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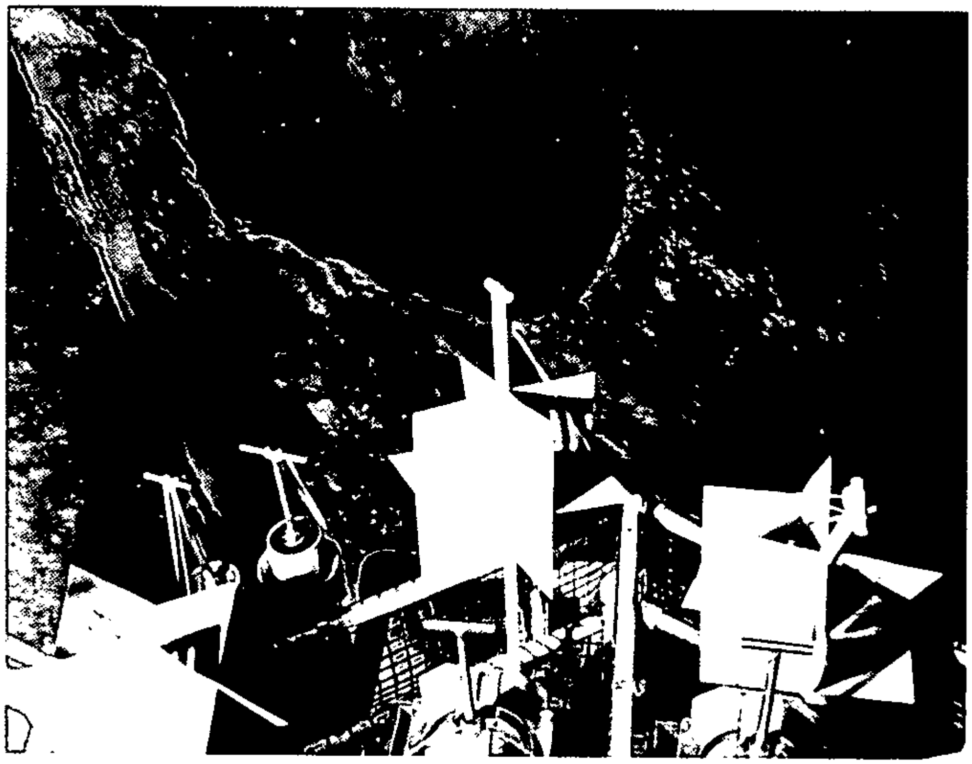
Site 98 Leg 11 Bahama Banks



Cover and Above:

DSDP Site #98 was successfully located and sampled by LDGO scientists aboard the DSRV *Alvin* in November, 1978. The drillhole, located 33 km northeast of Nassau, was found at a depth of 2765 m. The hole was first sighted by biologist Barbara Hecker within seven minutes after touchdown. Her diving partner was graduate student Raymond Freeman-Lynde. Their colleague William B. F. Ryan, using a prototype radio-ranging and acoustic navigation system, had guided the *Alvin* to a touchdown less than 50 m from the hole. The objective of this dive was to relocate and mark a disturbed area of the seafloor to study recolonization of deep-sea sediments. Preliminary samples were taken at the periphery of the hole. During the dive, the hole was marked with a long life acoustic beacon to facilitate relocation for subsequent study.

The drilling of Site #98 in 1970 produced a cone-shaped hole with an approximate diameter of 2 m and at least several meters deep. Due to the steep incline of the slope, the *Alvin* could not be positioned to look down the hole to determine its actual depth. Evidence of drill stem abrasion was found on the upslope side of the hole. The hole was surrounded by a blanket of sediment and gravel-size drill cuttings. Slump scars extended out to a distance of 4 m upslope and from the sides of the crater. Vertical white gouges on a manganese-coated outcrop, 10 m directly upslope of the hole, also indicated drill stem abrasion. The acoustic beacon originally used by *Glomar Challenger* during drilling was found within 33 m of the hole.

B. Hecker

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LEGS 63-69--*GLOMAR CHALLENGER* SCHEDULE*

Leg	Port	Arrival Date	Departure Date	Days at Sea	Purposes
65	Los Angeles	14 Jan 79	21 Jan 79	51	Gulf of California (P. Margin)*
66	Mazatlan	13 Mar	18 Mar	51	Mid-America Trench (Mexico)*
67	Mazanillo	8 May	13 May	50	Mid-America Trench (Guatemala)
68	Puntarenas, C. R.	2 July	7 July	45	Galapagos (Costa Rica Ridge)*
69	Guayaquil	21 Aug	26 Aug	44	Galapagos (Geothermal Mounds Area)*
	Cristobal	8 Oct			

*Re-entry scheduled

LEGS 70-81--TENTATIVE EXTENSION SCHEDULE

Leg	Port	Time of Departure	Purpose
	Balboa	Early Nov., 1979	Drydock
	Balboa	Early Dec., 1979	21-day transit
70	Recife	Late Dec., 1979	Paleoenvironment (SA-4)
71	Capetown	Mid-Feb., 1980	Paleoenvironment (SA-3, SA-3A, Agulhas Plat.)
72	Capetown	Early Apr., 1980	Paleoenvironment (SA-1, 2)
	Monrovia	Mid-May, 1980	15-day transit
73	Brest	Early June, 1980	Passive Margin (Biscay)
74	Plymouth	Late July, 1980	Passive Margin (Rockall Bank and Biscay)
75	Vigo	Mid-Sep., 1980	Passive Margin (N.W. Africa)
76	Monrovia	Mid-Nov., 1980	Paleoenvironment (SA-6, 7)
77	Montevido	Early Jan., 1981	Paleoenvironment (SA-5)
78	Rio de Janeiro Port of Spain	Early Mar., 1981 Mid-Mar., 1981	10-day transit Passive and Active Margin (Venezuelan Basin)
79	Miami	Early May, 1981	Passive Margin (Blake Plateau)
80	Miami	Late June, 1981	Passive Margin (Blake-Bahama Basin)
81	Norfolk	Early Aug., 1981	Passive Margin (slope and rise)

SUMMARY OF DEEP SEA DRILLING PROJECT

Leg 62

(Co-Chiefs: T. Vallier and J. Theide)

Introduction

Late Mesozoic and Cenozoic paleoenvironments in the North Pacific were studied during Legs 61, 62, and 63. These legs were planned to investigate the factors affecting the development of ocean plankton communities, in particular, on the Neogene history of the present-day communities, in a period (late Eocene-Oligocene) when organisms on the open oceans underwent extensive extinction and subsequent radiation, and on the early evolution of planktonic groups (Jurassic-Cretaceous).

Operations

Glomar Challenger departed Majuro, Marshall Islands for Leg 62, on July 29, 1978, and arrived in Honolulu, Hawaii on September 7. The cruise was shortened to 41 days in order to allow extra time for finishing Site 462 of Leg 61. All sites scheduled to be drilled in the Gulf of Alaska were cancelled. Drilling was concentrated on sites in the Central Pacific. Five holes were drilled at four sites, one (Site 463) in the Mid-Pacific Mountains, and three (Sites 464, 465, and 466) on Hess Rise (Fig. 1).

At Site 463 a smaller bit was used in order to test the pressure core barrel and three successful runs were made. Penetration was 822.5 m. At Site 464, a regular bit was run for attempts at heat flow measurements, but the tool was not quite ready at that time. At Site 465, however, the heat flow device made four successful runs with fairly good results. At Site 466, the smaller bit again was used for the pressure core barrel, but the core barrel encountered chert on both attempts and the sediments were not conducive for additional tests during the remainder of time on the site.

Coring was continuous at all sites. Site 463 was abandoned because of a worn bit, Site 464 because the bit became stuck and the bottom hole assembly had to be blown off, Site 465 because the bit was stuck, and Site 466 because of the departure for Honolulu. Igneous basement was reached at Sites 464 and 465. Chert was a major problem on this cruise. It was responsible for poor core recovery, for diminished bit life, and probably for sticking of the bit at two sites.

Drilling Results

Site 463--Western Mid-Pacific Mountains

Carbonate deposits capping a shallow volcanic plateau in the northwestern Mid-Pacific Mountains were cored at Site 463. The first objective was to recover Upper Mesozoic and Tertiary sections because there are few pelagic records for those time periods in the Mid-Pacific. A second objective was to sample igneous basement in order to date the age of the volcanic platform. The age of the Mid-Pac Mountains is not known. Mesozoic magnetic anomalies just northwest of the Mid-Pac Mountains are Late Jurassic and Early Cretaceous in age, and DSDP Holes 171 (Horizon Guyot) and 313 (northeastern Mid-Pacific Mountains) bottomed in basalt that was overlain by Albian and Campanian sediments, respectively.

Coring at Site 463 was continuous to a sub-bottom depth of 822.5 m, but the drill bit wore out before igneous basement was reached. The sediments recovered are divided into four lithologic units. The oldest unit consists of Early Cretaceous (Barremian), interbedded pelagic and clastic limestones more than 190 m thick. Shallow water debris and reworked, possibly much older, radiolarian microfaunas are common. Paleomagnetic studies of the limestones in the oldest lithologic unit show a correlation with the M0-M3 Mesozoic magnetic anomaly sequence. An overlying unit, 45 m thick, consists of carbonaceous limestone; black clay and marlstone, and volcanic ash of early Aptian age containing up to 4.3% organic carbon. The third lithologic unit is 136 m thick and consists of cyclic alterations of green and gray, and green and pink pelagic limestone with abundant chert. These limestones range in age from late Aptian through middle Albian. The youngest lithologic unit is subdivided into two parts; the lower part consists of a 405 m thick sequence of nanno and foram chalk, ooze, and limestone of late Albian to early Maestrichtian age; the upper part consists of 47 m of Lower Eocene through Pleistocene nannofossil ooze, major hiatuses occur from the late Maestrichtian through early Eocene and from the latest Oligocene through the middle Miocene. Condensed sections, with possible hiatuses, encompass intervals from the late Santonian through mid-Campanian and from the middle Eocene through most of the Oligocene.

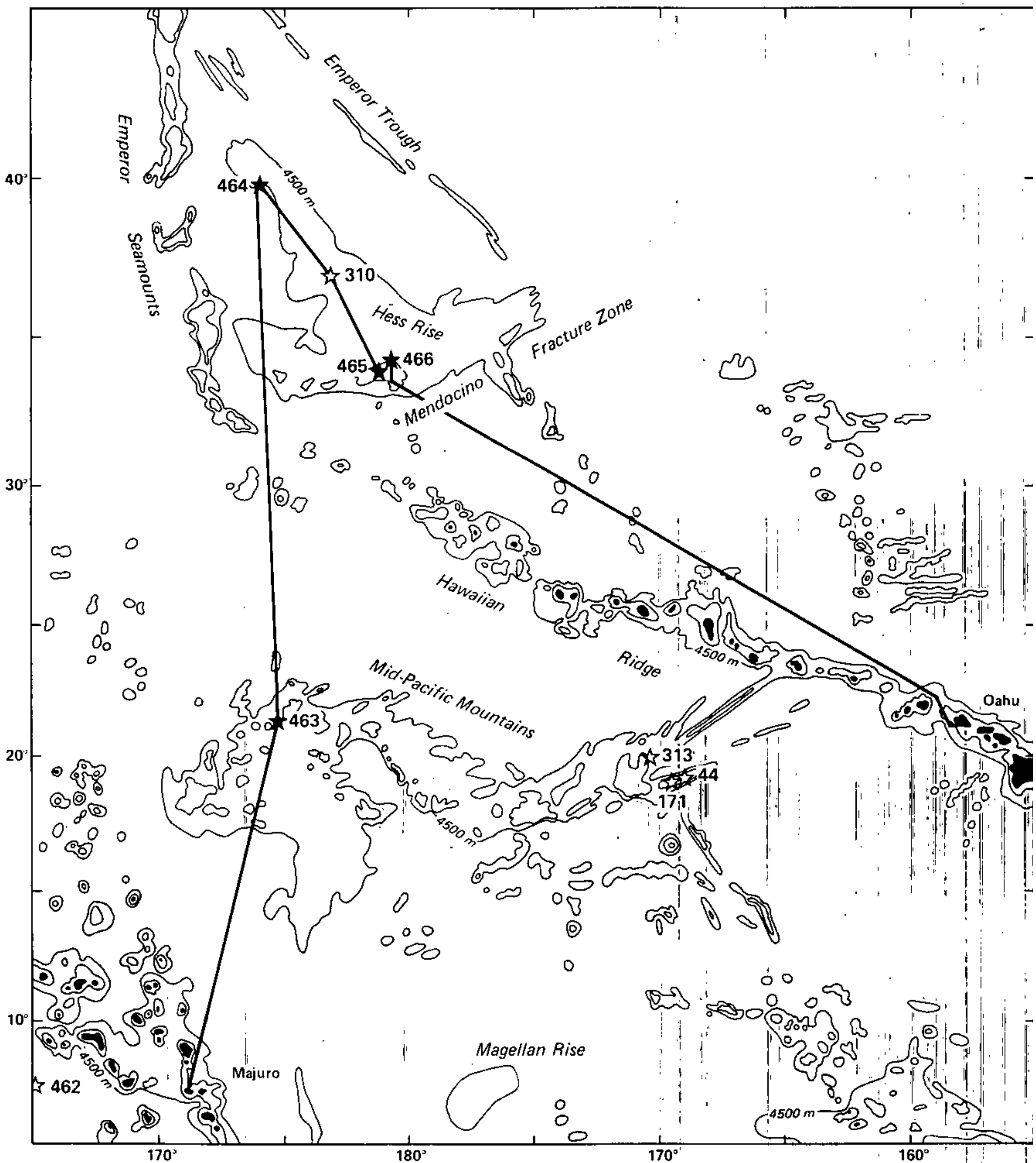


FIGURE 1: Site locations for Leg 62.

Site 464--Northern Hess Rise

Hess Rise is one of the major structural features of the northern mid-Pacific. It is bounded on the west by the Emperor Seamounts, on the east by the Emperor Trough, and on the south by the Mendocino Fracture Zone. It forms a triangle-shaped aseismic high that lies above the abyssal regions of the Pacific Plate by normal oceanic crust with the late Mesozoic linear magnetic anomalies. Northern Hess Rise was sampled at Site 464 at a water depth of 4637 m. A few pieces of altered basalt were recovered at the base of the 308.5 m deep hole before poor hole conditions forced the site to be abandoned. The sediment column above the basalt was divided into three lithologic units. The lowest consists of 219 m of chert, chalk, and marlstone of Albian age. Recovery of the softer sediments was hampered by the presence of abundant chert. The second unit consists of 53 m of Upper Miocene to Lower Pliocene pelagic brown clay. The youngest unit, 33 m thick, consists of siliceous clay and clayey radiolarian and siliceous oozes of late Pliocene age. A major hiatus at 89 m divides the section at Site 464 into two biostratigraphic units, an upper one of late Miocene through late Pliocene age and a lower unit of late Albian age. The hiatus between these two units spans more than 90 m.y.

Sites 465 and 466--Southern Hess Rise

Three holes were drilled at two sites (465 and 466) on southern Hess Rise about 28 nautical miles apart. Site 465 was to sample a thick Neogene age section, unaffected by the current regimes that created hiatuses at other sites, for paleoceanographic studies, to penetrate reef deposits or other shallow water sediments, and to sample igneous basement. Combined results from Site 465, Site 310 on central Hess Rise, and Site 464 on northern Hess Rise could be used to document the late Cretaceous time when Hess Rise crossed under the fertile equatorial current regime.

Hole 465 was continuously cored to a depth of 96 m and recovered sediments ranging from early Maestrichtian to early Pleistocene in age. The hole was abandoned because of ship positioning problems and a new hole (465A) was spudded in. Continuous coring of Hole 465A began at 39 m sub-bottom depth in order to sample the Cretaceous-Tertiary boundary which had been missed in Hole 465.

Hole 465A was cored to a depth of 476 m which includes penetration of 64 m of basalt. At that point the bit became stuck forcing us to abandon the site early. The basalt is highly altered to smectites and has vesicles up to 5 mm in diameter. It apparently represents a sequence of shallow water or subaerial flows. The overlying sediments are divided into two lithologic units. The oldest unit of Albian to Cenomanian age consists of olive-gray laminated limestone, 136 m thick. It contains evidence for current activity and redeposition, but surprisingly does not contain reef or any other shallow water fossil debris. Pyrite, dolomite, and barite in veins throughout the lowermost meter of limestone and volcanic ash immediately overlying the basalt, suggest post-depositional hydrothermal activity. The youngest sedimentary unit is 276 m thick and consists of nannofossil ooze and foram ooze with interlayered chert of Coniacian to Pleistocene age. Significant hiatuses occur from early Cenomanian to late Coniacian, from Santonian to late Campanian, and from late Paleocene to Pleistocene. These Albian to Pleistocene sediments at Site 465 reflect the transition of the southern Hess Rise depositional environment from tropical to temperate latitudes caused by horizontal movement of the Pacific Plate, and from shallow to intermediate water depths caused by subsidence of the rise. A heat flow value of 1.36 HFU obtained at this site is similar to that of averaged North Pacific heat flow values for crust of this age. A highlight of Hole 465A was the recovery of an apparently complete sedimentary sequence across the Cretaceous-Tertiary boundary with well-preserved sediments of the *G. eugubina* Zone in the lowermost Paleocene.

