north of Site 73. Site 72, along with 73 to the south, was added to the N-S line of sites proposed by the JOIDES Pacific Advisory Panel in order to obtain better stratigraphic correlation across the Equator.

There was no SCAN survey for this site and all site information is derived from observations made on the *Challenger*. The sea floor in the vicinity of the site has a gentle rolling character and dips to the northeast, about 100 meters in 10 miles, across the survey area. Irregularities in the acoustic basement are reflected in the overlying sediments and sea floor with decreasing amplitude upward. Acoustic reflectors in the vicinity are typically near 0.03, 0.16, 0.30 and 0.46 seconds depth; the 0.03 second reflection is not strong on the *Challenger* records; and the 0.46 second acoustic basement reflector commonly fluctuates in depth by 0.10 second or more (Figure 1 and Figure 12, Chapter 2). An occasional seamount penetrates through the sediments.

Site 72 was selected over a basement high where it was expected that the lower portion of the sediment section would be foreshortened. Prominent reflectors at Site 72 occur at 0.035, 0.160, and 0.345 seconds. The acoustic basement (0.345 second), in addition to adjacent deep reflectors, is steeply dipping near the site. It is correlated with the indurated sediments of the Upper Eocene found near the bottom of the drilled section. However, the correlation is poor. At this site the Challenger did not pass directly over the acoustic location beacon upon leaving the site, but about 300 meters to the southwest. Combined with the steep dips, this error might explain the poor correlation. The upper reflector (0.035 second) might correlate with the bottom of a cyclic unit, similar to that at Site 71, occurring at 35 meters. The lower portion of the section is inadequately sampled for correlation between physical properties and intermediate reflectors.

Geothermal heat flow measurements attempted at Site 72 indicate a value somewhat greater than 1.0 HFU $(10^{-6} \text{ cal cm}^{-2} \text{ sec}^{-1})$ and are discussed in detail in Chapter 18.

A topographic map of the vicinity of Site 71, airgun records, and further site information are given in Chapter 25.

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Figure 1. Airgun record across Site 72 and interpretation.

OPERATIONS

Three holes were drilled at the site. An exploratory hole (Hole 72) was cored at intervals of 30 to 50 meters, and was cored continuously from 311 to 345 meters, below the lowest acoustic reflector. Eleven cores were taken, the last requiring 7 hours coring time to penetrate about 3 meters of sediment of which one meter was recovered.

Hole 72A was drilled to recover a continuous section of the Pliocene into upper Miocene sediments. Six cores were taken to a depth of 63 meters. Hole 72B was drilled for making heat flow measurements: the results are discussed by Von Herzen and others in Part III of this volume.

LITHOLOGY AND STRATIGRAPHY

Three sedimentary formations are present at Site 72: the Clipperton Oceanic Formation (0 to 180 meters estimated) consisting of a cyclic unit (0 to 34.5 meters) of alternating white and brown calcareous oozes and a varicolored unit (34.5 to 180 meters) of calcareous oozes; the Marquesas Oceanic Formation (180 to 399

	Core No.	Interval Below Seafloor (meters)	Cored (m)	Recovered (m)	Comments
Hole 72	1	0-9	9.1	9.1	
		9-60			Drilled
	2	60-69	9.1	8.2	
		69-106			Drilled
	3	106-115	9.1	9.1	H ₂ S smell in core
		115-150			Drilled
	4	150-159	9.1	9.1	
		159-211			Drilled
	5	211-220	9.1	9.1	
		220-266			Stiff clay; center bit needed for drilling
	6	266-275	9.1	9.1	
		275-312			Drilled; hard at 312 m
	7	312-321	9.1	9.1	Chert, 6 cm, over 9 m with nannofossil chalk ooze
	8	321-330	9.1	9.1	
	9	330-339	9.1	9.1	
	10	339-342	3.1	3.1	Core barrel set down to determine depth to hard layer; 30 feet recovered, mostly cave
	11	342-345	2.7	1.2	Chert and siliceous ooze in core catcher; 1 m plus in Section 1
Total	11	345	88.1	85.7	99% recovery
Hole 72A	1	9-18	9.1	5.0	
	2	18-27	9.1	9.1	
	3	27-36	9.1	7.6	
	4	36-45	9.1	9.1	
	5	45-54	9.1	8.5	
	6	54-63	9.1	9.1	
Total	6	54	54.9	48.5	89% recovery
Site Total	17	345	143.0	134.2	93% recovery

	TABLE 1	
Summary	of Coring at Site	72

meters) of grayish calcareous ooze; and the Line Islands Oceanic Formation (339 to 345 meters) of nannofossil-radiolarian ooze, interbedded silicified limestone and nannofossil ooze, and chert.

Clipperton Oceanic Formation

The Clipperton Oceanic Formation is composed of two units at Site 72. The upper cyclic unit consists of white calcareous oozes alternating with light brown calcareous oozes from the sea floor to a depth of 34.5 meters. The contacts between the two types of beds are sharp. The compositional alternations in this cyclic unit at Site 72 are not as marked as they are at Sites 69, 70 and 71. The unit is all radiolarian-nannofossil ooze, however, the light brown beds are slightly less calcareous (70 to 80 per cent) than the white beds (80 to 90 per cent). The average composition of the cyclic unit is predominantly calcareous nannoplankton (80 per cent) with Radiolaria (15 per cent) and rare diatoms, sponge spicules, sea urchin spines, fish remains, and silicoflagellates. The unit is Quaternary and Pliocene in age. The contact of the cyclic unit with the underlying varicolored unit is sharp and is placed at the top of the uppermost pastel-hued bed.

