JOIDES Journal

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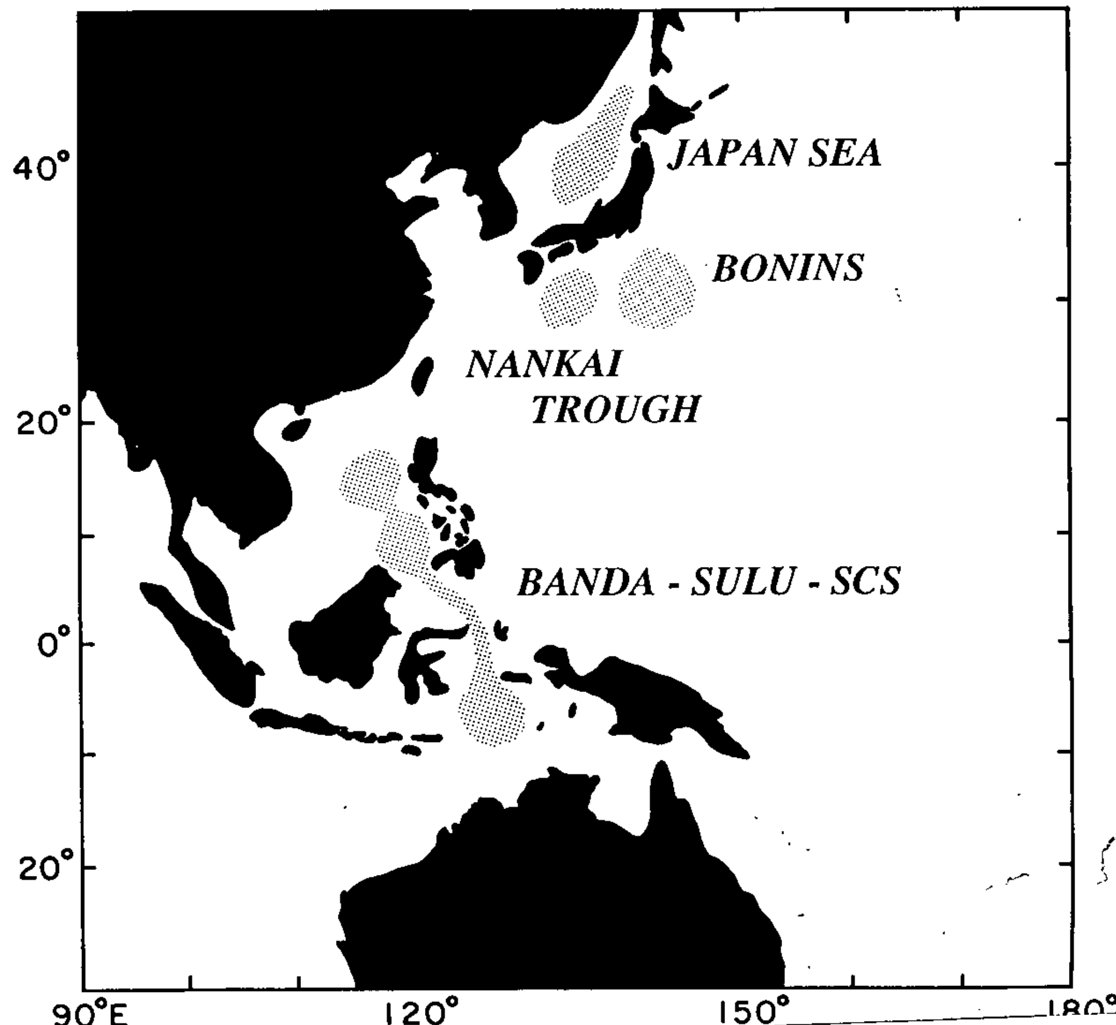

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FOCUS

In Strasbourg, one could not help but be awed by both the beauty of the Cathedral de Strasbourg and by the visionary drilling goals defined by COSOD II. Both represent monumental challenges to long-term planning: the Cathedral was planned and constructed over a period of more than 400 years, and the monument of scientific understanding envisioned by COSOD II will require a similar long-term commitment from the marine geology community. However, unlike the planners of the Cathedral, whose unifying goal was to hold up the roof, the drilling program planners advocate an extremely wide variety of goals and objectives.

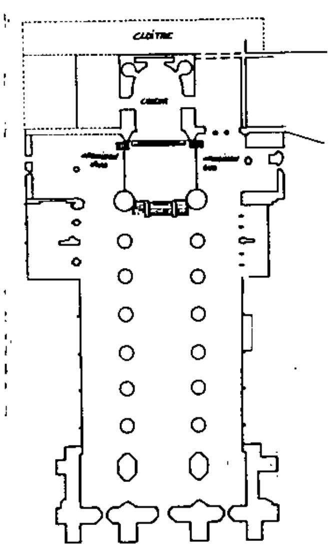
For those of us (particularly myself) who watched the COSOD II Working Groups agonizing over the prioritization, of scientific goals, and not always succeeding, a strong feeling of uneasiness prevailed. An all too common theme expressed to me was a dissatisfaction with how the JOIDES planning process is proceeding. These same disenchanted scientists returned to their COSOD II Working Groups and struggled with their own process of defining scientific priorities.

Unfortunately for me (and my successors), if COSOD II fails to produce a prioritization then that role must fall to JOIDES. With the five scientific realms represented by the COSOD II Working Groups, each with a number of different drilling objectives, setting priorities will be a difficult job for any group. If it falls to JOIDES planning, whatever structure evolves in the coming years, I suspect that any priority list will not be acceptable to a large fraction of the community.

The concern over how the JOIDES planning structure will respond to the long range objectives defined at COSOD II is shared by PCOM and other panels. An evaluation of the panel structure will be completed this coming year so that recommendations on changes can be made to the JOIDES Executive Committee. A small subcommittee has been named to address panel structure. To reflect the consensus of PCOM that the panels structure should be designed to assure that ODP is more thematically-oriented, and also to address the concern that regional perspectives are needed, this committee has been given the following charge: 1) to evaluate present panel structure and make recommendations for possible modification; 2) to see that any change in the number of thematic panels should be the minimum necessary to adequately represent the themes addressed by Ocean Drilling; 3) to consider and define the role of regional expertise; and 4) to make final recommendations after the COSOD II report is available.

The lessons of the last few years clearly show that it is time to begin a careful evaluation and possible modification of the panel structure. At COSOD II, many exciting scientific questions were raised. Drilling strategies for better understanding and studying the earth as a global system were presented. The challenge of COSOD II for scientific planning is how to build this "cathedral".

Nicklas G. Pisias
Planning Committee Chairman



COSOD II: A STATUS REPORT

The second Conference on Scientific Ocean Drilling (COSOD II), hosted by the European Science Foundation, was held in Strasbourg, France, on 6-8 July 1987. A total of 360 scientists, administrators, officials and observers attended the conference and 19 countries were represented: the United States, Canada, Japan, the Federal Republic of Germany, France, the United Kingdom, the ten ESF Consortium countries, plus Australia, Israel and the USSR. A meeting of the COSOD II Steering Committee and other interested participants, chaired by Xavier Le Pichon, followed on 9-10 July.

COSOD II began with a half-day plenary session on topics of general interest, including the status of engineering developments, logging and alternate drilling platforms. This session was followed by two days of separate, parallel workshops determined by the previously established Working Groups (W.G.):

- W.G. 1: Global Environmental Changes; John Imbrie, Chairman
- W.G. 2: Mantle-Crustal Interactions; Charles Langmuir, Chairman
- W.G. 3: Fluid Circulation and Global Geochemical Budget; Graham Westbrook, Chairman
- W.G. 4: Stress and Deformation of the Lithosphere *; Adolphe Nicolas, Chairman
- W.G. 5: Evolution and Extinction of Oceanic Biota; Hans Thierstein, Chairman

[* The name of W.G. 4 was changed from "Brittle and Ductile Deformation of the Lithosphere" by the Steering Committee]

The meeting concluded with another half-day plenary session at which the Working Group Chairmen reported some of the preliminary conclusions and recommendations of their groups.

The two days on which the Steering Committee met were devoted to further discussion of W.G. recommendations; of publication deadlines, formats and objectives; and of common themes and broader issues raised by COSOD II. It was agreed that the drafts of the W.G. papers would be prepared by early October and that the Steering Committee would have its final meeting on 19-21 October (in Paris) to review these papers and complete its own summary report. The report will be written primarily for scientific peers but will attempt to aid administrators, especially by means of executive summaries.

The overall report, as well as the appended W.G. reports, will deal with four major recommendations regarding the Ocean Drilling Program: 1) science,; 2) technology; 3) strategy; and 4) planning structure. The final report of COSOD II will be printed as soon as possible after the October meeting and should be widely available by the end of calendar 1987.

While the Working Group Chairmen understandably want to preserve the confidentiality of their now only partially-formulated recommendations, this correspondent feels safe in confiding that they will likely have two characteristics:

1) greater emphasis on thematic versus regional goals, and

2) recognition of the need for much better technology before ODP can achieve certain kinds of science.

A report which looks at scientific goals from COSOD II is planned for the next issue of the JOIDES Journal.

Tom Pyle
Director, Ocean Drilling Programs
Joint Oceanographic Institutions, Inc.

JOIDES RESOLUTION OPERATIONS SCHEDULE
LEGS 118-129

LEG	AREA	DEPARTS LOCATION	DEPARTS DATE	ARRIVES DESTINATION	ARRIVES DATE	IN PORT
118	Southwest Indian Ridge Fracture Zone	Mauritius	23 October	Mauritius	14 December	14-18 December
119	Kerguelen Plateau and Prydz Bay	Mauritius	19 December	Mauritius	20 Feb 1988	20-24 February
120	Central Kerguelen Plateau	Mauritius	25 February	Freemantle	26 April	26-30 April
121	Broken Ridge and N90°E Ridge	Freemantle	1 May	Singapore	23 June	23-27 June
122	Exmouth Plateau	Singapore	28 June	Singapore	27 August	27-31 August
123	Argo Abyssal Plain and Exmouth Plateau	Singapore	1 September	Darwin	29 October	29 Oct - 2 Nov
124	Sulu Sea/So.China Sea	Darwin	3 November	Manila	14 December	14-18 December
125	Bonins I	Manila	19 December	Tokyo	8 Feb 1989	8-12 February
126	Bonins II	Tokyo	13 February	Yokohama	10 April	10-14 April
127	Nankai Trough	Yokohama	15 April	Yokohama	12 June	12-16 June
128	Japan Sea I	Yokohama	17 June	Niigata	2 August	2-6 August
129	Japan Sea II	Niigata	7 August	Nagasaki (?)	7 September	
	Dry Dock	Nagasaki (?)				7-20 September

NOTE: Ports and dates after Leg 121 are tentative and should be used as estimates only. (Rev 9/18/87)

LEG 118 SCIENTIFIC PROSPECTUS

INTRODUCTION

Leg 118 drilling plans include one or more holes in the Atlantis II Fracture Zone of the Southwest Indian Ridge. The primary goal will be to drill a deep (500 m +) hole in exposed upper mantle peridotite on a median ridge of the fracture zone with the aid of a hardrock guidebase. If a deep hole at this site is not achievable, other locations on the walls and floor of the fracture zone will be attempted. If a deep hole is achieved, a major program of geophysical logging and other downhole measurements will be carried out. Secondary objectives are to drill a series of shallow basement holes across the floor of the fracture zone and to sample basement in active and fossil nodal basins.

SCIENTIFIC OBJECTIVES

Fracture zones are ubiquitous features of the oceanic lithosphere, yet little is known regarding their petrology, structure or tectonic evolution. Recent models for ridge dynamics (e.g., Schouten and Klitgord, 1982) suggest that fracture zones play a major role in segmentation of spreading ridges. They are considered to be relatively cold zones separating stationary spreading center cells beneath spreading ridge segments. Crustal magma chambers are believed to lie beneath the spreading cells, and new crust is formed by crystallization along the walls of the magma chambers and by vertical and lateral injection of magma along the spreading ridge. In this model, less magma will reach the far edges of the spreading cells (i.e., fracture zones) leading to thinner crustal sections. Such thinning of oceanic crust in the vicinity of fracture zones has been demonstrated by seismic studies along the ridge axes (e.g., Detrick and Purdy, 1980; Fox et al., 1980; Cormier et al., 1984). In some cases, the crustal thickness, particularly beneath nodal basins, may be less than 5% to 10% of normal sections.

Because of these relatively thin crustal sections and the great topographic relief of many fracture zones, mantle material is commonly exposed on their floors and walls. The abundance of mantle rocks in fracture zones appears to correlate closely with the spreading rate of the associated ridge. For example, peridotites compose over 65% of all material dredged from fracture zones of the very slow spreading Southwest Indian Ridge whereas they make up only 10-15% of dredge hauls from typical fracture zones of slow spreading ridges and are nearly absent from those of the fast-spreading East Pacific Rise (Dick, in preparation). Considering the difficulty of achieving deep penetration in normal ocean crust, fracture zone drilling provides one of the best possibilities for obtaining in-situ samples and stratigraphy of oceanic mantle.

Abyssal peridotites dredged from spreading ridges and fracture zones are generally regarded as residues of partial melting of mantle material from which mid-ocean ridge tholeiite magmas have been extracted. It is expected that drilling in fracture zones will allow sampling of petrologically related basaltic, gabbroic and ultramafic rocks. Study of such cores will lead to a better understanding of the processes of partial melting in the mantle, melt extraction and later modification in shallow magma chambers.

Other general objectives of fracture zone drilling are to: 1) Determine the lateral and vertical variability of rock types on the floor of the fracture zone; 2) Investigate the nature and distribution of deformation in a fracture zone and determine whether there is a single slip plane, multiple planes, or penetrative slip across the entire width of the feature; 3) Determine the thermal structure of transform-generated crust and assess the extent of alteration and seawater penetration; 4) Determine the nature and thickness of oceanic crust in the nodal basins where the ridge crests meet the transform fault; 5) Determine the physical properties, magnetism and seismic velocities of transform-generated crust and particularly to document any anisotropy in these properties.

GEOLOGIC BACKGROUND

The Atlantis II Fracture Zone is one of a series of major transform faults offsetting the very slow-spreading Southwest Indian Ridge. This 210-km-long feature trends roughly north-south and crosses the ridge at approximately 57°E. Spreading on the Southwest Indian Ridge is very slow, on the order of 0.8 cm/yr (Fisher and Sclater, 1983).

CONRAD cruise 27-09 conducted a detailed survey of the fracture zones and adjacent ridge segments in October, 1986. The southern and northern rift valleys of the offset spreading ridge are well defined, with over 2200 m of relief and widths of 22 km and 38 km, respectively (Figure 1). A line of small axial volcanos marks the southern ridge crest. Well-defined nodal basins lying on the transform side of the present day neovolcanic zone mark the intersections of the transform and ridge axes.

The transform valley is about 30-40 km wide, measured between the slope breaks from normal ridge topography to the steep transform walls. The valley floor systematically deepens from about 5 km to 6 km and narrows from 14 km to 7.5 km between north and south. The spreading rate, as determined from the magnetic anomalies mapped to the east and west of the transform (Figure 1), has been about 10 mm/yr over the last 20 m.y.

Relief on the transform valley is on the order of 5800 m, and the walls of the transform valley are remarkably steep (typically 30-40°), though locally they may be much more subdued, particularly along the western side of the valley. The deepest point is 6480 m in the southern nodal basin, and the shallowest is an uplifted bench on the eastern transverse ridge at 680 m.

A bathymetrically prominent "median tectonic ridge" bisects the northern half of the transform valley, and can be followed intermittently down the southern half as well (Figure 1). In the north, this ridge shoals to 4200 m and has relief between 1000 m and 1500 m, whereas in the southern half the relief drops abruptly to only a few hundred meters. In this area, two deep (6.3 km) flat-floored, sedimented basins, 2.5 km x 24 km and 4 km x 18 km, are divided by a relatively low (120-250 m) median tectonic ridge. Seismic reflection profiles along the axes of these basins and across the median tectonic ridge show stratified sediments which are at least 120 m thick in the centers of the basin and which appear to onlap and possibly drape the intervening ridge. These sediments are believed to consist of a mixture of pebbles, sand and pelagic ooze.

Dredging of the walls and floor of the fracture zone yielded chiefly ultramafic rock, and lesser amounts of gabbro, basalt and greenstone. In all, 2100 kg of rock were recovered from 35 dredge hauls. Peridotite is the dominant lithology in about one-third of these hauls. Four dredge hauls along the median tectonic ridge recovered serpentinized peridotite, gabbro, metamorphosed basalt and diabase, suggesting that this feature is the locus of extensive hydrothermal alteration and emplacement of serpentinized mantle peridotite. One dredge haul from the southern end of the median ridge recovered only peridotite. Virtually all of the basaltic rocks recovered are altered, and the alteration was usually oxidative with many of the rocks stained a bright red or white. In addition, some unusual breccias cemented by a black tarry-appearing hydrothermal oxide were recovered. These observations suggest that the conditions of hydrothermal alteration along the transform plate boundary may differ substantially from those occurring along ocean ridges.

Two sedimented basins, 4.5 km to 5 km deep and 10 km to 20 km across, are found in the fracture zone trace north of the transform.

PROPOSED DRILL SITES

SWIR I - Transform Median Ridge:

The prime site (SWIR I) is located on the southern portion of the median

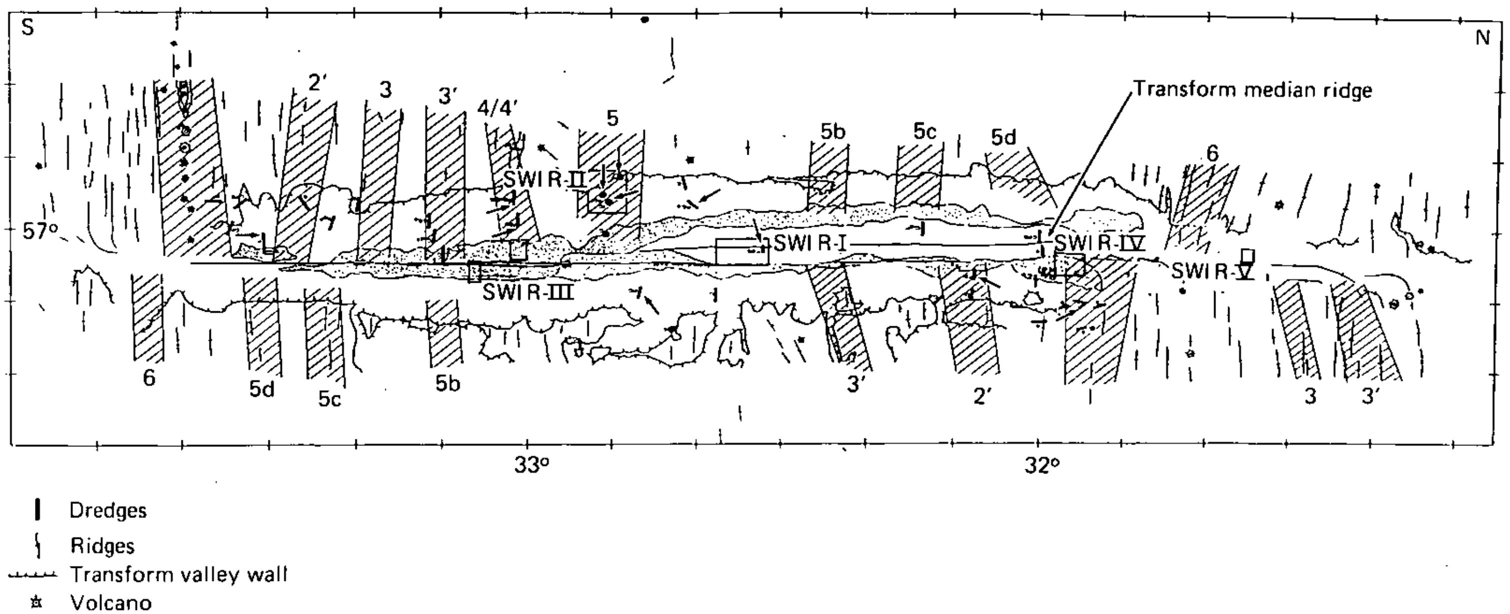


Figure 1. Tectonic map of the Atlantis II Fracture Zone (after Dick et al., in preparation). Hatched zones are preliminary magnetic anomaly identifications. Short lines and circles are rock dredge locations: arrows highlight dredges consisting predominantly of serpentinized peridotite. Dotted areas denote basins. Proposed drilling sites are rectangles with Roman numerals.

ridge in the transform at about 32°32'S, 57°03'E. The water depth at this site is about 4700 m. A survey along this portion of the ridge axis detected no sediment cover, so a hardrock guidebase will be deployed if a suitable site can be located. A dredge haul in this area recovered mainly ultramafic rocks, suggesting that peridotite crops out at the surface.