A thick section of Neogene age was not found at Site 465. Site 466 was drilled in a graben 2665 m deep about 50 km northeast of Site 465. Coring was continuous to a sub-bottom depth of 312 m when drilling stopped because of time considerations. The Upper Albian to Pleistocene sediment section contains two major lithologic units and at least three lacunas. The oldest unit consists of 66 m of Upper Albian limestone and nanno chalk that are correlative with the lower part of the sedimentary column in Hole 465A. The youngest lithologic unit consists of cherty nanno ooze and nanno ooze of Turonian to Pleistocene age. Plio-Pleistocene sediments are 65 m thick and contain diverse assemblages of siliceous and calcareous microfossils. Two possible mixed zones of early to mid-Eocene and early Pliocene ages contained reworked microfossils as old as Late Cretaceous. Major hiatuses encompass the late Santonian through part of the late Campanian, early Maestrichtian through the early Eocene, and Oligocene through the early Pliocene. Basalt pebbles in Upper Campanian sediments indicate probable uplift of surrounding basin walls and possible subaerial erosion during that time interval.

Summary

In the Mid-Pacific Mountains, high sedimentation rates occurred in the Barremian, due to redeposition of shallow-water carbonate debris. Extremely high sedimentation rates in the Late Cretaceous can be attributed both to the probable passing of the site under the equatorial high productivity zone during that time interval and to the abundance of volcanic ash in the sediments. A major Early Tertiary hiatus is evident at all three sites.

Rapid sedimentation rates during the Albian on Hess Rise are probably related to high fertility when the site was near the equator and to redeposition of sediments. Sites 465 and 466 should have passed under the equatorial high productivity zone about 90 m.y. ago according to current models of Cretaceous plate movement, but low sedimentation rates at that time at Sites 310 and 466 and a lacuna at Site 465 need further evaluation to explain the apparent discrepancy. High sedimentation rates also occurred in the Late Cretaceous, a little before 70 m.y. ago, at both Sites 465 and 466. This high rate is probably caused by a combination of redeposition and high organic productivity. The large hiatus (90 m.y.) between sediments of Albian and late Miocene age at Site 464 is not understood. The thick brown clay unit that overlies the hiatus may, upon further study, yield evidence that the deposition of that unit spanned a greater time interval.

Significant geologic features in the history of the Mid-Pacific Mountains, revealed by coring at Site 463, are:

1.) the Early Cretaceous age of the deepest sediments (Barremian and probably older);

2.) the dark, carbon-rich Aptian sediments which are interlayered with highly altered volcanic ash and which may be related to a world-wide anoxic event;

3.) High sedimentation rates in the Lower Cretaceous sediments are mostly due to redeposition of shallow water carbonate debris;

4.) Mid-plate volcanism and high organic productivity account for the high sedimentation rates in the Late Cretaceous.

Drilling at the three Hess Rise sites revealed the following features:

1.) Shallow water or subaerial extrusion of basalt flows on southern Hess Rise. This suggests that a large structural high or even a group of islands may have been present near the Equator during the Mid-Cretaceous, disturbing the flow of the equatorial current;

2.) High sedimentation rates in the upper Albian limestone are the result of high local relief and significant redeposition of sediments;

3.) High sedimentation rates in the Late Cretaceous are caused both by redeposition of material and high organic productivity;

4.) Abundant basalt pebbles in sediments of Campanian age at Site 466 coincide with relative uplift of the graben walls and possible subaerial erosion;

5.) Great differences in geologic histories among the various sites can in part be explained by different subsidence rates and northward movement of Hess Rise on the Pacific Plate. Additional explanations, however, must be sought in the tectonic and volcanic histories of Hess Rise.

Years

SITE REPORTS

Site:

Co-Chief Scientists B. Haq and R.

report:

Site: 467 (EP-4C) Lat.: 33°50.97'N
Long.: 120°45.47'W
Water Depth: 2146 m

A sediment sequence of 1041.5 m was continuously cored at Site 467 in San Miguel Gap. A middle Miocene to Holocene section was recovered and 4 lithologic units are distinguished. Unit 1 consists of 367 m of early Pliocene to Holocene silty clay and diatomaceous nannofossil clay with local concretions of argillaceous limestone. The Unit 1/2 boundary is an apparent angular unconformity based upon single-channel seismic profiles, and marking a velocity inversion from 1.71 km/sec above to 1.61 km/sec below. Unit 2 consists of early Pliocene to late Miocene calcareous claystone with minor siliceous claystone. Induration increases with depth. Below 450 m, siliceous microfossils and planktonic forams disappear, only coccoliths persist. A major reflector occurs within Unit 2 at 528 m corresponding to a down core increase in velocity from 1.61 km/sec in gas charged sediments to 3.38 km/sec in more cemented strata. Unit 3 begins at 700 m and consists of interbedded lapilli tuff and nanno-clayey chalk and limestone of late to middle Miocene age. Unit 4 is a middle Miocene (16.5 m.y.) unit similar to Unit 2. It spans the interval from 820 m to total depth. Two minor hiatuses at 0.9 to 1.5 m.y. and 3.3 to 3.6 m.y. were found. The absence of planktonic forams and siliceous microfossils below 450 m in the late and middle Miocene was unexpected. Whether this is due to diagenetic effects, changes in productivity or local oceanographic effects is not known.

Site: 468 (EP-4B) Lat.: 32°37.03'N
Long.: 120°07.07'W
Water Depth: 1859 m

Hole 468 on the Patton Escarpment was cored continuously to 241 meters. Four units were recognized: Unit 1, 19 cm of a glauconitic nanno foram ooze. Unit 2, a 4-m thick late Miocene or late Pliocene nanno foram ooze and glauconitic silty sand. A hiatus separates Units 2 and 3. Unit 3, 104 m of a nannofossil ooze with terrigenous components increasing down section, ages range from 10 to 14.5 m.a. with a sharp downward increase in sedimentation rate from 4 to 5 m/m.y. to 60 m/m.y. Unit 4, from 108 to 184 meters, contains mid Miocene fossils as old as 16.5 m.a. and consists of a diatomaceous calcerous sandy claystone with less common sandstone, ash, and tuff. The boundary with Sub-unit 4B marks a sharp increase in velocity and density. Sub-unit 4B is a well-indurated dolomitic silty claystone alternating with volcanic tuff, breccia, and sandstone, mid-Miocene fossils occur near the top.

The hole was abandoned due to sloughing hole conditions. Holes 468A and 468B at 32°37.41'N, 120°06.55'W in 1737 m of water were offset from Hole 468 to try to reach the pre-volcanic section. Hole 468A was abandoned at 35.5 m due to a parted sand line. Hole 468B was intermittently cored from 121 m to 206.5 m and continuously cored above and below 206.5 m to a total depth of 415.5 meters. The same four units (Hole 468) were recognized as follows: Unit 1 to 7 m, Unit 2 to 35.5 m, Unit 3 to 149.5 m, Sub-unit 4A to 235 m and Sub-unit 4B to total depth. The basalt part of Sub-unit 4B is unfossiliferous but grades into fossiliferous mid-Miocene. The subduction complex was not reached.

Site: 469 (EP-5A) Lat.: 32°37.0'N
Long.: 120°32.9'W
Water Depth: 3802.5 m

Site 469, at the foot of the Patton Escarpment, was continuously cored to 453.5 m. The bit did not release after repeated attempts, thus logging was impossible. The upper 396 m consisted of Quaternary clay and calcareous ooze. From 40 to 228 m, interbedded calcareous and siliceous ooze of Pliocene to mid Miocene age were recovered. Planktonic foraminifers were lost at 83 m sub-bottom. A velocity contrast is found at 228 m (1.5 km/sec above and 1.9 km/sec below). Most siliceous microfossils are lost at this boundary. Nannofossils provide the only biostratigraphy control in the lowermost sediments. From 228 to 302 m, mid Miocene calcareous porcellanite and silty claystone were recovered. The interval from 302 to 365 m consisted of mid Miocene silty claystone and tuffaceous volcanoclastics. An altered dolerite sill was found at 365 to 387 m. The lowermost sediments, from 387 to 396 m were nannofossil chalk with metalliferous sediment at the base. We cored basement to the destruction of the bit, 396 to 453.5 m. It contained altered pillow bed and altered hyaloclastite. Metallifero sediment is interbedded with pillow bas m in the upper section of the basement. is

Sediment accumulation rates are 27 m/m.y. in the uppermost 90 m and 60 m/m.y. below. Three major hiatuses occur: 3 to 5 m.y., 5.5 to 10 m.y., and 11 to 13 m.y. The sediment above basement is dated at about 17.5 m.y.

Site: 470 (EP-3) Lat.: 28°54.46'N
Long.: 117°31.11'W
Water Depth: 3554 m

Hole 470, 8 km SSW of the experimental Mohole, was continuously cored to basalt at 168 m sub-bottom. Hole 470A resampled the intervals from 47.5 to 95 m and 161.5 to 168 m for paleo, then continuously cored basalt to 215.5 m sub-bottom when operations were terminated by hole conditions. Sediments include Quaternary and late Pliocene silty clay to a depth of 32 m, late and early Pliocene nanno clay and nanno ooze between 32 and 68 m, late and mid Miocene diatomaceous silty clay and nanno clay between 68 and 126 m, mid Miocene nanno ooze and diatomaceous nanno ooze between 126 and 162 m, mid Miocene compact nanno ooze, dolomitic ooze, and dolomitic claystone between 162 and 167 m. The sediments have a uniform 1.5 km/sec vel, and the density is 1.5 gm/cc except for an increase to 1.7 gm/cc near the base. The basalt is extrusive and is comprised of altered, fine grained, pillows with quenched margins. The basalt is interbedded with local limestone lenses containing the same nannoflora as the overlying sediments.

Sediment accumulation rates are: 16 m/m.y. from 0 to 75 m sub-bottom, 6 m/m.y. from 75 to 104 m, 18 m/m.y. from 104 to 167 m. Two hiatuses are inferred at 3 to 4.5 m.y. and 6 to 7 m.y. A possible third hiatus may be present between 9 and 11 m.y. The logging was unsuccessful because of the unconsolidated nature of the sediments.

Site: 471 (EP-8) Lat.: 23°28.93'N
Long.: 112°29.78'W
Water Depth: 3115.5 m

The site was cored continuously to a total depth of 823 m. Lithologic units recognized are: Unit 1 to 63.5 m, Quaternary to Pliocene nannofossil silty clay. Unit 2 to 155.2 m, late Miocene diatomaceous clay and clayey diatomaceous ooze. Unit 3 to 304 m, late Miocene porcellanite and porcellaneous silty claystone with minor chert. Recovery in Unit 3 reduced to about 5%. Sediment velocity increases sharply at Unit 2/3 boundary from 1.5 km/sec above to 3.4 km/sec below. Density increased from 1.5 to 2 g/cc. Unit 4 to 735.7 m, mid Miocene bioturbated silty claystone with minor calcareous sandstone. Sediment velocity averages 2 km/sec with peaks up to 5 km/sec in calcareous layers. Unit 5 to 741.5 m, mid Miocene pelagic claystone with a 2 cm metalliferous sediment layer at bottom. Unit 5 underlain by extensively altered diabase sills with brecciated structure and two thin interbeds of metalliferous sediment. Brecciation possibly caused during intrusion of magma into sediment. True basement (pillow basalt) not reached but metalliferous sediment suggests oldest sediment age based on paleo is close to basement age. Sediment accumulation rates 15 m/m.y. in Unit 1, 35 m/m.y. in Units 2 and 3 and then increasing dramatically to 380 m/m.y. in Unit 4 due to high terrigenous input as part of a deep-sea fan. Planktonic forams absent below 58 m, diatoms absent below 230 m. Interval between 230 and 380 m barren. Below this interval only very rare nannofossils provide occasional age estimates, including 14 to 15 m.a. age of sediments overlying diabase. This age is much older than expected.

Two <u>in situ</u> heat probe measurements taken at 95 m (12.8°C) and at 115 m (22.8°C). Complete suite of downhole logs confirmed physical properties measured on cores, adding much information in Unit 3 where recovery was low. Density log indicates considerable soft sediments in this unit in addition to higher density porcellanite which shows as spikes on log. Metalliferous sediment interbeds in diabase show clearly on density and sonic logs. These logs also may indicate degree of alteration of diabase.

Site: 472 Lat.: 23°00.35'N
Long.: 113°59.71'W
Water Depth: 3847.5 m

Hole 472 was continuously cored to a total depth of 137.5 m. Hole 472A was re-spudded to wash and take a heat probe measurement above basement and recover contact sediments, however, basement was encountered 17.5 m above expected level and only 20 cm of basalt were recovered. In Hole 472, three lithologic units were recognized: Unit 1 to 24.5 m, mainly early Quaternary pelagic clay; Unit 2 to 91 m, middle to late Miocene clayey diatomaceous ooze, siliceous clay and pelagic clay; Unit 3 to 112 m, mid-Miocene diatomaceous nannofossil ooze and minor metalliferous dolomitic nanno ooze. Pillow basalt recovered to total depth. Velocity 1.5 km/

sec in sediment and 5.0 km/sec in basalt. Accumulation rates 5 m/m.y. in Unit 1 and 11 m/m.y. in Units 2 and 3. Good siliceous microfossil record through most of the section; nannofossils occur only below 80 m. Age of oldest sediments over basement is 15 ±0.5 m.a. Single heat probe measurement at 88 m (14.3°C). At this site Leg 62 broke the Leg 38 record for the most number of cores on a single leg.

Site: 473 (GCA-9) Lat.: 20°57.92'N
Long.: 107°03.81'W
Water Depth: 3267.5 m

Site 473, on the Rivera Plate, was cored continuously to 287.5 m (sub-bottom depth). Sediments from the mudline to 248.1 m are mainly terrigenous clay and silt becoming more consolidated at 143 m. Siliceous microfossils disappear and opal-chert appears at 181 m. Some turbidites occur in the lower part. The age is 6-7 m.y. at the base of the section through the Quaternary. Sedimentation rates are 60 m/m.y. for the last 1 m.y. and 33 m/m.y. for the rest of the section. Diabase was cored from 248.1 m and pillow basalt was found at the bottom of the last core. Heat probe data at 67, 143 and 182 m suggests 1.4 HFU, but data at 105 and 219 m suggests 3.9 HFU. Downhole Temperature Log at 133 to 185 m suggests 2.9 HFU, consistent with first appearance of opal-chert at 181 m. Other downhole logs unsuccessful due to local bridging and washed out hole in sediments.

Leg 64

Co-chief scientists J. Curray and D. Moore report:

Site: 474 (GCA-5) Lat.: 22°57.72'N
Long.: 108°58.84'W
Water Depth: 3023 m

Hole 474 was cored continuously to 182.5 m total depth. Hole 474A at 22°57.56'N, 108°58.68'W, in 3022 m water depth, was washed to 163.5 m and cored continuously to a total depth of 626 m. Core recovery average was 52%. Sediments from the mudline to 21 m are late Pleistocene diatomaceous ooze, nannofossil marls and hemipelagic mud. These overlie 66 m of an early Pleistocene redeposited debris flow-turbidite unit of sand and conglomerate to nanno-diatomaceous muds emplaced over 151 m of early to late Pleistocene hemipelagic nanno muds and mud turbidites of arkose sands to clayey siltstones. The lowermost sedimentary unit comprised 76 m of early to late Pliocene clayey siltstone mud turbidites with thick mass flows and cemented arkose and silty claystones between dolerite sills in the lower 45 m.

Basement of basalt pillow lavas from 562 to total depth was cored. The oldest sediment is early Pliocene (zone NN-14) claystone from beneath the first pillow basalt flow. Nannofossils persist throughout the section but siliceous fossils disappear below 275 m. Average sedimentation rate in late Pliocene-Quaternary time is 150-170 m/m.y. Earliest sedimentation 3.2 to 2 to 3.4 m.y. ago occurred in this area which was already at abyssal depths.

Site: 475 (GCA-6) Lat.: 23°03.03'N
Long.: 109°03.19'W
Water Depth: 2631 m

Three holes were drilled at this site: 475, 475A, and 475B. Their respective positions are: 23°03.03'N, 109°03.19'W; 23°03.44'N, 109°03.83'W; and 23°03.36'N, 109°03.57'W.

Hole 475 was drilled in 2631 m of water and cored continuously to a depth of 196 m. A cobble conglomerate encountered at 158 m eventually stopped drilling. Nearly 80% of the sediment column was recovered, but only 5% of the conglomerate. Four lithologic units were recognized: Unit 1, mudline to 130 m, Quaternary to late Pliocene nannofossil diatomaceous silty clay to clayey silt deposited at 80 m/m.y. A subunit (34 to 91 m) has few fossils and was deposited at 20 m/m.y. Unit 2, 130 to 153 m, late to early Pliocene diatomaceous silty clay deposited at 50 m/m.y. Unit 3, 153 to 158 m, early Pliocene zeolite-bearing clay and volcanoclastic dolomitic mudstone of unknown depositional rate. Unit 4, 158 to 196 m, early Pliocene (?) conglomerate of metavolcanics, metasediments, rhyolite, and ignimbrite cobbles. Heatflow and thermal conductivity measurements give a heatflow of 3.9 HFU.

