3. SITE 61

The Shipboard Scientific Party[1]

Occupied: August 9-11, 1969.

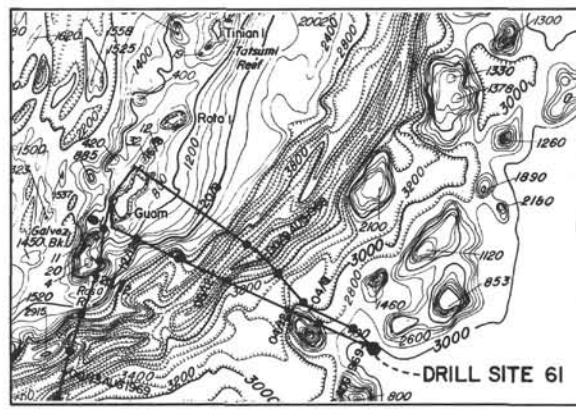
Position: 12° 05.8′N, 147° 03.9′E.

Water Depth: 5562 meters.

Total Depth: 96 meters, in basalt.

Holes Drilled: Two holes.

Cores Taken: Four cores.



Main Results: Soft Neogene sediments, including brown Lower Miocene radiolarian clays, overlie Upper Cretaceous cristobalitic mudstones associated with tuff, and minor chert which rests on (and may be interbedded with) amygdaloidal basalt. The lowest seismic reflector, shown on air-gun records at about 0.135 second, was not reached; and between 30 and 100 meters of sediments may lie beneath the basalts in which the holes bottomed.

BACKGROUND AND OBJECTIVES

The results at Site 59 (See Figures 2 and 4) suggest that Mesozoic sediments are present beneath a thin Tertiary cover in the region north of the Caroline Ridge near the Mariana Trench. Since one of the principal objectives of the drilling program is to find old Pacific crust, and since the section at Site 59 was not fully penetrated, it seemed worth a determined effort to go beyond the level reached at Site 59, somewhere in the same general area, in an attempt to reach basement. The reflection profile taken by *Argo* (Scan Leg V) through Site 59 (Figure 1) shows the section above the smooth basement reflector (Horizon B?) thinning northwestward from about 0.3 to 0.15 second, by loss of part of the lower "transparent" layer. The middle opaque layer at Site 59 becomes markedly less opaque about 35 miles northwest of Site 59, and this area was selected for Site 61.

Because the soft, upper sediment layers had been sampled at Site 59, we planned to take no samples until the bit met some resistance to its advancement by washing down.

OPERATIONS

Site Survey and Approach

The regional bathymetry around Site 61 and the track of *Glomar Challenger* on approaching and leaving the site are shown in Figure 2. Because the reflection profiling system on *Glomar Challenger* was for all practical purposes inoperative, we elected to retrace as closely as possible the track followed by R/V *Argo* during Leg V of the SCAN cruise, because good air-gun reflection profiles were available along that track. We approached the *Argo* track at about 0630 hours on August 9, and attempted to follow it as closely as possible. When judging from the bathymetry recorded on the echo sounder on *Glomar Challenger* that the ship was at approximately the position marked as "Site 61" on Figure 1, we stopped to drop the beacon.

The position of the *Argo* SCAN line is much less certain than the position of Site 61, which was determined from many satellite navigational fixes obtained while the ship was occupying the site. It is entirely possible that Site 61 is a mile or so off the

[1]E. L. Winterer and W. R. Riedel, Scripps Institution of Oceanography, La Jolla, California; R. M. Moberly, Jr., J. M. Resig and L. W. Kroenke, Hawaii Institute of Geophysics, Honolulu, Hawaii; E. L. Gealy, Scripps Institution of Oceanography, La Jolla, California; G. R. Heath, Oregon State University, Corvallis, Oregon; Paul Brönnimann, University of Geneva, Geneva, Switzerland; Erlend Martini, University of Frankfurt, Frankfurt, Germany; T. R. Worsley, University of Illinois, Urbana, Illinois.

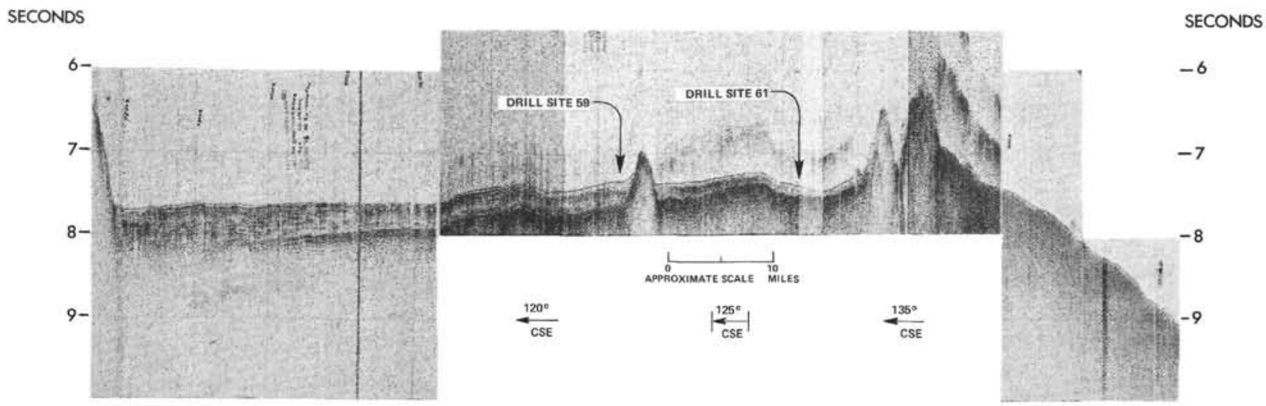


Figure 1. *Seismic reflection profile through Sites 59 and 61, taken by Scripps Institution of Oceanography from R/V* Argo, *on the SCAN cruise, Leg V. The slope at the right (NW) end of the profile descends into the Mariana Trench. The line of the profile is shown on Figure 2.*

SCAN line, and that some of the interpretational difficulties, especially in matching the *Argo* seismic reflection record (Figure 1) with the rocks encountered by the bit, are due to this difference of position.

Drilling Operations

The beacon was dropped in calm seas in 5562 meters of water at 0905 hours on August 9, and Hole 61.0 was spudded at 2300 hours on the same day. The drill string was washed down into the sediments with no resistance to 72 meters, where the first core was cut, yielding only about 1 meter of thoroughly mixed fragments of hard sedimentary rocks in a highly disturbed muddy matrix. The top 2 to 3 meters of the cored interval was firm, but the bottom 7 meters was soft and offered no resistance to coring. The drill string was then washed down to 93 meters, where a hard layer was met, and another core was cut which received just over 2 meters of basalt in a drilled interval of 4 meters.

TABLE 1
Site 61, Leg 7

Hole	Interval (ft)	(m)	Cores Drilled	Core Cut (ft)	(m)	Core Recovery (ft)	(m)	Core %	Recovery %
61.0	0-237		Drilled						
	237-267	72-81	Core 1	30	9.1	3	0.9		
	267-307		Drilled						
	307-320	94-97	Core 2	13	4.0	7	2.1		
	320 (97m)	Totals	2	43	13.1	10	3.1	13	23
61.1	0-272		Drilled						
	272-293	83-89	Core 1	21	6.4	9	2.7		
	293-315	89-96	Core 2	22	6.7	2	0.6		
	315 (96m)	Totals	2	43	13.1	11	3.4	14	23
	635 (193m)	Site Totals	4	86	26.2	21	6.4	14	24

A second hole (61.1) was spudded by raising the drill string off the ocean floor and letting it run back in, without the ship moving more than about 20 meters with respect to the beacon. Again, the tool string was washed down easily to 72 meters where slight resistance was met for a few minutes, and then was washed easily down to 83 meters. There, the first core recovered 3 meters of sedimentary rocks and mud from alternating soft and hard cherty and zeolitic beds in a 7-meter interval. The second core started at 89 meters in very hard material and the tools advanced only about half a meter in 45 minutes. The bit broke through this layer and advanced easily–without pumping–to 96 meters, where it encountered another hard layer. After drilling only a few more minutes, the barrel was retrieved and found to contain about 60 centimeters of basalt–presumably from the hard layer at the top of the cored interval.

The core-head used was especially made by Hughes Tool Company for the Mohole Project, and it has six rolling cones in which are embedded tungsten carbide studs. The device behaved very satisfactorily in chert and basalt, but the bearings loosened noticeably during the drilling of the two holes.

At 2245 hours on August 11, the drill string was aboard. After making a brief air-gun survey of the site, the ship departed for Guam to pick up a hydrophone streamer and spare recorder for the malfunctioning reflection profiling system.

SITE SUMMARY

Lithology

The rocks drilled at Site 61 fall into three general groups: (1) the uppermost unconsolidated sediment of unknown lithology; (2) Upper Cretaceous cristobalitic mudstones associated with tuff and minor chert; and (3) somewhat altered basalt.