The main goal at this site is to drill a deep hole in peridotite, presumed to represent upper mantle, in order to obtain samples for study of mantle mineralogy, petrology and alteration characteristics. Also of interest are the physical properties and deformational characteristics of the rocks. If a deep hole is drilled successfully, it will be used to carry out an array of downhole measurements (see below).

SWIR II - West Transform Wall:

Because the highest priority of Leg 118 is to drill a deep hole in mantle material, a backup site (SWIR II) has been identified in case no suitable site can be found on the median ridge. SWIR II is located on the west wall of the fracture zone at 32°51'S, 56°55'E in an area where abundant peridotite was dredged during the site survey and where the bathymetric contours suggest a relatively gently sloping wall. A hardrock guidebase will be deployed if a suitable site can be located. The general objectives and operational scenario for this site are similar to those for SWIR I.

SWIR III - Southern Transform Flat-Floored Basin (Central Basin):

This "site" is a transect of 4 to 5 "pogo test holes" designed to sample basement across the sediment-filled basins in the southern half of the transform. Two possible locations have been identified, one at about 33°07'S, 57°07'E in the eastern basin, the other at 33°01'S, 57°03'E in the western basin (Figure 1). The "pogo" drilling involves coring and washing the sedimentary section and coring the upper 20 or so meters of basement using the XCB/ 3-3/4 in. Navidrill. With this technique multiple holes can be drilled without tripping the pipe to the surface to change bits between each hole. The main goal of this drilling is to obtain samples of basement across the floor of the fracture zone to test for lateral variability in lithology, alteration and deformational fabric. A secondary objective is to sample the sediments on the floor of the fracture zone by spot coring. If one of the "pogo" holes samples easily drillable peridotite, the hole could be deepened by deploying a free-fall reentry cone. Alternatively, a standard reentry cone could be used to start a new hole in the same vicinity.

SWIR IV - Active Nodal Basin:

This site is located in the northern nodal basin at approximately 31°57'S, 57°05'E (Figure 1). A profile across this basin indicated no sediment cover, and two dredge hauls recovered basalt, gabbro, and greenstone. The main purpose of this site is to determine the lithology and structural characteristics of the rocks at the point were the spreading ridge and fracture zone meet. A deep reentry hole would be attempted here only if the hardrock guidebase had not been deployed at either SWIR I or SWIR II. Otherwise, unsupported bare-rock spud-in would be attempted using the 9 1/2 in. coring motors.

SWIR V - Fossil Nodal (?) Basin:

This site is located in an isolated basin on the east side of the fracture zone north of the present northern nodal basin at about 31°34'S, 57°08'E (Figure 1) on crust that has not passed through the transform. It is interpreted as a captured and uplifted fossil nodal basin with an age of about 10 m.y. The scientific rationale for drilling at this location is the same as for SWIR IV; the advantage is that SWIR V has a sediment cover in excess of 100 m, making conventional drilling possible. However, SWIR V is given a lower priority because its tectonic environment is less certain.

Logging, Downhole Measurements and Physical Properties:

A primary objective of Leg 118 is deep penetration of rock believed representative of the mantle (peridotite) in the Atlantis II Fracture Zone. Assuming that such a hole is established by drilling on Leg 118, an important part of the leg scientific objectives is to characterize the nature of the rock penetrated as completely as possible, especially since such rocks are only rarely drilled. Logging, special downhole experiments, and laboratory physical properties measurements will be conducted particularly to characterize the physical state (in-situ temperature, porosity, permeability, acoustic, electrical, and magnetic properties, density, fabric, stratigraphy, stress, etc.) and the chemistry and mineralogy (including alteration). In situ measurements will be compared with recovered sample measurements to the extent possible to optimize the characterization of the material penetrated. The following logs will be run in an 8.5-day logging program: (1) Temperature w. magnetic susceptibility, (2) Seismic strat./geochemical combo. logs, (3) Lithoporosity log, (4) Dual laterolog, (5) 12-channel sonic, (6) Borehole TV, (7) Magnetometer, (8) Complex resistivity, (9) Large scale electrical resistivity, (10) Vertical seismic profile, (11) Drill string packer, and (12) Temperature.

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[NOTE: The complete Leg 118 Prospectus is available from ODP Headquarters, 1000 Discovery Drive, College Station, TX 77843-3469.]

October

SUMMARY OF LEG 114 RESULTS

INTRODUCTION

Leg 114 began on 14 March 1987 in East Cove, Falkland Islands, and ended on 13 May 1987 in Port Louis, Mauritius. During this period seven sites (698 to 704) were drilled. The Co-Chief Scientists for Leg 114 were Drs. Paul F. Ciesielski and Yngve Kristoffersen.

The primary tectonic objectives of Leg 114 were to document the ages and subsidence histories of the Islas Orcadas and Meteor rises, and the basin between these two rises which formed a gateway between the Weddell Basin and the South Atlantic. Other tectonic objectives included determining the age and nature of basement of the Northeast Georgia Rise and the role this feature played in the evolution of the Malvinas Plate. The major paleoceanographic objectives of this leg were to document the Late Cretaceous to Holocene paleoenvironmental evolution of the passageway linking the South Atlantic and Weddell basins, to determine the latitudinal and vertical temperature gradients in the subantarctic South Atlantic during the Paleogene, to document the establishment of the Antarctic Circumpolar Current which resulted from the opening of the Drake Passage, to record more fully the Middle to Late Cenozoic Polar Front migrations, and to obtain records of changes in antarctic climate and ice volume. As a necessary precursor to the interpretation of the tectonic and paleoenvironmental history of the subantarctic South Atlantic, a major goal of Leg 114 was to obtain a high-resolution magneto-biostratigraphic chronology of the Late Cretaceous through Holocene.

DRILLING RESULTS

Site 698:

Site 698, located near the eastern edge of the Northeast Georgia Rise (NEGR) at 51°27.51′S, 33°05.96′W in a water depth of 2128 m (Figure 1), sampled a surface residual lag deposit of ice-rafted detritus above a thick pelagic carbonate sequence of nannofossil ooze, nannofossil chalk, and limestone. Frequent chert stringers and nodules that occur throughout the carbonate section hampered sediment recovery. Basement consists of a fine grained, sparsely pyroxene-plagioclase-phyric basalt overlying a hematite-rich regolith.

The smooth and layered acoustic basement on the NEGR may be attributed to, at least in its upper part, interbedded altered basalt flows and highly weathered (subaerially?) basalt regolith. A sandy mud above basement may represent a transgressive sand incorporating some eroded weathered basalt. Sparse nannofossils in this sandy mud suggest a Campanian age, if they are not downhole contaminants. A 9.5 m recovery gap occurs between the sandy mud and the base of the overlying pelagic carbonate sequence of probable Campanian age. Initial subsidence of the NEGR must have occurred during the Campanian or earlier as benthic foraminifers throughout the carbonate sequence overlying basement are indicative of water depths no less than lower bathyal (>1000 mbsl). If the NEGR was a Cretaceous convergent boundary between the Malvinas Plate and South American Plate, the cessation of any subduction must have occurred prior to or during the early Campanian.

Site 699:

Site 699 is located on the northeastern slope of Northeast Georgia Rise (51°32.537′ S, 30°40.619′ W) at a water depth of 3716 m (Figure 1). This site was selected to obtain a high-quality continuously cored sequence of Late Cretaceous to Neogene age which records the history of deep water communication between the Weddell and Georgia basins and the South Atlantic Basin.

This site sampled a thick pelagic section with an upper unit of siliceous ooze above nannofossil ooze with numerous variations of clay and biosiliceous content. The lower portion of the sequence is calcareous nannofossil chalk grading into a basal unit of zeolite-bearing claystone and clay-bearing micritic calcareous nannofossil chalk.

Calcareous nannofossils provide a high degree of biostratigraphic resolution for most of the Paleogene, whereas diatoms provide excellent stratigraphic control for the upper Paleogene and Neogene. A high quality paleomagnetic record was obtained for the upper Oligocene, Pliocene and Quaternary. The 200 m thick upper Oligocene sequence will provide the first southern high latitude calibration of biosiliceous stratigraphy to the Geomagnetic Polarity Time Scale (GPTS).

Site 700:

Site 700 is located in the western region of the East Georgia Basin (51°31.992′ S, 30°16.697′ W, water depth 3611 m) on the northeastern slope of the Northeast Georgia Rise (NEGR) (Figure 1). Site 700 is a companion site to Site 699 which was prematurely terminated at 518.1 mbsf in upper Paleocene strata about 250 meters above basement.

The stratigraphic section at Hole 700B consists of a thin unit of ooze above a thick section of chalk and limestone. The pelagic carbonates of Hole 700B show a progressive lithification with depth from ooze, to friable chalk, to indurated chalk, and finally limestone.

A condensed (<26.4 m) diatom ooze of late Pliocene through Pleistocene age disconformably overlies a thick sequence of Upper Cretaceous to upper middle Eocene ooze, chalk, and limestone. Between 26.4 and 228.5 mbsf, Hole 700B repeated the lower to upper middle Eocene sequence recovered at Site 699 thus providing better stratigraphic representation of an interval poorly recovered at both sites (55.2% at Site 699 and 40.2% at Site 700). A 260.5 m thick Paleocene to Santonian-late Turonian(?) section provides a greatly expanded section for a 32 m.y. interval only sparsely represented at Sites 698 and 699. Site 700 and companion Site 699 provide a Late Cretaceous-Paleogene pelagic record spanning 66 m.y. within a combined stratigraphic thickness of 640 m. These two sites provide the most continuous record of this period obtained from the Southern Ocean.

Site 701:

Site 701 is located on the western flank of the Mid-Atlantic Ridge (51°59.07′ S, 23°12.73′ W, water depth 4647 m; Figure 1) about 160 km east of the Islas Orcadas Rise on oceanic crust of middle Eocene age (Chron C22). The major objective at this site was to obtain a continuous sediment record of the development of an oceanic gateway for deep circulation between the South Atlantic and the Weddell Basin.

The stratigraphic section at Hole 701C consists of 400 m of mostly biosiliceous and diatom ooze, siliceous clay/mud, and clay-bearing diatom ooze overlying a 72 m thick sequence which shows increasing carbonate content with depth.

The sedimentary record of Site 701, the only Leg 114 site under the influence of Antarctic Bottom Water (AABW), differs significantly from our previous sites which are under the influence of Circumpolar Deep Water (CPDW). The Neogene sequence is thicker and the Paleogene is more attenuated than at previous sites. The biogenic sedimentation was dominantly calcareous during the middle Eocene and biosiliceous during the late Eocene to Holocene. Siliceous microfossils provide a detailed biostratigraphy of the Neogene which is complemented by a paleomagnetic record of the Brunhes Chron to Chron C3AR. Biostratigraphic resolution of the middle Eocene to early Oligocene is provided by calcareous and siliceous microfossil groups.

The sedimentary record of Site 701 documents the opening of the deep water gap between the Islas Orcadas and Meteor rises and the accompanying changes in benthic circulation. Nannofossil ooze began accumulating over basement during the initial stages (early middle Eocene) of the opening of the passageway between the rises. At this time, current intensity was low as a consequence of still weak latitudinal temperature gradients which allowed the deposition of warm

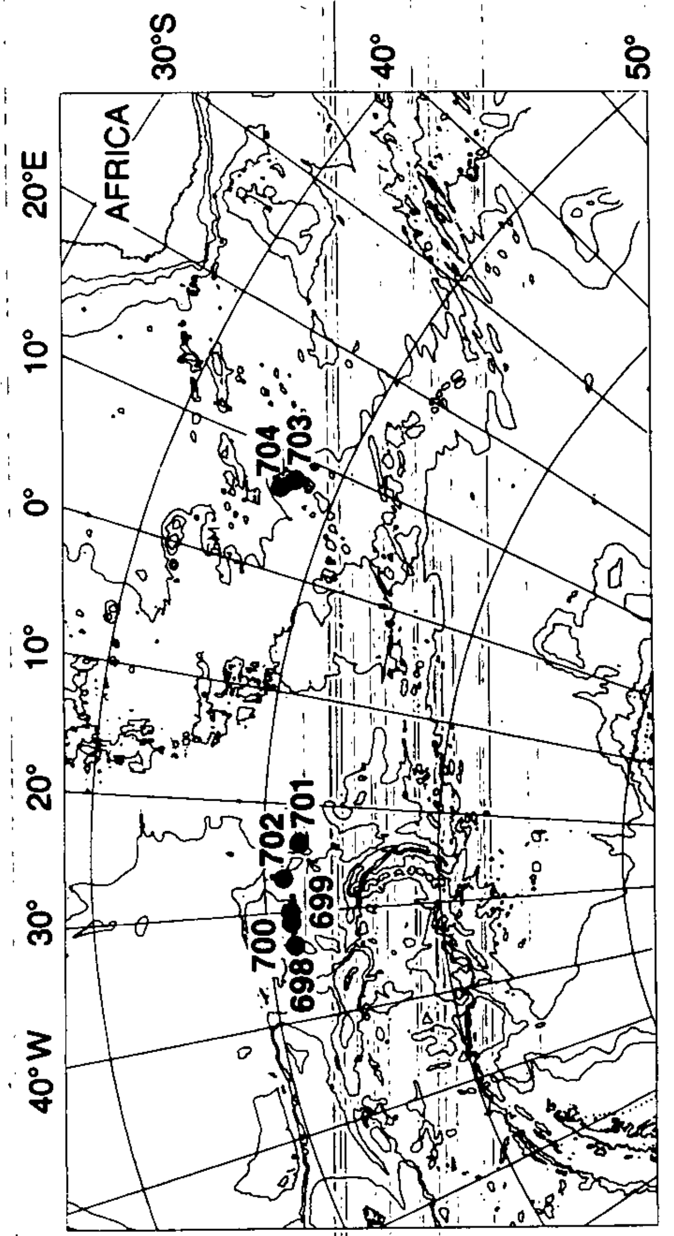

Figure 1. Index map for the seven Leg 114 sites drilled in the subantarctic South Atlantic. See text for descriptions and interpretations from each site.

water assemblages of planktonic foraminifers and calcareous nannofossils above the CCD. A major increase in benthic current velocity took place between the middle Eocene and late Eocene, resulting in a 2-5 my hiatus. Deposition was renewed by 40 to 38 Ma; however, sedimentation was slow and probably discontinuous resulting in an accumulation of only 60 m of upper Eocene to lower Oligocene sediment. A late Eocene shallowing of the CCD and subsidence of the site (to 4000 m by the early Oligocene) led to the last consistent occurrence of foraminifers and calcareous nannofossils by the early Oligocene. A thick sequence of upper Oligocene biosiliceous mud and clay overlies the attenuated sequence of the upper Eocene-lower Oligocene. A significant increase in sedimentation rates occurred during the late Oligocene at Sites 699 and 701 which is attributed to a higher rate of terrigenous supply by Circumpolar Deep Water and Antarctic Bottom Water. The formation of a deep water gap in the Drake Passage led to development of a true Antarctic Circumpolar Current by the early Miocene. Shortly after the earliest Miocene northward advance of the Polar Front (Site 699), a regional hiatus was formed between early Miocene to late middle or late Miocene sediments. This hiatus occurs at Sites 699, 701 and other regional sites, suggesting an age equivalent increase in the intensity of CPDW and AABW.

Site 702:

Site 702 is located on the central part of the Islas Orcadas Rise (50°56.786′ S, 26°22.117′ W, water depth 3093 m; Figure 1), a NNW trending aseismic ridge more than 500 km long, 50-100 km wide which rises over 1000 m above the adjacent sea floor. The Islas Orcadas Rise and Meteor Rise were once conjugate features prior to seafloor spreading that separated them in the Eocene. The major objectives of this site were to determine the age, nature and subsidence history of the Islas Orcadas Rise, and to investigate the influence of the shallow Islas Orcadas and Meteor rises on oceanic watermass communication between the southern high latitude region and the South Atlantic.

The stratigraphic section in Hole 702B consists of a thin layer of diatom ooze and nannofossil-diatom ooze overlying a thick sequence of pelagic carbonates with increasing downhole lithification. Most of the older sedimentary sequence of the Islas Orcadas Rise-Meteor Rise aseismic ridge system was obtained at Site 702. This predominantly early late Paleocene-late Eocene section represents a 23 m.y. history of pelagic carbonate sedimentation during a period which precedes and post-dates the rifting of these aseismic ridges. Although basement was not reached, the age of the Islas Orcadas Rise was further constrained to be older than 61 Ma. A Late Cretaceous age for the rise is suggested by reworked planktonic foraminifers and calcareous nannofossils present in the basal 20 m of the section about 150 m above basement. An early Eocene episode of extension generated numerous small half-grabens over much of the rise, and a major post late Eocene to pre-late middle Miocene tectonic event formed a N-S trending horst through the location of Site 702.

Site 703:

Site 703 is located on the Meteor Rise (47°03.042′ S, 07°53.679′ E, water depth 1807 m; Figure 1), an aseismic ridge extending southwest from the Agulhas Fracture Zone. The Islas Orcadas Rise (Site 702 location) and the Meteor Rise are both bounded by lower Eocene oceanic crust generated at the Mid-Atlantic Ridge. These rises were formed at the locus of a new spreading center following a Late Cretaceous westward shift of the ridge axis in the Agulhas Basin. The major objectives of drilling at this site were to determine the nature, age and subsidence history of the rise and to investigate the influence of the shallow Paleogene Meteor Rise, Islas Orcadas Rise and the adjacent fracture zones on oceanic communication between the high and temperate latitudes of the South Atlantic.

The stratigraphic section at Site 703 consists of calcareous ooze and chalk with intervals of mass flow deposits of clay, ooze, sand/gravel and volcanic breccia in the lower part. Site 703 is located between the

Subtropical Convergence and the Antarctic Convergence and has received predominantly calcareous biogenic sedimentation since the early Eocene, but with significant biosiliceous input in the late Eocene, the late Oligocene to early Miocene and particularly in the Pliocene and Quaternary.

Microfossil assemblages record a history of surface water cooling during the middle Eocene to late Oligocene. There is some indication at this easternmost site that surface waters remained warmer during the late Paleogene, although the general middle Eocene to late Oligocene cooling trend is the same as observed in the western sites drilled during Leg 114.

Paleodepth estimates based on benthic foraminifer assemblages suggest a depth >600 mbsl during the Eocene and >1000 mbsl during the Oligocene. Redeposited shallow water microfossils occur throughout the Eocene and Oligocene section; in the Eocene these include neritic diatoms suggesting the presence of nearby islands.

It is uncertain if the early(?) or early middle Eocene age of basement is indicative of the age of the Meteor Rise because of the elevated position of this site. Redeposited microfossils are no older than Eocene, unlike the Islas Orcadas Rise where Upper Cretaceous microfossils are reworked in the upper Paleocene. The igneous rocks recovered are weathered porphyritic plagioclase-rich basalts and basaltic tuffs and may represent basement or part of a volcanic rubble zone.