Holes 475A and B were drilled upslope and adjacent to Hole 475 to avoid drilling the conglomerate and reach assumed granite basement. Hole 475A in 2545 m of water recovered a mudline core. The hole was then washed to 76 m and cored to 96 m, recovering a few % of basalt cobbles. The basalts are of subaqueous extrusion and are petrographically similar to MORB, but are not <u>in situ</u> flows.

Site 476 (GCA-7) Lat.: 23°02.43'N
Long.: 109°05.35'W
Water Depth: 2403 m

Site 476 was spudded-in on the lower continental slope SE of the tip of Baja, California. The hole was continuously cored to a total depth of 294.5 m before unstable hole conditions forced abandonment. Recovery was 82% in the marine sediments from 0 to 199 m, but less than 4% in the underlying conglomerates and rubble to total depth. Six lithologic units were recognized which provided evidence for deposition on a subsiding granitic continental margin. Unit 1, mudline to 60 m, consists of Pleistocene nannofossil and diatomaceous oozes and terrigenous muds deposited at 50 to 100 m/m.y. Unit 2, from 66 to 145 m, is composed of upper Pliocene hemipelagic silty clays deposited at 40 m/m.y. Unit 3 is lower Pliocene muddy diatomaceous ooze with numerous turbidite layers, some vitric ash and galuconite sands, deposited at an average of 20 m/m.y. Unit 4, from 183 to 199 m, consists of Pliocene to upper Miocene(?) barren zeolitic clays and shallow marine organic claystones with phosphorite, pyrite, and glauconite of an unknown depositional rate. These are preceded from 199 to 256.5 m by Unit 5A, a probable subaerial conglomerate with metamorphic rock clasts and quartzose sandy clay. The basement, Unit 6, from 256.5 to 294.5 m total depth is a weathered granite.

Site: 477 (GCA-12) Lat.: 27°01.845'N
Long.: 111°24.023'W
Water Depth: 2003 m

Three holes were drilled at this site in the southern rift of Guaymas Basin. Hole 477 was continuously cored to sub-bottom depth of 191.0 m. A dolerite sill was cored from 58 to 105.5 m, and sediments continued beyond to total depth. The hole was terminated because of technical difficulties. Hole 477A, 27°01.802'N, 111°23.934'W, about 165 m NW of the first hole, was washed to 32.5 m where the dolerite sill was again encountered and cored to 62.5 m. The hole was then washed to 18.5 m and then continuously cored to a total depth of 267 m. Recovery averaged 20 to 27% in the dolerite, and 20% in the sediments above 181 m, but only about 6% in the sediments and sedimentary rocks below 181 m. Hole 477B is a piston core at the location of Hole 477A. It penetrated 4.6 m and recovered 3.46 m of relatively undisturbed diatomaceous ooze. Hole 477A was terminated because of high gas content and concern over hydrocarbon shows. The site is characterized by very high heatflow which is responsible for alteration mineralogy observed in the sediments below the sill. Three lithologic units were recognized. Unit 1, 0 to 58 m in Hole 477 and 0 to 32.5 m in Hole 477A, is diatomaceous turbidites. Unit 2, 59 to 105 m in Hole 477 and 32.5 to 62.5 m in Hole 477A, is coarse grained altered dolerite. Unit 3, 105.5 to 267 m, is hydrothermally altered and indurated diatomaceous turbidites of claystone to silty sandstone. Hole 477 was successfully logged throughout the drill pipe with gamma ray, neutron and temperature logs. A complete logging program was successfully completed in Hole 477A.

Site: 478 (GCA-25) Lat.: 27°05.81'N
Long.: 111°30.46'W
Water Depth: 1889 m

Site 478 lies on the northwest flank of the southern spreading rift of the Guaymas Basin. On the assumption of a 6 cm/yr steady state spreading, it should be 400,000 years old. The hole was cored continuously to 464 m. Recovery was 72% for sediments and 61% in igneous rocks. Four lithologic units were recognized. Unit 1, from 0 to 188 m, is a latest Pleistocene (NN-21) muddy diatomaceous ooze with turbidite sand layers. Unit 2, 188 to 260 m, also latest Pleistocene (NN-21), is a dolomite siltstone and diatom mudstone with two dolerite sills. Contact aureoles occur above and below the sills. Unit 3, 260 to 342 m, is a diatomaceous silty claystone, late Pleistocene (NN-20). Unit 4, below 342 m to total depth (464 m), is intrusive basalt and thick unjointed dolerite which yielded unbroken cores to over 2 m in length. Additional sediment probably underlies this lowest sill-like intrusive. The rate of sediment accumulation was about 1200 m/m.y. Heatflow in the hole was 2.9 HFU.

SHIPBOARD SCIENTIFIC STAFFING

Leg 64

J. Curray D. Moore	Co-Chief Scientists	USA USA	Scripps Inst. of Oceanography Scripps Inst. of Oceanography
K. Kelts	Staff Scientist/ Sedimentologist	USA	Deep Sea Drilling Project
G. Einsele	Sedimentologist	FRG	University of Tubingen
P. Markevich	Sedimentologist	USSR	Academy of Sciences
J. Niemitz	Sedimentologist	USA	Dickinson College
J. Aguayo	Sedimentologist/ Geochemist	Mexico	Instituto Mexicano del Petroleo
A. Saunders	Igneous Petrologist	UK	The University, Birmingham
J. Guerrero-Garcia	Igneous Petrologist/ Paleomagnetist	Mexico	University of Mexico
D. Fornari	Igneous Petrologist/ Curatorial Rep.	USA	Lamont-Doherty Geo. Obs.
M. Aubry	Paleontologist (nannofossil)	USA	Woods Hole Oceanographic Inst.
H. Schrader	Paleontologist (diatom)	USA	Oregon State University
A. Molina-Cruz	Paleontologist (radiolaria)	Mexico	Centro de Investigacion Cientifica y de Educacion Superior de Ensenada
Y. Matoba	Paleontologist (foraminifera)	USA	Stanford University
B. Simoneit	Geochemist (organic)	USA	Univ. Cal., Los Angeles
M. Lyle	Geochemist (organic)	USA	Stanford University
J. Gieskes	Geochemist (inorganic)	USA	Scripps Inst. of Oceanography
M. Kastner	Geochemist (inorganic)	USA	Scripps Inst. of Oceanography
J. Rueda	Palynologist/ Geochemist	Mexico	Instituto Mexico del Petroleo
V. Vacquier	Paleomagnetist/ Heat Flow	USA	Scripps Inst. of Oceanography

Leg 65 Experiments

The following scientists will board the *GLOMAR CHALLENGER* to perform experiments for specified periods of time:

F. Duennebier	Seismic Experiment/ GCA-1 (Jan. 20 - Feb. 5, 1979)	USA	Univ. Hawaii, Manoa
G. Blankinton	Seismic Experiment/ GCA-1 (Jan. 20 - Feb. 5, 1979)	USA	Univ. Hawaii, Manoa
T. Francis	Resistivity Exp. (March 2 - March 13, 1979)	UK	Institute of Oceanog. Sciences
R. Stephen	Oblique Seismic Exp. (March 2 - March 13, 1979)	USA	Woods Hole Oceanographic Inst.

Leg 65

P. Robinson	Co-Chief Scientists	USA	Univ. Cal., Riverside
B. Lewis		USA	Univ. Washington
M. Salisbury	Staff Scientist/ Physical Properties	USA	Deep Sea Drilling Project
M. Flower	Igneous Petrologist	USA	Smithsonian Institution
A. Kudo	Igneous Petrologist/ Geochemist	USA	University of New Mexico
M. Morrison	Igneous Petrologist/ Geochemist	UK	Imperial College
H. Schmincke	Igneous Petrologist	FRG	Institut für Mineralogie
B. Zolotarev	Igneous Petrologist	USSR	Academy of Sciences
C. Rangin	Sedimentologist	France	Universite Pierre et Marie Curie
M. Gutierrez-Estrada	Sedimentologist/ Physical Properties Specialist	Mexico	Universidad Nacional Autonoma de Mexico
R. Benson	Paleontologist (radiolaria)	USA	University of Delaware
J. Hattner	Paleontologist (nannofossil)	USA	Florida State University
R. Day	Paleomagnetist	USA	Univ. Cal., Santa Barbara

Leg 66

C. Moore	Co-Chief Scientists	USA	Univ. of Cal., Santa Cruz
J. Watkins		USA	Gulf Research & Development Company

Leg 67

J. Aubouin	Co-Chief Scientists	France	Universite Pierre et Marie Curie
R. von Huene		USA	U.S. Geological Survey

Leg 68

J. Cann	Co-Chief Scientists	UK	The University--Newcastle-upon-Tyne
M. Langseth		USA	Lamont-Doherty Geological Observatory

Leg 69

D. Cronan	Co-Chief Scientists	UK	Royal School of Mines
R. von Herzen		USA	Woods Hole Ocean. Inst.

REPORT FROM SITE SURVEY MANAGEMENT

Data Bank

The following data have been received:

- South Philippines final report "Site Surveys of the Western Sites of the Philippine Sea Transect of IPOD Drilling"--LDGO technical report NSF C-482-2, IPOD Scope I CU-7-78; navigation, bathymetry, magnetics, basement topo, sonobuoy, seismic, sediment and temperature data; from M. Langseth of Lamont-Doherty; Data Bank #798.
- Chart of navigation of Shell seismic lines P842 through P852 in Japan Trench area; from P. Lehner of Shell International Petroleum, Maatschappi, B.V.; Data Bank #799.
- Preliminary site proposals, safety check sheets, location map; seismic profiles, etc. for southeast Atlantic-Angola and Cape Basins, Walvis and Mid-Atlantic Ridges; Data Bank #800.
- Site proposals off Northwest Africa; sites M-1 through M-5, locations with seismic and bathymetric data; K. Hinz, BRG, Germany; Data Bank #802.
- Additional site locations and data for Legs 64 and 65; from Safety Panel Meeting held at Scripps in October.
- Mag tape containing navigation, magnetics, topography and gravity data from Gulf of California site survey; from J. Curray and G. Moore.
- Digitized Navigation depth and magnetic data from Scripps cruises processed through 1977; from SIO Data Center; RE #78-15.
- Seismic Reflection Profiles in the Western Pacific, 1965-1974, Dept. of Earth Sci., Chiba U., Tokyo; from S. Murauchi of Japan.
- AAPG Seismic Section No. 1: Tamaulipas Shelf to Campeche Scarp, Gulf of Mexico. MCS profile with location map and commentary. Watkins et al. DB #807.
- AAPG Seismic Section No. 2: Blake Continental Margin, Florida Shelf Slope; Blake Escarpment etc., Lower Continental Rise. MCS profile with location map and commentary. Buffler et al. DB #808.
- Gulf of California IPOD Site Survey, Final Report: Navigation, Bathymetry, Magnetics, Heat Flow, Gravity, Sonobuoy, Seismic Reflection, Core and Dredge data, text and figures. Moore et al. DB #809.
- Data packet for additional site GCA-30, Leg 64 from Stan White and Dave Moore.
- Mid-America Trench Site: Revised locations for Mexican sites, MCS data, bathymetry and magnetics, from 1978 survey; IDA GREEN data from Tom Shipley. DB #812-814.
- Computer Tape (TTΦ99) of navigation, bathymetry and magnetics data taken on the R/V THOMAS G. THOMPSON, University of Washington, in Pac 1 and 2 areas. From Brian Lewis. DB #811.
- Report on Data Analysis of Gulf of California Data; results of analysis of seismic and magnetic data; text and figures. From Brian Lewis. DB #810.
- Prospectus for CONRAD 21--Leg 18: IPOD Site Survey in the Costa Rica Rift Zone. Text and figures. From M. Langseth. DB #815.

Site Surveys

Prof. Eric Simpson of the Univ. of Capetown has made available the R/V THOMAS DAVIE for 1979 IPOD Site Surveys in the S.E. Atlantic. He will give all the data collected to the IPOD Data Bank at Lamont. The determination of the location of the site survey will await the outcome of the S.E. Atlantic Working Group meeting in January, 1979. It is tentatively scheduled to be the Walvis Ridge transect (SA II area).

LDGO R/V ROBERT D. CONRAD has done the site survey work in the Galapagos. M. Langseth is the chief scientist of the cruise.

DRAFT REPORT
EXECUTIVE COMMITTEE
11-12 December, 1978--Hawaii

Status of Drilling Operations

A. Current Drilling

Trials for the punch-corer are underway. Its drill speed exceeds the heave of the ship so that it never pulls back up, and undisturbed sediments can be recovered.

B. Logging

Logging funds are expected to be forthcoming. The present contract with Gerhart-Owen will expire at the end of Leg 65. There is a possibility that if the Soviet magnetometer is successful, other Soviet instruments may be employed on subsequent legs.

Information about the logging policy and the importance of logging is now included in the chief scientist's orientation at DSDP. Criteria for logging should be established that takes account of very shallow holes.

C. Downhole Experiments

In the future, blocks of time will be set aside for these experiments and for logging, so that they don't appear to be detracting from drilling time. The PCOM will continue to review all requests for downhole experiments. When approved, the experiments must be coordinated with the rest of the program through the chief scientists and DSDP with whom the final responsibility lies.

Future Plans

A. 1979-81 Plans

The PCOM was asked to make a pert chart to include site and regional surveys for the two-year extension.

Twinn stated that the top 100 m of sediment are valuable for radioactive waste disposal research.

B. 1981+ *Challenger* Program

The PCOM program was reviewed. No further action will be taken until the status of the *Explorer* program is better known.

C. *Explorer* Program

1.) Document on Future of Drilling vis-a-vis Other Reports Recently Issued

Outlines for a document to comment on the place of deep sea drilling in the 1980's vis-a-vis other goals in marine geology and geophysics in the U.S. were discussed.

The document will be short and include scientific and technical goals and benefits, plans to implement these goals, and the costs. It will be submitted to the NSF "Blue Ribbon Panel" in early 1979.

2.) *Explorer* Program Planning

The PCOM *Explorer* plans were discussed. Figure 2 shows the broad areas of scientific interest.

Discussion centered around the most effective ways to plan for, and points to be addressed during, planning for an *Explorer* program. The EXCOM requested the PCOM to:

a.) Consider complete reorganization of JOIDES panel structure.

b.) Provide recommendations for implementation of this reorganization.

c.) Provide EXCOM with plans for such a reorganization at their next meeting.

It is expected that the transition would occur in FY '80-81 time frame.

3.) Technical Developments and Capabilities

An interim report by the National Academy of Engineering, "Engineering for Deep Sea Drilling for Scientific Purposes" was distributed. This report did not "identify any insurmountable technological, safety, or environmental barriers to a continuation of deep sea scientific drilling," and it supported a surface drilling vessel as the most technically feasible drilling platform. The report recommended that specific drilling, coring, and program information be available. This would enable the necessary technical capabilities to be developed within the required time frame. Through negotiations with Lockheed and Global Marine, the *Explorer* is now being instrumented to determine its at-sea characteristics in detail.

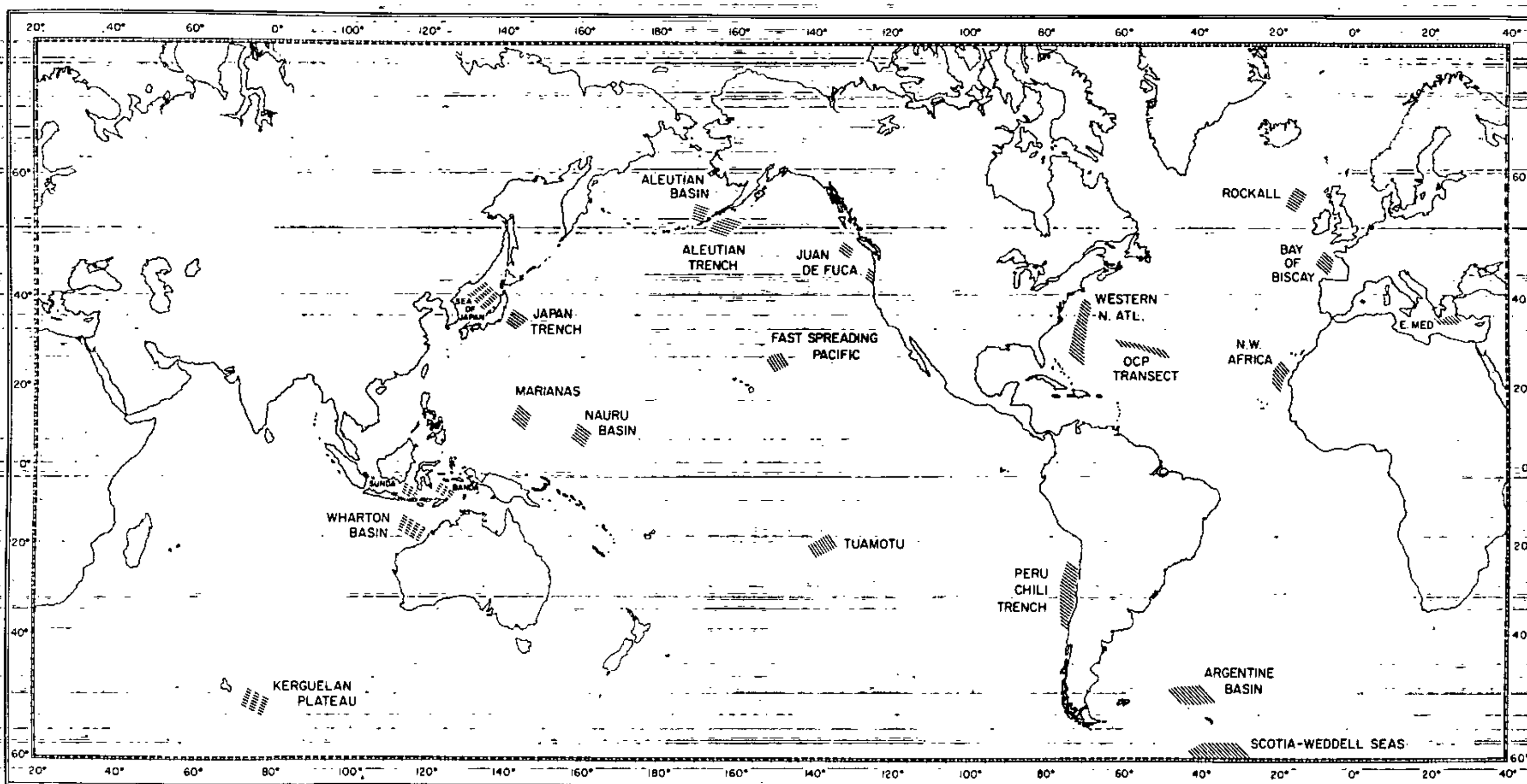


FIGURE 2: Areas of interest for *Glomar Explorer* drilling.