The varicolored unit of the Clipperton Oceanic Formation (34.5 to 180 meters) is distinguished mainly by its pastel colors. Compositionally it is mostly radiolariannannofossil ooze as are the beds of the overlying cyclic unit and the underlying Marquesas Oceanic Formation. The varicolored unit is composed predominantly of calcareous nannoplankton (75 to 85 per cent) with Radiolaria (15 to 25 per cent) and rare foraminifera, diatoms, sea urchin spines, and fish debris. The characterizing colors are pastel hues of bluish and greenish white and purple, generally in sharp contact where the bedding is undisturbed by coring. No compositional differences were noted among the various colored beds making up the unit. The varicolored unit is Pliocene and Miocene in age. The contact with the underlying Marquesas Oceanic Formation falls in the uncored interval between 159 and 211 meters and is tentatively placed at 180 meters. It is probably transitional near the base of the middle Miocene.

Marquesas Oceanic Formation

The Marquesas Oceanic Formation at Site 72 from 180 to 339 meters is a relatively homogeneous highly calcareous (mostly 85 to 95 per cent) nannoplankton ooze, grading in some horizons to foraminiferalnannofossil ooze. The oozes of the Marquesas Oceanic Formation are white to light gray and display no bedding except for alternating plastic and somewhat firmer horizons. The average composition of the formation is predominantly calcareous nannoplankton (85 to 95 per cent) with Radiolaria (1 to 10 per cent) and rare foraminifera, diatoms, and fish debris. At 328 and 333 meters the oozes are richer in foraminifera (20 to 30 per cent). At 312 meters, two thin layers of chert, 6 and 7 centimeters in thickness, are interbedded with upper Oligocene nannofossil ooze.

The base of the formation (335.6 to 339 meters) consists of slightly darker, brownish-white ooze compositionally similar to the white oozes but of slightly lower calcium carbonate (CaCO₃) content. The contact at 335.6 meters is sharp and corresponds to a hiatus in the lower Oligocene.

The Marquesas Oceanic Formation is early Miocene and Oligocene in age. The basal contact with the underlying Line Islands Oceanic Formation is sharp and is a disconformity corresponding to the Oligocene-Eocene boundary.

Line Islands Oceanic Formation

The upper portion (339 to 344 meters) of the Line Islands Oceanic Formation at Site 72 consists of homogeneous, stiff, yellowish-brown nannofossil-radiolarian ooze. The sediment is composed predominantly of Radiolaria (50 to 70 per cent) with calcareous nannoplankton (30 to 45 per cent) and diatoms (1 to 10 per cent).

The lower portion (344 to 345 meters) is mainly silicified limestone interbedded with nannofossil ooze. The dark, yellowish-brown silicified limestone layers are thin (5 to 9 centimeters) and become more siliceous toward the bottom of the hole with pods of opaline silica replacing areas of carbonate. The lower-most indurated layer is 5 centimeters of black chert containing much iron oxide. Drilling terminated in this layer. The interbedded nannofossil oozes (80 to 90 per cent CaCO₃) are semi-indurated, light gray to very dark grayish brown, and are bedded having a somewhat shaly aspect. They contain small amounts of Radio-laria.

The Line Islands Formation at Site 72 is late and possibly middle Eocene in age.

Figure 6 is a plot of age versus depth, based on the biostratigraphic zonations of the foraminifera, nannoplankton, and Radiolaria, with the time scale, in millions of years, based on that of Berggren (1969).

PHYSICAL PROPERTIES

Porosities range from less than 40 to about 75 per cent, and velocities range between about 1.45 and 1.59 km/sec. The calcium carbonate (CaCO₃) content is high and most of the velocity-porosity data lie near the theoretical curve for a grain-matrix density of 2.65 g/cm³ (Figure 2). The sediment showing very low



Figure 2. Sonic velocity versus porosity of unlithified sediments for Site 72. No measured sediments contained less than 63 per cent calcium carbonate. Theoretical curves are based on the equation of Wood (1941). Upper curve, grain-matrix density 2.2 g/cm³, appropriate for siliceous ooze. Lower curve, grain-matrix density 2.65 g/cm³, appropriate for calcareous ooze.

velocities (about 1.45 km/sec) near 40 to 50 per cent porosity probably contained some gas (or air). Sonic velocities are near that for sea water at a depth of 200 meters, and less at shallower depth (Figure 7, Chapter 2).

Velocities and densities were determined for several pieces of chert (Chapter 2). The highest velocity measured for this site, 5.04 km/sec, was for a sample with density 2.53 g/cm^3 .

Thermal conductivities measured for this site are given in Chapter 18.

Results of grain-size and carbon-carbonate analyses are tabulated in Appendices II and III, respectively.

PALEONTOLOGY

Foraminifera

In Hole 72, six spot cores were taken while drilling down to 312 meters. Continuous coring was then carried out from the Oligocene into the Eocene (Cores 7 to 11). Hole 72A was subsequently drilled and six continuous cores taken in order to get a complete record of the Quaternary and Pliocene. This location had been chosen in an area where the thickest subsea sediments had been indicated by preliminary reflection profiling. This was confirmed by the drilling, at least for the younger part of the Neogene: the thickness of the Upper Miocene, Pliocene and Quaternary combined is at Site 72 a maximum for all Leg 8 drilling locations (see Figure 1, Chapter 11). The Oligocene, on the other hand, is abnormally thin because of an unconformity which cuts out the entire *Globigerina ampliapertura* Zone (P. 20).