The top 72 meters of sediment was not sampled in either hole, and the lithology is not known. The drill string was washed down with little difficulty, suggesting that the sediment is unconsolidated. It is possible that this is similar to the Neogene siliceous oozes and clays cored nearby on Leg 6 (Site 59, 11° 46.8'N, 147° 34.9'E).

In Hole 61.0, the first resistance to drilling was encountered at 72 meters below the sea floor, and the next nine meters were cored. Several types of consolidated sedimentary rock were present as fragments in the one meter of highly disturbed mud recovered. The largest (up to 40 millimeters) and most consolidated fragments from the core catcher consist of compact, light brownish-gray cristobalitic mudstone or porcelanite, showing 0.5 to 1 millimeter of wispy, often lensoid laminae, some rich in ferromanganese micronodules. The original sediment was apparently an Upper Cretaceous silty ash containing Radiolaria. The ash is now mostly cristobalite, and the radiolarian opal has inverted to chalcedonic quartz.

Friable yellowish-white silty ash is about as abundant as the porcelanite mudstone. Some of the indistinct laminae within these pieces are radiolarian-rich. Somewhat less abundant are pieces of radiolarian-bearing, laminated olive-gray tuff rich in pyroxene and basic glass. The ash and tuff contain layers of brownish-black manganese impregnated clay and siltstone, about 1 millimeter thick, as well as pale laminae rich in radiolarians. The least abundant indurated material of the association is white, siliceous claystone, in which the opal of sponge spicules has inverted to quartz and that of radiolarians to chalcedony. The core catcher of Hole 61.0, Core 1 also contained lumps of brown silty mudstone.

The stiff mud recovered in Core 1 of Hole 61.1 was crowded with pieces of the types of sedimentary rock lithologies described above. Moreover, the sediment extruded when the bumper subs were compressed after abandoning the site contained chips of all the rock types described above. From these observations, we conclude that the sediments between 72 meters, and approximately 90 meters are variably consolidated volcanic ash and pelagic clay showing degrees of induration and diagenetic alteration to cristobalitic mudstones and tuffs, and are associated with subordinate amounts of siliceous ooze. The chips of consolidated sediment are uniformly scattered through all the cores, and their relative stratigraphic positions are unknown.

Bands and streaks of olive, very pale orange and gray clays, which were recovered in the lower meter of Section 2, Core 1, from Hole 61.1 and were highly contorted during coring, are probably representative of the softer beds of the section, throughout which the harder beds are present as thin stringers. These pelagic clays contain the less diverse of the two Cretaceous radiolarian faunas described in the paleontology report for this site.

Chert is present in the section, but is much less abundant than the other rocks. The largest fragment recovered (60 millimeters diameter) was jammed in the mouth of the core catcher of Core 1, Hole 61.1, and is therefore assumed to have come from about 86 meters below the sea floor. Smaller chips of gray to brown chert are common in the same core and in material recovered from the bumper subs. All the smaller fragments are angular, and closely resemble flints from continental areas. In thin section, the largest chert fragment show abundant (up to 50 per cent) ghosts and infilled tests of unidentifiable radiolarians. All original opal has inverted to quartz (in part, chalcedonic). The chert appears to be present as nodules or discontinuous lenses, because there was no evidence of a hard layer in Hole 61.0 corresponding to the chert at 86 meters in Hole 61.1.

The deepest rock cored in both holes was basalt. The contact between the basalt and the overlying sediment was not cored, so we do not have conclusive evidence as to whether or not the basalt is intrusive. The altered appearance of the upper-most basalt in both holes, and the fact that no baked sediment or minerals suggestive of low-grade thermal metamorphism were recovered from immediately above the hard basalt suggest, however, that the contact is depositional rather than intrusive. This inference is supported by the similarity

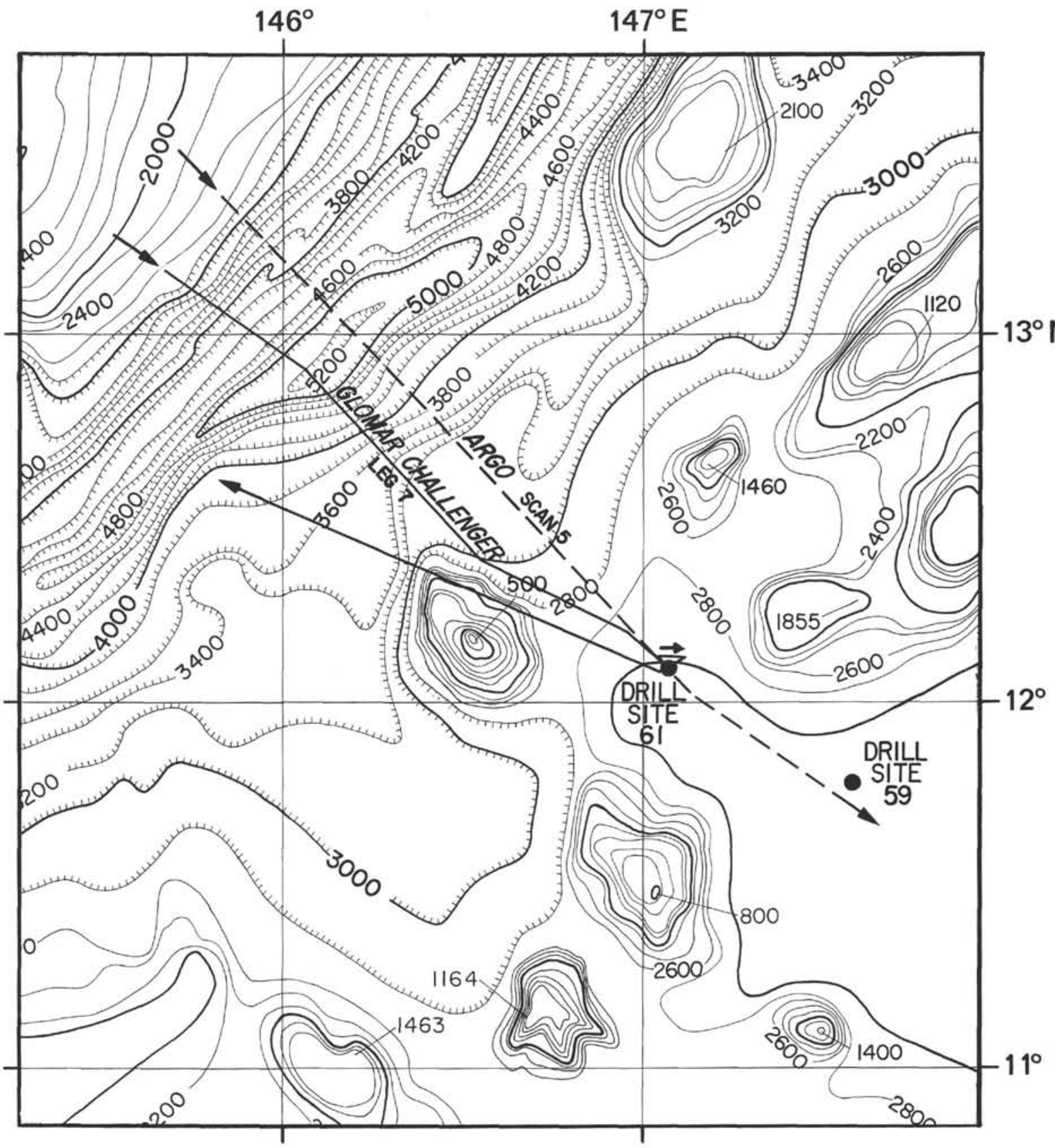


Figure 2. *Bathymetry in the region around Site 61, based on data available before 1969; showing Sites 59 and 61 and the tracks of D/V* Glomar Challenger *and R/V* Argo *(SCAN cruise, Leg V) from Chase, T. E., Menard, H. W. and Mammerickx, J. W. (1970). Contours in fathoms (uncorrected).*

of the mineral suite in the tuffs to that in the basalt, suggesting that the same volcanic episode is responsible for both. Overlap of the final stages of volcanism with pelagic sedimentation is suggested by the drilling record of Hole 61.1. Here, about 3 meters of basalt overlie approximately 6 meters of sediment (rapid penetration by the drill; no recovery), which in turn rests on unsampled hard rock that probably is basalt.

The basalt is olive-gray and nonporphyritic. Its dominant components are labradorite laths (An about 65), prisms of a nonpleochroic, pale brown pyroxene, both present as subhedral crystals about 1 millimeter in diameter, and euhedral to anhedral opaque grains (probably magnetite or ilmenite). The groundmass is largely chlorite (mainly green, some brown), probably altered from glass. A pale green clay, probably montmorillonite, lines small vesicules and partially replaces the plagioclase along cleavages and fractures. Basaltic hornblende is present in trace amounts as laths up to 200 microns in length. Amygdules are abundant in the top several centimeters, and sparse below that. They are 5 to 22 millimeters across, and consist mainly of calcite or chlorite. A few calcite veins about 1 millimeter thick cut the rock at high angles. In one case, the calcite appears to be associated with serpentine. The uppermost few centimeters of basalt recovered from both holes appear to be more altered than the lower parts of the cores.