Six-year program — Nine-year program

Initial Reports

Volume 47, Parts I and II, will be shipped to the printer in February. Volume 48 is complete except for the logging chapters. It will undergo co-chiefs' review in mid-January, and should be shipped to the printer in February. Volume 50 has been delayed.

The two volumes for the megaleg (51-53) have 75 out of 88 chapters completed and should be shipped at the end of May.

IPOD Data Bank

The IPOD Data Bank is funded through JOI, Inc., and therefore JOI, Inc. is responsible for its effective operation.

The publication of site survey folios was discussed. It was generally agreed that it would be useful to have the data available in a coherent form, but the necessity for publication was questioned. The PCOM is to investigate the matter.

DRAFT REPORT
PLANNING COMMITTEE
6-9 November, 1978--Hawaii

Report from DSDP

A. Science Services

1.) Sediment Laboratory

The sediment laboratory closed on 15 September. DSDP technicians are doing selected leg organic samples on a time-available basis, but $CaCO_3$ and grain-size analyses are not being done. G. Müller may do some of the analysis. It was suggested that chief scientists might negotiate with other laboratories to carry out the sediment analysis. The co-chief scientists on Leg 63, Haq and Yeats, are apparently doing this.

2.) Initial Reports

(a) It would cost approximately $1,050 to make a microfiche master for IR Volumes 1-42, and $230 to produce a copy of the set. A bound set, not including the five out-of-print volumes, now costs $657. It would cost $11 per volume to make an ICD microfiche master, and $0.60 per volume for a copy. It was estimated that producing the masters would take approximately three weeks. Discussion followed concerning the quality of reproduction, particularly of illustrations, and possible inconvenience to the paleo community.

Microfiche copies of DSDP Initial Reports and Initial Core Descriptions will be made available at cost to the scientific community. The microfiche is not to replace the hard-bound copies, and distribution will not be automatic. A full-page ad in *Geotimes* was suggested to notify the scientific community of the availability of IR's on microfiche.

(b) Eight IR Volumes and supplements were produced in FY '78. This is the most produced in a single year. Due to the layoffs at DSDP, production may not be as rapid during FY '79.

(c) The staff science representative is contacting the shipboard paleontologist to include the method of determining species quantity and species range charts with IR reports.

CEPEK data bank is being procurred for the *Challenger*, but is not yet on board.

B. Developmental Engineering

1.) Drill String Studies

(a) Long Drill String--Parametric plotting routines are operational and can be computer-generated to show dynamic stress and axial drill string motions as functions of sea states, drill pipe length, heave compensation, and other variables. The basic computer drill string program is being modified to include cyclic bending stresses of the pipe in the guideshoe area, which will allow more accurate predictions of fatigue life for very long drill strings.

(b) Ship Motion Data System--The system has been installed for Leg 63 and will simultaneously record on a strip chart and on magnetic tape the measurements of roll, pitch, heave, and drill string dynamic load.

2.) Pressure Core Barrel

The pressure core barrel underwent sea trials during Leg 62. It has been returned to DSDP for inspection and refurbishment, and should be operational for Leg 64. Work has been initiated for fabrication of a second ball valve assembly, and other critical spares. Pressure coring capability has been requested for Legs 64, 66 or 67, and 69.

3.) Hydraulic Piston Core

Drawings have been released to start fabrication of the proto-type piston corer. Delivery is expected the second week of November, and testing will begin immediately.

C. Operations

1.) *Challenger* Drydock

Extensive repairs were required as the hull plates had broken away from transverse frames in the ballast tanks in the area of the forward thruster tunnels. Longitudinal strengthening, which was recommended by GMI's naval architect, was installed. All thruster gear boxes were overhauled or replaced. Both main shafts were replaced, and all mandatory underwater biannual inspection for ABS and for USCG were completed. Overhauls on the caterpillar engines were delayed by labor disputes, but were completed.

2.) "Drilling in Casing"

The manufacturing of two "Drilling in Casing" systems should be ready for a final check-out in early November.

3.) XRF

Funding for a shipboard XRF will be provided by the French for Legs 65, 68, and 69.

1979-81 Drilling Plans

A. Funding

$47M for extension of drilling operations through 1981 and project operations through 1982 will be reviewed by the NSB in mid-November. Upon their approval it will be incorporated into the President's budget which goes before Congress in January. Final approval of the budget is not expected until late summer.

B. Science Planning

1.) Two transects are planned in the South East Atlantic:

(a) One across the MAR to show the variation through time on magnetic anomalies; and,

(b) A companion profile on the N flank of the Walvis Ridge, from the Angola Basin to the Cape Basin.

2.) The PMP prioritized sites for the N. E. and N. W. Atlantic (see pp 26-28).

Panel Report Items

See the panel report on subsequent *JOIDES Journal* pages. Items included here reflect some of the action taken by PCOM with respect to panel requests.

1.) Passive Margin Panel

The COST B-3 well near a USGS seismic line and east of a major east coast (U.S.) magnetic anomaly is being drilled by a consortium of eleven companies to a depth of 16,000 feet. This is approximately 4,000-5,000 feet short of a major seismic reflector and of considerable interest to the scientific community. The PCOM chairman will investigate the possibility of funding for continuing the COST B-3 well.

2.) Pollution Prevention and Safety Panel

Only those sites whose data is available to the entire scientific community (i.e. not proprietary) should be approved as drill sites.

The IPOD Data Bank should prepare and distribute the material for the PPSP meeting. DSDP personnel had been doing this in the past.

Site proponents are named by the Panel. The name should appear on the "DSDP/IPOD Site Proposal" form. This person should work in conjunction with the co-chiefs and panel chairmen to make sure the site has received adequate documentation from the IPOD Data Bank, and adequate representation at the PPSP meeting where it will be reviewed.

Ocean Crustal Dynamics (OCD) Workshops

These are a series of workshops funded under JOI, Inc. to look at important U.S. marine geology and geophysics problems in the 1980's. Each workshop will consist of about eight people, and produce a report. The reports will be completed by the spring of 1979 and presented to the JOI, Inc. Board of Governors. They will be used as a basis for a research proposal. Nine workshops are planned:

(a) High-Resolution Bathymetric Data;

(b) Ocean Bottom Observatories;

(c) Multi-Channel Profiling;

(d) Bottom Observations and Sampling;

(e) Data Archiving and Data Exchange;

(f) Upgrading and Standardization of Laboratory Facilities;

(g) New Technology;

(h) Drilling and Drill Hole Utilization; and

(i) Ocean-Continent Transitions.

DRAFT MINUTES
DOWNHOLE MEASUREMENTS PANEL
(27 October 1978 - Woods Hole, MA)

Report on Recent Logging and Log Analysis

(A) Leg 58--no logging equipment

(B) Leg 59--no logging equipment

(C) Leg 60--First Gearhart-Owen Ltd. (South Philippine Sea)

Successful runs of all main logs at Sites 454 and 459. Logging not possible at Site 453 because drill pipe bent, at 456 because bottom hole assembly stuck, and at 458 because bit release subassembly lost in blowing off pipe at Site 456. There was excellent integration of logging data and core physical properties measurements.

The logging proved to be very valuable for the reconstruction of the stratigraphic column. Figure 3 shows the density runs for Hole 454A.

Unit A (Cores 8 to 10, Section 4), especially in the intervals of Cores 9 and 10, had been thought to consist solely of pillow basalts which were the only recovered rocks. Logging results, combined with laboratory density measurements, indicate that Unit A consists mostly of sedimentary rocks with scattered pillow fragments no larger than 0.5 m in diameter. Sedimentary Unit C was not known before logging revealed its presence between two basalt flows previously thought to be a single unit. Within the two flows (Units B and C), the density runs reveal downward increasing densities. These are probably the result of decreasing vesicularity clearly showing that the two flows are indeed separate.

(D) Leg 61--Deep penetration Nauru Basin

Successful runs of most logs except sonic in Hole 462. Only sonic gamma, caliper data in reentry Hole 462A because logging cable damaged, but this log provided very valuable data.

(E) Leg 62--no logging

(F) Leg 63--Site 471. Complete suite of logs. Excellent Data. Chief scientists suggest review of these logs for design of processing and analysis routines.

The Panel recommends that logging results be summarized in shipboard site reports from chief scientists and be given in detail in shipboard reports.

The need for high temperature tools was discussed. Boyce is requested to investigate availability.

Report from Logging Consultant M. Tixier

M. Tixier, formerly with Schlumberger and now a private consultant, was retained by the Project on the Panel's recommendation "to evaluate DSDP logging techniques, quality control and interpretation procedures." Copies of his report may be obtained from G. Boyce, DSDP. A summary of his conclusions and those of A. Jageler and subsequent Panel discussions are:

(A) Normal logging tools are rather ill equipped for *GLOMAR CHALLENGER* holes because:

1) they must run though small diameter pipe but must operate in a large diameter hole (i.e. be held against side or in center of hole depending on the tool);

2) hole conditions are frequently poor because mud cannot be circulated;

3) calibrations, ranges, etc. are

generally for sediments and may not be suited or applicable to basalts.

(B) The resistivity logs generally are least affected by hole conditions and the quality of the other logs frequently can be estimated by cross plotting against resistivity. The quality of many of the early logs is poor primarily because of the failures of the tool centralizers, excentralizers, and the caliper tool. Only about 30% are really good. Tixier provided cross plots for most of the logged holes and an evaluation of log quality. The best of the logs was on Leg 46 run by British Schlumberger.

New Panel Recommendations on Logging

(A) That the logging contractor (or if necessary, DSDP) ensure that adequate tool centralizers, decentralizers, and calipers be employed in DSDP holes.

(B) That onboard quality control checks be carried out on each hole log before the site is abandoned e.g. cross plots - resistivity - porosity etc; pseudo-calibration in casing; comparison with some core physical properties measurements.

(C) That the tools be carefully calibrated and have appropriate (and variable) ranges and triggering and bias (for sonic) for conditions encountered (from unconsolidated sediments to igneous rocks). For the sonic tool the wavetrain should be monitored by the engineer (and recorded if possible) and the trigger maintained on the correct peak.

(D) That comparisons be made of log data with laboratory core physical properties measurements for calibration - particularly where the logs and core recovery are both good - e.g. GRAPE density, grain density, porosity, velocity and resistivity.

(E) That logging contractors be pressed to provide experienced logging engineers that are also competent log analysts.

(F) That DSDP staff provide the Chief Scientists and shipboard personnel with a standard routine for evaluating, processing and presenting logs onboard *GLOMAR CHALLENGER* and attempt to do subsequent shore processing to the best form for use by the scientific party.

Downhole Instrumentation and Experiments

A meeting was held at the DSDP office August 29-30, 1978, to work out operational details of the downhole seismometer, oblique seismic and hydrofracture experiments. A summary report may be obtained from Stan White, Associate Chief Scientist, DSDP.

(A) Second oblique seismic experiment - (Stephen, WHOI; Matthews, Cambridge) - tentatively GCA-1 reentry hole Gulf of California, Leg 65, February. The Panel endorses this proposal.

(B) Downhole seismometer - (Duennebier, HIG) - long term recording in hole. Tentatively in GCA-1 pilot hole, Leg 64. The Panel endorses this proposal.

(C) Second large scale electrical resistivity experiment - (Francis, UK) tentatively planned for Leg 65. The Panel endorses this proposal.

(D) Hydrofracturing, permeability experiment - (Anderson, LDGO; Zoback, USGS) - tentatively planned for Leg 65. The Panel endorses this proposal.

(E) Downhole magnetometer - (Soviet proposal). A test of the instrument is planned for the Washington State test well in December. No leg commitment as yet.

(F) Long term instrumentation, strainmeter - (Evertson, Sacks) - not yet funded.

(G) Formation dipmeter - the value of such a downhole tool was noted.

Heat Flow

The new Kinoshita-Uyeda sediment heat probe was first employed on Leg 60. It provided excellent and valuable data on this and on a number of subsequent legs. The Panel encourages its continued use along with the high resolution logging temperature tools. The conductivity has been measured by the Japanese QTM meter which has proven to be accurate and easy to use. The meter is on loan. As yet, no funds for purchase have been found for this essential instrument. The Panel endorses continued use of the heat flow equipment. High temperature equipment is needed for the geothermal legs.

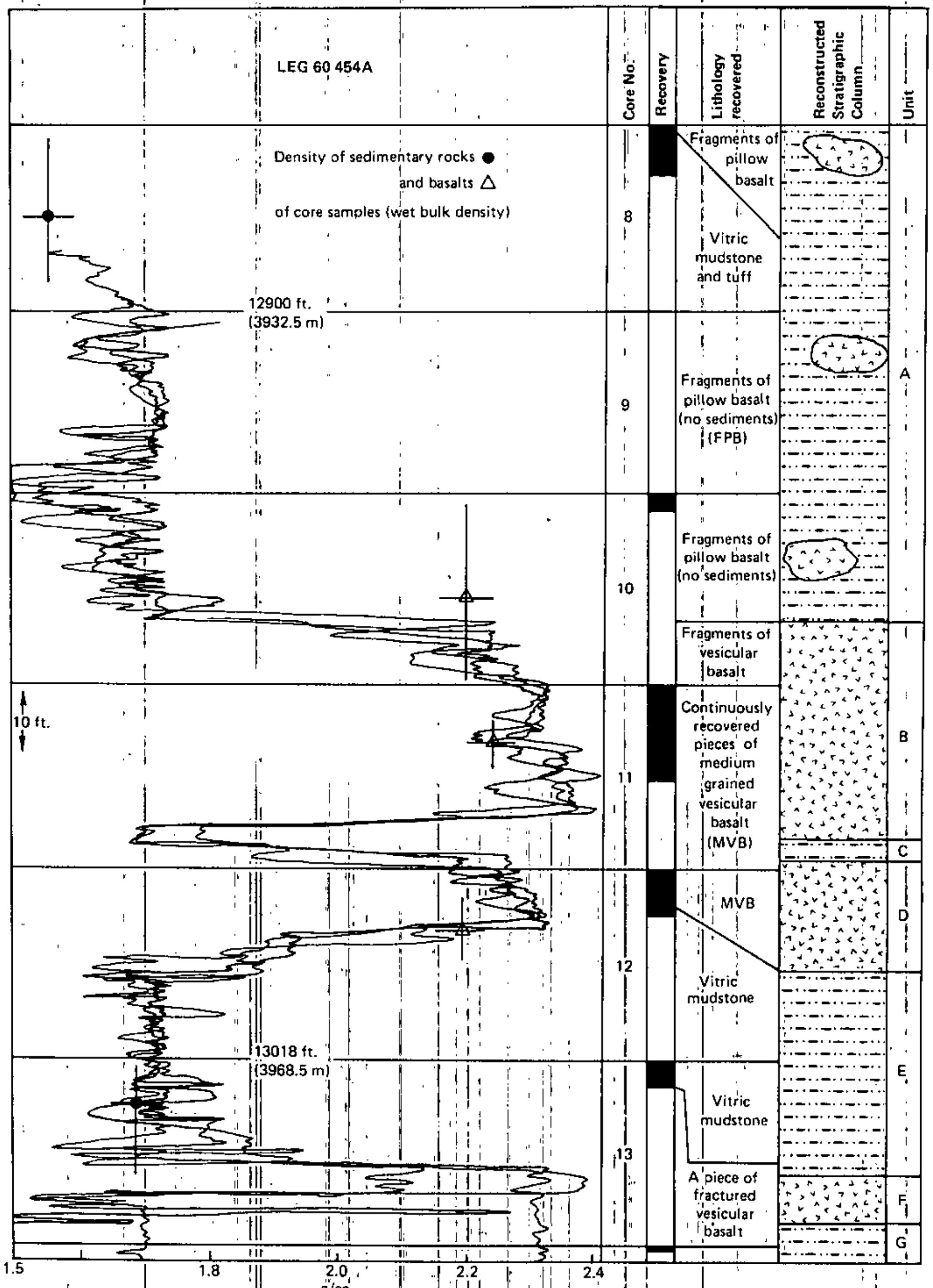


FIGURE 3: Three superimposed compensated density logs in basement at Site 454, Leg 60. Only basalts were recovered in most of this part of the hole, and before logging they were thought to make up the complete section. The downhole density tool is similar in principle of operation to the shipboard GRAPE core density equipment. It records the backscattered radiation from a gamma ray source. The tool actually measures electron density, but the relation to bulk density is a nearly constant factor depending only slightly on rock matrix material.

