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JOIDES Journal

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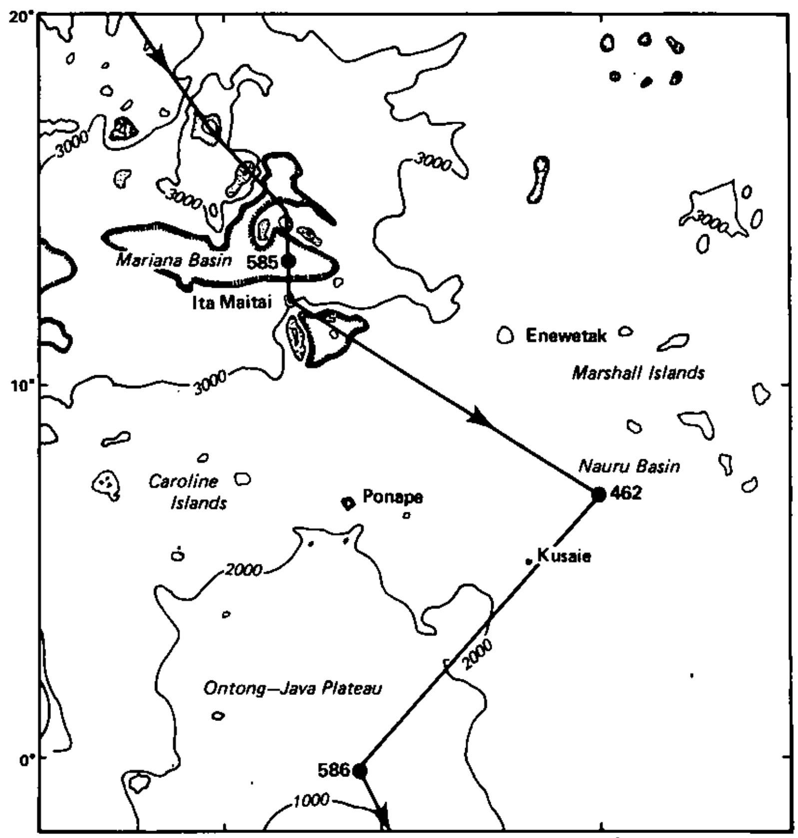

Sites drilled during DSDP Leg 89

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VOL. IX, NO. 1, FEBRUARY 1983

TENTATIVE *GLOMAR CHALLENGER* SCHEDULE, LEGS 92-96

Leg	Departs	Departure Date	Total Days	Days Oper.	Days Steam.	Terminates at	Arrival Date	Port Days	Re-entry	Objective
92	Papeete	23 Feb 83	55	33	22	Balboa, Panama	19 Apr 83	1	Yes	Hydrogeology
93	Balboa	20 Apr 83	08	--	08	Norfolk, Virginia	28 Apr 83	5	No	Transit
	Norfolk	03 May 83	46	43	03	Norfolk, Virginia	18 Jun 83	5	Yes	ENA 3 (W/O Logs)
94	Norfolk	23 Jun 83	56	33	23	St.Johns	18 Aug 83	5	No	NE Atlantic Paleo
95	St. Johns	23 Aug 83	32	21	11	Ft. Lauderdale, Fla.	24 Sep 83	2	Yes	N.J.Transect/Log ENA 3
96	Ft.Lauderdale	26 Sep 83	40	35	05	Galveston, Texas	05 Nov 83	12	No	Mississippi Fan

Compiled 8 February 1983

SHIPBOARD SCIENTIFIC PARTIES

Leg 90

J. Kennett	Co-chief scientist	USA - University of Rhode Island
C. Von der Borch	Co-chief Scientist	Australia - Flinders University of South Australia
R. Merrill	DSDP representative/ igneous petrologist	USA - Scripps Inst. of Oceanography
P. Baker	Sedimentologist	USA - Duke University
W. Dudley, Jr.	Sedimentologist	USA - University of Hawaii at Hilo
J. Gardner	Sedimentologist	USA - USGS, Menlo Park, CA.
C. Nelson	Sedimentologist	New Zealand - University of Waikato
C. Robert	Sedimentologist	France - Centre Universitaire de Luminy
R. Stein	Sedimentologist	FRG - Institut und Museum der Universitat Kiel
A. Takeuchi	Sedimentologist	Japan - Toyama University
R. Morin	Physical Properties Specialist	USA - Mass. Institute of Technology
A. Boersma	Paleontologist (foraminifers)	USA - Microclimates, Inc.
G. Jenkins	Paleontologist (foraminifers)	UK - Open University, Milton Keynes
M. Srinivasan	Paleontologist (foraminifers)	India - Banaras Hindu University
W. Lohman	Paleontologist (nannofossils)	USA - Marathon Oil Company
E. Martini	Paleontologist (nannofossils)	FRG - Johann Wolfgang Goethe Universitat
J-P. Caulet	Paleontologist (radiolarians)	France - Museum National d'Histoire Naturelle, Paris
D. Barton	Paleomagnetist	USA - University of Rhode Island

Leg 91

H. W. Menard	Co-chief scientist	USA - Scripps Inst. of Oceanography
J. Natland	Co-chief scientist	USA - Scripps Inst. of Oceanography
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G. Pascal	Sesimologist	France - Universite de Bretagne Occidentale, Brest
R. Whitmarsh	Seismologist/Physical Properties Specialist	UK - Institute of Oceanographic Sciences, Wormley, Godalming
E. Rosencrantz	Igneous Petrologist	USA - Univ. of Texas at Austin
D. Smith	Geophysicist/Physical Properties Specialist	USA - Scripps Inst. of Oceanography

Leg 92

M. Leinen	Co-chief scientist	USA - Univeristy of Rhode Island
D. Rea	Co-chief scientist	USA - University of Michigan
K. Becker	DSDP representative/Heatflow & Phys. Prop. Specialist	USA - Scripps Inst. of Oceanography
M. Kastner	Sedimentologist/Geochemist	USA - Scripps Inst. of Oceanography
M. Lyle	Sedimentologist/Geochemist	USA - Oregon State University
R. Owen	Sedimentologist/Geochemist	USA - University of Michigan
J. Gieskes	Geochemist/Sedimentologist	USA - Scripps Inst. of Oceanography
J. Boulegue	Porewater Geochemist	France - Universite de Paris 6
J. Erzinger	Igneous Petrologist/Geochemist	FRG - Justus Liebig Universitat
J. Pearce	Igneous Petrologist	UK - Open University, Milton Keynes
T. Nishitani	Paleomagnetist	Japan - Akita University

S. Knuttel	Paleontologist (nannofossils)	USA - Florida State University
K. Romine	Paleontologist (radiolarians)	USA - University of Rhode Island
M. Hobart	Packer Experiment Specialist	USA - Lamont-Doherty Geological Observatory

Leg 93

J. Van Hinte	Co-chief scientist	Netherlands - Vrije Universiteit
J. Schlee	Co-chief scientist	USA - USGS, Woods Hole, MA
D. Dunn	DSDP Representative/ Sedimentologist	USA - Scripps Inst. of Oceanography
M. Sarti	Sedimentologist	Italy - Universita di Ferrara
U. Von Rad	Sedimentologist	FRG - Bundesanstalt fur Geowissenschaften und Rohstoffe, Hannover
J. Haggerty	Sedimentologist	USA - University of Tulsa
J. Ogg	Sedimentologist/Paleomagnetist	USA - University of Wyoming
M. Moullade	Paleontologist (foraminifers)	France - University of Nice
S. Wise	Paleontologist (nannofossils)	USA - Florida State University
M. Okamura	Paleontologist (radiolarians)	Japan - Kochi University
P. Meyers	Organic Geochemist	USA - University of Michigan
B. Biart	Physical Properties Specialist	UK - Open University, Milton Keynes

RECENT JOIDES PANEL AND COMMITTEE MEETINGS

November 1982	8-9	Sedimentary Petrology and Physical Properties Panel (DSDP)
	10-11	Executive Committee (U of Texas at Austin)
January 1983	5-8	Active Margin Panel (SIO)
	6-7	Information Handling Panel (DSDP)
	10-11	Ocean Crust Panel (SIO)
	20-22	Ocean Paleoenvironment Panel (USC)
	21	Pollution Prevention and Safety Panel (SIO)
	21-22	Site Survey Panel (SIO)
	25-28	Planning Committee (San Francisco)
April 1983	19-20	Executive Committee Meeting (Easton, MD)

FUTURE JOIDES PANEL AND COMMITTEE MEETINGS

June 1983	1-3	Planning Committee (Morpeth, England)
August 1983	30-31	Executive Committee (Swindon, England)
September 1983	13-15	Planning Committee (U of Washington, Seattle)
November 1983		Executive Committee (Texas A & M)

GLOMAR CHALLENGER OPERATIONS

CRUISE SUMMARIES

Leg 87 - Japan Margins

Leg 87 began 25 June 1982 in Yokohama, Japan and ended 18 August 1982 in Hakodate, Japan.

Objective

The cruise objective was to probe subduction-related characteristics and processes operative in two quite different types of trenches: the Nankai Trough off southwest Japan and the Japan Trench off the northern end of Honshu.

Nankai Trough

Principal objectives of drilling in the Nankai Trough were to investigate changes in the physical and mechanical properties of sediment during subduction and in the structural character of the trench sediments deforming at the base of the trench slope. Two sites were drilled, Site 582 in the undeformed sediment filling the trench axis, and Site 583 on the lowest structural terrace, where seismic reflection profiles show a well defined thrust fault and reflectors represent strata that are formed and uplifted relative to the Trough floor. Expectations that samples cored from these wells might constrain the nature of deformation associated with subduction were not achieved because of a serires of mechanical mishaps, followed by one well-aimed typhoon. Nonetheless, the results of drilling at Sites 582 and 583 add several noteworthy facts and a number of strong inferences to our understanding of subduction processes.

Site 582

Site 582 is located on the floor of the Nankai Trough about 2 km south of a deformation front, where thrusting associated with subduction begins, and only 7 km seaward of the toe of the thrust drilled at Site 583. Hole 582B penetrated approximately 560 m of Quaternary trenchfill sediment overlying early Quaternary and late Pliocene hemipelagites of the Shikoku Basin section, to a total drill depth of 749.4 m (Fig. 87-2). The approximate age of the base of the trenchfill strata is 0.65 my, based on paleomagnetics reversals. These trenchfill deposits are dark olive gray and gray turbidites and hemipelagic clays and silts.

Coarse sand turbidites decrease in frequency with subbottom depth but no overall downhole fining of sands was observed. Although poorly recovered, drilling characteristics, logging profiles and correlation with seismic reflectors identify these sand intervals. Trench turbidites include volcanic glass, lithic fragments, heavy minerals, and red chert, in addition to well preserved mixtures of shallow and deep water benthic foraminifers, and both marine and non-marine diatom assemblages. These components indicate that the turbidites are fed axially from a source near the Izu Peninsula, a distance of about 400 km, but do not rule out sources areas in the adjacent insular area.

The average heat flow at Site 582 is 1.51 HFU, significantly less than the values obtained by near-surface probes in this trench. The thermal gradient could be interpreted as showing a downward decrease in heat flow, which could result from the upward movement of pore water expelled from the hemipelagites beneath the trenchfill.

Sedimentation rates in the trenchfill are, on the average lower than had been expected, but vary widely with depth. Biostratigraphic and paleomagnetic data suggest reduction of rates from near 900 m/my, before 0.4 my or earlier to less than 300 m/my after that time.

Site 583

Eight holes were drilled across the lowest structural terrace of the landward slope of the Nankai Trough at Site 583. Four of these were hydraulic piston cored (HPC) and Holes 583E, F, and G are rotary cored (Fig. 87-2). Hole 583A was drilled 400 m further landward on a structural terrace to sample the upermost part of the section observed on 3.5 KHz profiles, an interval missing at the location of Hole 583. HPC Holes 583B and C and rotary cored Hole 583D constitute the uppermost part of a hole through the toe of the thrust. The sediments recovered by piston coring at Site 583 may be collectively described as dark gray to dark olive gray hemipelagic muds with generally thin (less than 10 cm) and frequently graded sand and silt layers, the whole interrupted by sparse layers of ash and vitric sands. ... fragments are comm...

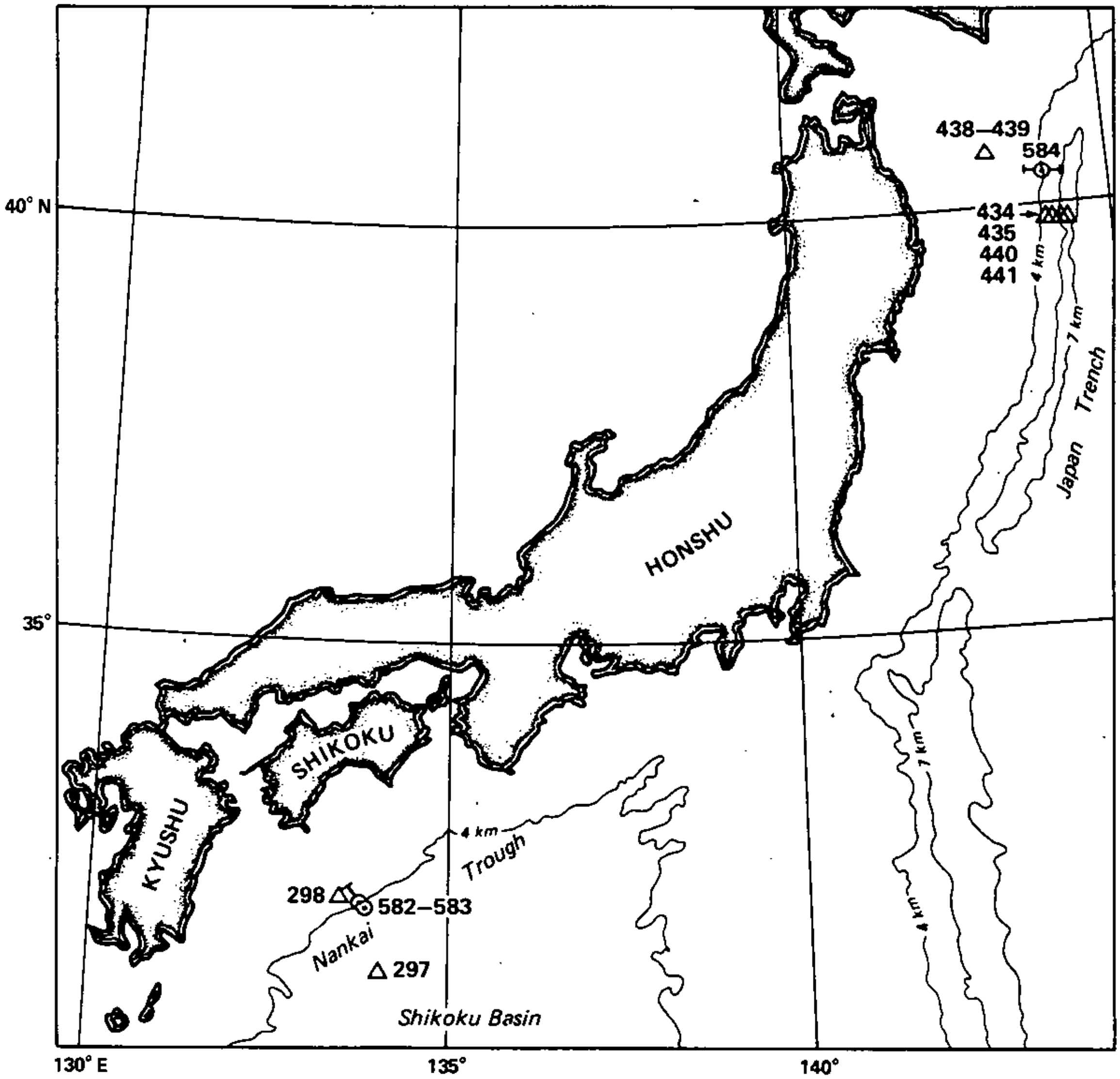


Figure 87-1. Location of Leg 87 drill sites.

rare, thin carbonate-rich layers or where large (some up to 5 cm in length) pale yellow and sometime hollow, authigenic calcium carbonate crystalline aggregates occur. The lithology of the deeper, rotary-cored section is effectively identical to that of the trenchfill strata at Site 582.

Bedding in all holes except at the combined Holes 583B, C, and D was effectively horizontal. The surficial dips, the absence of the uppermost radiolarian zone, and an upward shift of physical property gradients indicate erosion of the uppermost 20 m to 40 m of sediment. Average heat flow is 1.59 HFU, significantly lower than anticipated from surface probes and similar to that measured at Site 582.

Summary and Speculations: Nankai Trough

Computations based on sedimentation rates from Site 582 and our geometric interpretations of seismic reflection profiles produce subduction rates of not more than 2 cm/yr. These values are based on the assumption of steady-state conditions and are half the rate predicted by geophysical studies.

As expected, there is very little structural disturbance in the trench sediments at Site 582, but small normal faults are associated with sparse dewatering veins. Porosity is 45 to 65% lower than in cores from equivalent subbottom depths and of similar lithology drilled south of the

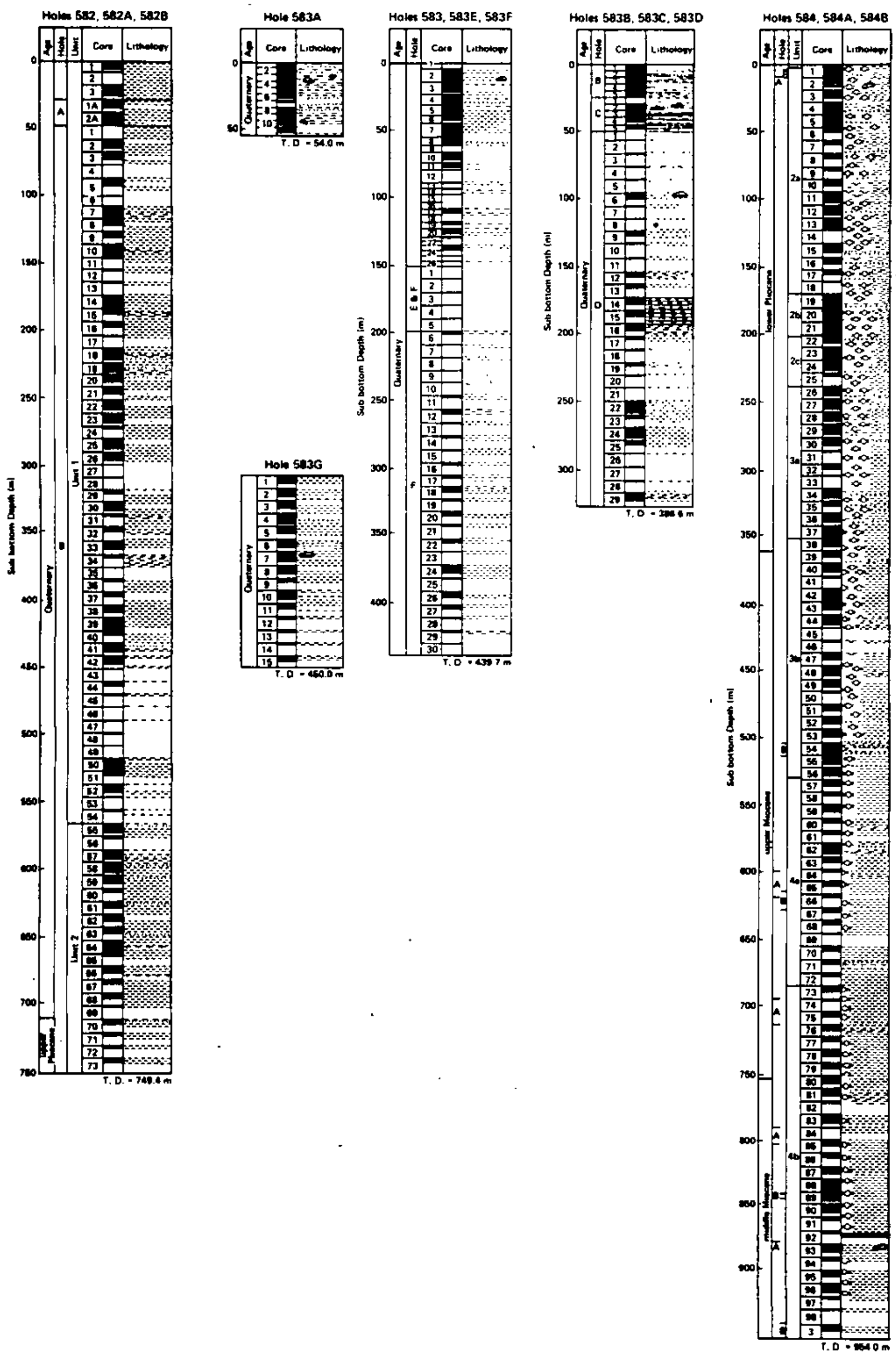


Figure 87-2. Summary lithologic columns for Leg 87 drill sites.

trench at Site 297. This porosity decrease correlates to a rapid and large scale thinning of the hemipelagite section beneath the southernmost several kilometers of the trench floor, probably resulting from rapid loading by trench sediments.

Sediment dewatering, expected to result from subduction-related deformation at Site 583, was not observed. The porosity gradient of sediments at Site 582 resembles those at Site 583, and at Site 298, previously drilled slightly upslope and along strike.

Interpretation of the reference seismic reflection profile indicates that a thrust fault elevates the lowest structural terrace relative to the Nankai Trough axis and cuts Hole 583D, drilled through the thrust toe (Fig. 87-3). The thrust surface crosses Hole 583D near 160 m, and a hanging wall splay intersects the Hole near 60 m subbottom. No obvious lithologic changes were recovered from these critical subbottom depths.

Dipping beds in HPC Holes 583B, C and D, however, define a 35° to 55° south-dipping homocline above the fault surface. The north-dipping beds in the footwall are interpreted as the south flank of a syncline. This hanging wall anticline, not present in Holes 583F and G, has probably developed above a ramp along a bedding plane step thrust. These structures are usually associated with highly lithified sequences with mechanically heterogeneous properties, not with relatively unlithified strata such as these Quaternary sediments. They are, however, outlined in the Nankai Trough and DSDP Leg 66 seismic profiles, and observed in Leg 78 sediments from Barbados.

Japan Trench

The principal objective in the Japan Trench drilling was to investigate the history of vertical motion of the continental margin near the trench and to penetrate a pervasive unconformity below the blanket of slope sediment. Periods of subsidence associated with subduction or tectonic-erosion apparently persisted during the Miocene, only to diminish or perhaps to revert to an episode of relative uplift since the Pliocene-Pleistocene. The combination of drilling results, logging, seismic profiles, and conventional sampling should produce a deformation profile that describes the large scale structural geometry and history of movement along the Japanese margin.

Site 584 is situated on the "deep-sea terrace" of the trench slope approximatey 42.5 km upslope from the trench axis. The upper part of the trench slope from 2000 m to 4200 m has a gentle dip of about 4°. A terrace at 4200 m separates the upper slope from the steeper lower slope that continues

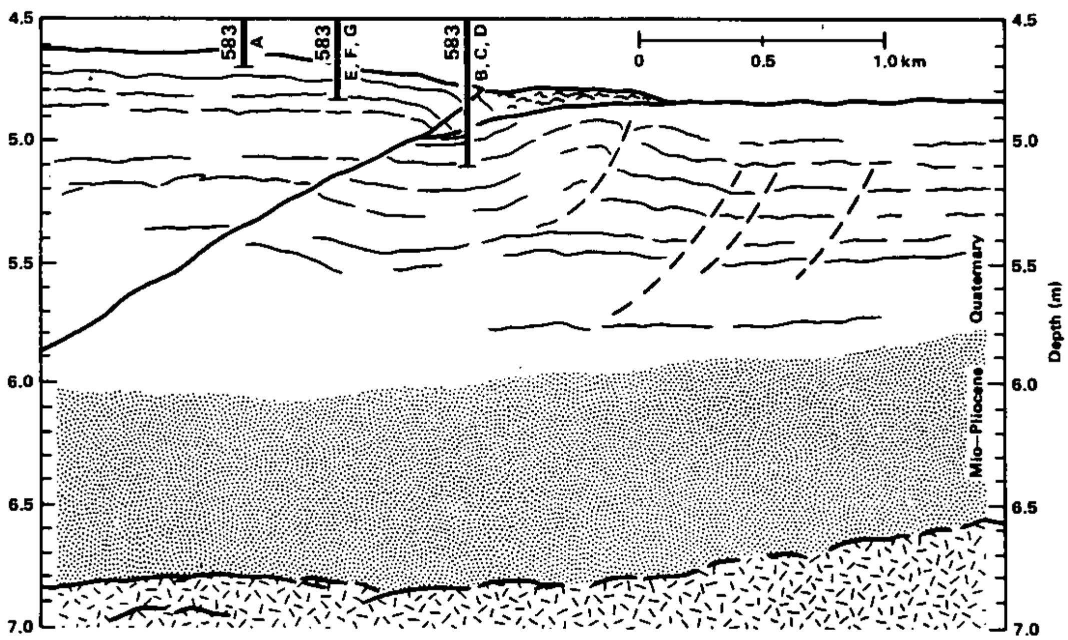


Figure 87-3. Interpretive structural cross-section of the Nankai Trough transect.

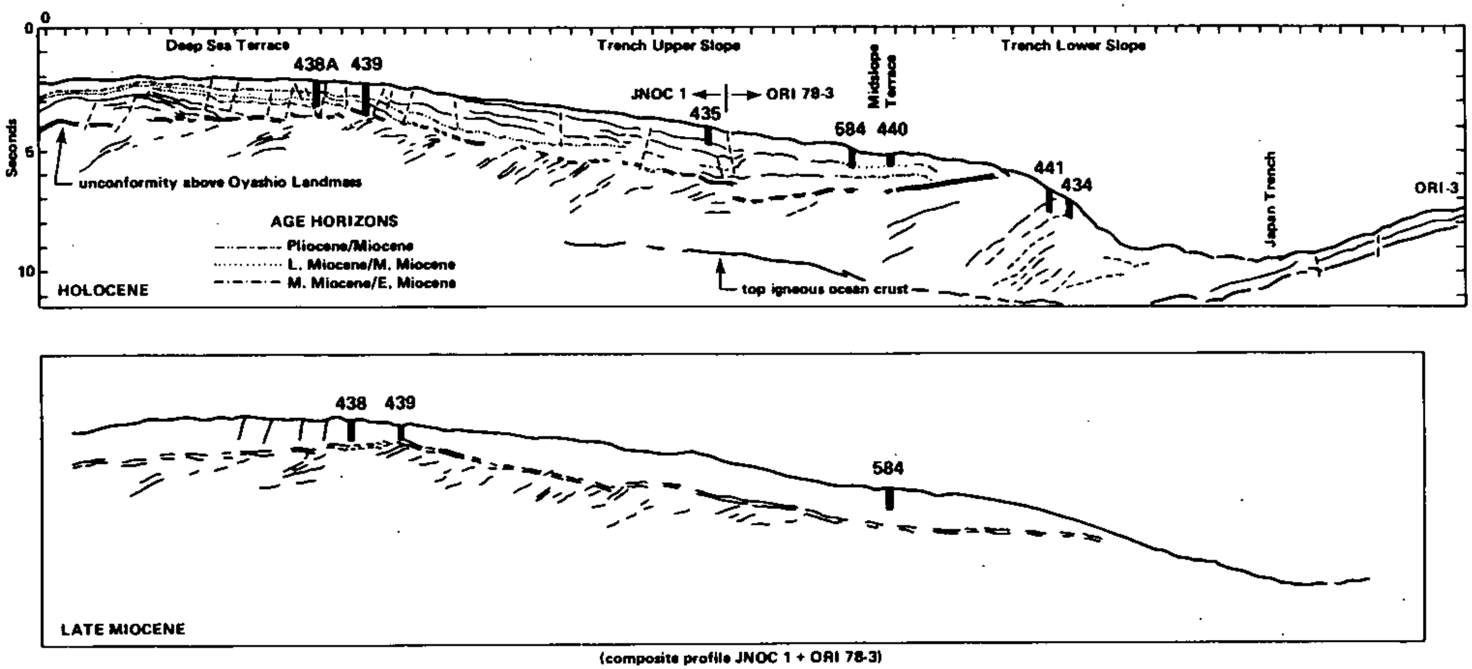


Figure 87-4. Schematic diagram showing the evolution of structures along the Japan Trench. Sites 434, 435, 440 and 441 are projected about 90 km along strike from a somewhat different structural setting. This representation provides only a very approximate view of their relation to the Leg 87 transect.

to the trench floor at 7300 m.

Site 584

Site 584, drilled at a depth of 4114 m, penetrated 954 m of the sedimentary section (Fig. 87-2). The oldest sediment cored was middle Miocene, the oldest ever cored from the outer slope of the Japan Trench. Four lithostratigraphic units are recognized.

The uppermost 4 m at Hole 584 are Pleistocene sediment underlain without a lithologic contrast by soft Lower Pliocene diatomaceous mud and mudstone, consolidating near 88 m subbottom. A third lithologic unit (231 m to 537 m subbottom) is also a diatomaceous mudstone, but is disringuished by fine sand and silt beds, seaward dipping strata, and markedly higher induration than in the overlying sediments. The Pliocene/Miocene boundary occurs within this unit, near 564 m subbottom, but again no lithologic contrast marks this boundary. A varicolored, bioturbated mudstone with a much reduced diatom content constitutes Unit 4 and the remainder of the 941 m drilled at Hole 584. The lower portion is noteworthy for its paisley appearance and pervasive network of dewatering veinlets. Healed fractures begin in Core 27 (250 m subbottom) and become more numerous downsection; in most cases the offsets are normal, but abundant examples of reverse motion also occur.

The frequency of ash layers and of dispersed glass and ash pods suggests that onshore volcanic activity increased near the end of the Upper Miocene and continued through the lower Pliocene.

Authigenic carbonate nodules including siderite are commonly disseminated in the Lower Pliocene sediments and are frequently intercalated with ash layers or dispersed volcanic sediments.

The diatom biostratigraphy of Site 584 is virtually identical to that of Site 438, located about 70 km to the west. Rates of sedimentation were estimated based on selected datum levels, and are highest (200 to 70 m/Ma) for the lower Pliocene and upper Miocene (7 Ma). Lower Upper Miocene through upper Middle Miocene rates are less (20 m/Ma). Paleomagnetic measurements on diatom biostratigraphy produce comparable sedimentation rates of 120 m/Ma after 7.7 Ma and 50 m/Ma before 7.7 Ma.

Logging and laboratory physical properties measurements outline large fluctuations in bulk density and in sonic velocity in zone of prominent reflectors beginning near 50 m subbottom.

Summary and Speculation: Japan Trench

Interpretation of the reference seismic profiles suggests that the seaward margin of the acoustic basement dips landward (Fig. 87-4). All three holes drilled at Site 584 bridged and terminated near 900 m subbottom, about 200 m above acoustic basement. Based on paleomagnetic studies, the 900 m surface, probably a fault, might have declination of 240° and inclination of about 60° and beds drilled at Site 584 dip easterly at inclinations ranging from 20° to 70° decreasing to about 20° at the bottom of the hole. These high angle dips are disharmonic to the nearly horizontal seismic reflectors. Stratigraphic horizons in each of the three holes near 500 and 700 m subbottom limit the relative vertical offset between holes to approximately 50 to 100 m, far less of an offset than continuously dipping beds would require. Numerous normal microfaults, or several large listric normal faults must offset the section. Paleomagnetic measurements suggest a southwest slip direction for these tensional features. Evidently, extensional tectonics from the middle Miocene continued until early Pliocene, and Site 584 was already at bathyal depths by the late Miocene. A hiatus between lower Pliocene and Quaternary sediments found at Hole 584 might indicate commencement of reversed gradient of the acoustic basement, a rotation from a seaward to a landward dip, which can be explained by vertical crustal movement associated with great interplate earthquakes caused by a new cycle of subduction at the trench.

DSDP Site Map Updated

Topography of the Oceans with Deep Sea Drilling Project sites now available through Leg 82. To request map contact:

Barbara J. Long
Information Handling Group
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: (714) 452-3506

Leg 88 - Downhole Seismometry

Leg 88 sailed from Hakodate, Japan on 19 August 1982 and ended in Yokohama, Japan on 20 September 1982.

Background

The primary objective of the leg was to install a borehole seismometer and seafloor recording package in the ocean crust off the Kuriles. The priniciple instrument, a sophisticated seismometer built for the Defense Advanced Research Projects Agency, could not be deployed because of our failure to drill a suitable re-entry hole, but a similar system built by the Hawaii Institute of Geophysics was deployed at Site 581, about 720 miles east of Hokkaido, Japan, and an excellent data set was obtained.

Scientific Objectives

The objective of DSDP Leg 88 was to emplace a borehole seismometer in oceanic crust in the Northwest Pacific basin off the Kurile Islands. It has been postulated that seismometers, permanently emplaced in oceanic basement, should be more quiet and more sensitive to earthquakes than ocean bottom seismometers and seismometers located on volcanic islands. By placing these seismometers in suitable locations it should also be possible to discriminate between small earthquakes and man-made events. Site 581 was selected because of its proximity to the seismicity associated with the subduction zone off the Kuriles and the need for better discrimination between earthquakes and man-made events in this area.

In particular, a wideband, wide dynamic range seismic system in a low ambient noise marine environment will provide information capable of contributing to the following scientific objectives:

1. Obtain data from a wide range of earthquake magnitudes, first motions and focal depths which will help to clarify processes associated with subduction such as defining possible areas of tensional, compressional and strike-slip faulting.

2. Determine the magnitude of changes of seismic properties of the oceanic crust with increasing age by establishing more accurate epicentral locations and by recording signals from events whose propagation paths are undistorted by seamount chains or island roots.

3. Measure signal absorption and propagation characteristics of both long-period and short-period body and surface waves.

4. Determine plate structure near the site using seismic refraction.

5. Evaluate source mechanisms within regional distances of an actively subducting plate boundary.

6. Measure anisotropy of the crust and upper mantle and anistotropic variations within crustal layers. Independent evidence suggests that crustal and upper mantle compressional wave velocities have azimuthal variations as large as 0.9 km/s near an active margin. studies of variations in surface wave dispersion and refracted body wave travel time from many directions within the same area may generate information pertaining to the magnitude, mechanism and direction of convective motions at various depths.

7. Determine the relationship of seismic background noise beneath the seafloor as function of such parameters as bottom currents, tidal cycles, storms, convection, heat flow, sediment thickness and lithification.

8. Measure elastic and rheological properties of converging plates.

9. Obtain long term borehole temperature measurements which will permit determination of steady state heat flow rates or the amount and direction of water flow in the hole.

The objective of sediment studies at Site 581 was to determine the Neogene subarctic paleoceanography of the Northwest Pacfic basin for comparison with other data from the area obtained on Leg 86 and with data obtained from the Southwest Pacific on Leg 90. The primary drill site, Site 581, lies north of the modern Subarctic Front. The predicted sedimentation rate of about 15 cm/1000 yr. would allow events with periods on the order of 10^4-10^5 yr. to be resolved if good results were obtained with the hydraulic piston core.

Geologic Setting

Site 581 lies just south of the Hokkaido Fracture Zone in the Northwest Pacific basin (Fig. 88-1). Magnetic lineations to the south run roughly parallel to the Hokkaido fracture

Zone, but the regions to the north apparently lie in the Cretaceous quiet zone. The age of the crust at the site is slightly older than 110 my based on magnetic anomalies. Reflection profiling data from Legs 86 abd 88 show a bottom roughness of 1/4 to 1/2 s with sediments generally draping evenly over the basemet and possible outcrops on the steeper slopes. The results from the pilot hole drilled on Leg 86 indicated that the sediments are 345 m thick, the lowermost 75 m of which consist of chert layers. Sediment velocities of 1.7 to 1.9 km/sec have been determined from refraction studies in the area.

Operations

It was orginally planned to deploy two borehole seismometers in different holes at the site. the primary unit, the Marine Seismic System (MSS) was conceived and funded by the Defense Advanced Research Projects Agency. This unit, because of its size, required a re-entry hole in which to emplace the seismometer. After two attempts were made to drill a re-entry hole, plans to deploy this instrument were abandoned. On the first attempt the pipe broke in the hole and in the second attempt the pipe could not be released from the casing.

The second unit was a borehole seismometer developed at the Hawaii Institute of Geophysics (HIG). This unit was slim enough to pass through the drill pipe and could be emplaced in a single bit hole. Deployment of this instrument was successful in Hole 581C. The HIG borehole instrument transmits 8 channels of digital data (three seismic, two tilt, one temperature, one hole diameter and one engineering) up the cable for recording either on the ship or in a recording package placed on the seafloor.

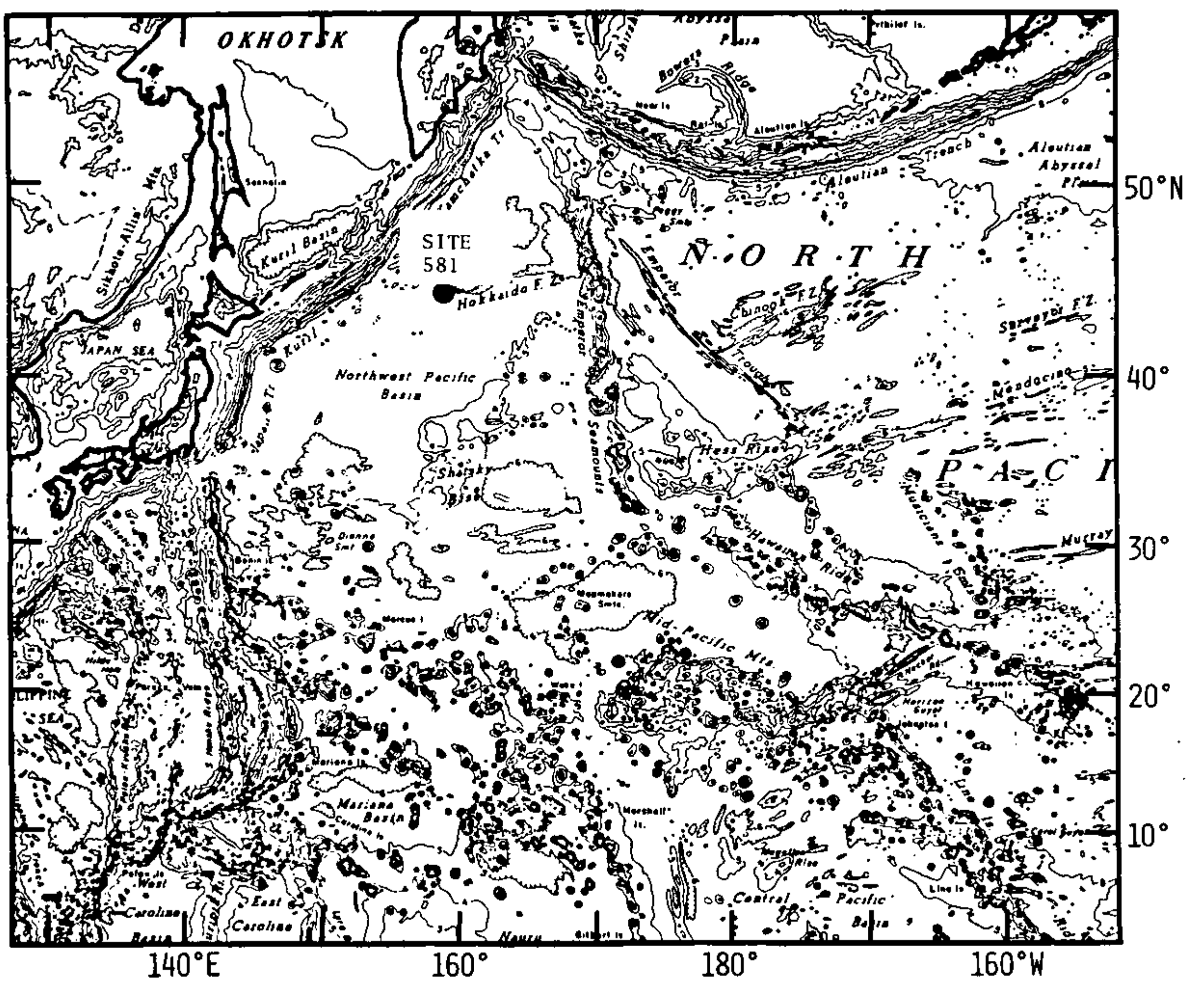


Figure 88-1. Location of Site 581, DSDP Leg 88.