Physical and Chemical Properties

The physical and chemical properties of cores obtained at Site 61 are summarized in Table 2 and are displayed as a function of depth in the Site Summary at the end of this chapter. The significance of these data is discussed in separate contributions elsewhere in this volume.

Paleontologic-Biostratigraphic Summary

The only calcareous microfossils found at this site were a few specimens of apparently displaced, Middle Miocene discoasters in the core-catcher sample of Hole 61.1, Core 1; therefore, biostratigraphic interpretation depends on the radiolarians, which occur in virtually all of the sediments sampled here.

The soft brown clay of the sample from a depth of about 80 meters (61.0-1) contains a well-preserved, diverse radiolarian assemblage assignable to the *Calocycletta costata* Zone. Associated with this are small (approximately 3 millimeters) lumps of semi-consolidated, finely bedded (grey and whitish) pyroclastic silt containing an assemblage of well-preserved radiolarians of Santonian-Low Campanian age, described in detail in the chapter on Cretaceous Radiolaria by H. P. Foreman.

The clayey core from about 85 meters below the sea floor (61.1-1) contains abundant radiolarians, moderately preserved, of approximately the same age as those in the pyroclastic silt above.

DISCUSSION

Depth to Basement

Even though the drill reached basalt beneath Upper Cretaceous strata, it appears that the entire sedimentary section was not penetrated at this site, and beds considerably older than those reached in these holes may be present at greater depths. The total depth to basement as shown on the *Argo* air-gun record near this site (Figure 1) can be estimated by assuming values for sound velocity in the overlying strata. The sequence of reflectors shown on the *Argo* profile and on the air-gun record made from *Glomar Challenger* at Site 61 is shown as the ordinate on Figure 3; and the drilled depths to prominent changes in lithology are shown as the abcissa. An interval velocity of 1.7 km/sec is assumed for the post-Cretaceous sediments, based on velocities measured elsewhere in the Pacific in comparable materials (and on the presence of a convenient reflector at 0.085 second—the very time required). The average velocity within the Upper Cretaceous rocks drilled can be estimated by assuming that the reflector at 0.095 second, is the top of the cherty section, and that the reflector at 0.105 second is the top of the basalt (averaging the depths for the basalt in the two holes). The value so derived (2.0 km/sec) can then be extrapolated to the deepest reflector, which is the regional basement on the *Argo* profile. The extrapolated depth is 130 meters, which is doubtless minimal, since sound velocity can be expected to increase downward. Another logical choice of reflector for the top of the basalt (at 0.095 second) yields a velocity for the Cretaceous of 3.2 km/sec, which seems somewhat high considering the small proportion of hard layers in an otherwise soft sequence.

Age of the Crust

Site 61 provides no evidence on the maximum age of the crust at this place. Only a minimum age of Late Cretaceous can be assigned. The paleontological determinations place the strata in the upper part of the Santonian or in the Campanian stage.

The significance of the phrase "age of the crust" is questionable at this site. The basalt is probably at least in part interlayered with sediments, and the overlying Upper Cretaceous sediments contain clastic grains of pyroxene identical with that in the basalt. This, along with the vesicular and amygdaloidal structure of the basalt, and the lack of any signs of thermal metamorphic or hydrothermal effects in the sediments, is

TABLE 2
Physical Properties of Cores Recovered From Site 61

	Lithology	Physical Properties									
		Saturated Bulk Density (Sect. Wt.)[a] gm/cm^3	Saturated Bulk Density (GRAPE)[b] gm/cm^3	Mean Grain Density[c] gm/cm^3	Porosity (Calculated)[d] Per Cent	Porosity (Drying, Ship)[e]		Penetrometer[f] cm	Sonic Velocity[g] m/sec.	Natural Gamma Radiation[h]	
						Interval cm	Per Cent				
Hole 61.1											
Core 1-1	Porcelanite, mudstone, shale and siltstone		1.840	2.64	49.5	120.0	69.1	0.850		344	
1-2	Porcelanite, mudstone, shale and siltstone		1.981	2.64	40.8	69.0	63.3	0.417	1778	519	

[a]Saturated bulk density derived by dividing net section weight by volume.

[b]Saturated bulk density derived from gamma ray attenuation data (see text). Value given is average of all valid data points per section.

[c]Mean grain density is assigned, considering selected grain density measurements made and reported elsewhere in this volume, and gross mineralogy of the section.

[d]Porosity is calculated: $\phi = \frac{\rho_g - \rho_B}{\rho_g - \rho_f}$; ρ_B is from GRAPE, average per section ρ_g is from column 5; $\rho_f = 1.024$; units in per cent of total volume.

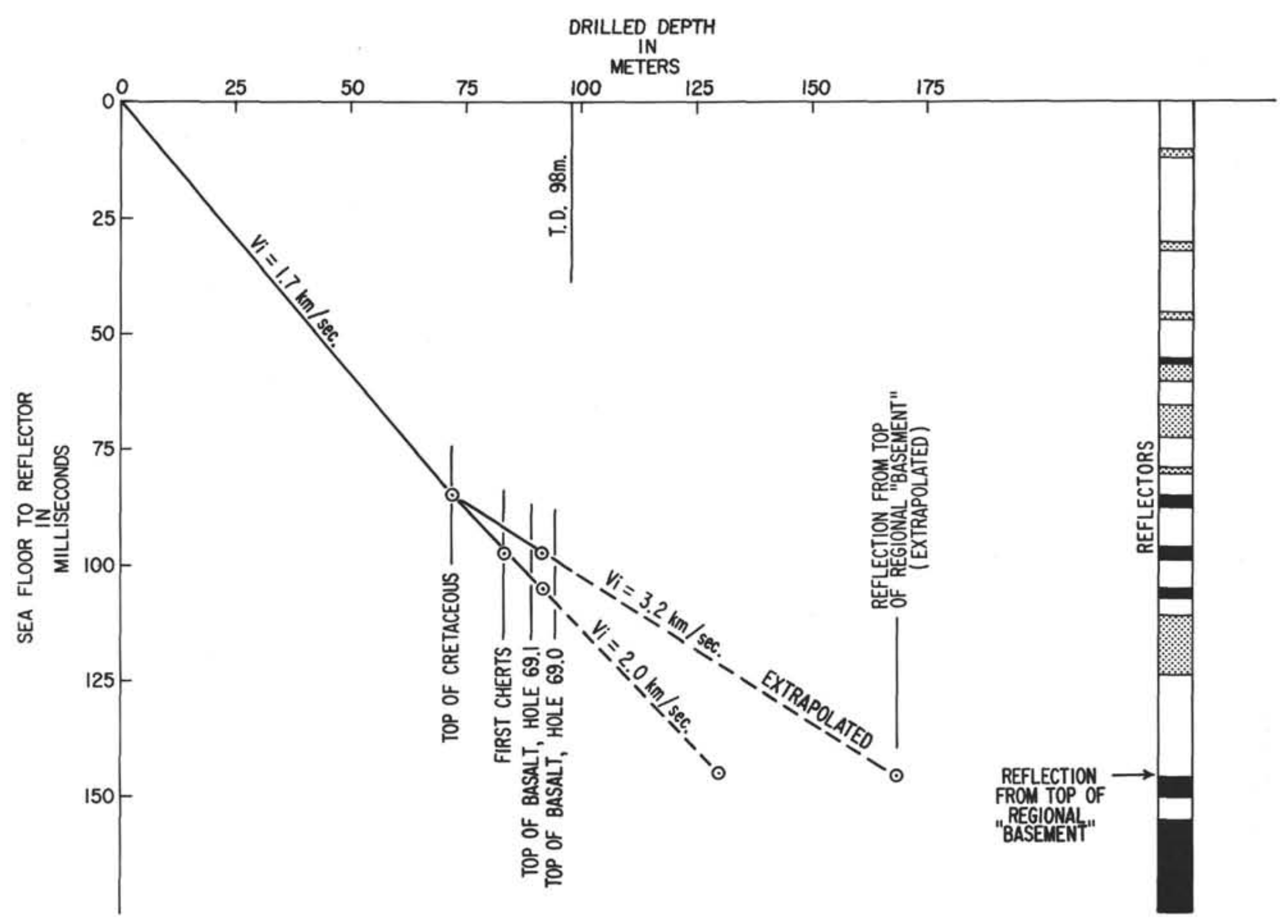


Figure 3. *Travel-time curves inferred from seismic reflection profile taken at Site 61 from D/V* Glomar Challenger. *On schematic profile, solid areas are strong reflections, stippled are weak.*

TABLE 2 – *Continued*

	Grainsize[i]					Carbon/Calcium Carbonate			Interstitial Water				
	Interval cm	Sand Per Cent	Silt Per Cent	Clay Per Cent	Classification	Interval cm	Calcium Carbonate Per Cent	Organic Carbon Per Cent	Interval cm		Eh (mu)	Temp °C	Salinity %
						120.0	0.0	0.0					
	42.0	4.3	45.9	49.8	Silty Clay	69.0	0.0	0.0	66-76	7.53	-300	24.0	34.7

[e]Porosity is by drying (shipboard measurements) and is corrected for salt.

