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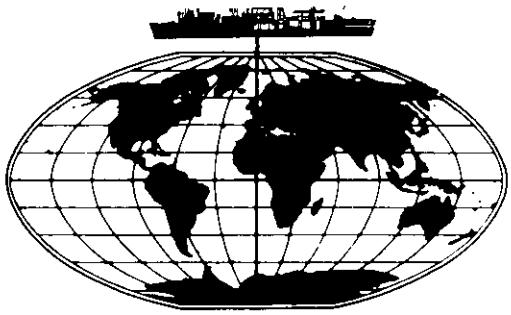

JOIDES Journal

VOL. XIV, No. 3, October, 1988

The Ocean Drilling Program actively solicits proposals for drilling in any ocean. These will be evaluated and considered for the FY92 drilling schedule and for future years.

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FOCUS

Three years ago, I broke one of my many non-negotiable rules and actually volunteered to take on the responsibility of the JOIDES Office. Now, with nine days left as PCOM chairman, it might be a good time to reflect on the past two years.

We took over the responsibility of coordinating JOIDES at a time of transition in the planning process. There were clear signals that it was time to move to a thematically-planned program, rather than one centered around ocean regions. In addition, COSOD II was scheduled to examine the future scientific goals of ocean drilling.

Philosophically, the OSU JOIDES Office agreed with this view and strongly felt that the panel structure should reflect a more focused mode of planning. Revised Terms of Reference, including mandates for the new panels and detailed planning groups, were drafted and appear in this issue of the JOIDES Journal. This new panel structure will take effect on 1 January 1989. We hope that all the hard thinking by the JOIDES subcommittee, PCOM and EXCOM to revise the panel structure will produce an effective advisory process for the next phase of ocean drilling.

In our term, long-range planning for ODP has been a critical issue. PCOM's mandate was changed to provide a four-year drilling schedule and science plan. Moreover, a ten-year outlook for ODP is required in a document for upcoming NSF review. Details of this long-range planning document also appear in this issue of the Journal. We've also included guidelines on how proponents can respond to ODP's "Request for Proposals" and we hope these proposals will emerge as an exciting drilling schedule in upcoming years.

But more important than the form of the planning structure is the people who make ODP work. I have had the opportunity to learn much from this job (not all of which I ever wanted to learn). There are the proponents, who submit proposals two days before a panel meeting and still want them properly reviewed. There are the panel members, who second-guess PCOM in its attempts at infinite wisdom. And there are the co-chiefs, who always want the engineering test done on the next leg.

Despite these challenges, it has been a great pleasure to work with everyone in the JOIDES community, although I will take the liberty to mention only a few. First, the JOIDES Office Staff. Cherry Moss kept the office in ship-shape while juggling the schedules for all too many meetings. Sharmon Stambaugh helped develop the JOIDES Journal beyond leg reports to make it a tool for long-range planning and sometimes made the FOCUS read in English rather than broken Greek. And finally, Michael Wiedicke: not much to say other than it would have been impossible to have survived this job without him. His now thoroughly-Americanized wit kept it all in perspective.

Important contributors to PCOM's work are its liaisons: Rich Jarrard for the Borehole Research Group, Lou Garrison for ODP/TAMU, first Dick Buffler and then Bruce Malfait for NSF, and Tom Pyle for JOI, Inc. Rich taught me that logging was more than cutting down the trees of Oregon. PCOM may have been tough on Lou's budgets, but TAMU still has the "Best Little Core House in Texas." Our NSF liaisons worked hard to protect the ODP budget in that swamp now known as Washington, DC. Finally, the program has never been in better hands than Tom's, even though he often has a beer in one of them. I thank these liaisons and look forward to continued association with them as colleagues and friends.

JOIDES could not function without the time and effort made by panel chairmen. Unfortunately I seemed to take the tack of one of Oregon's members of the U.S. Senate: If everyone is unhappy, you must be making the right decision, for you surely do not want to show favoritism and make only a few

happy. But I do thank the chairmen for tolerating a paleoceanographer intruding on meetings and discussing such matters as drilling to the mantle or examining collisional tectonics. I did manage to learn much from their discussions.

Finally, I thank PCOM--that group of scientists who compare the "apples and oranges" of marine earth sciences and try to produce a focused drilling program. I will remember particularly the Nikko meeting, where PCOM watchdogs provided thorough reviews of the Western Pacific drilling programs, then backed them up with a firm drilling schedule for FY89. Even some PCOM members were amazed that decisions were made in a timely fashion!

In closing, I feel like I should come up with some profound words to sum up these past two years. Alas, I am not as articulate as some of my predecessors and the only quote that comes to mind is paraphrased from an old gospel spiritual made famous by Dr. Martin Luther King, Jr.: " Free at last, free at last; thank God Almighty, I'm free at last."

Nick Pisias
Planning Committee Member

SCHOOL OF OCEANOGRAPHY
OREGON STATE UNIVERSITY

REQUEST FOR ODP PROPOSALS

The JOIDES RESOLUTION is finishing ODP's campaign in the Indian Ocean with Leg 123, and will soon head for the Western Pacific. In this issue of the Journal, we hope to inform the scientific community of plans following the Pacific program and to encourage submission of new proposals for an exciting post-1991 drilling schedule.

Traditionally, JOIDES has planned drilling based on the logistics of an ocean-by-ocean shiptrack. Knowing this shiptrack, researchers with interest in these regions responded by submiting ODP drilling proposals. The regional panels then defined a coherent drilling prospectus for their regions.

A new direction for ODP is evolving, which will require better coordination of scientific input to JOIDES and better definition of scientific objectives for ODP efforts. Elsewhere in this issue are details of the revised JOIDES advisory structure, with an emphasis on thematic drilling and well-focussed experiments that can be conducted by ocean drilling.