The recording package contains a power supply, electronics and five analog cassett recorders to record seismic data continuously for up to 75 days on three tracks and low-rate-digital data and time on a fourth track.

In order to carry out the comparison between the borehole seismometer and seafloor seismometers, the USNS DE STEIGUER deployed ten ocean bottom seismometers in the area and conducted an extensive shooting program. Scientists from Oregon State Univeristy and the Naval Oceanographic Research and Development Activity participated on the DE STEIGUER. Shots ranging in size from 1/2 to 1800 lbs. were fired at distances ranging from normal incidence to over 200 km. The quality of the borehole receiver data was generally excellent but a comparison of seafloor and subbottom seismometers cannot be made until after the data has been analyzed.

The Russian research vessel DMITRY MENDELEEV also participated in the program by deploying ocean bottom seismometers and shooting air gun profiles. Although not planned before the cruise, these efforts were coordinated with the GLOMAR CHALLENGER and DE STEIGUER programs.

Analysis of the sediments and basalts collected on Leg 88 will be carried out by the Leg 86 scientists. Unfortunately bad weather forced us to leave the site before the hydraulic piston coring of the Neogene sediment section could be done. Only 34 m of chert and basalt were recovered on the whole leg.

During a period of bad weather associated with Hurricane Gordon (5 September), tests of a wire line re-entry system developed at DSDP were made. Although tool malfunctions prevented actual location of a cone, we did test the trackability of the tool when it was 3000 m under the ship, using the ship's dynamic positioning computer. The tool appeared to lag behind the ship's motion by about 10-15 minutes.

Conclusions regarding the comparison of ocean bottom and subbottom seismometers and the analysis of earthquakes and the geophysical structure of the crust will have to wait until the scientists from the GLOMAR CHALLENGER and the DE STEIGUER can compare their data. Since the borehole seismometer data is of excellent quality, it is anticipated that the results will be of considerable importance.

Leg 89 - Old Pacific Paleoenvironment

Leg 89 began in Yokohama, Japan on 11 October 1982 and ended in Noumea, New Caledonia on 29 November 1982.

Introduction

The theme of DSDP-IPOD Leg 89 was the Mesozoic geologic history of the oldest remnant of seafloor in the Pacific. Jurassic-age crust and its overlying Jurassic and Cretaceous section were expected to provide a record of what in Mesozoic time was the world's "super-ocean", much larger than the present-day Pacific because the Atlantic and Indian oceans were narrow or non-existent then.

Three sites approved by JOIDES were drilled (Fig. 89-1). The first two lie in deep water on Jurassic-age crust in the Western Pacific Ocean, where the purpose was to penetrate to basement to obtain a truly oceanic record back into the Jurassic. The third site, on an oceanic plateau in the western equatorial Pacific, was assigned to Leg 89 by JOIDES in order to reduce Leg 90's travel time. It is the northernmost of a set of Neogene sites to be traversed mainly by Leg 90.

Site 585 (Mariana Basin): Background

Western Pacific Site MZP-6, one of several MZP sites considered for the Mesozoic Pacific program of the JOIDES Ocean Paleoenvironment Panel, was selected on the basis of site surveys carried out by the Hawaii Institute of Geophysics (HIG) and the Scripps Institution of Oceanography. The general area occupied by the east Mariana Basin was considered a favorable one in which to reach Jurassic strata because the water depth and magnetic anomaly patterns indicated that the basin was underlain by 150 to 160 my old lithosphere. DSDP Site 199 had been drilled 40 n.mi. to the west of proposed MZP-6 (now 585); Campanian limestone, underlain by lithified tuff, was cored there. Forty nautical miles south of MZP-6, DSDP Sites 200, 201, and 202 were drilled atop Ita Maitai Guyot. On Ita Maitai early Eocene to Recent foraminiferal ooze overlies hard oolitic limestone and lagoonal coraliferous mud of indeterminate age. In August 1981 dredge hauls taken from Ita Maitai Guyot by R/V KANA KEOKI recovered Inoceramus-bearing limestones indicating that Ita Maitai Guyot was accumulating shallow-water sediment in, probably, Late Cretaceous time (S. Schlanger, unpublished HIG data).

The Campanian tuffs found at Site 199 were believed to be the product of Late Cretaceous edifice building volcanism which formed, among other seamounts that lie around the perimeter of the east Mariana Basin, Ita Maitai Guyot. The ubiquitous character of Cretaceous mid-place volcanism in the western Pacific prepared us for encounters with volcanogenic sediments but the east Mariana Basin was, it seemed, the best bet for reaching the Jurassic objectives. On the basis of the site surveys and the Site 199 results, MZP-6 was predicted to have a 1200 m thick sedimentary section over Jurassic-age crust, and would require multiple re-entry to penetrate basement. Recovery of the section between 800 and 1200 m at MZP-6 was by far the single most important objective of Leg 89.

The drilling program for the site was changed by DSDP when we arrived in Japan to exclude re-entry, even though all JOIDES planning for MZP-6, and JOIDES communications with DSDP and DSDP scheduling had always been in terms of re-entry because of the thick and hard section that likely existed, and the uncertainties of weather and mechanical accidents. New engineering calculations, however, predicted that the drill string would be endangered by dynamic stresses at such depths. This surprising new limitation on operations led to telephone calls, to the effect that shortly before leaving Yokohama we were assured that if we made a reasonable attempt to drill an extended pilot hole to bit destruction, we could commence a re-entry operation.

Except for a northeasterly gale as we left Tokyo Bay, and the edge of tropical storm Owen as we approached our first site, our passage southeast from Japan was smooth and without major incident. The standard DSDP geophysical gear was deployed as we crossed the Bonin Trench and Magellan Seamounts enroute to the Mariana Basin. At 1534L on 18 October we turned south, crossing a guyot of the Magellan Seamounts to approach the flat-floored Mariana Basin site at right angles to the reflection profile that had been used for site selection. We launched the beacon for MZP-6, which then became Site 585, at 2122 hr. The depth of water was determined to be 6112 m.

Because the JOIDES Planning Committee realized that the deep Lower Cretaceous and Jurassic section was the principal objective, and because the upper sedimentary section was expected to be made of turbidites emplaced well below the CCD, the Planning Committee had decided that its stand[ard] policy of continuously coring all holes co[uld] be waived for the post-Eocene section. Aft[er] a jet-in test for the re-entry hole [we] expected to drill, we washed to 255.9 [m] where firm sediments including fragments [of] porcellaneous chert in a spot core forced [us] to commence continuous coring.

We obtained fair to poor recoveries of Paleogene chalks, cherts, and mudstones, and Latest Cretaceous zeolitic mudstones and cherts, to about 485 m. Recovery of Middle Cretaceous mudstones with radiolarian-rich layers was good to 560 m, but poor below that. The lowest lithologic unit encountered, of hyaloclastite debris with admixtures of shallow-water skeletal debris, yielded poor recoveries to 630 m and then good recovery to total depth of the hole. Significant features of the sediments and their fossils, geochemistry, paleomagnetism, and physical properties is in the following section and summarized in Fig. 89-2.

After retrieving Core 55 during the morning of 26 October, the next core barrel dropped into the drill string wedged into the liner of a poorly machined landing subassembly. It was impossible to circulate, and although four runs of the sand line were attempted to pull the barrel from the liner, we were unsuccessful. Pull on the sand line was limited because of the weight of the line itself at these depths.

As there was no re-entry cone set, the hole had to be abandoned at a total depth of 6886 m of drill string, 763.7 m below the seafloor. The drilling crews tripped out of the hole, having the last of the bottom-hole assembly (BHA) on board at 0410 hr. on 27 October. Thus, 8 days, 6 hr., 43 min. were expended drilling this hole. The core barrel was cut from the assembly and examined, confirming the cause of wedging.

The bit was also examined closely. It had been in use 29 hr. 53 min. Few teeth showed more than modest wear. Seals of two sets of bearings were still good, one seal was leaking, but the fourth seal and bearings had failed. The cone using those bearings was wobbly.

During the time of tripping the drill string out of the water we received a DSDP message that re-entry must not be attempted at this site. After weighing the highest leg priority of reaching Jurassic sedim[ents] crust at this site

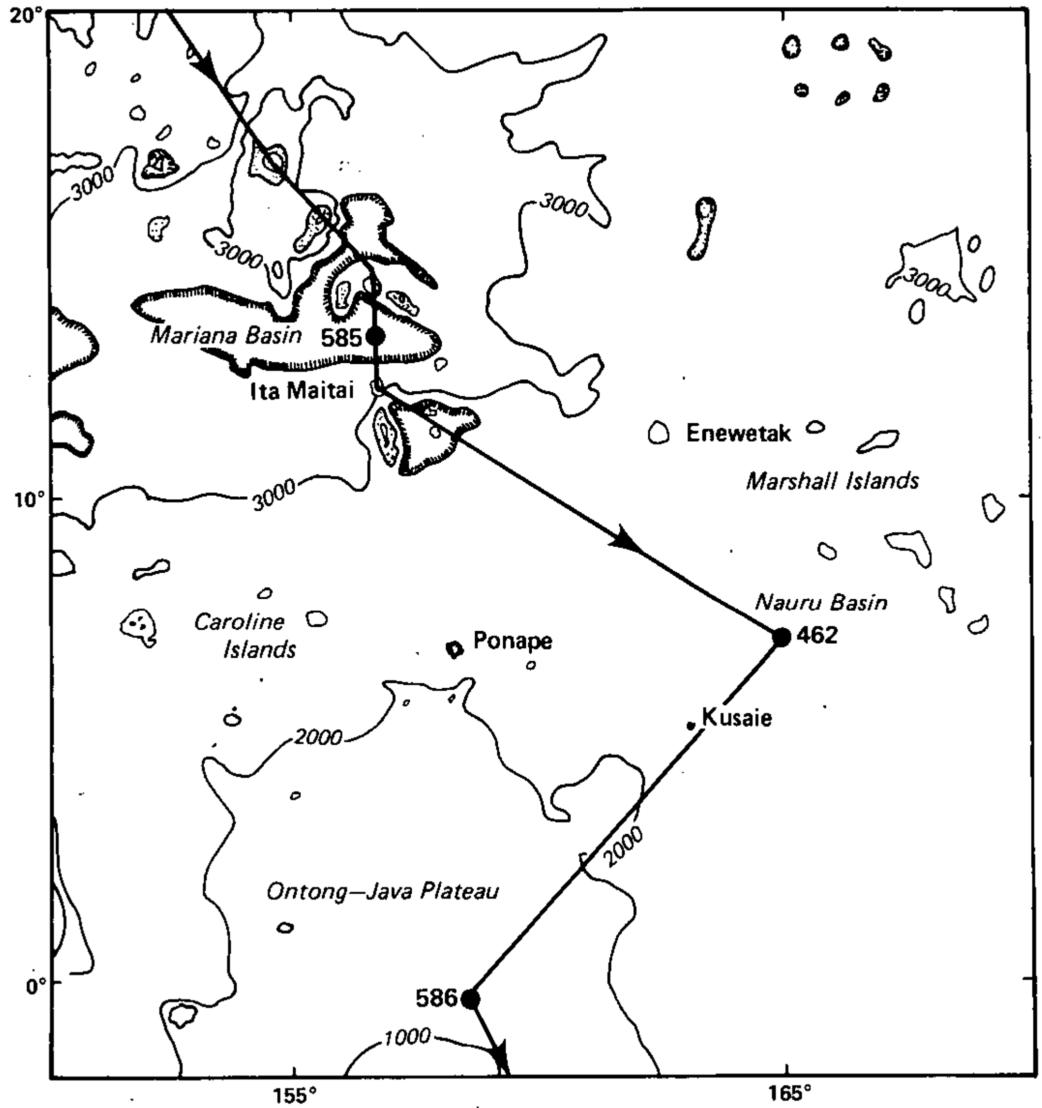


Figure 89-1. Sites drilled during DSDP Leg 89. Site 585, in the eastern Mariana Basin, lies in 6109 m of water. Site 462, in the Nauru Basin at 5177 m, was first drilled on Leg 61; re-entry Hole 462A was re-entered. Site 586, on the northeast slope of the Ontong-Java Plateau at 2208 m, is at Site 289, drilled on Leg 30.

bit attempt, versus the other leg objectives, and in consideration of the interests of the scientific party, we decided to try a single-bit hole here again. We planned to wash and drill to the old total depth as rapidly as possible, with strong pumping, removing core barrels with the sand line wherever drilling characteristics indiated they may be full. Some spot cores would be taken in the probable intervals of most scientific value.

During the trip into Hole 585A on 27 October the seas and weather remained exellent, with light airs to 6-knot winds, 3-ft. swells, and rolls and pitch of 22°. By 0313 on 28 Otober we had washed to 363.7 m and pulled the first wash-core, a rubble of broken pieces of mudstone with some short cored pieces of gray mudstone and chalk. We alternated washing and taking groups of spot cores to 772 m, one joint of pipe beyond the total depth of Hole 585. At that point near noon on 30 October, the bit had already rotated 20 hr. 20 min. From that point, excepting one for one washing interval of 9 m, we cored continuously to the total depth of Hole 585A.

Cores 585A-11 through -22 remained in a dominantly volcaniclastic section that generally resembled the lower part of 585. These firm sandstones, mudstones, and breccias were cored slowly, especially below 800 m depth, but gave good recovery, compared to most of Hole 585 and the upper part of 585A. Our average recovery was 70.2%, obtained at an average penetration of 7.2 m/hr. A slower drilling rate below 800 m may identify that depth as being equal to the 9.0 s reflector in the site survey seismic-reflection profile (Fig. 89-3). Further petrographic work ashore, on cements or composition or other aspects of these rocks, can test that possible explanation. Alternatively, perhaps 800 m is the depth at which the bit began to fail to cut as well.

During 31 October the ship's motion increased in a rising wind and swell. Occasional excursions of the drill string weight to the operating limits named for this site resulted from the 6970 m of drill string and the ship's motion. After Core 585A-17 was recovered at 1122 hr. on 31 October, the drill string was raised from 848 m to about 243 m, to remove sufficient weight for the safety of the drill string. By the early morning of 1 November the swell and wind diminshed to a degree that we lowered the drill string and commenced coring again. We cut the final six cores on 1 November.

Two events took place simultaneously late on 1 November. Penetration while cutting Core 585A-22 stopped at 7.7 of the planned 9.2 m and the drilling crew reported that the torquing or rotational behavior of the drill string indicated to them that the bit had failed. Meanwhile the swell and wind had increased, and because it was night the ship's officers could not observe the direction of the swell to attempt to improve the heave by trying a better ship's heading. Loss of the bit already meant that Hole 585A would have to be abandoned, but we could not at that moment ready ourselves for logging by dropping the bit at the total depth of 892.8 m, because the core barrel with Core 585-22 was still within the lower subassembly of the bottom hole assembly. The increased ship's motion which exposed the drill string to its posted limit would not allow the drilling crew the time to run the sand line to recover the barrel. Rather, the ship's motion resulted again in a decision to pull the drill string up several hundred meters to 280 m, to lessen its weight. Core 585A-22 was retrieved only after the string had been shortened. Decreased diameter of the core in 585A-22 was additional evidence that the bit had failed.

We intended to wait until the weather improved in order to rerun pipe to drop the bit at the bottom of the hole so we could then pull up and log. We could not pull out to drop the bit on the seafloor because there was no cone to allow re-entry, nor could we leave for a nearby site of low priority such as Ita Maitai Guyot, and drill there until the weather cleared and return and re-enter 585A to deepen or log.

We did not believe that dropping the bit while high in the hole would be successful. Almost certainly the bit and its release sub would wedge at one of the harder ledges part way down and thus block the logging runs. By noon on 2 November we reviewed the forecast for sea state and weather. No significant change, except possibly a worsening, could be expected in the 5-ft. swells and 20-knot winds for the next 48 hr. The oceanographic atlases gave scant hope

LEG 89 CORING SUMMARY

HOLE	DATES (1982)	LATITUDE	LONGITUDE	WATER DEPTH*	PENETRATION	NO.OF CORES	METERS CORED	METERS RECOVERED	% OF RECOVERY
585	18-26 Oct.	13°29.00'N	156°48.91'E	6109 m	763.7 m	55	514.6	164.50	32
585A	26 Oct.-2 Nov.	13°29.00'N	156°48.91'E	6109 m	892.8 m	22	208.8	101.50	49
462A	5-16 Nov.	07°14.50'N	165°01.90'E	5177 m	1209.0 m	17	137.3	74.40	54
586	19 Nov.	00°29.84'S	158°29.89'E	2207 m	44.4 m	5	44.4	38.98	88
586A	19-20 Nov.	00°29.84'S	158°29.89E	2207 m	305.4 m	31	260.9	257.03	99
586B	20-22 Nov.	00°29.84'S	158°29.89'E	2207 m	240.3 m	25	235.2	234.93	98
586C	22-23 Nov.	00°29.84'S	158°29.89'E	2207 m	623.1 m	1	9.6	2.18	23
						156	1410.8	873.52	62

*water depth from sea level, PDR, corrected.

for any general improvement in November. Wtihout such a limit as was imposed on our string length, which reached 7015.1 m at total depth, one might have characterized the weather and sea as mild. A current estimated by the Master as up to 2 knots was now running from the southeast, and as the 5-ft. swell was now from the northeast, maintenance of position in the current would put the swell on the beam. That configuration, in fact, caused us to pull up an additional 115 m closer to the seafloor shortly before noon. Faced with a delay of at least 48 hr. and no good chance of improvement even after that, we reluctantly decided to leave the site without logging. Also, we could not waste additional JOIDES time waiting to attempt yet another futile single-bit hole at this site. Thus we neither accomplished our primary leg objective of penetrating Lower Cretaceous and Jurassic sedimentary rocks and oceanic crust in the Mariana Basin, nor one of our lesser objectives, of logging there.

Geology of Site 585

The sedimentary section recovered at Site 585 was divided into six lithologic units as follows:

Unit I: 0-7 m nannofossil ozze and brown clay (Pleistocene).

Unit II: 256-399 m nannofossil chalk, siliceous limestone, chert, and zeolitic claystone (middle Eocene to Maestrichtian).

Unit III: 399-426 m zeolitic claystone, with nannofossil claystone, chalk, and chert (Maestrichtian and upper Campanian).

Unit IV: 426-485 m chert and zeolitic claystone (Campanian).

Unit V: 485-590 m claystone, locally with significant zeolites, graded radiolarian fine sands, thin laminae rich in organic carbon, and carbonate (Campanian to middle Albian).

Unit VI: 590-893 m volcanogenic sandstones, mudstones, and breccias, with admixtures of shallow-water debris (middle Albian to upper Aptian).

Unit I

A core at the seafloor recovered pelagic clay with layers of redeposited carbonate ooze of mixed ages. We interpretated the assemblage to be the distal parts of turbidites carried to the basin floor, which lies below the CCD.

Unit II

Most material recovered from Unit II consists of white to light-gray nannofossil chalk showing varying degress of diagenesis by $CaCO_3$ and SiO_2 towards chalk, limestone, siliceous limestone and chert. Interbeds of brown zeolite-bearing claystone are common, and increase in abundance below about 360 m.

Diagenetic silicification of carbonate ooze has resulted in a highly variable percentage of $CaCO_3$ which ranges from less than 20% in siliceous limestone to at least 85% in chalks. X-ray diffraction results from samples of zeolitic claystones show that the most abundant minerals identified are smectite, clinoptilolite, quartz, and calcite; less abundant minerals identified are celandonite, siderite, and nontronite(?). Small pieces of native copper were observed in a sample of claystone from Core 585-13. This thin zeolitic claystone may be the product of an Eocene ash fall.

Unit III

The dominant lithology of Unit III is dark-brown zeolite-bearing to zeolitic claystone with variable amounts of $CaCO_3$ as nannofossils and unspecified carbonate that presumably is present as cement. Grading is apparent in many of the units but it is usually very subtle. The bases of several carbonate-rich layers have thin laminae of silty, redeposited hyaloclastic material. XRD results from samples of brown claystone show that the most abundant minerals are quartz, clinoptilolite, smectite, celadonite, calcite, and siderite.

Unit IV

The most common material interbedded with the chert is brown zeolite-bearing claystone. Textures and fabrics observed in the larger chert fragments suggest that some chert formed by silicification of graded carbonate grainstones. A contrast in burrow preservation is taken as evidence that silicification of the limstone took place before the host chalks were significantly compacted. Further, microfossils in the silicified limestone appear to be less crushed than the fossils in the chalk. The percentage of $CaCO_3$ in the silicified limestones varies widely as in Unit II; petrographic observations of these $CaCO_3$-rich silicified limestones suggest that silica is added to the limestone as a pore filling rather than as a pervasive replacement. Silicification and chertification are commonly associated with current-worked laminae or with the basal parts of graded sequences, probaby because the greater porosity of these coarser sediments allows easier access to pore fluid circulation.

The upper part of Unit IV, with turbidite bedding, contains crystal, altered vitric and lithic fragments, as well as abundant zeolite. Crystal fragments are generally small (less than 4 mm) and are composed of broken feldspar, An_{60-70} (up to 50%), pale brown titanaugite, smectite-pseudomorphed olivine and rare euhedral apatite. Lithic fragments can make up to 25-30% and are largely

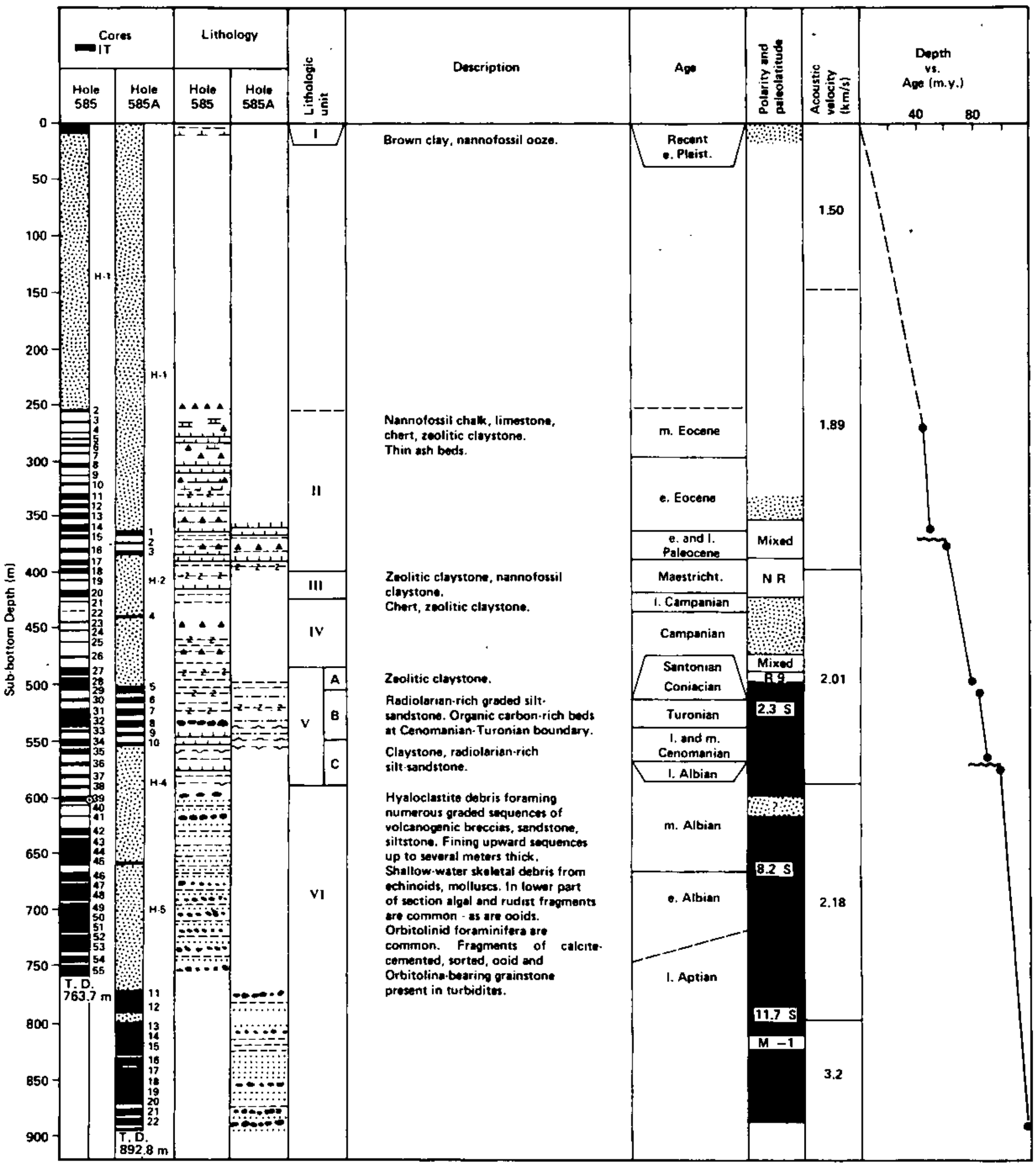


Figure 89-2. Sedimentary section and graphic display of main drilling results at DSDP Site 585, Mariana Basin.

plagioclase-phyric (now highly oxidized) glass with or without plagioclase microlites, together with a granular plagioclase-clinopyroxene (augite) basalt. Vesicular glass fragments (largely replaced by brown smectite and palagonite) have sharp points and cuspate margins typical of hyaloclastite deposits. At about 680 m depth are two reworked hyaloclastite layers within a turbidite sequence. The lower layer is distinguished by containing a variety of relatively large subrounded and angular basaltic clasts, ranging in size from 7-40 mm. Some of the more angular clasts exhibit a thin dark glassy rim, although others (more rounded) have only a portion of glassy margin or none at all. Most basalts are poorly or nonvesicular, and variably olivine-, clinopyroxene-, or plagioclase-phyric.

Unit V

The dominant lithology of Unit V is claystone, with varying amounts of zeolites, calcite, and radiolarians. Unit V was subdivided on the basis of color and the relative abundances of these three components.

The upper subunit consists of dark reddish-brown and olive-black zeolite-bearing claystone that is very low in carbonate content. Other minor components include feldspar, altered volcanic glass, and iron oxides. Plant fragments were found in a foraminifer preparation of a sample of a 0.5 cm dark band in Core 585-27-3, 138 cm. The claystone is mostly massive-appearing, but some is moderatey bioturbated. Silty laminae form the bases of graded sequences.

The middle subunit consists mainly of dark gray claystone with variable concentrations of recrystallized radiolarians, calcite, nannofossils, and zeolites. The recyrstallized radiolarians usually are concentrated in sandy layers, lenses, or stringers. Some fining-upward graded sequences are evident, one being over 3 m thick.

In Cores 585-32 and 585A-8 dark gray claystone contains common black flakes of organic-rich material (plant debris?) that are oriented parallel to stratification. A 2-cm thick black pyritic silty claystone containing about 5.4% organic carbon in Core 585, 32 cm occurs at the top of a fining-upward graded sequence, just above bioturbated claystone, and just below parallel-and cross-laminated siltstone of the overlying graded sequence. Near the base of Core 585A-8 is a 3-mm thick band of black sandstone consisting mainly of coated recrystallized radiolarians and flecks of black organic matter. This black layer contains 1.4% organic carbon, and clearly represents a single pulse or influx of both radiolarians and organic debris. The influx of organic debris then continued by at a much reduced rate, manifested as black flecks mixed with the overlying siltstone that decrease in abundance upward for 1 cm. The nature and origin of these organic carbon-rich layers are discussed below in reference to the Cenomanian-Turonian Oceanic Anoxic Event.

The lowest subunit consists of claystone with abundant but highly variable concentrations of radiolarians and calcite, as a result of interbedding of dark gray claystone, red nannofossil-bearing claystone and clayey limestone, radiolarian-bearing limestone and clayey limestone. Parallel laminations are common, and several graded units are apparent. These structures are interpreted as indicating that these rocks are distal turbidites.

Unit VI

Unit VI is a thick section of volcaniclastic sediments in fining-upward graded sequences that may be more than several meters thick, and commonly have bases of coarse sandstone or breccia. The bases of a few of the graded sequences consist of sand-size carbonate clasts or interlaminated or mixed carbonate and volcanogenic clasts. Most of the graded sequences grade upwards into fine-grained tops of mudstone. The Albian section in Hole 585 contains scattered skeletal debris of echinoids, molluscs and ostracods in addition to individual ooids. The Aptian section in Hole 585A in contrast contains an abundance of ooids in association with fragments of calcareous algae, rudists, bryozoans, small gastropods and tests of orbitolinid foraminifers. In addition to the individual ooids and skeletal fragments, the coarse volcanicalstic units contain fragments of calcite-cemented, sorted, ooid- and orbitolinid-bearing limestone. Although many of the ooids are severely micritized, some can be seen to have cores of volcanic rock fragments suggesting that a subaerial volcanic edifice was being eroded when the ooids were forming. Other common components include altered volcanic glass, zeolites, celadonite, clay minerals, and volcanic lithic and crystal fragments.

Many of the graded sequences in Unit VI show well-developed and relatively complete

Bouma turbidite sequences. The bases of many of the coarser sandstone beds at the bottom of graded sequences are scoured into the underlying bed or have load casts. We conclude that the graded sequences as deep as Hole 585A, Core 16 are turbidites. Below that, the unsorted nature of the clasts, their extreme size range up to boulder-size clasts that have been truncated by the core, and the heterogeneity of clast composition, ranging from volcanic fragments, shallow-water carbonate debris, and subrounded fragments of siltstone and claystone suggest that this material is part of one or more debris-flow deposits.

From 700 to 850 m is a turbidite sequence of volcaniclastic mudstone to breccia, containing crystal and lithic fragments. The crystal fragment content is highly variable from about 20 to 80% and is composed of feldspar, altered olivine and some clinopyroxene. Basaltic clasts are angular, fine-grained (size range, 2 to 10 mm) and generally plagioclase- or olivine-phyric. Some are probably alkali basalts with pale purple titanaugite forming much of the groundmass. Highly feldspathic and Fe-ore-rich trachytes are also common. Glass fragments are oxidized, highly vesicular and commonly contain large augite and olivine phenocrysts.

Next deepest in Unit VI is a relatively coarse volcaniclastic sediment featuring grayish red tabular fine-grained sediment clasts (1-6 cm long) in a dark green sandstone matrix. Apart from the usual glassy fragments, the unit is also characterized by variably sized basaltic clasts (usually less than 10 mm) that can also reach cobble dimensions; one large clast measured 15 cm across and was terminated by the core diameter. As the large volcanic and sediment clasts are poorly sorted and matrix supported, they probably represent a debris flow. At the base of Hole 585A are pieces of reworked, poorly vesicular, hyaloclastite, altered to dark-green smectite.

Throughout Unit IV, both the vesicular and nonvesicular glass fragments are characteristic of submarine hyaloclastite deposits. Vesicles are generally small (less than 0.5 mm) and inidicate relatively deep water for the hyaloclastite formation. They were transported to their resting place on the floor of the mid-Cretaceous Mariana Basin by turbidity currents and debris flows.

Other components of the volcanogenic section include rounded and angular basalt and trachyte clasts near 700 m, which were probably the transported products of differentiated alkaline volcanism. The rare occurrence of a lower amphibolite facies amphibolite at about that depth may indicate turbidity current sampling of a submarine fault scarp exposing metamorphosed (Jurassic?) oceanic crust. Zeolite veining and zeolite-rimmed vugs are relatively common below 820 m depth. Analcite and phillipsite have been found in the upper layers and heulandite at greater depth.

Fossil assemblages recovered reflect the turbiditic nature of the sediments: the majority of sediments recovered from Site 585 are transported and reworked deposits. Indeed, few intervals of autochthonous pelagic clay were recovered throughout the cored sequence. Younger aged material typically is masked by the influx of older, often better preserved fossil material, thus commonly obscuring the biostratigraphic signal. Consequently, the ages reported must be considered maximum ages and many may in fact be considerably younger. Sorting by shape and size are characteristic attributes of the foraminiferal and radiolarian assemblages. The recovered specimens are small-sized adults and juveniles that range in size from 45 to 149 um. Deposition below the CCD also has strongly altered the character of the calcareous and siliceous fossils due to dissolution and recrystallization. Bio-. otratigraphic assignments for the cored sections are shown on Figure 89-2.

A synthesis of the biostratigraphic events in Hole 585 based on the three fossil groups, namely calcareous nannoplankton, foraminifers (both planktonics and benthics), and radiolarians, shows that some straigraphic intervals could not be identified. That does not imply that the succession is not continuous. The generally poor recovery, the fact that the autochthonous sediments are devoid of age-diagnostic species, and the turbiditic character of the other sediments which contain index species prevent any sort of biostratigraphic refinement. In particular, there is no evidence for the presence of most of the Paleocene: the few nannofossil and planktonic foraminiferal zonal assemblages recorded were either reworked into the Eocene sequence or mixed with younger zones within the Paleocene. Moreover, late and middle Maestrichtian assemblages occur only mixed within the Tertiary sequence. The Cretaceous/Tertiary boundary is tentatively placed between Cores 16 and 17 of Hole 585 and in 3 of 585A. Cores 585-29 and -30 seem to span the interval from Santonian through late Turonian. The Cenomanian/Turonian boundary is placed within Core 585-32 and in 585A-9. The early Cenomanian and late Albian interval may be located between Cores 585-15 and -16 and 585A-9 and -10, but the poor recovery prevents further resolution. Cores 585A-11 to -22 are dated as late Aptian.

The most complete intervals recorded are from: early middle Eocene to latest Paleocene, Campanian, and early late Albian to late Aptian.

Benthic foraminifers recovered from sediments of Site 585 consist of three groups: (1) autochthonous abyssal species, (2) transported bathyal species, and (3) transported neritic and shallow-water species. The autochthonous group consists of agglutinated species that are interpreted to be most characteristic of water depths between 5000 and 6000 m or closely analogous to the present water depth of the east Mariana Basin. This assemblage is found in the reddish brown zeolitic claystones that represent pelagic sedimentation between turbiditic episodes, and is associated solely with fish debris and recrystallized radiolarians. The abyssal assemblage is found in Cores 585-15 to -54 which indicates that the entire sequence from the late Aptian to the Recent was deposited at abyssal water depths.

A bathyal foraminiferal assemblage consists of small, size-sorted specimens that are characteristic of water depths above 2500 m. The assemblage is found predominantly in the laminated intervals and coarse basal units of graded sequences that represent distal, gravity-flow deposits. In intervals devoid of shallow-water material, the assemblage is associated with size-sorted radiolarians, planktonic foraminifers, and sponge spicules. The bathyal assemblage is found throughout Hole 585. Of special interest are the occurrences of transported bathyal species in Core 585-32-2 and -4, that flank the organic-carbon-rich layer in section 3.

The third group consists of benthic species characteristic of neritic or shallow-water environment. Included are neritic species of genera such as Patellina, Textularia, and species of miliolids, polymorphinids and nodosariids. Also included in this group are specimens of larger, shallow-water foraminifers such as Orbitolina, complex agglutinated forms such as Cuneolina, and some attached agglutinated species. The neritic or shallow-water forms occur typically in the coarser basal layers of turbiditic sequences that also contain debris of shallow-water origin such as echinoid fragments and spines, ostracodes, bivalve fragments, sponge spicules, fecal pellets and very rare algal fragments in addition to ooids. Neritic species and shallow-water fossil debris are particularly noticeable in the middle Albian sequence of clastic carbonates and volcaniclastic turbidites (Fig. 89-3). Noticeably lacking however, are Inoceramus prisms, thick-shelled bivalve and rudist fragments, and shallow-water algal debris typical of reefal environments and recovered from both Cenozoic and Mesozoic sediments of Leg 61 in the Nauru Basin. In Hole 585A-11 to-20 rudist fragments are contained in association with neritic and shallow-water foraminifers, algal fragments, bryozoans, bivalve fragments, echinoid debris and ooids.

In summary, the late Aptian Cores 585A-18 to -20 contain the greatest abundance of shallow-water material in association with volcaniclastic debris flows. This material decreases in abundance, diversity and coarseness through the late Aptian-early Albian section of Hole 585 from total depth up to Core 585-48. In Cores 585-36 to -44 of middle and late Albian ages the transported material is predominantly neritic in nature, small-sized including the rare macrofossil fragmented material and indicative of distal turbidite deposits. Cores 585-29 to -34 of Cenomian through Santonian age in Hole 585 contain transported foraminifers that are bathyal in nature. Abyssal foraminifers are particularly in evidence in the Maestrichtian to Paleocene Cores 585-15 to -20 of Hole 585 characterized by zeolitic claystones and chert.

Four pulses of sedimentation separated by apparent unconformities or reductions in sedimentation are recorded in the sedimentary section at Site 585. These four are from late Aptian to late Albian, from middle Cenomanian to Turonian, from Campanian to early Paleocene, and from latest Paleocene to middle Eocene time. Sedimentation rates for the Cenomanian to Eocene pulses range from about 5 to 10 m/my and apparently reflect the lessening of volcanogenic sediment transported into the basin or the waning of major edifice building volcanism. Unconformities or much reduced rates of sedimentation are apparent during the late Albian to early Cenomanian, the Conicacian to Santonian and the middle and late Paleocene. The rapidly deposited section represented by the 303 m of

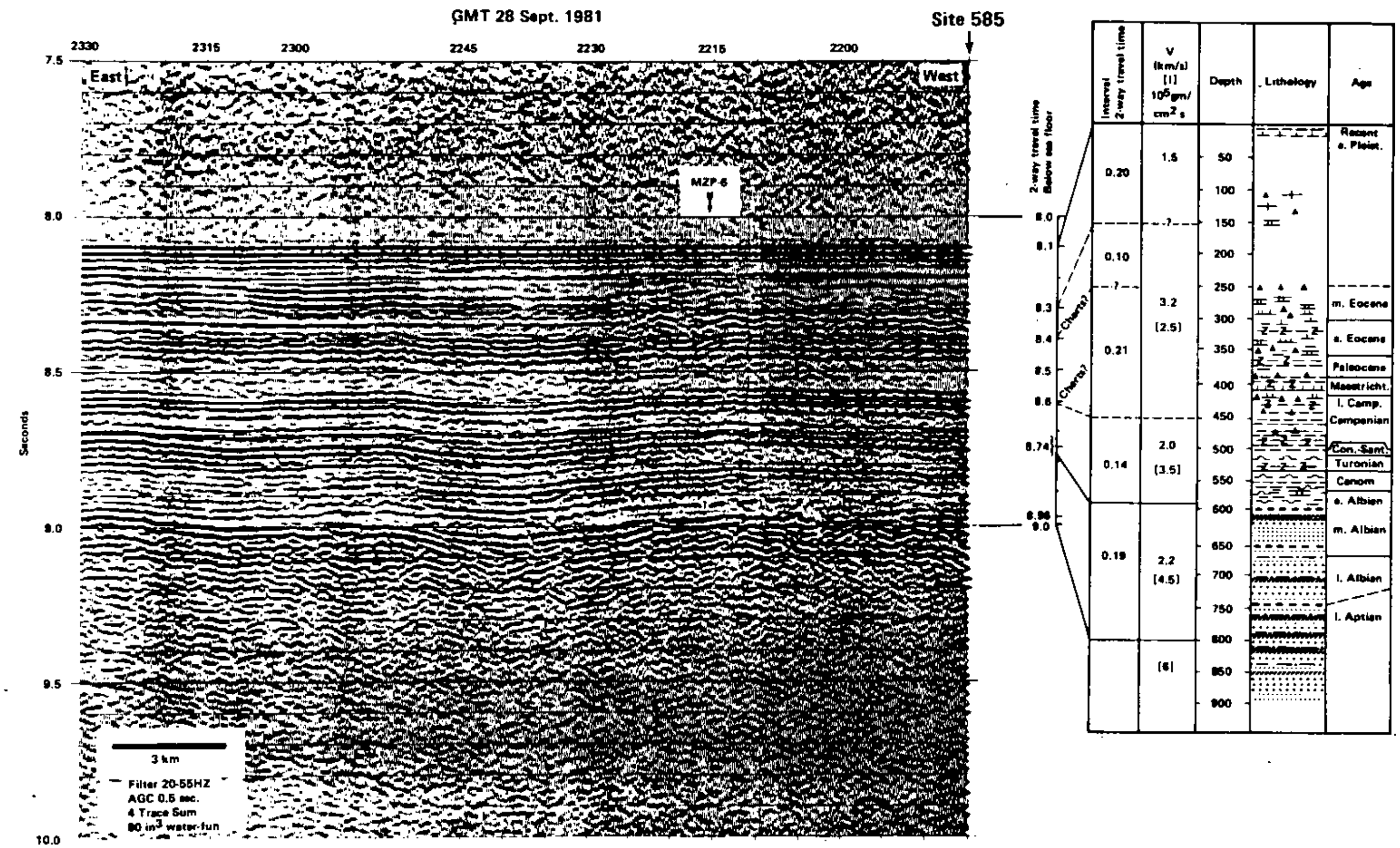


Figure 89-3. Correlation of seismic profile with the drilled section and shipboard physical properties data at Site 585.

volcaniclastic turbidities and debris flows of Unit VI accumulated at a rate of approximately 40 m/my during late Aptian to late Albian time. This is a minimum rate because the base of the late Aprian was not reached.