[f]Only the minimum penetrometer measurement per section is given.

[g]Sonic velocity measurements were made aboard ship and are corrected to 23°C. Maximum of three measurements per section is shown.

[h]Natural gamma radiation: Average of middle 16 of 20 counts/3 inch/1.25 minutes minus 1350 background.

[i]Grainsize: Sand per cent of total weight greater than .062 millimeter; clay per cent of total weight less than .0039 millimeter; silt remainder of total weight.

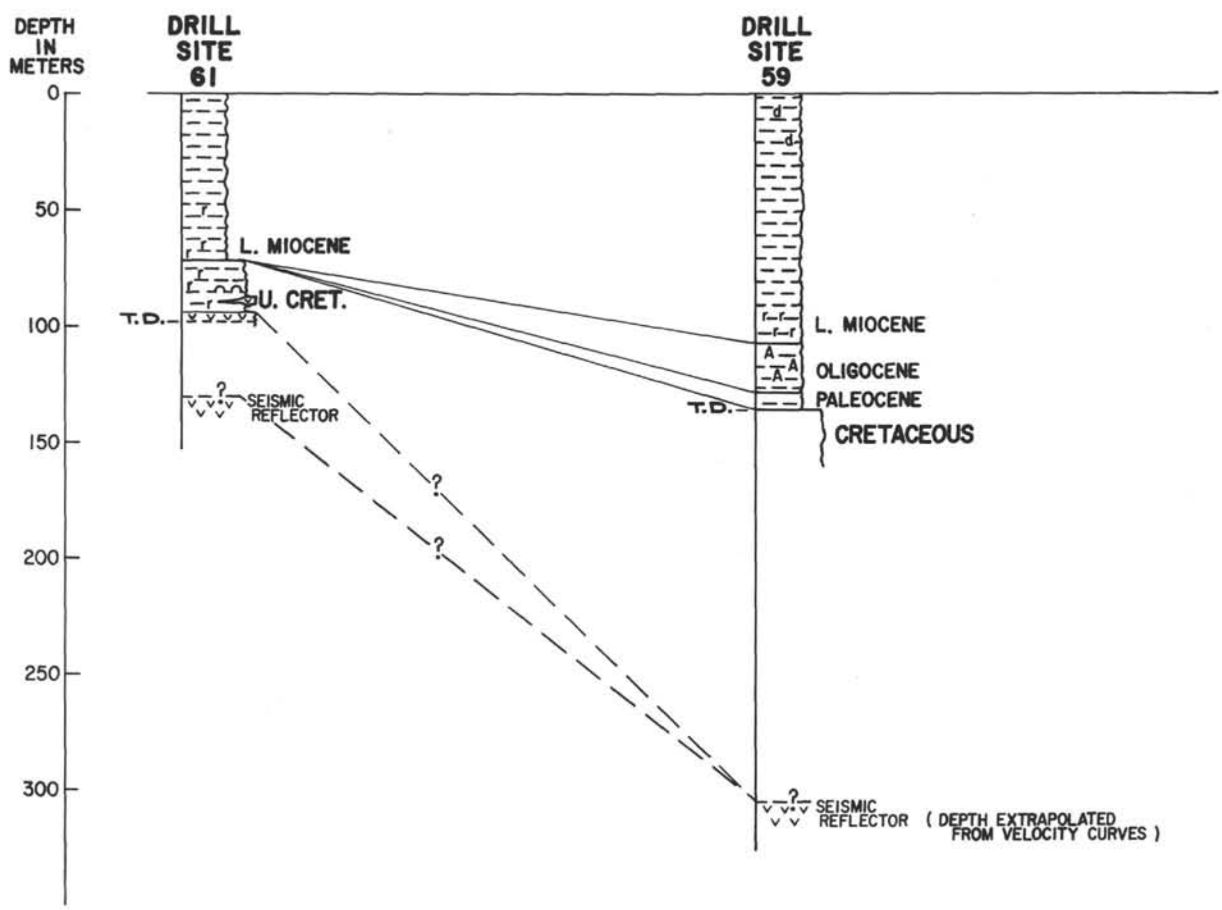


Figure 4. *Inferred correlations between Sites 59 and 61.*

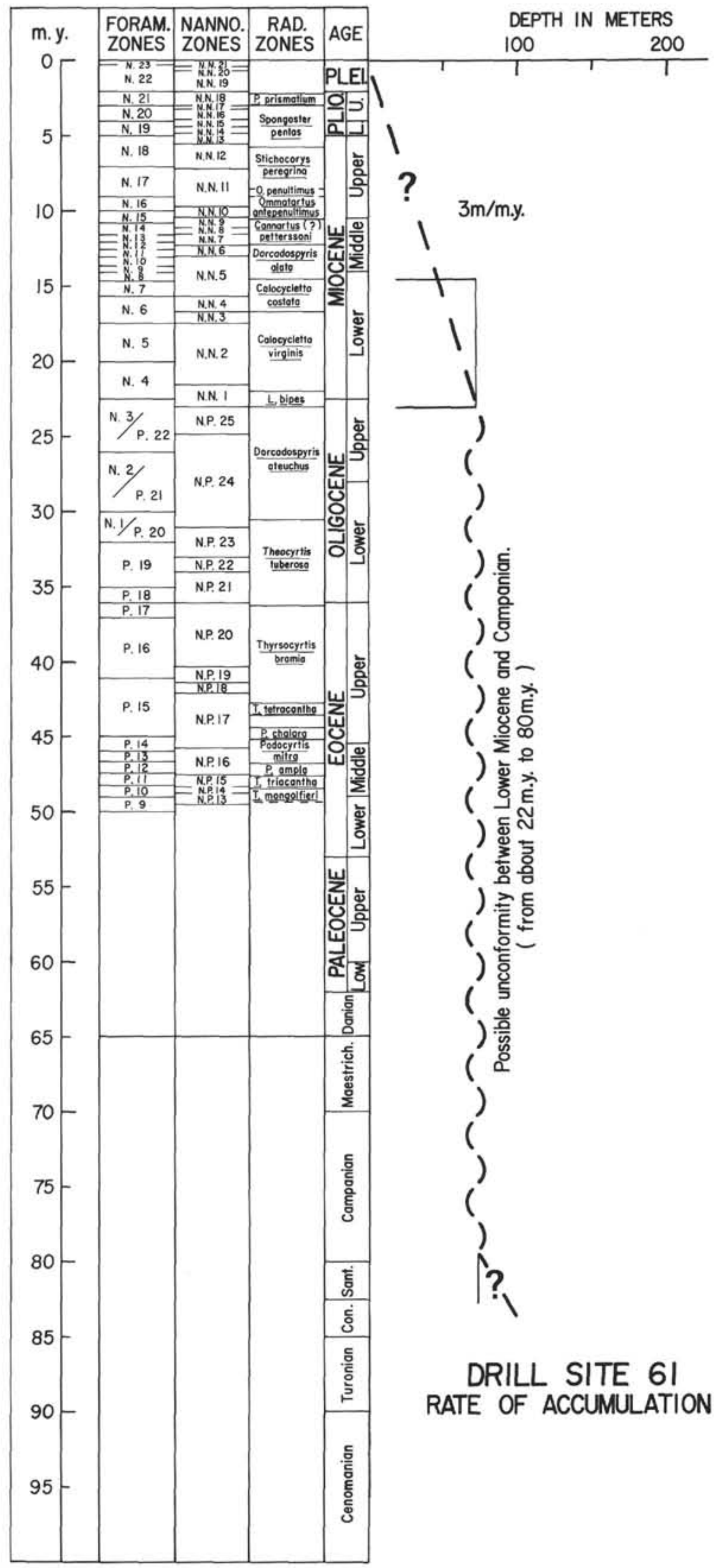


Figure 5. *Rate of sediment accumulation at Site 61. The overall average rate, ignoring unconformities, is about 1 m/m.y.*

taken to mean that the basalt occurs as flows interlayered with the sediments. The geographic and stratigraphic limits of this volcanic sequence are not known, but they might easily include the regional reflecting horizon (Figure 1) identified as basement, which may bury and conceal still older sediments above the "true crust".

Near Site 59 (Figure 1) the eastward-thickening wedge of sediments includes an opaque layer that might correlate with the basaltic part of the section cored at Site 61, and beneath this layer the section is acoustically more transparent above the "basement".