Physical Properties Report

An ad hoc committee of the SP 4 Panel has prepared recommendations on "Improved undisturbed sampling and physical properties testing of sediments, sedimentary rocks, and crystalline rocks." The report has been approved by the SP 4 and Downhole Measurements Panel (for excerpts of report, see pp. 39-40).

Geothermal Working Group

A meeting of the Geothermal Working Group was held (Miami, 16 April 1978) to discuss drilling in geothermal areas - Gulf of California (Legs 64-65) and Galapagos area and Costa Rica Rift (Legs 68-69). Some recommendations on downhole instrumentation are:

(A) Logging, including high resolution temperature (if possible high temperature logging tools).

(B) Sediment <u>in situ</u> porewater - temperature probe.

(C) Porewater sampler for high temperatures, e.g. in basalt.

(D) Temperature measurement device for high temperatures (e.g. Kuster tool).

(E) Thermal conductivity equipment for sediments and basalts (e.g. QTM).

DRAFT MINUTES
INORGANIC GEOCHEMISTRY PANEL
24-25 July, 1978--SIO

Chemical Analysis of Bulk Solids

Researchers involved in major and minor element analyses on DSDP material were contacted. Three written responses were discussed, all agreeing there is a huge investment involved in bulk chemical analyses of DSDP material if done on a routine basis, coupled with only a long-term pay-off. Other aspects of this problem concern: proper standards, laboratory intercalibration, advanced instrumental methods, and associated mineral phase analyses.

The importance of bulk chemical analysis of sediments was discussed, particularly in those sites that are characterized by high sediment recovery and good biostratigraphic control. Such chemical analyses, particularly when interpreted in terms of accumulation rates and elemental ratio variations, set important constraints on interpretations of geochemical processes that have affected the sediments. Such programs should be accompanied by studies of the mineralogy and isotope geochemistry of the solids, which also yield additional important information on the geochemical history of the sediments.

The panel recommends that the vast number of raw data on bulk chemical analysis of DSDP material accumulated by T. W. Donnelly (and by other workers) be made available through publication in the Initial Reports (blue volumes), ideally as part of an "overflow volume" or a special volume. This compilation should be accompanied by a section on methods and evaluation of the accuracy of the data and an account of how these data may be used to address basic problems (synthesis-type). It is understood that normal review procedures should be adhered to.

The panel recommends this action because for bulk chemical data, a longer commitment in time is involved, which generally prevents the investigators from submitting all data to the appropriate DSDP volume. The usefulness and value of bulk chemical data become apparent only with a larger regional coverage than is provided by a single leg, and publication of data in appropriate journals would be difficult because of space limitations.

Prof. Ronov (USSR) has expressed interest in large-scale bulk chemical rock and sediment analyses of DSDP material. The data are to be used in support of global budgetary approaches. The panel supports Ronov's request, but urges that he must be made aware of existing standards and intercalibration results.

There is a need for members of the IGP to be represented on other panels (particularly the problem panels), to have a better input in early planning stages of IPOD. The PCOM will be approached regarding this.

Pressure-Core Barrel--The present version of the pressure core barrel was tested on Leg 62. J. Gieskes will disseminate the results and pertinent information before the panel makes any recommendation. Use of the pressure core barrel as a device for sampling hydrothermal fluids was discussed. The only problem to be investigated is that of complete flushing of the device when lowered to the bottom of the hole. Use of the core barrel in this manner will not necessitate a smaller core diameter.

A brief discussion concerned the recommendation of the Sedimentary Petrology Panel to abandon the so-called "syringe technique" as a shipboard procedure for physical properties measurements. The IGP supports this recommendation, but adds that a simple water content technique be retained, performed at frequent intervals, and supplemented by an accurate wet bulk density determination (cylinder technique). The latter is necessary only at major lithologic changes.

The in situ pore water sampler was explained and the first results of the gas concentration measurements were presented. The N_2/Ar ratios obtained are representative of saturation values of air in seawater; the absolute concentrations, however, appear to be affected by stripping of N_2 and Ar from solution through degassing of CH_4. Excellent agreement was reported between major ion and nutrient concentrations obtained by pressure filtration techniques and in situ sampling. Helium isotope abundances and other rare gas analyses are not completed yet; but preliminary results on δ^3He clearly indicate addition of ^3He. Such $^3He/^4He$ isotope ratio studies may be particularly useful during the hydrothermal legs.

It was suggested that the CH_4 result from the in situ sampler be compared with the routine methane/ethane determinations on gas pockets by the Safety Panel.

In view of these accomplishments and the potential scientific value, the IGP recommends that the inert gas program be routinely carried out along with the temperature measurements. As the Barnes' sampler has been modified with a temperature sensor (Uyeda device), this does not require additional efforts or time on board ship.

Presentation of Drilling Results

Leg 60--Among the ten sites of Leg 60, across the Mariana Trough and Trench, some unusual interstitial water profiles for dissolved Ca^{2+} and Mg^{2+} of Sites 459 and 453 were reported. In these two holes the general trends of increasing Ca contents and decreasing Mg contents were observed throughout the various sedimentary sequences, but the trends reversed within the last ~100 m above basement. If this reversal can be confirmed at other sites, some important implications may result with regard to the circulation of seawater through Layers I and II, etc. It is suggested that investigators look closely into heatflow data and downhole temperature profiles of this area.

Future Legs--Further discussion centered around drilling on the geothermal legs:

1.) Recovering thin undisturbed sediment, possibly by piston coring through the drill string.

2.) The sequence and correlation of sedimentary facies of the Galapagos Mounds Area, i.e., Fe-Mn-oxides, green hydrothermal mud, foram-, nanno- and siliceous nanno-oozes.

Future Legs (IGP objectives)

Legs 64-65

1.) Sediment diagenesis, particularly of biogenic silica;

2.) basalt-seawater interaction;

3.) in situ water sampling;

4.) sampling of hydrothermal fluids, if encountered.

<u>Legs 68-69</u>

1.) Collect pore water;

2.) collect hydrothermal fluids;

3.) obtain altered basalt;

4.) obtain hydrothermal sediments.

Following extensive discussion, the IGP recommends for Leg 68:

1.) Piston-coring before and after punch-in through the drill stem at single-bit sites to obtain sediments, and to find a suitable site for drilling (highest temperature site);

2.) coordinate site selection with survey and results of submersible program cruise, and, if feasible, mark prospective drill sites in mounds area with a beacon;

3.) that the water sampler for hydrothermal fluids be obtained with a maximum reading thermometer;

4.) that the possibility be explored of acquiring various temperature-reading devices and water samplers;

5.) that preservation of water be of concern to the chief scientist; because of cooling and pressure changes, instantaneous precipitation of solutes may occur;

6.) that a hole be filled with drilling fluid and subsequently returned to for sampling of interstitial water and gases.

DRAFT REPORT
OCEAN CRUST PANEL
2-4 October, 1978--Newcastle

Long-Term Ocean Crust Drilling Program

The OCP reviewed its future drilling objectives. This review was prompted by:

1.) Post-'81 proposal plans;

2.) Results from the Paleomagnetics Penrose Conference; and

3.) Geochemical results from the North Atlantic drilling.

Two strong opinions emerged from these discussions. The first was that, in order to use drilling to understand ocean crust structure and magnetics, a major effort must be made on Pacific fast-spread crust which is far better understood geophysically, structurally and magnetically than the Atlantic where we have so far concentrated most of our ocean crust drilling. Because of the demonstrated difficulties of drilling young Pacific crust (apparently related to the abundance of sheet flows rather than pillows), this effort must be made on older Pacific crust with well-defined magnetic anomalies with high (>30°) paleolatitude (either the site near the Tuamotus already proposed, or a site on the M-series anomalies in the Pacific Central Basin). The results of Leg 61 demonstrate that sheet flows, when sufficiently altered and cemented, can be easily drilled.

The second opinion was that the geochemical anomalies discovered in the North Atlantic are of profound importance to our understanding of crust-mantle evolution, and that tracing the physical boundary of the geochemical transition in the North Atlantic will have important bearing on the connection between mantle heterogeneities and the patterns of spreading and perhaps mantle convection. Drilling is the ideal tool to investigate this problem because of the precise control it gives to sample locations and stratigraphy. The problem has been well defined with the drilling done so far. This investigation should be carried through by completing the transect and adding the few more holes needed to define the transition zone.

Following this discussion, objectives were summarized as follows:

A. Crustal structure

1.) Changes in time.

2.) Changes with depth.

3.) Changes locally in space.

4.) Differences as a function of spreading rate, etc.

5.) Relationship to seismic structure (Layer 2-Layer 3 transition, and Moho transition).

B. Ridge-crest processes

1.) Geochemical provinces in time and space.

2.) Tectonic processes.

3.) Igneous/magmatic processes.

4.) Geothermal processes (perhaps of economic importance).

5.) Mantle-crust relationships.

6.) Metamorphic processes.

C. Transform-fault domain

1.) Structural/tectonic processes.

2.) Igneous processes.

3.) Metamorphic processes.

D. Crustal aging processes

1.) Low-temperature alteration.

2.) Elemental fluxes.

3.) Changes in physical and magnetic properties of rocks.

E. Magnetic problems

1.) Acquisition of magnetization.

2.) Relationship to magnetic anomalies.

F. Crust in island arcs

1.) Back-arc crust.

2.) Island-arc crust.

In view of these objectives, previous drilling results, and discussion, the following priorities were established:

Priority 1

A. A deep hole (3 km or more) in the Pacific using *Glomar Explorer* preceded by reconnaisance single-bit and re-entry drilling with *Glomar Challenger*. Sites should be clustered in a single surveyed area on fast-spread crust sufficiently old to ensure easy drilling across a magnetic anomaly transition. Site designated LTP-1 (Layer Three Pacific). Site location critically dependent on length of riser. Only young crust (less than 21 million years) is shallower than 12,000 feet.

B. Completion of the Atlantic transect with additional single bit sites to investigate the N. Atlantic geochemical provinces. Proposed for the 1979-1981 drilling period.

Priority 2

A. A deep hole (3 km or more) in the Atlantic using *Glomar Explorer* preceded by reconnaisance single-bit and re-entry drilling with *Glomar Challenger*. The pattern of holes would be much the same as in the Pacific. Site designated LTA-1 (Layer Three Atlantic). Site location again is critically dependent on length of riser. Fairly old crust south of the Azores platform is shallower than 12,000 feet, and falls within the less-depleted Atlantic geochemical province. The re-entry drilling with *Challenger* is essentially equivalent to that previously proposed by the OCP to achieve greater than 500 m penetration by drilling in old (presumably sealed), but still shallow crust. Based on discussions stemming from the Penrose conference, the Layer 2 - Layer 3 transition here is expected to be more complex than in the Pacific; hence, these holes are a true complement to a deep hole in the Pacific.

B. If *Glomar Explorer* does not become available, or if the riser length precludes a truly deep hole in the Pacific, then completion of a single-bit and *Challenger* re-entry program in the Pacific, largely to answer the question of magnetic structure of the Pacific crust, is given equal weight to the Atlantic deep hole just discussed.

C. Completion of Site 462 in the Nauru Basin.

Priority 3

A. Zero-age drilling, basically following up Gulf of California and

Galapagos drilling planned for the immediate future, and possibly including the Juan de Fuca spreading center (included on the tentative *Glomar Explorer* schedule in the preliminary proposal to NSF).

B. Fracture zone drilling.

1979-1981 Drilling Program

A. South Atlantic

The OCP is quite interested in the sites on Miocene and younger Mid-Atlantic Ridge crust between 22°S and 26°S, as well as in sites in the Cape and Angola Basins and on Walvis Ridge. The ridge-crest sites fall in an area which may reflect mantle source heterogeneities of the type found by drilling in the N. Atlantic. The sites on and near Walvis Ridge are important because the Walvis Ridge may represent the trace of a mantle melting anomaly (hot spot) continuously active at or near the ridge crest to the present day. The relationship of such melting anomalies to the surrounding ocean floor and to possible widespread mantle compositional heterogeneities is of special interest.

B. North Atlantic

Important results of the ocean crust drilling program in the N. Atlantic were presented. Mantle composition heterogeneities are reflected in the basalt compositional heterogeneities and the location of postulated mantle plumes (Iceland and the Azores). Near the ridge crest, there appears to be a transition between typical depleted mid-ocean ridge basalts (MORB's), such as those drilled on Legs 45 and 46, to less depleted basalts drilled on Legs 37 and 49 somewhere near 29°N.

The OCP strongly urges that a leg of single-bit holes be devoted to tracing the southern boundary of this geochemical anomaly during the 1979-1981 drilling. The leg would complete the N. Atlantic transect (Survey Areas AT-3 and AT-4) and include other holes on Tertiary and younger crust to the north across the apparent transition at 29°N.

Plans for Legs 68 and 69

Detailed consideration of the plans for these legs will take place at the next OCP meeting, when Costa Rica rift site survey data will be presented, and the precise number of downhole experiments will be known. The staffing requirements for these legs were reviewed. It is apparent that the legs might have to be short-handed in sedimentologists, paleontologists, and petrologists, to accommodate those doing special experiments. This is viewed as a necessary shortcoming. It is most important to give every opportunity to the special experiments.

On the basis of the Leg 54 experience, it was recommended that exploratory holes in the mounds area (Leg 69) sample the sediment section and a single core into basement. The string can be repeatedly lifted and moved across the mounds in order to find hydrothermally altered basalts, pore waters with evidence for hydrothermal fluxes, and unusually high heat flow, prior to selecting a location to wear the bit out in basement or attempt re-entry. It was also recommended that a reference sediment section be cored away from the mounds (preferably on the "mirror image" side of the ridge crest to the mounds area) to determine regional sedimentation rates, and to calibrate the effects of hydrothermal solutions in the mounds area on dissolution of carbonate sediments.

Other Business

A: Igneous Rocks Data Base

The position of the DSDP computer group regarding processing of igneous rock descriptive data was explained. The OCP was reassured that incorporation of this data even in its crude form was better than having the computer group attempt to limit the data, and that proper search routines could be devised to handle such data. More information about the present status of the data base, of search programs, and of an instruction manual will be sent to the OCP chairman.

B. GRAPE Report

Some problems with GRAPE were reviewed. The OCP resolved that DSDP ensure that GRAPE standards are all of the same aluminum alloy and that they are properly stored and labelled on the ship; also that as soon as cores are lithified in any given hole, that GRAPE be done with discrete parallel-sided blocks sawn from the core for this; also that velocity and GRAPE measurements be made at the rate of 1 sample per section of core in rocks of uniform lithology.

DRAFT REPORT: ACTIVE MARGIN PANEL
26-28 October, 1978--Toronto

Planning Committee Items and Actions

There will be a Caribbean Leg. There is a need for the AMP to support its proposed drilling in the Barbados Ridge. AMP should propose a supporting letter for PMP which now has responsibility for Caribbean and Mediterranean Seas.

If holes drilled on Legs 66 and 67 are to be left open after drilling, then AMP must argue the case for this with the Safety Panel.

The AMP is requested to define what it means by "regional survey" as distinct from "site survey" in the context of future problem areas. Its draft statement is as follows:

"Regional Surveys along active margins involve exploration of areas equivalent in area to geologic provinces and they tend to result in descriptive products and overviews into which subsets of more detailed problems can be placed. In contrast, Site Surveys are more restricted aerially, and are processes oriented, tending to constrain or lead to redefinition of a problem. Both types of surveys should ideally be multidisciplinary and involve marine geophysics, sampling (including drilling), and comparison with analogues in exposed ancient fold belts. The blend of field methods used in each type of survey must be judged on the basis of expected scientific return for a given effort."

Reports by non-U.S. Members on IPOD Progress and Future

Japan--There is broad interest in the program with many continuing studies of Legs 56-60.

USSR--There is particular interest in margin studies and in related geological provinces such as igneous rocks in the Middle America Trench area. USSR is willing to provide scientific staff with special interests, e.g. in basalts of the Mid. Am. Trench. The USSR will summarize results of IPOD I and inquiry was made as to whether the AMP would be willing to also make such a summary.

Germany--There is a wish to see collaborative scientific programs with onshore studies particularly with a view to advance our knowledge of metallic ore deposits.

France--Results have been stimulating. The Caribbean needs its objectives upgraded. The suggestion was made for a future AMP meeting to be held in Paris in conjunction with the IGC in July, 1980. At this IGC there will be a review of all active margin drilling in the Pacific region.

U.K.--Results had been reviewed with great interest. There was a move to try to relate these results with what could be seen of ancient examples in folded mountain belts. In particular, there is interest in deformation processes in the arc-trench zone and in magmatic processes in the arc and back-arc regions.

Scientific Results of Legs 56-60

A. Conclusions from Legs 56-57

1.) One conclusion is that during subduction there was subsidence of the uplifted landmass situated on the leading edge of the upper plate. This was associated in its early stage with volcanism close to the present trench simultaneously with activity along the volcanic arc. The question arises of how this subsidence may be related to spreading in the Sea of Japan.