Preliminary NRM measurements show the Paleocene-Maestrichtian chalks and zeolitic claystones have mixed polarity with a strong normal overprint. The early Campanian reversal-polarity interval is tentatively identified in the gray volcanogenic claystones of Cores 585-28 and 585A-5. Underlying Turonian claystones in both holes yield an average paleolatitude of $2.3^{o}S \pm 3.0^{o}$. Middle and early Albian volcaniclastic turbidites yield a palaeolatitude of $8.2^{o}S \pm 2.5^{o}$; the late Aptian volcaniclastic turbidites yield a paleolatitude of $11.7^{o}S \pm 1.5^{o}$. A mixed polarity interval in Cores 585A-14 and -15 (late Aptian) is tentatively correlated to reversal clusters at other DSDP sites and land sections and to an unnamed marine magnetic anomaly, and is provisionaly called "M-1". Compilation of Cretaceous paleomagnetic data from DSDP Sites 289, 462, and 585 indicates that the western Central Pacific had a 4.5 cm/yr. northward component of motion (relative to the magnetic dipole or spin axis) between the Aptian and Campanian.

Measurements made of cores from Holes 585 and 585A include wet bulk density, water content, porosity, and compressional sonic velocity. A somewhat systematic variation in velocity and density with depth allowed the division of the drilled section into acoustic units which further allowed a correlation to be made between the seismic profiles and the lithology of the section (Fig. 89-3). Closely spaced velocity and density measurements made throughout a single, thick volcaniclastic turbidite unit that spanned Cores 585A-17 through -20 gave velocities at the top of the unit of approximately 3.0 km/s whereas those at the base of the unit approach 4.0 km/s. At 800 m depth in Hole 585A a marked increase in velocity and density result in a calculated reflection coeffecient of 0.142 at 8.96 s two-way travel time. We therefore interpret the "9 s" reflector of the site survey to be a high velocity layer in the Aptian volcaniclastic section rather than a reflection produced by the predicted Mesozoic pelagic sediment section.

A combination of paleontologic, lithologic and organic geochemical data indicates that the Cenomanian-Turonian Oceanic Anoxic Event left its record in the sediments cored at Site 585. In Core 585-32-3, a 2-cm thick band of black, pyritic silty claystone lies within a turbidite sequence. The sediments directly below the black band are bioturbated claystone; directly above the black band, in very sharp contact (assuming no missing section) are 1 cm of plane-laminated siltstone overlain by a 2-cm thick bed of cross-laminated siltstone. Organic carbon percentages from samples studied in Hole 585 are all well below 1.0% except for two replicate analyses of the black band at 72 to 73 cm in Core 585-32-3 which yielded C_{org} values of 5.6 and 5.1%. Rock-Eval data from this interval showed the following:

S_1 = 0.042 mg hydrocarbon/g
S_2 = 51.5 mg hydrocarbon/g
S_3 = 1.78 mg CO_2/g
HI = 954 mg hydrocarbon/g C_{org}
OI = 33 mg CO_2/g C_{org}.

The HI (Hydrogen Index) and OI (Oxygen Index) values plotted on a van Krevelen diagram show that this sample falls exactly on the initial part of the type-I kerogen evolution path; the rock is a typical sapropelic oil shale. The organic carbon in the black band is of marine algal origin. Paleontological data show that in Core 585-32-2 and -32-4, sections which lie directly above and below Core 585-32-3, transported bathyal species are found. The C_{org}-rich black band in Core 585-32-3 is in the W. arcaecretacea zone that straddles the Cenomanian/Turonian boundary.

A second C_{org}-rich layer of somewhat different character was cored in Hole 585A. In Core 585A-8,CC a thin layer 1 cm thick of a black sediment composed of recrystallized radiolarians coated and encased in a matrix of dark material lies at the base of a light gray section of radiolarian-rich sediment marked by flecks of black, presumably organic matter. The black lamina in Core 585A-8,CC contains 1.45% C_{org}. Rock-Eval data for this sample showed the following:

S_1 = 0.018 mg hydrocarbon/g
S_2 = 11.7 mg hydrocarbon/g
S_3 = 0.83 mg CO_2/g
HI = 807 mg hydrocarbon/g C_{org}
OI = 57 mg CO_2

The C_{org} in Core 585A-8,CC is also an immature, marine algal-derived type-I kerogen. This layer, being composed largely of radiolarians, may represent a reworked deposit which was originally similar to the black band in Core 585-32-3 or it may represent a second manifestation of preservation of algal kerogen. In Hole 585A the Cenomian/Turonian boundary is placed at the level of Core 585A-9-1, 50 cm (i.e., 50 cm below the C_{org}-rich radiolarian lamina).

The occurrence of these algal kerogen-rich layers at or very close to the Cenomanian/Turonian boundary indicates that they are a product of the preservation of organic carbon during the short-lived but global Cenomanian-Turonian "Oceanic Anoxic Event" now known to have left its record in sections from the Atlantic basin, the Tethys, the U.S. Western Interior Basin, the northern European shelf, and west African marginal basins as well as the Pacific basin.

In summary, drilling Holes 585 and 585A resulted in a maximum penetration of 763.7 m in 585; a misfit core barrel sub resulted in loss of the hole. Hole 585A was terminated a 892.8 m due to complete bit failure. Fifty-five cores were taken from Hole 585 and 22 from 585A.

The sedimentary section that was recovered is dominated by redeposited volcanogenic material in middle Cretaceous strata and redeposited fossils in Upper Cretaceous and Neogene strata. Compared to most open ocean sites the rocks are relatively unfossiliferous and the faunal and floral diversity is low. The intensive reworking and general paucity of the autochthonous fossils made the task of assigning a precise zone to each core difficult. Many biostratigraphic zones were recognized and it appears that the section is largely complete from middle Eocene to late Aptian with minor hiatuses although evidence for the presence of most of the Paleocene is lacking and late and middle Maestrichtian assemblages occur only redeposited within Tertiary strata.

Although the Jurassic obejctives were not reached, information derived from Holes 585 and 585A revealed the following

1. Benthic foraminiferal faunas indicate that the east Mariana Basin was at abyssal depths from Aptian time to the present.

2. Intense edifice-building volcanism took place in the area during Aptian through middle Albian time. The timing of the onset of volcanism is not known.

3. Volcanic edifices around the basin reached to or above sea level and were capped or fringed by carbonate reefs and banks in Aptian-Albian time.

4. The growth of these edifices provided the bathymetric relief needed for the delivery to the abyssal Mariana Basin of the numerous and thick turbidite sequences that dominate the sedimentary section.

5. Organic carbon-rich sediments formed in the basin at or very close to the Cenomanian/Turonian boundary; these carbonaceous sediments are the local record of a global oceanic anoxic event.

6. The Pacific plate moved from a paleolatitude of 11.7°S in late Aptian time, through 8.2°S in Albian time and 2.3°S in Turonian time before reaching its present latitude of 13.5°N at Site 585.

7. The "acoustic basement" in the east Mariana Basin is mid-plate volcaniclastic strata of Aptian age. This state of affairs may hold true for much of the western Pacific.

Site 462 (Nauru Basin): Background

Hole 462A, which was terminated on 27 July 1978 due to time limitations on Leg 61, had bottomed at a total depth of 1068.5 m in basalt sheet flows. Within the sill and flow complex that occupied the interval between 563 and 1068.5 m several intercalations of sediment had been cored. the deepest of these sediment layers recovered in Core 462A-80 was interpreted on the basis of radiolarians as being Barremian in age. The sediment is a red-brown siltstone containing radiolarians, fish debris and agglutinated benthic foraminifers representative of faunas from bathyal to abyssal depths. The Naura Basin was then thought to have been perhaps 5 km deep during Barremian time. The presence of this Barremian sediment was taken as indicating that the sill flow complex was not the basement, if we take basement to mean the lithospheric plate generated at a ridge crest approximately 150,000,000 Ma: the age predicted for the plate below the Nauru Basin as based on the position of Site 462 on the older boundary of Anomaly M-26.

After leaving the eastern Mariana Basin and Site 585 on 2 November 1982 at 1709 Z, GLOMAR CHALLENGER proceeded south across Ita Maitai Guyot and then southeastward through the western Marshall Islands and their associated seamounts, towards site 462. We passed between Enewetak and Ujelang atolls and over the lower flank of Heezen Guyot as we entered the Nauru Basin. Our final approach was nearly over the approach during Leg 61, and was controlled well by satellite-navigation fixes.

At 1832 (0732Z) on 5 November we crossed the dead-reckoning location of Hole 462A, at 7°14.495'N, 165°01.898'E, and dropped an acoustic beacon. A series of fixes showed that the beacon was about 1035 m northwest of Hole 462A's recorded position. We maneuvered closer and dropped a second beacon. Water depth, corrected to sea level, was 5177 m as determined during the Leg 61 drilling.

Our initial operation after a successful re-entry with a logging and clean-out bit was to lower a temperature-logging tool as deeply into the old hole as possible. It met with very slight obstructions at 470 and 515 m depth, and was blocked at 521 m. The tool was retrieved, and the drill string used to clean out the hole down into the basalt sills below 560 m. No difficulty was encountered, and so the drill string was tripped from the hole. A regular BHA and bit was run down on the drill string. The hole was reentered and pipe was then run to the bottom of the hole, flushing out carefully en route, until the bit reached bottom. The total depth at the end of Leg 61 was 1068.5 m; the drillers now reported a depth of 1071.7 m. The 3.2-m discrepancy must have resulted from a mismeasurement of pipe during either Leg 61 or this leg or both. So as not to have to change all the records of Leg 61 cores, yet to be able to use the length of the present drill string from drill floor to bit for present measurements, the first core (Core 93) would be cut less than the usual 9 m, and any discrepancy put within the amount of recovered versus not-recovered rock.

Eight cores were cut with the bit. They were almost entirely of basalt sheet flows. Some softer volcanogenic zeolitic mudstone was recovered in a few of the cores. During the cutting of the lower part of Cores 99 and 100, behavior of the drill string indicated bit damage. The string was pulled and the bit was on board at 0334 hr. of 11 November. Evidently the bit was pulled just before complete failure. It had lasted 31 hr., 50 min. The bit was replaced and the drill string was run from the ship for our third re-entry. Coring then continued on 12 and 13 November in hard sheet-flow basalts and probably some pillowed basalts. After retrieving the third core of the new bit (number 103), the drillers noted an abnormally high pump pressue, indicating an obstruction at the bit. A heavy chisel-ended rod was pumped down the drill stem ahead of a core barrel, and apprently cleared the obstruction. Core 103 and 104 cut slowly and their recovery was poor, indicating probable bit damage. The bit was brought up on the drill string, arriving at the drill floor at 2115 hr. of 13 November. It had been used for 25.6 hr. and penetrated only 35.8 m. Bearing wear was nearly as bad as for the first bit and tooth breakage was somewhat worse.

For a few hours on 13 November before the drill string was pulled from the hole, a second train of wells, coupled with wind gusts to 28 knots caused the ship to roll to a maximum of 5°. The weight indicator for the drill string reached the new operating limits imposed for Leg 89 on two or three occasions. With that exception, roll was mainly less than 3° under what can best be described as an excellent environment that lasted through our several day occupation of Site 462, namely winds from 0 to 18 knots, seas rippled to 2 ft., and 3 to 5 ft. swell.

A new bit of the same type was added to the BHA and the round trip and fourth re-entry completed quickly. The final five cores were cut slowly but with good recovery, with two exceptions. After some problems in the seating of the core barrel, Core 107 was cut but only one piece of basalt a few centimeters in length was recovered. Core 109, the last core of the bit and of Leg 89's occupation of the site, drilled very slowly for the first 2 m and faster thereafter, and with more torque. Only basalt was recovered, and it is not known what it was that was not recovered.

At 1209 m total depth the hole was abandoned, clean of junk and awaiting further re-entry after a change in engineering capabilities. The third bit had always been used nearly 24 hr. and penetrated 38.7 m. Although its bearings were in fair condition, it had lost as many teeth as the first two bits. All in all we cored 137.3 m and recovered 74.43 m (54% average); mainly of sheet flow basalt with minor sedimentary rock and pillows. At 1654 hr. on 16 November, GLOMAR CHALLENGER got underway on a southwest course towards our last site of the leg, SW-9, which is at DSDP 289 on the northeastern edge of the Ontong-Java Plateau.

Site 462: Geologic History

The volcanic sequence cored in this 140.5 m interval is composed of an alternating

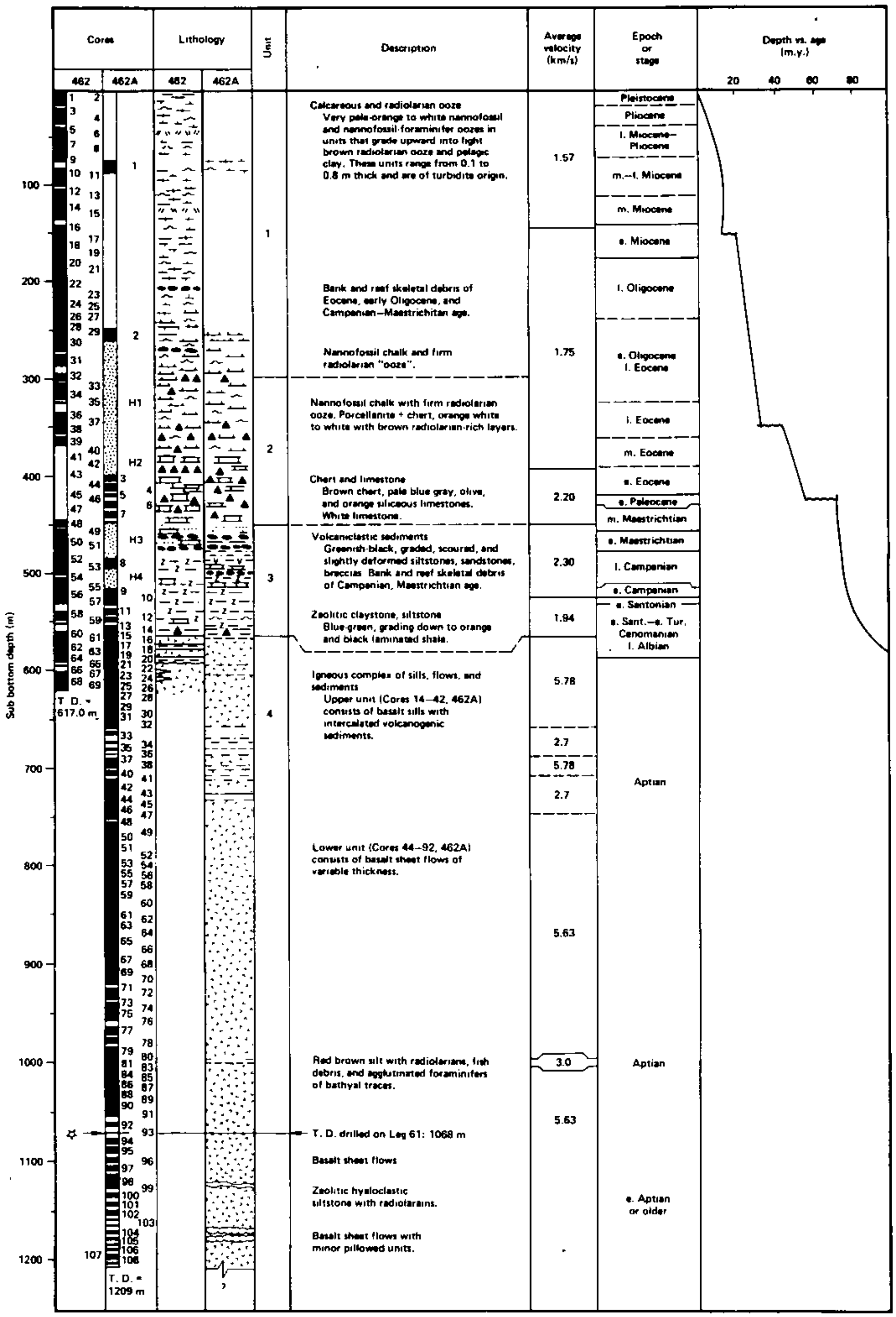


Figure 89-4. Section and graphic display of main drilling results at DSDP Site 462, Nauru Basin. Below the point marked *, data from Leg 89 has been added to the results of Leg 61.

series of aphyric and moderately phyric flow basalts containing various proportions of clinopyroxene, plagioclase and olivine as phenocryst phases. The basalt flows represent the continuation downwards of the lower flows (type B basalts) found during Leg 61, the lowest of which was designated as Unit 44, and are divided into 11 volcanic units, 45 through 56. The thicker volcanic units commonly are aphyric holocrystalline or glassy basalts and in some cases represent a packet of rapidly extruded smaller cooling units. The thinner volcanic units are often quench-textured throughout and represent individual flows. Except for a questionable occurrence of pillow structures in Unit 51 (Core 462A-104) all of the units are apparently sheet flows.

Although glass and olivine are characteristically replaced by brownish smectices through the basaltic pile, the degree of alteration is generally low. No fresh glass remains, although palagonite is present in a few cases. Alteration took place in the lower zeolite facies under slightly acid to mildly alkaline, low CO_2-activity, reducing conditions.

In Core 462A-00-1 a few centimeters of zeolitic hyaloclastitic sediment was recovered in contact with a chilled, glassy margin of a basalt flow. Radiolarians from this sediment include Holocryplocapsa hindei which has a range from latest Jurassic to earliest Aptian.

Shipboard revision of radiolarian based age determinations of Cores 462-A-46 and -80 is significant but needs to be checked ashore. Core 462A-46 was thought to be Aptian-Barremian in age. It is now thought that the sediment is Aptian in age but contains a reworked Berriasian fauna. Core 462=80 was thought to be Berremian but now is interpreted to be of late early Aptian age; the sediment also contains a reworked lower Cretaceous (pre-early Hauterivian) radiolarian fauna. These revisions are important because they show that older sediments are in the vicinity.

Paleomagnetic data were obtained from 35 minicores which were analyzed using progressive alternating field (AF) demagnetization. A steep positive inclination (probably an artifact of the drilling and exposure to the highly magnetic drill pipe) was overprinted on a primary negative inclination in every sample. As the site was south of the equator during the Cretaceous, this implies that the entire basalt flow complex is of normal polarity. The inclinations are tightly grouped within individual flow units and these cluster means range from -51.2° ($\pm1.5^{\circ}$) to -10.7° ($\pm 1.5^{\circ}$).

The mean inclination of the magnetic units which could be distinctly identified as -35.9° ($\pm7^{\circ}$), implying a paleolatitude of 19.9°S ($\pm5^{\circ}$). This is comparable to the paleolatitude of the overlying basaltic complex drilled on Leg 61 of 20.6° ($\pm2.4^{\circ}$) (recalculated from Steiner, 1981). The two nearly identical mean paleolatitudes imply that northward movement of the site was insignificant during the emplacement of the igneous comlex. Resetting of the thermal remanent magnetism at the tops of some units to match that of the overlying unit is good evidence, along with the chilled margins, that these layers are flows, not sills.

A temperature log was run in Hole 462A for several reasons: 1) the hole had remained undisturbed for 4¼ yr. since Leg 61 and presumably was at thermal equilibrium, 2) there was some uncertainty in the interpretation of the logs run in 1978, and 3) there remains the question whether heat flow values become constant with age or decrease as a "root-t" trend. The results of the temperature log run on Leg 89 showed that seawater is flowing down into the hole at a rate of about 2800 l/hr. This drawdown flow condition is similar to that described at DSDP holes in young crust. At Site 462 the downward flow is interpreted as a forced convention due to pore-fluid underpressure in the sediment column above the basalt sill-flow complex and not due to hydrothermally driven circulation. This raises the interesting question as to the origin of underpressure in the deep sea sediment sections.

Although Jurassic sediments were not reached at this site the hole remains clean, the re-entry cone is easily seen on the re-entry scanning tool and the sediment layers in the sill-flow complex show that there are older sediments than Aptian in the Nauru Basin; conditions are propitious for a return to the site when a longer drill string can be deployed.

Site 586 (Ontong-Java Plateau): Background

A traverse of shallow-water sites from the equator to New Zealand was planned in order to recover Neogene calcareous oozes deemed valuable for paleoceanographic studies in the Southwest Pacific. Most of those sites will be cored with the hydraulic piston corer (HPC) during Leg 90. to reduce

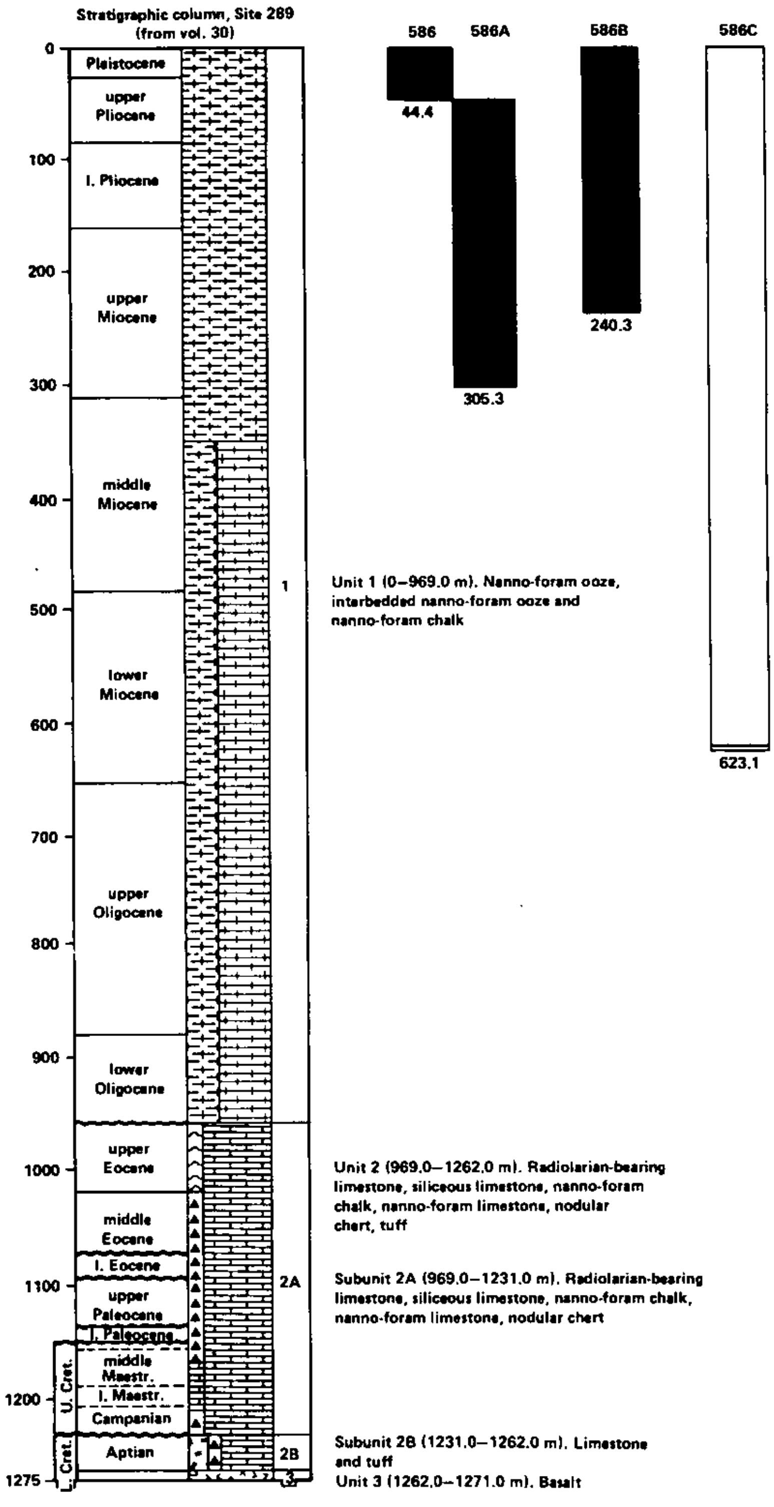


Figure 89-5. Main drilling results, northeast Ontong-Java Plateau. Site 289, Leg 30, was rotary-cored to basement. Holes 586, 586A, and 586B were HPC-cored. Hole 586C was drilled for logging.

the total amount of Leg 90 travel time, the northernmost site was assigned to Leg 89. This site is on the Ontong-Java Plateau at Site 289. A hole drilled there during Leg 30 indicated there were no major discontinuities in the post-early Oligocene section.

The principal aim at Site 586 was to obtain piston cores to about 250 m depth. We also intended to log a hole to give the opportunity to relate the petrography and laboratory-determined physical properties of specimens with downhole measurements of their geophysical parameters.

We approached old Site 289 from the northeast and dropped an acoustic beacon at the dead reckoning position of the site at 0527 hr. on 19 November. The PDR, mudline cores in two holes, and the gamma ray log runs gave different depths to the seafloor. We decided to use as datums for all holes the gamma ray measurement of 2218 m from the drill floor (2208 from sea level), which was close to the 2207 PDR determination corrected to sea level, and the filled second mud line core which indicated the seafloor to be above 2219.4 from drill floor, but which is shallower than the 2223.1 mud line determined in the first hole.

The first hole was cored with the HPC to 44.4 m and had to be abandoned there when the inner core barrel holding what would have been Core 6 broke off while extended below the bit. We started Hole 586A by washing to 44.4 m and continuously coring. We reached 305.3 m total depth, with 98.5% recovery. The 586 and 586A cores were split, described, and sample. A second set of continuous HPC cores was taken to 240.3 m in Hole 586B, with 97.8% recovery. This set was stored unsplit, along with the earlier split cores, for Leg 90's use.

Hole 586C was rotary drilled to 623.1 m, with one spot core at its total depth, to provide a borehole for logging. An excellent suite of Schlumberger sonic velocity, spontaneous potential, induction, density, gamma ray and caliper logs was obtained. The logging equipment and drill string was brought on board and the GLOMAR CHALLENGER was underway at 0810 hr. on 23 November. After a brief survey over the site, including three failed attempts to launch a working sonobuoy, we proceeded south towards Noumea, New Caledonia.

Site 586: Gelogic History

The 503 m-section recovered is of Quarternary to late Miocene age and consists of foraminifer-nannofossil ooze which became chalky below about 260 m. The fossil contact and the type of preservation of the formainifers suggest that these sediments are not the result of a purely pelagic "rain". Allochthonous shallow-water faunal elements and mixtures of abraded specimens with specimens having delicate structures preserved occur throughout the cored section.

Most of the studies of the HPC cores from Site 586 will be by Leg 90 personnel and will appear in the Leg 90 volume.

Recipients of DSDP Samples and Data

Remember to send five reprints of any paper you have published using data or samples collected by or in conjunction with the Deep Sea Drilling Project to the DSDP Curator.

Curator
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093

Major- and Minor-Element Analyses

Major- and minor-element analyses for igneous rocks are now available as listings or for computer searches. Both shipboard and shore laboratory data are included for DSDP Legs 13-62 and Legs 63-65. For information contact:

Donna Hawkins
Information Handling Group
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3526

PLANNED CHALLENGER DRILLING

Leg 91 - Tonga Trench

Wellington, New Zealand to Papeete, Tahiti, 16 January to 20 February 1983. Co-chief scientists: W. Menard and J. Natland.

Background

Leg 91 of the Deep Sea Drilling Project will focus on emplacing the DARPA Marine Seismic System (MSS) in a hole to be drilled east of the Tonga Trench in the southwest Pacific by the GLOMAR CHALLENGER (Table 91-1). The CHALLENGER and the R/V MELVILLE will conduct geophysical experiments involving the MSS and a cluster of ocean bottom seismometers (OBS's) placed near the hole. The hole will be cored through approximately 100 m of sediment and an additional 80-100 m into igneous basement, and will be fitted with a re-entry cone to allow the CHALLENGER to emplace the MSS. Once the MSS is in place, the MELVILLE, which will already have begun shooting to the OBS's, will begin shooting to the MSS as well. Data from the downhole seismometer during this part of the experiment will be recorded on board the CHALLENGER. The experiment to this point will be two-fold, involving a seismic refraction study designed to elucidate the structure of the ocean crust and upper mantle, and a noise study, described below. Following completion of these studies, the CHALLENGER will place a Bottom Processing Package (BPP) on the seafloor for a 45-day long teleseismic study. Simultaneously the MELVILLE will re-deploy the OBS's to monitor seismicity in and around the Tonga Trench to the west and mid-plate seismicity associated with seamounts and islands to the north. The combined seismic refraction and teleseismic data sets will provide important constraints on oceanic upper-mantle structure not available from previous experiments.

The experiment will be a two-ship

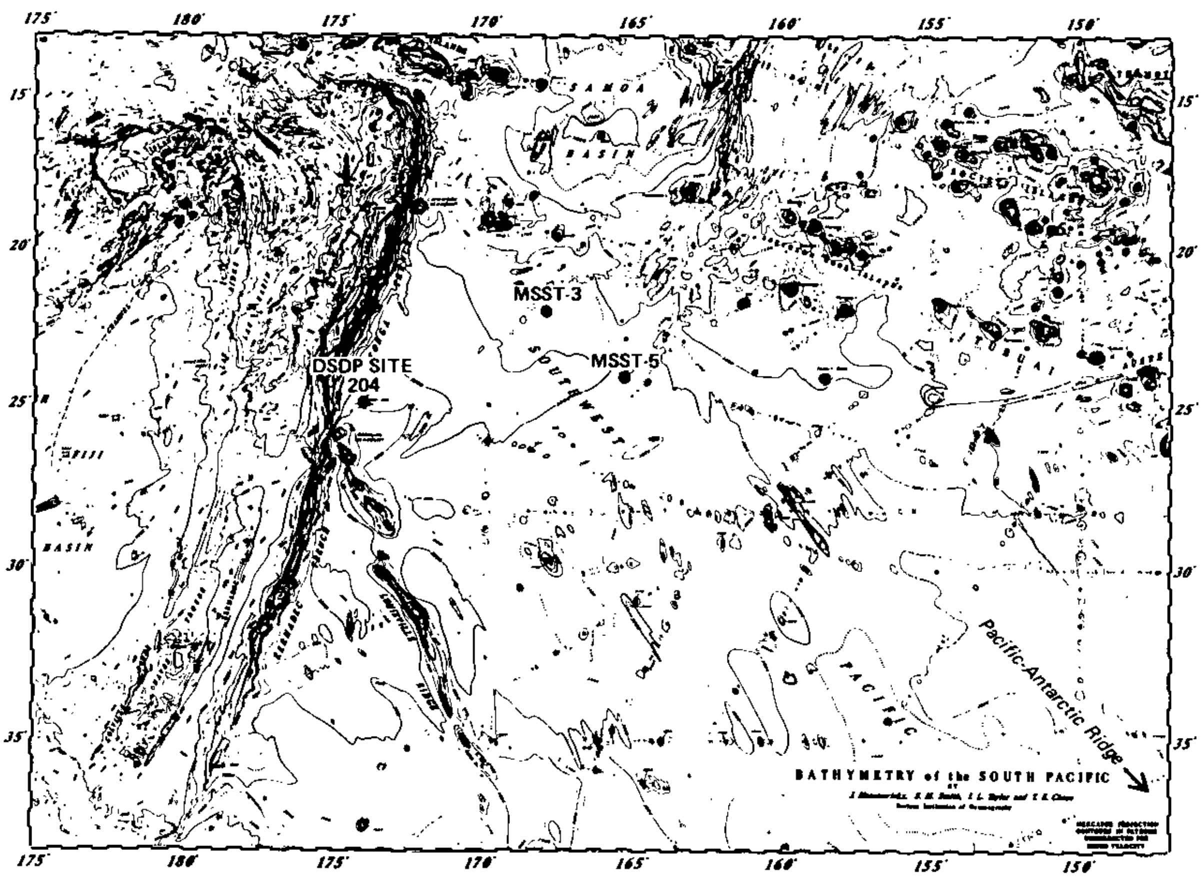


Figure 91-1. Location of proposed Leg 91 Sites MSST-5 and MSST-3 in the Southwest Pacific.

operation involving the GLOMAR CHALLENGER during Leg 91, and two MELVILLE legs, one overlapping with Leg 91, the second involving both OBS and BPP recovery operations. Tentative time-tables for the operations of both the CHALLENGER and the MELVILLE are presented in Tables 91-2 and 91-3. In this report, we summarize the scientific objectives of the entire operation in terms of both drilling and geophysics.

Site Selection

The seafloor east of the Tonga Trench is highly attractive from a seismological point of view. Earthquakes have been recorded beneath the Tonga arc from depths as great as 700 km. The area is also proximal to a region of mid-plate seismicity thought in part to be associated with submarine volcanism in island chains to the north (e.g. MacDonald Seamount, in the Austral chain).

The site selection process was designed largely to optimize the geophysical experiments, but was constrained by water depth and sediment thickness limitations. Engineering studies indicated that water depths much greater than 5500 m would seriously hamper operations and probably endanger the drill string when the re-entry cone was being deployed. In addition, at least 90 m of sediments are necessary to stablize the drill string and test the re-entry cone. In the area of interest, water depths are rarely as shallow as 5500 m, and more typically range between 5600 and 5900 m. Furthermore, the sediments are also thin, as revealed by seismic reflection profiling.

Fortunately, a target (designated MSST-5) has been found at 24°03'S and 165°30'W in 5538 m of water (Table 91-1, Figs. 91-1 to 91-3) which meets the engineering criteria, and which is well suited to the seismic studies. A second somewhat deeper target at 22°12'S and 167°52'W (MSST-3; Table 91-1, Fig. 91-1) has only about 60 m of sediment (Figs. 91-4 and 91-5), but will be used as an alternate target in case the basement proves difficult to drill at Site MSST-5. Both targets have what is apparently typical ocean crust for the region, and typical sediment thicknesses. They appear to be well removed from fracture zones and the large seamounts which are particularly abundant to the north. However, a cluster of small seamounts lies just east of Site MSST-5. A volcaniclastic apron drapes the flanks of the Louisville Ridge to the south (Fig. 91-1) and was cored at DSDP Site 204 during Leg 21. Smaller aprons occur near seamounts, including the one east of MSST-5 (Fig. 91-2), but no such aprons extend either to Site MSST-5 or Site MSST-3.

The MELVILLE will precede the CHALLENGER into the area of Site MSST-5 by about 2 days, and will conduct a survey which will allow precise site selection to be made at that time. The MELVILLE will drop the beacon to be used by the Challenger during the coring operations.

In the event the MSS cannot be deployed for operational reasons at either site and sufficient time remains to drill a new site, the CHALLENGER will drill a contingency site located on the landward wall of the Tonga Trench or an alternate site on anomalously shallow crust about 150 miles west of Tahiti. Detailed information on these sites is not available at the present time but will be given to the shipboard party prior to departure.

Geophysical Objectives

The fundamental objective of the experiment is to provide four-component, broad-band seismograms digitally recorded by OBS's at the water-sediment interface for comparison with MSS data recorded in the drill hole proximal to the OBS array. Such a comparison is needed to assess the performance of th MSS. The experiment has three parts, each capable of satisfying important scientific and engineering objectives.

1. Noise study. The comparison of noise recorded by OBS's at the sediment-water interface with MSS recordings in the basement will permit a quantitative assessment of the noise reduction as a function of frequency attainable by downhole instrumentation. The MELVILLE will deploy an array of 6 OBS's to investigate the frequency-wavenumber characteristics of saefloor noise at the MSS site. Each OBS digitally records the three components of inertial motion and one component of pressure at 128 samples per seconds. The data returned by this array will permit the identification of noise sources and the modes of noise propagation. No comparable set of deep-ocean noise data has been previously collected; hence this experiment affords a unique opportunity to gain fundamental insight into the mechanism of noise generation and propagation. In particular, it

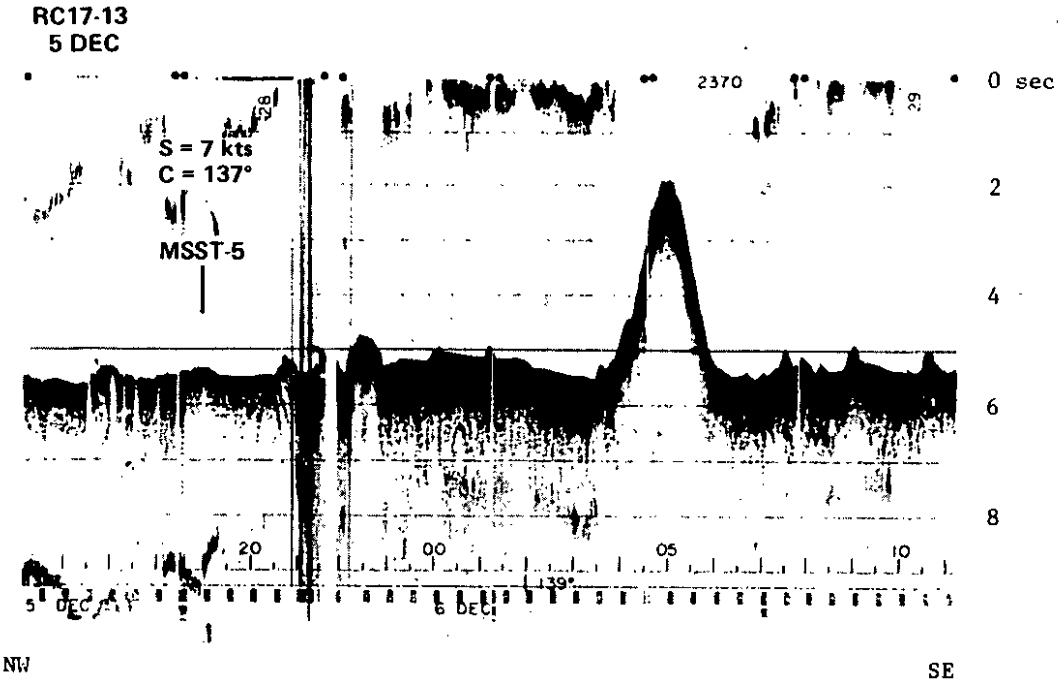


Figure 91-2. Seismic profile CONRAD 17-13 showing location of MSST-5 at 05 Dec., 1900 hr., and nearby ocean floor.

Table 91-1.

LEG 91 PROPOSED SITES

Site	Priority	Coordinates	Water Depth	Distance From Land (n. mi.)	Nearest Land	Maximum Penetration	Objectives
MSST-5	1	24°03'S 165°30'W	5538 m	372	Niue, New Zealand	190 m	Emplace DARPA Marine Seismic System in basement for acoustic, seismic velocity and seismicity experiments in the vicinity of the Tonga Trench.
MSST-3	2	22°11.7'S 167°52.0'W	5579 m	215	Niue, New Zealand	160 m	Emplace DARPA Marine Seismic System in basement for acoustic, seismic velocity and seismicity experiments in the vicinity of the Tonga Trench.