The entire layered sequence at Site 59 appears to abut a small hill to the west which projects about 400 meters above the surrounding sediment plain. Where similar peaks were crossed along the *Argo* track some 150 kilometers to the southeast, the sediments thicken and become more opaque toward the peaks, suggesting that the same volcanic episode may have created both the seamounts and the opaque (and transparent) sediments. The age relation between the seamounts and the "basement" remains a moot question.

Relation to Site 59

On Figure 4, correlations are suggested between Sites 61 and 59. The sharp change in lithology and induration at the top of the Cretaceous strata is the only horizon that can be correlated between the sites. The thicker post-Cretaceous section at Site 59 includes "Oligocene" (*Triquetrorhabdulus carinatus* Zone), Upper Eocene/Lower Oligocene and Paleocene deposits, which are probably not represented by fossiliferous strata at Site 61. No fossils limited to the Eocene were identified at either site. Eocene sediments may be missing entirely in this region, or their rate of deposition may have been very slow–less than 1 mm/thousand years at Site 59. Since no cores were taken in the Neogene sediments at Site 61 the only clue to their age range is provided by cavings in cores cut deeper in the section. These cavings contain Lower Miocene radiolarians and rare Miocene discoasters.

Relation of Site 61 to Mariana Trench and Site 60

Site 61 is about 150 kilometers seaward of the trench, and some 250 kilometers from the crest of the Mariana Arc, with its history of Tertiary volcanism. At Site 60 the thick transparent sequence on the inner trench slope was sampled during Leg 6 and found to be mainly Miocene ashy sediments (personal communication, Leg 6 Scientific Party). This apron is more than a kilometer thick just above the steep inner slopes of the trench, whereas the equivalent transparent sequence at Site 61 is no more than 72 meters thick. Such a rapid change in thickness suggests that the trench may have been effective as a barrier to bottom transport of sediment since at least early Miocene time. Sea-floor spreading westward into the trench at typical rates (say 4 cm/yr) would place Site 61 some 800 kilometers east of the trench 20 million years ago–far away from effects of volcanism in the Mariana Arc. The highest average rate of deposition for the section above 72 meters is 3.5 m/m.y., assuming the age of sediment above the hiatus, is 1 m/m.y. (See Figure 5).

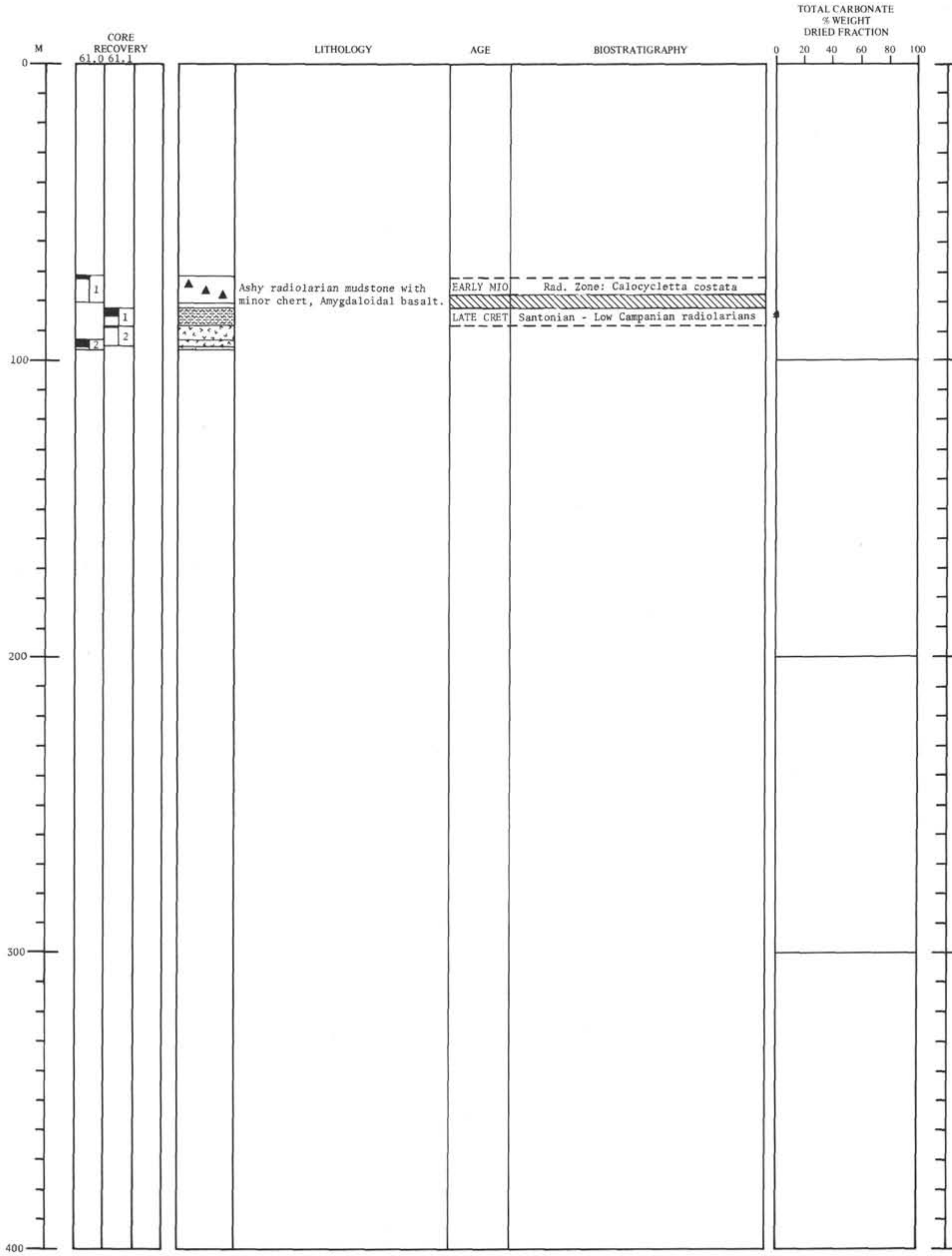
Relation to Darwin Rise

The lack of biogenous carbonate indicates deposition below the Late Cretaceous calcite compensation depth (probably 4800 meters), whereas the presence of siliceous microfossils suggests at least moderately high surface productivity. Site 61 was close to the axis of the Darwin Rise in the Late Cretaceous as drawn by Menard (1964). However, the lack of carbonate places a substantial constraint on the paleobathymetry of the central western Pacific.