2.) Shear resulting from subduction at 8-9 cm/yr does not appear to have been transmitted very far across the upper plate.

3.) Accreted sediments on the upper plate are insufficient in volume to account for all the material transported from the oceanic plate.

4.) It is possible that large slices of upper plate have been removed and disposed during the Neogene.

5.) The geology found by AMP drilling in the Japan transect does not easily fit any of the existing models.

6.) Riserless *Explorer*-type drilling on the Japan Trench wall would allow some central objectives to be reached because of the much longer drill stem. The use of *Explorer* without riser would be a valuable improvement for achieving AMP objectives in the Japan margin.

B. Conclusions on Leg 58:

1.) There has been symmetric or asymmetric spreading in the northern part of the Philippine Sea.

2.) There has been northward migration of the Daito Ridge.

3.) There has been off-ridge volcanism in the Shikoku Basin.

C. Conclusions on Leg 59:

1.) There is a symmetric spreading history in the Parece Vela Basin. Interpretation suggests that the opening of the Mariana Trough coincided with cessation of spreading in the Parece Vela Basin.

2.) The pre-40 m.y. history of the Mariana and Palau-Kyusho Ridges remains uncertain.

D. Conclusions on Leg 60:

1.) Symmetrical spreading from an axial graben in the Mariana Trough is indicated, although details of the opening are still unresolved.

2.) There is evidence for subsidence of the trench-slope break and mid-slope of the Mariana Arc system.

3.) Arc related igneous basement occurs on the trench-slope break.

4.) There remain significant problems to be resolved by additional drilling in the Mariana-Arc-Trench area.

5.) Evidence for intensely local thermal anomalies associated with hydrothermal circulation was found during this leg and a subsequent cruise in the vicinity of the Mariana magmatic arc. These phenomena may be directly related to metallic ore genesis.

6.) No evidence of repeated stratigraphic sections, nor of an accretionary prism was found. Tensional features appear to predominate at all scales.

Results from Middle America Trench Working Group (see full report, pages 35-39)

Latest geophysical data were reviewed. As a result, the Working Group recommended some changes in sites off Mexico which were approved by AMP. The AMP approved all sites in the Middle America Trench.

The AMP agreed that the proposed HIG downhole seismic experiment program is very important for study of active margin dynamics and for the Middle America Trench in particular (see Minutes from 10-12 January, 1978 meeting of AMP).

Additional AMP Candidate Transects for IPOD II

Candidates for additional AMP drilling transects were discussed and the following were tentatively accepted by the AMP: Banda-Sunda Arcs, Peru-Chile, Eastern Mediterranean and Caribbean. The matter of Working Groups was deferred until the next meeting.

There will be future AMP discussion of Molucca Sea, Oman, Tonga-New Hebrides, Aleutian, Bering Sea and Oregon-Washington transects. The OPP will repropose the Gulf of Alaska site because Leg 61 was shortened. As the proposed sites are in an area of AMP interest, they may be grouped with some Aleutian Trench sites by AMP or else with some Bering Sea sites. Working groups will be set up at a later meeting.

Discussion of AMP Objectives in Light of Recent Active Margin Drilling Results

The AMP attempted to reevaluate, on the basis of recent drilling results, it's objectives for *Explorer*-type drilling. It was guided in this by the requirement to define the most important processes that are indicated by study of folded mountain belts, and the recognition that the types of active margins may be as variable as the exposed mountain belts themselves. The objectives were considered for *Explorer*-type drilling both with and without a riser.

This re-evaluation of objectives resulted in some modification of emphasis and refinements to the earlier concepts of the most important dynamic, magmatic, geochemical and sedimentological processes. This is set out in an Appendix to these minutes.

It was agreed that any future AMP plan would emphasize the integration of marine and land-based studies.

Resolutions, Future Discussions

The AMP postponed until its next meeting a discussion on the call by some members for AMP representation on the Mediterranean Working Group and the need to ask this Group to undertake a study of active margin scientific objectives in the Mediterranean region.

The AMP postponed until its next meeting a discussion on the suggestion from some members of the Panel that an Arabian-Iranian Region Working Group should be set up to consider the scientific objectives and data available for active margin drilling in the tectonically active zone between the Mediterranean and the Indian Ocean, with particular reference to the general area of the Gulf of Oman.

The importance of placing a downhole seismometer was discussed. The Panel strongly endorses the placement of a seismometer near the Mid-America Trench on either Leg 66 or 67 and stresses the importance of recording low level seismicity in this environment. Low-level seismicity may be peculiar to the initial deformation of sediment at the leading edge of a subduction zone as concluded from study of cores along the Japan Trench. These cores showed extensive microfracturing rather than large faults and therefore the apparent absence of large earthquakes may be a function of the style of deformation.

A Sunda-Banda Working Group was formed and chaired by Michael Audley-Charles.

DRAFT REPORT
PASSIVE MARGIN PANEL
22-25 September, 1978--Bermuda

Chairmanship

R. E. Sheridan assumed the chairmanship. J. Curray was thanked for his excellent chairmanship and leadership of the PMP for the last four years.

Gulf of California Plans

J. Curray and D. Moore reported on the Gulf of California program. The PMP recommended that the highest priority be given to implementation of a heatflow program for Legs 64 and 65.

It was pointed out that Weiss of SIO had developed a new technique for analyzing CO_2 in small samples. This will be looked into.

N.E. Atlantic Sites

A. Biscay

Objectives in the Armorican margin of the Bay of Biscay were reviewed and discussed. Three high-priority holes were proposed to:

1.) Penetrate to the oldest oceanic crust adjacent to the continent-ocean boundary to establish its nature and subsidence history for comparison with the adjoining ocean crust. Re-entry would be required.

2.) Penetration of the pre-syn-rift sedimentary sequence at site 400A missed due to loss of drill string. This should give data about subsidence during rifting that will bear on mechanisms of crustal attenuation.

3.) Drill in a mid-slope environment to examine the facies of Mesozoic and Tertiary sediments deposited in intermediate water depths.

A second series of priority II sites on the Goban spur was also presented. The margin here is much shallower and the purpose would be to examine the altitude of the continent-ocean boundary and the subsidence histories of the adjacent continental and oceanic crusts.

B. Rockall Plateau

Seismic profiles for a transect across the 52 m.y. old margin of the Western Rockall Plateau were presented, contrasting this margin with Biscay. The outer part of the Rockall margin consists of a broad high or "horst" overlain by a thick sequence of reflectors that pass laterally into an ocean crust clearly identified and characterized by oceanic magnetic anomalies. It is possible that this margin may represent an "end-member" in which rifting was accompanied by volcanism and resulted in a substantial subaerial relief.

The proposed program is designed to compare the subsidence history of the oceanic and continental parts of the margin in relation to rifting and spreading. Sites have been chosen to provide maximum information on; the nature of the first oceanic crust, the outer high complex, syn- and pre-rift sediments, and the changing Tertiary paleoenvironment.

C. Galicia Bank

On the western slope of Galicia Bank, tilted blocks can be followed downslope toward the continent-ocean boundary. These blocks typically lie at shallow depths. The main interest in these sites is to easily obtain syn-rift and pre-rift sediments at different paleodepths to establish the environmental changes during the transition from rifting to spreading. Little penetration is required at most sites. The sites are considered as priority II targets.

D. Faeroe-Shetland Proposal

Two holes were proposed in the Faeroe-Shetland channel to test an interpreted thickened oceanic crust and the nature of syn- and pre-rift sediments on a deeply buried outer high. Both holes require in excess of 1500 m penetration.

These holes are relevant to the proposed NATO Iceland-Faeroes Project, however, penetration is beyond the capabilities of *Glomar Challenger*.

N. W. Africa

The geology of the N.W. African margin was outlined with emphasis on the margin off Morocco. Beyond a Jurassic carbonate bank, there is a complex structural zone previously interpreted as a salt diapir field. Three types of structure (which may not be halokinetic) are now recognized. The importance of N.W. Africa as a conjugate to E. N. America was also noted.

Sites are proposed to test:

1.) Nature of shallow structures and role of mass sliding to influence the slope and rise.

2.) The paleoclimate over the margins as well as the continent.

3.) The paleo-oceanography of the margin with special emphasis on the temporal and spatial distribution of hiatuses of direct relevance to seismic stratigraphy.

4.) The early (i.e. pre-Oxfordian) paleo-environment of the N. E. Atlantic.

It was observed that the salt is apparently underlain by oceanic crust and that a magnetic anomaly is apparently associated with the continent-ocean boundary. The safety aspects of several candidate sites near structure were queried. Many structures are breached, and the basin is not oil producing. The origin of the structure was discussed. High salinities were found at Site 416 (off Morocco), and salt was drilled in the Essaocuira Basin. It is possible that there may be diapirs of different origin and age off Morocco.

Caribbean Sea

AMP interest in the Caribbean, especially the Antilles arc, was noted. Sites CAR I and II (toe of Barbados Ridge) are of interest for in situ stress measurements.

IFP has continued to evaluate seismic data for the Safety Panel, etc. Multichannel surveys are scheduled for the Venezuela-Colombia Basin by Lamont in April, 1979. The lines will examine the relationship of horizen 13" to the basement and the proposed buried ridge complex. Exxon is interested in the Yucatan Basin.

The statement was made that the first priority should remain the Venezuela Basin, but that two sites should be drilled on the Aves swell to recover the Tertiary section.

South Atlantic Ocean

The OPP proposals for the South Atlantic were reviewed (see Working Group Minutes, *JOIDES Journal*, Vol. IV, #3, pp 45-49). The PMP made several suggestions and comments:

A. Blackshales

A re-entry hole and complementary survey are needed north of the Walvis Ridge on Late Aptian or Barremian crust. This site would be compatible with SA-I-1. The site is well defined geophysically, but a problem with the magnetics requires clarification.

A clastic lower section may have been produced by subaerial erosion of the Walvis Ridge. It was noted that the subsidence of the ridge and adjacent basin have remained coupled and that the Walvis Ridge formed contemporaneously.

B. Mid-slope of Walvis Ridge

A new site was proposed at the western end of the Walvis Ridge in a paleodepth of 1 km compared to the deep basin of 3.5 km. Present water depth of the hole would be about 2 km.

C. Site SA-III-1

This site proposed by OPP is located on Late Albian crust. As black shale deposition ceased in Early Albian time, the proposed site may not penetrate black shales. New data are required.

It was noted that the contrasting character of the two black shale intervals implies that one was produced by euxinic conditions and the other, confined to the basin margins, by an expanded O_2 minimum. The mid-slope hole may be useful in examining this idea. Its depth is 1 km greater than 364. The OPP hopes to obtain a complete section as well as penetrate black shales.

D. Site SA-I-1

The panel generally felt that the proposed SA-I-1 hole should be close to the Walvis Ridge to minimize sediment thickness, but noted potential poor hole conditions due to turbidites, etc.

Western North Atlantic (Eastern North America)

A report from the Western No. Atlantic Working Group was tabled, but an outline of the regional geology of the ten candidate sites was given. The problem of predicting basement age and the age of deep reflectors on the outer rise was emphasized. The application of the seismic stratigraphic concept was noted, for example, the J_2 reflector can be followed from the Blake Basin to the New England Seamounts. The objective of holes would be to examine the early Jurassic sequence and also to look at the quiet magnetic zone and paleomagnetism.

A series of slope sites was outlined.

ENA-5: The objective would be to examine the very large erosional unconformity.

ENA-6: The principal objective is to obtain the shallow stratigraphy with the ancillary objective of penetrating fossil clathrate horizons.

Canadian Margin

Candidate sites were identified from seismic sections supplied by Imperial Oil and Seiscan. Further site surveys are an obvious requirement.

Sites on the Newfoundland Ridge are intended to penetrate the sequence of deep reflectors of hypothetical, continental origin. Holes on the flanks of Orphan Knoll are proposed to determine the subsidence of the Orphan Basin and the nature of the pre- and syn-rift sediments.

DRAFT REPORT
POLLUTION, PREVENTION AND SAFETY PANEL
2-3 October, 1978--SIO

The geology of Mexican land areas around the Gulf were discussed. PEMEX has drilled exploratory wells in the Vizcaino and Magdalena areas of Baja, California. Except for spotty gas shows and one well flowing gas from the Cretaceous, hydrocarbons were generally absent in Mesozoic and Cenozoic sediments. The opinion was offered that if Cenozoic sediments in the Gulf contain hydrocarbons, they are likely to be immature. Other presentations and discussions included information about:

1.) the early tectonic history of the Gulf of California, postulating a prerifting event that opened up the initial gap at the mouth of the Gulf;

2.) the historical and present seismic activity in the Gulf;

3.) the important geological problems that drilling there can resolve; and

4.) the history of JOIDES interest in the Gulf of California as a study area for young ocean basins.

The Safety Panel made the following recommendations about the proposed drilling sites:

Leg 64 Sites

GCA-1 --Satisfactory for single-bit drilling, and for later multiple re-entry.

GCA-2 --Satisfactory.

GCA-3 --Satisfactory.

GCA-4 --Satisfactory.

GCA-5 --Satisfactory.

GCA-6 --Satisfactory.

GCA-7A --Satisfactory.

GCA-7B --Satisfactory.* Discussion of this site revolved around the nature of acoustic basement in the area. The consensus was that because the beds to be penetrated were incised by canyons, outcropping in escarpments, and broken up by faulting, the risk of hydrocarbon accumulation was minimal, and drilling should be permitted to proceed to bit destruction.

*It is noted that the Panel's decision was not unanimous. One member believed that drilling should proceed to bit destruction only if basement proved to be granite; if found to be otherwise, drilling should be stopped.

GCA-7C --Satisfactory* but not unanimous.

*One panel member maintained that drilling should be stopped at 500m bottom penetration as stated on check sheet.

GCA-10 --Satisfactory.

GCA-11 --Satisfactory.

At this point in the proceedings, a 1972 gravity core taken in the southern rift by Scripps was described. This core gave off a strong hydrocarbonaceous odor below about 2.5 m. Analyses showed the presence of gas of petrogenic origin in significant amounts, increasing to the bottom of the core at 3.6 m. No compelling explanation was forthcoming, but the presence of mature hydrocarbons in the area of the Guaymas Basin was noted.

GCA-12 --Satisfactory, but drill with all due precaution. The possible consequences of entry into a magma chamber at the bottom of this hole was discussed. However, the Panel felt that hydrostatic pressure at this site would prevent the release of large amounts of steam into the drill pipe, and that any steam generated would condense in the cold water column before it reached the surface. Magma penetration would not present a hazard to the ship and would not be a source of pollution.

GCA-13 --Satisfactory, but drill with extra precaution; core ahead only after analysis of previous core by gas chromatigraph and stop drilling if hydrocarbon shows strong tendency to increase.

The Panel recognized the possibility of encountering some hydrocarbons here based on their presence in a gravity core taken 12 km away, but believed that dangerous hydrocarbon accumulations were unlikely.

GCA-14 --Satisfactory to 860 m or destruction of the bit, whichever comes first. If hydrocarbons are detected in coring, further core recovery should proceed only as results of gas chromatograph analyses are known.

*A dissenting opinion wished penetration to be limited to 760 m.

GCA-15 --Satisfactory to 760 m or to bit destruction. All due precautions should be observed as for GCA-14 above.

GCA-16A--Unsatisfactory. Panel noted dip reversal in sediments overlying the buried feature, the presence of a thick sediment section in the adjacent syncline with possible migration routes into beds truncated by and draped over the buried feature, the possibility that the buried feature itself might have arched, porous beds, and the uncertainties of controlling the drill string closely enough to just "scratch" the crest of the buried feature without inadvertently penetrating several meters.

GCA-16B--Satisfactory.

GCA-19 --Satisfactory.

GCA-23 --Satisfactory.

*A dissenting opinion wished penetration to be limited to 760 m.

GCA-24 --Satisfactory.

GCA-26 --Satisfactory.

GCA-27 --Satisfactory.

GCA-28 --Satisfactory only for drill site located at 0300 hours on USNS Davis Profile of 23 October, 1967.

GCA-29 --Satisfactory if location moved to site at 0515 hours on USNS Davis Profile of 23 October, 1967.

After the meeting another site, GCA-30, was informally reviewed. The site was considered satisfactory and approved as a single bit hole. Normal abandonment procedures were deemed sufficient.

<u>Leg 63 Sites</u>

EP-8 --Satisfactory.

EP-11 &
EP-11B --Unsatisfactory due to insufficient data.

The Panel felt that in continental margin areas of such complex geology, detailed site surveys must be made, and drilling cannot be approved on the basis of proprietary "eyes only" seismic data.

DRAFT MINUTES
SEDIMENTARY PETROLOGY AND
PHYSICAL PROPERTIES PANEL (SP4)
23 August 1978 - SIO

One of the SP4's strongest recommendations in 1977, which was endorsed at the January 1978 PCOM meeting, to initiate grain density measurements on selected samples, has not been implemented because of financial constraints. Panel members voiced their concern and hoped that these much-needed analyses would soon be undertaken at the DSDP. In addition the SP4 recommends that the reopening of the sediment laboratory be given very high priority in future negotiations and proposals. It is important to immediately institute procedures to routinely preserve samples for future processing that would have previously been handled by the sediment laboratory. DSDP is developing and soon expects to test a pressurized core barrel for collecting gas samples and clathrates, and a piston-core sampler capable of sampling in advance of the drill bit.