The percentages of calcareous microfossils in the samples are generally rather high. Predominantly siliceous faunas are restricted to parts of the Upper Miocene (Core 72-3) and the top of the Eocene (Cores 72-9, lower part, and 72-10).

The Quaternary faunas can be dated by *Globorotalia* truncatulinoides and Pulleniatina finalis and are found down to 72A-1-4, 15 centimeters (0 to 17 meters). Pulleniatina spp. are abundant throughout the Quaternary, and the coiling change from random to dextral is found at the top of Section 72A-1-2. A little higher, at the very bottom of Core 72-1, there is a sudden downward increase in the frequency of Sphaeroidinella dehiscens, similar to the one recorded by Hays et al. (1969).

The Pliocene extends from the core catcher sample of 72A-1 down to 72A-5-5 (17 to 52 meters). The stratigraphic sequence of the planktonic foraminifera is normal and follows the pattern outlined by Parker (1967), Blow (1969) and Hays *et al.* (1969). The depths of the important boundaries are as follows:

Base N. 21 (earliest *Globorotalia tosaensis*) at 72A-3-6 (35 meters).

Base N. 20 (earliest *Globorotalia pseudopima*) at 72A-4-5 (43 meters).

Base N. 19 (earliest *Sphaeroidinella dehiscens*) at 72A-5-5 (52 meters).

There is a short overlap of the ranges of *Globoquadrina* altispira altispira and *Globorotalia tosaensis* at 72A-3-6. The highest *Sphaeroidinellopsis* was found in the core catcher sample of 72A-4. *Globorotalia margaritae*, an important zonal marker of Bolli and Bermudez (1965), was seen only in one sample in Section 72A-5-2.

The highest Miocene zone (N. 18) was entered at 72A-5-6 (52 meters). The earliest *Globorotalia tumida* was seen at 72-2-4 (66 meters), shortly before continuous coring was interrupted. The lowest part of Core 72-2 may therefore be in the next lower unit N. 16-17. The remainder of the Miocene and the top part of the Oligocene were tested only with spot cores. The essential data are shown on Table 6.

Continuous cores are again available from 312 meters to total depth at 345 meters. Cores 72-7 and 72-8

include a fauna of the Globorotalia opima opima Zone (P. 21). The top of Core 72-9 contains already the highest *Pseudohastigerina barbadoensis*, indicating the lowest Oligocene unit P. 18-19. Between Cores 8 and 9 of Hole 72, the entire *Globigerina ampliapertura* Zone (P. 20) and probably parts of the overlying and underlying zones are therefore missing. The cause of this irregularity is a matter of speculation; it might be faulting or, more likely, an unconformity.

The base of the Oligocene is provisionally placed just above the core catcher sample of Core 72-9 (339 meters). This sample contains the highest *Spiroplectammina trinitatensis* and *Alabamina dissonata*, benthonic species which are usually recorded from the Eocene. The samples of the Eocene (339 to 345 meters) are badly contaminated with younger material. Only Core 72-11 contains reasonably good calcareous faunas. The concurrence of *Nuttallides truempyi* and *Catapsydrax dissimilis* indicates an interval P. 13 to P. 17 (upper Middle or Upper Eocene). The presence of *Anomalina dorri aragonensis* in Core 72-11 makes it probable that the top of the Middle Eocene was reached.

Calcareous Nannoplankton and Silicoflagellates

Calcareous nannoplankton occur in all sampled intervals at Site 72. Generally the floras are well preserved, but in the upper 65 meters there is much reworking. Forty-five species of nannoplankton and two species of silicoflagellates were found (Table 2, Figure 4). These permit the recognition of 15 zones ranging from Eocene to Recent in age.

Hole 72

Core 1-1 to 1-CC:	Gephyrocapsa oceanica and Pseudoemiliania lacunosa Zones
Core 2-1 to 2-3:	Ceratolithus rugosus Zone
Core 2-4 to 2-CC:	Ceratolithus tricorniculatus Zone
Core 3-1 to 3-CC:	Discoaster calcaris Zone
Core 4-1:	Discoaster kugleri Zone
Core 4-2 to 4-CC:	Discoaster exilis Zone
Core 5-1 to 5-CC:	Sphenolithus heteromorphus Zone
Core 6-1 to 6-CC:	Triquetrorhabdulus carinatus Zone
Core 7-1 to 8-2:	Sphenolithus distentus Zone?
Core 9-1 to 9-CC:	Discoaster tani ornatus Zone
Core 10-1 to 11-CC:	Middle Eocene

Hole /2A	
Core 1-1 to 2-2:	Gephyrocapsa oceanica and Pseudoemiliania lacunosa Zones
Core 2-3 to 3-3:	Discoaster brouweri Zone
Core 3-4 to 4-5:	Reticulofenestra umbilica and Discoaster surculus Zones
Core 4-6 to 5-CC:	Discoaster asymmetricus Zone
Core 6-1 to 6-5:	Ceratolithus rugosus Zone
Core 6-6 to 6-CC:	Ceratolithus tricorniculatus Zone

Radiolaria

II.1. 70 A

The top and bottom parts of the Site 72 section were cored continuously. Spot coring was carried out in the middle part of the section where cores were taken in the lower part of the Upper Miocene (*Ommatartus antepenultimus* Zone), the Middle Miocene (*Dorcadospyris alata* Zone), the upper part of the Lower Miocene (*Calocycletta costata* Zone), the lowermost Miocene (*Lychnocanium bipes* Zone) and Upper Oligocene (*Theocyrtis annosa* Zone).