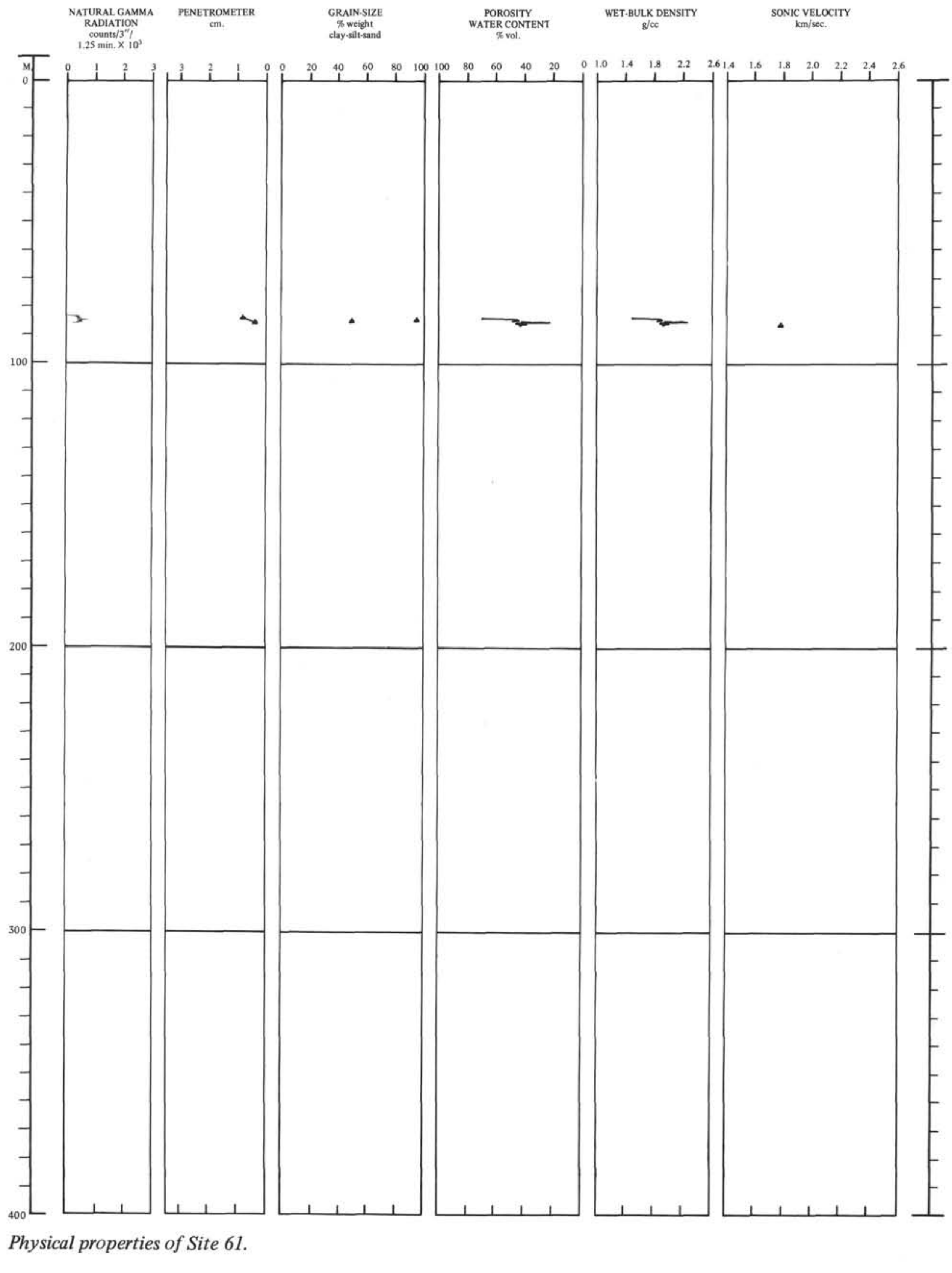
REFERENCES

Chase, T. E., Menard, H. W. and Mammerickx, J. W., 1970. Bathymetry of the North Pacific. Sheet No. 6, *Univ. Calif., Inst. Marine Resources, Tech. Rept. No. 11.*

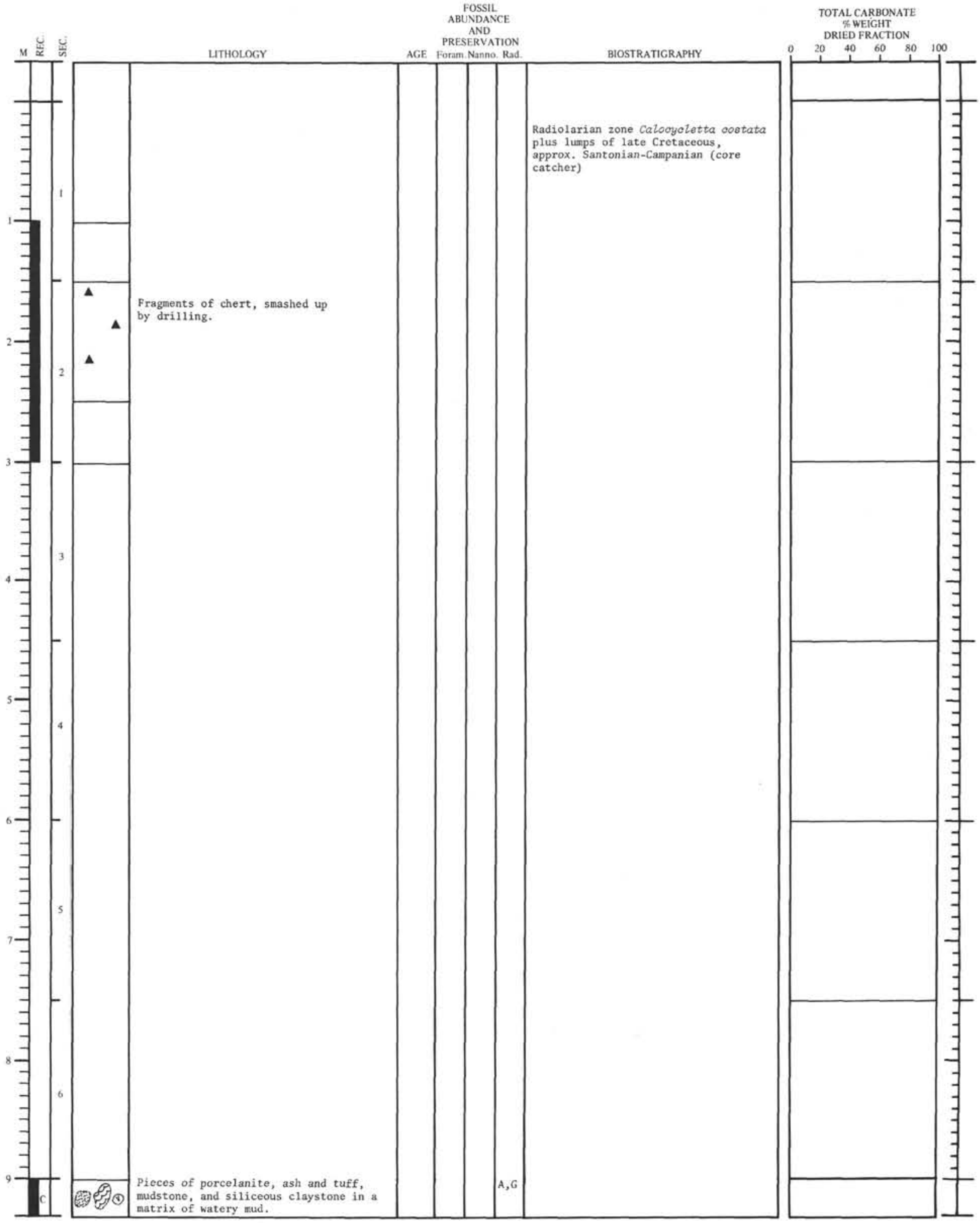
Menard, H. W., 1964. *Marine Geology of the Pacific.* New York, McGraw-Hill). 1964.



Lithology and biostratigraphy of Site 61.



Physical properties of Site 61.

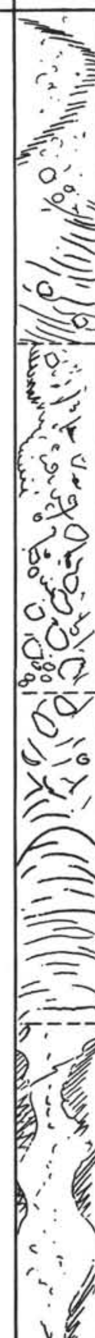


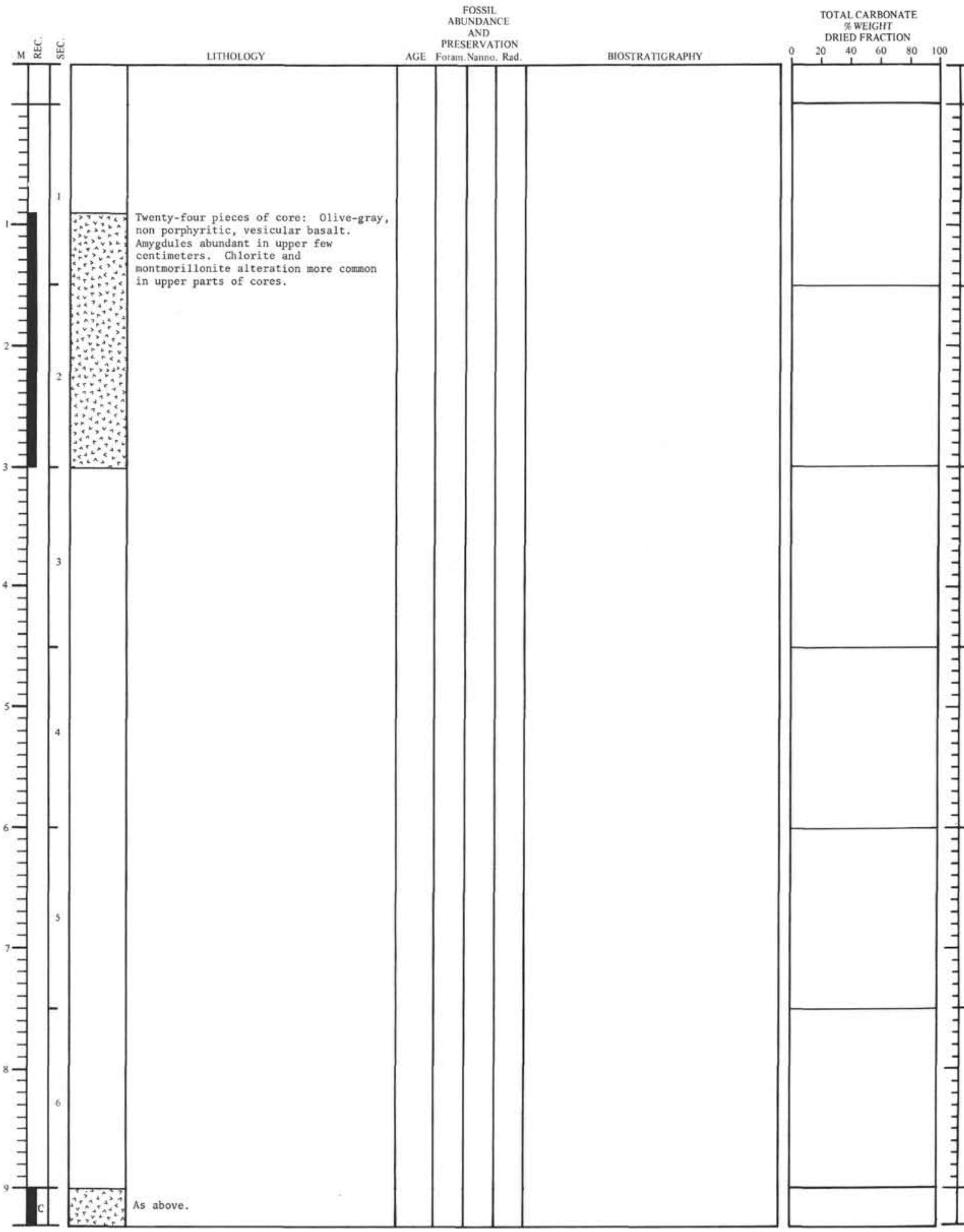
Lithology and biostratigraphy of Core 1, Hole 61-0.