Site 704:

Site 704 (46°52.757′ S, 07°25.250′ E, water depth 2532 m; Figure 1) is located on the southern portion of the Meteor Rise, an aseismic ridge formed by extensive Paleocene-Eocene volcanism at a propagating extension of the Mid-Atlantic Ridge. Site 704 was a fitting end to Leg 114. After having already recovered thick Paleogene carbonate sequences at the prior sites, a thick mixed carbonate and biosiliceous sequence of early Oligocene-Holocene age was obtained at Site 704. In conjunction with our previous sites, Leg 114 recovered a remarkably complete representation of the Upper Cretaceous-Holocene, most of it carbonate-bearing. Site 704 is potentially a very important reference section for the interpretation of Neogene southern high latitude paleoenvironments. The Neogene sequence at this site is the thickest (about 576 m) and most complete section at high southern latitudes with (1) the presence of carbonate throughout which offers an extended stable isotopic record of planktonic and benthic environments; (2) little or no terrigenous component; (3) the continuous presence of all calcareous and siliceous microfossil groups; and (4) a relatively complete paleomagnetic record.

WEATHER

The severe weather conditions encountered during this cruise tested the drilling capabilities of JOIDES Resolution and her crew. Strong gale force winds (greater than 41 kt) were encountered during 29 days of the cruise. Maximum wind speeds of 86 kt and combined seas of 40-50 ft were experienced during the transit from Site 702 to Site 703. A wind of 71 kt occurred while on location at Site 703, which together with the seas, required 7.2 megawatts of power to keep the ship on station. For roughly one-third (28%) of the cruise, the combined seas exceeded 18 ft. The maximum roll taken by the vessel was 26°.

SUMMARY OF LEG 115 RESULTS

INTRODUCTION

Leg 115 was the first of a nine-leg ODP program of exploration of the Indian Ocean. The scientific objectives of this leg fall into two main subject areas: hotspot volcanism and paleoclimatology.

Hotspots and Plate Tectonics:

As the Indian subcontinent moved northward away from Antarctica and Australia from Early Cretaceous time to the present it passed over stationary thermal anomalies in the upper mantle, called hotspots (Morgan, 1981). Excess melting of the mantle peridotite within these hotspot areas led to anomalous volcanism on the overlying plate and hence the formation of lineaments consisting of discrete volcanos and coalesced volcanic ridges. These lineaments record the motion of the plates surrounding the Indian Ocean.

The drilling plan was to recover volcanic rocks at selected locations along this hotspot lineament to determine the age of volcanism and its petrologic and geochemical character. An additional plate-tectonic objective is the definition of true polar wander. Under the premise that hotspots remain stationary in the upper mantle over geologically significant periods of time, all volcanos produced over a given hotspot should give the same magnetic latitude - unless the whole earth has shifted with respect to its axis of rotation.

Paleoceanography and Stratigraphy:

The main purpose of the Leg 115 paleoceanographic program was to study the interplay between the flux in carbonate production and the dissolution of this material as a function of water depth, as the shallow and deep circulation and the climate evolved through late Cenozoic times.

DRILLING RESULTS

Sites 705:

Site 705 is located on the eastern shoulder of the Mascarene Plateau along the northeastern margin of the Nazareth Bank at a water depth of 2307.5 m on relatively gently sloping terrain (Figure 1). This site is approximately 30 nautical miles (nmi) north and east of shallow water carbonate banks and reefs and is composed predominantly of biogenic sediments, deposited on the volcanic slopes.

The sedimentary sequence (0-27.5 mbsf) at Site 705 is composed of a single lithologic unit consisting of homogeneous, coarse-grained foraminifer ooze lacking sedimentary structures. Depositional rates were less than 10 m/m.y. during the past 2.65 Ma, but increased to 11.4 m/m.y. during the early part of the late Pliocene (between 2.65 and 3.00 Ma). These rates further increased to >20 m/m.y. in the lowermost part of the sequence (3.0-3.45 Ma).

Site 706:

Site 706 lies 3 nmi north of Site 705 at a water depth of 2506.5 m (Figure 1). The stratigraphic section at Site 706 consists of loose foraminifer sands, overlying compact calcareous oozes with numerous volcanic ash layers, that overlie breccias of shallow-water limestone and volcanic rock fragments, covering vesicular basalts of early Oligocene age.

Site 707:

Site 707 is located in the western tropical Indian Ocean at a water depth of 1541.4 m. The northwestern part of the Mascarene Plateau stretches 1300 km, from the Seychelles Bank to the Saya de Malha Bank, separating the deep Arabian Sea basin to the north from the deep Mascarene basin to the south (Figure 1).

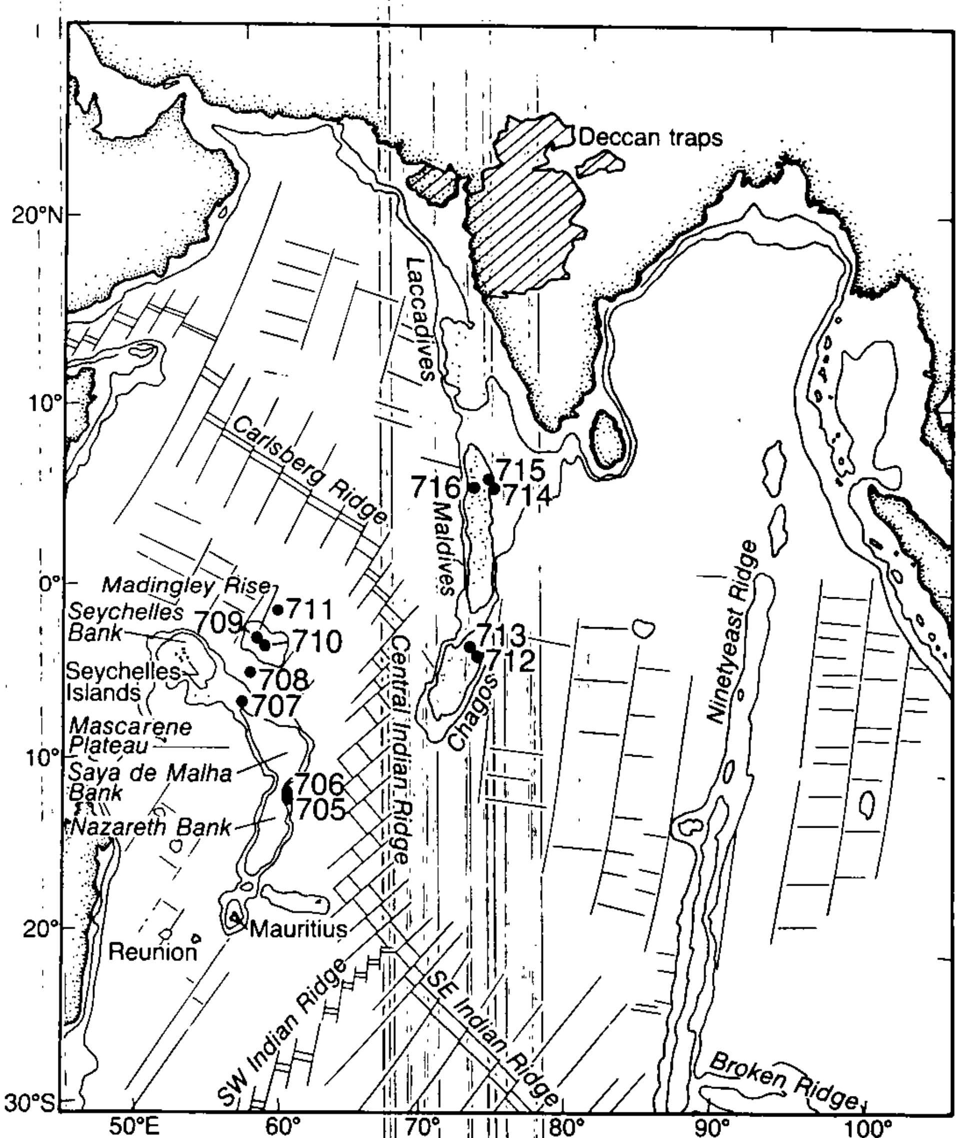

Figure 1. Location of Leg 115 sites in the central Indian Ocean: Sites 712 and 713 are on the northern margin of the Chagos Bank, and Sites 714, 715 and 716 are on the eastern shoulder of the central Maldives Ridge.

The lithologic composition and stratigraphic preservation of the sedimentary section at Site 707 show many similarities to DSDP Site 237, located 60 nmi to the northwest. A fairly expanded sequence of upper Neogene sediments overlies condensed sediments of middle Miocene through Oligocene age, which overlie less condensed lower Paleogene sediments showing increased rates of deposition during Paleocene (primarily early Paleocene) times. The basaltic basement contains a few intercalated shallow-water limestones that are virtually unaffected by dolomitization, in contrast to the limestones lying on top of the basement.

Site 708:

Site 708 is located in the abyssal plain southwest of Madingly Rise, in the western equatorial Indian Ocean at a water depth of 4096.5 m (Figure 1). The Seychelles Bank, which forms the northwestern end of the Mascarene Plateau, descends from water depths of less than 200 m to just over 4000 m along its eastern rim. Site 708 was drilled at a depth approaching two critical chemical boundaries in the water column: the lysocline and the CCD.

About 25% of the recovered sequence consists of turbidites exceeding 0.4 m in thickness. Including thinner turbidites would approximately double the turbidite percentage. On a turbidite-free basis, the biostratigraphy suggests sedimentation rates of 10 m/m.y. from the Pleistocene back to about 9 Ma, followed by a stepwise reduction in rate leading to a hiatus at about 13 Ma. The hiatus has a duration of about 2 m.y.; the average sedimentation rate for the remaining part of the sequence, early Miocene through most of the Oligocene, is estimated to be about 5 m/m.y.

Site 709:

Site 709 is located in the western equatorial Indian Ocean at a water depth of 3038.2 m in a small basin near the summit of the Madingley Rise, a regional topographic high between the Carlsberg Ridge and the northern Mascarene Plateau (Figure 1).

The cored sediments at Site 709 make up a single major lithostratigraphic unit consisting of alternating clay-bearing nannofossil ooze and nannofossil ooze, of middle Eocene to Pleistocene age.

Site 710:

Site 710 is located in the western equatorial Indian Ocean on the central Madingley Rise, a regional topographic high between the Carlsberg Ridge and the northern Mascarene Plateau (Figure 1). Situated at a water depth of 3812 m, near the present-day sedimentary lysocline, Site 710 is ideally suited for a study of the Neogene history of carbonate flux and dissolution. It should also provide information on down-slope transport processes.

Major lithologies are (1) nannofossil ooze containing about 5-10% biogenic silica and about 80% carbonate, encompassing the interval from the Pleistocene to the upper Miocene (0-8 Ma), (2) clay-bearing nannofossil ooze and nannofossil clay of Miocene (8-24 Ma) age, the upper limit of which coincides with a marked change in carbonate content, from values around 80% to values around 60%, indicating strong carbonate dissolution, and (3) alternating nannofossil ooze and chalk of Oligocene age (24-33 Ma), with consistently high (90%) carbonate content although the planktonic foraminifers are largely dissolved.

Site 711:

Site 711 is located at a water depth of 4428.2 m on the northern edge of the Madingley Rise, just a few hundred meters above the abyssal plain which separates the Madingley Rise from the Carlsberg Ridge (Figure 1). Site 711 forms the deep end-member of the carbonate bathymetric transect.

Based on differences in biogenic components and carbonate contents, four lithologic units were described from Site 711: (1) alternating light yellowish clayey nannofossil ooze and dark grayish brown radiolarian-bearing nannofossil clay and nannofossil-bearing clay of late Pliocene through Pleistocene age; carbonate content varies between 40 and 60%; (2) generally carbonate-poor

(0-10%) clays with about 25 thin (<30 cm) turbidites, representing the time from the late/early Pliocene boundary to the earliest Miocene; (3) carbonate-rich (75-90%) nannofossil ooze or clay-bearing nannofossil ooze and chalk virtually devoid of foraminifers, representing the time interval from the earliest Miocene through the Oligocene; and (4) spanning the major part of the middle Eocene (41-50 Ma), and distinguished from the unit above by the consistent occurrence of radiolarians, which decreases the carbonate values to about 70-80%; a few short intervals within this unit consist of almost pure radiolarian ooze.

Site 712:

Site 712 is located on the northern margin of the Chagos Bank at a water depth of 2892.4 m (Figure 1). Shallow-water carbonate reefs and banks lie 70 nmi to the south and southwest. An abrupt scarp, probably related to pre-36 Ma transform faulting, drops 3000 m just 30 nmi to the east. In the immediate vicinity of this site is a gently dipping volcanic apron which deepens to the north to a 4500-m channel, dividing the Chagos Bank from the Maldive Islands.

The basement rocks in this region form a series of offset steps, probably resulting from extension and normal faulting. The sediment cover is about 190 m. Hole 712A cored clay-bearing foraminifer nannofossil ooze with thin turbidites of late Pliocene to middle Miocene age, recrystallized limestone (that was poorly recovered as drilling rubble) of late Oligocene age, and terminated in middle Eocene nannofossil ooze and volcanic ash at 115.3 mbsf.

Site 713:

Site 713 is located 1.6 nmi to the north of Site 712, on the northern margin of the Chagos Bank, at a water depth of 2909.5 m (Figure 1).

The lithologies recovered from Hole 713A were (1) nannofossil-bearing foraminifer ooze to foraminifer-bearing nannofossil ooze of Pleistocene to late Miocene age; (2) foraminifer-bearing nannofossil chalk, clay-bearing in parts, with volcanic ashes increasing in occurrence and thickness with depth of middle Eocene age; and (3) basalts of olivine tholeiitic composition, intercalated with nannofossil chalks of early middle Eocene age (47-48 Ma). Thermal subsidence considerations (Sclater et al., 1977) predict a depth for this site of about 1000 m at the time of volcanic activity. The benthic foraminiferal assemblage observed between the lava flows indicates a deeper water environment; this conflict, however, is at present unresolved.

Site 714:

Site 714 is located at a water depth of 2231.5 m on the eastern shoulder of the Maldives Ridge, which forms part of the aseismic ridge extending northwards from the Chagos Bank to the Laccadive Islands (Figure 1).

The sequence is composed of two lithostratigraphic units, (1) upper Pleistocene (0-0.5 Ma) clay-bearing foraminifer-bearing nannofossil ooze, grading downhole into a foraminifer-bearing clayey nannofossil ooze, with average carbonate content of 76%; and (2) lower upper Miocene through middle Miocene (8.2-16 Ma) clay-bearing foraminifer-bearing nannofossil ooze and chalk; the carbonate contents range from 61% to 95%.

Site 715:

Site 715 is located on the eastern margin of the Maldives Ridge, at a water depth of 2262.3 m (Figure 1). The main objective was to penetrate the supposed basaltic basement underlying the carbonate bank deposits which form the Maldive Islands.

The uppermost pelagic ooze section was similar to that cored at Site 714, only 3 nmi to the west. A major hiatus of about 14 m.y. exists between the Pleistocene and middle Miocene nannofossil oozes. The next unit down, of early Paleogene age, progresses from (1) wackestone, composed of benthic foraminifers, fragments of bivalves, brachiopods, pelecypods, minor hardgrounds and glauconite, that are interpreted as slope deposits; (2) packstone with large intact benthic foraminifers, bryozoans, gastropods, and mollusks, indicating shallower water deposition; to (3) grainstone with solitary and colonial coral fragments and bryozoans, indicating very shallow water and high energy conditions of deposition; and (3) subaerially erupted lava flows of olivine basalt composition, overlain by very shallow water reef limestones of early Paleogene age (Paleocene or Eocene). In the basaltic section, we see the final stages of volcanic activity of an oceanic island in early Tertiary time.

Site 716:

Site 716 is located in the center of the Maldives Ridge at a water depth of 533.3 m (Figure 1). The site lies in flat terrain on a broad, shallow basin which is filled with 1-1.5 km of sediments and sedimentary rocks. The primary objective was to retrieve a complete late Neogene sequence for studies of aragonite-bearing periplatform oozes.

The recovered sequence represents a single lithologic unit from the mudline to 267.4 mbsf, consisting of foraminifer-bearing nannofossil ooze that grades into chalk. Celestite occurs sporadically in the deeper part of the section; this site thus appears to contain a fascinating history of diagenetic processes.

DISCUSSION

Hotspots and Plate Tectonics:

Biostratigraphic age estimates for the four sites that recovered basaltic volcanic rocks (706, 707, 713, and 715; Figure 1) are in good agreement with ages predicted assuming a fixed Reunion hotspot (Duncan, 1981; Morgan, 1981; Emerick, 1985). With further radiometric and biostratigraphic refinement, Site 706 (35 Ma), Site 713 (47 Ma), and Site 715 (55-60? Ma) ages will be used to define poles of rotation for Indian plate motion through the Cenozoic. Through drilling to basement at Site 707 we now know that this ridge formed by basaltic volcanism in early Paleocene time (64 Ma), probably as part of the Deccan flood basalt event.

The ratio Zr/Nb is not thought to change during mantle melting or crystal fractionation processes because Zr and Nb are both equally incompatible elements. Thus, differences in Zr/Nb reveal differences in mantle source compositions. Intraplate oceanic island basalts yield low ratios (5 to 10) while spreading ridge (MORB) basalts have high ratios (20 to 30). Site 715 basalts are indistinguishable from Reunion basalts on this basis, while Site 707 and 713 basalts show more of a MORB contribution. Site 706 basalts are intermediate and similar to some of the Deccan basalts. Isotopic compositions for these basalts will further distinguish likely contributions to the melting, but from our preliminary results it appears that Site 715 may have formed in an intraplate setting, Site 706 closer to a spreading ridge, and Sites 707 and 713 erupted when a spreading segment coincided with the hotspot.

Studies of paleolatitudes for the Pacific plate (Gordon and Cape, 1981) have shown true polar wander of about 10° since the Late Cretaceous; that is, central Pacific hotspots have moved south relative to the spin axis. On the opposite side of the globe hotspots should appear to move north over the same period. Our paleolatitude studies suggest that, indeed, the Reunion hotspot lay 7° farther south than its present position up until at least 35 Ma. No significant polar wander is discerned for the interval from 67 to 35 Ma.

Paleoceanography and Stratigraphy:

Carbonate Dissolution Profile. The shallow Site 707 was to be used as reference for the other, deeper carbonate sites, as it was anticipated that carbonate dissolution would be negligible. Low-amplitude, but distinct, long-period oscillations in carbonate content occurred through the entire pelagic sequence (0-37 Ma). Winnowing has strongly reduced the accumulation rates, which of course complicates the use of this material to monitor the true carbonate flux. Winnowing is particularly emphasized after 3 Ma, and between 9 and 29 Ma. This implies a depositional history suitable for analysis of the variability of flow strengths of intermediate deep waters across the topographic saddle joining the Seychelles Bank to the Saya de Malha Bank. A trough in accumulation coincides with the early Oligocene deep water event (Shackleton and Kennett, 1975). Likewise, drastic decreases in accumulation close to the Oligocene/Miocene and near the middle/late Miocene boundaries may eventually be linked to glacial episodes in Antarctica (Miller and Fairbanks, 1985). The moderately good preservation of planktonic foraminifers during middle and early Miocene times is in agreement with vigorous bottom currents at Site 707.

Thirty to fifty percent of the sequence recovered at Site 708 (4096.5 m) consists of shallow water calciturbidites, presumably originating from the Seychelles Bank.

Three sites were drilled from the summit of the Madingley Rise (709) and downslope (710, 711). Dissolution increases with depth, and Sites 709 and 710 share some common features: (1) strong variability in carbonate accumulation during the late Neogene, (2) shallow CCD's during middle and late early Miocene times, and (3) increased carbonate accumulation during earliest Miocene and Oligocene times. Apart from the upper Pliocene-Pleistocene, Site 711 was located below the CCD throughout the Neogene, but was above this chemical boundary during the Oligocene and most of the Eocene (24-49 Ma)-- except for a few strong dissolution cycles straddling the middle/late Eocene boundary.