The top part of the section contains sediments from the Quaternary through the uppermost Miocene (*Stichocorys peregrina* Zone). Radiolaria are numerous and moderately well preserved. All the zones proposed by Riedel and Sanfilippo (1970) for this interval were identified; however, most of the cores were disturbed in drilling and the exact location of stratigraphic boundaries is uncertain. In addition, reworked material from the lower part of the Upper Miocene is found in the cores from the uppermost Miocene (72A-5 and 72A-6).

The bottom part of the section contains sediments from the Upper Oligocene, Lower Oligocene and Upper Eocene. A large portion of the Upper-Lower Oligocene section is apparently missing between Cores 72-8 and 72-9. The Oligocene-Eocene boundary probably lies at the base of Core 72-9 or in 72-10. Unfortunately Core 72-10 was badly disturbed during coring. Cores 72-10 and 72-11 contain Radiolaria from the Upper Eocene.

Radiolarian tests show signs of corrosion in the Middle Miocene part of the section. The degree of preservation decreases down into the Upper Oligocene (Cores 72-7, -8) where the fauna is very poorly preserved. In the Lower Oligocene and uppermost Eocene the Radiolaria are again moderately well preserved. However, between and beneath the chert layers of Core 72-11, radiolarian tests are almost totally dissolved.

	DSDP	Leg 8	Site 72				E														cens			
DEPTH in meters	BARREL No.	FORAMINIFERA FORAMINIFERA 50 percentage of total fauna in > 80 mesh fraction	- 1:10 - 1:10 - 10 - 100 - 100 planktonic/benthonic - 1000 ratio	strong SOLUTION EFFECTS weak	Globigerina dutertrei	Globigerinoides fistulosus	Globoquadrina altispira altisp	Globorotalia crassaformis rond	Globorotalia humerosa	s Globorotalia cf. miocenica	Globorotalia cf. plesiotumida	Globorotalia pseudopima	Globorotalia tosaensis	Globorotalia truncatulinoides	s d Globorotalia tumida	Pulleniatina finalis	s Pulleniatina obliqueloculata	s Pulleniatina primalis d	Pulleniatina spectabilis	Sphaeroidinella dehiscens	Sphaeroidinellopsis paenedehis	Sphaeroidinellopsis seminulina	BIOSTRATIGRAPHY	AGE
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Figure 3. Foraminifera of Site 72. Frequency distribution, ranges of important species and biostratigraphy.

	DSDP	Leg 8 Sit	e 72 (cont.))						qa	ina	~	
S DEPTH in meters	BARREL No.	 FORAMINIFERA FORAMINIFERA Forcentage of total 50 fauna in > 80 mesh fraction 	-1:10 - 1 - 1 - 10 - 100 - 100 - 1000 - 1000 - ratio	strong SOLUTION EFFECTS weak	Globigerina nepenthes	Globorotalia acostaensis	Globorotalia fohsi lobata	Globorotalia fohsi robusta	Globorotalia mayeri	Globorotalia cf. plesiotumi	Sphaeroidínellopsis seminul	BIOSTRATIGRAPH	AGE
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Figure 3. Continued.

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B DEPTH in meters	BARREL No.	 O FORAMINIFERA 50 percentage of total 50 mesh 60 mesh 700 	–1:10 FORAMINIFERA – 1 – 10 planktonic/benthonic –100 ratio		Catapsydrax dissimilis	Globigerina tripartita	Globigerina sp. A	Globoquadrina altispira glob	Globoquadrina dehiscens deh	Globoquadrina praedehiscens	Globorotalia fohsi peripheror	Globorotalia mayeri	Globorotalia opima s.l.	Sphaeroidinellopsis seminulin	BIOSTRATIGRAPH	AGE
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Figure 3. Continued.

D	SDP	Leg 8 Site	72 (cont.)															sis				sis	,	
1 80 DEPTH in meters 1	BARREL No.	 FORAMINIFERA FORAMINIFERA 50 percentage of total 50 percentage of mesh fauna in > 80 mesh fraction 	-1:10 FORAMINIFERA - 1 FORAMINIFERA -10 planktonic/benthonic 100 planktonic/benthonic 100	strong SOLUTION EFFECTS weak	Cassigerinella chipolensis	Catapsydrax dissimilis	Chiloguembelina cubensis	Globigerina ampliapertura	Globigerina galavisi	Globigerina prasaepis	Globigerina tripartita	Globigerina sp. A	Globorotalia gemma	Globorotalia mayeri	Globorotalia opima opima	Globorotalia opima s.l.	Globorotaloides sp. A	Pseudohastigerina barbadoen	Alabamina dissonata	Anomalina dorri aragonensis	Nuttallides truempyi	Spiroplectammina trinitatens	BIOSTRATIGRAPHY	AGE
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Figure 4. Calcareous nannoplankton of Site 72. Distribution and biostratigraphy.





Figure 5. Radiolaria at Site 72. Frequency, distribution and biostratigraphy.

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Figure 5. Continued.



Figure 5. Continued.



Figure 6. Age versus depth at Site 72, based on the biostratigraphic zonations of the foraminifera, calcareous nannoplankton and Radiolaria. Ages based on the time scale of Berggren (1969).