The two COSOD conferences, thematic White Papers and the advances made in understanding interconnected global systems will define priorities for the next decade of ocean drilling. Thus, rather than simply defining where the ship will go, JOIDES is communicating the scientific goals of ODP. And as ODP remains a proposal-driven program, we are requesting proposals from the scientific community which best address those goals. Only in this way is it possible to have science lead the ship rather than the ship lead the science.

The PCOM will decide soon on the drilling priorities for FY92 and FY93. Should the vessel extend its stay in the Central and Eastern Pacific to complete drilling the high priorities there, or are scientifically exciting topics to be covered in the Atlantic Ocean, South Pacific Ocean, or elsewhere?

In order to make an educated decision, **PCOM is encouraging submission of drilling proposals from any ocean**. Based on an evaluation of existing proposals, and on new incoming ones, PCOM will define a schedule that best encompasses the goals of ocean drilling. Crucial periods for making these decisions are the Annual PCOM Meetings in late 1989 and 1990, when the scientific input for upcoming fiscal years is finalized. To have proposals evaluated for discussion at these meetings requires that they be submitted as soon as possible. The following PCOM consensus from the August 1988 PCOM meeting describes the envisioned process:

PCOM Consensus:

In order to move the JOIDES Planning structure into the thematic mode future planning will proceed in the following manner:

1. At the annual PCOM meeting in November, 1989, PCOM will choose a firm schedule for FY91, consisting of drilling in the Pacific.
2. At subsequent annual meetings, schedules will be chosen based upon the thematic values of the proposals which have reached the mature stage by the time. Modifications may be made in order to adapt the schedule to the logistical and technological capabilities of the Ocean Drilling Program.
3. PCOM will actively solicit proposals, responsive to the themes in the White Papers, for drilling in all ocean basins.
4. Thematic panels will reconsider those proposals already submitted for drilling in regions outside the Central and Eastern Pacific area.

The scientific community is encouraged to submit new proposals and to update existing ones in order to take its part in the decision-making process.

JOIDES RESOLUTION OPERATIONS SCHEDULE
Legs 124 - 129

LEG	AREA	DEPARTS		ARRIVE		IN PORT	DAYS AT SEA
		LOCATION	DATE	DESTINATION	DATE		
124	SE Asia Basins	Singapore	11/6/88	Manila	1/4/89	1/4 - 1/8	59
124E	Engineering I	Manila	1/9/89	Guam	2/15/89	2/15 - 2/19	37
125	Bon/Mar	Guam	2/20/89	Tokyo	4/18/89	4/18 - 4/22	57
126	Bon 2	Tokyo	4/23/89	Yokohama	6/19/89	6/19 - 6/23	57
127	Japan Sea I	Yokohama	6/24/89	Hakodate	8/20/89	8/20 - 8/24	57
128	Japan Sea II	Hakodate	8/25/89	?	10/5/89		41
	Dry Dock					10/5 - 10/18	
129	Nankai	?	10/19/89	?	12/18/89	12/18 - 12/22	60

(Rev 8/25/88)

LEG 121: BROKEN RIDGE AND NINETYEAST RIDGE PROGRAM

INTRODUCTION

Leg 121 sailed from Fremantle, Australia on 30 April and ended in Singapore on 28 June, 1988. Co-chiefs were J.Peirce (Petro Canada) and J.Weissel (LDGO), with E.Taylor as ODP/TAMU Staff Scientist. Scientific objectives of the leg were summarized in the June, 1988 JOIDES Journal (Vol. XIV, No. 2). A comprehensive report on preliminary scientific and operational results is available from ODP/TAMU. A summary of the Leg 121 results appears below, including a report on the Navidrill deployment.

ODP Leg 121 drilled a transect of four closely spaced sites (Sites 752-755) across the crest of Broken Ridge, and three widely separated sites (Sites 756-758) on a latitudinal transect along Ninetyeast Ridge (Figure 1). During the 58.9 days of Leg 121 operations, 34.3 days were spent on site and 19.4 days were spent in transit. Part of the underway time included a magnetometer survey east of Ninetyeast Ridge and extending from Site 756 to Site 757, aimed at providing much-needed constraints for tectonic models of that region.

SETTING AND OBJECTIVES

The Kerguelen-Heard Plateau, Broken Ridge and Ninetyeast Ridge (Figure 1) all have tectonic histories derived from the history of the Kerguelen/ Ninetyeast hotspot in context of the evolution of the Indian Ocean. Broken Ridge and the Kerguelen-Heard Plateau are conjugate rifted fragments of an oceanic platform, which likely formed from intraplate volcanism in Early or mid-Cretaceous time. The basement rocks of both features are basaltic, based on recovery to date from limited dredging and ODP Legs 119 and 120 drilling results. The Ninetyeast Ridge is interpreted to be a hotspot trace of mid-Cretaceous to Oligocene age produced when the Kerguelen hotspot was either under the Indian Plate or at the Indian/ Antarctic spreading center.

Drilling Objectives on Broken Ridge

The overall aim for drilling at Broken Ridge was to extract rift-related information from the preserved sedimentary record to help understand how the lithosphere responds to extension. Two major problems concerning lithospheric extension were addressed through drilling at Broken Ridge:

1. What is the role of the sub-lithospheric mantle in initiating lithospheric extension?

2. What is the magnitude of vertical motion of rift flanks during (and after) extension, and what is the implication of such vertical motion for the mechanical strength of extended lithosphere?

Ninetyeast Ridge Drilling Objectives

Drilling at Ninetyeast Ridge was aimed at understanding the origin and tectonic history of the ridge, documenting the northward motion of the Indian Plate and its collision with Asia, and studying the paleoenvironmental history of the eastern Indian Ocean. Major objectives addressed at Ninetyeast Ridge were:

1. To obtain geochemical and petrological data from basement rocks in order to understand the origin of the Ninetyeast Ridge and its relationship to the Kerguelen Plateau.