The panel was requested to consider how SP4-type information could be shortened in the Initial Reports. In the ensuing discussion, it was clear that the Panel favored other methods of conserving space before shortening scientific information. An ad hoc committee composed of George Klein, Orin Pilkey, and Richard Bennett was delegated to draft a recommendation, which was subsequently adopted unanimously:

<u>Initial Report Manuscript Policy</u>

A. <u>Policy Recommendation</u>

Both the Planning and Executive Committee should stand behind the Co-chiefs and the DSDP staff representatives with respect to enforcing editorial review, guidelines, manuscript size, etc. Their policy statement to this effect should appear in the Shipboard Manual and in the Newsletters for each leg.

B. <u>Mechanical Matters</u>

1) Illustrations should appear only once.

2) More cross-referencing.

3) Use smaller type size for: tables, reference lists, appendices, and text dealing with methods and description.

4) Microfiche, certain tables, diagrams, and appendices.

5) Put more photos in montages and single plates rather than spread them over two or more plates.

6) Use narrower margins.

7) Redraft diagrams so as to permit more size reduction.

8) Delete core photos that are uniform (Site Reports).

9) Possibly use a common reference list for each volume?

10) Start new chapters on left page, if needed, to avoid the blank page problem.

11) Edit and trim manuscripts that end on a right-hand page.

C. Symbolic Coding

A field test for the proposed symbols was given at Site 445 on Leg 58. They were found to be easy to use and to replicate. The following changes were adopted and accepted:

1) Use an arrow to designate the entire vertical interval through which a specific sedimentary structure occurred. This arrow should be shown only in combination with one of the proposed symbols. For instance, a graded bed, 1 meter thick, would be represented by a symbol for graded bedding at the elevation of the base of the graded bed, with an arrow extending upward to the top of the one-meter interval.

2) Delete compositional symbols since compositional terms are routinely used in lithologic descriptions and smear slide descriptions.

3) Delete symbols for structures indistinct, interval over which primary sedimentary structures occur, sedimentary clasts, local unconformity and concretions.

4) List intervals of core discing and microfaulting as part of the lithologic description, along with firmness, rather than using a separate symbol.

Two recommendations were discussed and passed unanimously:

1) Adoption of sedimentary structure symbols.

2) Implementation of new symbols in DSDP publications.

A third recommendation was proposed and adopted:

The shipboard scientific staff is requested to make notation of drilling disturbance on core logs in detail sufficient to indicate relative core quality (disturbance) in both soft and indurated sediments. Insufficient data are currently being recorded on available log sheets.

DRAFT REPORT
SITE SURVEY PANEL
2-3 November, 1978--LDGO

Mechanisms by which JOIDES Countries Formulate and Fund IPOD Site Surveys

This discussion was to establish how member countries formulate and fund surveys with the objective of determining how to maximize the effectiveness of the working group mandates.

A. E.J.W. Jones (U.K.) reported that Britain has mostly concentrated IPOD survey work in the NE Atlantic, particularly in the area of Rockall Bank and Bay of Biscay. Because of the sources of funding, much of the data are confidential and only portions relevant to specific drilling sites can be released. IPOD surveys in other areas can be funded by NERC, but definitive problems and areas are needed two years in advance in order to obtain research grants and schedule surveys.

B. Y. Lancelot (France) reported that in France nearly all of the multichannel seismic is done by Institute Francais de Petrole (I.F.P.), and much of these data are classified and only those portions related to specific sites can be released. CNEXO, on the other hand, can undertake site specific surveys if the scientific interest exists in this group. These data are not proprietory.

C. In the absence of the German member, Lancelot and Jones indicated that the situation in Germany was similar to that in England and France.

D. S. Marauchi (Japan) reported that in Japan site surveys are coordinated by the IPOD Domestic Committee, organized in the Ocean Research Institute, University of Tokyo, and are conducted by universities, Geological Survey of Japan, Japan National Oil Corp. (formerly Japan Petroleum Development Corp.), and Japan Petroleum Exploration Co. (JAPEX). Site surveys which are conducted by universities are funded by the Ministry of Education through the Ocean Research Institute, University of Tokyo. Site surveys by other organizations are conducted as a part of their own projects, and the expense is provided by their own money.

The data of JNOC and JAPEX are classified, but necessary information has been offered to the IPOD domestic committee.

E. B. Lewis reported that in the U.S. site surveys are funded by NSF through JOI, Inc. Specific surveys are awarded on a competitive basis to U.S. institutions by a JOI, Inc. Site Survey Planning Committee. Specific site objectives and locations are needed several years in advance of surveying in order for JOI, Inc. to request NSF funds for these surveys. It is therefore of great importance for the Working Group to specify in a timely manner their survey requirements.

Working Group Mandates and Members

It was agreed that the end product of a working group would be a written and an oral report dealing with scientific objectives and surveying in a geographic area and, insofar as possible, working group members would be drawn from existing working groups to minimize meetings and travel. The specific recommended mandates are:

1.) Refinement of the scientific objectives initially formulated and agreed upon by the subject panels.

2.) Specification of geographic areas and potential sites where the objectives can be achieved by drilling.

3.) Collection and presentation of existing data pertaining to the geographic areas. (It is expected that extensive use of the data bank will be made here.)

4.) Specification of additional site surveys and/or special experiments required to define the drilling objectives.

5.) Summary describing the results of the site surveys or special experiments and recommended drilling sites.

It is intended that 1 through 5 be the form of a document that will be used by each country as the basis for formulating its site specific survey activity. The JOIDES Site Survey Panel members will be responsible for informing their national bodies of these requests. The SSP will then be the forum for coordinating the national efforts. It was stressed that in order to be effective a two-year lead time for ship scheduling is needed which in turn constrains items 1 through 5 to be prepared at least 3 years prior to drilling.

After the site surveys are completed, a written summary report (Item 5) will be prepared and an oral presentation made to the overall standard of the work and may, if necessary, suggest further work or request additional data, especially if potential safety hazards are envisaged.

The following working groups are nominated with deadlines for receipt of specific documentation:

<u>S. E. Atlantic Working Group</u>

K. Hsu, Chairman
D. Needham
P. Rabinowitz
J. Ladd
K. Hinz

In this area the Univ. of Texas will be undertaking site specific surveys in early 1979. Regional geology and geophysics work has been done in the area by French and German scientists, but we understand that none of this work is specifically related to OPP objectives and cannot be construed as IPOD surveys. Jones will investigate possible British support. We request items 1-5 by December, 1978, and a summary report by June, 1979 (if possible).

<u>S. W. Atlantic Working Group</u>

J. Kennett, Chairman
J. Ladd
J. LaBreque

In this area the Univ. of Texas will also be undertaking site specific surveys in mid-1979. No other surveys are contemplated. For this area we request items 1-5 by December, 1978, and a summary report by late 1979 or early 1980.

<u>N. W. Atlantic Working Group</u>

R. Sheridan, Chairman
J. Ewing
J. Grow
J. Kennett
OCP representative

R. Sheridan presented us with a document outlining the scientific objectives and sites for the N.W. Atlantic. This working group will provide us with requested site surveys and specific experiments before the end of 1978.

N. E. Atlantic Working Group

L. Montadert, Chairman
D. Roberts
K. Hinz

Drilling in this area is scheduled for 1980 and we request items 1-5 before the end of 1978.

Galapagos Working Group

R. Anderson, Chairman
R. von Herzen
B. Rosendahl
J. Hall

This area is designated for drilling in late 1979 with geothermal objectives. Several surveys have been conducted in this area and LDGO will undertake another expedition in December, 1978. We request from this working group items 1-5 by May, 1979. (Drilling is scheduled for July-August, 1979.)

Caribbean Working Group

L. Montadert, Chairman
W. Ludwig
J. Watkins

A number of surveys and reports by this working group has already been executed. We request by the end of 1978, if possible, items 1-5. Of particular interest here is whether any additional surveying is required.

IPOD Data Bank

Data Bank discussions dealt with three items.

1.) Inventory

It was recommended that an inventory of all data in the IPOD Data Bank be circulated to SSP members. Included in this inventory would be a base map showing navigation data for each site.

2.) Maps

It was recommended that maps for all sites be compiled and a selection in the Atlantic transect be published in map folio form using funds already allocated in the 1978 budget for this purpose.

Effectiveness of the new SSP

It was the consensus of the group that the new panel provided a forum for communication between subject panels and allowed input into surveys by different subject panels. The working group concept would allow a focusing of scientific objectives and survey needs and was an efficient forum for the development of drilling goals. Overall there is great optimism that the new SSP will better meet the needs of the scientific and drilling programs.

Recommendations for Chairman of the SSP

The panel then unanimously recommended that Dr. E. J. W. Jones of England be approved as the next chairman. B. Lewis will remain on the panel as the U.S. representative.

DRAFT REPORT
GEOTHERMAL WORKING GROUP
26 April, 1978--Miami

Leg 64-65 Plans

1.) Leg 64-65 plans were discussed and outlined (see Gulf of California Working Group, page 36).

2.) Geothermal Field Report--Where values of heat flow are as high as those observed in the median valley of the Guaymas Basin (30 HFU), temperatures are high at shallow depths. In the Salton Sea field, which has higher temperatures than most, but which has a comparable heatflow to that in the Guaymus Basin, the temperatures rise quickly with depth at shallow levels, and then rise more slowly at deeper levels. Metamorphic minerals are generally consistent with downhole temperatures.

*Leg 68-69 Plans**

Leg 68/Summary of Tentative Drilling Plans--Drilling in the Costa Rica Rift area is planned around a T-shaped pattern of single bit holes designed to study the downwelling and upwelling links of a sealed hydrothermal system. This will be followed, if possible, by a multiple re-entry hole at the most drillable of these sites, preferably in a zone displaying high heatflow and extensive basalt alteration. Detailed site selection will follow completion of site surveys in the area.

Leg 68/Site Survey Plans--Langseth indicated that the site survey for drilling in the Costa Rica Rift area will be completed in early 1979. Detailed coverage will include numerous heatflow traverses, underway geophysics (3.5 kHz, air gun and magnetometer surveys in a 20-mile square located on 6-7 m.y. old crust south of the Rift at about 83°40'W, 1°00'N. Additional sonobuoy studies will be conducted in two areas further to the south to find areas of high velocity (i.e., drillable?) basement in older crust.

Leg 69/Summary of Drilling Plans--

Priority 1: Galapagos Mounds Transect/Multiple Re-entry. Purpose: Examination of plumbing, processes and products across an open hydrothermal system.

Priority 2: Alternate multiple re-entry site in thicker sediments on older crust to north or south of mounds area.

Priority 3: Single bit basement traverse (2 or 3 holes) north of mounds area to test for tectonic rotation.

Back-up: a) More single bit holes in mounds area to fill in details of hydrothermal system.

b) Move to Costa Rica Rift to drill pilot holes for Leg 69 multiple re-entry attempt.

*This is the currently planned order for Legs 68-69 and is the reverse of the initial (pre-April, 1978) plans. The order was changed to allow sufficient time to drill a deep Costa Rift hole on Leg 68 which can be logged and used for downhole experiments on Leg 69.

Geothermal and Special Experiments

An ambitious series of geothermal and special experiments has been proposed for Legs 64, 65, 68 and 69. Since many of the experiments are either under construction or under consideration for funding, the experiment schedule is only tentative.

A strong recommendation was made during the meeting for numerous in situ pore water samples and bottom hole temperature measurements in the sediments using the Uyeda pore water/temperature package and for water samples and temperature measurements in high temperature (300°C) zones in the basement using either equipment from industry or a specially designed package consisting of a maximum reading thermometer and a water sampler modeled after the Nansen bottle. To ensure that the basement water sampler is used frequently and that it may be used at high temperatures, it should be independent of the logging program. To enhance water sampling in the basement, it was suggested that the sampler might be opened below a packer after reverse circulation had sucked water into the hole from the country rock.

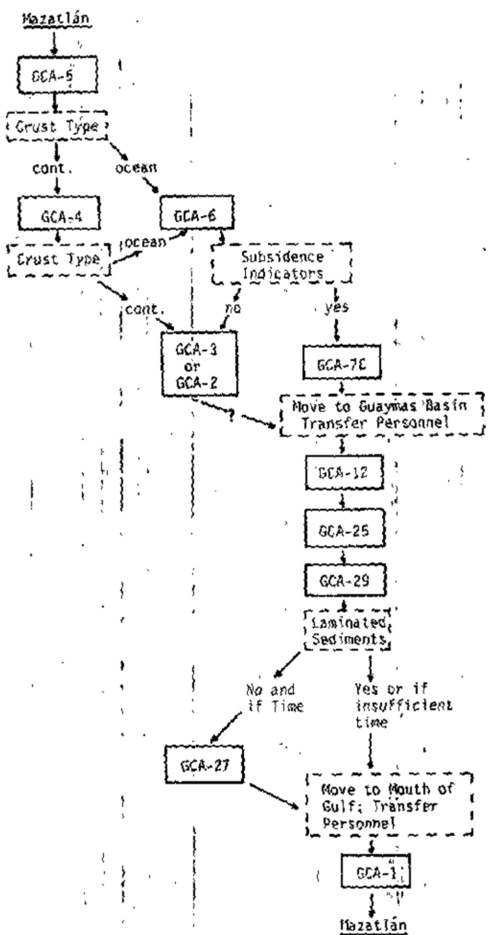
After arriving on shipboard, it is proposed that the samples be subjected to extensive geochemical studies of both fluids and dissolved gases. To study N, Ar and CO_2 will require either the purchase or loan of new equipment or conversion of the gas chromatograph currently on board.

The water sampling and temperature measurement program should be supplemented in every hole by a standard program of geophysical logging (velocity, density, porosity, resistivity, natural gamma ray) and geothermal logging (high resolution temperature, maximum reading thermometer, flow meter). These studies should be followed up by a shipboard physical properties program which has been expanced to include permeability and thermal conductivity studies of both sediments and basalt. V. Vacquier (SIO) is supplying equipment to measure thermal conductivity of hard rocks.

DRAFT REPORT
GULF OF CALIFORNIA WORKING GROUP
6-7 October, 1978--SIO

A. Priorities for Drilling Sites, Leg 64

The locations, objectives, requirements, and restrictions for each of the sites passed by the Safety Panel were outlined, discussed, and reviewed. A tentative drilling plan and schedule for Leg 64 is shown in the following Table.



B. Priorities for Drilling Sites, Leg 65

After considerable discussion, it was decided that no priorities can be assigned for Leg 65 until after completion of Leg 64. It is proposed that the Working Group meet in Mazatlan between Legs 64 and 65.

C. Tentative Plans for Combined Initial Reports for Legs 64 and 65

Members of the Working Group agreed in principle that it would be desirable if initial reports for Legs 64 and 65 be combined, with a Part I and Part II Volume. They concede, however, that the final decision cannot be made until after the legs and after discussion with the Co-Chief Scientists, Science Representatives, and the responsible editors. It was also agreed that it would be desirable in principle if additional papers from peripheral related geological, geophysical, and geochemical studies in the Gulf of California might also be included in these two volumes.

REPORT FROM MID-AMERICA TRENCH
WORKING GROUP

(25 October, 1978)

Oaxaca Transect--Leg 66

The Oaxaca Trench appears to be an end member of the subduction mechanism family. It is characterized by a narrow shelf underlain by continental crust, a 10 km ocean-continent transition zone and a steep, narrow slope underlain by oceanic crust. Various investigators attribute these characteristics to consumption of continental crust into the subduction zone, non-accretion, or youthful subduction. Discrimination between these hypotheses is of obvious importance.

Leg 66 proposes drilling a reference hole through hemipelagic-pelagic sediments and into oceanic crust seaward of the trench, and another reference hole through continental sediments into meta-igneous (?) basement beneath the shelf, and then drill a transect between the reference holes. This will include two holes in the transition zone between oceanic and continental crust and three holes into the accretionary wedge. The lowermost accretionary wedge hole is of special interest as it appears possible to penetrate the sole thrust fault of the accretionary wedge, underlying turbidites and pelagites, and bottom in oceanic crust.