Periplatform Oozes. Site 714 was a disappointment in terms of recovery of aragonite-bearing periplatform oozes (hiatus from 0.5 to 8.2 Ma), but a tremendous and unexpected success in terms of recovery of a unique middle Miocene through upper Oligocene sequence that contains all major pelagic microfossil groups.

Site 716 (533.3 m water depth) was the last site to be drilled during Leg 115, and the available time was too short to allow even routine shipboard analyses to be performed, except for lithostratigraphy and biostratigraphy. The sequence was stratigraphically continuous from the Pleistocene through the upper Miocene, with remarkably high sedimentation rates prior to 4.6 Ma (>100 m/m.y.). Aragonite occurs throughout the sequence, which also contains what seems to be the promise of a fascinating history of diagenetic processes.

Stratigraphy. The results obtained from Site 710 suggest that major revisions have to be made in the calibration between zonal schemes and the geomagnetic polarity record. The range of one critical species (*S. heteromorphous*) has been changed from 14.4 Ma (last occurrence) and 17.1 Ma (first occurrence) to 13.0 and 18.5 Ma, respectively. This observation, which is corroborated by data from DSDP Leg 94 (Ruddiman, Kidd, Thomas, et al., 1986), has important consequences for lower and middle Miocene biochronology and, hence, for paleoceanographic interpretations focused on that time interval.

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[NOTE: The complete text of the Leg 115 Preliminary Report (#15) is available from ODP Headquarters, 1000 Discovery Drive, College Station, TX 77843-3469.]

SUMMARY OF LEG 116 RESULTS

The following site summaries were received during Leg 116 from Drs. James Cochran and Dorrik Stow, Co-Chief Scientists aboard JOIDES Resolution, during the period 7 July to 19 August 1987. For further information, the Leg 116 Preliminary Report will be available in October 1987 and can be requested from ODP Science Operations, TAMU Research Park, 1000 Discovery Drive, College Station, Texas 77840.

<u>Site Summary, Site 717</u>
Latitude: 00°55.785′ S
Longitude: 81°23.408′ E
Water Depth: 4746 m

Site 717 (target site ID-1) is the first of three closely spaced sites located in the central Indian Ocean approximately 800 km south of Sri Lanka and 200 km northwest of the Afanasy Nitikin Seamount group (Figure 1). It lies at the distal end of the Bengal Fan within a large area of intraplate deformation, which affects both the oceanic crust and the thick pile of overlying sediments. Site 717 is located near the northern (lower) edge of one of the tilted fault blocks that make up the tectonic fabric of the area of intraplate deformation. It was drilled in the thickest part of the sedimentary section at the axis of a synclinal structure developed in the sediments between the faults. The objectives of Site 717 were to obtain as complete a section of the fan sediments as possible for lithofacies, provenance, and diagenetic studies and to serve as a reference section for other sites further up the fault blocks where portions of the sedimentary sequence are either missing or much condensed.

Site 717 consists of three APC/XCB holes. Hole 717A with only one APC core penetrated 9.6 mbsf with a recovery of 9.6 m (100%). Hole 717B, with three APC cores, penetrated 23.0 mbsf with a recovery of 14.3 m (62%). Hole 717C with 91 XCB cores penetrated 828.2 mbsf with a recovery of 480.2 m (58.9% recovery). Hole 717C established a new record for XCB penetration. Loss of the bottom hole assembly near the mudline prevented the scheduled logging runs from being attempted.

The stratigraphic section recovered at Site 717 ranges from upper Quaternary to the base of the upper Miocene and has been divided into five main lithologic units. The dominant lithologies and ages of the stratigraphic sequence are as follows:

Unit I: 0-5.5 mbsf. Muds, mud turbidites and pelagites of Holocene to latest Pleistocene age;
Unit II: 5.5-152.0 mbsf. Micaceous silty turbidites with thin intervening muds and calcareous clays of late Pleistocene age;
Unit III: 152.0-302.0 mbsf. Biogenic mud turbidites and mud turbidites with thin interbedded pelagic clays of Pleistocene and late Pliocene age;
Unit IVA: 302.0-335.0 mbsf. Silt turbidites with thin muds and mud turbidites of early Pliocene age;
Unit IVB: 335.0-456.0 mbsf. Mud turbidites with interbedded pelagic clays of early Pliocene to late Miocene age;
Unit IVC: 456.0-465.2 mbsf. Silt and silt to mud turbidites with minor amounts of mud of late Miocene age;
Unit IVD: 465.2-533.2 mbsf. Mud turbidites with interbedded pelagic clays of late Miocene age;
Unit V: 533.2-828.2 mbsf. Silt and silt to mud turbidites with rare intervals of pelagic clay and organic-rich mud turbidites of late Miocene age.

Sedimentation at Site 717 has been dominated by fan sedimentation processes and consists mainly of a sequence of turbidites. A thin layer of mud (0-5.5 mbsf; Unit I) overlies a sequence dominated by micaceous silt turbidites (Unit II) which accumulated very rapidly during the late Pleistocene at a rate probably in excess of 350 m/m.y. This unit comprises a distinctive seismic stratigraphic unit which in places truncates lower reflectors. These coarser grained, rapidly deposited turbidites probably reflect the

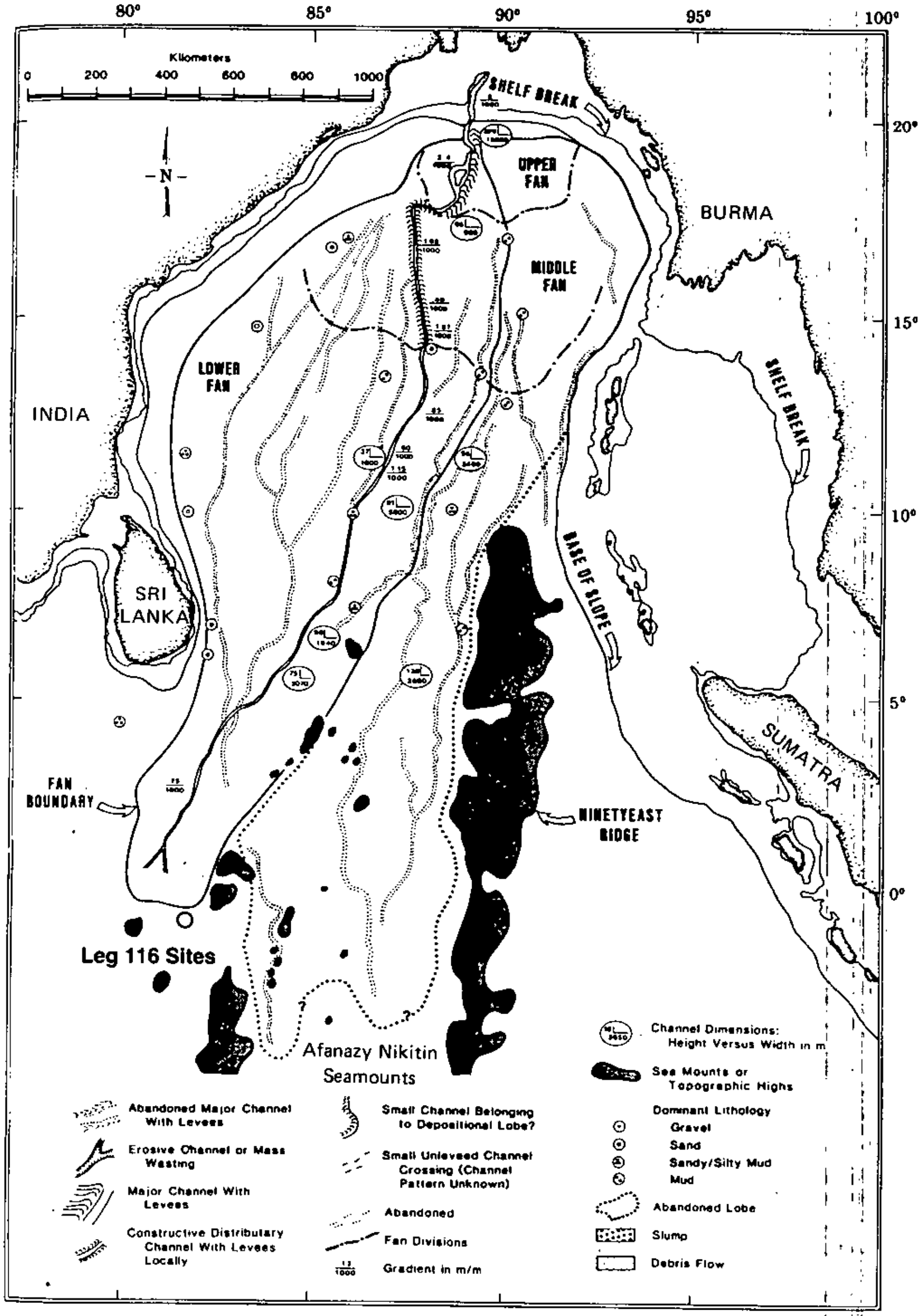


Figure 1. Morphometric map of the Bay of Bengal showing Leg 116 drilling area (after Emmel and Curray, 1984).

Pleistocene sea level lowstand. Units III and IV together represent a thick section of mainly mud turbidites with thin interbedded pelagic clays that accumulated at a slower average rate of about 70 m/m.y. through the latest Miocene and early Pliocene. Distinctive green, biogenic turbidites characterize Unit III, and at least two pulses of coarser silty turbidites occur in Unit IV. The lowest unit (Unit V) consists of a monotonous sequence of micaceous silt and silt-mud turbidites separated by intervals of muds and pelagic clays. The average accumulation rate for the whole of this unit is 90-100 m/m.y.

The sequence of lithostratigraphic units at Site 717 gives a very good record of sedimentation on the distal fan showing the nature, thickness and vertical succession of turbidites that have been transported over 2500 km. At least three different sources of turbidites can be tentatively identified: silts and muds from the Ganges-Brahmaputra delta, dark gray organic-rich muds from the upper slope of the Bay of Bengal and greenish biogenic turbidites probably from the Afanasy-Nitikin Seamount group. One of the main controls on sedimentation appears to have been sea level variations. Local tectonic affects, perhaps related to the intraplate deformation, may have resulted in the more local supply of biogenic turbidites from adjacent seamounts. It is not yet certain to what extent particular phases of Himalayan uplift are reflected in the sedimentary record.

The biostratigraphic control at Site 717 is based primarily on nannofossils as most other microfossil groups are either poorly preserved or absent in all but the upper unit. The site has clearly been close to or below the carbonate compensation depth for at least the past 10 m.y. Siliceous microfossils are almost completely absent in spite of the location of the site within the supposed equatorial high productivity zone.

Site 717 successfully established a reference section for comparison with other sites that will be drilled higher up on the fault blocks. There is some evidence from physical properties measurements, of horizontal stress, but the heat flow is normal for 78 Ma crust and a complete sedimentary sequence was recovered with no marked unconformities. The seismic unconformity that appears to mark the onset of intraplate deformation occurs within Unit V and does not correspond to a change of lithology. Interpolation between well established paleontological dates gives a date of 7.2 Ma for the beginning of the deformation.

<u>Site Summary, Site 718</u>
Latitude: 01°01.252′ S
Longitude: 81°24.065′ E
Water Depth: 4742 m

Site 718 (ID-6) was drilled on a tilted fault block immediately to the south of the block drilled at Site 717 and is situated on a local heat flow high within a region of high and quite variable heat flow. One objective at Site 718 was to investigate the presence and nature of possible hydrothermal circulation suggested by the heat flow pattern and in particular to understand the relationship between the fault zones, bedding planes and the flow of water. A second objective was to investigate the development of the fan and distal fan depositional processes through time. This was possible because the upper syndeformation sequence is thinner at this site than at Site 717, making it possible to recover older sediments.

Site 718 consists of four APC/XCB holes. Hole 718A was dedicated to detailed pore-water geochemical studies and consists of one APC core which penetrated 9.5 m, recovering 9.42 m (99.1%). Hole 718B with one APC core penetrating 9.5 m, recovering 9.26 m (97.5%), and Hole 718C with 98 XCB cores penetrating 925.7 m, recovering 274.05 m (29.6%), together drilled a continuous section from the seafloor to 935 mbsf, setting another depth record for XCB penetration. The low recovery from Hole 718C is a direct reflection of the thick section of relatively unconsolidated silt and silt to mud turbidites making up the distal fan sediments. Two logging runs were made in Hole 718C, obtaining a good set of logs down to a depth of 559.5 mbsf where a sediment bridge prevented further penetration. Hole 718D was washed down to 70 mbsf to obtain further interstitial water samples and temperature measurements. Two cores were taken, penetrating 19 m and recovering 0.18 m (0.95%).

The stratigraphic section recovered at Site 718 ranges from late Quaternary to early Miocene in age and has been divided into five main lithologic units. The dominant lithologies and ages of the stratigraphic sequence are as follows:

Unit I: (0.0-2.0 mbsf) Clay and calcareous clay of Holocene to latest Pleistocene age.
Unit II: (2.0-100.0 mbsf) Micaceous silt and silty mud turbidites of late Pleistocene age.
Unit III: (100.0-154.5 mbsf) Mud turbidites with thin interbedded pelagic clays of Pleistocene to latest Miocene age.
Unit IV: (154.4-185.0 mbsf) Mud and silty mud turbidites with thin interbedded pelagic clays of late Miocene age.
Unit VA: (185.0-605.0 mbsf) Silt and silty mud turbidites with thin, sporadic interbeds of mud turbidites and pelagic clays of late to middle Miocene age.
Unit VB: (605.0-935.0 mbsf) Silt and silty mud turbidites with up to 20 m thick intervals of interbedded mud turbidites, biogenic mud turbidites and pelagic clays of middle to early Miocene age.

Sedimentation at Site 718 has been almost exclusively through fan deposition processes and the lithologic section consists mainly of a sequence of turbidites. A major surprise has been the discovery that the Bengal Fan was well established at Site 718, 2500 km from the Ganges delta, by the early Miocene and has been delivering sediment, including wood fragments and fine-sand-sized grains, with a nearly constant sedimentation rate since that time. Interpretation of seismic reflection data in light of the drilling results implies that fan sedimentation may have begun here by the earliest Miocene and that nearly the entire sedimentary section in the Central Indian Ocean consists of Bengal Fan turbidites.

The lithologic units at Site 718 correspond approximately to the units identified at Site 717. A thin layer (2 m) of mud (Unit I) overlies a sequence dominated by micaceous silt turbidites (Unit II) which accumulated quite rapidly during the late Pleistocene. These coarser grained turbidites probably reflect the Pleistocene sea level lowstand. The base of Unit II coincides with a prominent seismic unconformity which truncates deeper reflectors. Units III and IV together represent a section of mainly mud turbidites with thin interbedded clays that accumulated during the period of rotation of the fault blocks. This section is much thinner at Site 718 than at Site 717 and there appears to be one or more hiatuses or periods of erosion. This thinner section reflects the fact that the fault block under Site 718 sits higher than the block under Site 717. The unconformity marking the onset of deformation appears to also mark the boundary between Units IV and VA and can be dated at about 7 Ma. Unit V consists of a thick monotonous sequence of silt and silt-mud turbidites with thin interbedded clays. Subunits VA and VB are distinguished by the presence in the latter of intervals of reddish-brown pelagic clay. However, the clayey intervals contain numerous small turbidites and thus do not represent long time intervals. The average sedimentation rate is about 70-80 m/m.y. throughout Unit V.

Temperature measurements at Site 718 found dramatic evidence in the form of a temperature inversion for vigorous hydrothermal circulation. Temperatures measured in the silty turbidites of Unit II were scattered and were actually higher than those measured in the upper part of the underlying clay turbidites of Unit III. Warm water appears to be rising up the fault to the north of Site 718 and spreading laterally through permeable layers in the upper silty turbidites. At the same time cooler sea water is flowing downward through silt layers within the predominantly clay turbidites below, which appear on seismic records to crop out several km to the south at the tip of the fault block. The conclusions from the temperature measurements are supported by geochemical studies of interstitial water which show throughout the section the effects of mixing between two end members, one of which is sea water and the other a water which has been chemically altered by interaction with basement rocks or by diagenetic processes.

After drilling at Site 719 (see below), JOIDES RESOLUTION returned to Site 718 to drill another hole expressly for logging purposes. Hole 718E was drilled to 962 mbsf; the three rotary cores recovered contained barren silt and mud. One successful logging run (DIT/SDT/NGT) was made from total depth to 197.5 mbsf.

Site Summary: Site 719
Latitude: 00°57.646′ S
Longitude: 81°23.967′ E
Water Depth: 4747 m

Site 719 (ID-2) is located near the center of one of the tilted fault blocks that make up the tectonic fabric of the region. It is designed as a companion site to Site 717, located 3.2 km to the northwest on the northern (lower) edge of the same block. Site 717 cored a complete syn-deformation sequence in the axis of a synclinal structure developed in the sediments. Site 719 is located part way up the fault block in an area where the syn-deformation sedimentary sequence is attenuated, in order to determine the time of deformation and the history of motion on the block through comparison of the sedimentary record at the two sites.

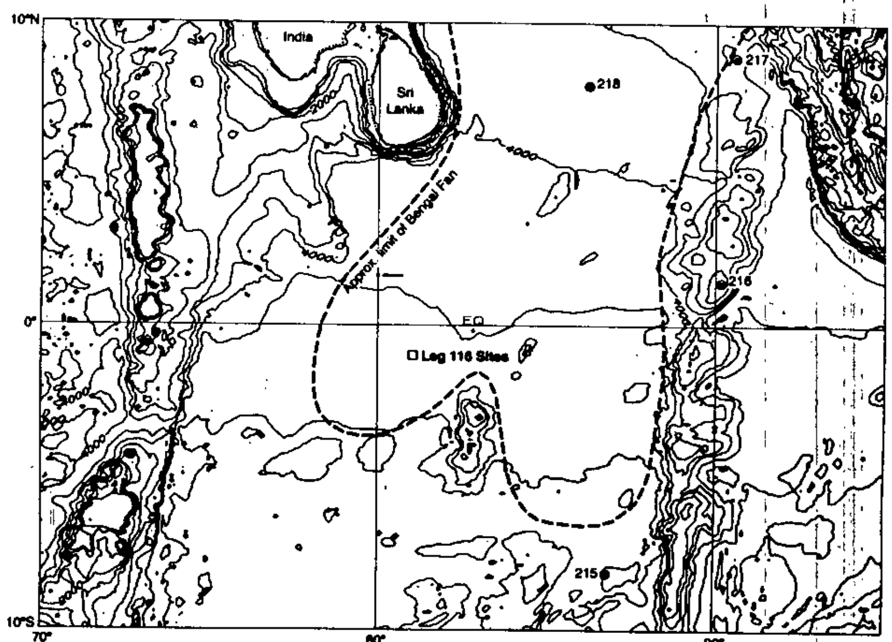
Site 719 consists of two holes. Hole 719A, consisting of one APC core, penetrating 4.2 m and recovering 4.27m (101%) and 48 XCB cores penetrating to 460.2 mbsf and recovering 181.26 m (39.8%). Hole 719B was drilled to 465.6 m and was utilized for three successful logging runs.

The stratigraphic section recovered at Site 719 ranges from late Quaternary to late Miocene and has been divided into five main lithologic units. The dominant lithologies and ages of the stratigraphic sequence are as follows:

Unit I: (0.0-4.0 mbsf) Clay and calcareous clay and mud of Holocene to latest Pleistocene age.
Unit II: (4.0-135.0 mbsf) Micaceous silt and silty mud turbidites with thin intervening muds of late Pleistocene age.
Unit III: (135.0-207.0 mbsf) Mud turbidites and biogenic mud turbidites with thin interbedded pelagic clays of Pleistocene to early Pliocene age.
Unit IVA: (207.0-240.0 mbsf) Silt turbidites with thin muds and mud turbidites of early Pliocene age.
Unit IVB: (240.0-357.0 mbsf) Mud turbidites with interbedded pelagic clays of early Pliocene and late Miocene age.
Unit V: (357.0-460.2 mbsf) Silt and silty mud turbidites with rare intervals of pelagic clay and organic-rich mud turbidites of late Miocene age.