2. To complete a high-resolution study of the northward motion of India by studying paleomagnetic inclinations of the recovered sedimentary and basement rocks.

3. To establish a south-north transect of sites with high core recovery in the Eastern Indian Ocean, thus providing the appropriate data base for studying spatial and temporal paleontological distributions and paleoclimatological changes.

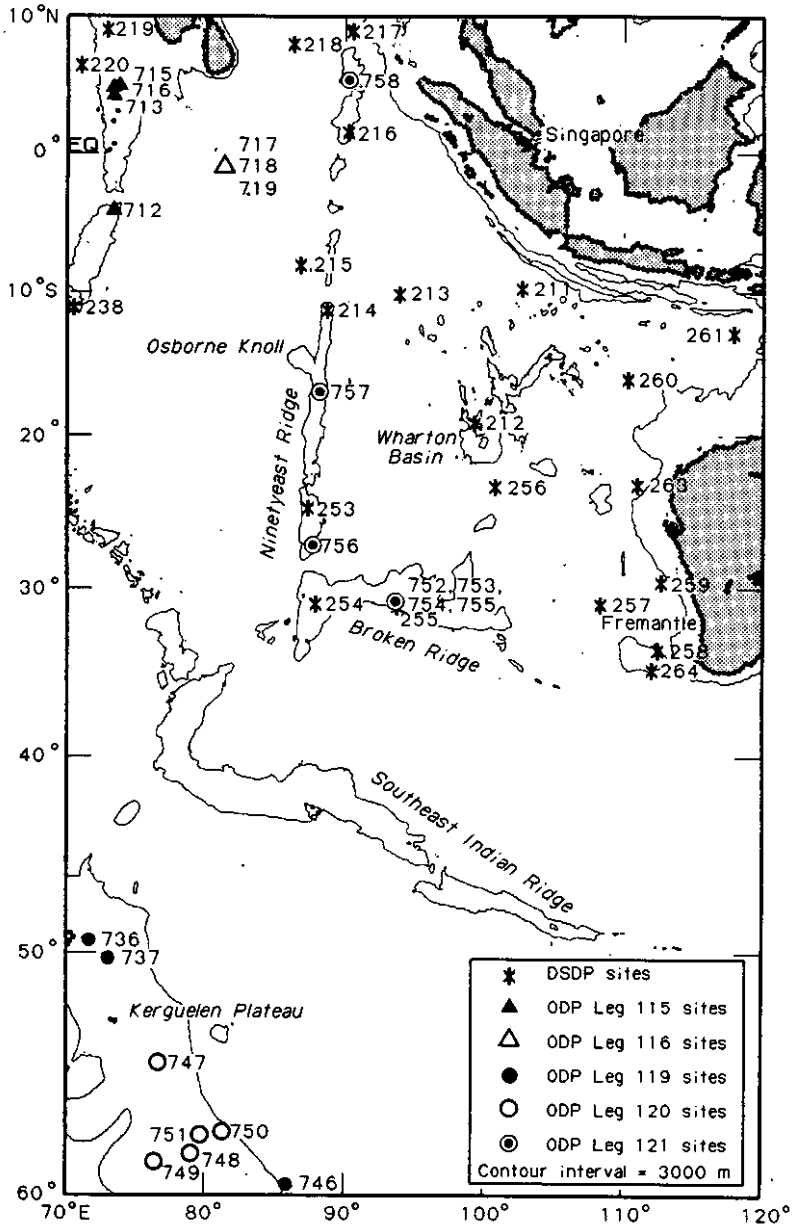

Figure 1. Index map of the Indian Ocean, showing major bathymetric plateaus and ridges, and DSDP/ODP sites.

PRELIMINARY SCIENTIFIC RESULTS

Drilling results from Leg 121 provided the needed sediment and rock to satisfy nearly all the objectives established at the beginning of the cruise.

Studies at Broken Ridge indicate:

1. Rifting at Broken Ridge occurred over a very short time interval, beginning at about 47-50 Ma, and lasting only 3-7.5 my. Furthermore, this rifting event seems to be a result of "passive" mechanisms, or far-field stress, rather than "active" thermal doming. This is implied from increasing water depths prior to rifting, lack of a thermal signal in magnetic overprinting, low heat flow, and the brevity of the rifting event.

2. The Cretaceous/Tertiary (K/T) boundary at Broken Ridge is marked by a loss of typical Cretaceous taxa, and the predominance of hardy opportunistic survivor species over Tertiary forms several meters into the Tertiary section. Lithologically, the Cretaceous chalks are overlain by a thick ash layer representing more than a million-year period following the K/T event, during which time the amount of carbonate production/deposition was 8 times lower than during the Maestrictian or later Paleocene. The longer recovery process for biota following the K/T event may reflect greater ecologic stress on higher latitude forms compared to lower latitude "Tethyan"species.

3. Ash layers recovered from lower Turonian to middle Eocene beds in the dipping and truncated section record 40 my of eruptive volcanic history, probably related to the then nearby Kerguelen/Ninetyeast hotspot. The waning supply of ash throughout that section reflects the decrease in hotspot volcanic activity, or its migration away from Broken Ridge.

Ninetyeast Ridge drilling indicates:

1. Biostratigraphic ages increase from south to north. Those ages, together with the ages predicted by the hotspot model are: Site 756, >38 Ma actual, 48 Ma predicted; Site 757, >58 Ma actual, 58 Ma predicted; Site 758, >80 Ma actual, 80 Ma predicted.

2. Lavas forming Ninetyeast Ridge are moderately evolved tholeiites, with trace-element ratios indicative of a mixing of mid-ocean ridge and Kerguelen Island magmas. Preliminary interpretation is that the ridge formed as newly created Indian Plate material passed over the Kerguelen/Ninetyeast hotspot. Gravity measurements indicate isostatic compensation is local, this being consistent with ridge construction on young, weak oceanic crust.