Hole 61.0 Core 1
Section 1

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
0–150 (scale: 0, 25, 50, 75, 100, 125, 150)					Fragments up to 5.5cm and silvers of chert in a slurry of small fragments and mud. At 120cm: Cobble - 5.5cm long, with fractures and bedding.

Hole 61.0 Core 1
Section 2

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
0–150 (scale: 0, 25, 50, 75, 100, 125, 150)					Chips and fragments of rock (chert) in a matrix. Lineations in upper third of core probably artifacts. Shadows from 115-150cm probably due to firmer core of irregular diameter in a slurry.



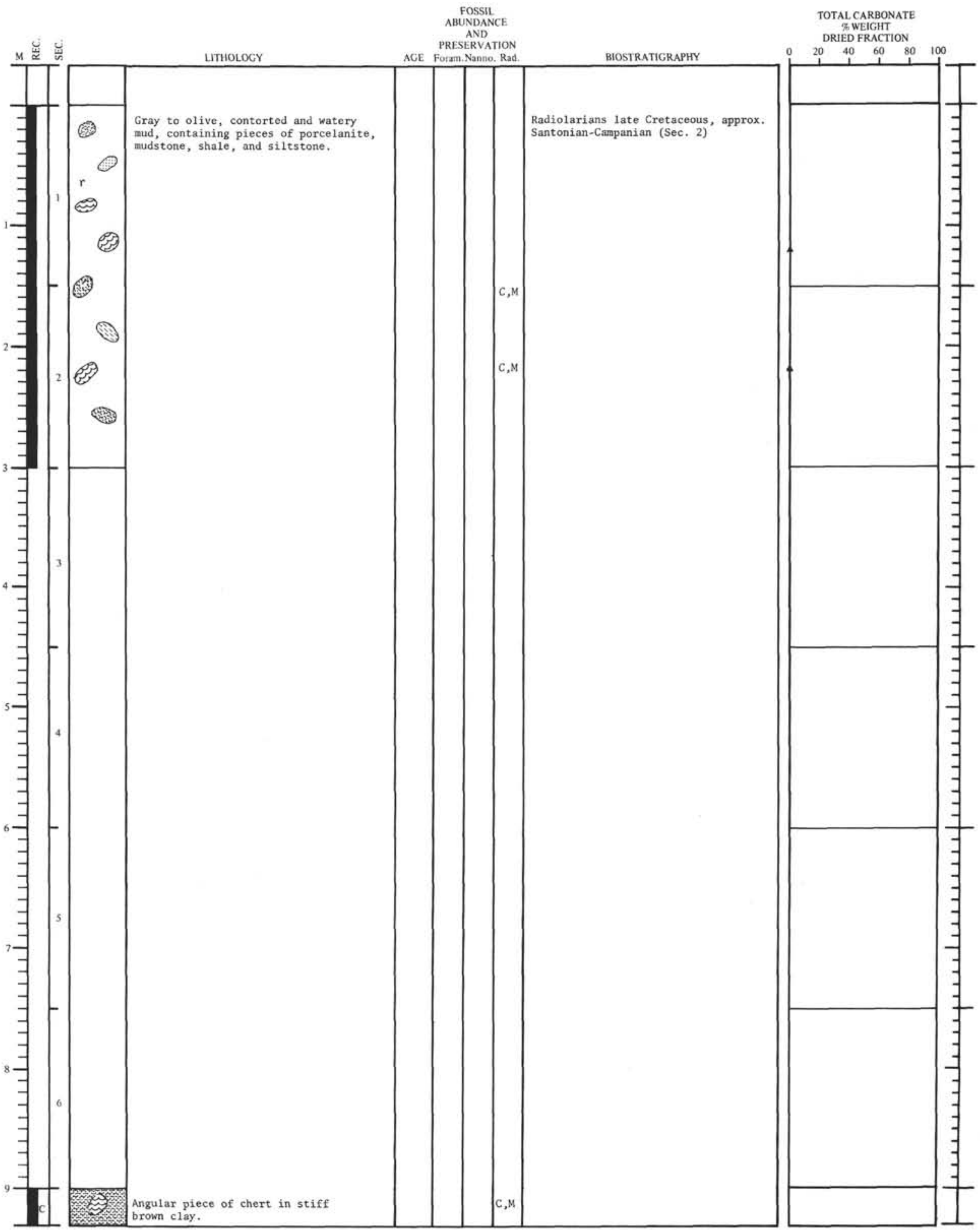
Lithology and biostratigraphy of Core 2, Hole 61.0.

Hole 61.0 Core 2
Section 1

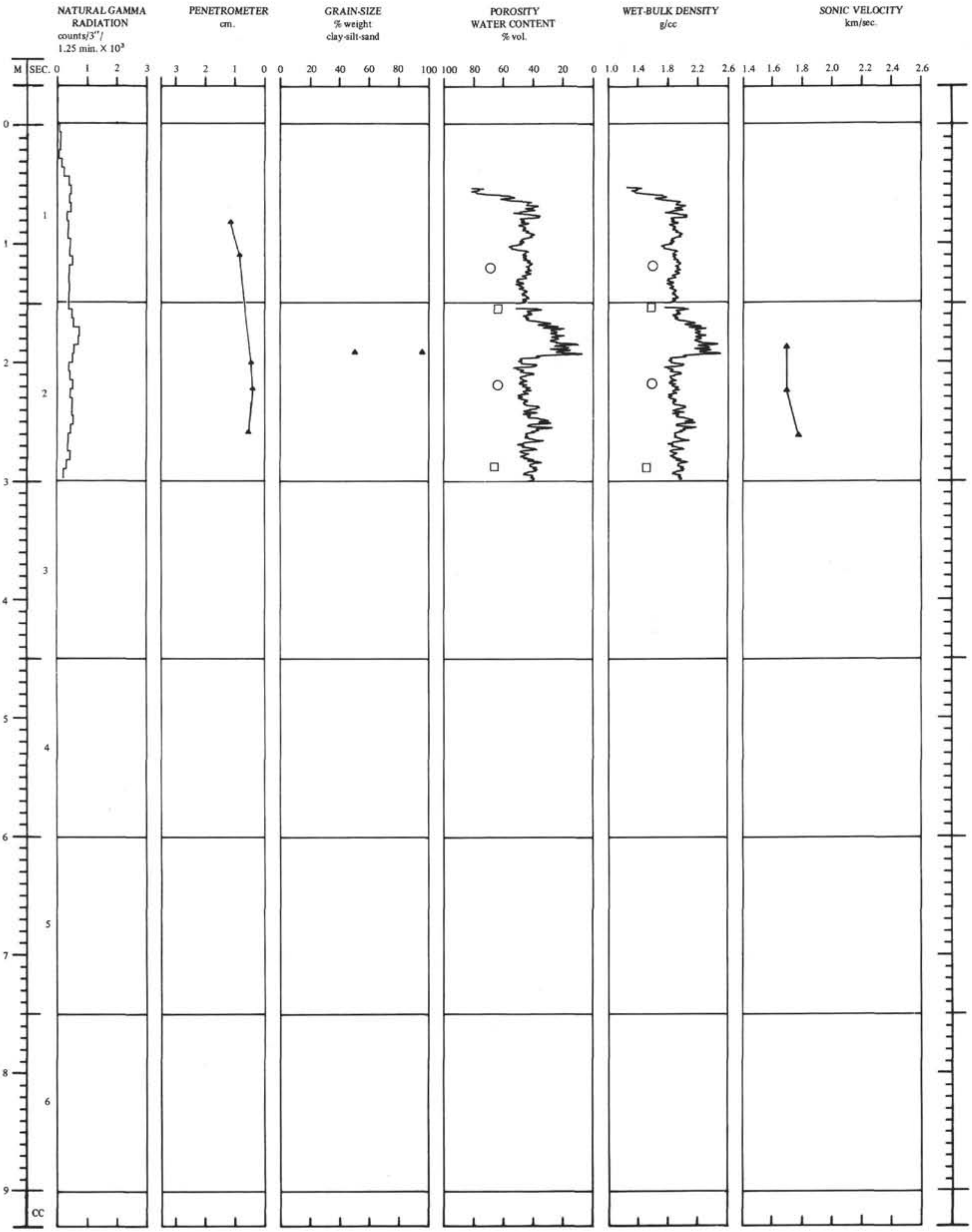
Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
0 25 50 75 100 125 150					9 Pieces of Igneous Rock 5Y6/2 hard, 1/2 to 1mm X 1/s. White zeolite x'ls in veins and vugs. See visual description of core 2, Section 2 for mineralogic description. Void below 60cm.