Sedimentation at Site 719 has been almost exclusively by fan deposition processes; the section consists primarily of a sequence of turbidites. A thin layer of mud (Unit I) overlies a sequence of silty turbidites (Unit II) that accumulated very rapidly during the late Pleistocene. These coarser grained turbidites probably reflect the Pleistocene sea level low stand combined with increased glaciation in the Himalayas. Units III and IV together represent a section of mainly muddy turbidites that accumulated during the late Miocene and Pliocene. It is within these units that most of the attenuation of the sedimentary section between Sites 717 and 719 occurs. The lowest unit (Unit V) consists of a monotonous sequence of micaceous silt and silty mud turbidites with thin interbedded clays. The seismic horizon that marks the onset of deformation occurs within Unit V and does not represent a lithologic boundary.

The sedimentary section at Site 719 corresponds very closely to the section obtained at Site 717 and in many instances distinctive individual turbidites and turbidite sequences can be correlated between the two sites. Attenuation of the section between Sites 717 and 719 appears to have occurred through a combination of pinch outs and thinning of individual beds. The limiting factor in determining the deformation history will probably prove to be the resolution on ages that can be obtained. Biostratigraphic control at all of the Leg 116 sites is provided primarily through nannofossils since the other microfossil groups are either poorly preserved or absent. However, to the resolution provided by the nannofossil zones, the data obtained at Sites 717 and 719 will allow a detailed history of the motion on the fault block to be determined. Preliminary shipboard studies indicate that rotation of the fault block has occurred throughout the period of intraplate deformation at a fairly constant rate.



ODP ENGINEERING REPORT

DIAMOND CORING SYSTEM

Three companies responded to the request for proposal on the development of a wireline-retrievable, high-speed, narrow-kerf diamond coring system. This hardrock system, using mining coring technology, is being evaluated for potential use in penetrating deep into fractured and/or massive ocean crustal material.

After conducting separate engineering and cost evaluations of the three concepts proposed it was decided to cancel the initial RFP and continue to work with all three vendors on various facets of the development. Two concepts remain under consideration for the ultimate ODP system. One uses mining drill rod rotated inside ODP drill pipe with torque and weight on bit (or hold-back as required) provided from a top drive/hydraulic advance system located at the rig floor. An alternate system uses a hollow rotor turbine coupled with a downhole thruster unit. The advantages and disadvantages of both concepts continue to be studied.

Several engineering concerns are being investigated including the long and short term effects of rotating drill rod at high speed inside ODP drill pipe and the ability of the JOIDES RESOLUTION heave compensator to adequately control the weight on bit of the small diameter (nominal 3.75 inch) diamond core bit. An initial test of rotating drill rod inside two joints of five inch drill pipe has been completed. The pipe was bent to a radius of 350 feet to model potential shipboard operating conditions. The drill rod was put under tension and rotated at speeds up to 500+ rpm. No appreciable wear was identified, but a rod connection failed after 534,000+ cycles. Testing will continue with the evaluation of specially designed drillrods and connections.

Engineers met with Hal McPhaiden, the Western Gear engineer who designed the JOIDES RESOLUTION heave compensation system. After discussing the potential application, it was determined that the heave compensator would not be capable of adequately controlling the weight on bit of a small diamond core bit. It does appear feasible, however, to achieve the desired control by designing a servo-controlled hydraulic advance system to work in conjunction with the main heave compensator.

NAVI-DRILL CORE BARREL

The 3-3/4" Navi-drill Core Barrel coring system has undergone several modifications for Leg 118. The thruster release system has been redesigned to incorporate a shock absorbing system allowing freefall deployment. A new wireline delivery system has been developed as a back-up to the freefall system. The profile seal pack has been modified to prevent rotation and potential loss of downhole pressure. New stronger alloy steel spline assemblies have been fabricated. The torque segments have been redesigned to prevent damage during deployment. An anti-jam system has been incorporated into the core barrel assembly to aid in the recovery of fractured formations. Drop testing, hydraulic flow testing and actual drilling tests are currently under way and will be completed prior to delivery of the system to the vessel for Leg 118. UK testing of the system in interbedded chert/chalk sequences remains desirable and will probably be pursued after Leg 118.

ODP DRILLING OPERATIONS REPORT

HOLE STABILITY RESEARCH

Progress continues on the TAMU Petroleum Engineering Department's research project on ODP hole cleaning problems. The background research phase has been completed, in which DSDP/ODP drilling records were reviewed and a thorough search of industry literature on drilling carrying capacity and hole stability was made. A theoretical analysis of fluid velocities and slip velocities for ODP hole geometries and circulation rates has been done using computer simulation. An annular flow loop to simulate actual ODP flow conditions has been designed and is under construction. Testing with the loop will begin soon using "sweeps" of various compositions to lift material similar to drill cuttings. A cost analysis will also be done to determine the more cost-effective alternatives for mud sweep composition.

CORE BITS

Core bits of specialized and alternate designs continue to be evaluated for coring systems that are both currently operational and under development. A 9-7/8" natural diamond RCB bit was used in basalt on Leg 115. The test was a moderate success in that the penetration rate was better than expected and core recovery was equivalent to the roller cone bit that preceded it in the hole. The bit life was disappointingly short, with a total penetration of only 8.4 m before the cutting structure "ringed" just outside the core throat. The performance and condition of the bit will provide valuable information for design improvement.

More testing is planned for diamond and other drag type bits for RCB work, with emphasis probably shifting to thermally stable synthetic polycrystalline diamonds in the cutting structure. On Leg 116, a 9-7/8" APC/XCB drag bit with PDC (polycrystalline diamond compact) cutters was used on two sites. The bit, which was designed for soft formation drilling, actually proved to be more effective and durable in the distal Bengal Fan than the conventional 11-7/16" roller cone bit. The bit is still in excellent condition and will be used, along with a second bit of similar construction, for continued testing with the APC/XCB system.

Three-cone "hybrid" bits with diamond core trimmers will be tried with downhole coring motors in the near future. The relative merits of three-cone vs. four-cone bits are again under scrutiny. The next APC/XCB bit procurement will include some three-cone models.

In September, tests were conducted near Grants Pass, Oregon, with the purpose of optimizing bit and drilling assembly selection for the forthcoming Southwest Indian Ridge drilling on Leg 118. A truck-mounted drilling rig was contracted to core serpentinized peridotite with the ODP RCB coring assembly. Several core bits of various types, including one diamond bit, were used to determine the most effective performance in peridotite, which has been encountered only rarely in DSDP/ODP coring operations. Other components, including a roller reamer and a stabilized bit sub, were evaluated to study the contribution of stabilization of the bit to core recovery and quality and to combat the potential problem of peridotite "swelling" into the borehole. A byproduct of the technical evaluation is some interesting cores. They will be curated by ODP personnel and probably will be stored at the ODP Gulf Coast Repository.

WELLBORE SAMPLING FOR ODP

WORKSHOP REPORT

A workshop to outline the current issues in wellbore sampling and to make recommendations for future ODP and other applications was held 27-28 May 1987 in Houston, TX. Richard K. Traeger (Sandia National Laboratories and Downhole Measurement Panel member) and Barry Harding (ODP/Engineering) convened the workshop, which was sponsored by Joint Oceanographic Institutions, Inc. and the U.S. Department of Energy. The 72 participants, representing academia, industry and research laboratories in about equal numbers, considered the current scientific limitations and technology needs for future drilling operations.

BACKGROUND ON WELLBORE SAMPLING

The fact that any drilling or intrusion immediately alters the formation being sampled must be considered in all new technology and experiment plans. Given that limitation, the coring of soft sediments by piston systems and of competent hard sediments by standard coring systems appears satisfactory. Gas and liquid sampling from nonpermeable formations would be highly desirable, but no methods for accomplishing this are now available or in development.

ISSUES AND RECOMMENDATIONS

Developments for improved sampling discussed at the workshop included: enhanced recovery in unconsolidated sediments; improvements in flow-through samplers with capabilities for measuring in situ temperature, pressure and pH; and better pressure coring systems to allow nonintrusive examination of the core while still in the confining liner.

Recovery in Unconsolidated Sediments:

Improved recovery in unconsolidated sediments has been a top-ranked item in recent JOIDES Planning Committee and advisory panel recommendations. Development priorities forwarded at the workshop for enhanced recovery in this drilling environment focussed on: improved heave compensation, redesigned core catchers and liners, and higher rotary coring speeds. Measurement-while-coring technology is needed for determinations of barrel speed, flush flow, rates of penetration, entry of core into the barrel, and scientific measurements. Workshop participants discussed possible design concepts such as freezing or encapsulating the formation before coring and measuring critical in situ parameters ahead of the bit.

Pressure Coring and in situ Analyses:

Developing a pressure coring system continues to be an engineering priority at TAMU/ODP Engineering; the engineering group has asked the JOIDES scientific community to define requirements for such a system. Issues forwarded at this workshop included: need to maintain in situ conditions, retention of volatile components, and sample access. The potential cost of a pressure core barrel system was discussed.

Development priorities for a pressure coring system include:

* maintenance of borehole pressure (and temperature);

* ability to interrogate the core while in the pressurized core barrel (tomography, electrical methods, e.g.);

* ability to transfer the core while maintaining pressure, temperature and structure; and

* means for identifying gas hydrates before opening the core barrel.

Issues for in situ chemical analyses and fluid sampling included: obtaining representative samples to allow for subsequent thermodynamic modelling; identifying amounts and sources of sample contamination; maintaining in situ chemical and physical conditions; and establishing a range of operating temperatures.

Some development priorities for in situ sampling were:

* using chemically inert flow through of syringe-type samplers;

* feasibility studies for high temperature (400-450°C) samplers; and

* determinations of in situ T, P and pH measurements at the sampling point; eH, conductivity and turbidity measurements are also of interest.

Sample Handling:

Recovery of oriented core would be highly desirable for shipboard analyses as well as shore-based physical properties work. Core handling protocol and archiving was discussed by the participants, with a mobile plugging unit and an improved repository environment being needed developments. Other development priorities were the design of a low atomic number core barrel-liner assembly and developing gamma ray monitors for measurement while coring (for correlation purposes).

Finally, the workshop participants discussed drilling and handling contamination, particularly the contribution from polymers and other chemicals used during drilling, and corrosion/erosion during drilling. Suggestions for improving sample integrity were to identify contaminants and to develop techniques for sampling ahead of the bit (and out of the drilling fluid invasion zone).

FUTURE DEVELOPMENTS

The initial response from the workshop is encouraging in that sampling problems have been identified as well as immediate and long-range solutions outlined. The JOIDES Downhole Measurement Panel is taking an active interest in the results from the workshop and has recently increased the number of physical properties experts on the panel. The workshop conveners have noted that future direction should focus foremost on making scientific measurements in the borehole itself. Such measurements should be research developments and not solely dependent on commercial logging developments.

[Note: This report was compiled from a preliminary report from R. Traeger. The final workshop report will be available in November, 1987, from JOI, Inc.]

WIRELINE SERVICES CONTRACTOR REPORT

The following report was compiled from ODP technical progress reports from the Borehole Research Group at Lamont-Doherty Geological Observatory. For further information contact the Borehole Research Group, LDGO, Palisades, NY 10964.

SUMMARY OF LOGGING RESULTS: LEG 114

Hole 700B:

At Hole 700B (489 mbsf), two logging runs were completed. The first run consisted of the digital tool string, which was used for the first time in ODP logging. The digital sonic tool (seismic-stratigraphic and litho-porosity combinations) stopped functioning at the very beginning of the logging run. The other digital tools worked well, providing excellent data from 42m above total depth to 132.5 mbsf. The second logging run, consisting of the geochemical tool combination, was lowered to 417 mbsf and logged up to 126 mbsf. Logging time was 27 hours for rig-up to rig-down. Log delineation of lithologic units was quite good, with more sub-divisions visible on the logs (GST and resistivity) between 235 and 300 mbsf than identified from the cores. Initial clay typing indicates potential depositional environment information.

Hole 703:

Only one log was completed at this site with the analog seismic-stratigraphic combination. Because of rough seas, the heave motion compensator malfunctioned and depth determination was difficult. The logs are of lower quality from this site; reprocessing should improve them, however.

Hole 704B:

At Hole 704B, more than 600m of logs were obtained from three runs. The heave compensator failed during the entire Site 704 logging operation. Consequently the logs will have to be processed to remove the heave motion from the log signal. The geochemical combination (GST) logs show good periodicity of approximately 10m that seem to correspond to cycles of nannofossil and diatom ooze deposition.

Initial post-cruise analysis indicates a periodicity in the sonic and resistivity logs which can be correlated with obliquity and eccentricity signals. Because of the high core recovery at this site, it is hoped that post-cruise processing will enhance the logs so that they can be valuable in defining (and refining) the physical properties measurements, biostratigraphy and cycles of sedimentation.

SUMMARY OF LOGGING RESULTS: LEG 115

Hole 715:

At Site 715, three successful logging runs were obtained from just above total depth (228 mbsf). Two passes were obtained with the geochemical string. The GPIT tool was added to the lithodensity string to provide magnetic field strength and inclination values, at the request of the shipboard paleomagnetic scientists, to investigate possible problems associated with induced magnetization in the extremely poorly magnetized carbonate sediments in the hole. The geochemical logs correlate extremely well with core data and provide a continuous record of the lithologic changes encountered. The geochemical logs show a clear differentiation of lithologies at 115 mbsf (chalky ooze and reef limestone), and at 220 mbsf (reef limestone and vesicular basalt). Within the basalt, a highly altered zone can be differentiated as well as several obvious sediment stringers.

Hole 707C:

At Hole 707C, seis/strat logs (resistivity, gamma ray and sonic) of excellent quality were obtained from 150 to 440 mbsf. The subsequent logging runs were unsuccessful due to a combination of problems, the GST tools failed either in the hole or on deck, and hole conditions deteriorated with a number of major bridges below the drillpipe.

SPECIAL REPORT: LEG 116

Early plate tectonic theories assumed that plates behave as rigid units, with deformation confined to active margins. In the central Indian Ocean, however, the oceanic lithosphere has buckled, forming 100-300 km wavelength undulations, hundreds of kilometers from the plate boundaries. Geophysical surveys tied this deformation to the India-Eurasia collision and subsequent uplift of the Himalayas. These same surveys noted the presence of abnormally high heat flow associated with tilted fault blocks in the area.

The Leg 116 scientific party investigated the history of intraplate deformation and the abnormal heat flow by drilling two adjacent fault blocks. At the three ODP sites (717, 718 and 719), coring operations recovered interlayered units of Bengal Fan silt and mud turbidites, from which the biostratigraphers were able to provide rough limits on the timing of local deformation [See the Leg 116 Report in this issue for further details].

Heat Flow/Fluid Flow Regimes:

Heat flow and interstitial water studies at Site 718 revealed a seemingly complicated system of hot formation water, rising along a fault plane and out into permeable beds, with cold sea water recharging the system through a separate network of permeable beds.

Leg 116 provided an excellent opportunity for the application of logging technology to address several questions on fluid flow regimes:

1) given the impermeable nature of the clay-rich mud turbidites, how and where were the hot and cold water conduits forming;

2) were the zones of poor recovery mostly silt, or were silt and clay fractions approximately equal; and

3) could the deformation and dewatering history of the fault blocks be modeled solely on physical properties measurements from core, even though these measurements were confined to the well-recovered clay-rich zones?

Lithologies, Deformation Processes and Permeability Structures:

The success of this application is shown in Figure 1, which displays a series of natural gamma radiation, resistivity, sonic velocity, density, and porosity logs from Hole 719B, along with core recovery (see figure caption for additional information). The logs clearly demonstrate that the zones of poor recovery are dominated by silt turbidites, showing a striking correlation between grain size and core recovery. The less porous but more permeable silts form conduits for fluid flow; by using the logs to identify these layers in the hole and to tie them to seismic reflectors (through synthetic seismograms), the entire "plumbing" system of the tilted fault blocks has been mapped out. Also, the porosity log indicated that the silt turbidites follow a compaction-with-depth trend which differs from mud turbidite trend. This shows that deformation studies based on mud turbidite compaction alone would be incorrect, and that the amount of upwelling fluid is constrained by the dewatering of a mixed clay and silt system. A combination of log measurements with lithological, thermal and chemical observations should serve as an excellent foundation for a comprehensive model of fluid flow and deformation processes within the tilted fault block system.

The logging measurements from Leg 116, even with low core recovery, drilling disturbances and difficulty in correcting for in situ conditions, provide a comprehensive description of lithology, physical properties, hydraulic properties, and compaction trends. These measurements are not only helping to resolve the questions of intraplate deformation, but they also demonstrate that drilling operations in regions of intense deformation, such as accretionary wedges, can succeed even when drilling conditions are not ideal.

PLANNING COMMITTEE REPORT

The following report contains highlights from the Planning Committee Meeting, held 26-28 August, 1987, in Nikko, Japan.

ODP PUBLICATIONS

At the April EXCOM meeting, EXCOM made recommendations on ODP Part A and B publications. The Information Handling Panel met in early August, at the PCOM Chairman's request, to look at the implications of the EXCOM decisions. The international community, in particular, was concerned with cuts to the numbers of Part A & B volumes printed, as well as with the requirements for author-prepared, camera ready copy for Part B contributions.

Together with the science operator, IHP was able to identify $182,000 in further savings in the cost of ODP publications from the total $1.2M budget. These savings were reprogrammed in order to: have Volume B typeset rather than change to author-prepared photo ready production; hire two editors to aid in the text editing, especially for non-English speaking authors; and hire another person in data bases to assure that ODP data bases are maintained at a more adequate level.

PCOM passed a motion in support of the IHP recommendations for ODP Proceedings Parts A & B. In addition, letters explaining the publications decisions, from N.Pisias and T.Pyle, as well as from the TAMU ODP Publications group, were to be circulated to the JOIDES community. [See page 38 for the complete text of these letters.]

INDIAN OCEAN PROGRAM:

The basic priorities for the Indian Ocean program have not changed from previous reports, although minor operations changes were made. The June JOIDES Journal (Vol. XIII, No. 2) lists the scientific objectives of the Indian Ocean program through Leg 123. [See page 3 for the current JOIDES RESOLUTION Operations Schedule for the Indian Ocean Program.]

WESTERN PACIFIC PLANNING

At Nikko, PCOM spent a significant part of the meeting evaluating the first nine programs from WPAC's Third Prospectus. These included: Banda-Sulu-South China Sea Basin, Sunda Arc, Bonin, Nankai Trough, Japan Sea, Bonin forearc and geochemical reference hole, Northeast Australia Margin, Vanuatu and Lau Basin, which represented about 12 legs of drilling as presented in the prospectus. PCOM will base a firm drilling plan for FY89 on these program evaluations at the PCOM Annual Meeting in December. Results of these discussions were summarized in a memo sent to the thematic panels and to WPAC. The motions and consensus items for each program, as outlined in the memo, appear below:

Banda-Sulu-South China Sea:

PCOM feels that this program does not warrant more than one leg of drilling. PCOM feels that one leg would provide first order information on thematic problems related to the ages of these basins. PCOM requests WPAC to prepare a single leg program for this transect. PCOM suggests that the program should consist of one South China Sea Basin site, one Sulu and one Banda Sea site (with the latter sites being located on oceanic crust). For PCOM to consider more than one leg for this transect, WPAC must provide a well defined justification for drilling beyond one leg. A Celebes Sea site might be considered as part of this one leg program.

Sunda:

Because of the low ranking by the thematic panels and the uncertainties about whether this leg can address collisional processes, PCOM cannot consider this leg for the FY89 program. However, if the planned site survey data and the proponents provide the TECP with justification that drilling in the Sunda region can adequately address collision processes, PCOM is willing to consider this leg for drilling beyond FY89.