Species	Occurrences (Hole/Core Nos.)
Calcareous Nannoplankton	
Ceratolithus cristatus Kamptner	72/1, 2; 72A/1-6
C. rugosus Bukry and Bramlette	72/2; 72A/2, 4-6
C. tricorniculatus Gartner	72/2; 72A/4, 5
Coccolithus bisectus (Hay, Mohler and Wade) as figured by Bramlette and Wilcoxon	72/7-11
Coronocyclus nitescens (Kamptner) Bramlette and Wilcoxon	72/6
Cyclococcolithus formosus Kamptner	72/9-11
C. leptoporus (Murray and Blackman) Kamptner	72/1-5; 72A/1-6
C. neogammation Bramlette and Wilcoxon	72/5-8
Discoaster adamanteus Bramlette and Wilcoxon	72/6
D. asymmetricus Gartner	72/2?; 72A/3-5, 6?
D. barbadiensis Tan Sin Hok	72/10, 11
D. brouweri Tan Sin Hok	72/2, 3; 72A/2-6
D. calcaris Gartner	72/3,4;72A/6
D. challengeri Bramlette and Riedel	72/3;72A/6
D. deflandrei Bramlette and Riedel	72/5-11
D. dilatus Hay	72/3
D. exilis Martini and Bramlette	72/2-4; 72A/3
D. extensus Hay	72/3; 72A/4-6
D. incomptus Hay	72/10
D. kugleri Martini and Bramlette	72/4; 72 A /3
D. ledoensis Bramlette and Riedel	72/10, 11
D. pentaradiatus Tan Sin Hok	72/2; 72A/3, 5, 6
D. perplexus Bramlette and Riedel	72/2
D. saipanensis Bramlette and Riedel	72/10, 11
D. surculus Martini and Bramlette	72/2; 72A/3-6
D. tani nodifer Bramlette and Riedel	72/9,11
D. tani tani Bramlette and Riedel	72/9
D. variabilis Martini and Bramlette	72/2-4; 72A/4-6
Gephyrocapsa oceanica Kamptner	72/1; 72A/1-3
Helicopontosphaera compacta (Bramlette and Wilcoxon)	72/9
H. intermedia (Martini) Hay and Mohler	72/4,9
H. kamptneri Hay and Mohler	72/1,3;72A/1-6
Oolithotus antillarum (Cohen) Cohen and Reinhardt	72A/1,3,4
Pseudoemiliania lacunosa (Kamptner) Gartner	72/1; 72A/1, 3
Reticulofenestra pseudoumbilica Gartner	72/2-5;72A/5,6
R. umbilica (Levin) Martini and Ritzkowski	72/9-11

		TABLE 2		
Calcareous	Nannoplankton	and Silicoflagellate	Occurrences a	t Site 72

Species	Occurrences (Hole/Core Nos.)
Sphenolithus ciperoensis Bramlette and Wilcoxon	72/6
S. distentus (Martini) Bramlette and Wilcoxon	72/7
S. heteromorphus Deflandre	72/5,6
S. moriformis (Bronnimann and Stradner) Bramlette and Wilcoxon	72/4-11
S. predistentus Bramlette and Wilcoxon	72/7-9
S. pseudoradians Bramlette and Wilcoxon	72/8
S. radians Deflandre	72/8
Triquetrorhabdulus carinatus Martini	72/6
T. rugosus Bramlette and Wilcoxon	72/2-4; 72A/6
Silicoflagellates	
Dictyocha fibula Ehrenberg	72/3;72A/5
Distephanus speculum (Ehrenberg) Haeckel	72 A /5

TABLE 2 – Continued

Diatoms are frequently found in the Quaternary, Pliocene and uppermost Miocene parts of the section. They are common to abundant in the Lower Oligocene (72-9).

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Physical Properties, Site 72, 0-200 Meters G./M. DENSITY (g/cm^3) 2.0 3.0





Physical Properties, Site 72, 200-400 Meters G./M. DENSITY (g/cm³) 2.0 3.0

AGE	FORAMS	NANNOS	RADS	METERS	ECT. NO.	LITHOL.	LITHOLO	GIC DESCRIPTION		CaC	6 203	
QUATERNARY	N.22 - N.23 FORAMS	oceanica and Pseudoemiliania lacunosa	aternary (undifferentiated) RADS	4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 SECT. NO.	LITHOL	LITHOLO 0 5 25 Section 5 and 6 moder Nanno Ooze. White (N white beds (N8). Sparse bedding. <u>Microfossil group</u> Foraminifera Calcareous nannoplankton	GIC DESCRIPTION Section 1-0 Above barrel 1, floor sample). 5cm of light gr. ooze above 20cm Nanno ooze. Pately deformed. 18) with sparse br Preservation Good Poor	true sea- ay Nanno of white rownish <u>Abundance</u> Common common to abundant			
		yrocapsa o	Quate	111111	5		nannoplankton Radiolaria	Moderate to good	abundant Common			
		Geph		811111111111	6		Smear summaryNannos85-90%Diatoms5-15%Rads5-10%Forams1-5 %Sponge spicules< 5 %				•	

SITE 72 Core 1 Cored interval: 0-9 m



Barrel moderately disturbed. Barrel moderately disturbed. Rad Nanno to Nanno Ooze. Greenish and purple white (NB). Well developed bedding of green and purple-white beds with sharp contacts. H ₂ S odor. Barrel moderately disturbed. Nell developed bedding of green and purple-white beds with sharp contacts. H ₂ S odor. Barrel moderately disturbed. Nell developed bedding of green and purple-white beds with sharp contacts. H ₂ S odor. Barrel moderately disturbed. Nell developed bedding of green and purple-white beds with sharp contacts. H ₂ S odor. Barrel moderately disturbed. Nell developed bedding of green and purple-white beds with sharp contacts. H ₂ S odor. Barrel moderately disturbed. All N 1 M - 11 Nannos 80-90% Rads 10-15% Sponge sp. 1-5% Sponge sp	A	GE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOLOGIC DESCRIPTION	9 CaC 0 5	6 203 0 10	
Calcareous Moderate Common nannoplankton Radiolaria Moderate Common		UPPEK MIUCENE	N. 16 - N. 17 N. 18	Ceratolithus tricorniculatus Ceratolithus rugosus	Stichocorys peregrina		1 2 3 4 5 6		Barrel moderately disturbed. Rad Nanno to Nanno Qoze. Greenish and purple white (N8). Well developed bedding of green and purple-white beds with sharp contacts. H2S odor. Smear summary Nannos 80-90% Rads 10-15% Forams 1-5% Diatoms 10-5% Sponge sp. 1-5% Sponge sp. 1-5% Microfossil group Preservation Abundance Common Calcareous Moderate Common Nanoplankton Moderate Common			



AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOLOGIC DESCRIPTION	Cat 0 5	% CO3	
R MIOCENE	17 FG	is NI	H	2	2		Barrel moderately disturbed. <u>Rad Nanno Ooze</u> . Greenish (dominant) and purple white (N8). Well developed bedding separating sequences (10 to 15 cm) with sharp basal contacts showing a color grading from green at the base to purple on top. H ₂ S odor.			
UPPER	N. 16 - N.	Discoaster calcari	Ommatartus antepenultimus	5 6	4		Microfossil groupPreservationAbundanceForaminiferaGoodCommonCalcareous nannoplanktonModerate (to Sec. 3) to goodCommonRadiolariaModerateCommonComments:Reworked older nannofossils.Some diatoms and contamination (down- working) of younger radiolarians			
MIDDLE MIOCENE				8	6		in core catcher. <u>Smear summary</u> Nannos 75-90% Rads 10-20% Forams 1-5% Diatoms 1-5% Sponge spicules trace			

SITE 72 Core 3 Cored interval: 106-115 m



AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOLO	OGIC DESCRIPTION		% CaC	, :O ₃ 0 100
	N. 12 (Gr. fohsi robusta)	Discoaster kugleri		2	2		Barrel moderately di <u>Nanno Ooze</u> . Greenis white (N8). Bedding in Sections	sturbed. h white with som 1, 2 and 4.	e purple		•
MIDDLE MIOCENE	N. 12 (Gr. fonsi lobato)	Discoaster exilis	? Dorcadospyris alata		4 5 6		<u>Microfossil group</u> Foraminifera Calcareous nannoplankton Radiolaria Comments: Some rewo a few dia <u>Smear summary</u> Nannos 80-90% Rads 5-10% Forams 1-10% Diatoms 1-5%	Preservation Good Good Poor to mod- erate rked older nanno toms.	Abundance Common Common fossils and		•

SITE 72 Core 4 Cored interval: 150-159 m



AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOLOGIC DESCRIPTION	9% CaC 0 5%	; :O ₃ 0 100
		suitar	ta		2		All sections partly disturbed by drilling. <u>Nanno Ooze</u> . Greenish white (N8), no visible bedding.		•
LOWER MIOCENE	? N.7	? Sphenolithus heteromo	Calocycletta costat	5	4		Microfossil groupPreservationAbundanceForaminiferaGoodCommonCalcareous nannoplanktonGoodCommonRadiolariaModerateCommon		•
				7	6		Smear summary Nannos 80-90% Rads 3-10% Forams 1-10% Diatoms 1-5%		

SITE 72 Core 5 Cored interval: 211-220 m



	777	_		Σ	E	 LITHOLOGIC DESCRIPTION			0 10
				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1	Section 1 moderatel <u>Nanno Ooze</u> . White(and firmer beds. T pure Nanno Ooze whi higher percentage c	N8). Alternati he plastic beds le firmer beds of Rads and Fora	on of plastic are almost contain a ms.	•
UPPER OLIGOCENE	? P.22	orhabdulus carinatus	mocanium bipes	3 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3	<u>Microfossil group</u> Foraminifera	Preservation Moderate to	<u>Abundance</u> Few	•
		Triquetr	Lych	8	6	Calcareous nannoplankton Radiolaria Comments: Some rew Radiolar <u>Smear summary</u> Nannos 90-95% Rads 3-10% Forams 1-5% Diatoms 1-5%	good Good Poor to moderate worked older Oli ria in Section 2	Abundant Common gocene	•

SITE 72 Core 6 Cored interval: 266-275 m





SITE 72 Core 7 Cored interval: 312-321 m


AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOLOGIC DESCRIPTION	Ca(% CO3 60 10
UPPER OLIGOCENE	P. 21	Sphenolithus predistentus	Theocyrtis annosa		1 2 3 4 5 6	Unopened	Foram Nanno Ooze. White (N8). Alternating beds of plastic and semi-indurated oozes. Aboundant Forams in some horizons (as in Section 6). Microfossil group Preservation Abundance Foraminifera Good Common Calcareous Good Common Radiolaria Poor to mod- erate Common Comments: Some contamination (downmixing) of radiolarians in Section 3. Smear summary Nannos 70-90% Forams 10-30% Rads 1-5%		
									HH

SITE 72 Core 8 Cored interval: 321-330 m



AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOLOGIC DESCRIPTION	9 CaC	6 203 0 10
				2	2		Foram Nanno Ooze. White (N8) above 335.6 m, brownish white (10YR8/2) below. Alternating beds of plastic and semi-indurated oozes as in Barrels 6, 7 and 8.		•
LOWER OLIGOCENE	P. 18 - P. 19	Discoaster tani orantus	Theocyrtis tuberosa	4	3		← Sharp color change at 335.6 m		•
	(undetermined)		T. brc	7 8 8 111111 8 111111 mia	6		Smear summaryNannos70-95%Forams30% in Sec. 2 & 3, rare in other sectionsRads1-5%Microfossil group ForaminiferaPreservation GoodAbundance Common (to Sec. 4) to rareCalcareous nannoplankton RadiolariaGoodCommon to abundant moderateComments:Reworked Eocene Radiolaria (Sec. 4-6) and nannofossils (Sec. 6).		•