3. The magnetic anomaly pattern on either side of Ninetyeast Ridge requires asymmetric spreading (or ridge jumps) of the spreading center segment which was at the southern end of the ridge. It appears that this asymmetry may have been related to the position of the hotspot. The position of the Galapagos hotspot near to, but not coincident with, the spreading center may be a good analog.

4. The large volume of basaltic ash recovered on both Ninetyeast and Broken Ridges is an important feature of the Kerguelen/Ninetyeast hotspot relative to other hotspot volcanoes. These ashes formed in shallow marine environments as individual volcanic centers emerged and then subsided again. Apparently the ridge was constructed by discrete volcanic centers which were mostly subaerial (Sites 756, 253, 757, 214, 216). Marginal to these centers were deep-water pillows and sheet flows (Site 758).

5. Sediments obtained along the south-north transect record Campanian to Miocene assemblage transitions from temperate to tropical forms. Paleogene recovery at the northern site was abbreviated due to hiatuses. These fossil assemblages provide material to extend the more detailed tropical zonations to higher latitudes, and to unravel paleoenvironmental changes in the Eastern Indian Ocean.

6. The upper ten cores at Site 758 contain a terrigenous clay component which first appears in the upper Miocene. This section has preserved a superb magnetostratigraphy over the last 7 my as well as a tephrochronology for volcanism in the Indonesian arc. The Toba ash (70 ky) is tentatively identified at 1.5 -1.8 mbsf.

7. Very large differences in chemical gradients were observed at Site 756 in holes only 200 m apart.

8. Several cruise objectives can only be addressed by post-cruise analysis. These include:

- Paleolatitude determinations. No serious attempt was made to determine paleolatitudes due to concerns about the quality of demagnetization which could be achieved on board. Many of the carbonate cores were magnetically unstable in the ship's environment, but it may be possible to recover a stable signal in a magnetically clean laboratory.

- Eolian studies.

- Study of the intensification of the monsoonal climate pattern (Site 758).

- Study of glacial/interglacial climatic variations. Alternating layers of light gray and darker gray material recovered in the upper 25 m of the double HPC cores at Site 758 suggest that there is excellent material to work with.

- Analysis of the BHTV logging at Site 758 to look for breakouts as an indicator of in-situ stress.

ENGINEERING RESULTS

The Navidrill coring (NCB) system was deployed three times with mixed success. It worked very well when drilling in competent rock, but tended to plug up in clayey material. From a scientific perspective, its chief limitation is the excessive time to cut cores, followed by the time needed to ream out the hole in preparation to cut the next core. In its current configuration, the NCB system is suitable for cutting short amounts of hard rock at the end of an XCB hole, or for cutting a pilot hole ahead of the XCB bit for setting instrumentation. Addition of the extendable coring rod system may make the NCB system time effective for moderate penetration (50 m), but the lack of real-time feedback on downhole performance is a serious limitation.

LEG 122: EXMOUTH PLATEAU SITE REPORTS

INTRODUCTION

Northwestern Australia from the Exmouth Plateau to the Scott Plateau forms one of the oldest oceanic margins in the world (155 Ma), with a relatively low sediment influx and a large biogenic component (Figure 1). It is an ideal margin for comprehensive and integrated sedimentologic, biostratigraphic, paleobathymetric, and subsidence studies. Two ODP legs are planned in this area: Leg 122, to drill a transect of sites across the Exmouth Plateau, and Leg 123, to drill one site on the Exmouth Plateau and one on the Argo Abyssal Plain. The Exmouth Plateau-Argo Abyssal Plain transect will allow comparison of tectonic and seismic sequences with Atlantic passive mar-gins, improvement of the accuracy of the Mesozoic geological time scale, and characterization of old ocean crust prior to subduction under the Sunda arc.

Leg 122 departed from Singapore 2 July 1988 and returned to Singapore 28 August 1988. The following site summaries were sent from the JOIDES RESOLUTION by Leg 122 Co-Chiefs Drs. Bilal Haq (NSF) and Ulrich von Rad (Bundesanstalt fur Geowissenschaften und Rohstoffe, FRG). Dr. Suzanne O'Connell was the ODP/TAMU Staff Scientist for Leg 122.

Site Summary, Site 759
Latitude: 16°57.20′ S
Longitude: 115°33.61′ E
Water Depth: 2091.9 m

Drilling at Site 759 (proposed Site EP-10A) off northwestern Australia extended the record of the oldest sediments cored during DSDP/ODP to middle/late Triassic (Ladinian/Carnian, 235-225 Ma).

Site 759 is located in the northeastern part of the Exmouth Plateau and was drilled on the southeastern flank of a small sub-plateau, the Wombat Plateau, which is separated from the Exmouth Plateau proper by a half graben. The site was chosen to sample the older Mesozoic record in order to unravel early rift, drift and subsidence history of this sediment-starved passive margin, and to provide a record of sea-level fluctuations for testing the eustatic cycle chart.

The 308 m cored section consists of an upper 26.7 m of Quaternary foraminifer nannofossil ooze unconformably overlying 4.7 m of lower Miocene nannofossil ooze. This unit is unconformably underlain by a 9.5 m thick foraminifer-quartz sand containing mixed assemblages of Quaternary to early Miocene age. The sand forms a mixed terrigenous/pelagic lag deposit overlying a major Late Triassic unconformity. The sediments below this unconformity can be subdivided into two discrete units representing two large, upward-shallowing cycles. The upper 95.5 m thick unit consists of alternating neritic carbonates and paralic claystones of Carnian age that may represent sea-level variations or moving deltaic lobes over the area. The lower unit is largely devoid of carbonates and consists of a 172 m thick sequence of laminated silty claystones, bioturbated mudstones with mollusks, siltstones, sandstones and coal seams. This unit is of Ladinian to Carnian age and represents a shallowing-upwards cycle.