[Note: Recent decisions from the Indonesian government have jeopardized clearances for pre-drilling site surveys in both the Sunda and Banda Seas.]

South China Sea Margin:

The South China Sea Margin continues not to be included in the WPAC drilling schedule. However, PCOM recognizes that new geophysical survey data available for this region, may result in a change in the thematic panel's ranking of this program.

Bonins:

The Bonin program (Site BON 1, 2, 5a, 5b and 6) is considered by PCOM to be worthy of one and a half legs of drilling. TECP and LITHP are requested to provide detailed justification for additional Bonin program objectives, which can be fit into the remaining one-half leg of drilling. Specifically, PCOM requests scientific justification for drilling diapirs and/or the forearc terrace in the Bonins.

Geochemical Reference Sites:

PCOM requests that LITHP provide the minimum strategy necessary for obtaining a reference hole(s) for the Bonin system. PCOM feels that the Bonins are the most appropriate place for drilling a geochemical reference hole(s). However, justification of drilling strategies are needed from LITHP.

Nankai Trough-Nankai Geotechnical-Zenisu:

a) PCOM accepts the Nankai Trough leg (NKT-1 and NKT-2) as presented in the WPAC Third Prospectus; b) PCOM would consider at a later date (beyond FY89) a second leg which could include extensive geotechnical studies, downhole measurements and Zenisu Ridge drilling.

The thematic panels, especially SOHP and TECP, should examine proposed sites along the Nankai transect (NKT-3, NKT-7) for possible development of a program to examine hydrologic processes in this accretionary prism.

PCOM recognizes that the Zenisu Ridge is part of the tectonic setting of the Nankai region and could be considered part of a second Nankai program.

Japan Sea:

PCOM accepted the one and one-half leg program in the Japan Sea as presented in the WPAC Third Prospectus.

Northeast Australian Margin:
(previously referred to as Great Barrier Reef)

PCOM requests that SOHP provide PCOM with the specific objectives and their justification of this program, which holes address these objectives and how these holes provide the necessary data to achieve these objectives. Specific concerns expressed during the discussions include how the effects of subsidence and sea level changes are going to be identified/separated. PCOM also found that some of the objectives listed in the WPAC Third Prospectus to be unclear and requests that the SOHP provide clarification.

LITHP is asked to provide its evaluation of the Mississippi Valley Type Mineralization Proposal (268/D) for PCOM.

Vanuatu:

PCOM presently considers this program to be a single leg of drilling. PCOM feels that the D'Entrecasteaux Ridge and Aoba Basin sites address an important thematic process and are of highest priority. The sites in the Coriolis Trough and also site BAT-2 are considered to be of lower priority. WPAC is asked to provide PCOM with a single leg program for this region.

Lau Basin:

At the present time, PCOM considers the Lau Basin to be an important region to examine backarc processes, specifically to examine volcanism and its relationship to the tectonics of the backarc. Drilling in the Lau region should focus on backarc processes. LITHP is asked to formulate two scenarios for a single leg of drilling; on a leg without drilling on bare rock and one leg drilling on bare rock zero age crust. Specifically, LITHP should provide the scientific objectives for each of these scenarios and describe the relative merits of each. We wish to endorse the LITHP's recommendation that this program should be focused, and thus consider drilling the forearc not of prime importance.

TECP is asked to provide LITHP and PCOM with their views on the tectonic objectives to be addressed in the Lau backarc.

WESTERN PACIFIC SCHEDULE

As part of the Western Pacific planning, and in planning for the rest of the Indian Ocean, PCOM attempted, with the help and encouragement of the Science Operator, to include at least two days contingency time in each leg. PCOM endorsed efforts to use this time for engineering tests as well as for aiding in completing the scientific objectives of each leg.

PCOM also devised a schedule of the first six legs of the Western Pacific program, using rankings of the programs, weather windows and maturity of the site surveys. [Note: The six legs are illustrated on the front cover and listed in the Ship Operations schedule on page 3.]

A synopsis of the scientific objectives of the first six legs of proposed drilling appears on page 42.

CENTRAL PACIFIC PLANNING

PCOM has asked CEPAC to prepare a prospectus for initial review at the December PCOM Annual Meeting and for full review at the spring meeting. Each of the thematic panels were asked to provide CEPAC with their <u>six</u> highest priority projects. An 18-month planning framework is still suggested for the CEPAC programs.

ODP ADVISORY STRUCTURE REVIEW

PCOM has begun a review of the thematic and regional panel structure. PCOM generally agreed that the role of the regional panels should be reduced and that ODP should remain a proposal-driven program.

A sub-committee of PCOM (with one EXCOM representative) has been named [T.Francis (U.K.), A.Taira (J), M.Langseth, M.Leinen and G.Ross Heath]. This sub-committee is to consider changes in the panel structure. The goal of this structure should be to ensure that ODP is indeed "thematically driven" and that the thematic panels adequately focus on the diverse set of problems to be addressed by ocean drilling.

Initial requirements for the panel reorganization include: that any increase in the number of thematic panels should be kept to a minimum; the role of "regional expertise" should be considered; and final recommendations are not expected until after the COSOD II report is available.

For the short term, PCOM discussed ways of guaranteeing a thematically-driven program. Proposals are to be evaluated by the thematic panels in terms of how well they address the major scientific problems identified. Proposals which are viewed to address thematic issues will be forwarded to the regional panels for evaluation. The regional panels will be asked to review proposals in terms of maturity, adequacy of documentation and probability of success. Only thematic panels will be asked to rank proposals. Regional panels will then write prospectuses to include those programs identified by thematic panels. Finally, PCOM will use this input to formulate a drilling program.

SPECIAL REPORT: ODP PUBLICATIONS

At the August Planning Committee meeting, several changes were adopted which concern the ODP Proceedings Volumes, Parts A and B, as well as other publications issues (see Planning Committee Report, page 35). A joint letter from N.Pisias, PCOM Chairman, and T.Pyle, JOI, Inc. Director for ODP, explaining these recent changes, was sent to over 2,000 people on the JOIDES mailing list. The TAMU/ODP Publications staff also attached a letter which explains new procedures for ODP publications. The text of both letters appears below.

JOIDES Planning Office
College of Oceanography
Oregon State University
Corvallis, OR 97331
Telephone: 503-754-2600

OCEAN DRILLING PROGRAM

24 September 1987

Dear Colleague:

Due to the budgetary constraints posed by the 1987-88 fiscal year budget, funds for ODP publications were increased from $1.095 M to only $1.388 M. This increase was not sufficient to meet the estimated cost for publishing the Final Reports or Part B volumes of the Proceedings of the Ocean Drilling Program in the form originally envisioned by JOIDES and ODP.

The budget constraints were a result of two actions. First, the unfortunate decision to not allow the Soviet National Academy of Science to become the eighth member of the ODP. The second was the recommendation of both the Planning and Executive Committees that the base budget must include the funds necessary to complete scientific programs which have expenditures beyond normal drilling expenses. For the coming year this includes the cost of an ice support vessel for Leg 119 and the costs associated with bare rock drilling on Leg 118.

As we enter the Pacific Ocean, future programs such as drilling on the EastPacific Rise, high latitude drilling in both the North and South Pacific and the technical requirements for drilling in difficult formations will all require significant amounts of money. In addition, we must anticipate large capital expenditures such as the replacement [of large amounts] of the drill string in the next few years. All this must be budgeted for if we are to succeed in achieving the scientific goals of the Ocean Drilling Program.

Recognizing the need to reprioritize funds within the FY88 budget the PCOM recommended, and EXCOM endorsed, cost savings in the production of Volumes A & B of the Proceedings of the Ocean Drilling Program. These recommendations were in the form of two decisions: 1) that Volume B be produced as an "author prepared, camera-ready copy" publication; and 2) that the press run for both volumes be changed from 2000 hardbound copies to 1000 hardbound and 1000 microfiche copies.

These decisions created a number of misunderstandings. It is the unanimous intent of both PCOM and EXCOM that both Volumes A & B are to be published. Secondly, that any reduction in the press run of hardbound volumes does not mean that member nations would receive fewer bound volumes. The Memorandum of Understanding requires that each member nation receive 100 copies; each member nation will therefore continue to receive the 100 hardbound copies specified. The primary intent of the PCOM and EXCOM decisions was that some of the production costs for Volumes B could be transferred to the contributors and users of this program.

After the EXCOM meeting in April,1987 we requested that the JOIDES Information Handling Panel (IHP) meet to discuss the impact of these changes in publication policy and make further recommendations. The panel, chaired by Dr. T.C. Moore, met in August of this year. At their meeting the panel received detailed budget information outlining all production costs of ODP volumes and, together with the help of the ODP Publications Group, were able to identify funds within the Publications and Computer Services Groups which could be reprogrammed.

These reprogrammed funds represent savings in production costs of approximately $180,000 and were used to replace funds for: 1) typesetting Volume B, thus eliminating the need for "photo ready" text; 2) the hiring of two editors to provide text editing support, especially to non-English speaking authors; and 3) an increase in the press run to 1800 volumes; 4) replacing some of the lost funds in the Database Group; and 5) providing funds for ship board laboratory (XRF/XRD) support.

The detailed implications of these recommendations are found in the attached memo from the ODP Publications Group.

The recommendations of the IHP were supported by PCOM, have been forwarded to JOI, Inc., and will be presented to EXCOM at their October meeting.

In closing, I would point out that the most unpleasant part of science is recognition of the fact that there is never enough money. In the halls of COSOD II was heard much concern about recent JOIDES budgetary decisions, while in the meeting rooms a large part of the scientific community are outlining ambitious plans for the future--plans which would require funds far in excess of the present program. However, in a world of finite funds we must find a balance in our priorities. It was the intent, and continues to be the intent, of PCOM to find this balance. I feel that the decisions of PCOM and EXCOM were the correct ones and that we have, in part, achieved this balance. Unfortunately, the budget process this year was not the smoothest and we are forced to accept that the "ends justified the means".

Sincerely,

Nicklas G. Pisias, Chairman
JOIDES Planning Committee

Thomas E. Pyle, Director
Ocean Drilling Program, JOI, Inc.

CHANGES IN PUBLICATIONS FOR ODP PROCEEDINGS

Because of the necessity to cut costs in the ODP Publications budget for the 1988 fiscal year, the JOIDES Information Handling Panel (IHP) and Planning Committee (PCOM) approved a number of changes in the publication process at their August 1987 meetings.

The impact on authors of these changes affects principally the preparation of manuscripts and accompanying artwork for the Final Reports, or Part B, volumes of the Proceedings of the Ocean Drilling Program.

In its deliberations, the IHP discussed ways in which to maintain high-quality, leg-coherent, peer-reviewed Part B volumes in spite of the necessary budget cuts. It was decided to ask ODP/TAMU to examine ways in which costs could be cut from production of the Initial Reports, or Part A, Proceedings volumes so that Part B volumes would be as little adversely affected as possible.

To attain these goals, several areas of potential savings were identified in the FY88 Publications budget so that typesetting of Part B volumes could be continued, and the necessary editorial support could be reinstated to aid in the review and editorial process including helping authors in rewriting.

We emphasize that a stringent peer-review system will be maintained for Part B Proceedings manuscripts. Because the ODP Science Operations Department is losing about one-third of its staff scientists, also because of budget cuts, much of the responsibility of the peer-review process will be borne by the co-chief scientists for each cruise instead of by the ODP staff scientists. An editorial board will be established to handle review of the Part B manuscripts from each cruise; this board will consist of the co-chief scientists, the ODP staff scientist for that cruise, an ODP editor, and one other scientist to be selected by the manager of the ODP Science Operations Department in consultation with the co-chief scientists. This board will be responsible for obtaining adequate reviews and in making decisions concerning the acceptance or rejection of papers. The board will be assisted by the ODP manuscript coordinator, who occupies a key role in making sure that the manuscript flow is orderly and remains on schedule. Members of this board will be listed prominently in the front matter of each Part B volume. The possibility of reimbursing non-ODP members of the editorial boards for postage and other communications expenses is being explored.

Owing to staff reductions, manuscripts for Part B volumes no longer will be routinely copy edited. Authors not having English as their primary language, however, can be provided suitable editorial help in polishing their manuscripts. In addition, authors will be required to submit all artwork for figures and plates for their accepted papers in final camera-ready form, ready for publication.

Other changes to both Part A and Part B volumes include the following:

- Elimination of color frontispieces in both series of volumes unless funds are furnished by the authors to defray printing costs.

- Use of uncoated, acid-free paper except for signatures containing micropaleontological plates in Part B volumes, which will be printed on coated, acid-free paper.

- Elimination of unnecessary pages in Part A volumes by grouping several "barrel sheets" on a page and by treating core photographs in the same manner.

- Reduction of the printing run from 2000 to 1800 copies. This will be accomplished principally by reducing free distribution to companies and individuals. No formal microform distribution of the Proceedings is contemplated, although microfiche and microfilm versions will be available to those who prefer them.

- Elimination of free distribution of offprints! Authors will be given an opportunity to order offprints at cost.
- Reduction in length of indexes from a maximum number of 6000 entries per volume to 3000. Indexes will cover both Part A and Part B volumes but will be published only in Part B.
- Allowance of only one free back-pocket foldout per book; others will be permitted only if funds to cover printing costs are provided by the authors.
- Publication of lengthy tables and seismic sections on microfiche as back-pocket inserts.
- Requirement of authors to provide manuscript copy in a format that is electronically capturable, either from "hard" manuscript copy by means of our optical character reader or from magnetic diskettes (the nature of which will be specified later). Authors who do not provide copy in one of these formats will be assessed a typesetting surcharge.

In view of the foregoing, it is important to note that many aspects of our publishing procedure will remain the same as originally established:

- Printing of both Part A and Part B volumes in traditional leg-coherent, typeset, hardbound form.
- Maintenance of a rigorous peer-review system.
- Allowance of 5 free plates per paper.
- Retention of English as the required language for all manuscripts.

The following paragraphs outline our plans for handling manuscripts for Part B volumes now in preparation. For Vols. 101B, 102B, and 103B, we will handle all accepted manuscripts in the traditional manner, with full editorial processing and assistance in completing artwork.

Vols. 104B and 105B will be handled in a transitional manner: For these volumes the ODP Science Operations Department will provide the necessary staff support to complete the peer-review procedure already in place; authors will be required to provide camera-ready artwork for their illustrations, however, unless their manuscripts were accepted for publication by 15 August 1987.

Subsequent volumes (Vol. 106B onward) will be processed under the new system of editorial boards and procedures as given previously.

Meanwhile, we are revising our lavender booklet entitled "Instructions for Contributors to the Proceedings of the Ocean Drilling Program." This revised edition will contain the necessary details for preparing text and artwork for publication in accord with our new procedures. The booklet will be distributed in the near future to all Part B authors, beginning with Vol. 101B.

Finally, if you have any questions, please feel free to contact William D. Rose, Supervisor of Publications, or Russell B. Merrill, Curator and Manager of Science Services, at ODP headquarters.

HOW TO ORDER COPIES OF ODP PROCEEDINGS VOLUMES

Standing orders for the Proceedings of the Ocean Drilling Program are welcomed. Those on the standing-order list receive each volume directly from the printer; an invoice to cover the cost of the book and postage follows shortly afterward.

Back copies of the volumes that have already been published are also available. If you wish to place a standing order or purchase back copies, contact Fabiola Byrne, Publications Distribution, Ocean Drilling Program, 1000 Discovery Drive, College Station, Texas 77840, Telephone (409) 845-2016.

PRELIMINARY WESTERN PACIFIC SCIENCE PLAN

At the August 1987 Planning Committee meeting, the first six legs of the Western Pacific program were tentatively scheduled [See the Planning Committee report on page 35]. Although details of the planning may change, this program will bring the JOIDES RESOLUTION through FY89. See the Ship Operations schedule on page 3 for dates and locations of port calls, as well as for the estimated number of days devoted to each leg.

This schedule is based on an earlier PCOM decision which defined four programs, Banda-Sulu-SCS Basin, Bonin I, Japan Sea and Nankai, as a core program for Western Pacific drilling. Maturity of site surveys and weather windows were also considered in this tentative priority.

SCIENTIFIC OBJECTIVES

Below are brief descriptions of the FY89 drilling programs for the Western Pacific, based on the Western Pacific Third Prospectus, drilling proposals, and PCOM discussions of these legs. The following table lists tentative drilling sites for each of the programs, although these are subject to change if logistics or drilling safety become a factor.

Banda-Sulu-South China Sea Basin:

Two very different processes are thought to have led to the formation of marginal sea basins in the W-Pacific: (1) Entrapment of Mesozoic oceanic crust, and (2) Paleogene-Neogene back-arc spreading. Each process has considerable implications for the reconstruction of the geological history of the whole region.

In the Banda Sea (Basin), both processes are thought to have occurred; a carefully selected site will answer questions about age and origin of the basin, plus provide a record of the (Neogene) paleoceanographic history of this basin.

Drilling in the Sulu Sea Basin, besides addressing the question of its origin, will focus on the anoxic/suboxic paleoceanographic conditions in this silled basin. Investigations on basin evolution in this region should have implications for interpretation of analogous Mesozoic-Early Tertiary basins, which formed in similar carbonate-rich, equatorial settings.

The South China Sea is interpreted to be a basin generated by sea-floor spreading during the Oligocene-Miocene. Drilling is necessary to verify the age and history of the opening of this basin, including spreading reorganization and cessation of spreading, which is possibly related to a regional kinematic change occurring throughout the Western Pacific.

Bonins:

The Bonin and Mariana Island chains mark active volcanic arcs in an intra-oceanic setting. They trace the subduction zone where the Pacific Plate (E) is subducted beneath the Philippine Sea Plate (W); subduction started as early as the Eocene. Associated rifting of the volcanic arc and subsequent back-arc spreading has caused several episodes of arc-related magmatism.

The Bonins are the type locality of boninites, highly depleted arc lavas. The forearc region also shows a narrow belt of serpentinized ultramafics, marked by a series of serpentinite diapirs.

A transect of at least six holes is planned across the arc and forearc to look at these processes in the development of intra-oceanic arc-trench systems: (1) Volcanic-arc rifting and formation of back-arc basins; (2) Arc/forearc magmatism, structure, stratigraphy and vertical tectonics; (3) Serpentinite diapirism in the outer forearc; the ideal area for addressing this exiting problem are the Marianas, where sites are presently under consideration.

TENTATIVE FY89 WESTERN PACIFIC DRILLING SITES

SITES	LOCATION	WD[m]	DRILL DEPTH [mbsf]	BASEMENT [m]	MAIN OBJECTIVES [& COMMENTS]
BANDA-SULU-SCS BASIN					
BNDA1*	6.5°S/128.0°E	4600	>800	20	Stratigraphy, age & basin origin,
SUL5*	8.8°N/121.2°E	4300	1200	--	compare with BNDA sites; paleoceanographic objectives
SCS5*	13.0°N/113.7°E	4000	>200	20	Cessation of spreading (site at axis of basin)
SCS9*	16.3°N/117.8°E	4200	>500	20	Calibrate magn.anomaly-pattern (site at magn.anomaly 6)
BONINS					
BON1	30°55'N/139°53'E	2270	900	50	History of rifting arc, nature of rift and arc basement
BON2	30°55'N/140°00'E	1100	700	200	extent and chemistry of hydrothermal circulation
BON5A	32°26'N/140°47'E	2700	950	--	Uplift & subsidence history, forearc [forearc site]
BON5B	32°23'N/140°48'E	3400	950	50	stratigraphy, nature of ign.basement [forearc site]
BON6	31°54'N/141°06'E	2850	1100	150	deformation & translation history [outer arc site]
BON7**	30°58'N/141°48'E	4650	500	--?	(?) ultramafic diapir at outer forearc seamount
BON8**	31°18'N/142°54'E	6000	520	20	Geochemical reference site (for mass balancing calc.)
NANKAI TROUGH					
NKT1	32°58'N/134°58'E	4803	900	--	Reference hole
NKT2	32°32'N/134°56'E	4730	1300	--	Hole through decollement; in situ geotech. measurements
JAPAN SEA					
J1B	40°14'N/138°15'E	2780	800	100	Nature and age of basement of basins,
J1D	44°00'N/138°49'E	3170	380	30	style of multiple rifting
J1E	38°37'N/134°33'E	2890	880	50	
J2A	39°14'N/133°51'E	2050	1390	20	Metallogeny on failed back-arc rift, style of rifting
J3A	43°51'N/139°09'E	2040	730	30	Timing of convergence and obduction of oceanic crust
JS2	37°05'N/134°45'E	998	600	--	Paleoceanography (anoxic-subocix-oxic history)

Notes: * Sites not yet final; a Celebes Sea site may replace one site;
** Preliminary; a forearc-terrace basement site may replace this site; the objective "geochemical reference hole(s) is still under discussion

The high-priority sites form a transect of the volcanic arc, frontal arc, fore-arc basin, outer-arc high and serpentinite diapir at forearc. Another priority is to establish a geochemical reference site to determine what geochemical components are being subducted from the down-going plate.