SITE 72 Core 9 Cored interval: 330-339 m





	FC	NAJ	RA	MET	SECT.	LITHOL.	LITHOLOGIC DESCRIPTION	CaC	CO ₃
	F unde termined				2	Unopened	NOTICE: In Barrel #10, 9 m recovery for 3 m drilled. Most of the core is formed of caved and injected overlying sediments. * Most of the core is formed of caved and injected overlying sediments. Only 5 layers of relatively undisturbed Nanno Rad Ooze	•	
UPPER EOCENE) UPPER EOCENE 13	ddle Eocene	rsocyrtis bromia		3	2 2 2 2 2 2 2	Name Rad GozeYellowish brown.Stiff texture.No visiblebedding.Microfossil groupPreservationAbundanceMicrofossil groupPreservationAbundanceForaminiferaModerateFewCalcareousGoodCommonnannoplanktonModerateCommon toRadiolariaModerateCommon to	Ι	
(probably)	Eocene ? P. 13	2 Mi	Thy r	8	6	J J J Void	Comments: Some contamination (down mixing) noted in all groups (especially Sec. 1, 5 and 6). Smear summary Rads 60-80% Nannos 20-40% Diatoms 1-2% (10% in Section 5).	+	

SITE 72 Core 10 Cored interval: 339-342 m



Site 72, Core 10, Physical Properties

AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOL	OGIC DESCRIPTION		9 CaC 0 5	6 20 ₃ 0 100
2 UPPER EOCENE 2	Eocene FORAMS	? Middle Eocene NANNOS	Thyrsocyrtis bromia RADS	METERS	2 3 3 4 4		LITHOL Interbedded: <u>Nanno Rad Ooze</u> <u>Chert</u> <u>Indurated Nanno</u> <u>Chert</u> <u>Indurated Nanno</u> <u>Chert</u> (See detaile <u>Microfossil group</u> Foraminifera <u>Calcareous</u> nannoplankton Radiolaria Comments: Radiolari preserved	OGIC DESCRIPTION	Abundance Few Common Rare to abundant ry poorly of the core.	9 CaC	
				7	6		Total drilling 345 m	in Chert.			1111

SITE 72 Core 11 Cored interval: 393.5-345 m



Site 72, Core 11, Physical Properties

_	SITE	72 Co	re 11	Detailed description Section 1 (343.5-395 m)
F		343.5 m		343.50 - 343.75 m: Very watery. May be caved.
	25	343.75		343.75 - 344.01: <u>Nanno Rad Ooze</u> . 40% CaCO ₃ . Brown (10YR 5/3). Bedded. Plastic and indurated layers.
	50	344.01 344.03 344.08		344.01 - 344.08: <u>Chert</u> - dark yellowish brown (10YR4/2).
	75			344.08 - 344.73: <u>Indurated Nanno Ooze</u> . CaCO ₃ 90%. Light gray (10YR7/2) to light brownish gray (2.5Y6/2). Bedding: plastic and indurated layers.
	100	344.73		344.73 - 344.87: <u>Chert</u> (2 pieces) dark yellowish brown (10YR4/2).
	125	344.81 344.87		344.87 - 345.00: <u>Indurated Nanno Ooze</u> . CaCO ₃ 80%. Very dark grayish brown (10YR3/2). Fine laminations (shally), plastic and indurated layers.
-	- 150 -	345.0		345.00 - 345.06: <u>Chert</u> . Black.



AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOLOGIC DESCRIPTION	9 CaC 0 5	6 203 0 10
				111111	1	Void	From top (10 m) down to 12.5 m: <u>Rad Nanno Ooze.</u> White (N8). Sparse bedding.		1110
QUATERNARY	N. 22 - N. 23	Gephyrocapsa oceanica and Pseudoemiliania lacunosa	Pterocarium prismatium Quaternary		2 3 4 5 6	No core	Smear summary Nannos 60-70% Rads 20-30% Forams 10% Diatoms 3% Below 12.5 m: Succession of beds of Rad Nanno Ooze. Mostly sharp boundaries. The different hues of greenish and brownish white (N8) are often related to the CaCO ₃ content (50 to 80%) of each bed. Smear summary Nannos 50-80% Rads 20-50% Diatoms 1-5% Microfossil group Preservation Abundance Foraminifera Good Common Calcareous nannoplankton 1) to moderate Radiolaria Moderate to good Common Comments: Reworking of older nannofossils in Sections 3 and 4.		
PLIOCENE	N.2	1		_					

SITE 72A Core 1A Cored interval: 9-18 m



AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOLOGIC DESCRIPT	FION	% CaCO ₃ 0 50	100
PLIOCENE	N. 21	Discoaster brouneri G. oceanica and P. lacunosa	Pterocarium prismatium		2		Some sections moderately distur Beds of <u>Rad Nanno Ooze</u> . Each i displays some hue of brownish o (N8), the darker beds being poor Sharp contacts. <u>Microfossil group</u> <u>Preservati</u> Foraminifera Good Calcareous Moderate nannoplankton Radiolaria Moderate Comments: Reworked older nanno <u>Smear summary</u> Nannos 50-80% Rads 20-45% Diatoms 2-5%	ndividual bed r grayish white rer in CaCO ₃ . <u>on Abundance</u> Common Common fossils.		
										1