Hole 61.0 Core 2
Section 2

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
0 25 50 75 100 125 150					IGNEOUS ROCK 5G5/1 greenish gray hard igneous rock, X 1/s are 1mm, largest about 2mm. White zeolite (?) veins at steep angles. Under binoculars green mineral looks like serpentine; soft light mineral in laths and blades, polysynthetic twins seen. Possibly feldspar - albite(?) (actually carbonate, as shown by later study). At 118cm: Thin section of white swelling mineral in vesicules.

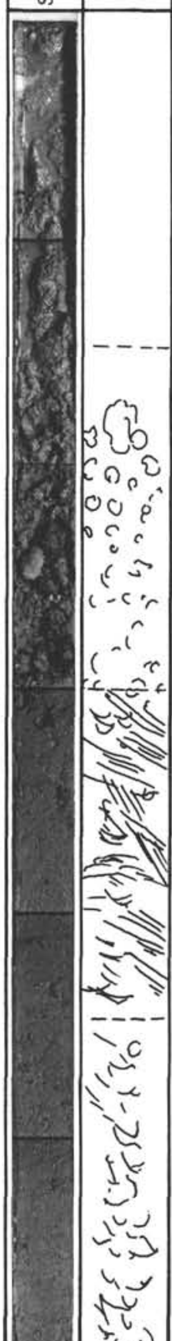


Lithology and biostratigraphy of Core 1, Hole 61.1.



Physical properties of Core 1, Hole 61.1.

Hole 61.1 **Core** 1
Section 1

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
0, 25, 50, 75, 100, 125, 150					No visual description available.

Hole 61.1 Core 1
Section 2

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
0, 25, 50, 75, 100, 125, 150					see below

0-41cm:

"Pebbly mudstone", top (0-16to 19) mainly 2.5 Y5/2 (light olive gray to pale yellowish gray) mud with few larger, harder fragments. Lower (16 to 19-41cm) with increasing fragments. Some largest ones 35, 28 and 21cm dia; of zeolitic (?) mudstone (of A of Section 1 of this barrel) of chert (C, ditto), and of siltstone (B, ditto). All above probably cavings.

41-123cm:

Convoluted, slightly pebbly, mudstone. Highly convoluted bands and streaks of soft, 5Y5/3 olive clay and 10YR8/2 very pale orange clay. (Sampled **olive clay** at 82cm; **orange clay** at 57cm.)

123-139cm:

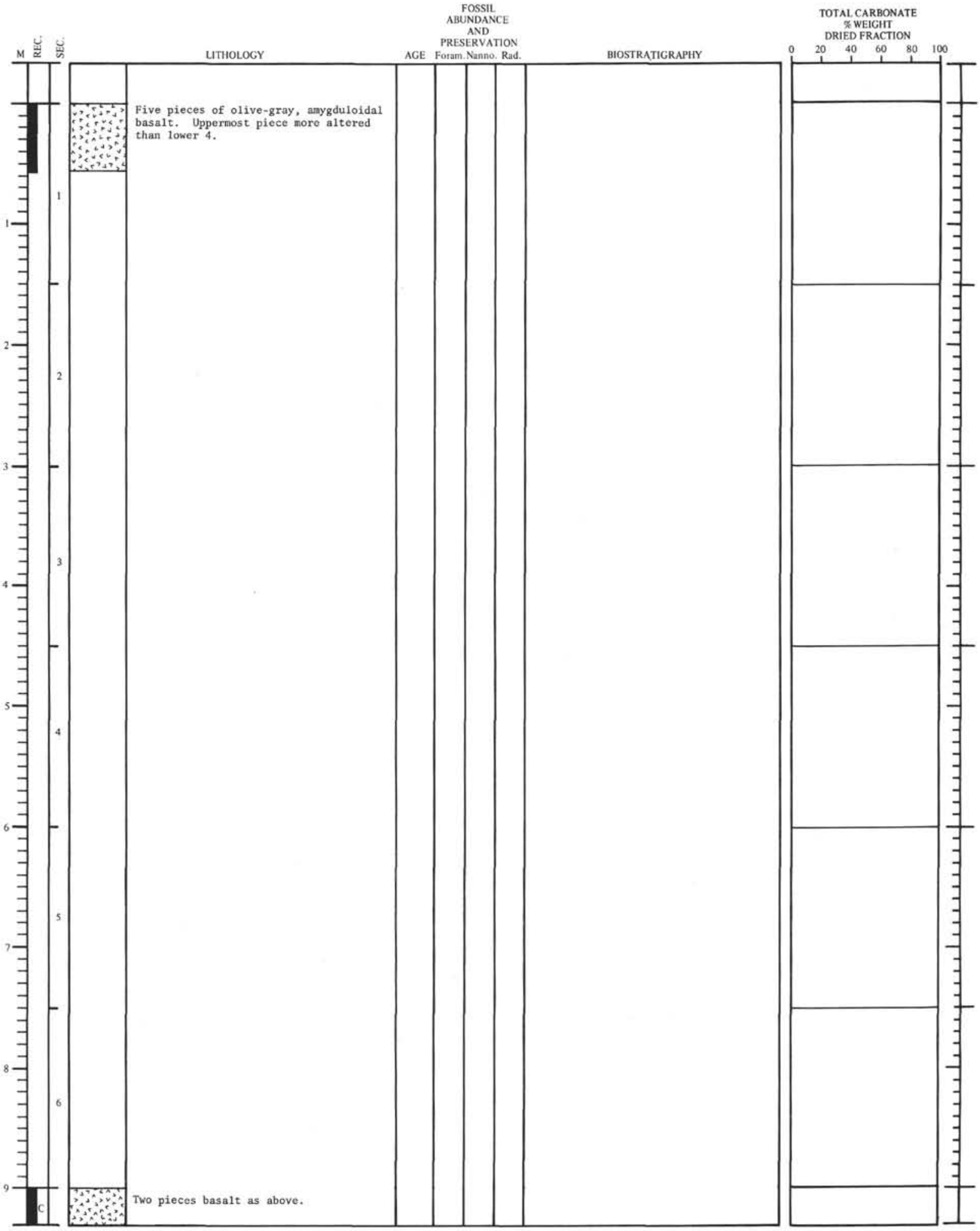
As above, plus some 5Y5/1 gray clay (sampled at 133-134cm) contorted within the other lithologies. No coarse fragments.

139-150cm:

Some what less contorted, with layer of 5Y7/3 dusky yellow clay near top of "fold" and 5YR4/2 dark reddish gray clay at base.

Hole 61.1 Core 1
Section CC

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
0					(CORE CATCHER) Stiff, convoluted silty clay 7.5YR5/2 brown when wet, drying to various pale yellowish brown.
25					
50					
75					An angular piece of chert wedged into bottom of core-catcher (was projecting out of bottom of core-catcher slightly). About 5-6 cm dia. about 177 grams Banded 5Y4/1 olive gray and 2.5Y7/1 light (yellowish) gray.
100					
125					
150					



Lithology and biostratigraphy of Core 2, Hole 61.1.

Hole 61.1 Core 2
Section 1

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
0, 25, 50, 75, 100, 125, 150					

← 1
AMYGDALOIDAL BASALT

Five (5) pieces
5Y3/2 at top, 5Y5/2
← 2 at bottom olive gray.

Occasional veins
(white) to 1mm width
← 3 Amygdaloids to 5mm
diameter (spheroidal
← 4 ones). A few elongate ones to 22mm long. Ave. grain size ∿ 1mm. Pyroxene, plagioclase.
← 5

57 cm:

Uppermost piece (1) has most altered appearance. Contains most and largest amygdales. Amygdales mainly white calcite: many are soft and pale green 5G7/2 RI ∿ 1.57, commonly only as vesicle linings (washed out??), platy, chlorite ?; one 5G3/2 dusky green and a few light brown 5YR6/4 amygdales. Yellowish gray 5Y8/1 coating on fracture. Abundant white specks (secondary ?). One surface "micro-knobby", and covered with felted xl's of ? (a clay??).
Pieces (2) through (5) less altered. Chip off top of piece (4) looks very fresh, possibly including glass. Calcite veins in (5).

Note: Two additional pieces in core catcher (236 grams) have same general lithology.