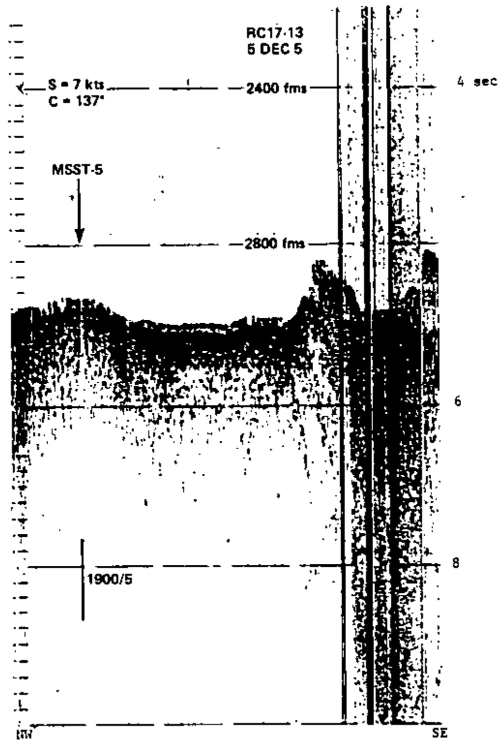


Figure 91-3. Blow-up of a portion of seismic profile CONRAD 17-13 showing location of MSST-5, and transparent sediment layer over reverberant material, probably basement.

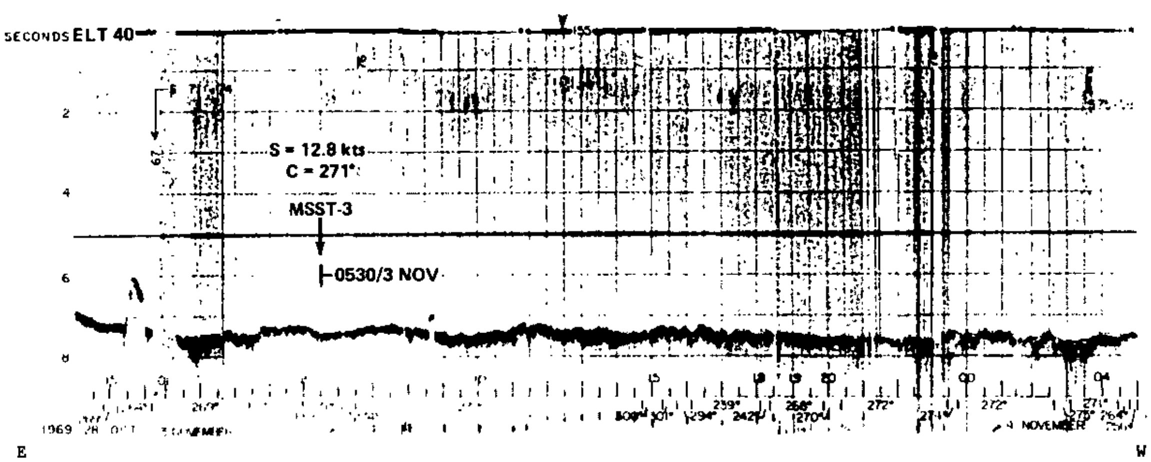


Figure 91-4. Seismic profile ELTANIN 40, 1969 showing location of alternate target MSST-3 at 03 Nov. 0530 and a portion of the nearby ocean floor.

will permit a test of local noise generation models.

2. Refraction study. The MELVILLE will shoot a star pattern of eight 50 km-long refraction lines convergent at the MSS site (Fig. 91-6). In addition, two perpendicular lines will be short to 150 km. From these data, the seismic structure of the crust at the MSS site and local variations in the vicinity of the site will be determined. By densely shooting to both the MSS and the OBS array over short baselines, very high structural resolution will be obtained in the vicinity of the hole. Because the crossover from crustal first-arrivals to mantle first-arrivals typically occurs at distances on the order of 30 km, all lines will yield information on the structure of the uppermost mantle, in particular on mantle anisotropy. The two longer lines will permit an investigation of the degree of anisotropy to a depth of approximately 35 km. The refraction experiment will also provide the data needed to orient the horizontal-component seismographs of the MSS and OBS's and to compare the signal-to-noise ratio (SNR) at the seafloor with that below the sediments.

3. Teleseismic study. At the end of the refraction experiment the MELVILLE will redeploy the OBS array in an extended configuration for the passive (triggered) recording of regional and teleseismic signals during the 45-day period of MSS recording by the Bottom Processing Package (BPP). The number of earthquakes expected to occur as a function of distance depth and magnitude is shown in Table 91-4 and Figs. 91-7 and 91-8.

Table 91-2.

LEG 91 SITE OCCUPATION SCHEDULE

Location	Travel Time (days)	Time on Station (days)	Departure (approx.)
Depart: Wellington, New Zealand			16 January 1983
Underway	7.5		
Site MSST-5: 24°03'S 165°30'W		24.9	17 February 1983
Underway	4.6		
Arrive: Papeete, Tahiti			21 February 1983
Alternate Site			
Site MSST-3: 22°11.7'S 167°52.0'W		15.8*	
Melville Schedule			
Leg 1.			
Depart: Honolulu, Hawaii			09 January 1983
Underway	12.0		
Site MSST-5: 24°03'S 165°30'W		22.0	11 February 1983
Underway	5.0		
Arrive: Papeete, Tahiti			16 February 1983
Leg 2.			
Depart: Papeete, Tahiti			12 March 1983
Underway	5.0		
Site MSST-5: 24°03'S 165°30'W		4.0	21 March 1983
Underway	5.0		
Arrive: Papeete, Tahiti			26 March 1983

*No logging, contingencies or piston coring.

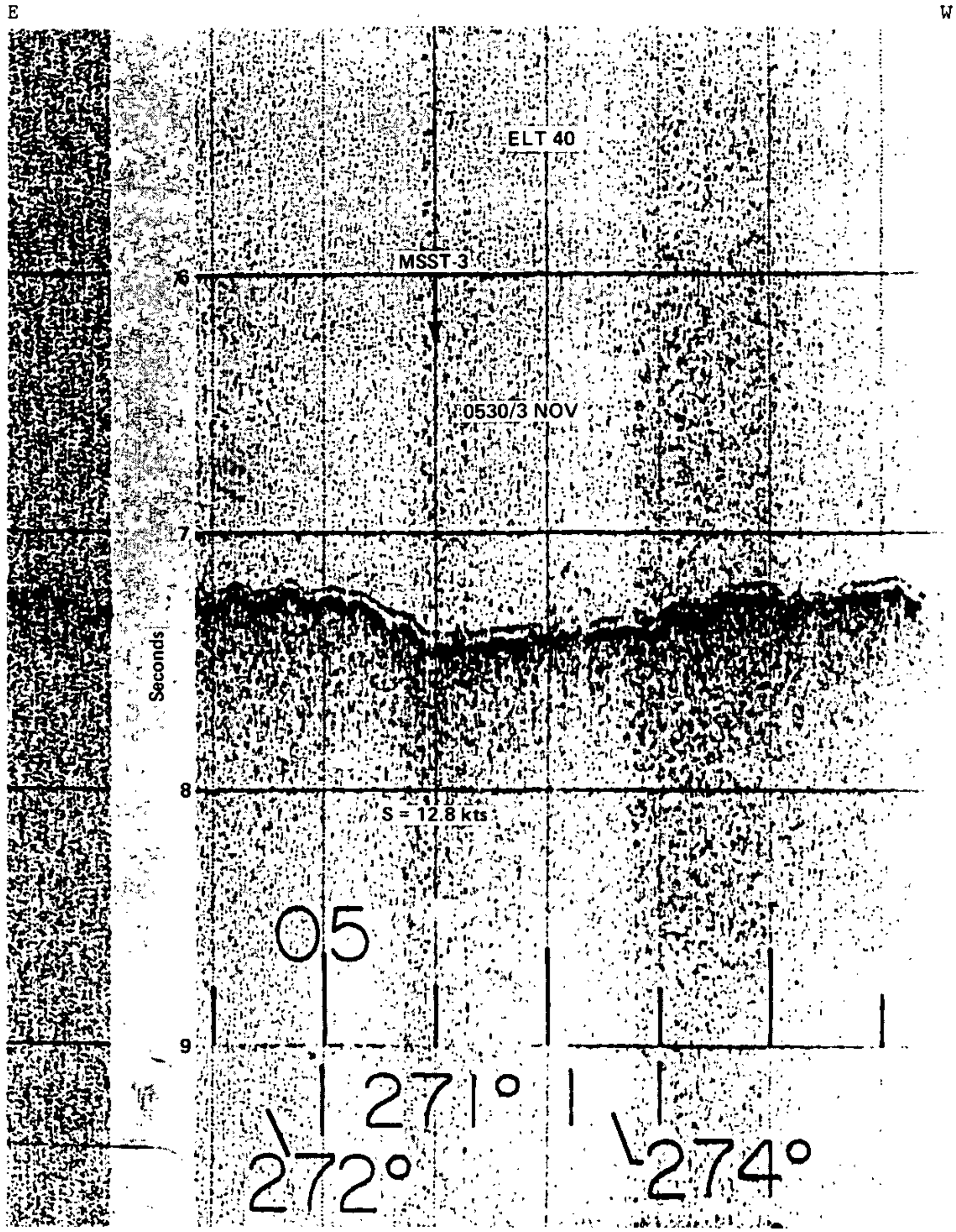


Figure 91-5. Blow-up of a portion of seismic profile ELTANIN 40, 1969 showing location of MSST-3 and transparent sediment layer over basement which does not have the reverberant aspect of that at MSST-5.

It is estimated that a minimum of 40 events will be captured by the OBS triggering algorithm in a typical 40-day recording interval. A comparison of the signal quality and SNR between the MSS and OBS sites will thus be possible for events at a variety of distances and depths. The combined data set will provide important constraints on oceanic upper-mantle structure not available from previous experiments.

Drilling Objectives

Targets MSST-5 and MSST-3 are located in a region of the Pacific with crust that probably had its inception sometime in the Late Cretaceous along a fast-spreading portion of the Pacific-Antarctic Ridge, which is presently located far to the southeast, well beyond the region shown at the lower right-hand corner of Fig. 91-1. The site to be

Table 91-3.

Tentative Operations Schedules for CHALLENGER and MELVILLE during Leg 91, and MELVILLE during Retrieval Operations

DATE		D/V Glomar Challenger Optimum Schedule	D/V Glomar Challenger Contingency Schedule	R/V Melville [1)]
January	9, 1982			Lv. Honolulu, Hawaii
	15			Transit
	16	Lv. Wellington, N.Z.	Lv. Wellington, N.Z.	"
	17	Transit	Transit	"
	18	"	"	"
	19	"	"	"
	20 [2)]	"	"	Site survey
	21	"	"	"
	22	Drill pilot hole	Drill pilot hole	"
	23	"	"	"
	24	"	"	"
	25	Drill re-entry hole	Drill and case re-entry hole	Deploy ATNAV-II System
	26	"	"	"
	27	"	"	Deploy OBS array
	28	"	"	"
	29	"	"	"
	30	"	"	"
	31	Install MSS	"	"
February	1	"	"	Refraction experiment
	2	Record shooting	"	"
	3	"	Redrill re-entry hole	"
	4	"	"	"
	5	"	"	"
	6	"	Install MSS	"
	7	Deploy IRR	"	Redeploy OBS array
	8	"	Record shooting	"
	9	Drill HPC hole	"	"
	10	"	"	"
	11	Contingencies[3)]	"	Leave site
	12	"	"	Transit
	13	"	Deploy IRR	"
	14	"	"	"
	15	"	Drill HPC hole	"
	16	"	"	Arr. Papeete, Tahiti
	17	Depart for Papeete	Leave site	
	18	Transit	Transit	
	19	"	"	
	20	"	"	
	21	Arr. Papeete, Tahiti	Arr. Papeete, Tahiti	
March	12			Lv. Papeete, Tahiti
	17			Recover OBS's
	18			"
	19			Recover BPP
	20			Redeploy BPP
	21			Leave site
	26			Arr. Papeete, Tahiti

[1)] Melville schedule based on optimum Challenger schedule. OBS's will be redeployed and shooting delayed if contingency schedule activated.

[2)] Challenger crosses date line.

[3)] In the event that the MSS deployment is not delayed by weather or operational problems, any contingency time remaining at the end of the leg will be used at the discretion of the shipboard party either in support of the seismic experiment or to drill one of several contingency sites.

drilled is of geological interest for the following reasons:

1. Through paleontological and paleomagnetic studies of the cores from the site, it will be possible to fix the age and probable latitude at which volcanism at the Ridge axis occurred. This information will be integrated with regional bathymetric and magnetic data, as well as the MELVILLE and CHALLENGER transit and site survey data, to allow palusible plate tectonic models for this area to be developed.

2. The drilling will provide sediments giving information about paleoceanographic conditions in the temperate and high-latitude southern Pacific, a region in which there are almost no DSDP sites.

3. Should drilling in the basement be successful, it will provide samples of the ocean crust produced, presumably at a Cretaceous fast-spreading ridge. If this is the case, the samples should record a long history of alteration. No similar hole attempted by DSDP on younger crust has penetrated more than about 60 m of basalt. Should between 80 and 100 m of basalts be drilled, downhole logs will allow the first in situ geophysical evaluation of the density, porosity, and velocity structure of the uppermost crust produced at a fast-spreading ridge, as well as important data for interpreting the seismic refration results which are a principal objective of Leg 91.

4. The sediments will record the geochemical signature of ridge-crest hydrothermal activity as the site moved away from the spreading center. Sedimentation rates have been extremely low (less than 1 m/my) because the site has moved by seafloor spreading exclusively through the southern Pacific region of low surface productivity. Thus components provided to the sediments by hydrothermal activity should be present in very little diluted form. It will be particularly interesting to compare the geochemistry of these sediments with those cored during Leg 92. One of the principal objectives of Leg 92 is the evaluation of geothermal activity on the East Pacific Rise near 15°S for the past 20 my, using sediment composition and mineralogy.

5. The drilling may provide an understanding of the nature of the reverberant acoustic layer that is widespread beneath transparent sediments in much of the western Pacific, and that is well developed near the Louisville Ridge south of Sites MSST-5 and MSST-3 (Fig. 91-1). There it appears to represent volcanogenic sediments. The reverberant character of the deeper reflectors at Site MSST-5 (Fig. 91-3) may conceal similar sediments, although there is no evident source nearby for them, or it may represent the acoustic response of extremely flat ocean crust consisting of thin, nearly horizontal flows.

Table 91-4.

Expected number of earthquakes during a 40-day recording period as a function of magnitude, depth, and distance from Site 3.

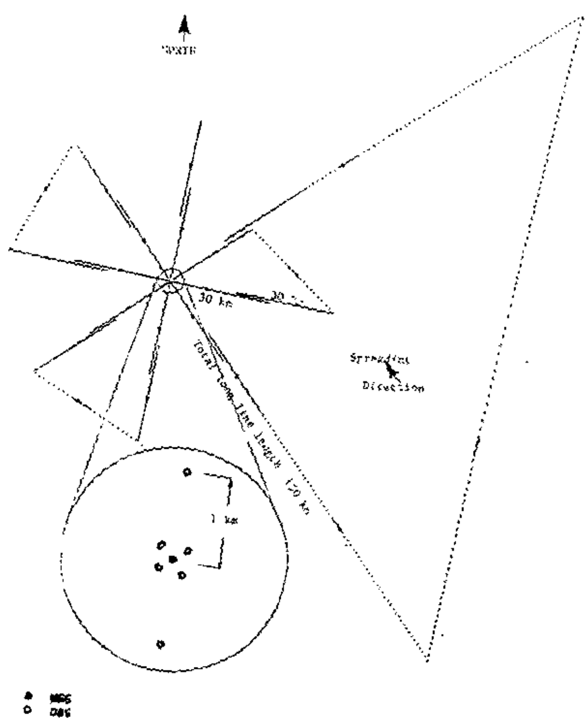
	Epicentral Distance					
Depth Range (km)	0°-10°	10°-20°	20°-30°	30°-50°	50°-70°	>70°
0-50	1* 13**	1 7	1 9	3 -	5 -	15 -
50-300	1 7	<1 4	1 6	2 -	2 -	4 -
>300	1 16	<1 2	<1 <1	<1 -	<1 -	<1 -

*Upper figure is number of events with $m_b \geq 5.5$.

**Lower figure is number of events with $m_b \geq 4.5$ (statistics not compiled for $\Delta > 30°$).

Coring Operations

After the beacon dropped by the MELVILLE has been located and the pipe has been lowered to the seafloor, a pilot hole will be rotary cored to basement. The basement will then be cored for about 20 m, which should be sufficient to determine whether deeper drilling in the basement in the crust at the site is viable. If it proves difficult to drill the basement in this first hole, the ship will be offset with the pipe lifted above the mudline, and two or three additional holes will be washed to basement until basement that can be drilled is found. Once found, the MELVILLE will drop OBS's to the seafloor and commence the seismic refraction experiment. While this is occurring, the CHALLENGER will set up a re-entry cone, drill 80-100 m into the basement and log the hole. No sediments will be cored at the re-entry hole, which will be cased to basement to allow the passage of the MSS through the soft sediments. Should the basement at Site MSST-5 prove difficult to drill and unsuitable for clamping the MSS, both ships will move to Site MSST-3 for the experiment. If sufficient time is available at either site, the sediments will be piston cored for sedimentologic and micropaleontologic studies.



Site MSST-5 (East of Tonga Trench)

Position: 24°03'S 165°30'W Water Depth: 5538 m

Sediment Thickness: 90 m Priority: 1

Proposed Drilling Program: Pilot hole - continuously core through sediments, then rotary core 20 m into basaltic basement. Re-entry hole - wash through sediments, then core 80-100 m into basement. Emplace Marine Seismic System and associated recording and recovery equipment. Offset and HPC to refusal.

Objectives: 1) determine seismic signal to noise ratio in basement for comparison with OBS data; 2) determine seismic velocity structure of crust and upper mantle in old fast-spreading crust; 3) study long term seismicity in the vicinity of the Tonga Trench.

Heat flow: Yes Logging: Yes

Seismic Profile: CONRAD 17-13, 05 Dec. 1900 hrs. (Figs. 91-2 and 91-3).

Sediment Types: Pelagic clay with increased calcareous-siliceous biogenic component near the base of the sediment section; possible thin volcanogenic sediments above basement.

Figure 91-6. MSS and OBS deployment for active portion of experiment. The two long refraction lines are oriented parallel and perpendicular to the probable spreading direction as determined by the orientation of the regional seamount chains. The OBS's near the MSS are 50-100 km from the reentry core; the two outer OBS's serve to increase profile data intensity.

Site MSST-3 (East of Tonga Trench)

Position: 22°11.7'S 167°52.0'W Water Depth: 5579 m

Sediment Thickness: 60 m Priority: 2

Proposed Drilling Program: The site is a contingency target in case the objectives at MSST-5 cannot be met. A pilot hole will be drilled through the sediments and then cored 20 m into the basement. A re-entry hole will then be washed through the sediments and cored 80-100 m into basement. The Marine Seismic System and associated recording and recovery gear will be emplaced upon the completion of drilling.

Objectives: Same as at Site MSST-5.

Heat Flow: No. Logging: Yes, time permitting.

Seismic Profile: ELTANIN 40, 1969 03 Nov., 0530 hrs. (Figs. 91-4 and 91-5).

Sediment Types: Pelagic clay with increased calcareous-siliceous components near the basement.

Figure 91-7. Number of earthquakes with body-wave magnitude greater than 4.5 expected in a typical 40-day period as a function of depth and epicentral distance from Site 3. Means were computed from 27 40-day intervals in the period 1977-1979 using the seismicity cataloged on PDE tapes. Histogram interval is one degree.

Figure 91-8. Number of earthquakes with body-wave magnitude greater than 5.5 expected in a typical 40-day period as a function of depth and epicentral distance from Site 3. Means were computed from 27 40-day intervals in the period 1977-1979 using the seismicity cataloged on PDE tapes. Histogram interval is five degrees.

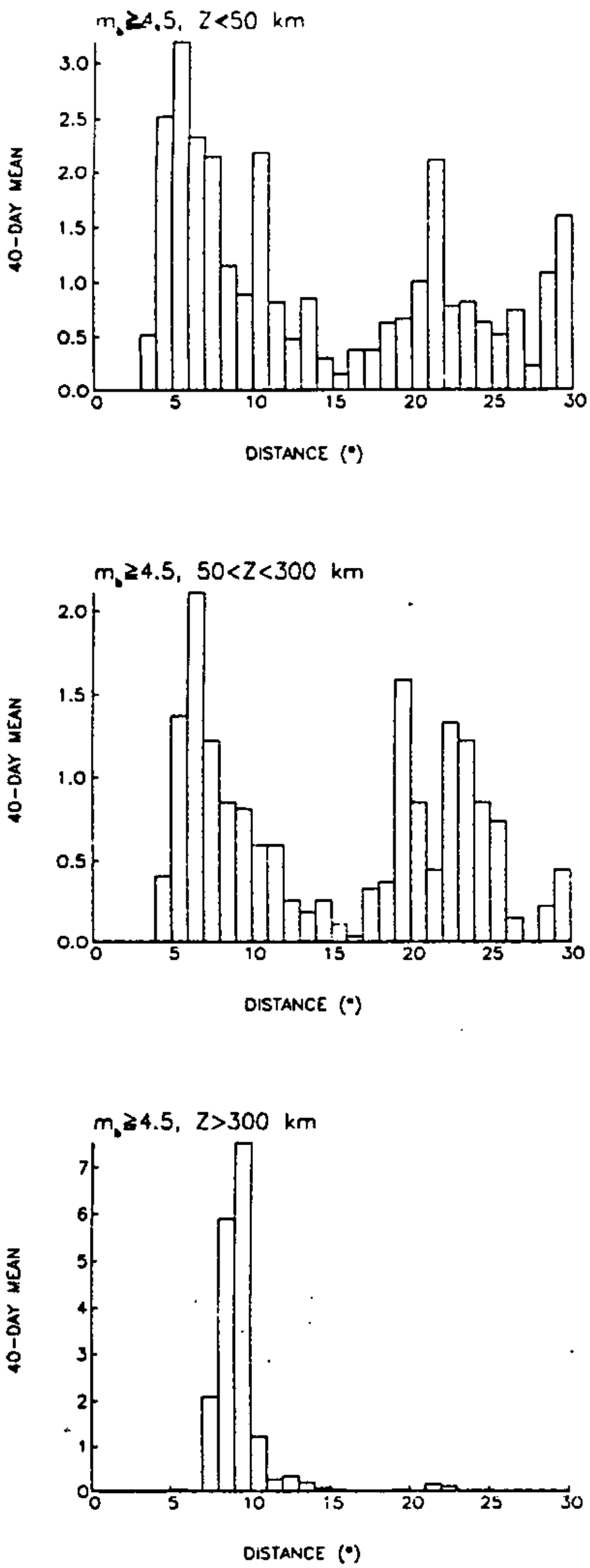


Figure 91-7.

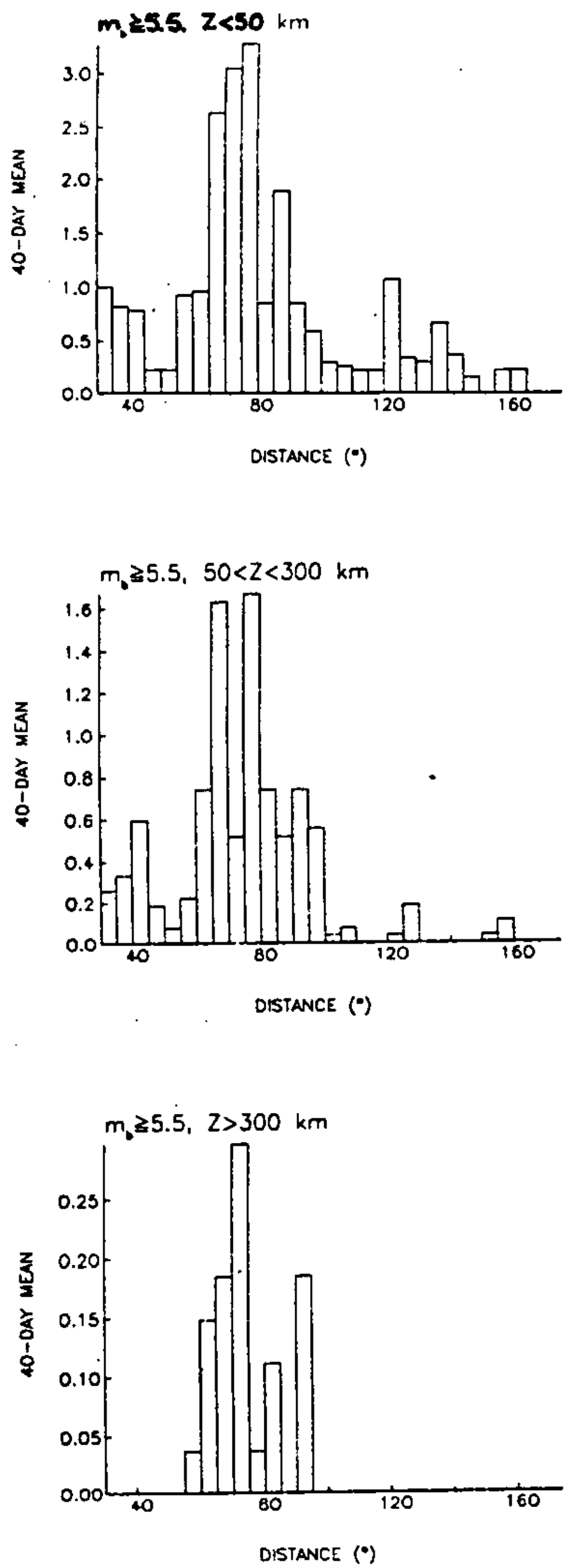


Figure 91-8.

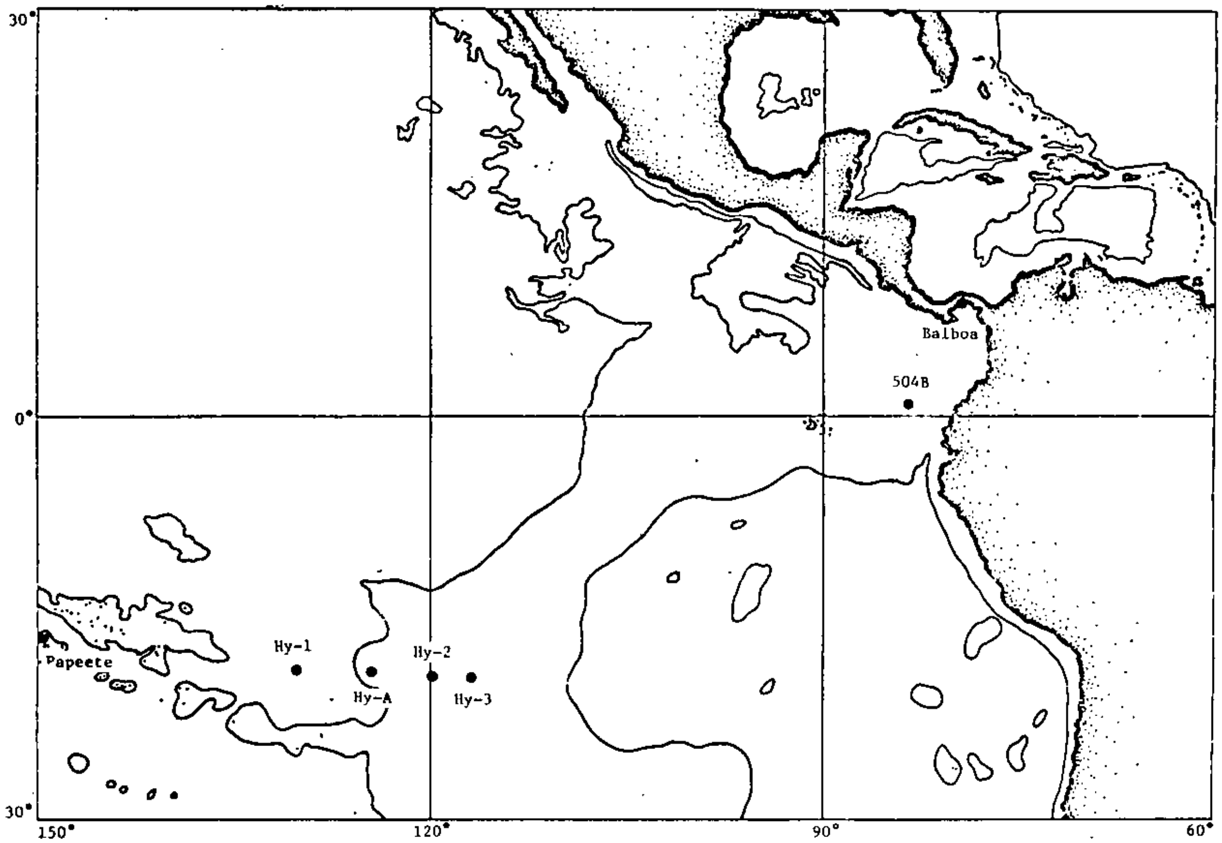


Figure 92-1. Location of Leg 92 sites.

Leg 92 - Hydrogeology

Papeete, Tahiti to Balboa, Panama, 23 February to 19 April 1983. Co-chief scientists: M. Leinen and D. Rea.

Background

Leg 92 of the GLOMAR CHALLENGER, the hydrogeology leg, is planned as a traverse across the fast-spreading East Pacific Rise at 19°S (Fig. 92-1). The past several years of geological and geochemical research concentrating on chemical processes near the spreading center have demonstrated that sea water circulates deep within the crust, is heated by the cooling basalts with which it reacts and precipitates hydrothermal minerals within the crust, the sediment column, and at the sediment/seawater interface.

The gross mineralogy of these precipitates appears to depend on the water/rock ratio and the flow rate of water

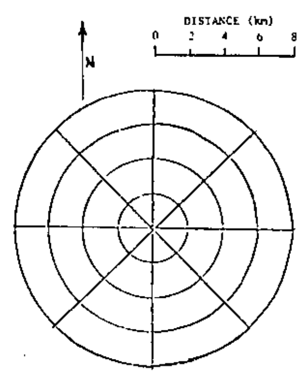


Figure 92-2. Proposed shooting program for the oblique seismic experiment in Hole 504B. The shooting program will be repeated with the seismometer clamped at four depths in the hole.

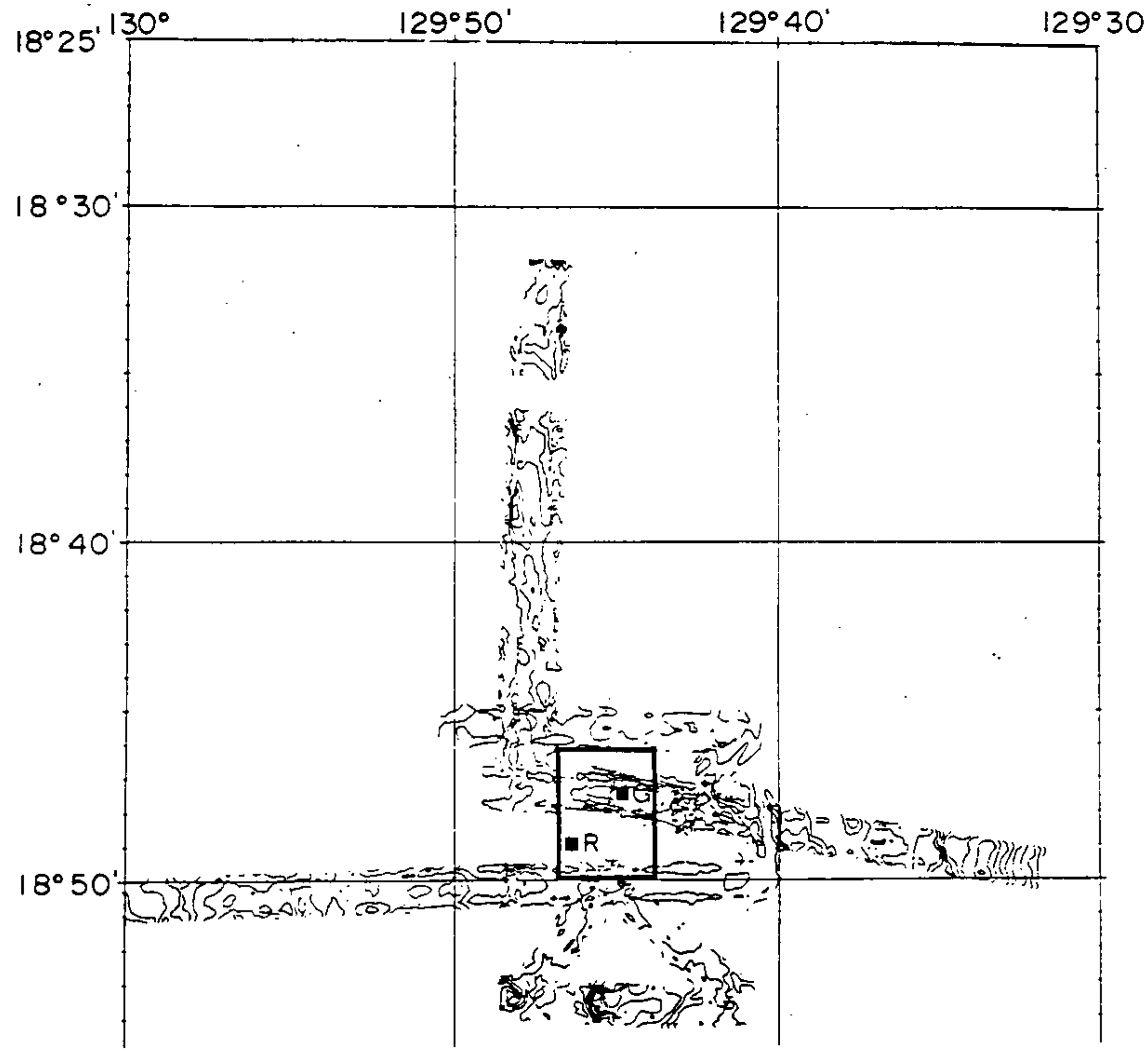


Figure 92-3. SEABEAM (ARIADNE II) survey of Area I. Inset square shows location of detailed survey area shown in Figure 92-4. Contours unreliable due to lack of adequate track crossings. "R" and "G" mark position of navigation transponders.

circulating through the upper crust. Along our 19°S transect, where the whole spreading rate is now 162 km/my, the accumulation rate of hydrothermal phases in the surface sediments is the highest observed on the entire East Pacific Rise. Recent heat-flow studies have demonstrated that the ridge flanks are alst sites of hydrothermal activity.

Site Selection and Objectives

The sites selected for drilling on Leg 92 are designed to study ridge flank hydrothermal processes as a function of age along a single flow line and to study sediments which directly or indirectly reflect ridge crest activity. To these ends we plan to core a young site (Hy-3, 4.8 m.y.) where hydrothermal circulation is active in order to sample both the rising, high heat-flow and descending, low heat-flow limbs of a circulation cell. Sites on older crust (Hy-1, 30 m.y.; Hy-2, 9 m.y.; and possibly Hy-A, 15 m.y.) will be drilled to provide a long-term history of hydrothermal sediment deposition. We intend to test the hypothesis that the intensity or amount of hydrothermal activity (deposition) has varied in concert with fluctuations in spreading rate and both mid-plate and plate margin volcanism in the Pacific during the Neogene. Both of these latter processes display maxima about every 5 m.y. (back to about 20 m.y.). By studying the geochemistry of fresh and altered

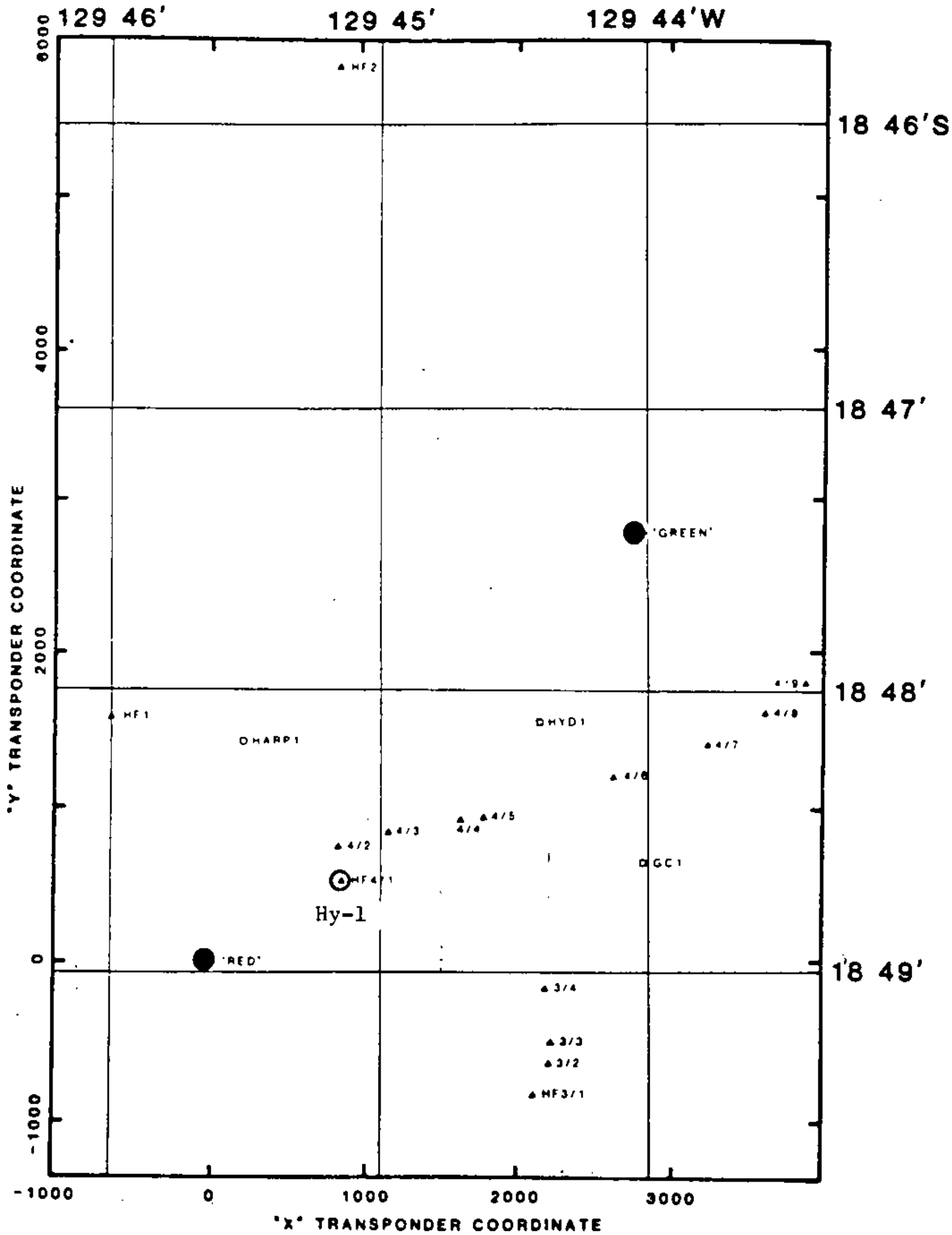


Figure 92-4. Detail of Area I showing location of site survey stations and Site Hy-1. GC = gravity core; HF = heat flow station; HYD = hydrocast; HARP = in situ pore water station (Harpoon). Heat flow stations are labelled with heat flow run number and measurement number, e.g. HF 3/2 = heat flow run #3, penetration #2. "Red" and "Green" indicate transponder locations.