Spores and pollen proved to be the best source for age dating in the Triassic section. However, coccoliths were encountered in fair numbers in two intervals within the lowermost unit, and sporadically throughout the Triassic section. This provides the oldest record of nannofossil occurrence in the world and detailed study may be significant for biostratigraphic subdivision of this interval.

The hole was logged under excellent hole conditions and will provide a basis for comparison of cycles and sequence stratigraphy with seismic and lithologic records.

Owing to Site 759's location along the flank of the Wombat Plateau, which now appears to be an upthrown block of Triassic age, a major objective was

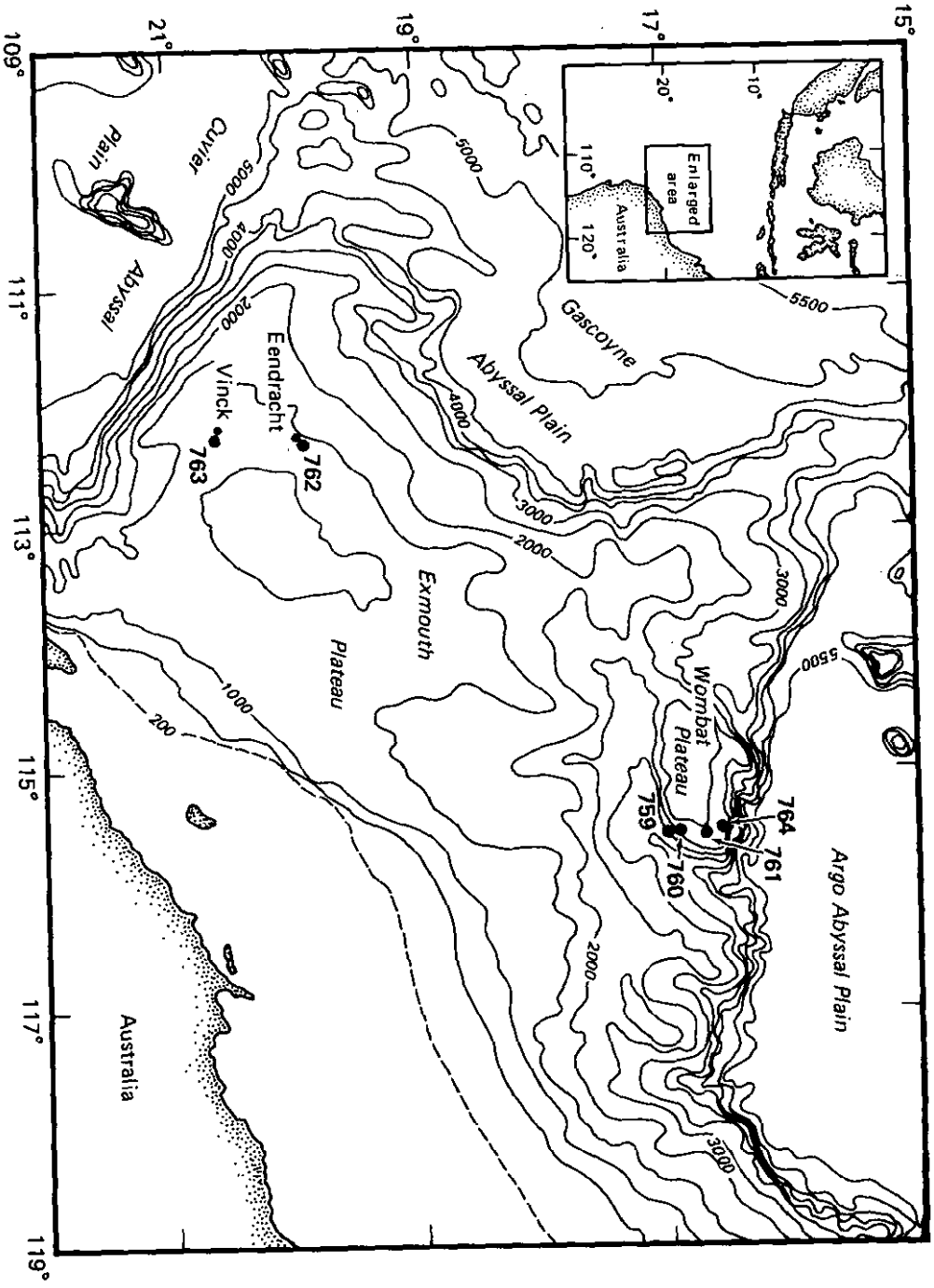

Figure 1. Locations of sites proposed for drilling on ODP Leg 122.

missed at this site--that of recovering the Jurassic-Early Cretaceous stratigraphic record crucial for dating the breakup unconformity and for understanding the early history of this continental margin.

Site Summary, Site 760
Latitude: 16°55.32′ S
Longitude: 115°32.47′ E
Water Depth: 1969.7 m

Site Summary, Site 761
Latitude: 16°44.23′ S
Longitude: 115°32.10′ E
Water Depth: 2167.9 m

Sites 760 and 761 (proposed sites EP-10A′ and EP-9E) along with previously drilled Site 759, form a transect of sites on the Wombat Plateau. The transect was designed to recover a composite section of Paleogene through Triassic age, underlying a veneer of Neogene sediments, with the objectives of deciphering the structural and paleoenvironmental evolution of the Exmouth Plateau, to provide a record of sea level changes for testing the eustatic model, and to refine Mesozoic magneto-biochronostratigraphy.

Site 760

Site 760 is located on the southeastern end of the Wombat Plateau, 5 km upslope north of Site 759. It was drilled to a depth of 506 mbsf and recovered a section ranging from Quaternary to Carnian (Late Triassic).