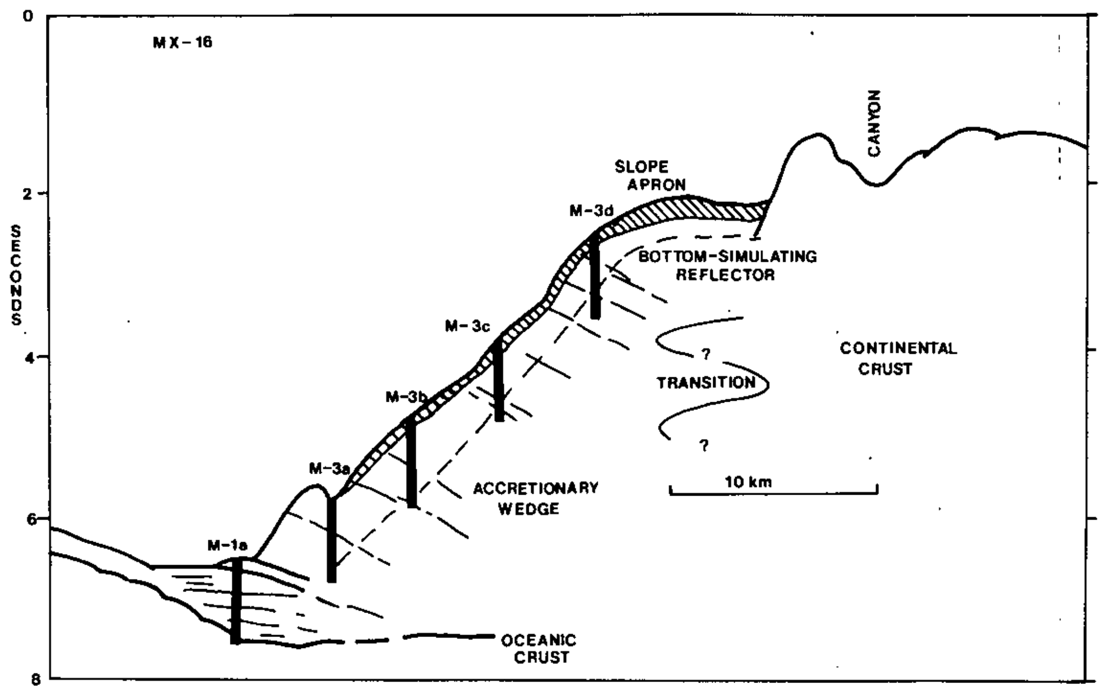


FIGURE 4: Transect showing location of Oaxaca Sites, Leg 66. For location of transect, see *JOIDES Journal*, Vol. IV, No. 2, page 32.

A brief justification of individual holes follows:

1b) Sample undeformed trench fill and subjacent hemipelagic-pelagic sediments for an oceanic reference section.

*2a) Sample undeformed hemipelagic-pelagic sediments of outer slope as reference section for inner slope drilling.

*1a) Sample trench fill and subjacent hemipelagic-pelagic sediments as oceanic reference section. Possibly document initial deformation of lower slope.

*3a) Document progressive deformation of trench slope. Penetrate landward dipping reflectors. Sample sediments of lower slope basin.

*First Priority Sites

*3b) Document progressive deformation of trench slope. Penetrate landward dipping reflector. Penetrate bottom simulating reflector.

3c) Document progressive deformation and trench slope. Penetrate landward dipping reflector. Penetrate bottom simulating reflector.

3d) Document progressive deformation of trench slope. Penetrate landward dipping reflector. Penetrate bottom simulating reflector.

*4c) Define transition zone between accretionary wedge and continental crust. Sample slope-sediment apron.

*4a) Define transition zone between accretionary wedge and continental crust. Sample mid-slope sediment apron.

4b) Define transition zone between accretionary wedge and continental crust.

4d) Define transition zone between accretionary prism and continental crust. Sample acoustic basement reflector. Document sedimentological and paleobathymetric history of slope sediment apron.

Continental reference hole:

*5a) Penetrate upper slope sediment apron to document sedimentological and paleobathymetric history. Sample acoustic basement. Possible re-entry.

Guatemala Transect--Leg 67

The Guatemala Trench transect is designed to test the constant convergence model of subduction. In this model imbrication is presumed to occur as ocean basin crust is accreted to the leading edge of the continent. High-powered multichannel seismic records are obscured in the presumed imbricate stack, perhaps as a result of deformation so intense that its geometry can no longer be resolved geophysically. Thus, drill sampling is needed to test imbrication by establishing whether ocean basin materials are uplifted as much as 4 km from trench depths, whether there are successively younger thrust slices seaward from the edge of the continental shelf, and whether the observed changes in seismic velocity represent successively more deformed and altered rocks with age or different kinds of rock.

Holes 9a and 10a--These two sites are designed to give lithology, age, and deformation reference information to compare with data from holes in the subduction zone. These holes are also designed to yield a reference fauna and paleodepths. Proprietary industry data has been interpreted to indicate an early Tertiary uplift of this shelf edge from bathyal depths. This interpretation needs testing and public documentation.

Hole 3b--This site is located to test the nature of the seaward boundary of the forearc basin. Strong reflectors of the basin fade out seaward. Is this due to progressive deformation or to intrusion of igneous material? The depth to magnetic basement suggests a shallow magnetic source body at the shelf edge.

Holes 2b, 2c, 8a--These three sites are designed to investigate the sediment apron that blankets the upper slope and the underlying deformed "imbricate wedge." To what extent is the sediment apron composed of olistostromes? What is the landward progression of ages within the underlying "imbricate wedge?"

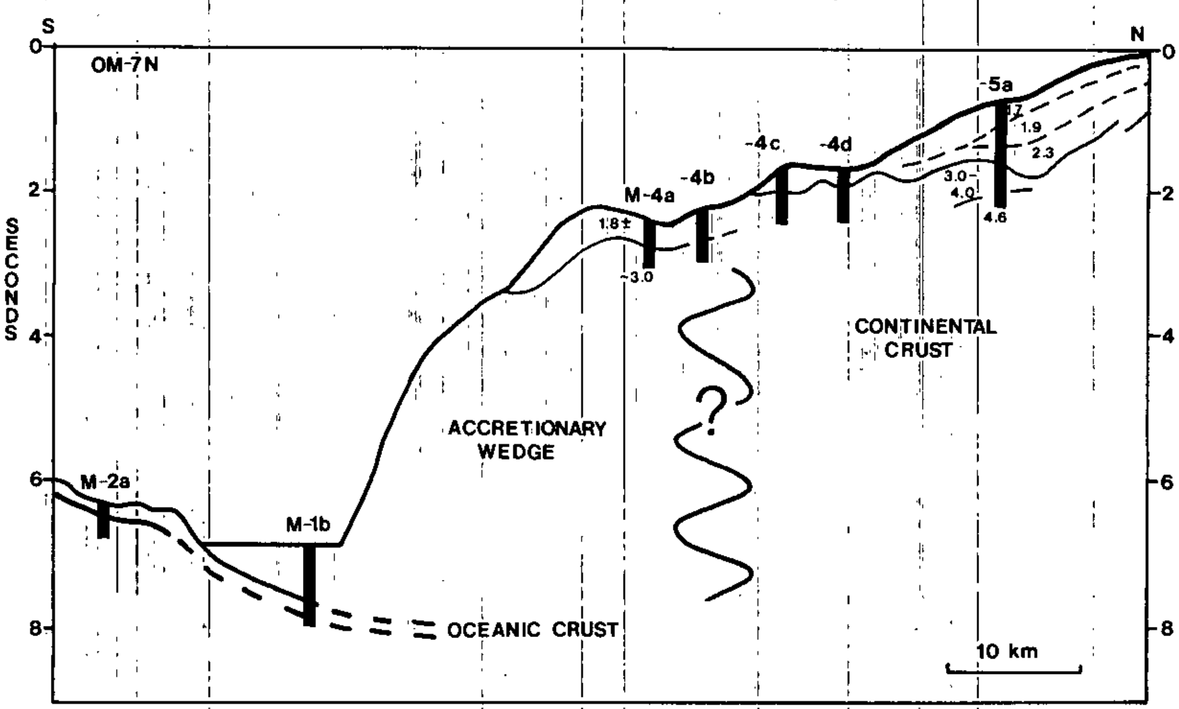


FIGURE 5: Transect showing location of Oaxaca Sites, Leg 66. For location of transect, see *JOIDES Journal*, Vol. IV, No. 2, page 32.

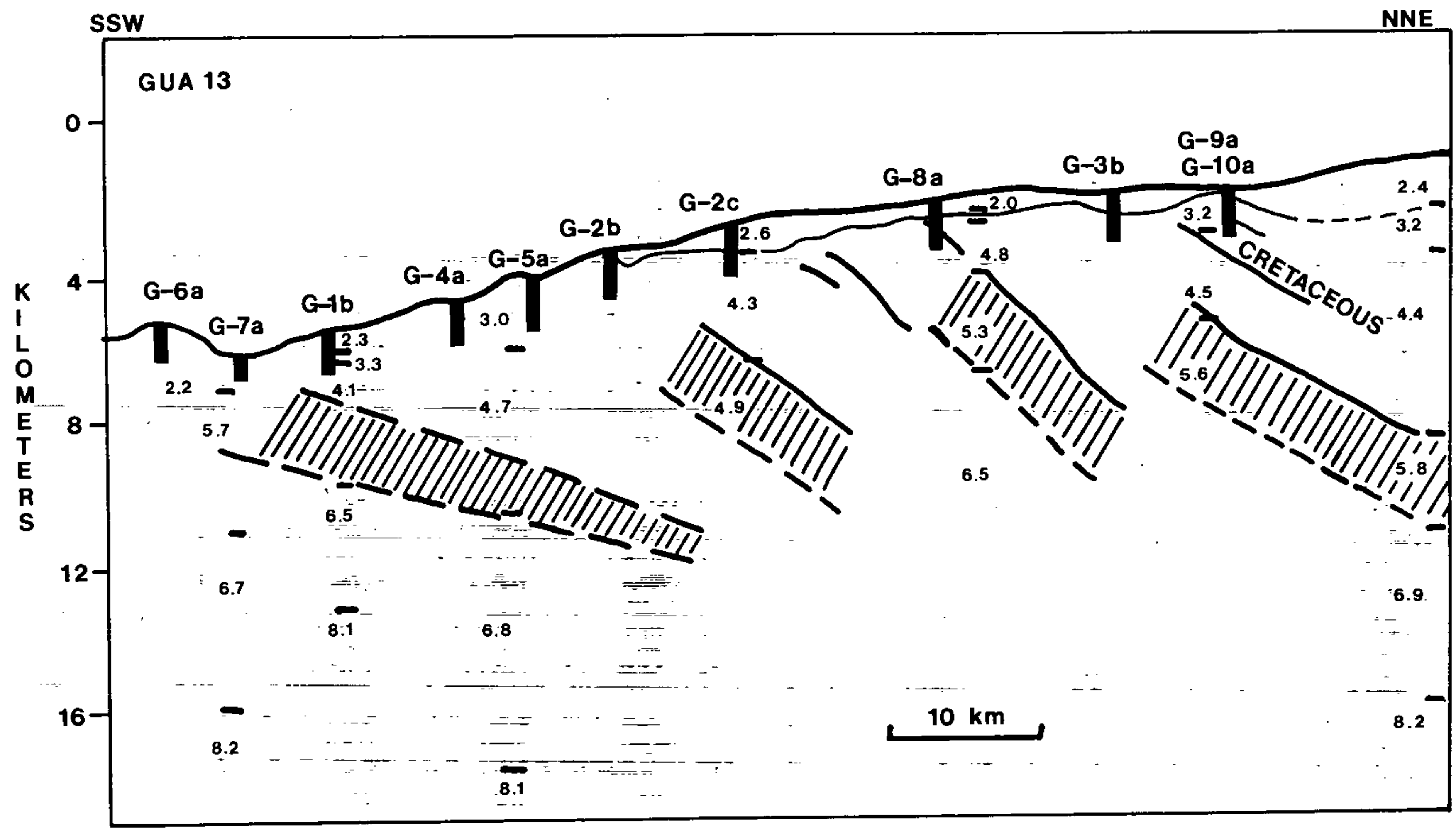


FIGURE 6: Transect showing location of Guatamala Sites, Leg 67. For location of transect, see *JOIDES Journal*, Vol. IV, No. 2, page 32.

The Seely, Vail, Walton, model developed for this area says that this "imbricate wedge" should get progressively older landward. Drilling at sites 2b and 8a may sample material with seismic velocities of about 5 km/sec. These may be ophiolitic sequences that are the local source for ultrabasic rocks that occur in gravels lower on the slope.

Holes 1b, 4a, 5a--These sites are designed to investigate progressive deformation, diagenesis, and age progression of the products in the subduction complex at the toe of the slope.

Hole 7a--This site is located to sample an oceanic reference section for comparison of lithologies in the "imbricate wedge."

Hole 6a--This hole is a reference hole for comparison of lithologies between pelagic sediments on ocean crust and deformed sediments in the "imbricate wedge." In particular to determine the rate at which material supplied to the trench is scrapped off.

REPORT FROM SUB-COMMITTEE ON PHYSICAL PROPERTIES

An ad hoc Committee on Physical Properties was formed to review existing physical properties measurements and procedures; to review the problem of improving core quality; and to consider what might be added, deleted, or done differently in future conventional or riser-type drilling in sediments and in both sedimentary and crystalline rocks.

Recommendations, Comments, and Justifications

A. Undisturbed Sampling of Soft Sediments

1.) The development and use of the piston corer and the extended core-barrel devices be given the highest possible priority. The new corer can only be used for undisturbed sampling of sediments deeper than approximately 5 m below mudline. The Panels* recommend that to obtain a complete profile from mudline, a separate piston corer be deployed from a ship to sample the top 5 m.

*SPP and DMP

2.) Soft sediment samples collected with the new pressurized core barrel would be impractical and costly for physical properties testing until such time as suitable hyperbaric equipment can be developed for the handling of samples under high ambient pressures.

B. Physical Properties of Soft Sediments

1.) Acoustic and Related Properties

(a) For the measurements of velocity, through core samples, the present velocity equipment and techniques are considered satisfactory. Specific routine and data presentation recommendations are made.

(b) Wide-angle reflection (sonobuoy) measurements of sediment and rock layer interval velocities are urged whenever layer geometry indicates possible success.

(c) Layer interval velocities from sound travel time, measured from reflection records and drilled depth (to reflectors), should be reported to 0.001 s.

(d) Heat conductivities should be routinely measured using the QTM (thermal conductivity meter), on the same samples used for velocity and associated density-porosity measurements.

(e) Use Compensated Velocity and Density Logs in semi-lithifield sediments and rocks.

(f) The site survey vessel is encouraged to piston core, and determine: sound velocity, density, water content, grain density and size analysis in the fresh core, and have the core description done on the *Challenger*.

(g) Grain density measurements should be made, using the ASTM standard, at the DSDP, of samples collected for selected water content.

(h) Adding (i) velocity and attenuation of shear waves, and (ii) attenuation of compressional waves in oblique experiments involving instruments in a borehole in which compressional wave velocity and density have been determined.

2.) Other Geotechnical Properties

Tables and Appendices are included recommending and justifying other geotechnical test not presently being performed.

C. Physical Properties of Igneous and Metamorphic Rocks and Indurated Sediments

1.) Recommended measurements for the next two-year program are:

(a) In Situ, Downhole Measurements

i. Downhole logging;

ii. Oblique path and other large-scale seismic experiments;

iii. Large-scale resistivity;

iv. Hydrofracture with televiewer and other in situ stress techniques and permeability by pumping against packers.

v. Long-term inhole recording (of high priority, although listed last), including: seismometers, short and long period; tiltmeters; strainmeters; stress meters (as development makes feasible); and temperature recorders.

(b) Comments on in situ Downhole Measurements

i. All suggested physical properties from logging are now being measured. Improvements are needed in operations and tools; multichannel gamma to give U, Th and K concentrations may be a useful addition; there is a continuing need for specialized temperature devices in addition to T log. A downhole magnetometer and the downhole gravimeter are the most accurate methods of measuring in situ density, but present instruments are too large for *Glomar Challenger* pipe.

ii. Oblique seismic and large-scale resistivity experiments are essential for the evaluation of the effect of large-scale fractures and porosity on large-scale properties.

(c) Ship Laboratory

Electrical resistivity is the only proposed addition. It can be done easily and cheaply, is a valuable compliment to logging and other properties measurements, and the pore fluid composition may change significantly with time.

(d) Shore Laboratory

i. A list is given of ten areas of measurements including: magnetic, seismic, electrical, thermal, and mechanical properties; density, porosity, permeability, petrofabric, and composition and texture.

ii. An attempt should be made to orient samples, improving the interpretation and evaluation of other measurements.

iii. Most physical properties measurements require that samples be kept fluid saturated. For electrical measurements, the original fluid composition should, if possible, be preserved.

iv. Grain densities, measured on sediments or rocks representative of major lithological sections, are of particular importance for use with electrical resistivity logs to calculate in situ bulk density.

2.) Post 1981 Recommended Additions

(a) More complete hydrofracture and permeability experiments.

(b) Development of a pressurized core barrel for hard rocks, and associated laboratory equipment for making measurements while pressure and fluid content are maintained.

(c) More sophisticated long-term inhole recording.

(d) Additional downhole logging tools.

1978-1979 JOIDES MEETINGS

Approved and Tentative

Panel	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
EXCOM	15-16 WHOI				11-13 Hawaii				6-7 Houston				14-16 Reykjavik			26-30 USSR	
PCOM				6-9 Hawaii				5-9 SIO				16-18 Italy			22-24 URI		
DMP			-27 WHOI							24-25 ?							
ILP																	
IHP						9-11 Boulder											
IGP																	
OCP			2-4 Newcas.				26-28 Menlo-Pk										
AMP			26-28 Toronto			25-27 SIO							22-24 ?				
PMP		22-25 Bermuda									11-13 ?						
OPP			28-30 Toronto		W.G. 11,12 URI	W.G. 10 Paris	W.G. 2-4							5-6 ?			
OGP														21-22 ?			
PPSP			2-3 SIO				8-9 La Jolla										
SPPP	23-24 SIO																
SSP				2-3 LDGO												2-3 ?	
SCP																	
LEGS	62	Drydock	63		64		65	66		67		68		69	Drydock		70

Ex

D:

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