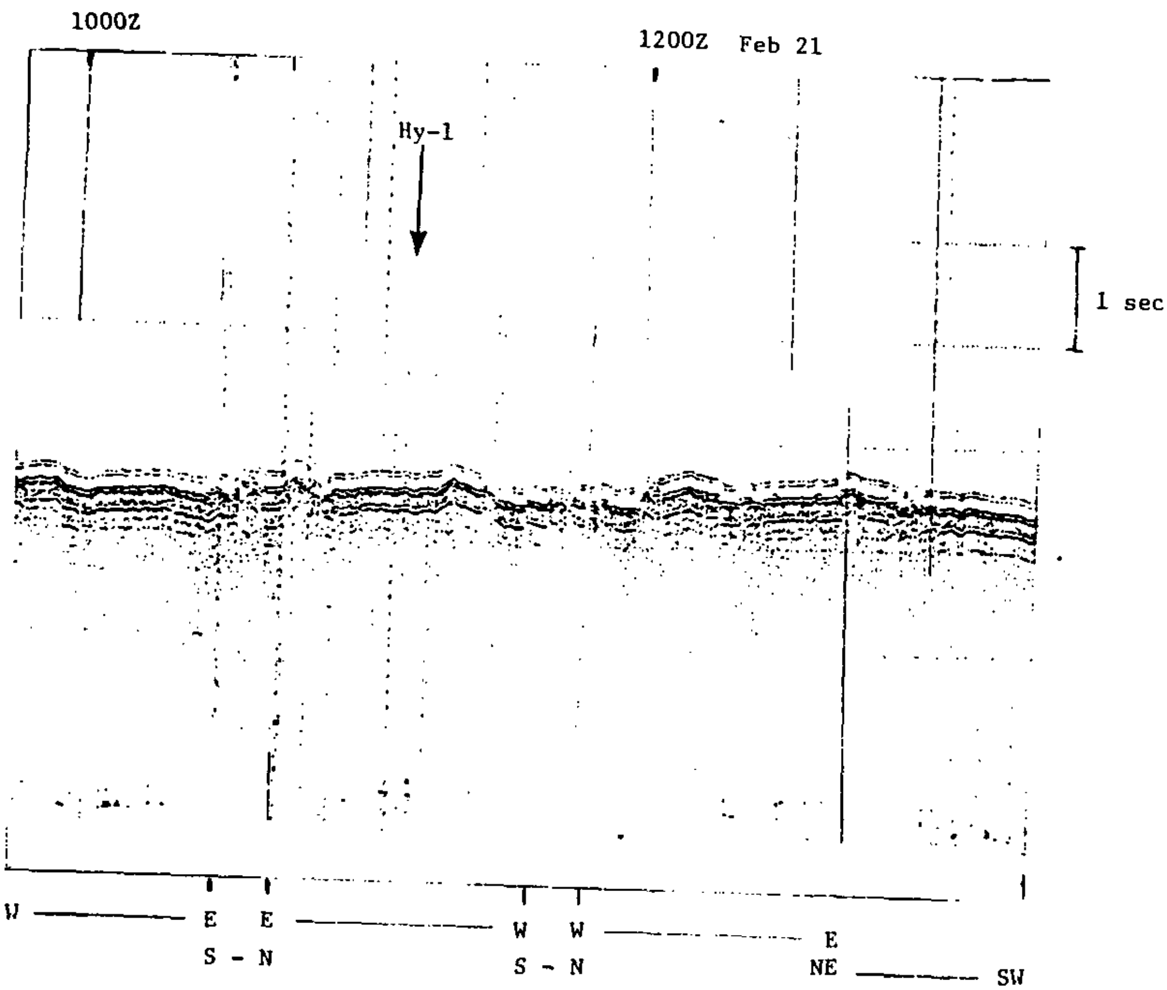


Figure 92-5. Airgun records in the vicinity of Site Hy-1 (ARIADNE II, Feb. 21).

basalts, sediments and sediment pore waters we also hope to constrain models of post-depositional geochemical activity.

A second goal of Leg 92 is to recover sediments useful for interpretation of the paleoceanography and paleoclimatology of the South Pacific subtropical gyre. The Leg 92 sites will recover the southernmost HPC cores from the East Pacific and will thus provide the only undisturbed Neogene sections from that large portion of the world's oceans. To insure stratigraphic continuity for both paleoceanographic and paleohydrothermal studies, we will recover paired HPC cores from two locations at each site, a total of 6 or 7 such pairs.

A third objective of the leg is to drill relatively deep into the oceanic basement at Site Hy-1 (the oldest site) in order to determine the petrology and permeability of intermediate age, fast-spread crust. A second ship, the ASTROLABE will rendezvous with the CHALLENGER so that personnel involved with packer, televiewer and logging experiments can be transferred to and from the ship.

The fourth objective of Leg 92 will be to return to Hole 504B which as drilled to a depth of 836 m in 1979 (Legs 69, 70) and then deepened to 1350 m (1075.5 m sub-basement) in 1981 (Leg 83). Two critical experiments are planned at the site; the first will be to obtain downhole temperature measurements and large-volume samples of formation water in the hole. This location provides an excellent opportunity to collect formation water from crustal layers 2B and 2C, and experiment of considerable importance to the marine geochemical community.

The second objective at Site 504 is to

TABLE 1

LEG 92 PROPOSED SITES

Site	Priority	Coordinates	Water Depth (m)	Distance From Land (n. mi.)	Nearest Land	Maximum Penetration (m)	Objectives
Hy-1	1	18°49'S 129°45'W	5538	>200	Oeno Is. (UK)	180	Nature of hydrothermal sediments in an area closed to circulation. Petrology and permeability of intermediate age, fast-spread crust.
Hy-A	2	19°01'S 124°39'W	3675	>200	Ducie Is. (UK)	160	Nature of sediments deposited during Neogene period of increased spreading rate and hydrothermal activity. Petrology of fast-spread crust in an area of open circulation.
Hy-2	1	19°26'S 119°48'W	3620	>200	Ducie Is. (UK)	160	Nature of hydrothermal sediments in an open circulation. Petrology of fast-spread crust.
Hy-3	1	18°55'S 116°53'W	3450	>200	Ducie Is. (UK)	50	Compare nature of sediments and pore water in areas of high, medium and low heat-flow.
504B	1	1°14'N 83°44'W	3470	>200	Ecuador	NA	Seismic velocity structure of the crust. Pore water composition in Layer 2C.

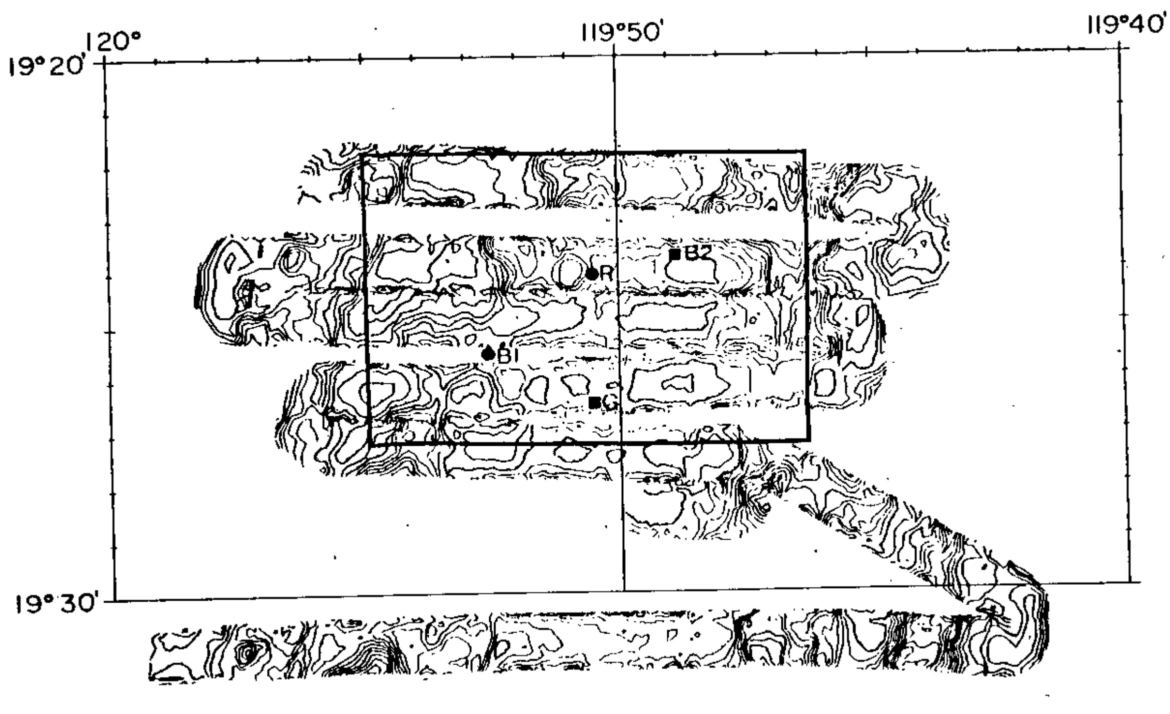


Figure 92-6. SEABEAM (ARIADNE II) survey of Area II. Inset square shows location of detailed survey area shown in Fig. 92-7. Contour interval is 20 m. Contours labelled on Fig. 92-7. R, G, Bl and B2 indicate position of navigation transponders.

conduct the oblique seismic experiment (OSE) originally scheduled for Leg 82. The object of this experiment is to determine the seismic velocity structure of the crust in the vicinity of the site as a function of azimuth and depth. To provide sufficiently dense coverage to ensure that changes in travel times, particle motion and amplitude are continuous requires a shooting pattern with shot and receiver separations of at least one wavelength (150 m in water, 500 m in basalt). To accomplish this, the shooting pattern shown in Fig. 92-2 will be fired with the seismometer clamped at four depths in the hole (<50 m, 350, m, 700 m and > 1000 m). The shooting, which will be conducted by the ELLEN B. SCRIPPS will take approximately four days. An additional five days have been allocated at the site for re-entry and hole conditioning, the temperature logging program and water sampling. If time allows, it is also planned to conduct a final packer test at the bottom of the hole and to log the hole with a multichannel sonic tool.

Site Hy-1 (Area I)

Position: 18°49'S 129°45'W Priority: 1

Water Depth: 5538 m

Sediment Thickness: 80 m, above strong smooth reflector

Proposed Drilling Program: Position ship at highest heat-flow area of Area I (which is still quite low) using transponders left by Site Survey cruise. Hydraulically piston core sediments twice to provide stratigraphic overlap. Drill pilot hole to determine feasibility of re-entry hole. Set cone and drill re-entry hole to 100 m. Log hole with caliper, televiewer and multichannel sonic tool to determine feasibility of packer experiment. Perform packer-hydrofracture experiment.

Objectives: Recover 30 my record of sedimentation in subtropical South Pacific. Determine petrology of basalt formed at a fast spreading ridge and recovered from a portion of the crust which is now sealed to hydrothermal convection. Obtain pore water profile. Examine nature of fracture patterns, permeability and physical properties of basalt. Determine nature of smooth reflector at 80 m depth.

Heat Flow: Yes. Logging: Yes.

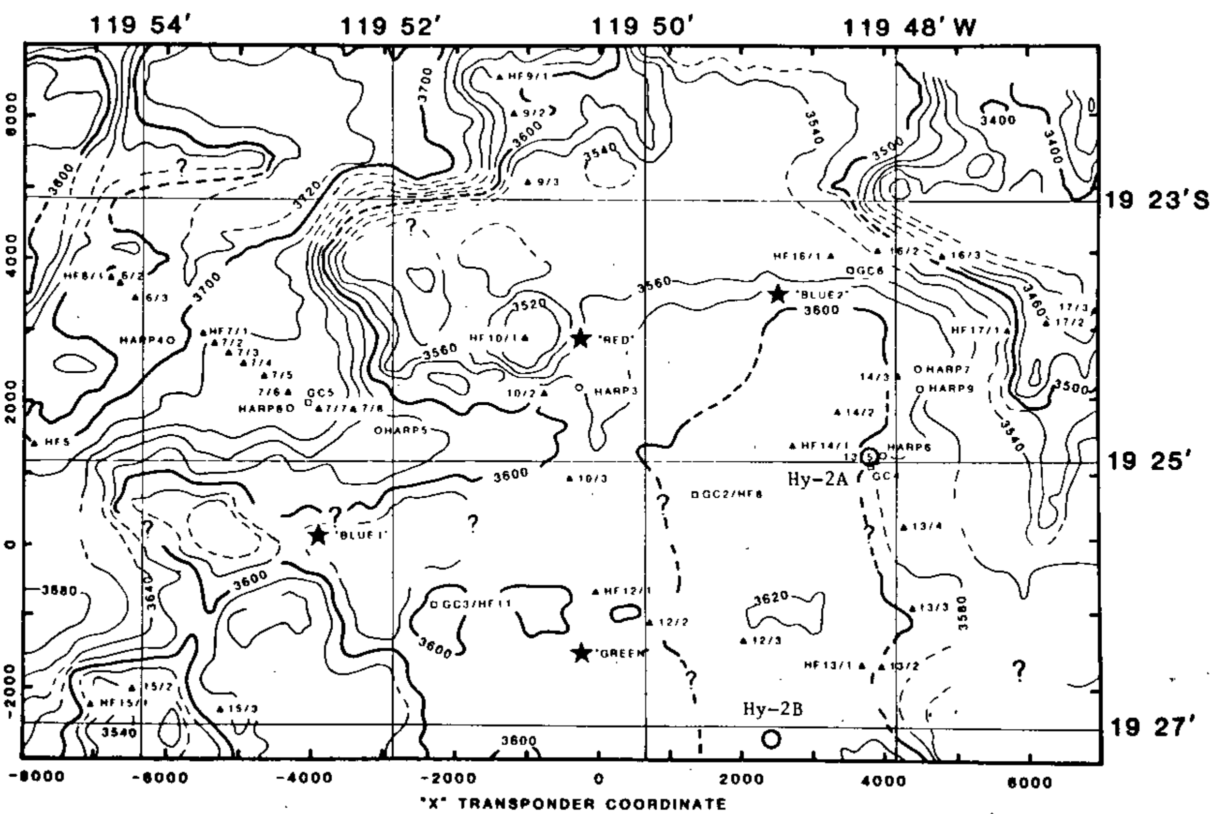


Figure 92-7. Detail of Area II showing location of site survey stations and Sites Hy-2A and 2B.

Seismic Profile: CONRAD 13; ARIADNE II, 21 February 1981 (Figs. 92-3, -4, and -5).

Sediment Types: Pelagic clay over mixed calcareous and siliceous ooze underlain by calcareous ooze with a hydrothermal sediment component.

Site Hy-2 (Area II)

Position: 19°26'S 119°48'W Priority: 1

Water Depth: 3620 m

Sediment Thickness: 30 m (Hole A)
50-70 m (Hole B)

Proposed Drilling Program: Position ship at moderate heat-flow area of Area II (Hole A) using transponders left by Site Survey cruise. Hydraulically piston core sediments twice to provide stratigraphic overlap. Offset to low heat-flow area of Area II (Hole B). Hydraulically piston core sediments twice. Rotary drill basalt at Hole B to 100 m or bit destruction.

Objectives: Obtain 9 my record of sedimentation in order to study the history of hydrothermal activity at the East Pacific Rise crest and subtropical South Pacific pelagic and biogenic sedimentation. Determine petrology of basalt formed at a fast-spreading ridge and recovered in an area of open circulation for comparison with basalts from Area I which is sealed to hydrothermal convection. Compare sediments and pore waters in low versus moderate heat-flow areas.

Heat Flow: Yes. Logging: No.

Seismic Profile: CONRAD 13; ARIADNE II, 27 Feb. 1981 (Figs. 92-6, -7 and -8).

Sediment Types: Carbonate ooze and mixed carbonate and hydrothermal sediments.

Site Hy-3 (Area III)

Position: 28°55'S 116°53'W Priority: 1

Water Depth: 3450 m

Sediment Thickness: 50 m (Hole A)
30 m (Hole B)
20 m (Hole C)

Proposed Drilling Program: Position ship at low heat-flow area of Area III (Hole A) using transponders left by Site Survey. Hydraulically piston core sediments twice to provide stratigraphic overlap. Offset to moderate heat-flow area (Hole B) and hydraulically piston core sediments twice. Offset to high heat-flow area (Hole C) and hydraulically piston core sediments twice.

Objectives: Obtain 5 my record of sedimentation at high, medium and low heat-flow areas for comparison of sedimentation, alteration and pore water chemistry. Obtain sediments for study of pelagic and biogenic sedimentation in subtropical South Pacific.

Heat Flow: Yes. Logging: No.

Seismic Profile: CONRAD 13; ARIADNE II, 4-5 March 1981 (Figs. 92-9, -10 and -11).

Sediment Types: Carbonate ooze and mixed carbonate and hydrothermal sediments.

Site Hy-A (Alternate Site)

Position: 19°01'S 124°39'W Priority: 2

Water Depth: 3675 m

Sediment Thickness: 60 m

Proposed Drilling Program: Hydraulically core sediments twice. If time is available, wash to basement and rotary drill basalt to 100 m or bit destruction.

Objectives: Recover record of sedimentation that spans the time interval of the proposed step increase in spreading rate and hydrothermal activity during the late Miocene. Recover basalt from a fast-spreading ridge in an area which is not sealed to convection.

Heat Flow: Yes. Logging: No.

Seismic Profile: CONRAD 13, 14 March 0530 hrs. (Fig. 92-12).

Sediment Types: Carbonate ooze and mixed carbonate and hydrothermal sediments.

Site 504B

Position: 01°14'N 83°44'W Priority: 1

Water Depth: 3470 m

Sediment Thickness: 275 m

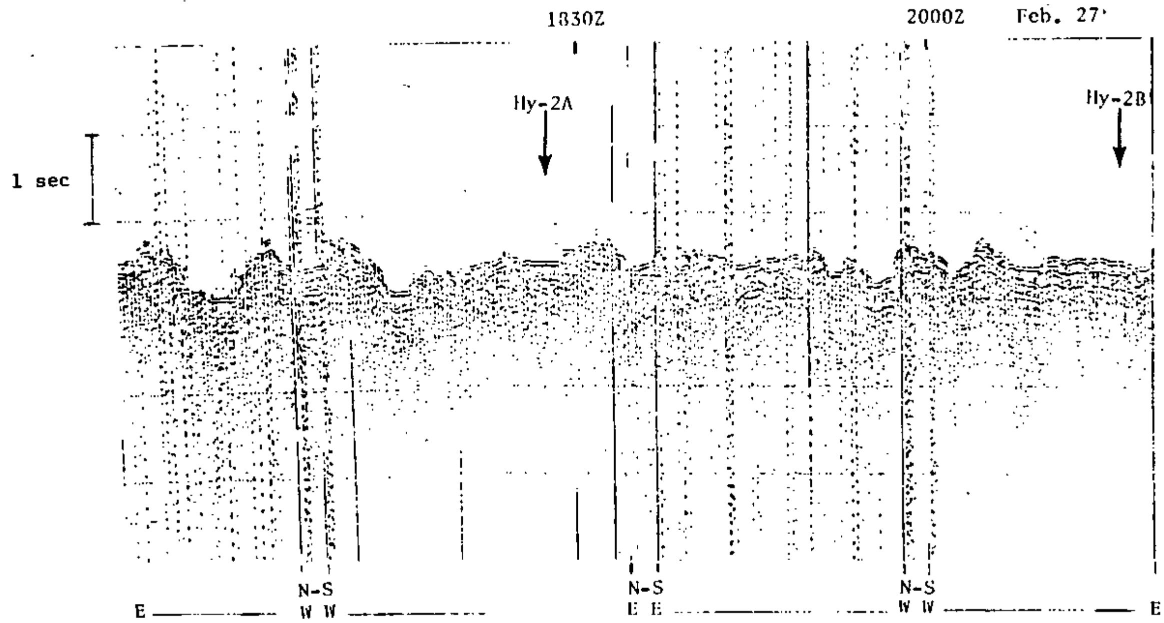


Figure 92-8. Airgun records in the vicinity of Sites Hy-2A and 2B (ARIADNE II, Feb. 27).

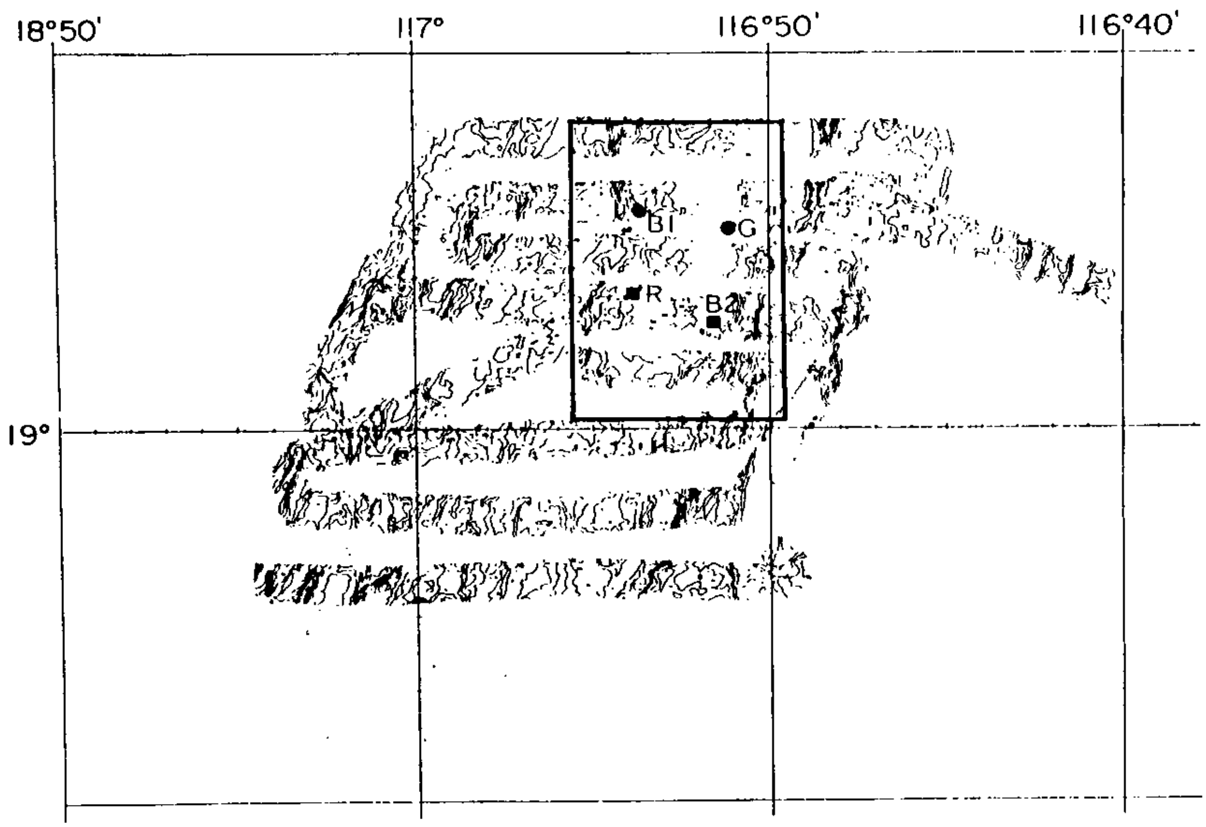


Figure 92-9. SEABEAM (ARIADNE II) survey of Area III. Inset square shows location of detailed survey area shown in Fig. 92-10. Contour interval is 20 m. Contours labelled on Fig. 92-10. R, G, B1 and B2 indicate position of navigation transponders.

Proposed Program: No drilling is proposed. After the hole has been located and re-entered, the temperature will be logged and a large volume water sample will be taken near the bottom of the hole. The oblique seismic experiment will then be run with the seismometer clamped at several levels in the hole. If time is available, a packer test will be run near the bottom of the hole and the entire hole will be logged with the multichannel sonic tool.

Objectives: Determine composition of Layer 2C formation water. Determine seismic velocity structure and anisotropy of the crust and upper mantle. Measure permeability of the upper levels of the ocean crust.

Heat Flow: Yes. Logging: Yes.

Seismic Profile: CONRAD 21-17, 2553 (Fig. 92-13).

Sediment Type: Nannofossil ooze.

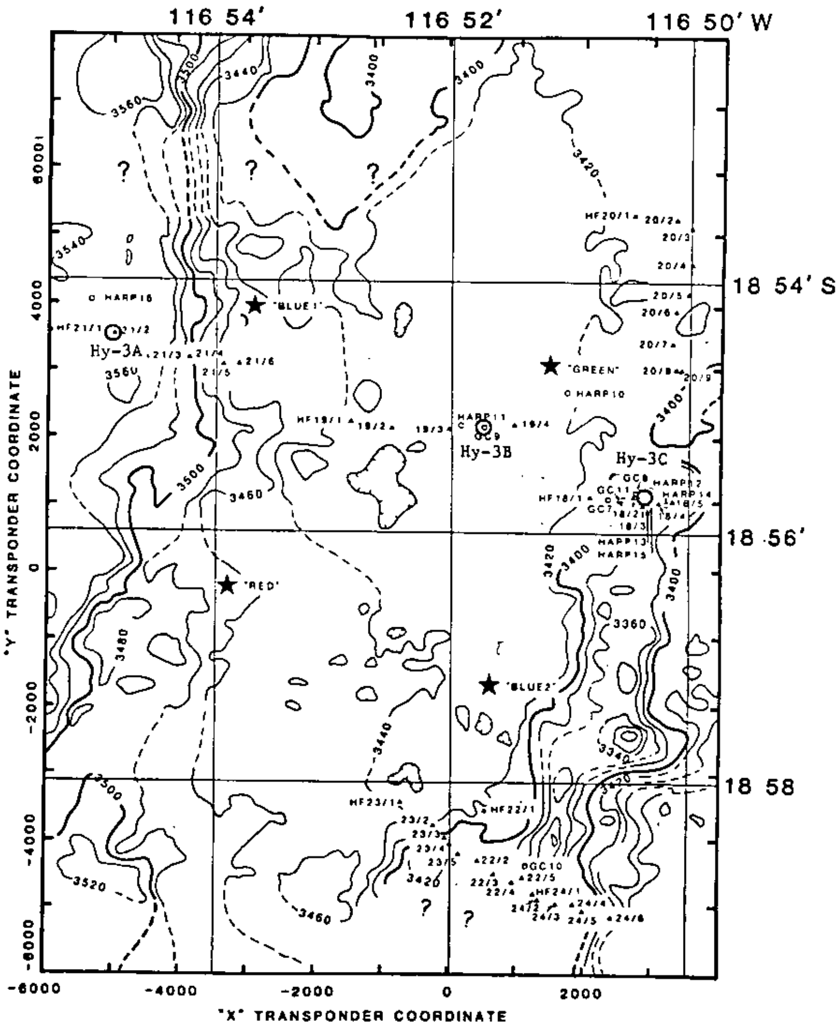


Figure 92-10. Detail of Area III showing location of site survey stations and Sites Hy-3A, 3B and 3C.

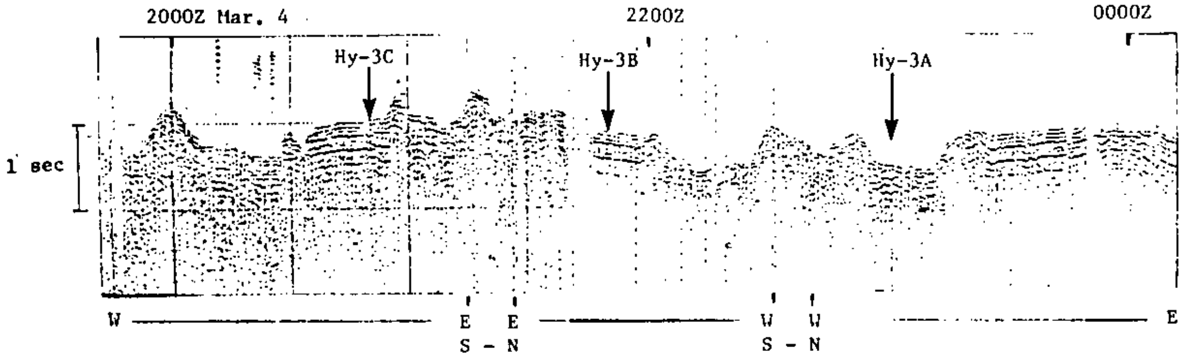


Figure 92-11. Airgun records in the vicinity of Site Hy-3A, 3B and 3C. (ARIADNE II, Mar. 4, 1981).

Figure 92-12. Airgun record in the vicinity of Site Hy-A (CONRAD 13, 14 March).

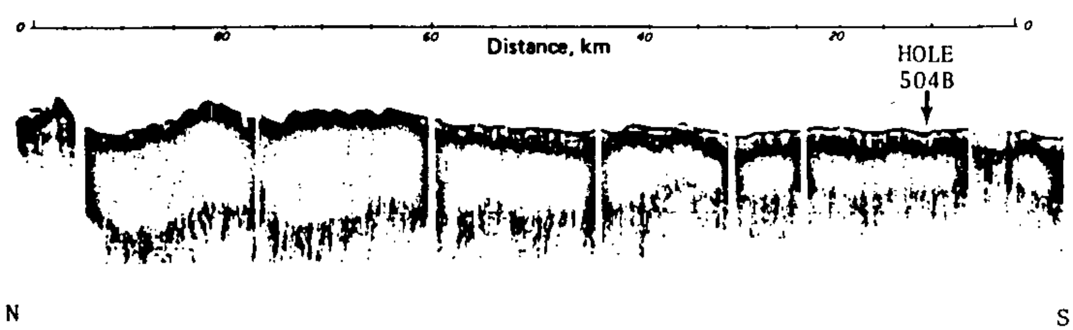


Figure 92-13. N-S profile through Site 504 showing basement topography and sediment thickness.

DEEP SEA DRILLING PROJECT

INFORMATION HANDLING GROUP

Background

The DSDP data bank is a dynamic library of information. As the Project has expanded so have the areas of responsibility of the DSDP Information Handling Group (IHG). Not only has the volume of data multiplied, but the kinds of data and information handled have also increased. The IHG manages all aspects of routine collection, storage, and retrieval of data, in addition to specialized areas of scientific interest which require computer-assisted technology. The development of tools and technology onboard Glomar CHALLENGER has required development of new software to integrate the resulting data in a harmonious fashion with other DSDP departments, creating programs to enhance their operations with greater efficiency and reliability. We have three primary goals in this work: (1) to preserve the data collected by DSDP operations for future use; (2) to make data readily available to qualified scientists upon request; and (3) to provide advice and assistance by means of computer reduction and display of data to contributors to the Initial Reports.

Data Availability

The DSDP Sample Distribution Policy restricts the release of scientific data gathered aboard GLOMAR CHALLENGER to those immediate members of the respective shipboard scientific party for a 12-month period following completion of the cruise. This policy excludes the Preliminary Report on underway data containing track charts and data indexes; these data have immediate unlimited distribution. DSDP may require reimbursement for expenses if a data request costs more than $50.

Table DSDP-1 summarizes and categorizes the data. With the exception of the seismic data, which are available only on microfilm or hardcopy, all data are stored and are available on magnetic tape and microfilm. Investigators can also obtain copies of the original data (shipboard forms) on microfilm, or they can view them at DSDP headquarters at Scripps Institution of Oceanography or at Lamont-Doherty Geological Observatory.

A major work effort towards updating the data bases for visual core descriptions, smear slide descriptions, and paleontology is in its final stage of completion. We will soon have computer-generated lithological classifications (output from JOIDESSCREEN program) through Leg 75.

The hard rock minor- and major-chemical analyses files continue to be modified and updated as more data is published and coded. The hard rock paleomagnetics data base is now available upon request for those legs specified in Table DSDP-2.

Logging data were collected on selected legs. These data are available on magnetic tape or analog strip charts for Legs 60, 61, 63-65, 67, 68, 70-76 and 78; analog records are only available for Legs 66 and 69; magnetic tapes are available for selected sites from Legs 46, 48, 50 51, 52 and 57.

Data Handling and Retrieval Tools

The special reference files (Sitesummary, Guide, Ageprofile, and Coredepth, see Table DSDP-2) are used independently and in coordination with other files in (a) multi-step searches, and (b) generation of standard files with assigned ages (from Ageprofile) and/or sub-bottom depths (from Coredepth).

The Sitesummary file contains key data for each hole including drilling statistics, site location, age of sediments, presence of basement sediment and hard rock descriptions. The file is continually updated from data reported in DSDP Initial Reports, Hole Summaries, and Initial Core Descriptions.

The Guide (to DSDP cores) also summarizes data published in the Initial Reports (Legs 1-34)[1], but in a different format than in the Sitesummary file. It comprises thirty categories of data which summarize the characteristics of each core. The Guides are available on microfiche and magnetic tape. All of these files can be accessed by DATAWINDOW - DSDP's principal program for the retrieval and display of data.

DATAWINDOW transfers data between tape and disk storage, updates tapes, corrects records, and monitors the tape status within a tape series (storage unit for our data base files). Access is accomplished through

[1]DSDP is no longer encoding for the Guides.

Table DSDP-1.

DEEP SEA DRILLING PROJECT - DATA BASE STATUS
Physical Properties, Quantitative and Analytical Core Data

DATA FILE	LEGS	COMMENTS
Carbon-carbonate (shore lab)	1-79	No data for Legs 46, 72
Grain-size (sand-silt-clay) (shore lab)	1-76	No data for Leg 16. Legs 64 & 65 not yet available.
G.R.A.P.E. (gamma ray attenuation porosity evaluator) (shipboard measurements, processed and edited onshore)	1-87	No data collected on Leg 46. Leg 45 GRAPE is not complete.
Hard Rock Major-Element Chemical Analyses (prime and onshore labs)	13-19, 22-30, 32-39, 41, 42A, 43, 45-46, 49, 51-55, 58-65, 68-70.	No data for Legs: 1-12, 20-21, 31, 40, 42B, 44, 47-48, 50, 56-57. Includes igneous and metamorphic rock and sediment composed of volcanic material.
Hard Rock Minor-Element Chemical Analyses (prime and onshore labs)	13-19, 22-26, 28-34, 36-39, 41-42A, 43, 45-56, 49, 51-55, 58-65, 68-70	No data for Legs: 1-12, 20-21, 27, 35, 40, 42B, 44, 47-48, 50, 56. Same set of data source as major-element file.
Hard Rock Paleomagnetics	14-16, 19, 23, 25-29, 32-34, 37-38, 41-43, 45-46, 49, 51-55, 58-66, 70.	No data for Legs: 1-13, 17-18, 20-22, 24, 30-31, 35-36, 39, 40, 47-48, 50, 56-57.
Sonic Velocity (shipboard, Hamilton Frame)	3-90	Leg 71 not completed.
Water Content (shipboard lab)	1-88	No data for Leg 41
Long-core Spinner Magnetometer Sediment Paleomagnetics	68, 70-72, 75	From hydraulic piston cores. This is a CLOSED data base due to rust contamination of cores and sediment disturbance.

Table DSDP-1 (continued)

DEEP SEA DRILLING PROJECT - DATA BASE STATUS
Physical Properties, Qualitative and Analytical Core Data

DATA FILE	LEGS	COMMENTS
Discrete Sample Magnetics, sediment	71-73, 75	From hydraulic piston cores.
Alternating Field Demagnetization	72, 73, 79	From hydraulic piston cores.

Lithological and Stratigraphic Core Data

DATA FILE	LEGS	COMMENTS
Paleontology (onshore labs)	1-44, 54-58	From Initial Reports. Includes 10,000 species from 24 bug groups.
SCREEN	1-44	Output from JOIDESSCREEN. Computer-generated lithological classification includes basic composition data, average density, and age of layer.
Smear Slide Descriptions	1-31	Shipboard observations.
Thin Sections	49 only	Legs 37, 45, 46, 51-55, 57-64 keypunched.
Visual Core Descriptions	1-73	Shipboard observations.

independent easily modifiable data dictionaries which the program references in both its interactive and batch modes of operation. Individual requests can easily be constructed using DATAWINDOW's versatile search commands. Through DATAWINDOW, investigators can search the data bases by leg(s), site(s), ocean area(s), and age(s), in addition (or linked) to specific elements stored in each data base.

Areas of Support and Endeavor

The DSDP programming staff continues to provide the engineering group with mathematical and computer support for advanced engineering data collection (shipboard), reduction, and analysis.

Requesting Information or Data

We encourage researchers to use all these extensive data systems described above. Address your requests for information or data to:

Information Handling Group
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
(Tel: (619) 452-3526.

(Nancy Freelander, DSDP Information Handling Group, April, 1983).

CORE REPOSITORIES

Samples from DSDP Legs 1-84 are available to investigators for studies which will result in published papers. We encourage investigators who desire samples to obtain a statement of the NSF/DSDP sample distribution policy and a sample request form from the DSDP Curator before submitting requests. (A statement of the sample distribution policy also appears in the Initial Reports and in the Initial Core Descriptions.) We ask that requests for samples be a specific as possible. Requestors should specify the hole, core, section, interval in centimeters measured from the top of each section, and sample volume in cubic centimeters. Refer to the graphic core descriptions in the Initial Reports and/or the Initial Core Descriptions for core details.

Samples for research which will be reported in publications other than the Initial Reports cannot be distributed until one year after the completion of a cruise or two months after publication of the Initial Core Descriptions for the cruise, whichever occurs sooner. Beginning with Leg 76, the Initial Core Descriptions are available only in microfiche. This change in production format does not affect the sample distribution policy.

The DSDP Curator can approve many standard requests in his own office, but requests for material of particularly high interest (e.g., certain hydraulic piston cores, key stratigraphic boundaries) or for large volumes of material must be forwarded by the Curator to the NSF Sample Distribution Panel for review and approval.

Cores form the Atlantic and Antarctic oceans and the Mediterranean and Black seas (Legs 1-4, 10-15, 28, 29, 35-53 and 71-82) are at the East Coast Repository at the Lamont-Doherty Geological Observatory. Cores from the Pacific and Indian oceans and the Red Sea (Legs 5-9, 16-27, 30-34, 54-70, 83-90) are at the West Coast Repository at the Scripps Institution of Oceanography. Due to a lack of core storage space at the West Coast Repository, only the work halves of the cores from Legs 87-90 are racked and accessible to the scientific community. The archive halves are still in their shipping boxes and inaccessible and will remain so until temporary or permanent storage becomes available. The thin sections and smear slides from a particular cruise are stored at the same repository as the cores from that cruise. Photographs of all cores and prime data and publication from all legs are kept at each repository. Frozen samples (collected specifically for organic geochemical analyses), interstitial water samples, and gas samples from all DSDP legs are kept at the West Coast Repository. Interested scientists may view the cores, core photographs, or other associated data at either repository by making arrangements in advance with the Curator. Investigators wishing to visit the West Coast Repository are urged to request appointments well in advance because the repository is currently booked with visitors three to four months ahead.

Table DSDP-2

DEEP SEA DRILLING PROJECT - DATA BASE STATUS
Underway Data

DATA FILE	LEGS	COMMENTS
Bathymetry	7-9, 13-56, 61-80	
	7-9, 12-80	
	3-80	
	1-80	Seismic data available only in hardcopy or microfilm.
Merged format files (MDG77)	1-80	
SPECIAL REFERENCE FILES		
Sitesummary	1-87	Hole oriented. Regularly updated.
DSDP/Guide	1-34	Core oriented. Microfiche or tape.
Ageprofile	1-86	Hole, core, section. From biostratigraphy.
Coredepth	1-91	Hole-core. Primary reference tool.
AIDS TO RESEARCH		
Datawindow		Search & retrieval program, data base maintenance.
Mudpak		Plotting program, handles multiple parameters.
Maps		Topographic maps with DSDP sites.
DASI/Inquiry		DSDP affiliated scientists & institutions searchable.
Keyword Index-Search		Constructed from bibliography & sample request files. Searchable keywords & site numbers.
Sample Records		Point data inventory.
Data Data		Series of informal specific memoranda containing detailed descriptions of procedures and capabilities of the IHG.

Please address your questions or sample requests to:

The Curator
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
University of California, San Diego
La Jolla, CA 92093
Tel. (619) 452-3528

(Amy B. Altman, DSDP Assistant Curator).