An upper 21.7 m unit (Unit I) of Quaternary through upper Pliocene nannofossil-foraminifer ooze rests disconformably on a 58.4 m thick unit (Unit II) of upper Eocene to upper Miocene nannofossil ooze with minor clay.

A 40 cm thick manganese crust marks a major unconformity separating Unit II from Unit III, the latter comprising 6 m of Upper Cretaceous to Eocene varigated, massive to laminated silty claystone and sandstone with scattered manganese nodules. Unit III is underlain by two Norian (Upper Triassic) marginal-marine (estuarine to intertidal) to subaerial units of dominantly silty claystone.

The upper 124.4 m thick unit (Unit IV) is interbedded with clayey silt- and sandstones with root-mottling and minor occurrence of coal. In the lower 74 m thick unit (Unit V) the claystone is parallel-laminated to massive or bioturbated, with fining-upward sequences and occasional molluscs and glauconite.

These units are followed by a 179.1 m thick unit (Unit VI) of lower Norian shallow-marine limestone interbedded with silty claystone and mudstone, with sporadic algal mats, rootlets, coal and pyrite, attesting to a carbonate bank to lagoonal origin. Near the Carnian/Norian boundary a rudstone with reworked, rounded, and algal-coated limestone and volcanic fragments may represent the erosion of Carnian shallow-water carbonates and early-rift volcanics during a transgression. The lowermost 42 m drilled through silty claystone with minor sandstone, showing parallel lamination, sideritic nodules, and graded sequences of shallow marine, tidal flat to distributory channel environment of late Carnian age.

Spores and pollen again proved most versatile in dating the marginal-marine sediments of Carnian and Norian age. Triassic nannofossils with calcite replaced by siderite were observed at two levels, including several undescribed forms. A few late Norian foraminifers were observed in Unit VI. Traces of Radiolarians were observed in the Triassic. Due to severe bridging problems, only the upper part of the hole between 80 and 150 mbsf was logged.

Site 761

Site 761 is located approximately 20 km north of Site 760 on the central part of Wombat Plateau. The site was selected because seismic facies suggested a section younger than that at Site 760, most likely Jurassic through Neogene in age.

In the three holes drilled at Site 761, 437 m of Quaternary through Norian sediments were recovered. An upper 177 m of nannofossil foraminiferal ooze of Quaternary through early Paleocene age is separated from upper Maestrichtian nannofossil chalk. Chert horizons were encountered in the lower Eocene. A nearly complete

pelagic Paleocene section and Cretaceous/Tertiary boundary were recovered.

The Upper Cretaceous is represented by 21.8 m of white upper Maestrichtian nannofossil chalk, 38 m of pale brown Turonian to lower Maestrichtian nannofossil chalk with foraminifers and Inoceramid shells, and 20.4 m of yellowish-brown Cenomanian calcisphere nannofossil chalk with ?bentonite layers (derived from volcanic ash?). The Lower Cretaceous section is very condensed and consists of 4.1 m of poorly dated (?Barremian to Albian) yellowish brown to dark brown ferruginous sandstone with abundant belemnites and Inoceramus fragments. Below a major unconformity 77.7 m of white shallow-water limestone of Rhaetian age was recovered, with *Triasina hantkeni* and megalodont shells, apparently a carbonate platform deposit.

These limestones grade downhole into 62.2 m of very dark gray to black marine limestone rhythmically alternating with marlstones, also of Rhaetian age. Below these are 27.6 m of dark laminated calcareous claystone, alternating with crinoidal limestone of early Rhaetian age, possibly a transgressive open-shelf deposit. The base of the Rhaetian chronostratigraphic supersequence was reached after penetrating 9.7 m of Norian black siltstone and claystone with coal, deposited in a paralic (lagoonal, deltaic, or floodplain) environment.

Despite bridging problems Hole 761C was logged with the gamma ray-geochemical combination tool through pipe, and valuable logs were recorded.

Wombat Plateau Stratigraphy

Stratigraphic highlights of the Wombat Plateau transect of Sites 759, 760 and 761 include:

- A 20 my Late Triassic history documented by a composite section of almost 600 m including an important paralic to marginal-marine lower Carnian to Norian section of an early rift environment with the oldest nannoflora yet discovered on- and offshore, and a possibly complete marine Rhaetian section with ostracods, foraminifers, nannofossils, and palynomorphs, which might be unique for the southern hemisphere;
- a condensed hemipelagic mid-Cretaceous section with belemnites;
- a probably complete Cretaceous/Tertiary boundary; and
- a nearly complete Paleocene section which will be valuable for magnetostratigraphy, stable isotopes, and plankton stratigraphy, including radiolarians.

Site Summary, Site 762
Latitude: 19°53.24′ S
Longitude: 112°15.24′ E
Water Depth: 1360 m

Site 762 (proposed Site EP-12P) is located on the western part of the central Exmouth Plateau. In this area a thick Triassic paralic section is unconformably overlain by a thin Upper Jurassic marine succession and Lower Cretaceous prodelta sediments, covered by mid-Cretaceous to Cenozoic pelagic carbonates. This site will provide a unique opportunity to document Cretaceous and Tertiary depositional sequences and cycles of sea-level change in an area with excellent seismic-stratigraphic control. Together with Site EP-7V, to be drilled more proximally to the source of terrigenous influx, this site will furnish data to separate tectonic, sedimentary, and eustatic signals for testing the sequence stratigraphic models.