Nankai Trough:

The predominantly clastic sedimentation of Nankai Trough is considered a highly differentiated end member of a convergent margin setting. The goal of Nankai Trough drilling is to determine how deformation takes place in a subduction zone sedimentary prism and to determine the fluids and physical properties that control the initial deformation process.

Geomechanical models require a knowledge of the sediment deformation behavior depending on chemical and physical consolidation, induration, age, depth, position and others factors more. This program will involve complete core sampling and downhole logs and measurements. Key parameters to be addressed are porosity, permeability, mechanical properties and state, seismic velocity, temperature and thermal properties and fluid geochemistry. Two holes are planned: one hole near the toe of the accretionary wedge through the major thrust decollement and an associated hole just seaward of the trench for a reference site.

A dedicated geotechnical leg (possibly to include drilling in Zenisu area) is tentatively scheduled for the second year of Western Pacific drilling, if the specialty tools required for it are available.

Japan Sea:

The Japan Sea is a back-arc basin, which is thought to have formed by multiaxial rifting of a former continental arc. Several deep basins with oceanic basement are separated by ridges of continental crust. Different models are proposed to explain the spreading history of the Japan Sea, including: (1) a double scissor-shaped opening to accommodate contradictory rotation of the southwestern and northeastern parts of Japan, and (2) development of pull-apart basins. Better constraints on the age of rifting and spreading are needed to understand the kinematics of the entire region. Objectives for drilling six sites in the Japan Sea include: (1) paleoceanography of Japa Sea; (2) nature and age of basement o basins; (3) style of multiple rifting; (4) proof of obduction of oceanic crust; and (5) ore genesis in failed back-arc rift (massive sulfides).

The available site survey data are of excellent quality; selection of the six planned drilling sites successfully avoided sites with possible shallow gas horizons.

PROPOSALS RECEIVED BY THE JOIDES OFFICE

Through 30 September 1987

Total number of proposals received: 293

A. ATLANTIC OCEAN:	**42**
U.S.[JOIDES institutions]	13
U.S.[non-JOIDES institutions]	3
France	13
UK	4
FRG	3
ESF consortium	3
Canada	3
B. INDIAN OCEAN:	**67**
U.S.[JOIDES institutions]	30
U.S.[non-JOIDES institutions]	16
France	9
Canada	4
UK	3
ESF consortium	2
FRG	1
(Australia)	1
(Seychelles)	1
C. SOUTHERN OCEANS:	**17**
U.S.[JOIDES institutions]	6
U.S.[non-JOIDES institutions]	4
France	3
FRG	2
(Australia)	1
(New Zealand)	1

D. WESTERN PACIFIC:	**75**
U.S.[JOIDES institutions]	9
U.S.[non-JOIDES institutions]	11
Japan	26
France	11
FRG	4
UK	2
Canada	2
(Australia)	5
(Peoples Republic of China)	3
(New Zealand)	1
(Korea)	1
E. CENTRAL AND EASTERN PACIFIC:	**70**
U.S.[JOIDES institutions]	31
U.S.[non-JOIDES institutions]	27
Canada	6
France	2
Japan	3
F. GENERAL/INSTRUMENTAL:	**23**
U.S.[JOIDES institutions]	8
U.S.[non-JOIDES institutions]	2
Japan	5
FRG	3
Canada	2
France	1
UK	1
ESF Consortium	1

TOTAL BY COUNTRY:

USA	160
JOIDES institutions	100
non-JOIDES institutions	60
France	39
Japan	34
Canada	17
FRG	13
UK	10
ESF consortium	6

NON-JOIDES NATIONS:	**14**
Australia	7
Peoples Republic of China	3
New Zealand	2
Korea	1
Seychelles	1

In addition, 68 ideas or suggestions for drilling have been received. Several of these have now been resubmitted as full proposals.

PROPOSALS RECEIVED BY THE JOIDES OFFICE

1 May through 30 September, 1987

Ref. No.	Date Rec'd.	Title	Investigator(s)	Inst.	Site Survey Avail. Data	Site Survey Future Need	Panel Reference	PCOM Ref.	Remarks
				INDIAN OCEAN					
288/B	8/1/87	Repositioning of site EP2 to EP12, Exmouth Pl., based on results of two-ship seismic experiments	J.Mutter R.Larson	L-DGO URI	Yes	-	SOHP 8/87 TECP 8/87 IOP 8/87		refers to 121/B
				WESTERN PACIFIC OCEAN					
281/D	6/9/87	Melanges in accretionary prisms landward of Kuril/Japan Trench junction and the Nankai Trough	Y.Okamura T.Yamazaki	Geol. Survey, Japan	Yes	Some	TECP 6/87 WPAC 6/87		related to 144/D, 164/D
292/D	9/21/87	Drilling in the SE Sulu Sea	K.Hinz et al.	BGR, F.R.G.	Yes		TECP 9/87 SOHP 9/87 LITHP 9/87		related to: 48/D, 27/D
293/D	9/21/87	Drilling in the Celebes Sea	K.Hinz et al.	BGR, F.R.G.	Yes		TECP 9/87 SOHP 9/87 LITHP 9/87		some relation to: 48/D, 27/D
				CENTRAL AND EASTERN PACIFIC OCEAN					
278/E	5/1/87	Hydrothermal alteration, oceanic layer three and crustal extension in the Blanco Transform Fault	R.Hart et al.	OSU, Woods H., UW & Smithsonian	Yes	--?	LITHP 5/87 TECP 5/87 CEPAC 5/87		see also 224/E, 232/E, 284/E
279/E	5/20/87	Anatomy of a seamount: Seamount 6 near East Pacific Rise	R.Batiza	NW Univ.	Yes	(SCS high-resol.)	LITHP 5/87 TECP 5/87 CEPAC 5/87		see also 280/E
280/E	6/4/87	Cretaceous-aged Geisha seamounts and guyots in Western Pacific	P.Vogt et al.	Washington NORDA, Scripps	Yes	Some	LITHP 6/87 TECP 6/87 SOHP 6/87 CEPAC 6/87		related to 203/E

Ref. No.	Date Rec'd.	Title	Investigator(s)	Inst.	Site Survey Avail. Data	Site Survey Future Need	Panel Reference	PCOM Ref.	Remarks
282/E	6/22/87	Tracing the Hawaiian hotspot	N.Niitsuma H.Okada	Shizuoka Univ., Japan	Yes	Yes	LITHP 6/87 TECP 6/87 SOHP 6/87 CEPAC 6/87		see also 3/E
283/E	6/28/87	Kuroshio Extension and Pacific Pl motion, recorded in sediment drifts of the NW Pacific	R.Jacobi et al.	L-DGO	Yes	Yes	SOHP 6/87 TECP 6/87 LITHP 6/87 CEPAC 6/87		
284/E	7/6/87	Escanaba Trough, Southern Gorda Ridge	R.Zierenberg et al.	USGS, OSU, GS Canada	Yes	Some high-resol.	LITHP 7/87 TECP 7/87 SOHP 7/87 CEPAC 7/87		(Seabeam classified) related to 224/E see also 232/E, 278/E
285/E	7/14/87	Deep drilling in the Jurassic quiet zone, Western Pacific	D.Handschumacher et al.	NORDA, Washington URI	Yes	MCS	LITHP 7/87 TECP 7/87 SOHP 7/87 CEPAC 7/87		see also 287/E
286/E	7/20/87	Return to 504B to core & log the dike/Gabbro, layer 2/3 transition	K.Becker (et al.)	Univ. Miami	Yes	--	LITHP 7/87 CEPAC 7/87		Engineering needs; (first proposal to mention COSOD II)
287/E	8/3/87	Deep drilling in the M-Series, Western Pacific	D.Handschumacher P.Vogt	NORDA Washington	Yes	MCS	LITHP 8/87 TECP 8/87 SOHP 8/87 CEPAC 8/87		see also 285/E
289/E	9/1/87	Subduction zone mass budget in Japan Arc - ^{10}Be tracer ref.site	S.Sacks, K.Suyehiro, M.Imamura	Washington, Chiba U., U.Tokyo	Yes	Some	TECP 9/87 LITHP 9/87 SOHP 9/87		
290/E	9/11/87	Deep drilling on Axial Seamount, Juan de Fuca Ridge	16 member consortium,	USA and Canada	Yes	MCS	LITHP 9/87		see also 224/E, 232/E, 278/E and 284/E
291/E	9/25/87	Volcanic moat, apron and pedestal drilling in the Marquesas Isl.	J.Natland, M.McNutt	Scripps, MIT	Yes	MCS	LITHP 9/87 TECP 9/87		

JOIDES / ODP BULLETIN BOARD

JOIDES MEETING SCHEDULE

Date	Place	Committee/Panel
29 Sept - 2 Oct	Paris	CEPAC/LITHP
6-8 October	College Station	PPSP
6-9 October	Nikko	EXCOM/ODP Council
8-9 October	Columbus, OH	SOP
21-23 October	Rome	IOP
2-5 November	London	WPAC
30 Nov - 4 Dec	Bend, OR	PCOM/Panel Chairmen (Annual Meeting)
5-7 January*	to be announced	SSP
19-20 January	Miami	DMP
26-28 January*	College Station	IHP
25-27 May	Washington, DC	EXCOM/ODP Council
20-22 April	College Station	PCOM

* Tentative meeting (not yet formally requested/approved)
(rev. 9/10/87)

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ODP/TAMU PANEL LIAISONS

Atlantic Regional Panel - JACK BALDAUF
Central & Eastern Pacific Regional Panel - ELLIOT TAYLOR
* Downhole Measurements Panel - SUZANNE O'CONNELL
Indian Ocean Regional Panel - BRAD CLEMENT
* Information Handling Panel - RUSS MERRILL
Lithosphere Panel - ANDREW ADAMSON
* Pollution Prevention & Safety Panel - LOU GARRISON
Sediments & Ocean History Panel - AMANDA PALMER
* Site Survey Panel - AUDREY MEYER
Southern Oceans Regional Panel - LOU GARRISON
* Technology & Engineering Development Committee - BARRY HARDING
Tectonics Panel - CHRISTIAN AUROUX
Western Pacific Regional Panel - AUDREY MEYER

[Note: Liaisons who routinely attend panel meetings are indicated]

SAMPLE DISTRIBUTION

The materials from ODP Legs 110 and 111 are now available for sampling by the scientific community. The twelve-month moratorium on cruise-related sample distribution is completed for Ocean Drilling Program Legs 101-111. Scientists who request samples from these cruises (after October 1987) are no longer required to contribute to the ODP Proceedings. ODP Leg 110 collected cores from the decollement zone in the Caribbean Sea. ODP Leg 111 returned to Site 504B in the eastern equatorial Pacific.

Preliminary sample record inventories for ODP Legs 101-115 are now in searchable database structures. The DSDP sample investigations database has been uploaded; keyboarding of the ODP sample requests are in progress. This database contains records of all sample requests, the purpose for which the samples were used and the institute where the samples were sent. At present, the most efficient way to access this database is to request a search by contacting the Curator.

Investigators requiring information about the distribution of samples and/or desiring samples, or who want information about the sample investigation or sample records database, should address their requests to:

The Curator
Ocean Drilling Program
Texas A&M University Research Park
1000 Discovery Drive
College Station, Texas 77840
Phone: (409) 845-4819

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JOI/USSAC ODP FELLOWSHIP

Joint Oceanographic Institutions, Inc., in cooperation with the U.S. Science Advisory Committee, is continuing to support its new Ocean Drilling Graduate Fellowship Program in the fiscal year 1988. The fellowship will provide an opportunity for scientists of unusual promise and ability who are in residence at a U.S. institution to conduct research compatible with that of the ODP. The award for a doctoral candidate is $18,000, to be used for stipend, tuition, benefits, research costs and incidental travel, if any. Applications for upcoming legs should be submitted to JOI according to the following schedule:

Leg*	Application Deadline
Shorebased work	1 January 1988
124 (Sulu Sea/So. China Sea)	1 January 1988
125 (Bonin I)	1 January 1988
126 (Bonin II)	1 May 1988
127 (Nankai Trough)	1 May 1988
128 (Japan Sea I)	1 September 1988
129 (Japan Sea II)	1 September 1988

* This is a tentative schedule, based on discussions at the August meeting of the JOIDES Planning Committee.

An application packet, with instructions and information on upcoming cruises is available from: JOI/USSAC Ocean Drilling Program Fellowship, JOI, Inc., 1755 Massachusetts Ave., NW, Suite 800, Washington, DC 20036.

NORDIC GEOLOGICAL MEETING ANNOUNCED

The 18th Nordic Geological Winter Meeting will be held from 12-14 January, 1988 in Copenhagen, Denmark. In conjunction with the meeting, a special session will be held on 15 January, 1988 on "Deep Sea Geology and the Ocean Drilling Program." The special session will discuss the outcome of COSOD II and, in light of this, identify deep sea geological problems of worldwide reconnaissance, with special interest for Scandinavian cooperation. For further information contact Naja Mikkelsen, Geological Survey of Denmark, Thoravej 31, 2400 Copenhagen, Denmark, Phone +45-1-10-66-00.

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JOI / USSAC WORKSHOPS

The following JOI-USSAC Workshops are scheduled for the next several months. If you are interested in attending one of these workshops you should contact one of the conveners directly. These workshops are advertised in greater detail in EOS and other journals. The workshops are:

CARIBBEAN REGION
17-21 November 1987 - Jamaica
Dr. Robert Speed

PRECISE DATING OF OCEANIC BASALTS
10-11 November 1987 - Northwestern University
Dr. Rodey Batiza
Dr. Robert A. Duncan
Dr. D.R. Janecky

U.S. Workshops in support of the Ocean Drilling Program are sponsored by the JOI-USSAC. If you are interested in proposing such a workshop, please contact Dr. Ellen Kappel at JOI, Inc. for proposal guidelines.

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JOI/USSAC WORKSHOP REPORTS AVAILABLE

Three recent reports of JOI-USSAC sponsored workshops are now available at JOI, Inc. For copies of these reports write to: JOI/USSAC WORKSHOP REPORT, JOI, Inc., 1755 Massachusetts Ave. NW, Suite 800, Washington, DC 20036.

Scientific Seamount Drilling, Drs. Tony Watts and Rodey Batiza, conveners

Measurements of Physical Properties and Mechanical State in the Ocean Drilling Project, Drs. Daniel Karig and Matthew Salisbury, conveners

Wellbore Sampling, Mr. Barry Harding and Dr. Richard Traeger, conveners

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DSDP/ODP SITE SURVEY CATALOGUE

The revised and updated catalogue of DSDP and ODP site survey data will be available from the ODP Databank in the fall of 1987. Included will be track charts and descriptions of data available for each survey carried out in support of ocean drilling. For further information contact the Manager, ODP Databank, Lamont-Doherty Geological Observatory, Palisades, NY 10964.

JOIDES JOURNAL MAILING LIST

Joint Oceanographic Institutions (JOI), Inc. has been handling distribution of the JOIDES Journal. Please notify JOI of any changes or additions to the mailing list, or if you have not received your copy of the Journal please contact: Robin Smith, JOI, Inc., 1755 Massachusetts Ave., NW, Suite 800, Washington, DC 20036, Telephone: (202) 232-3900, Telex: (RCA) 257828/BAKE UR UD, Telemail: R.Smith.JOI

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REQUEST FOR NOTICES

The JOIDES Journal editorial staff encourages members of the scientific community to submit news items for publication in the JOIDES Journal. We would welcome updates on upcoming meetings, workshops and symposia, relevant publications and workshop reports, or other items of interest to the ODP community.

The Journal is published in February, June and October of each year; notices should be received no later than one month before press time to ensure their publication. Please send items to the JOIDES Journal, c/o JOIDES Office, College of Oceanography, Oregon State University, Corvallis, OR 97331.

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DATA AVAILABLE FROM ODP

ODP databases currently available include all DSDP computerized data files (Legs 1-96), geological and geophysical data collected by ODP from Legs 101-111, and all core photos taken by DSDP and ODP (Legs 1-111). The table below lists and briefly describes the data available.

Most data collected by ODP are available as paper and microfilm copies of the original paper forms collected on the JOIDES RESOLUTION. Underway geophysical data are on 35 mm continuous roll microfilm. All other data are on 16 mm microfilm.

The ODP data are currently being computerized (please contact the Data Librarian to find out what data are available electronically). All DSDP data and much ODP data are contained in a computerized database. These data can be searched on almost any specified criteria related to the database. All data files can be cross referenced so that a data request can include information from more than one data file.

Complete copies of the computerized data files are available, or customized searches from one or many data files can be performed. Computerized data are currently available on hard copy printouts, on magnetic tape, or through the BITNET network.

Photos of cores and seismic lines collected by ODP and DSDP are also available. Seismic lines, whole core and closeup core photos are available in black and white 8 x 10 prints. Whole core color 35 mm slides are also available.

The ODP Data Announcements, which contain information about the ODP database, and Data File Documents, which contain information about specific data files, can also be requested.

To obtain data or information please contact:

Kathe Lighty, Data Librarian
Ocean Drilling Program
1000 Discovery Drive
College Station, Texas 77840
Phone:(409) 845-8495 or 845-2673
Telex Number: 792779 ODP TAMU
Easylink Number: 62760290
BITNET Number: DATABASE@TAMODP
Omnet Number: Ocean.Drilling.TAMU

AVAILABLE DATA

Data Available	Data Source	Description	Comments
1. LITHOLOGIC and STRATIGRAPHIC DATA			
Visual Core Descriptions			
–Sediment/sedimentary rock	Shipboard data	Information about core color, sedimentary structures, disturbance, large minerals and fossils, etc.	
–Igneous/metamorphic rock	Shipboard data	Information about lithology, texture, structure, mineralogy, alteration, etc.	
Smear slide descriptions	Shipboard data	Nature and abundance of sedimentary components.	
Thin section descriptions	Shipboard data	Petrographic descriptions of igneous and metamorphic rock. Includes information on mineralogy, texture, alteration, vesicles, etc.	
Paleontology	*Initial Reports*, *Proceedings*	Abundance, preservation and location for 26 fossil groups. The "dictionary" consists of more than 12,000 fossil names.	
Screen	Processed data	Computer-generated lithologic classifications. Basic composition data, average density, and age of layer.	
2. PHYSICAL PROPERTIES			
G.R.A.P.E. (gamma ray attenuation porosity evaluator)	Shipboard data	Continuous whole-core density measurements.	
Grain size	Shore laboratory	Sand-silt-clay content of a sample.	Legs 1–79 only
Index properties: bulk and grain density, water content, and porosity	Shipboard data	Gravimetric and volumetric measurements from a known volume of sediment.	
Liquid and plastic limits	Shipboard data	Atterberg limits of sediment samples.	
Shear-strength measurements	Shipboard data	Sediment shear-strength measurements using motorized and Torvane instruments.	
Thermal conductivity	Shipboard data	Thermal conductivity measurements of sediments using a thermal probe.	
Velocity measurements	Shipboard data	Compressional and shear-wave velocity measurements.	
Downhole measurements			
–Heatflow	Shipboard data	*In-situ* formation temperature measurements.	
–Pressure	Shipboard data	*In-situ* formation and hydrostatic pressure.	
3. SEDIMENT CHEMICAL ANALYSES			
Carbon-carbonate	Shipboard data, shore laboratory	Percent by weight of the total carbon, organic carbon, and carbonate content of a sample.	Hydrogen percents for Legs 101, 103, 104, 106–108; nitrogen percents for Legs 101, 103, 104, 107, 108.
Interstitial water chemistry	Shipboard data, shore laboratory	Quantitative ion, pH, salinity, and alkalinity analyses of interstitial water.	
Gas chromatography	Shipboard data	Hydrocarbon levels in core gases.	
Rock evaluation	Shipboard data	Hydrocarbon content of a sample.	
4. IGNEOUS/METAMORPHIC CHEMICAL ANALYSES			
Major element analyses	Shipboard data, shore laboratory	Major element chemical analyses of igneous, metamorphic, and some sedimentary rocks composed of volcanic material.	
Minor element analyses	Shipboard data, shore laboratory	Minor element chemical analyses of igneous, metamorphic, and some sedimentary rocks composed of volcanic material.	