Major- and Minor-Element Analyses

Major- and Minor-Element Analyses for igneous rocks are now available as listings or for computer searches. Both shipboard and shore laboratory data are included for DSDP Legs 13-62 and Legs 63-65. For information contact:

Donna Hawkins
Information Handling Group
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: (714) 452-3526

Now Available
Geological map of the Indian Ocean

The Geologic Map of the Indian Ocean was produced by B. C. Heezen, R. P. Lynde, Jr., and D. J. Fornari to accompany the book, *Indian Ocean Geology and Biostratigraphy* (1977). The colored map shows the location of DSDP sites along with:

- a generalized stratigraphic column for each site
- age of oceanic basement
- bathymetry
- fracture and earthquake zones
- biostratigraphy
- magnetic stratigraphy

DSDP has a limited number of these maps available at no cost. Contact:

Trudy Wood
Information Handling Group
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: (714) 452-3526

Recipients of DSDP Samples and Data

Remember to send five reprints of any paper you have published using data or samples collected by or in conjunction with the Deep Sea Drilling Project to the DSDP Curator.

Curator
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093

Major- and Minor-Element Analyses

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- bathymetry
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JOINT OCEANOGRAPHIC INSTITUTIONS, INC.

REPORT FROM JOI INC.

EXPLORER Scientific Laboratories

The final layout for the EXPLORER laboratories was submitted to the National Science Foundation in December 1982 for transmittal to lockheed, the Systems Integration Contrator. The JOIDES PCOM meeting which followed in January 1983 included a visit to the ship anchored in Suisun Bay. Captain Robert Dinsmore of Woods Hole Oceanographic Institution, who has led the laboratory layout effort, together with architect Mr. Gerald Schiff were on hand in the upper and lower 'tween deck areas of EXPLORER to describe the laboratory layouts on site. The following day during the PCOM meeting, they also provided a more detailed discussion of the laboratories and how the layout was developed.

JOI Site Survey Program

The Mississippi Fan Site Survey was completed in December 1982 and the results were presented to cruise scientists and the Pollution Prevention and Safety Panel in January 1983.

The contract to L-DGO for the Morocco Survey is in the final stages of the approval process, funding is in hand and Dr. Dennis Hayes notes that mobilization for the R/V CONRAD cruise has begun.

IPOD SITE SURVEY DATA BANK

The IPOD Site Survey Data Bank at Lamont-Doherty Geological Observatory has recently (September 1982-January 1983) received the following data:

-Cruise report from IPOD Site Survey, Mesozoic Pacific (KK816062604), from F. Duennebier, Hawaii Institute of Geophysics.

-Site Survey cruise report for Site ENA-3 and full sized copies of the geophysical contour maps compiled in the area, from B. Tucholke, WHOI.

-Corrected digital data for R/V FRED MOORE cruises 012 through 017 (IPOD Site Surveys, Caribbean and South Atlantic) and corrected blackline tract charts, from P. Ganey UTMSI.

-Track charts and 9 processed multichannel seismic sections from line SO-7 (R/V SONNE) in the area of Leg 90 sites, from K. Hinz, BGR.

-Well log data from offshore New Jersey oil and gas wells (in the area of Leg 95 New Jersey Transect sites), from NGSDC.

-Digital navigation merged with underway geophysics for CHALLENGER Legs 82-86, from DSDP.

-Digital navigation merged with underway geophysics, 2 rolls of microfilm (bathymetry, navigation, seismic reflection (air gun) and 3.5 kHz records) and report on pore water chemistry from R/V THOMAS WASHINGTON cruise (ARIADNE, Leg 2), and IPOD Site Survey in the East Pacific Rise (for Leg 92), from P. Lonsdale, SIO.

DSDP Site Map Updated

Topography of the Oceans with Deep Sea Drilling Project sites now available through Leg 82. To request map contact:

Barbara J. Long
Information Handling Group
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: (714) 452-3506

Sediment Paleomagnetism Data Now Available

The sediment paleomagnetism data base contains shipboard paleomagnetic measurements taken by the discrete-sample spinner magnetometer, the alternating-field demagnetizer and the long-core spinner magnetometer. The file is restricted to paleomagnetic measurements of cores recovered by the hydraulic piston corer. The long-core spinner-magnetometer sediment-paleomagnetism file is complete with measurements from DSDP Legs 68, 70-72 and 75. Discrete-sample spinner magnetometer sediment-paleomagnetism data are available for DSDP Legs 71-73 and 75.

Address requests for these data to:

Donna Hawkins
Information Handling Group
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: (714) 452-3526

LETTER FROM THE PLANNING COMMITTEE CHAIRMAN

J. Honnorez

I would like to emphasize only one of the highlights of the last JOIDES Planning Committee meeting (25-28 January in San Francisco) because of its obviously vital significance to the JOIDES community. On the last day of the meeting Dr. Allen Shinn, Director of the Office for Scientific Ocean Drilling of the National Science Foundation announced that a third drilling platform (D/V SEDCO 472) had become available at a competitive price because of the presently depressed mobile drilling rig market. This unexpected option surfaced just in time to be taken into consideration by the Ad Hoc Advisory Group on Crustal Studies recently designated by Dr. Edward A. Knapp, the new Director of NSF.

The broad purpose of this "blue ribbon committee" was "to provide advice, recommendations, and counsel on major goals and priorities pertaining to NSF activities and programs relating to crustal studies, including drilling programs". Both ocean floor and continental scientific drilling programs were to be considered. Among other specific tasks, the "blue ribbon committee" had to advise Dr. Knapp on the relative merits of D/V GLOMAR CHALLENGER, EXPLORER and a third drilling platform. The budget for scientific ocean drilling was also to be considered as part of the budget for crustal studies. The Ad Hoc Group chaired by Dr. Charles L. Drake was made up of fifteen earth scientists and engineers (including one non-member). The Ad Hoc Group met on February 1983 and unanimously recommend in its April 1983 report that "scientif (ocean) drilling should continue..., th additional foreign participants be invited t join" and that "this new (drilling platforn option...is the most desirable for continuatio of ocean scientific drilling."

As a direct consequence of these recommendations, JOIDES is once more facing a novel situation: we must consider a third drilling platform costing about the same as the D/V GLOMAR CHALLENGER to operate and (re)convert to deep sea drilling but with possibilities often quite different from both other vessels (see following table). Some of these differences are a scientific party as large as on the EXPLORER, laboratory space twice that of the CHALLENGER but half that of the EXPLORER, the use of a 6000 ft riser at least from time to time, etc. Finally, the actual capability of the third platform to work in high latitudes is still unknown.

Even though the US Congress and the Office of Science and Technology Policy of the White House have not yet allowed that NSF contract the new drilling vessel, I am much more optimistic than two months ago. Also it becomes urgent for JOIDES to have the new Science Advisory Structure (SAS) ready to function as soon as AODP is approved and funded. Our task will be to finalize the SAS and to come up with a more defined operational plan for the initial phase of AODP. We will need the collaboration of all the existing panels and working groups of JOIDES to meet the deadlines.

DRILLSHIP OPTION COMPARISONS

	CHALLENGER	SEDCO-472	EXPLORER
Technical Summary			
Length	400 ft	470 ft	617 ft
Beam	65 ft	70 ft	116 ft
Operating Draft	22 ft	25 ft	30 ft
Operating Displacement	10,600 tons	16,700 tons	44,400 tons
Installed Power	7,700 KW	14,700 KW	27,500 KW
Speed	12 Kts	14 Kts	10 Kts
Crew	45	55	55
Scientific Party	29	50	50
Quarters	74	116	150
Liveability	poor	fair-good	excellent
Drill String	23,000 ft	30,000 ft	33,000 ft
Heave Compensation	good	good	good
Mud/Cement Systems	limited	good	good
Casing Storage	limited	good	good
Riser & BOP	no	6,000 ft+	maybe someday
Weather Limits for drilling	less than other ships, but not precisely known	45 kts wind 15/26 ft seas 2.5 kt current	45 kts wind 15/26 ft seas 2.5 kt current
Sea Keeping	good	good+	excellent
High Latitude Capability	fair	fair-good	good
Lab. Space	4,500 ft2	9,000 ft2	19,000 ft2
Cost Summary			
Day Rate	$33,600	$32,200	$33,600
Fuel @ $320/ton	3,520	5,400	7,200
Fuel Type	Diesel	Diesel	Heavy Oil
Other Costs	12,200	12,200	11,800
Total	$49,320	$49,800	$52,600
Budget Estimate	$53K/day	$53K/day	$57K/day
Capital Investment	$11M	$10M	$90M

REPORT FROM NSF

Office of Scientific Ocean Drilling

Status of AODP

An Advisory Group on Crustal Studies was convened by Dr. Ed Knapp, the new Director of the National Science Foundation, on 3 & 4 February 1983 to review the full range of crustal research supported by the Divisions of Earth and Ocean Sciences and the Office of Scientific Ocean Drilling. The committee's charge was to review the cost of a scientific ocean drilling program within the context of other explorations of the earth's crust and within the constraints of the National Science Foundation's budget. In addition, the committee was asked to provide a recommendation for the future of ocean drilling in relation to crustal research and to consider the most effective drilling platform to carry out such a program.

The Crustal Committee's final report will be available in mid-April. The significant recommendations concluded at the meeting have already been relayed to the National Science Foundation and Congress. They are summarized as follows:

1. The committee unanimously recommended continuing scientific ocean drilling as a first-order priority in the earth and ocean sciences.

2. International participation is central to the scientific planning of a scientific ocean drilling program and the commmittee recommended that the international participation be expanded with a goal of 50% of the funds for operational support to come from foreign participants.

3. The EXPLORER, CHALLENGER and a third leased platform options were all evaluated. The **leased platform option is strongly recommended** by the committee because present market conditions in the offshore drilling industry make ships available for lease at this time on very favorable terms. At present there are four to six privately owned, modern dynamically-positioned drillships with the capability to carry out deep sea drilling. Each of these ships has more space, greater seakeeping ability and can handle a longer drill string than the CHALLENGER and is equipped to handle a riser in water depths up to approximately 2000m (6000 ft) and possibly up to 2500 m (8000 ft).

If the third leased platform option were not available at a reasonable cost, then the option to refit the CHALLENGER and extend her services a few years was recommended. The EXPLORER, at present, because of budgetary constraints and the high conversion cost is the least attractive option.

In the coming months the National Science Foundation plans to competitively select a science operations contractor and a drillship, secure international agreements to support the program, and support the necessary scientific activities to resume drilling in FY 1985. In addition the NSF will continue to support current drilling activities and related science.

Annual IPOD Meeting

The annual IPOD meeting will be held on 21 and 22 April 1983 in Easton, Maryland. As last year, observers will be invited from countries who have expressed continued interest in the ocean drilling program. Here they will be brought up to date on the most current plans, ask questions from the present IPOD members and state their scientific priorities and goals with respect to scientific ocean drilling and related geophysical investigations.

Other News

Dr. Ian MacGregor, Chief Scientist for the Office of Scientific Ocean Drilling is transferring to another branch of the National Science Foundation. His new title is Deputy Director, Division of Earth Science. Ian will be missed in OSOD, but his presence in the Earth Science Division along with his knowledge of ocean drilling will greatly enhance future cooperative studies between scientific ocean and continental drillers.

The Office of Scientific Ocean Drilling as of 23 January 1983 is placed back into the AAEO Directorate of the NSF. The OSOD remains as a unit but reports at a division level to the Assistant Director. This change has no impact on scientific ocean drilling. (Peter Borella, Office of Scientific Ocean Drilling, 22 March 1983).

STATUS OF IPOD REFERENCE CENTER

Work Completed to Date

Selection of samples by W. Riedel and J. Saunders is now complete up to the end of Leg 60. Of 507 samples from Legs 47 through 60, 110 are for Foraminifera, 260 for Nannofossils, 266 for Radiolaria and 178 for Diatoms.

Nannofossils/lithology

Completed: Legs 1, 2, 7-12, 16-23 (a total of 1241 with 2 slides ready for each reference center).

Foraminifera

Work in Basel: All samples that have been received have been processed. Legs included are: 1-26 (Site 25a), 36-39. Still awaited are samples requested from Legs 26 (257) through 35 from Scripps and Legs 40-45 from Lamont.

Work in Lower Hutt, New Zealand: 54 samples from Legs 1-6 that would not split 8 ways were listed by Saunders and dispatched from the East and West Coast repositories. It is through that these have been processed in New Zealand and are ready for splitting.

Diatoms

Twenty-six samples from the eastern tropical Pacific were taken by Y. Takayanagi at the end of 1981 to make trial Diatom preparations. No word has yet been received on the results.

Radiolarians

Lamont offered to make the radiolarian preparations.

Publicity

New Zealand is preparing to publicize its holdings and Basel has already done so at meetings and is ready to put notices in suitable publications. The new Science Services brochure will contain a statement on the existence of the centers.

Reference Center Inventory List

J. Saunders is working with the Information Handling Group on the content of the Reference Center Inventory List which will form the index to the reference collections. Saunders suggests the eventual production of microfiches arranged in different ways, e.g. by Fossil Group, by Site, by Age, by Ocean Basins etc. This will be an inexpensive way of answering queries from prospective visitors to the centers. (W. R. Riedel and J.B. Saunders, January 1983.)

JOIDES COMMITTEE AND PANEL REPORTS

EXECUTIVE COMMITTEE

Alan Berman, Chairman

The Executive Committee met 1-2 September 1982 in Kyoto, Japan.

National Science Foundation Report

NSF Budget

A. Shinn reported for the National Science Foundation. Since the last EXCOM meeting in May 1982, NSF has continued to seek approval for the Advanced Ocean Drilling Program from the Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP). OMB has requested that NSF prepare a series of analyses of cost comparisons between CHALLENGER and EXPLORER. The comparative costs in $ millions are:

EXPLORER vs.	CHALLENGER	
22.6	22.5	Operating Cost
12.1	11.5	Science Budget
12.5/yr.	2.8/yr.	Capital Cost

A review of the estimated costs was begun 1 August by a panel of experts from NOAA and the Maritime Administration. Shinn noted that the cost review is the last major hurdle before possible Administration approval of the project.

As part of the review process, H. Loweth (OMB) and D. Pewitt (OSTP) visited the EXPLORER on 16 August to become more familiar with the physcal aspects of the ship.

The U.S. Congress is proceeding the review of the 1983 NSF budget request. The budget does not contain a specific request for EXPLORER funds, although approximately $9 million earmarked for EXPLORER is contained within the NSF budget. Shinn expects the budget will be resolved within a few weeks.

The 1983 NSF budget is adequate to continue CHALLENGER drilling for 12 months, including logging and engineering development at the present level. No excess funds are available, however, to cover unexpected costs (e.g. loss of drill string).

Foreign Participation

France set up a working group at the Versailles Conference to respond to President Mitterand's request for science and technology planning. The U.S. member on that group is the President's science advisor. At a meeting in Paris last week, the following were designated as priority areas in science and technology: space program; scientific ocean drilling; and breeder reactor development.

NSF will visit Canada this fall to continue discussions on the draft Memorandum of Understanding.

A visit to Australia and New Zealand is also scheduled for this fall to discuss participation in AODP.

P. Kent requested that A. Shinn comment on the $9 million in the NSF budget allocated to scientific ocean drilling. A. Shinn presented the figures shown below:

Original Plan, assuming $9M reprogrammed

$24.7M	DSDP Budget
2.3M	EXPLORER science planning
6.0M	EXPLORER design
$33.0M	Total
-10.0M	Assumed foreign contribution
$23.0M	NSF Appropriation

Revised Plan, assuming $9M reprogrammed

$24.0M	DSDP Budget
1.0M	EXPLORER science planning
6.0M	EXPLORER design
$31.0M	Total
- 8.0M	Revised foreign contribution (without Soviets)
$23.0M	NSF Appropriation

Deep Sea Drilling Project

M. Peterson (DSDP) reported.

Leg 86. Approximately 12 holes at 6 sites were drilled on both sides of the Shatsky Rise. Relatively short HPC cores (150-175 m long) were taken and the DARPA site was drilled to basement. The Cretaceous/Tertiary boundary was cored 3 times resulting in good sections for stratigraphic studies.

Leg 87 is actually two legs, 87A and B, separated by a port call at Yokohama.

Difficulty in drilling was encountered because of sand interfering with the down-hole mechanism. The HPC was utilized in 4 of 8 holes to recover cores for soft-sediment deformation studies. Attempts were made to drill into thrust zones and were only partially successful because of problems with the hole collapsing around the drill.

Leg 88. The leg was in progress at the time of the EXCOM meeting. The bottom hole assembly (BHA) was lost, a new cone was set and drilling resumed. About 5 m of basement was penetrated. The latest report from CHALLENGER indicated that about 350 m of casing was about to be set.

The DARPA experiment has met with some difficulties, including an explosion of one of the battery packs. An initial report for Leg 88 will be published and data will be handled in accord with the usual DSDP/JOIDES procedures.

Leg 89 (11 October to 29 November 1982). This leg is expected to be technically difficult to drill considering the water depth (6075 m) at the drill site. A 23,800 ft. drill string will be used, which will be near its minimum yield strength while drilling the deepest portion of the hole. Furthermore, calm seas will be required to set the cone. New drill pipe will be used in the upper part of the drill string.

Leg 90. The procedure for core orientation is being improved to assure maximum usefulness of the HPC cores of this leg.

DSDP Publications

Five volumes of the Inital Reports will be delivered to NSF this year and one volume early next year. Plans are to publish 7 or 8 volumes next year.

Engineering

The fly-in (wireline) re-entry is completed and ready for testing.

A 14-day yard period is scheduled for CHALLENGER after Leg 88 at which time the ship will be dry-docked for extensive maintenance; 17 or 18 days will be spent in port.

DSDP Budget

The year will end with almost full fuel tanks. Logging is scheduled for Leg 89 (first leg of next year).

A slight easing of the tight budget has resulted in FY 1982 from the lack of pay increases for DSDP and Global Marine personnel. The FY 1983 budget is expected to decrease from target $22.35 million to $22.2 million.

Discussion

EXCOM members were concerned about the potential for loss of the drill string and the effects of such a loss on the remainder of the CHALLENGER drilling program. The following motion resulted:

The Executive Committee reaffirms the decision to continue with drilling as scheduled for Leg 89, subject to the operational constraints defined by DSDP.

Planning Committee Report

J. Honnorez, PCOM chairman, reported. The last PCOM meeting in Fujinomiya, Japan, 7-9 July 1982, resulted in 17 motions. Several are of direct interest to the Executive Committee (PCOM meeting minutes appear in the October 1982 issue of the JOIDES Journal).

Funding

Relative to the funding of science and technology during the hiatus period and program funding in general, J. Honnorez pointed out that the NSF budget provides funds for EXPLORER conversion, but not for adequate science and engineering technology development. The COSOD report clearly indicates the need for such development, given the increase in capabilities of EXPLORER over CHALLENGER.

Discussion resulted in the following motion:

We recognize that the EXPLORER AODP has proceeded well toward the conversion of the EXPLORER as a scientific drilling ship and how the necessary scientific strategy to make optimal use of these unique capabilities must be devleoped. Furthermore, the scientific program funds must be identified in accordance with a sound plan including surveys, syntheses and new technological develoments design to achieve the scientific objectives of high priority as given in the COSOD report. These funds should be separately budgeted from the project, ship's

conversion and operations funds to ensure that the scientific efforts remain in propoer balance with the other elements of the drilling program.

The EXCOM notes that JOI has asked the U.S. Planning Committee members to prepare a budget for th FY 84-87 period for the U.S. funds for review and approval by JOI.

EXCOM directs PCOM to develop a preliminary plan and budget for co-mingled funds for scientific and technical development including site surveys over the four years beginning FY 84. We recommend that PCOM call on advice from panels and consulting experts. Both budgets and plans for U.S. and co-mingled funds should be reviewed by the PCOM as a whole and presented to EXCOM for review at the November meeting win Austin.

J. Honnorez requested that EXCOM provide guidance on logging priorities and on the advisory panel structure during the phase-out of the current drilling program. The following motions resulted:

The EXCOM repeats its recommendation that logging should be a normal requirement of each leg, exceptions being made for example where a leg consists of shallow holes cored by HPC.

The EXCOM instructs the Planning Committee to make recommendations to EXCOM leading to the phase-out of the existing advisory panel structure and its replacement by a new panel structure more appropriate for achieving the objectives of the advanced Ocean Drilling Program.

Member Country Reports

J. Debyser reporting for France informed EXCOM that the vessel JEAN CHARCOT will circumnavigate the globe in 1984 and would be able to perform regional studies and site surveys of interest to the IPOD program. Research proposals have already been received and plans are to begin in the Pacific, then work the Indian Ocean and the Atlantic. It is therefore important to known early which ocean EXPLORER will drill first.

H. Durbaum (FRG) had no additional information to his report given at the EXCOM meeting 21-22 May 1982 in Washington, D.C..

P. Kent (UK) commented that although financial problems have existed in the UK over the past 2 or 3 years, use of DSDP data in UK universities is extensive resulting in strong support for science aspects of the drilling program. He also mentioned the possibility of hosting the EXCOM meeting in the UK next year either at Swindon (easy access from Heathrow airport) or in Glasgow with a field trip in the north country.

N. Nasu (Japan) reported. JAPEX (Japanese Petroleum Exploration Co.) seismic records across the Nankai Trough were published as part of IPOD Data Set #4, and used for Legs 87 and 88. Record shows a good example of large-scale acretion wedges. The ocean side of the plate has a graben and trough topography, whereas the Nankai Trough is smooth. the axis of the trough may migrate through time from the landward side toward the ocean side. Drilling results from Leg 87A will reconcile the multichannel record.

The Geology Council of Japan which oversees the geological scientific community, has passed all IPOD business. On 30 July the IPOD Working Group was disbanded and the Deep Sea Research Committe was formed to review proposals. In general, the Geology Council of Japan oversees science and the Ministry of Education controls the budget.

Discussion of international cooperation in site and regional surveys resulted in the following motion:

The EXCOM recommends that the Planning Committee provide a list of areas of interest and their priority as a basis for submission and coordination of site and regional survey efforts.

To this end, PCOM members should be invited to present annually the cruise programs of their institutions (or nation), followed where possible by a formal undertaking to carry out said survey in specific areas.

Coordination of scientific effort and equipment is desirable.

Role of JOI Inc. in AODP Management Structure

J. Honnorez (PCOM chairman) asked the Executive Committee to consider the concern expressed by PCOM
JOI Inc., in ...

EXCOM members explained that PCOM's concern that JOI may "filter" advice from the advisory panels is unwarranted and "Annex A" precludes filtering by JOI Inc.

Ocean/Continental Drilling Coordination

J. Honnorez expressed the concern of PCOM that many earth scientists view DSDP as a "closed" program. PCOM feels that contacts with continental geologists be expanded. EXCOM agreed and suggested that B. Raleigh act as DSDP liaison to the Continental Drilling Committee, of which he is a member.

Departure of William W. Hay as JOI President

The Executive Committee expressed their gratitude to W. Hay for his extensive and constructive participation in the Deep Sea Drilling Program.

PLANNING COMMITTEE

J. Honnorez, Chairman

The Planning Committee met 6-8 October 1982 at Lamont-Doherty Geological Observatory, Palisades, New York. Items from the minutes of that meeting are reported here.

National Science Foundation Report

S. Toye informed PCOM of NSF activities relating to funding of the Advanced Ocean Drilling Program (AODP):

Congress adjourned the previous week and will reconvene in December. The Housing and Urban Development appropriation which includes the NSF budget was passed. Ocean drilling received special attention during the appropriation process. Congress saw only a portion of the DSDP budget.

<u>$24.0M</u> for DSDP (including JOI contract) in the original NSF budget.

14.0M NSF request from Congress.

10.0M NSF/IPOD funds ($2.0M x 5 IPOD countries).

NSF/IPOD funds are actually $8.0M reflecting loss of USSR contribution.

$9.0M earmarked for AODP was noted and acknowledged, but not officially requested pending the Administration's decision regarding the future ocean drilling program. The $9.0M is no longer intact; $2.0M was used in lieu of the lost USSR contribution and $1M for site surveys.

At present the House has approved $12.0M for DSDP and no funds for AODP. S. Toye stressed that the $12.0M figures is not realistic and NSF is confident that DSDP will eventually be allocated the required $24.0M. The 1983 NSF budget is $1.02 billion, $14.0M more than requested, so other research areas will not be impacted by ocean drilling costs.

Last July the Director of NSF asked the Director of NOAA to form a committee to review cost estimates of EXPLORER conversion. The committee consists of the Associate Administrator of NOAA (J. Winchester), naval architects, Maritime Administration cost estimators and others. A two month review of the records revealed:

a) operations estimates for EXPLORER or CHALLENGER at about $50K/day ± 5% are correct.

b) conversion cost estimate for EXPLORER may be partly in error. The original estimate of $69.6M ($26.9M shipyard and $42.7M other) was revised in September to $75.6M (reflecting an engineering decision to use new diesel engines to burn heavy fuel oil). The committee estimate was $88.6M, the increase due to the estimated cost of shipyard labor. The "cost overrun" is therefore about 17%.

In response to a question on the recruitment of new members, Toye reported that negotiations with Canada are the most advanced, Australia and New Zealand are interested and currently meeting jointly to discuss membership, Petrobras (Brazil) is interested, and China has sporadically expressed interest. Countries attending the Versailles Summit decided to try to develop joint science initiatives; the U.S. is promoting ocean drilling which is compatible with the interest of all member countries.

(I. MacGregor of the National Science Foundation joined the Planning Committee on Friday, 8 October. He reported on the previous days meeting with Congressional staff).

During a seven hour meeting 7 October the Advanced Ocean Drilling Program was thoroughly discussed. Items discussed included EXPLORER design, operating costs and conversion costs, science, and budget. The Foundation at this time still does not know the fate of AODP. In summary, all options (no AODP, extended CHALLENGER program, or EXPLORER program) are still viable. A decision will be made by January at the latest.

J. Cann (U.K.) noted that a $4M shortfall in the 1983 CHALLENGER budget coupled with a loss of 1 or 2 foreign members would mean a shortfall of $7M to $9M. He also indicated that the U.K. most likely would not be able to pay its full contribution in 1984 if CHALLENGER (rather than EXPLORER) is chosen as the drilling platform.

I. MacGregor (NSF) said that NSF would cover the costs of an AODP CHALLENGER program to make up for any loss in foreign contributions. Although the exact configuration of the AODP is still ambiguous, the Planning Committee should assume that there will be a program and should plan as if EXPLORER will be the drilling platform. PCOM can assume that the AODP platform will have drilling capabilities at least equal to those of the present CHALLENGER.

Deep Sea Drilling Project

Y. Lancelot reported for DSDP.

Leg 87 (Japan Margins). Technical problems were encountered during drilling, primarily from weather (a typhoon passed over the ship), and the drill "sticking" in the drill hole. A BHA was lost in the first Nankai Trough hole (sticking and high torquing). Similar drilling conditions were encountered in the Japan Trench but drilling produced interesting results. Physical properties indicated a slower rate of subduction than anticipated. rough swells and 40 ft. seas required that the thrusters be used to avoid broaching; the ship was not damaged.

Leg 88 (DARPA). This leg also experienced drilling problems resulting in a disappointment for DARPA. The reentry cone was apparently set too high and the casing stuck before the total previous depth was reached. Weather was also a problem because of the deep site and difficulty in reentry. A request from DARPA to try again was denied based on evaluation of the site by the shipboard party and threatening weather conditions. DSDP decided to terminate the leg and try to reschedule a DARPA leg at a later time.

Lancelot expressed concern that communications with the ship during the DARPA experiment did not always follow the accepted procedure of being channeled through DSDP; at times the ship communicated directly with DARPA and NSF. (S. Toye noted that it is strict NSF policy to communicate with the ship only through DSDP). In view of the potential for such a situation leading to conflicting instructions to the ship, Lancelot requested that the PCOM reaffirm that ship operations are the responsibility of DSDP alone.

(PCOM concern over the lack of communication during Leg 88 resulted in the following motion.)

In light of the experience of Leg 88, the Planning Committee reaffirms its position that all scientific operations of the drilling program are under the direct authority and supervision of the Chief Scientist of DSDP. All participants at sea or ashore are expected to conform fully to established JOIDES and DSDP policies.

Leg 89 (Old Pacific). CHALLENGER is expected to depart Yokohama 10 or 11 October. Leg 89 is antipated to be technically difficult; a 7.3 km drill string is planned. DSDP analysis indicates that the stress will be close to limiting conditions and is therefore difficult to assess. Operational constraints will be determined next week. Stress will be greatest during 3 critical phases:

a) during lowering of the reentry cone and casing;

b) when drill string is at maximum length before the addition of heavy wall pipe;

c) when deep into the hole and hard rock is encountered.

New pipe is being delivered by NKK at Yokohama. The inside diameter of "old" pipe is being modified to meet specifications. Total pipe available is not known because inspection by NKK is still in progress. A substanial number of CEMSCO pipe has been rejected after inspection.

Maximum allowable penetration will be limited by sea conditions. In particular it appears that basement penetration will probably have to be limited to less than 200 meters.

The Ontong/Java Plateau site will be drilled on Leg 89. Initial data will be handled by Leg 89 and appear in Vol. 89 of the Initial Reports. The synthesis and special studies will be attached to Leg 90, as that site is part of the Leg 90 transect.

DSDP Publications

Six volumes have been completed this year. SP4 technical manual has to be edited, the Site Survey volume is well advanced; camera-ready pages are being "pasted up" at this time.

Volume 70 is completed and waiting for NSF to approve a contract with a new printer after Rand McNally has declined an offer to to continue printing the Initial Reports.

DSDP Funds

The 1983 program plan will soon be sent to NSF. The budget has been revised from $22.35M to $22.2M, placing DSDP in a very tight financial position. To run the program on existing inventory is a very risky operation - for example there will be 4 reentry cones for 3 reentry sites; no extra casing; enough cement for 1 deep site (ENA-3); 3 logging cables for a full (except for Leg 90) logging program; and a limited number of beacons eliminating any possible last minute changes to a multi-site plan.

DSDP strongly objects to the $22.2M budget. Cuts may have to be made in logging, engineering and (for the first time) in operations. No contingency exists for equipment loss.

Future Ship Operations Contract

Discussion relating to the current DSDP budget led to a query to S. Toye (NSF) of the necessity for an open bid for the science operations contract for AODP. S. Toye responded that AODP will be a new program with a new ship and must go through the bidding process.

EXPLORER Conversion Report

R. Dinsmore and J. Schiff, constultants to JOI on EXPLORER conversion, made a detailed presentation using graphic illustrations of the proposed layout of EXPLORER laboratories, work areas, living accommodations, and core handling facilities. Engineering aspects of the planned conversion were made available in a handout.

Executive Committee Report

J. Honnorez (PCOM chairman) reported that the Executive Committee at their last meeting (1-2 September 1982 in Kyoto, Japan) has asked PCOM to:

1) prepare a budget and schedule for science and engineering/technology development for AODP.

2) prepare a plan for the phase-out of the existing advisory structure and phase-in of the future structure.

3) prepare a list of areas of interest and their priority as a basis for submission and coordination of site and regional survey efforts.

J. Honnorez requested that item 3 (site and regional surveys) be discussed at this time; points 1 and 2 are agenda items to be covered later.

Concensus

Decide on the ocean for AODP now and try to arrange for the Site Survey Panel to meet as soon as possible. The Atlantic ocean should be the start-up even if conversion is done on the West Coast; should a west coast shipyard be selected then a brief drilling program in the Pacific and/or Antarctic could be part of the transit to the preferred ocean. The following motion resulted:

The Planning Committee identifies the first areas to be drilled during AODP as (a) the Atlantic Ocean and contiguous seas including the Mediterranean, (b) the Weddell Sea and the contiguous parts of the southern ocean, and (c) the Pacific Ocean.

It requests panel and working group chairmen to perform the following tasks:

1) To identify, on the basis of the 8-year plan and the COSOD report, targets within the preview of their panel that lie within the above areas.

2) To consult with proponents of these targets and to develop a scientific rationale for drilling to achieve these targets.

3) To specify as closely as possible sites and site survey requirements necessary to achieve these targets.

4) To send these specifications to the chairmen of the JOIDES and JOI site survey panels before December 1982.

5) To come to the January PCOM meeting prepared to discuss these targets.

PCOM requests the JOIDES site survey panel to come to the January PCOM meeting with as close a definition as possible of the site survey requirements to meet the targets defined by panel chairmen.

Panel chairmen should take into account the fact that planning will be for about 18 months of Atlantic drilling, 3 months of Antarctic drilling, and 6 months of Pacific drilling, divided between all panels. Definition of an excessive number of targets by any panel should be avoided.

Core Orientation Device (Leg 85 problem)

F. Theyer reported on problems experienced during Leg 85 with core orientation. The device uses a camera and triggering mechanism to photograph a compass face as the core is "shot". Problems were both operations (lack of communication between scientist and technician, empty film chamber, etc.) and technical (film fogging, trigger failure, etc.). About 50% of the orientation data was usable. The main problem, however, results from the fact that only one orientation reading is made. F. Theyer suggested a new (different) system.

Y. Lancelot commented that DSDP will tackle the problem immediately.

Archive Sampling

(Background: during the previous PCOM meeting of 7-9 July 1982, Y. Lancelot reported that the archive halves of cores were to be sampled, with permission from NSF. He requested PCOM guidance on future sampling of archive material. J. Honnorez asked W. Riedel, Core Curator, and S. Gartner (ex-NSF) for additional information regarding past cases of archive sampling.)

J. Honnorez read a letter from W. Riedel informing PCOM that "toothpick" size samples only were taken on one occasion from an archive half of a depleted core, and it is not policy to sample the archive halves of cores.

After a brief discussion, PCOM decided to leave as is the policy for core sampling and sample distribution.

Leg 96 (Orca Basin)

J. Honnorez requested PCOM members to consider conflicting opinions on the scientific merit of the Orca Basin, specifically if it should be drilled as part of the Mississippi Fan study, Leg 96. The Passive Margin Panel and the COMFAN group revised proposal has placed a low priority on the Orca Basin. A letter from the SP4 chairman, G. Klein to the PCOM chairman supports drilling the Orca Basin, as does a letter from M. Arthur (OPP chairman).

Consensus

Allow 3 days for drilling the Orca Basin at the end of Leg 96 after the fan objectives have been achieved.

DARPA Extension

During the PCOM meeting, J. Honnorez invited A. Ballard to make a presentation for a new DARPA leg. A. Ballard (NORDA), R. Alewine (DARPA), T. Jordan (SIO) and J. Orcutt (SIO) presented the case for a DARPA leg.

R. Alewine - DARPA would like to try again to comlete the experiment at a new site, the Tonga Trench. Aproximately 23 days would be added to the CHALLENGER program. The experiment would be a joint Navy/DARPA/SIO effort. Suggested co-chief scientists are W. Menard (USGS) and A. Ballard (NORDA).

A Ballard - Experiment failed because of an inability to case the hole and keep it open. The pipe broke above the BHA, possibly due to sub-standard pipe. A second attempt 600 ft. north of the pilot hole also failed. Problem was with equipment, not weather.

T. Jordan - Proposed sites are near the active part of Tonga Trench (Sites A, C, D, and E). Site was selected because of favorable overlying sediment characteristics; Site C is the backup site.

J. Orcutt - Would be a classical seismological experiment with important scientific objectives. A teleseismic experiment of this type has never been done before. About 650 events of a magnitude above 3.5 are expected to be recorded in a 40 day period.

J. Aubouin (France) - Objects to the applied nature of the science and asked if DARPA has contacted the French Navy

(France has an atomic testing faciity at Mururoa). R. Alewine responded that DARPA has contacted the French "Atomic Engergy Commission" and will share data with that organizaton. Data will also be made available to JOIDES and will be published in the DSDP Initial Reports.

Consensus

A new DARPA leg will be granted. Co-chief scientist staffing will be decided by DSDP; it is likely that only one of the candidates nominated by DARPA (A. Ballard or W. Menard) will be approved, to balance the orientation of the science crew.

J. Honnorez recommended that J. Natland (DSDP) be considered for the co-chief scientist position.

Hole 504B

R. Stephen and M. Bender were invited by PCOM to present a case for drilling in Hole 504B, in lieu of an additional hole requested by M. Leinen and D. Rea (co-chief scientists for Leg 91 - Hydrogeology).

R. Stephen reported that returning to Hole 504B for an oblique seismic experiment (not related to DARPA) would require 9-14 days. The non-DARPA part of Leg 88 was very successful. The seismic borehole experiments are needed to link downhole logging measurements and large-scale geophysics. Five days are required for the experiment, plus some contingency time; other experiments (water sampling, wire-line reentry, etc.) would be performed if weather becomes a problem.

M. Bender made a brief presentation for returning to Hole 504B for hydrothermal measurements. He reported that the downhole water sampling at 504B would require 12-18 hrs. The results would be important to the understanding of hydrothermal circulation and the metalliferous sedimentation rate.

CHALLENGER Schedule

After the DARPA and Hole 504B presentations, PCOM considered modifying the CHALLENGER schedule to accommodate the requests. Y. Lancelot (DSDP) presented a schedule for consideration (see Table 1).

Consensus

The Planning Committee adopts Plan A (Table 1) as is up to Leg 94, leaving the remaining days as contingency and using any remaining days for either Leg 95A or 95B as needed.

PCOM calculates that an additional 5 days of steaming are required to accommodate the new DARPA leg. A requisite for granting the new DARPA leg is that DARPA makes available to the remainder of the drilling program the 5 days.

(NOTE: Shortly after the meeting a new schedule was formulated by DSDP which demonstrated that the total number of days to be charged to DARPA was 27, and that there would be no further rescheduling penalty down the line.)

Future AODP Advisory Structure

J. Honnorez reported for the AODP advisory structure ad hoc committee consisting of H. Beiersdorf (FRG), D. Hayes (L-DGO), R. Moberly (HIG), E. Winterer (SIO) and Honnorez as chairman. He then presented the following scheme for disucussion:

Planning Committee

Engineering Technical Panel

Thematic Panels:	Regional Working Grps.:
Ocean Crust	NE Pacific Rim
Margin Tectonics	N Atlantic
Sedimentary Sequences	SE Asia
	Southern Ocean
Geologic History	Central, S,SW Pacific
	Medit., Black Seas
	Indian Ocean
	S Atlantic
Discipline Panels	Operational Panels

J. Honnorez compared the above and the existing advisory structures and noted that in the proposed scheme, the Engineering/Technical Panel has a more important role than in the present structure.He suggested that PCOM determine the hierarchy of the various advisory groups.

Consensus

General agreement was reached on the following items leading to phase-out of the existing advisory structure and phase-in of the AODP advisory structure:

a) Only those existing panels which have a

TABLE 1.