Site 762 was drilled to a total depth of 940 m and recovered a section ranging in age from Berriasian to Quaternary at an overall recovery rate of 69%. The upper 182 m of foraminifer-nannofossil and nannofossil oozes of late Oligocene through Quaternary age are underlain by nannofossil chalk of early Paleocene to late Oligocene age with numerous intervals of cyclic color bands. The Cretaceous/Tertiary boundary occurs at 554.3 mbsf, within the nannofossil chalk and is marked by a slight color change. The chalky lithofacies continues to 838.5 mbsf, with generally increasing clay content and age ranging from mid-Albian to latest

Maestrichtian. The Cenomanian chalk includes abundant pressure-solution contacts (stylolites). The Cenomanian-Turonian boundary is well represented by an organic-rich interval.

Below 838.5 mbsf a 10-m-thick unit of black shale (equivalent to Muderong Shales on land) of early Aptian age represents a period of anoxia on the plateau in an open-marine setting. The mid-Cretaceous to Paleogene section is essentially complete and in large part well-preserved. The black shale is unconformably underlain by silty claystone and prodelta mudstone of the Barrow Group of early Berriasian to early Valanginian age, which extend to the hole total depth of 940 mbsf. A belemnite-rich horizon below the black shale most likely represents the beginning of a major global transgression of the late Neocomian.

The site yielded an expanded Maestrichtian-Paleocene succession with well-preserved calcareous microflora and fauna, suitable for detailed magneto-biostratigraphic and stable isotopic work. Nannofossils, and to some extent foraminifers, were useful in assigning ages to the pre-Tertiary section. Rich dinoflagellate assemblages were found in the Aptian black shale unit. The hole was logged during three runs to generate seismic-stratigraphic, geochemical, and neutron density suites of logs for detailed correlations and safety considerations regarding the drilling of EP-7V.

Site Summary, Site 763
Latitude: 20°35.19′ S
Longitude: 112°12.52′ E
Water Depth: 1367.5 m

Site 763 (proposed site EP-7V) is located about 84 km south of Site 762 on the western part of central Exmouth Plateau. Because it is a known hydrocarbon area, safety provisions stipulated that the site be located near the industry well site of Vinck 1 (about 2 km southeast). Together with Site 762, Site 763 was designed to provide a transect of sites on the Exmouth Plateau, where Site 762 is located distally and Site 763 more proximally to the terrigenous source of sediments being shed from the southern hinterlands during the Triassic through early Cretaceous. This is demonstrated by the extensiv seismic data in the area which shows thinner Cenozoic, but a considerably thicker Cretaceous section at Site 76 than that cored at Site 762. The majo objectives include the documentation of Cretaceous depositional sequences, dating of the Tertiary hiatuses, and the testing of sequence-stratigraphic and eustatic models.

Site 763 was drilled to a depth of 1036.6 mbsf with a recovery rate of 82%. Cored section ranges from lower Berriasian/Tithonian syn-rift stage prodelta mudstones to eupelagic Quaternary oozes. The upper 141.7 m consist of gray to white Quaternary to lower Miocene foraminifer nannofossil ooze which are unconformably underlain by 105.4 m of white nannofossil chalk of early Miocene to middle Eocene age. A 30-million year hiatus separates the underlying 138.7 m thick upper Campanian to Turonian greenish, bioturbated chalk with microcycles and Inoceramus fragments (Toolonga Calcilutite equivalent). This is followed by 184.3 m of upper Cenomanian to mid-Aptian greenish-gray, calcareous, zeolitic claystones rich in glauconite, belemnites and pyrite (Muderong Shale equivalent).

Below the breakup unconformity of pre-Aptian age, 414.1 m of silty claystones of shelf margin prodelta origin (Barrow Group equivalent) were cored. The upper part consists of 21 m of glauconite- and belemnite-rich silty claystones to sandy siltstones of Valanginian age, underlain by 27.1 m of sandstones with poor recovery. The lowermost unit down to the total depth of 1036.6 m consists of structureless black to dark gray silty claystones to sandy siltstones with pyrite nodules and siderite concretions.

Highlights of this site include:

- Discovery of an unexpected major hiatus between upper Campanian and mid-Eocene sediment, eliminating 340 m of the record of the nearby Site 762 and suggesting major remobilization of sediments by erosive bottom currents (caused by tectonic events?) during that time interval.

- Color cycles in the Campanian to Turonian chalks, based on

carbonate:clay ratios, possibly caused by Milankovich-type cycles of about 20-60 ky duration.

- A well represented Cenomanian/ Turnonian boundary black shale event.

- A possibly complete, 180 m-thick mid-Aptian to upper Cenomanian hemipelagic "juvenile ocean" facies of bioturbated, zeolitic calcareous claystones with minor limestone.

- A slowly deposited early Aptian transgressive series of neritic, glauconite-rich silty claystones with thin-shelled ammonites, overlying the pre-Aptian breakup unconformity.

- A low-sedimentation rate (?condensed) facies of Valanginian glauconitic claystones rich in belemnites and ammonites, probably deposited during a sea level rise.

- A rapidly deposited, >370 m-thick Berriasian sequence of prograding prodelta claystones, deposited during the latest rifting stages prior to the Neocomian onset of sea floor spreading in the adjacent Gascoyne and Cuvier Abyssal Plains.

- Multiple magneto- and biochronostratigraphy (including dinoflagellates) extending down into the lower Berriasian/?Tithonian, forming, together with seismic stratigraphy, an important database for groundtruthing sequence stratigraphic models.

- Significant downhole changes in the source and maturation of organic matter correlating with age and lithology of the various stratigraphic units.

Due to severe bridging problems, especially in the rapidly swelling lower Cretaceous claystones, we could only log the short interval between 690 and 200 mbsf of Site 763 was logged.

Site Summary, Site 764
Latitude: 16°33.96′ S
Longitude: 115°27.43′ E
Water Depth: 2698.6 m

Site 764 (proposed site EP-9F) is located near the northeastern edge of the Wombat Plateau, approximately 34 km north northeast of Site 762. This site together with Sites 759, 760 and 761 provide a complete transect over the plateau covering a wide range of nearshore to offshore, paralic to carbonate bank Mesozoic environments, blanketed by Cenozoic pelagic succession. The site was drilled on the northeastern flank of the plateau where the Cenozoic drape is relatively thin. It was rotary cored to a total depth of 294.5 mbsf.