SITE 72A Core 2A Cored interval: 18-27 m



AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHO	OGIC DESCRIPTION	5	Cat 0 5	% CO ₃
					1	Void	Sections 2, 3, 4, a	and 6 badly dist	curbed.		TTT
		Discoaster browneri	l Pterocanium prismatium	2	2		<u>Rad Nanno and Nanno</u> 72A-2, succession o greenish white (N8 Lighter bed Darker beds	<u>o Rad Ooze</u> . As of beds of brown) ooze ds = 70% CaCO ₃ . s = 50% CaCO ₃ .	in Barrel ish or		
				-			Microfossil group	Preservation	Abundance		
				Ē	3		Foraminifera	Good	Common		t
				4			Calcareous	Moderate (to Sec. 3) to good	Common		
							Radiolaria	Moderate	Common		
.I OCENE	N. 21			5 1 1 1 1	4		Comments: Some dia	atoms.			
PL		///		6111							ť
		ica and		7	5		Smear summary				
		umbil:		1111		**************************************	Nannos 45-50% Rads 45-50%				
		seudo er su	tas			Void	Diatoms 5%				
		ofenestra p Discoast	ngaster pen	8 11 11 11 1	6						
	7	sticul	Spo	=	-						
	N.19 N.20	Re									

SITE 72A Core 3A Cored interval: 27-36 m



AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	ITHOL.	LITHOL	OGIC DESCRIPTION		9 CaC	6 203 0 10
							Core badly disturbe of Section 2. Rad Nanno and Nanno 72A-2 and 3, succes CaCO ₃ content. Co the core: below 36 and greenish white	ed except Sectio <u>Rad Ooze</u> . As assion of beds of lor change near 5.33 m hues of b (N8).	n l and part in Barrels different the top of luish gray		
		ter surculos		2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 ²						f
		hiscoast					<u>Microfossil group</u>	Preservation	<u>Abundance</u>		
		ca and I		4	33333333		Foraminifera Calcareous nannoplankton	Good Good	Common		f
PL IOCENE	N. 19 - N. 20	ulofenestra pseudoumbili	Spongaster pentas	5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			Radiolaria Comments: Some dia	Common	Moderate		•
		Retio			5		Smear summaryNannos50-Rads25-Diatoms5-Forams0-Sponge spiculestra	70% 40% 10% 3% ice			ł
		CUB		81111111	6	Void					L L L
		D. asymmerti								1111	1111

SITE 72A Core 4A Cored interval: 36-45 m



AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOLOGIC DESCRIPTION	9 Ca(0 5	% CO ₃
_			-		1	Void	Sections 2 and 3 badly disturbed. Upper part of the barrel (above 51.5 m). Rad Nanno and Nanno Rad Ooze. As in Barrels 72A-2, 3 and 4, succession of beds of different CaCO ₃ content. Light gray (7.5YR7/0) and bluish gray beds.		•
PLIOCENE	N. 19 - N. 20	Discoaster asymmetricus	Spongaster pentas	4	3		Smear summaryNannos 50-70%Rads 20-40%Diatoms 5-10%Forams 0-2%Microfossil groupPreservationAbundanceForaminiferaGoodCalcareousGoodnannoplanktonRadiolariaModerateCommonComments:Reworked older nannofossils (Sec. 1)and radiolarians (Sec. 3).Some diatoms.		•
UPPER MIOCENE	N. 18			8 7 8 1	6		Below 51.5 m. <u>Rad Nanno Ooze</u> . Successions of beds of more homogeneous and higher CaCO ₃ content ooze. Sharp boundaries between beds of purple white and green white (N8) hues. <u>Smear summary</u> Nannos 70-90% Rads 10-30% Diatoms 1-5% Forams 0-2%		•

SITE 72A Core 5A Cored interval: 45-54 m



AGE	FORAMS	NANNOS	RADS	METERS	SECT. NO.	LITHOL.	LITHOLOGIC DESCRIPTION	0 5	6 203 0 1	
UPPER MIOCENE	N. 18	Ceratolithus rugosus	ratolithus tricorniculatus Spongaster pentas		2 3 4 5 6		Core completely disturbed except Section 5. Rad Nanno Ooze. Succession of pastel colored beds (greenish white and purple white - N8) with sharp boundaries. The texture is still plastic but firmer than in Barrels 72A - 3 and 4. Smear summary Nannos 70-90% Rads 10-25% Diatoms 1-5% Forams 0-2% Microfossil group Preservation Abundance Foraminifera Good Common calcareous Good Common nannoplankton Radiolaria Moderate Good Common diatoms.			
								ш	Ш	

SITE 72A Core 6A Cored interval: 59-63 m





Site 72, Core 1, Sections 1, 2, 3, 5, 6.



Site 72, Core 2, Sections 1-6.



Site 72, Core 3, Sections 1-6.



Site 72, Core 4, Sections 1-6.



Site 72, Core 5, Sections 1-6.



Site 72, Core 6, Sections 1-6.



Site 72, Core 7, Sections 1-6.







Site 72, Core 9, Sections 2-6.



Site 72, Core 10, Sections 3-6.

Site 72, Core 11, Section 1.



Site 72A, Core 1, Sections 1-4.



Site 72A, Core 2, Sections 1-5.



Site 72A, Core 3, Sections 1-6.


Site 72A, Core 4, Sections 1-6.



Site 72A, Core 5, Sections 1-6.



Site 72A, Core 6, Sections 1-6.