AVAILABLE DATA (Continued)

Data Available	Data Source	Description	Comments
5. X-RAY MINERALOGY			
X-ray mineralogy	Shore laboratory	X-ray diffraction.	Legs 1–37 only
6. PALEOMAGNETICS			
Paleomagnetics	Shipboard data, shore laboratory	Declination, inclination, and intensity of magnetization for discrete samples and continuous whole core. Includes NRM and alternating field demagnetization.	
Susceptibility	Shipboard data	Discrete sample and continuous whole-core measurements.	
7. UNDERWAY GEOPHYSICS			
Bathymetry	Shipboard data	Analog records of water-depth profile.	Available on 35 mm continuous microfilm
Magnetics	Shipboard data	Analog records and digital data.	Available on 35 mm continuous microfilm
Navigation	Shipboard data	Satellite fixes and course and speed changes that have been run through a navigation smoothing program, edited on the basis of reasonable ship and drift velocities, and later merged with the depth and magnetic data.	Available in MGD77 exchange format.
Seismics	Shipboard data	Analog records of sub-bottom profiles and unprocessed signal on magnetic tape.	Available on 35 mm continuous microfilm
8. SPECIAL REFERENCE FILES			
Leg, site, hole summaries	Shipboard data, initial core descriptions	Information on general leg, site, and hole characteristics (i.e. cruise objectives, location, water depth, sediment nature, drilling statistics).	
DSDP Guide to Core Material	*Initial Reports*, prime data files	Summary data for each core: depth of core, general paleontology, sediment type and structures, carbonate, grain size, x-ray, etc.	Legs 1–85 only
AGEPROFILE	*Initial Reports*, hole summaries	Definition of age layers downhole.	
COREDEPTH	Shipboard summaries	Depth of each core. Allows determination of precise depth (in m) of a particular sample.	
9. AIDS TO RESEARCH			
ODASI	A file of ODP-affiliated scientists and institutions. Can be cross-referenced and is searchable.		
Keyword Index	A computer-searchable bibliography of DSDP- and ODP-related papers and studies in progress.		
Sample Records	Inventory of all shipboard samples taken.		
Site Location Map	DSDP and ODP site positions on a world map of ocean topography.		
Thin Section Inventory	Inventory of all shipboard thin sections taken.		

ODP PROMOTIONAL MATERIALS

A new portable ODP display is available for use at meetings and conventions. The display folds into two compact cylinders and may be put on board a plane as luggage or shipped. For more information and scheduling, contact Robin Smith, JOI, Inc., 1755 Massachusetts Ave., NW, Washington, DC 20036, (202) 232-3900.

A new 24 page, 8 1/2" x 11" full-color booklet on the Ocean Drilling Program is now available from Joint Oceanographic Institutions. Write to ODP Booklet, JOI, Inc., 1755 Massachusetts Ave. NW, Suite 800, Washington, DC 20036.

The Science Operator brochure for the Ocean Drilling Program has been updated. This edition features a color photo of the JOIDES RESOLUTION when she was in the Panama Canal. The section on research has been updated and includes a summary of cruises in the South Atlantic. Copies may be ordered from Karen Riedel, Ocean Drilling Program, 1000 Discovery Drive, College Station, TX 77840 USA.

JOI, Inc. has a pamphlet available entitled "Impact of Ocean Drilling on the Earth Sciences" written by William Hay. The pamphlet is an informative overview of Ocean Drilling and could be quite useful for public relations, education, or just as an information piece for your marine science program. If you are interested, please contact Robin Smith at the JOI Office.

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BITNET COMMUNICATIONS NETWORK

BITNET is a world-wide communication network which enables one to send mail and files to a user on a remote Computer System. Currently, there are approximately 2000 nodes on this network.

In order to send mail or files to a remote user, one must know the "USERNAME" and "NODENAME" of the target user. The NODENAME of the computer systems at the Ocean Drilling Program (ODP) is "TAMODP". The username for any ODP user or all ODP users can be acquired from the System Manager at ODP. If you do not know the username of the person at ODP that you desire to send to, an account has been set up for this purpose Username "SYSTEM", nodename "TAMODP". When sending to this address, please indicate who the message is for.

If you are a first time user of the Bitnet, it is advised to check with your System Manager for the details of using the network. The format of the command to initiate a BITNET file transfer may vary from installation to installation.

If you need assistance or have questions concerning the SYSTEM account,or to obtain a list of the ODP user account names, please feel free to contact the System Manager Moses Sun at (409)845-9298 or Wanda Johnson at (409)845-7918.

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DRILLING BULLETIN BOARD

The DRILLING Bulletin Board is a great way to advertise meetings, catch up on activities of the JOIDES RESOLUTION, or send a general message to the Ocean Drilling and Continental Drilling Programs. The DRILLING Bulletin Board is available on Omnet's ScienceNet electronic mail system. If you are on the Omnet system, it's as easy as typing "compose" and then "To:Drilling". If you have any questions contact E.Kappel by telemail or (202) 232-3900 by telephone.

BIBLIOGRAPHY OF THE OCEAN DRILLING PROGRAM

The following publications are available from the ODP Subcontractors. Information from TAMU can be obtained from ODP Headquarters, 1000 Discovery Drive, College Station, TX 77843-3469. Information from the Lamont-Doherty Geological Observatory can be obtained from the Borehole Research Group, L-DGO, Palisades, NY 10964.

TEXAS A&M UNIVERSITY

1. Proceedings of the Ocean Drilling Program, Part A (Initial Reports)

   Volumes 101/102 published together, December 1986
   Volume 103 published April 1987
   Volume 104 published July 1987
   Volume 105 published August 1987

2. Technical Notes

   #1 Preliminary time estimates for coring operations (REV. ED. December 86)
   #2 Operational and laboratory capabilities of JOIDES RESOLUTION (June 85)
   #3 Shipboard scientist's handbook (September 85)
   #4 Five papers on the Ocean Drilling Program from "OCEANS '85" (May 86)
   #5 Water Chemistry Procedures aboard JOIDES RESOLUTION (September 86)
   #6 Organic Geochemistry aboard JOIDES RESOLUTION - An Assay (September 86)
   #7 Shipboard Organic Geochemistry on JOIDES RESOLUTION (September 86)

3. Scientific Prospectuses

   #0 (March 1986) Leg 100
   #1 (January 1985) Leg 101
   #2 (February 1985) Leg 102
   #3 (March 1985) Leg 103
   #4 (April 1985) Leg 104
   #5 (June 1985) Leg 105
   #6 (September 1985) Leg 106
   #7 (October 1985) Leg 107
   #8 (December 1985) Leg 108
   #9 (March 1986) Leg 109
   #10 (April 1986) Leg 110
   #11 (July 1986) Leg 111
   #12 (August 1986) Leg 112
   #13 (October 1986) Leg 113
   #14 (February 1987) Leg 114
   #15 (May 1987) Leg 115
   #16 (May 1987) Leg 116
   #17 (June 1987) Leg 117
   #18 (June 1987) Leg 118
   #19 (September 1987) Leg 119
   #20 (October 1987) Leg 120

4. Preliminary Reports

   #0 (May 1986) Leg 100
   #1 (April 1985) Leg 101
   #2 (June 1985) Leg 102
   #3 (July 1985) Leg 103
   #4 (September 1985) Leg 104
   #5 (December 1985) Leg 105
   #6 (March 1986) Leg 106
   #7 (May 1986) Leg 107
   #8 (June 1986) Leg 108
   #9 (August 1986) Leg 109
   #10 (September 1986) Leg 110
   #11 (November 1986) Leg 111
   #12 (February 1987) Leg 112
   #13 (May 1987) Leg 113
   #14 (June 1987) Leg 114
   #15 (September 1987) Leg 115
   #16 (September 1987) Leg 116

5. Other Items Available

   - Ocean Drilling Program (in English, French, Spanish or German)
   - Onboard JOIDES RESOLUTION
   - ODP Sample Distribution Policy
   - Instructions for Contributors to Proceedings of the Ocean Drilling Program
   - ODP Engineering and Drilling Operations

LAMONT-DOHERTY GEOLOGICAL OBSERVATORY

Wireline Logging Manual (2nd Edition, December, 1986)

NATIONAL GEOPHYSICAL DATA CENTER

DSDP DATA REQUEST PROCEDURES

INTRODUCTION

The Information Handling Group of the Deep Sea Drilling Project was responsible for all scientific data collected on board the Glomar CHALLENGER and produced in the Deep Sea Drilling Shore laboratories during the program's 96 cruises. All DSDP data files have been transferred to the National Geophysical Data Center (NGDC) as of May, 1987. A summary of DSDP data available is given in the following pages. All prime data collected as part of the Deep Sea Drilling operations and some special files compiled by the DSDP Information Handling Group are available for distribution from NGDC.

DATA SERVICES

Data files can be provided in their entirety on magnetic tape according to user specifications. NGDC is also able to provide researchers with a full range of correlative marine geological and geophysical data from other sources. NGDC will provide a complimentary inventory of all data available on request. Inventory searches are custom tailored to each user's needs (ie. geographic area, parameter measured, etc.).

Information from the DSDP Site Summary file is fully searchable and distributable in PC-compatible form on floppy diskette, as well as in the form of computer listings and graphics, and magnetic tape. NGDC is working on making all of the DSDP data files fully searchable and available in PC-compatible form. Digital DSDP geophysical data are fully searchable and available on magnetic tape.

In addition to the DSDP data files described in the following table, NGDC can also provide analog geological and geophysical information from the DSDP on microfilm. One summary publication, "Sedimentology, Physical Properties, and Geochemistry in the Initial Reports of the Deep Sea Drilling Project volumes 1-44: An Overview", Report MGG-1, is also available.

DATA REQUEST PROCEDURES

Data requests may be made by telephone or by letter. Costs for services are as follows: $100 per magnetic tape, $50 per floppy diskette, $35 per reel of microfilm, $12.50 per copy of Report MGG-1. Costs for computer listings and custom graphics vary. Prepayment is required by check or money order (drawn on a U.S. bank), or by charge to Mastercard, VISA, or American Express. A $10 surcharge is added to all foreign shipments, and a $15 fee is added to all rush orders. Shipping and handling is included in the prices quoted.

FOR MORE INFORMATION

Data Announcements describing each DSDP data set in detail are available at no charge on request. For additional information on data availability, costs, ordering, etc., please contact:

Marine Geology & Geophysics Division
National Geophysical Data Center
NOAA E/GC 3 Dept. 334
325 Broadway
Boulder, CO 80303
303-497-6338 (FTS 320-6338)

For technical details, call 303-497-6339 (FTS 320-6339) or write to the address above.

AVAILABLE DSDP DATA

Data file: legs available	Data source	Description	Comments
Part 1. Lithologic and stratigraphic data			
Paleontology: 1-96	*Initial Reports*	Data for 26 fossil groups. Code names, abundance and preservation data for all Tertiary fossils found thus far in DSDP material. The fossil dictionary comprises more than 12,000 fossil names and codes.	Does not include Mesozoic fossils. No data for Leg 83. Legs 1-85 at NGDC.
Smear Slide: 1-96	Shipboard data	Information about the nature and abundance of sediment components.	No data for Leg 83 (hard rock cores only).
Thin Sections: 4-92	Shipboard Data *Initial Reports*	Petrographic descriptions of igneous and metamorphic rocks. Includes information on mineralogy, texture, alteration, vesicles, etc.	No data for Legs 1-3, 5, 8, 9, 15, 20-21, 24, 27, 40-41, 42B, 44, 47-48, 50, 56, 71-72, 75-76, 78, 80, 95, 96.
Visual Core Descriptions: 1-96	Shipboard data	Created from shipboard descriptions of the core sections. Information about core color, sedimentary structures, disturbance, etc.	
Visual Core Descriptions - igneous rocks: 4-94	Shipboard data	Igneous and metamorphic rock lithology, texture, structure, mineralogy, alteration, etc.	No data for Legs 40, 42B, 44, 47-48, 50, 56, 95, 96. Legs 22-94 available in digital form.
SCREEN: 1-96	Processed data	Computer generated lithologic classifications. Basic composition data, average density, and age of layer.	
Part 2. Physical properties and quantitative analytic core data			
Carbon-carbonate: 1-96	Shore Laboratory Shipboard, carbonate bomb data	Percent by weight of the total carbon, organic carbon and carbon carbonate content of a sample. Bomb data has carbonate only.	No data for Legs 46, 83, 88, 91, 92.
Grain Size: 1-79	Shore laboratory	Sand-silt-clay content of sample.	No data collected for Leg 16, 64 and 65.
GRAPE (gamma ray attenuation porosity evaluator): 1-96	Shipboard data	Continuous core density measurements.	No data for Leg 46.
Hard-rock major element analyses: 13-92	Shore-based and shipboard analyses	Major-element chemical analyses of igneous, metamorphic and some sedimentary rocks composed of volcanic material.	No data for Legs 20, 21, 31, 40, 42B, 44, 47, 48, 50, 56, 71, 93-96.
Hard-rock minor element analyses: 13-92	Shore-based and shipboard analyses	Minor-element chemical analyses of igneous, metamorphic and some sedimentary rocks composed of volcanic material.	No data for Legs 20, 21, 27, 35, 40, 42B, 44, 47, 48, 50, 56, 57, 66, 67, 71, 93-96.
Hard-rock paleomagnetics: 14-92	Shore-based and shipboard	Paleomagnetic and rock magnetic measurements of igneous and metamorphic rocks and a few sedimentary rocks composed of volcanic material.	No data for Legs 1-13, 17, 18, 20-22, 24, 30, 31, 35, 36, 39, 40, 47, 48, 50, 56, 57, 67, 68, 74, 93-96.
Interistial Water Chemistry: 1-96	Shore-based and shipboard analyses	Quantitative ion and/or pH, salinity, alkalinity analyses of interstitial water and surface sea water samples.	No data for Legs 46, 83.
Long-core spinner magnetometer sediment paleomagnetics: 43, 68, 70-73, 75, 90	Shipboard analyses	Paleomagnetic measurements: declination and intensity of magnetization. Data from hydraulic piston cores only.	Should be used with reservation since the cores were later discovered to be rust-contaminated and disturbed. Quality of the data for each core clarified by documentation.
Discrete sediment sample magnetics: 1-94	Shipboard laboratory	Paleomagnetic measurements: declination, inclination, and intensity of magnetization. NRM measurements and AFD measurements when available.	Rotary cores: 1-76, 78 encoded. HPC cores: 71-75 encoded. No data for 95, 96.
Alternating field demagnetization: 4-96	Shipboard laboratory	Paleomagnetic measurements of sediments on which alternating field demagnetization is carried out.	Rotary cores: 4-73 encoded. HPC cores: 72-79 encoded.

Part 2. Physical properties and quantitative analytic core data. (Cont.)

Sonic velocity: 2-95	Shipboard analyses	Hamilton frame and 'ear muff' methods.	No data for Legs 1, 13, 96.
Vane Shear: 31-94	Shipboard data	Sediment shear strength measurements using Wykeham Farrance 2350 and Torvane instruments.	No data for Legs 32-37, 39-40, 45-46, 49, 52-56, 59-60, 62, 65-67, 70, 77, 79, 81-84, 86, 88-89, 92.
Analytic water content, porosity, and density: 1-96	Shipboard laboratory	Measurements by syringe method from known volumes of sediment.	No data for Leg 41.
Well Logs: 6-96	Shipboard data	Analog charts and magnetic tapes produced by Gearhart-Owen and Schlumberger.	Schlumberger LIS tapes: 48, 50, 51, 57, 80-84, 87, 89, 95, 96. Gearhart-Owen tapes: 60, 61, 63-65, 67, 68, 70, 71, 74-76, 78. Analog data only: 6, 8, 46, 66, 69.
X-ray mineralogy: 1-37	Shore laboratory	X-ray diffraction	Data for Legs after 37 not available in digital form.

Part 3. Underway geophysics

Bathymetry: 7-96	Shipboard data	Analog record of water-depth profile.	Available as digital data and 35mm continuous microfilm. No data for Legs 10-12, 57-60.
Magnetics: 7-96	Shipboard data	Analog record produced on the Varian magnetometer in gammas. Digitized at 5-min. intervals on an OSCAR X-Y digitizer.	No data for Legs 10, 11.
Navigation: 3-96	Shipboard data	Satellite fixes and course and speed changes that have been run through a navigation smoothing program, edited on the basis of reasonable ship and drift velocities and later merged with the depth and magnetic data.	
Seismic: 1-96	Shipboard data	Sub-bottom profiles recorded on Edo Western Graphic Model 550. Digital data for Legs 89-96 in SEG-Y tape format.	Both Bolt and Kronllite filters available on board. Fast and slow sweeps available on microfilm and photographs.

Part 4. Special reference files

Site Summary: 1-96	Initial Core Descriptions	Information on general hole characteristics (i.e., location, water depth, sediment nature, basement nature, etc.).	
AGEPROFILE: 1-96	*Initial Reports* Hole summaries	Definition of age layers downhole.	
COREDEPTH: 1-96	Shipboard summaries	Depth of each core. Allows determination of precise depth (in m) of a particular sample.	

Part 5. Aids to research

SAMPLE RECORDS	Inventory of all shipboard samples taken.

DIRECTORY OF JOIDES COMMITTEES, PANELS AND WORKING GROUPS

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- Special Issue No. 1: Manual on Pollution Prevention and Safety, 1976 (Volume II)
- Special Issue No. 2: Initial Site Prospectus, Supplement One, April 1978 (Volume III)
- Special Issue No. 3: Initial Site Prospectus, Supplement Two, June 1980 (Volume VI)
- Special Issue No. 4: Guide to the Ocean Drilling Program, September 1985, (Volume XI)
- Special Issue No. 4: Guide to the Ocean Drilling Program, Supplement One, June 1986 (Volume XI)
- Special Issue No. 5: Guidelines for Pollution Prevention and Safety, March 1986 (Volume XII)

BACK COVER

Core 11R, Section 2 from Hole 713A, Leg 115 on the Chagos Bank, Indian Ocean. This section is from 91 mbsf. Seen in this interval are micrite chalks and volcanic ash layers of middle Eocene age, complexly interbedded and heavily bioturbated. These sediments preserve evidence of considerable local tectonic activity, in the form of several generations of both normal and reversed microfaults, shearing, fracture filling, and numerous examples of soft sediment deformation. Interestingly, this site is in a region of intense current seismicity (Schlanger and Stein, 1987, EOS, v. 68, p. 137-141). [Photo courtesy of J.Beck, TAMU/ODP]