PLAN A Hydrogeology = 33 days OPS + 22 days steaming
Includes 9 days for Hole 504-B

LEG	DEPART		TOTAL	OPS	ST	ARRIVE		PORT	OBJECTIVE
89	Yokohama	10 Oct 82	50	31	19	Noumea	29 Nov	5	Old Pacific
90	Noumea	4 Dec 82	39	28	11	Wellington	12 Jan	5	SW Pacific
91	Wellington	17 Jan 83	39	26	13	Papeete	25 Feb	5	Tonga Trench
92	Papeete	2 Mar 83	55	33	22	Balboa	26 Apr	5	Hydrogeology
93	Balboa	1 May 83	62	55	11	Halifax	2 Jul	5	ENA-3
94	Halifax	7 Jul 83	61	36	25	New York	6 Sep	5	NE Atlantic Paleoenvir.
95-A	New York	11 Sep 83	58 { 19	15	4	Ft. Lauderdale	30 Sep	1	New Jersey Transect
95-B	Ft. Lauderdale	1 Oct 83	39	35	4	Galveston	9 Nov	12	Mississippi Fan
							+12		
							21 Nov		

PLAN B-1 Without 9 days for 504-B (Minimum Hydrogeology)

LEG	DEPART		TOTAL	OPS	ST	ARRIVE		PORT	OBJECTIVE
92.	Papeete	2 Mar 83	46	24	22	Balboa	17 Apr	5	Hydrogeology
93	Balboa	22 Apr 83	62	51	11	Halifax	23 Jun	5	ENA-3
94	Halifax	22 Jun 83	61	36	25	New York	28 Aug	5	NE Atlantic
95	New York	2 Sep 83	24	20	4	Ft. Lauderdale	26 Sep	5	New Jersey Transect
96	Ft. Lauderdale	1 Oct 83	39	35	4	Galveston	9 Nov	12	Mississippi Fan
							+12		
							21 Nov		

PLAN B-2

LEG	DEPART		TOTAL	OPS	ST	ARRIVE		PORT	OBJECTIVE
94	Halifax	28 Jun 83	63	36	27	San Juan	30 Aug	5	NE Atlantic Paleoenvir.
95	San Juan	4 Sep 83	22	14	8	Ft. Lauderdale	26 Sep	5	Barbados
96	Ft. Lauderdale	1 Oct 83	39	35	4	Galveston	9 Nov	12	Mississippi Fan
							+12		
							21 Nov		

direct involvement in the remaining CHALLENGER program should remain active.

b) Only those panels which have rquested panel meetings from the JOIDES office to this date (8 Otober) will be allowed to meet. J. Honnorez (PCOM chairman) will contact each of 4 major panel chairmen to determine the necessity for meeting prior to disbanding.

c) Panel chairmen should solicit suggestions from their panels for possible replacement members.

d) AODP advisory structure. Dissolve the existing discipline panels and absorb them into the thematic panels. Combining thematic and discipline panels would result in the following 3 or 4 panels:

Ocean Crust Panel
Margin Tectonics Panel
Sedimentary Sequences Panel*
Geologic History Panel*

*Ocean Environment Panel

e) Reduce the number of panels to a few as possible.

f) Regional working groups should have the same status as thematic panels.

g) Soon after the 25-28 January 1983 PCOM meeting, organize and activate the following regional working groups:

E. Pacific (to 140°W)
S. Atlantic
N. Atlantic
Atlantic Marginal Seas (Mediterranean, Caribbean, Gulf of Mexico)

h) All or part of the existing advisory structure and the AODP advisory structure may co-exist for several months to ensure harmonious phasing-in and out of the advisory structures.

Scope of Panel Mandates

The issue of either broadly defined or narrowly defined mandates was discussed. Some members felt that a mandate would be too restrictive and that only the field of operation of each panel should be defined; others preferred a narrlowly defined mandate with a larger number of panels. E. Winterer noted that R. Moberly had already attempted to write mandates for panels of the AODP advisory structures.

Consensus

Draft mandates would be written by the AODP science advisory structure ad hoc committee. J. Honnorez requested J. Cann be added to the committee to replace the two members (H. Beiersdorf and R. Moberly) presently at sea.

JOI Science and Technology Development ad hoc Committee - U.S. Budget and Schedule

NSF requested that JOI Provide a plan and budget including co-mingled funds for science and engineering technology developments during the EXPLORER conversion period.

J. Honnorez and D. Hayes presented the graph shown in Figure 1, noting that the scale and shape of the cost curve represents the information required by NSF for ADOP cost planning.

Site Surveys and Syntheses

J. Clotworthy (JOI) read the following EXCOM motion from the Executive Committee minutes of 1-2 September 1982:

"The Executive committee recommends that the Planning Committee provide a list of areas of interest and their priority as a basis for submission and coordination of site and regional survey efforts.

To this end, PCOM members should be invited to present annually the cruise programs of their institutions (or national), followed where possible by a formal undertaking to carry out said survey in specific areas.

Coordination of scientific effort and equipment is desirable."

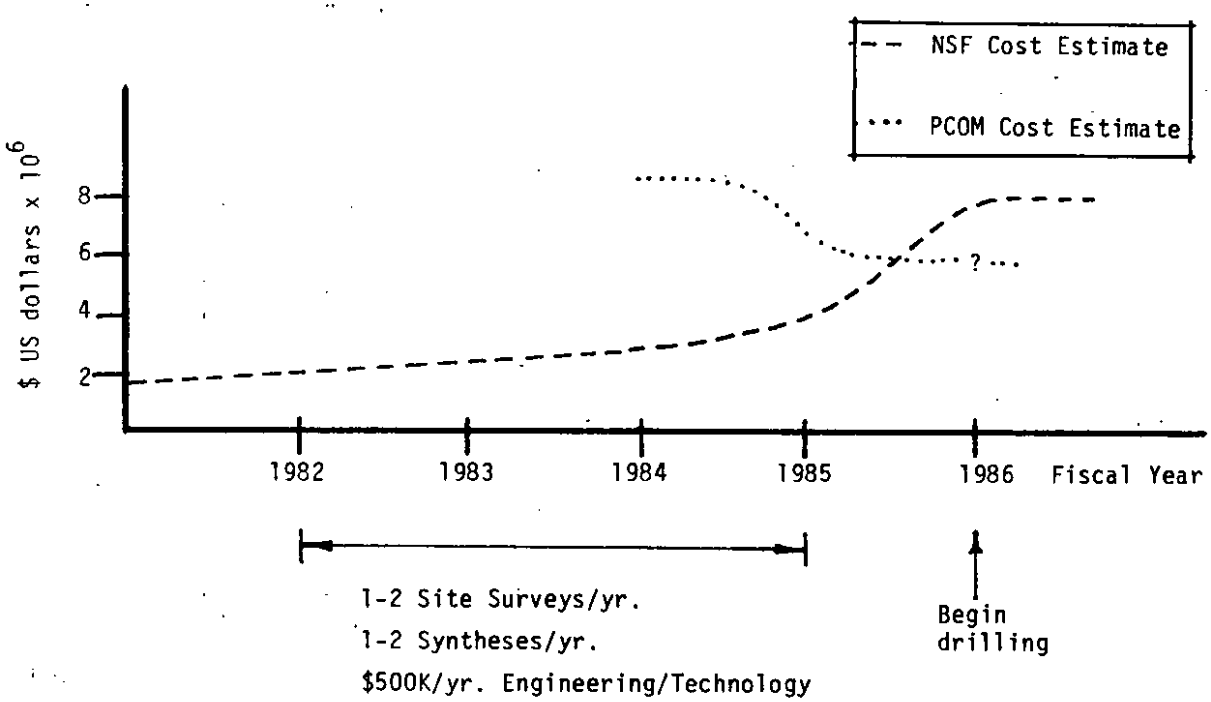
Consensus

Each non-U.S. member representative should try to determine (at least approximately) the likely level of activity in site surveys, regional syntheses and post-cruise studies, for presentation at the next PCOM meeting.

PCOM recognizes the need for science services and science development and alerts IPOD members to these needs.

J. Honnorez appointed a subcommittee consisting of R. von Herzen, D. Hayes (will present data to EXCOM), and J. Honnorez to determine U.S. costs for science and engineering technology development.

Figure 1



SEDIMENTARY PETROLOGY AND PHYSICAL PROPERTIES PANEL

George deV. Klein, Chairman

The Sedimentary Petrology and Physical Properties Panel (SP4) met 8-9 November 1982 at Scripps Institution of Oceanography.

Post-1982 Drilling Proposal

In response to the PCOM request to identify drilling targets in the Atlantic and contiguous seas, the Pacific and the Weddell Sea for a two-year post-1983 program, SP4 recommends the following drilling targets in order of priority by area in sedimentary sequences. These targets are consistent with the goals of COSOD and the SP4 White Paper dated 22 May 1981.

Atlantic Drilling

1. **Turbidites in the Granada Basin and the Lesser Antilles Fore-arc.** The purpose of this drilling program is to trace laterally a series of turbidites in the Granada Basin to see what their lateral variability is like. Four HPC sites are required to determine changes in fabric, grain size, structures and mineralogy. Stratigraphic correlation would be provided by geochemical imprinting methods on the volcanic ash fractions within and between turbidite beds.

The Lesser Antilles Fore-arc sites would require six HPC and three continuous conventional holes and the objectives here are to determine the spatial and temporal distribution of sediments in a forearc setting and correlate these to tectonic and other geodynamic events in the region. Proposed site locations are:

GB-1	12°10'N, 63°20'W
GB-2	13°17'N, 62°10'W
GB-3	14°20'N, 61°27'W
GB-4	14°15'N, 62°25'W
LAF-1	13°30'N, 56°45'W
LAF-2	13°30'N, 57°35'W
LAF-3	13°30'N, 58°50'W
LAF-4	13°30'N, 60°00'W
LAF-5	12°00'N, 57°10'W
LAF-6	12°00'N, 57°35'W

2. **The origin of slides.** The objective here is drill a series of slides with an HPC (five sites) to determine the nature and physical properties of sediments transported and deposited by slides, to sample the slide surface itself, to test its physical characteristics and properties and to determine the lateral change in slide-transported and deposited sediments downslope. As part of this program, we also recommend drilling three HPC sites on the lower continental margin to determine its sedimentary history in terms of slide deposition and other processes. The suggested location for this drilling would be the Baltimore Canyon and Wilmington Canyon region off eastern USA. Proposed sites are:

SL-1	38°19.5'N, 73°23.15'W
SL-2	37°00'N, 73°56'W
SL-3	38°12'N, 73°12'W
SL-4	38°21.5'N, 73°24.15'W
SL-5	38°15'N, 72°43'W
LCR-1	35°12'N, 70°02'W
LCR-2	36°00'N, 70°00'W
LCR-3	36°30'N, 70°00'W

3. **Amazon Cone.** SP4 recommends a drilling program in the Amazon cone to determine the variability of fan deposition in a tropical latitude submarine fan off a cratonic region. Nine HPC sites are recommended to determine the nature of different sedimentary domains (levees, channels, interchannel regions, debris-flow deposited upper fan systems, outer fan lobes, and basinal plain settings) and to determine down-fan changes in sediments. A site in the Vema Fracture Zone to sample distal turbidites derived from this fan is also planned. Proposed sites are:

AC-1	4°30'N, 48°25'W
AC-2	4°45'N, 47°40'W
AC-3	4°30'N, 30°00'W
AC-4	3°27'N, 47°38'W
AC-5	5°08'N, 46°56'W
AC-6	5°25'N, 47°56'W
AC-7	6°50'N, 46°40'W
AC-8	8°05'N, 45°06'W
AC-9	9°45'N, 45°45'W

4. **Western Gulf of Mexico - Tephrachronology Site.** SP4 recommends drilling of one HPC site in the western Gulf of Mexico to establish a tephrachronology for this region. This site will be correlated to one proposed in the Pacific Program in the Panama Basin (see below). The proposed site is SWCM-1 - 21°00'N, 95°00'W.

Weddell Sea Program

Widespread erosion in the seafloor of the Weddell Sea is well known since the Pliocene, but the depositional site of this eroded material is less well known. Several such depositional sites are suggested, the most obvious one being the Argentine Basin.

SP4 recommends a transect of three sites with HPC and conventional drilling from South to North from a region north of the Falkland Fracture Zone to the southern Argentine Basin where zones of high sediment accumulation rates with sediments containing reworked microfossils are indicated. The timing of the initiation of erosion should be recorded in the depositional sequences; this permits determination of paleoclimatic forcing mechanisms for bottom current erosion. Proposed sites are:

SAB-1 45°00'S, 45°00'W
SAB-2 46°00'S, 45°00'W
SAB-3 46°00'S, 47°00'W

Pacific Program

1. **Anoxic Sediments.** A transect of four HPC holes is suggested off Peru to determine the nature of sediment above, within and below the intersection of the oxygen minimum zone on the sea floor. The goal here is to determine the nature of the sediments in each of these settings, diagenetic changes caused by the oxygen minimum zone, and fluctuations through time of the oxygen minimum zone. A conventional hole would be required also to determine the time-stratigraphic variation.

We anticipate that this sampling program would involve a single leg and therefore recommend that, as part of such a leg, one site be cored by HPC in the Panama Basin for regional tephrachronology (see Atlantic Program, Item 4). Proposed sites are:

ANS-1	13°55'S, 76°54'W
ANS-2	13°50'S, 76°40'W
ANS-3	13°40'S, 76°31'W
ANS-4	13°30'S, 76°20'W
SBG-1	10°00'N, 88°00'W

2. **Physical Properties at Site 504B.** SP4 endorces a program to deepen Site 504B to obtain a continued record of changes in physical properties of crustal materials. Proposed site: 504B - 1°13.63'N, 83°43.81'W.

3. **Navy Fan.** Eight HPC sites are recommended for drilling on Navy Fan to determine variation in sediment content and physical properties within and down-fan in levees, channels, interchannel regions, suprafan lobes and distal zones. This program would sample a small fan in order to determine the nature of sediment variability and associated process in different fans. Proposed sites are:

NF-1	32°15'N, 117°40'W
NF-2	32°15.5'N, 11740'W
NF-3	32°16.5'N, 117°40'W
NF-4	32°16'N, 117°43'W
NF-5	32°14.5'N. 117°47'W
NF-6	32°14'N, 117°47'W
NF-7	32°14.3'N, 117°48.5'W
NF-8	32°18'N, 117°48.5'W
NF-9	32°19.5'N, 117°50.5'W

Future Panel Structure

In response to a request from PCOM regarding suggestions about the possible future panel structure of JOIDES, the SP4 Panel endorsed the proposal for establishing a thematic panel on sedimentary sequences. The view was expressed that in order to continue a viable research program in physical properites, matters pertaining to physical properties should be combined with the activities of a downhole measurements and technical panel.

The Panel reviewed past efforts to effect liaison between SP4 and other panels with common interests. Concern was also expressed that the proposed panel structure did not address the liaison issue. The Panel felt that an annual conference of thematic panels should be considered. The thematic panels should consider meeting concurrently at a common site. During the first two days, these panels meet separately, but on the third days, they come together and present each other with the status of their recommendations and drilling proposals and deliberations, which would then be discussed (to effect improved liaison). On the fourth day, panels meet separately again to revise their programs and recommendations. Minutes are distributed to all thematic panel members. In short, the major panel meetings become an annual meeting. A possible cost-saving for travel could be realized.

It was also suggested that PCOM solicit requests for proposals (RFP's) for drilling with a submittal date well before the annual meeting of thematic panels for common evaluation.

Other Business Items

Leg 96. Requested three dedicated geotechnical HPC cores be obtained for the Geotechnical Consortium. W.R. Bryant was invited to coordinate the Leg 96 Geotechnical Consortium research program.

Laboratory for sedimentology and Physical Properties on EXPLORER. Reviewed present plans and proposed modifications of the laboratory arrangements. Reviewed and prepared a revised list of equipment needs on board ship for sedimentology and physical properties.

Received a proposed revision of the **sediment classification.** G. Klein was to arrange for a review of the proposed classification from 25 marine geologists before further action was to be taken.

Report of the **evaluation of physical properties research** on board CHALLENGER was circulated. Panel recommended formation of a special working group to be chaired by R.L. Carlson to plan a proper physical properties research program for the post-1983 drilling program. Present CHALLENGER physical properties program was found to be inadequate because of lack of proper advance planning.

Report on PCOM request regarding **HPC penetration** was circulated. The principal findings indicate recovery of high quality samples and that HPC operations do not compact sediment samples seriously.

Reviewed **problem of backlog** for obtaining sediment samples at core respository because of lack of adequate facilities. Recommended addition of space a staff to alleviate problem, reaffirmation of priority on sample requests for individuals (ship-board and shore-based) meeting Initial Report deadlines, and reaffirmed accommodation, where possible, of those investigators wishing to come to do their own sampling.

Dissolved SP4 Working Group on Long-Range Planning because its charge was made a panel function.

SP4 Technical Manual is being published by National Geophysical Data Center. DSDP funded and completed artwork and editing. Typesetting and camera-ready copy should be transmitted to NGDC by early February 1983.

OCEAN PALEOENVIRONMENT PANEL

Robert G. Douglas, Chairman

The Ocean Paleoenvironment Panel met 7-8 June 1982 at Lamont-Doherty Geological Observatory, Palisades, New York.

Leg 85: (F. Theyer, co-chief scientist.) At Site 571 problems were encountered with Uyeda heat probe/pore water samples; minimum results for heat probe experiments. At sites 572-575 very successful HPC was obtained with rotary coring in deeper part; all sites contain late Miocene hiatus; at Site 573 EOC-Oligocene boundary was recovered; Site 575 offered the most complete section for biostratigraphy. F. Theyer reported that the magnetic intensity was less than 0.1 gauss; paleomagnetic results were not exciting. Also, the orientation system in the HPC only worked about 50% of the time.

Leg 86: The location of Site NW 6 was moved nearer the DARPA site, saving 5 operation days. The K/T boundary was recovered in two HPC sites on Shatsky Rise. The locations of NW 3 & 4 off Japan were modified due to Safety Panel objections; new NW3C and 3D were finally approved as limited HPC sites.

Leg 89: R. Douglas and S. Schlanger reviewed the plan approved by PCOM. MZP-6 will be prime site (34 operation days) in 6100 m water; total depth estimated at 7280 m, including 100 m in basement.

Staffing: S. Schlanger and R. Moberly, co-chiefs; Sliter, Premoli-Silva, Cepek, Baltac, Ogg, Effing selected at this time and possibly Thierstein.

Leg 90: J. Kennett briefly reviewed the sites approved by PCOM - 6 sites, no logging, with HPC into the Miocene as the prime objective.

Staffing: C. von der Borsch and J. Kennett, co-chiefs; Jenkins, Scrinivasecin, Colet, Martini, Baker, Barton, Margolis; Sarnthein uncertain.

N. Atlantic Leg: W. Ruddiman and R. Kidd reviewed the proposed sites for the N. Atlantic transect (Table OPP-1).

Based on the existing ship schedule, a reasonable estimate of the leg is 53 days total, 36 days operation & 17 days steaming.

Table OPP-1.

ATLANTIC TRANSECT

Site	Section	Estimated Drill Time	Major Objection
NW-1	450 m	5 days	Neogene sediments; no basement drilling
NW-2	800 m	9 days	Neogene; no basement drilling
NW-3A	600 m	7 days	King's Trough; Neogene
NW-4	450 m	5 days	Neogene
NW-6	1000 m	10-12 days	Expanded Pliomiocene section
Lower priority:			
NW-7	500 m	4-5 days	Neogene

OPP recommends R. Kidd as co-chief with W. Ruddiman.

Resolution to PCOM

The OPP, stressing the importance of paleomagnetic measurements on HPC and other drill cores, strongly recommends immediate action to remedy the frequent failure of the core orientation device. We recommend a review of shipboard procedure in order to clearly define responsibility for proper assembly and monitoring for correct operation.

NSF Report

S. Gartner reviewed recent NSF actions and the current status of AODP. Congressional action and OMB review of the EXPLORER program will be completed by the end of summer. Discussions are underway as to the membership and contribution of non-US countries in any post-1983 program. A drilling hiatus of 2 years, perhaps longer, will follow conclusion of the present DSDP.

PCOM Report

E. Winterer reviewed recent PCOM actions, results of the NSB about AODP, and discussed the possible role of Lockheed as a logistical operator. He reviewed plans of the science labs on the EXPLORER which will maintain handling of cores in a vertical position. Approximately 1000 m^2 has been designated for scientific labs and support facilities.

DSDP Report

Y. Lancelot reviewed the probable procedures that will follow at the end of the drilling if "demobilization" occurs.

The panel indicated its concern about the core orientation system of the HPC and Lancelot stated he would investigate the problem.

Panel Structure - Present & Future

A broad-ranging discussion was initiated by R. Douglas focusing on the advantages/disadvantages of a "regional" vs. topical orientation to the advisory panels. In response to the question of how many and how large advisory panels should be, the panel agreed that the working groups are a valuable means of augmenting the size and expertise of the panels and the working group concept should be maintained in any future panel structure. It was recommended that the working groups should be better supported (for travel, etc.). Both process/topic oriented and geographic oriented panels are valuable and provide necessary input to science planning. However, the process/topic panels tend to have a larger view and thus are probably better suited as the primary advisory groups.

E. Winterer asked the panel for its recommendation regarding the long-term fate of SCP and, after discussion, the following was concluded:

1. Stratigraphic correlation, resolution and the integration of biostratigraphic and paleomagnetic zonations are now well

established tools in deep sea research and do not warrant the attention of a full advisory panel.

2. However, the importance of stratigraphic correlation to nearly all aspects of deep sea geology does warrant the existence of a small, standing body of experts who can provide advice and suggestions on related matter to DMP, AMP, OPP, and PCOM. This would be best handled as a standing working group composed of 4 to 6 persons.

3. Because of the OPP's interests in biostratigraphy and chronostratigraphy and the broad topical overlap which already exists between OPP & SCP, it seems logical to place the SCWG under OPP. Thus:

Resolution to PCOM

The Ocean Paleoenvironment Panel recommends that the Stratigraphic Correlation Panel be instituted as a standing working group composed of 4 to 6 members and that this WG be placed under OPP.

Joint Meeting of PMP & OPP

On the afternoon of 9 June 1982 the two panels met to discuss two proposals for Leg 95, NW Africa and the NJ transect. D. Roberts, R. Tucholke and W. Poag reviewed the proposed sites for the NJ transect, including ENA-3. Four sites, NJ1-4, compose a transect extending from near the slope break in 800 m to mid-slope depth (1000 m). The primary objectives are 1) to document lateral facies change in the continental margin, 2) to obtain detailed paleo and environemntal control, and 3) to document the stratigraphic unconformities in order to test the so-called Vail curve.

D. Futterer outlined the proposal site of Sarnthein and Beiersdorf off NW Africa. During the discussion of the two proposals, it became clear that while the immediate interest of OPP were closer to the NW Africa proposal, these sites require additional documentation and site surveying before they would be ready to drill.

Resolution to PCOM

The OPP concludes that the NW Africa proposal has considerable merit and is important science, but in view of the time constraints, we recommend the NJ transect for Leg 95.

Assuming that the NJ Transect becomes Leg 95, OPP unanimously recommends double HPC at all sites where possible, including ENA-3 (Leg 93).

Membership

Considering the lame-duck nature of DSDP and the uncertainties of post-1983 drilling, the panel decided to wait until early 1983 before recommending changes in membership. Douglas was asked to remain on the panel, providing a transition for the new chairman, M. Arthur, until the next meeting.

DOWNHOLE MEASUREMENTS PANEL

R. von Herzen, Chairman

The following items are extracted from the minutes of the 25-26 May 1982 Downhole Measurements Panel meeting at Lamont-Doherty Geological Observatory, Palisades, New York.

Review of plans for upcoming year

M. Salisbury (DSDP) discussed plans for logging over the next year. Legs 85 and 86 will have no logging due to financial constraints and the nature of operations (primarily HPC in sediments). Logging is planned for Leg 87 (Japan margin) and Leg 89 (SW Pacific), but not on Leg 88 (DARPA, seismic). New contract negotiations with Schlumberger for logging must begin soon, with a higher rate anticipated post-Leg 89. It was recommended that a representative of the Panel be involved as an observer in the contract negotiations for logging, now planned after the Leg 86/87 port call. the importance of logging for Leg 91 (hydrogeology) was emphasized.

The seismic experiments planned for Leg 88 were described by A. Ballard (NORDA) and F. Duennebier (HIG). The DARPA equipment will be similar to that of Leg 78B, and recording will be attempted for 45 days before recovery of the data by another ship. Data from the DARPA experiments will be available to interested investigators, according to the normal DSDP-JOIDES procedures. The HIG seismometer will be deployed in a nearby hole for a similar recording duration. Deployment limitations may result from the lack of a suitable crane to replace the logging cable used during the HIG experiment, so that the HIG instrument may be deployed only after the DARPA operations close to the end of Leg 88.

Long-term Developments

M. Salisbury discussed other possible contract arrangements with a logging company in the future, such as testing new tools and facilities in deep-sea drill holes, acquiring tools and/or expertise for an in-house logging program by DSDP, etc. A problem with testing new tools is that DSDP hole are considered high risk for logging.

R. Carlson (SP4) discussed the need for planning of future measurements of physical properties in coordination with downhole measurements. Towards this end, the Panel recommends continuing the activie liaison with SP4. R. Anderson (HWG) introduced a draft proposal from L-DGO to develop, coordinate, and analyze future downhole measurements and physical properties. The Panel generally recognizes the need for early development of tools for such measurements, and encourages the early funding of such developments for the EXPLORER program. It may be desirable to separate the research and development functions from the coordination of measurements. An improved mechanism for rapid integration of new developments with drilling operations may be needed, based on the CHALLENGER experience.

Future Legs Emphasizing Logging and Downhole Measurements

Beyond the DARPA/seismic experiments on Leg 88, the Panel discussed possibilities of legs or mini-legs on which logging/downhole measurements would be scientifically rewarding. These are listed in order of priorities expressed by the Panel:

1. Site 504B. The expectations of results from an oblique seismic experiment in this deep hole, proposed by R. Stephen (WHOI), make this a high priority site. Additional borehole packer experiments, and sampling for water chemistry equilibrated with dikes in the deeper part, would enhance the expected return. Approximately 10 days to 2 weeks on site would be desirable for these programs which the Panel recommends be done.

2. The possibility for doing more at Sites 417 and 418 in the Atlantic was discussed by R. von Herzen and M. Salisbury. Hole 417D contains a broken bottom hole assembly that might be fished out, and 418 may have a logging cable and tool that could be pushed to the bottom of the hole. Additional logging and downhole measurements would be useful over the basement rock sections of these sites on relatively old crust (110 My). The Panel recommends that the accessibility of these holes be determined with a few days of CHALLENGER time during an early Atlantic leg, to determine the possibility for such measurements.

3. Additional logging and packer permeability experiments would be useful at site 395A.

For future standard logging, the Panel recommended the priorities according to Table DMP-1

New Technology and Instrumentation Devleopments

Several ongoing and new possible thrusts for intrumentation and technology development were discussed by the Panel:

1. A new temperature recorder for the hydraulic piston core has recently been constructed and is being tested on Leg 86. It is contained within a small pressurized space in a specially-constructed cutting shoe, and could also be used to record other parameters downhole.

2. The JOI-sponsored Logging While Drilling (LWD) Workshop, which some panel members attended, was discussed. It was noted that: a) to date it has mainly been a relatively expensive industry development to improve drilling efficiency (e.g. pore pressure measurements), and to monitor for blowout hazards in real time, (b) the data transmission rate is relatively low (e.g. mud pulses), (c) limited types of tools are used, (d) present systems do not permit coring.

Recognizing the high costs of drilling and the relatively slow penetration rates because of the coring requirement or basement rock drilling, the Panel feels that LWD on an Advanced Ocean Drilling Program (e.g. EXPLORER) could be very cost effective. Every hole could be logged for at least some parameters with no additional ship time. The Panel recommends that a serious effort be made to develop LWD in advance of such a program.

3. The need for logging and downhole measurements in high temperature environments was discussed. The normal maximum temperature is 180°C, and many tools for 260° have been developed, although their reliability under field conditions may need improvement. The Panel believes that there

Table DMP-1.

LOGGING PRIORITIES

Leg	Objective	Logging Priority	Comments
89	Old Pacific paleoenvironment	1	Deep hole
90	SW Pacific paleoenvironment	2	Mainly HPC
91	Hydrogeology	1	At least 1 deep basement penetration
92	Mississippi Fan	2	Only 1 deep hole?
93	ENA-3 (NW Atlantic)	1	Deep hole, good seismic stratigraphy
94	NE Atlantic paleoenvironemnts	2	Mainly HPC
95	Morrocco	2(?)	Desirable to log 547B
	New Jersey Transect	1	cf. physcial properties /stratigraphy
	Caribbean (Barbados)	1	Subduction margin

is a strong demand from industry for high temperature capabilties in deep holes and geothermal settings, and that we should be prepared to adapt and use such tools as they become available, but should probably not attempt a separate development of such capabilities.

4. Additional capabilties for geotechnical and permeability measurements should continue to be encouraged. In situ permeability in sediments may be obtainable from the DSDP temperature/pressure/pore water sampler tool, and some capability should be developed to measure permeability on cores (e.g. falling-head tests) for comparison.

5. Wireline re-entry of holes was discussed at some length,. as several proponents of this development were present. F. Duennebier indicated that computer simulation of a typical system showed overdamping, with a response time of about 5 min. at the end of the wire to a lateral vessel displacement. M. Salisbury discussed a new DSDP azimuth re-entry tool to be tried with wireline re-entry probably on Leg 87, although only limited time is available. The Panel supports this test. V. Renard described a test design under construction in France, which incorporates a small winch and electronics unit emplaced in the re-entry cone. R. Stephen discussed a re-entry design which has been proposed but not funded by NSF.

The questions of ownership and coordinated use of existing holes for re-entry are still outstanding. The Planning and Executive Committees are urged to resolve these issues, even on an interim basis, as soon as possible. The Panel considers the development of wireline re-entry capability to be high priority, especially for a scientific program during any drilling hiatus.

SITE SURVEY PANEL

E.J.W. Jones, Chairman

The Site Survey Panel met 21-22 January 1983 at Scripps Institution of Oceanography, La Jolla, California.

Review of 1982 Site Surveys

France: In the absence of Dr. Renard, E. Jones presented the outline of French site surveys reported at a meeting at University College London on 13 October 1982. During 1982 the main surveying activity near DSDP sites was carried out by the submersible "Cyana" over the Mazagan escarpment off Morocco. The principal objective is to examine the lateral variations in sediment stratigraphy east of sties drilled on Leg 79. Dr. Renard will provide a summary of the survey at a later date.

F.R.G.: Dr. Weigel described site surveys undertaken in three areas:

1. East Pacific Rise (H. Beiersdorf, BGR). A study of an area of hydrothermal activity using Seabeam, a 3.5 kHz profiler and deep-towed sidescan (December 1982).

2. Sulu Sea/South China Sea (K. Hinz, BGR). In the Sulu Sea multichannel reflection seismic, gravity, magnetics and Seabeam profiles were recorded to investigate a fossil accretionary wedge and the nature of a chaotic zone of diapirs. The same instrumental techniques were used to determine the age, sediment stratigraphy and subsidence history of parts of the South China Sea.

3. NW Africa (Mazagan escarpment). A submersible investigation using "Cyana", carried out jointly with the Centre Oceanologique de Bretagne.

Japan: In Dr. Nagumo's absence aboard the HAKUHO-MARU, Dr. Kobayashi reported that two multichannel lines (24-fold) had been shot across the Bonin and Ryukyu trenches as part of Japan's contribution to site surveys. In addition, single-channel seismic and sampling work has been carried out in the western part of the Sea of Japan and in the Weddell Sea (R.V. HAKUREI-MARU, Dec.1981-Jan.1982). The Japanese do not yet possess a Seabeam system, but one should be in use with the Hydrographic Survey by the end of 1983.

U.K.: The Institute of Oceanographic Sciences remains the most active group involved in site surveys. During 1982 four regions were studied:

1. Mississippi Fan. GLORIA profiles were recorded from FARNELLA in January as part of a detailed survey of the microtopography in the vicinity of sties to be drilled on Leg 96 (N. Kenyon).

2. OPP Site 6. This proposed drilling location for Leg 94 lies on the southern end of Gardar Drift near the Charlie Gibbs Fracture Zone. DISCOVERY carried out a 2-day survey around the site during September using airgun and 3.5 kHz profilers (Dr. R. Kidd.)

3. Sites 548, 549. Post-drilling surveys undertaken by DISCOVERY in the Goban Spur region. Deep-tow 7.0 kHz and 3.5 kHz site survey to examine shallow seismic structure.

4. Madeira-Cape Verde Rise. Study of sedimentary processes. GLORIA, 3.5 kHz profiling and coring.

U.S.: Dr. F. Duennebier reviewed three JOI-funded site surveys:

1. Equatorial Pacific (Leg 85 sites). This survey was accomplished on R.V. THOMAS WASHINGTON during January and February 1982 (T. Shipley, Chief Scientist). The principal objectives were to define the shallow seismic structure and to map the microtopography in the OPP drilling area using SEABEAM, in order to select sites where sedimentation is likely to have been continuous. A water gun used in conjunction withg a single-channel digital recording system gave excellent high resolution seismic profiles. The processed data were delivered in time to meet the CHALLENGER's sailing date.

2. Western flank of East Pacific Rise. Hydrogeology transect sites near 17°S (for Leg 92). The sites were surveyed by the THOMAS WASHINGTON on cruise ARIADNE II, Feb. 16 - Apr. 1, 1982 (P. Lonsdale, M. Leinen, co-chief scientists). Seabeam and the water gun seismic system were employed and closely-spaced heat flow measurements taken to identify optimum drilling sites for investigating fluid circulation in the oceanic crust.

3. Mississippi Fan. This survey of small-scale sedimentary features was carried out by R.V. ROBERT D. CONRAD during the period Nov. 29-Dec. 23, 1982 in preparation for drilling on Leg 96 (A. Shor, chief scientists; A. Bouma and J. Coleman, observers). High resolution

reflection profiles were acquired using a water-gun and 3.5 kHz transducer. Sidescan data were obtained with a SEAMARC system. GLORIA profiles had been recorded by N. Kenyon aboard FARNELLA early in 1982.

Proposed Site Surveys During Period 1983-1986

France: Dr. Renard had indicated at a meeting in London on 13 October 1982 that French groups have plans to work in the following regions of interest to the drilling program:

a. Mazagan Escarpment (continuation of submersible work).
b. Barbados area.
c. Columbia Basin.
d. Area around Site 504B.
e. Peru-Chile Trench.
f. Japan Trench (cooperative venture with Japanese).

In a recent letter (13 January 1983) Dr. Renard emphasized that ship programs still have to be finalized.

F.R.G.: Dr. Weigel outlined the general form of the 1983-86 site survey program:

1983

a. Norwegian continental margin. Multichannel reflection, two-ship seismics. To examine dipping reflectors and role of volcanism during ocean basin development. High latitutde coring will be carried out.

b. South China Sea (SE region). Multichannel reflection seismic, Seabeam, 3.5 kHz and bottom sampling. To investigate the age and subsidence history of margin.

1984-85

a. NW Africa. Multichannel reflection and refraction in region of ocean/continent transition.

b. Mediterranean. Multichannel reflection and refraction. Examine crustal structure, subduction and sub-evaporite sediments.

c. Coral Sea. Multichannel reflection seismic Seabeam, 3.5 kHz. A cooperative program with BMR, Canberra, to investigate crustal stretching and volcanism around sites in Australian drilling proposal (COGS).

d. Sulu Sea. Multichannel reflection seismic. To examine fossil accretionary wedge, nature of a chaotic zone of diapirs, plate movements in SE Asia.

e. Ryukyu Trench. Seismic refraction study of the subduction zone.

1986

Weddell Sea. Multichannel reflection, seismic refraction, Seabeam, 3.5 kHz, bottom sampling. To investigate crustal structure, nature of the ocean/continent transition, phases of Antarctic glaciation, nature and age of regional unconformity, age of opening.

Japan: Dr. Kobayashi reported that Japanese vessels will be able to contribute to site surveys in three areas:

1. Ryukyu Trench. A research cruise of R.V. HAKUHO-MARU under the direction of Dr. Nasu is scheduled for the North Philippine Sea and East China Sea during the period 9 June -8 July 1983. It is anticipated that multi-channel seismic, 3.5 kHz, gravity and magnetic lines will be run across the Ryukyu Trench and, possible, the Okinawa Trough.

2. Sea of Japan. Although additional data will probably be gathered, a major contribution to site selection can be made by synthesizing the existing large quantity of information from this region. The Japan National Oil Corporation has much multichannel seismic. Extensive surveys with single channel airgun, gravity, magnetics and bottom samples have been carried out by the Geological Society of Japan. Dr. Nagumo has indicated that such a compilation is now underway by the Survey.

3. Bonin-Marinana Arc Junction. The results of earlier work are summarized in a series of maps published by the Geological Survey of Japan. A geological/geophysical research program aboard HAKUHO-MARU (Dr. Kobayashi, chief scientist) is scheduled in the region from 16 April - 30 May 1984. Possible drill sites will be closely examined in this critical junction region where a seamount chain is truncated by the trench. Dr. Kobayashi reported the occurrence of harzbergite from a small ridge on the inner slope of the Bonin Trench.

U.K.: Two areas of interest to IPOD will be investigated during 1983-84:

1. Equatorial Atlantic. A detailed study of selected fracture zones will be carried out using GLORIA (Dr. R. Searle).

2. Madeira-Cape Verde region. GLORIA and coring work (Dr. R. Kidd).

Dr. T.J.G. Francis has reported that support for investigations in four areas relevant to the location of future drill sites has been requested for the period April 1984 - April 1985:

1. Northern North Atlantic. Wyville-Thomson Ridge. Primarily a sidescan sonar study - GLORIA and hull-mounted transducer (Dr. N. Kenyon).

2. Northern North Atlantic (North Rockall). Explosion seismology investigation by Dr. R. Whitmarsh.

3. Madeira-Cape Verde area. Continuation of GLORIA and bottom sampling work (Dr. Francis).

4. Ceara Rise. Study using GLORIA, 3.5 kHz and bottom samplers (Dr. Kidd).

Dr. Francis has also indicated that research vessels may carry out IOS work in the following regions during 1985-86.

1. Nares Abyssal Plain. Long-range seismic experiment.

2. Indus Fan. GLORIA, 3.5 kHz, coring and deep-tow surveys to examine recent sedimentary processes.

3. Indian Ocean. GLORIA work. Specific areas are yet to be decided.

4. North Atlantic. Continuing GLORIA and bottom sampling studies.

Three University groups have shown a strong interest in carrying out site surveys during regional studies:

1. University of Birmingham (Dr. P. Barker), Weddell/Scotia Sea. Study of ridge/trench collision in an intra-oceanic environment (SE Scotia Ridge). Investigation of the continental margin around the Antarctic Peninsula. Study of late Cenozoic paleo-oceanography using piston core samples. As well as using multichannel seismic and 3.5 kHz profilers, it is hoped that GLORIA could be employed. Passage data can also be obtained in the peripheral regions.

2. University of Leicester (Dr. I. Hill). Geophysical and geochemical study of Cape Verde Rise region. Determination of the geochemical signature of oceanic crust in the eastern Atlantic along latitude 16°N. Investigation of paleobathymetry near the Cape Verde archipelago.

3. University College of London (Dr. E.J.W. Jones). Geophysical and geological study of eastern Equatorial Atlantic south of Cape Verdes. Investigation of crustal composition by seismic and bottom sampling. Relation of area to Mesozoic-Cenozoic plate motions in the equatorial region.

U.S.: Dr. F. Duennebier indicated that a site survey aboard ROBERT D. CONRAD, partially funded by JOI, will take place off Morocco (30-35°N) during April 1983. The aims of this survey are (a) to resolve the location and nature of the ocean/continent boundary off Morocco, (b) to determine the morphology and structure of the basement in the disturbed zone seaward of the continental slope and their relation to Alpine movements, and (C) to investigate the regional stratigraphy in relation to Cenozoic deformation. Multichannel reflection, seismic refraction and 3.5 kHz profiling will be carried out in addition to recording magnetic and gravity data.

A survey of the Peru-Chile Trench between 8-15°S has not yet been carried out owing to financial constraints. The JOIDES Site Survey Panel strongly recommended that a Peru-Chile Trench survey by a US vessel should be funded at the earliest opportunity.

IPOD Data Bank

A statement on the activities of the Data Bank was presented by C. Brenner:

It is expected that the North Atlantic site survey volume will be published by the end of 1983.

During the last year information from the following surveys has been submitted to the Data Bank: Nankai Trough multichannel survey; data for Leg 90 drilling; GLORIA recordings from the Mississippi Fan.

The Data Bank hopes to publish two further site survey volumes: South Atlantic (principally University of Texas); Pacific 1975-78.

Site Surveys in Relation to Post-1983 Drilling Program

There was a lengthy discussion of reports on future drilling targets submitted by other panels. We were fortunate to have present D.

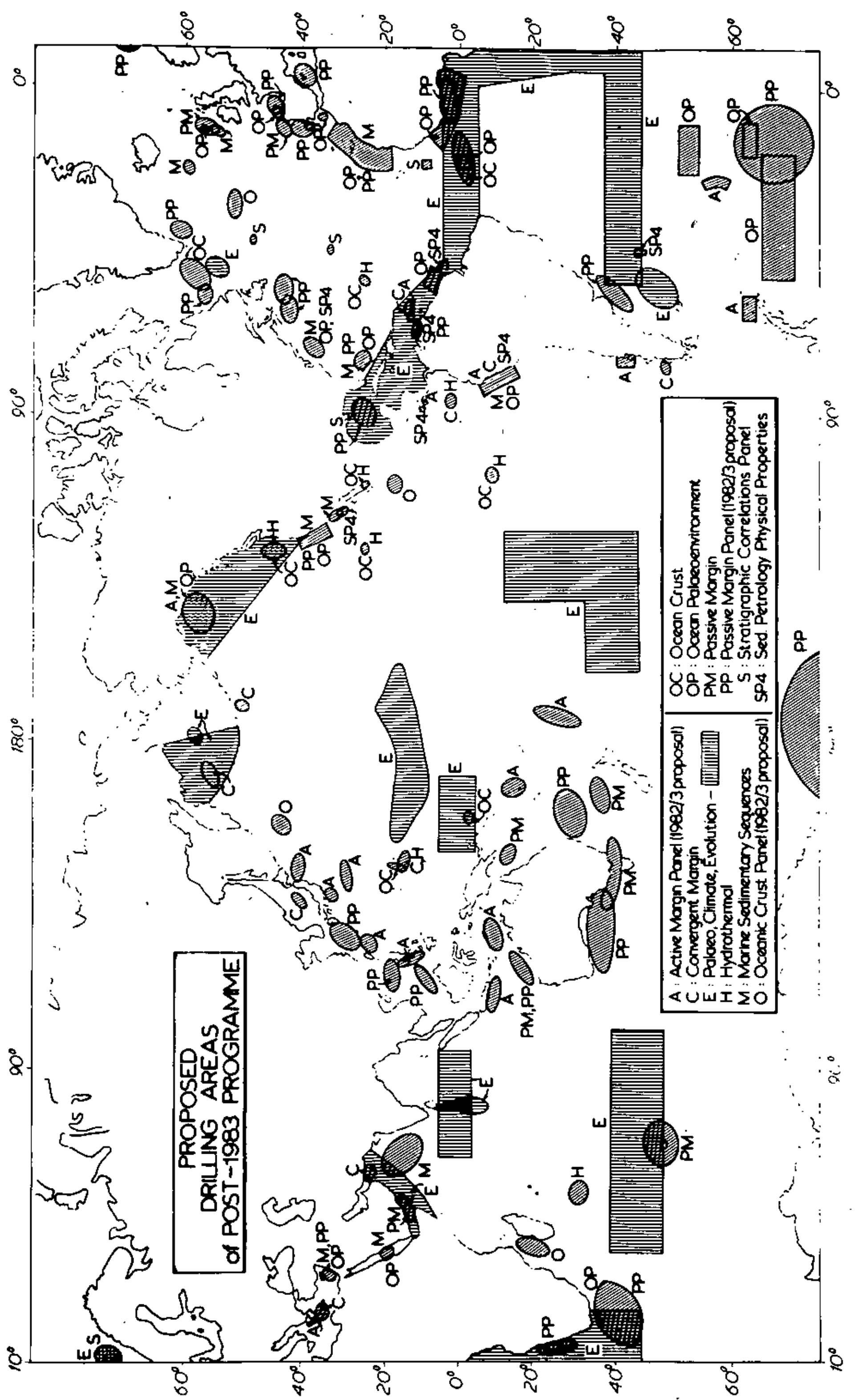

PROPOSED
DRILLING AREAS
of POST-1983 PROGRAMME
A : Active Margin Panel (1982/3 proposal)
C : Convergent Margin
E : Palaeo, Climate, Evolution –
H : Hydrothermal
M : Marine Sedimentary Sequences
O : Oceanic Crust Panel (1982/3 proposal)
OC : Ocean Crust
OP : Ocean Palaeoenvironment
PM : Passive Margin
PP : Passive Margin Panel (1982/3 proposal)
S : Stratigraphic Correlations Panel
SP4 : Sed. Petrology Physical Properties

Figure 1.

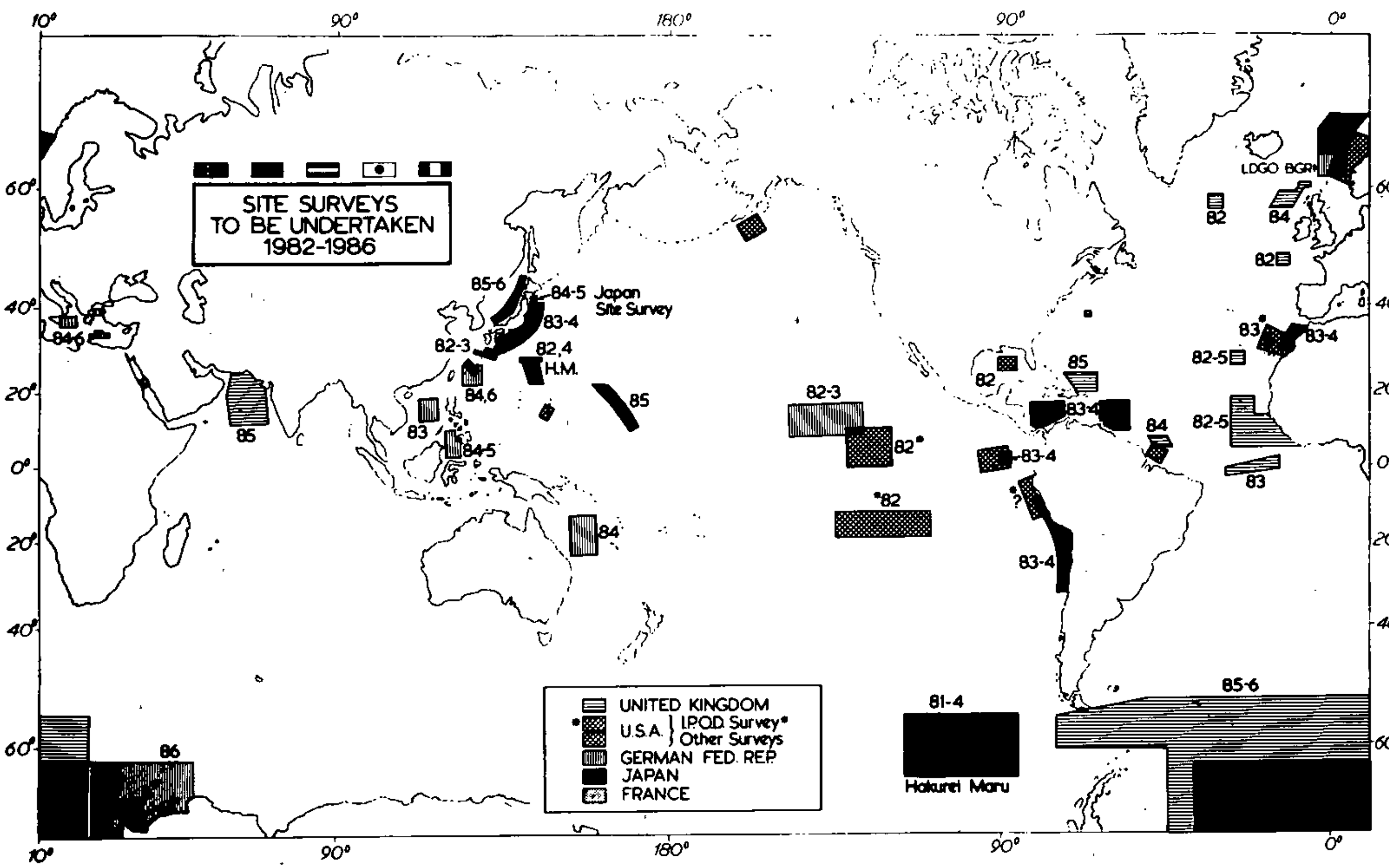

SITE SURVEYS
TO BE UNDERTAKEN
1982-1986
UNITED KINGDOM
U.S.A.
I.P.O.D. Survey*
Other Surveys
GERMAN FED. REP.
JAPAN
FRANCE
Japan Site Survey
H.M.
Hakurei Maru
LDGO
BGR
85-6
84-5
83-4
82-3
82,4
84,6
84-5
84-6
85
83
84
82
82-5
81-4
86
82-3
10°
90°
180°
0°
60°
40°
20°

Figure 2.

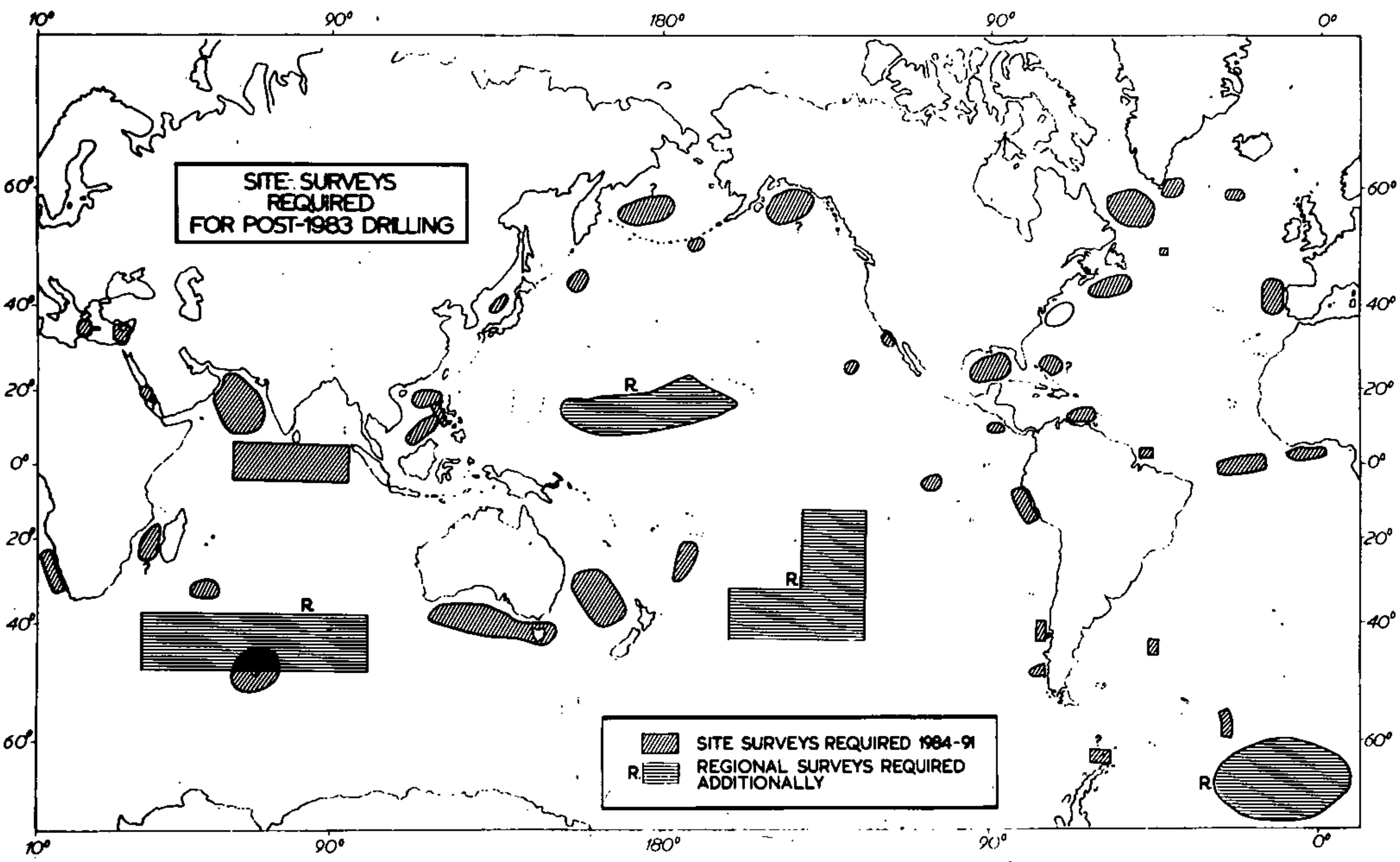

SITE SURVEYS REQUIRED FOR POST-1983 DRILLING
SITE SURVEYS REQUIRED 1984-91
REGIONAL SURVEYS REQUIRED ADDITIONALLY
R
10°
90°
180°
90°
0°
60°
40°
20°
0°
20°
40°
60°

Figure 3.

Roberts and L. Garrison who provided us with the view of PMP and PPSP.

A summary of the conclusions of the Panel discussion is presented in the form of 3 maps (Figures 1, 2 and 3). Figure 1 shows the tentative target areas for an eight-year drilling program, partly extracted from the April 1982 eight-year proposal ("A program for 8 years of Scientific Drilling after 1983": PCOM and JOIDES Advisory Panels") and partly from Panel reports issued since that time. Further proposals will need to be incorporated in the early years of AODP, especially if the membership of IPOD is expanded. Figure 2 indicates the site surveys which are already planned. Drilling target areas that will require further site surveys are plotted on Figure 3. "R" indicates that a regional, in additio to a site specific survey, will be needed.

The Site Survey Panel estimates that 41 site surveys will be required during the period 1984-1881.

In terms of the instrumentation required, the surveys can be subdivided as follows:

Multichannel seismic - essential for 21 areas.
Sidescan, Seabeam - essential for 29 areas.
Seamarc - desirable for 12 areas.
Deep crustal studies - essential for 12 areas.
Heat flow - essential for 11 areas.

The Panel emphasized that, in order to meet these commitments, there must be no hiatus in the international site survey program.

PASSIVE MARGIN PANEL

D. G. Roberts, Chairman

The following items are extracted from the 9-11 June 1982 meeting at Lamont-Doherty Geological Observatory, Palisades, New York.

Logging

The PMP strongly recommends that logging become an integral part of PMD legs and that DSDP examine the possibility of using a dipmeter as part of the logging package. The logging program should be made an integral part of the scientific prospectus.

1982-83 Drilling Plans

ENA-3 (B. Tucholke).

Tucholke reviewed the geology from site surveys around ENA-3 and tabled the drillling proposal. The key objective of ENA-3 is to penetrate older sediments and the J1 reflector. Detailed studies of the seismic data now show that J1 is not as widely distribued as previously believed. Five sites have been identified of which the best is thought to be site D:

ENA-3A. J1 here coincident with basement and the site is less desirable stratigraphically. Depth to J1 is 1600-1800 m.

ENA-3B. Sediments below J1 are present. Depth to J1 is 1900-2100 m, total depth is 6.5-6.7 km.

ENA-3C. J1 is well defined above basement but is too deep.

ENA-3D. Basement is unusually smooth and is overlain by J1 other two objectives. Penetration depth is 1800-2000 m requiring a total of 6600-6400 m.

ENA-3E and -3F. These sites lie at or beyond the limits of CHALLENGER drill string length.

Sites B and D are the optimum sites and would require reentry. Experience of nearby site 106 suggests that the first 1000 m of hole will be stable.

Tucholke also summarized the additional objectives of ENA-3 and their relevance to the New Jersey transect:

Sites B and D are optimum for regional seismic-stratigraphy. The site will allow calibration of the A_u reflector and the interaction of downslope processes with changes in the abyssal circulation regime in determining the stratigraphy above A_u. Important points are the age of seismic discontinuities, the how, why and if of their relationship to sea level changes and the correlation with sequence boundaries to be drilled on the New Jersey transect. The post A_u section will provide an important record of North Atlantic circulation changes. Below A_u, thin Late Cretaceous red clays (datable only by fish teeth) rest on black shales (Aptian-Albian). Within the black shale sequence, reflector β^1 is a hiatus (?) between the U. Aptian and Lower Albian with onlap above and truncation below. The same event is known in Europe and Nova Scotia and is associated with an abrupt change in clay content.

The site will also contribute to an understanding of the age of anomalies in the Jurassic quiet zone and the rate of spreading. There is debate as to the validity of results from 534. The paleomagnetic stratigraphy of the Jurassic will enable correlation with the Tethyan section.

A general discussion of the seismic data took place. The PMP endorsed the recommendation of site D as the optimum site but suggested some reprocessing to examine whether the smooth basement could be a sill; site B is the alternative site.

The PMP recommended two tactical plans for Leg 93:

1. Drill pilot hole, HPC, set reentry cone, wash to above A_u then continuously core to basement, log and then drill a third hole for the missing section. If time does not permit drilling the third hole, it should be considered as a possible target for Leg 95.

2. Drill pilot hole, set reentry cone, wash to above A_u and then continuously core to basement, log, HPC and/or drill third hole for missing section. If time does not permit drilling the third hole, it should be considered as a possible target for Leg 95.

New Jersey Transect (W. Poag).

A modified proposal for the New Jersey transect was distributed. The transect consists of four holes, situated on the slope and rise, designed to penetrate the Tertiary and the latest Cretaceous. Principle objectives of the holes are to:

- examine litho and bio facies changes between the slope and rise.
- lateral changes in paleoenvironment and paleobathymetry.
- examine the principal unconformities.
- relate the data to the Vail hypothesis of sea level change.

Although this could be done in several areas, New Jersy is attractive because of:

- good geological control on the shelf and onshore (30 holes have been drilled of which five are in the public domain).
- availability of Caldrill holes.
- dense network of MCS and high resolution seismic profiles.

The importance of studying the unconformities was exemplified by the Leg 80 results on the Goban Spur. There, the cored unconformities correspond to seismic reflectors and fit the Vail curve well. It would also be possible to compare the New Jersey data with data from N.W. Africa although data release by Exxon would be necessary.

As alternates, the proposers had looked at Georges Bank. Here the Tertiary is very thin and eroded; there are also no coastal plain wells. The Carolina Trough has no previous stratigraphic control.

NJ4 - is at the up dip limit of the continental rise wedge, water depth 2387 m, penetration ∿1000 m. The site lies at the junction of lines 25 and 35. The site would penetrate Plio-Pleistocene Miocene, Oligocene, M. + L. Eocene, Paleocene and Maestrichtian sediments.

NJ3 - penetration 600 m, water depth 2000 m. This site would penetrate to the Maestrichtian.

NJ2 - water depth 1500 m, penetration 700 to the Late Cretaceous. The site will give the most complete stratigraphic sequence developed on the slope. Oligocene and Late Eocene are probably present. In addition, firm dates are available from the COST B-3, ASP14 and 15 wells.

NJ1 - upper slope, penetration of 850 m to U. Eocene. Anticipated section consists of the Pleistocene-Miocene wedge, with thin L. Miocene and Oligocene resting on U. Eocene. The site lies on strike with the COST B-3 well.

Poag also noted that the sites would:

- yield a good calcareous fossil record.
- contribute significantly to the role of paleobathymetry in influencing assemblages.
- their close relationship to wells on the shelf and to land geology would allow use of flexure/subsidence models in testing the Vail curve.
- form the end member of a transect extending to ENA-3.

After discussion, the PMP agreed the following:

a. given a good new safety review of NJ2 by PPSP, order of priority is NJ2, NJ4, NJ3 and NJ1.

b. if the safety review is poor, priorities are NJ4, NJ3, NJ1 and NJ2.

c. site NJ6 was eliminated.

d. sites NJ8 and NJ9 to be adopted and documented as contingency sites.

The PMPalso moved that logging be an essential part of the New Jersey transect and ENA-3 leg.

The PMP also asked that Snelson discuss with Shell, attitudes to drilling NJ2 in view of recent leasing.

The PMP also asked that the US Department of the Interior be contacted to establish limits (if any) on depth of penetration.

Gulf of Mexico-
Mississippi Fan (A. Bouma/L. Garrison)

Roberts reported letters from Shor and Dorman and asked that the PMP consider scales of site surveying after presentations by Bouma and Garrison.

Bouma reported that the original proposal had been reworked in detail by the fan working group. He tabled a copy of the proposal. New data for the fan area includes the GLORIA survey made earlier this year, which shows recent activity over a large part of the fan.

The site survey should look at sites in detail tying in the relationships between sites and the characteristics of the fan. As time is restricted for the survey, it will need to be specific. Another question concerns logging. There is also some uncertainty as to the nature of the sediments (sand/silt) and alternate sites are difficult to choose. A piston core taken from CHALLENGER would be useful.

A deep site is included to give the time scale for a large part of the fan; dating of the uppermost sediments cored with the HPC may be difficult. Sites were then outlined by Bouma. The general notion is to begin work in the south east and move to the north. The leg would form the basis of a second leg. Sites outside the fan area include intraslope basins (Pygmy, Gyre Basin) designed to examine the relationship between seismic stratigraphy and sea level. The Orca Basin is a high temperature brine/anoxic basin. There is strong geochemical interest in this basin.

L. Garrison presented the GLORIA data and his interpretation. The GLORIA traverses consist of a series of N-S traverses across the fan. The data clearly show a large meandering channel. The slump described by Walker and Massingill may not exist. This region of slumping may correspond to the most recent lobe that has partly masked and buried older channels. Part of the GLORIA survey extends SE towards the Florida escarpment.

As part of this review, J. Damuth kindly demonstrated the results of the recent Petrobras/L-DGO GLORIA survey on the Amazon Cone. A series of spectacular meandering channels traverse the cone longitudinally forming a distributary pattern.

The GLORIA survey suggests minor modifications to the original proposal as follows:

MISS 1,3,4 - changes in site position based on GLORIA.
MISS 2- overbank area.
MISS 3- old slump (SP4 panel request).
MISS 7- area of depositional lobes.
MISS 8- deep test through 1000 m.

The question of the time of site survey was then discussed at length. Concern was expressed that the RFP for site surveys had gone out and that the proposals might not relate to the current discussion/GLORIA data. Assurances were given on this point. The use of deep towed systems, ship seismic and the need to concentrate effort were issues reviewed by the PMP. The following suggestions were made by the PMP:

a. Outline the fan lobe at present partly covered by GLORIA. In addition to the KANE and UT data, new tracks should be at right angles to the GLORIA traverses. Attention should be paid to the outer fan going on to the Florida abyssal plain.

b. Seismic survey. Intermediate and high resolution reflection profiling digital and analog; analog for overall survey. Digital: to enable synthetics at site locations. Resolution: 3-4 m in upper 200 m. Penetration: to 1-1.5 second (two way time). Survey will fall in data gaps to complete (a) and to select overall sites, detailed 3-D surveys in site areas are needed.

c. Side-scan sonar with subbottom profiles. Resolution side-scan 100 m (means target not over 100 m is identifiable). Resolution subbottom: true bottom shape. 2-3 m resolution, penetration 50 m for non-sands.

d. Navigation. Repeatable LORAN-C. Side-scan positioning should have the same absolute accuracy to the LORAN navigational network.

e. The site survey should also identify the location of MISS 8 to address the feasibility of penetrating a sequence that may represent sandy fans.

The PMP agreed that the leg should concentrate primarily on the fan with one hole in the Orca basin and the Pygmy basin as a contingency site.

The PMP endorsed this program for 3 or 4 days of double HPC coring subject to operational considerations, time, etc.

The PMP also moved that logging be an essential part of the Missisippi Fan leg.

The PMP endorsed Bouma's participation in the site survey as nominated co-chief.

Staffing Recommendations

Gulf of Mexico

After discussion of possible candidates, the PMP recommended that J. Coleman be considered as first candidate in view of his familiarity with processes on the delta and in the Gulf of Mexico. Alternate candidates in order of priority are (2) Kelling/Coumes, (3) Normark.

The PMP also recommended strong physical properties/geotechnical staffing of three scientists consisting of paleomagnetic anisotropy/fabric specialist, geotechnical specialist, and log analyst cum seismic stratigrapher.

A list of candidate shipboard scientists tabled by Bouma was handed to Lancelot.

ENA-3

Tucholke indicated that he would be unable to participate because of seagoing commitments. Possible nominees include J. Ewing, J. van Hinte, J. Grow, K. Klitgord and W. Dillon.

After discussion, the PMP recommended to PCOM that the priority candidates for co-chief scientist should be J. Ewing and J. van Hinte followed in order of priority by W. Dillon, K. Klitgord and J. Grow.

New Jersey Transect

Possible co-chiefs include W. Poag, U.V. Rad, J. Grow, A. Watts, M. Steckler. After discussion, the PMP recommended to PCOM that the prioirty candidates for co-chief be W. Poag and A. Watts followed by U.V. Rad, J. Grow and M. Steckler.

The PMP also recommended to PCOM that K. Miller (WHOI) be considered as Paleontologist.

Post-1983 Planning: Priorities and Objectives

A general discussion and review of the results of the program so far took place considering at the same time future targets and priorities. It was agreed that since the inception of the IPOD program, many of the basic premises used in formulating the program were changed and many new ideas, hypotheses and targets have been identified, e.g. it is now evident that extension plays an equally important role in the development of back arc basins, the problem of the dipping reflectors has emerged but has barely been tested by the drilling. Individual panel members gave opinions as follows:

Vail emphasized drilling in high latitudes to test evidence of glaciation in Jurassic and L. Cretaceous time; straigraphy specifically looking at fans, drifts, deep sea erosion surface (their relation to sea level and ocean circulation changes), breakup inconformities as sea level changes; tectonics specifically the dipping reflector problem, developing of tilted blocks; opening history of the N.W. Atlantic (Vail noted that the first deepening event is Toarcian-Late Pliensbachian in age and conflicts with Sheridan's estimate).

Biju-Duval asked that the Panel again consider fans and noted that the Cap Ferret Fan had been studied in detail; the Rhone Fan is the subject of a similar study. Other fans of interest noted by members included the Indies Fan and Amazon Fan. The PMP noted that SP4 would have a joint interest in these areas. Ryan commented that a sandier fan would be an appropriate target after Leg 92.

Van Hinte noted (and the PMP concurred)

that transform margins had been a grossly neglected topic.

Several panel members asked that carbonate platforms be studied in view of the interest for diagenesis, their growth history and application to Triassic Tethyan models. Schlager et al. also consider such platforms to be natural sea level gauges.

Several panel members commented that dredging, submersible observations, deep crustal studies can be important cost effective alternates and are complements to drilling.

Areas of specific interest included marginal basins. In this context, the PMP recommended that the Caribbean/Mediterranean Sea Working Group be reconvened to develop new targets in the Mediterranean Basin, S. China Sea and Yucatan.

The PMP recognized that future planning was clouded by uncertainties about the management structure of the AODP. Nonetheless the PMP felt a useful start could be made by identifying areas/problems amenable to solution by drilling.

The Panel identified a series of problems fundamental to a better understanding of the evolution of passive margins and also of wider interest. In identifying these problems, the Panel recognized that some areas could be considered as ideal natural laboratories where more than one of these problems could be addressed by drilling. The list is not exhaustive nor is it intended to be exclusive, but rather to focus effort and attention on these areas for preliminary review.

The PMP agreed to undertake a further review at their next meeting and members will bring or report data from area of interest.

The PMP identified the following themes or problems around which future passive margin drilling might be centered:

a. Pangea Break-up:

The problem here is to thoroughly document the timing and dates of the break-up of Pangea. Dates are generally not avialable but have great impotance, e.g. in understanding Tethyan paleogeography; the break-up of the Indian Ocean etc.

Candidate margins would include all Australia, Ceylon (?), Caribbean Sea (Yucatan Basin, Venezuela Basin, Colombia Basin), Weddell Sea, Somali Basin, Owen Basin, the Arctic Ocean, Mozambique Channel, Gulf of Mexico, the Blake-Bahama Basin and its conjugate off Mauritania.

b. Extensional margins:

Further drilling is needed to examine in more detail the extension problems raised by the two types of passive margin, i.e.

1. Dipping reflector type: Important questions here include the duration of rifting and associated volcanism, the subsequent subsidence history (does it follow that predicted by the McKenzie stretching model, etc.?). Candidate margins include: E. Greenland, Antarctica, the Voring Plateau, S. Australia, ENA-8, India (poor data), the Labrador Sea.

2. Tilted block type: Questions here include the amount of subsidence developed in response to stretching as well as the duration of the stretching. Candidate margins include the Exmouth Plateau, Queensland, the Northern Coral Sea, the S. China Sea, Tyrrhenian Sea, Baffin Bay, the Orphan Basin and the region east of the Grand Banks as conjugate to Galicia.

3. Subsidence: The variability of subsidence in time and space across the different types of extensional margin is not understood. On the dipping reflector type of margin, subsidence appears to be initiated at or close to sea level but at c. 2000 m below sea level in the case of the tilted block type. Allied questions include the timing and origin of the topographic relief across both types of margin. Candidate margins include: Tyrrhenian Sea, S. China Sea, Gulf of California, Bering Sea, Andaman Sea.

c. Flexure vs. Sea Level:

Flexure is now proposed as a natural method of accounting for the coastal onlap patterns interpreted by Vail et al. as due to global euslatic changes in sea level. Both hypotheses urgently need testing best done in two ways: 1) by drilling transects to calibrate the flexure model and 2) drilling these transects on different margins of different ages. Candidate margins include Australia and Tyrrhenian Sea.

d. "Ensimatic" Rifts

Rifting also occurs in the oceanic atmosphere viz by ridge jumps etc., but little is known of the mechanism involved in this process. Candidate areas include the Kolbeinsey Ridge, the Red Sea and Walvis Ridge.

e. Marginal Plateau (e.g. Kerguelen).

f. Transform Margins

Little is known of the thermal and subsidence history of transform margins and surprisingly only one transform margin seems to have been drilled in the history of the DSDP. Ideally, transects both along and across transform margins are needed to examine this history in relation to that predicted for the adjoining rifted margin. Candidate margins include: Norwegian Sea, South China Sea, Demerara Rise (plus Ivory Coast conjugate), Euqatorial Fracture Zones, Falklands-Agulhas Fracture Zone, Western Australia.

g. Unconformities, Sea Level and Paleoenvironments

A continuing and not well understood problem is the relationship between unconformities, global sea level changes and changes in the ocean paleoenvironment. Questions include the triggering role of sea level changes in ocean circulation revealed by the unconformities. Drilling could (by means of the HPC) measure rates of change leading up to a particular event.Candidate margins include Australia, the Voring Plateau and the Tyrrhenian Sea.

h. Carbonate Platforms

The growth of carbonate platforms in relation to sea level changes and their possible use as natural sea level gauges are major problems. Differences in the "atoll" type of carbonate platform as well as the Bahaman type are important. Candidate areas include the west margin of India (Chagos-Laccadive), S. China Sea, Bahamas and Demerara Rise.

i. Fans

Following Leg 92 in the Mississippi Fan, it will be desirable to drill fans (e.g. high sand) developed in different tectonic environments. Candidate areas include: the Norwegian Sea, India, Canada, Rhone Fan, Cap Ferret Fan, Amazon Cone, Monterey Fan and equivalents.

j. Drifts

Although a first attempt at drilling drifts will be made on Leg 94, the importances of drifts as part of the sedimentary records of the rise requires a more systematic study, but longitudinal and sectional transects of their dynamic and development in relation to circulation changes. Candidate drifts include: the Blake-Bahama Outer Ridge, the Elrik Drift (Laborador Sea), the Gardar Drift, the Feni Drift.

Ideal Natural Laboratories

The PMP, in developing these themes /problems, noted that several margins could be regarded as natural laboratories because they offered the opportunity to test several of these problems during one carefully designed transect. The repeated occurrence of one or other candidate margin above emphasizes this point.

The PMP therefore identified the following ideal natural laboratories: Norwegian Sea, Tyrrhenian Sea, Exmouth Plateau, Weddell Sea, South China Sea, Caribbean Sea, Antarctica.

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DEEP SEA DRILLING PROJECT

LITERATURE AND SAMPLE INVESTIGATION

SEARCH REQUEST FORM

Any interested researcher may request a bibliographic search. Routine searches with printed results are done free of charge. Keyword searches will be done on two data files:

1. PUBLISHED PAPER FILE contains data on:

   a. Journal reprints received from authors in Curator's office (we have not exhaustively searched the literature for all DSDP related papers). Over 700 papers are indexed.

   b. Chapters (excluding Introduction and Site Chapters) from Initial Report Volumes 1-3, 6, 9, 10, 12, 13, 19, 22 and 24-33. (We are currently adding other published volumes.)

2. SAMPLE INVESTIGATION FILE contains data on:

   a. Abstracts of proposed sample investigations intended for journal publication. Over 2000 sample investigations are indexed.

LIST OF KEYWORDS AND/OR SITE NUMBERS you are interested in searching.

(NOTE: Keywords can be linked, such as RADS at SITE 380 or CLAY MINERALS in the SEA OF JAPAN.) List your own words if you do not see the exact keywords that are of interest to you.

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SEND SEARCH RESULTS TO:

Name ____________________________ Date __________

Address ____________________________

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Send search request to:

Trudy Wood, Science Services Office
Deep Sea Drilling Project, A-031
University of California, San Diego
La Jolla, California 92093

11/82

KEYWORDS FOR DSDP LITERATURE AND SAMPLE INVESTIGATION SEARCHES

(searchable keywords are capitalized and underlined)

I. VIEWPOINT OF STUDY

Qualities:

a) Composition
   1) <u>SEDIMENT CONSTITUENT ANALYSIS</u>
   2) <u>CHEMICAL COMPOSITION</u>
   3) <u>MINERAL COMPOSITION</u>

b) <u>TEXTURE</u> (grain size, fabric)

c) Structure
   1) <u>CRYSTAL STRUCTURES</u>
   2) <u>PRIMARY STRUCTURES</u>
   3) <u>SECONDARY STRUCTURES</u>

d) Form or shape
   1) <u>ORGANIC MORPHOLOGY</u>
   2) <u>INORGANIC MORPHOLOGY</u>
   3) <u>TOPOGRAPHY</u>
   4) <u>GEOMETRY</u> (rock unit form)

e) <u>COLOR</u>

f) <u>PHYSICAL PROPERTIES</u> (in general)
   1) <u>DENSITY</u>
   2) <u>ELECTRICAL PROPERTIES</u>
   3) <u>MAGNETIC PROPERTIES</u>
   4) <u>OPTICAL PROPERTIES</u>
   5) <u>POROSITY</u>
   6) <u>RADIATION</u>
   7) <u>SONIC PROPERTIES</u>
   8) <u>SHEAR STRENGTH</u> (stresses, etc.)
   9) <u>THERMAL PROPERTIES</u>
   10) <u>WATER CONTENT</u>
   11) <u>OTHER PHYSICAL PROPERTIES</u>

Occurrences:

a) Space distribution
   1) <u>GEOGRAPHIC DISTRIBUTION</u>

b) Time distribution
   1) <u>ABSOLUTE AGE</u>
   2) Relative Age - <u>STRATIGRAPHY</u>

c) Numbers distribution - <u>ABUNDANCES</u>

Processes:

a) <u>ALTERATION PROCESSES</u>
b) <u>CHEMICAL PROCESSES</u>
c) <u>EVOLUTION</u>
d) <u>IGNEOUS PROCESSES</u>
e) <u>MINERAL PROCESSES</u>
f) <u>SEDIMENT PROCESSES</u>
g) <u>TECTONIC PROCESSES</u>

Relationships:

a) <u>TAXONOMY</u>
b) <u>ENVIRONMENT</u>

Synthesis studies:

a) <u>SYNTHESIS</u>

General studies:

a) <u>CHEMISTRY</u>
b) <u>GEOPHYSICS</u>
c) <u>MINERALOGY</u>
d) <u>PALEONTOLOGY</u>
e) <u>PETROLOGY</u>
f) <u>PHYSICAL OCEANOGRAPHY</u>
g) <u>SEDIMENTOLOGY</u>
h) <u>SITE SURVEYS</u>

II. GEOGRAPHIC AREA

<u>ANTARCTIC OCEAN</u>
<u>ARCTIC OCEAN</u>
(Arctic) <u>NORWEGIAN-GREENLAND SEA</u>
<u>ATLANTIC OCEAN - EAST</u>
<u>ATLANTIC OCEAN - WEST</u>
(Atlantic) <u>MID-ATLANTIC RIDGE</u>
<u>BLACK SEA</u>
<u>CARIBBEAN SEA</u>
<u>GULF OF MEXICO</u>
<u>INDIAN OCEAN</u>
<u>MEDITERRANEAN SEA</u>
<u>PACIFIC OCEAN</u>
(Pacific) <u>BERING SEA</u>
(Pacific) <u>CORAL SEA</u>
(Pacific) <u>PHILIPPINE SEA</u>
(Pacific) <u>SEA OF JAPAN</u>
(Pacific) <u>TASMAN SEA</u>
(Pacific) <u>GULF OF CALIFORNIA</u>
<u>RED SEA</u>

III. AGES

<u>QUATERNARY</u>
   1) <u>HOLOCENE</u>
   2) <u>PLEISTOCENE</u>

<u>TERTIARY</u>
   1) <u>PLIOCENE</u>
   2) <u>MIOCENE</u>
   3) <u>OLIGOCENE</u>
   4) <u>EOCENE</u>
   5) <u>PALEOCENE</u>

<u>CRETACEOUS</u>
<u>JURASSIC</u>
<u>TRIASSIC</u>
<u>PALEOZOIC</u>
<u>PRECAMBRIAN</u>

IV. DSDP SITE NUMBERS

ALL DSDP SITE NUMBERS ARE SEARCHABLE.

V. MATERIAL USED AS OBJECT OF STUDY

Water column:

a) WATER COLUMN
b) PLANKTON

Sea floor and ocean crust:

a) WATER-SEDIMENT INTERFACE
b) FOSSILS (in general)
   1) DIATOMS
   2) DINOFLAGELLATES
   3) EBRIDIANS
   4) FORAMINIFERA
   5) ICHTHYOLITHS
   6) MOLLUSCS
   7) NANNOFOSSILS
   8) OSTRACODS
   9) PALYNOMORPHS
   10) RADIOLARIA
   11) SILICOFLAGELLATES
   12) OTHER FOSSILS
c) MINERALS (in general)
   1) NON-SILICATE MINERALS
      a) CARBONATES
      b) HALIDES
      c) HYDROXIDES
      d) OXIDES
      e) PHOSPHATES
      f) SULFATES
      g) SULFIDES
   2) SILICATE MINERALS
      a) CLAY MINERALS
      b) ZEOLITES
      c) SILICA MINERALS
d) SEDIMENTS AND/OR SEDIMENTARY ROCKS
   1) CARBONACEOUS
   2) CARBONATE
   3) CLAY
   4) EVAPORITES
   5) METALLIFEROUS
   6) PHOSPHATIC
   7) SILICEOUS
   8) TERRIGENOUS
   9) VOLCANICS, ASHES
e) METAMORPHIC ROCKS
f) IGNEOUS ROCKS
   1) GABBRO CLAN, BASALTS
   2) GRANITE CLAN
   3) DIORITE, MONZONITE, SYENITE CLANS
   4) LAMPROPHYRES
   5) PYROCLASTICS
   6) ULTRAMAFIC CLAN
g) Other components
   1) CHEMICAL ELEMENTS
   2) HYDROTHERMAL DEPOSITS
   3) INTERSTITIAL GAS
   4) INTERSTITIAL WATER
   5) EXTRA-TERRESTRIAL MATERIAL
   6) ORGANIC CARBONS
h) Other features
   1) TOTAL STRATIGRAPHIC COLUMN
   2) REFLECTOR
   3) HORIZON
   4) UNDERSEA FEATURES (basins, ridges, trenches, etc.)

V. MATERIAL USED AS OBJECT OF STUDY (Cont'd.)

i) Data used for study
   1) BATHYMETRY
   2) MAGNETICS
   3) NAVIGATION
   4) SEISMIC PROFILES
   5) WELL LOGS
   6) SITE SURVEYS
   7) IGNEOUS ROCK DATA
   8) PALEO/BIOSTRAT DATA
   9) SMEAR SLIDE DESCRIPTIONS
   10) VISUAL CORE DESCRIPTIONS
   11) CARBON-CARBONATE ANALYSES
   12) GRAVIMETRIC CHEMISTRY DATA
   13) GRAIN SIZE
   14) SONIC VELOCITY
   15) G.R.A.P.E. DATA
   16) X-RAY MINERALOGY
   17) INTERSTITIAL WATER DATA
   18) THERMAL CONDUCTIVITY
   19) LITHOLOGIC AGE DATA
   20) OTHER DATA

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The Deep Sea Drilling Project has acquired surplus Initial Report volumes and is making them available to institutional libraries and individuals, while the supply lasts, for the cost of postage and handling only.

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