The Cenozoic pelagic sequence consists of 41.5 m of foraminifer nannofossil ooze of late Eocene to Quaternary age. This unit is unconformably underlain by a thin unit (41.5-49.3 mbsf) of alternating nannofossil and foraminifer nannofossil chalk of late Santonian to late Maestrichtian age. A major unconformity separates the chalk from the underlying late Rhaetian carbonate facies. The upper 9 m (49.3-58.3 mbsf) is a fossiliferous assemblage of wackestone, packstone, and grainstone that were deposited in shallow, oxygenated waters, underlain by a unit of alternating recrystallized limestone and calcareous claystone (58.3-68.7 mbsf) of more restricted, lagoonal to deeper shelf setting. A 207.6 m thick Rhaetian reef complex was drilled between 68.7 and 280.1 mbsf, representing various perireefal environments. The reef complex is underlain by a dark grey, highly bioturbated clayey calcareous mudstone representing quiet restricted (lagoonal) mud flat environment.

Logging could only be attempted through the drill pipe, because the drill-bit could not be released at the bottom of this single-entry hole. A suite of geochemical logs and gamma-ray/neutron porosity/density logs were obtained, which will be invaluable in reconstructing the lithologies in the low recovery units below 80 mbsf.

Sites 761 and 764 have together recovered a nearly complete marine Rhaetian, representing a variety of environments, including a thick unit of reef complex and other reefal carbonates. This expanded marine Rhaetian section is unique in the

southern hemisphere, and represents two well-documented cycles of sea level change corresponding to the global cycle chart. The lower sequence boundary was identified near the Norian-Rhaetian boundary (at Site 761), and the upper sequence boundary within the late Rhaetian (at Site 764).

Site 764 was the last site of an exceptional cruise comprising drilling on a sediment-starved passive continental margin. Leg 122 drilled more than 3500 m of sediments of which 1284 m are of Cretaceous and 1107 m of Triassic age. It recovered the oldest dated marine sediments of deep sea drilling and addressed numerous important related paleoenvironmental, paleoceanographic and tectonic issues.

LEG 124: SE ASIA BASINS PROSPECTUS

The Southeast Asia Basins program initiates the ODP drilling campaign in the Western Pacific. Leg 124 is currently scheduled to set sail from Singapore on 6 November 1988 and end on 4 January 1989 in Manila.

Cruise Co-Chiefs are Dr. Karl Hinz (Bundesanstalt fur Geowissenschaften und Rohstoffe, FRG) and Dr. Eli Silver (UC-Santa Cruz). Dr. Marta von Breymann is the ODP/TAMU Staff Scientist. A complete scientific prospectus for Leg 124 (ODP Scientific Prospectus No.24) is available from ODP/TAMU.

INTRODUCTION

The Sulu, Celebes, and Banda seas are marginal basins with tectonized margins. Their ages of formation are uncertain and each contains a thick sequence of Tertiary and possibly Cretaceous sediments, which should record a history of complex collisional and tectonic events inferred to have occurred during Neogene time. Each basin presently has restricted circulation, evolving from more open-ocean circulation in the past. In each basin, the proposed sites for drilling on Leg 124 have three key objectives:

1. To determine the age and nature of oceanic basement.
2. To determine the stratigraphic history of the basins with implications for both tectonic and paleoceanographic events, such as changes from oxic to anoxic conditions.
3. To determine stress orientations.

SULU SEA

The Sulu Sea is a marginal basin, approximately 600 km long and 400 km wide, located between northern Borneo (Sabah) in the west and the central Philippine Archipelago in the east. A distinct northeast-trending bathymetric high, the Cagayan Ridge, subdivides the Sulu Sea into two sub-basins, the northwest Sulu basin and the southeast Sulu basin (Figure 1). The northwest Sulu basin has water depths ranging from 1000 to 2000 m. The southeast Sulu basin is much deeper, with maximum depths between 4500 m and 5500 m along the Sulu trench located off the Zamboanga Peninsula of Mindanao and Negros Island.

There is a diversity of geophysical and geological data from the Sulu Sea (Murauchi et al., 1973; Mascle and Biscarrat, 1978; Hinz et al., 1986; Hinz and Schluter, 1985; Durbaum and Hinz, 1983). Geological sampling and heat flow measurements have also been collected in the Sulu Sea (Anderson et al., 1978; Kudrass et al., 1985).

The deep southeast Sulu basin is characterized by crustal thicknesses and seismic basement characteristics typical of oceanic crust; a 1-2 second two-way travel time (s twt) thick and seismically-coherent sedimentary sequence overlies oceanic basement. The sedimentary sequence is subdivided by several unconformities that have been interpreted stratigraphically by Hinz et al. (1988). The oceanic crust of the southeast Sulu basin descends eastward at the Sulu Trench. An accretionary wedge lies above the downgoing oceanic crust of the southeast Sulu basin. The thickness of the wedge increases steadily from about 1 s twt at the Sulu Trench to > 4 s twt. In general the toe of the wedge is characterized by thrust sheets forming an imbricate system in front of an inferred oceanic crustal slab that forms the "backstop" against which the wedge accretes. The top of the downgoing oceanic crust forms a major detachment plane.

Sediments recovered by piston coring in the Sulu Trench are finely laminated and variously colored, and are interpreted as turbidites (Kudrass, 1988). Temperatures of +10°C have been measured at the seabed in the Sulu Trench, and high heat-flow values have been determined. High methane concentrations (up to 17,700 ppb) have been encountered in the surface sediments from the toe of the accretionary wedge (Berner, 1988). These findings suggest

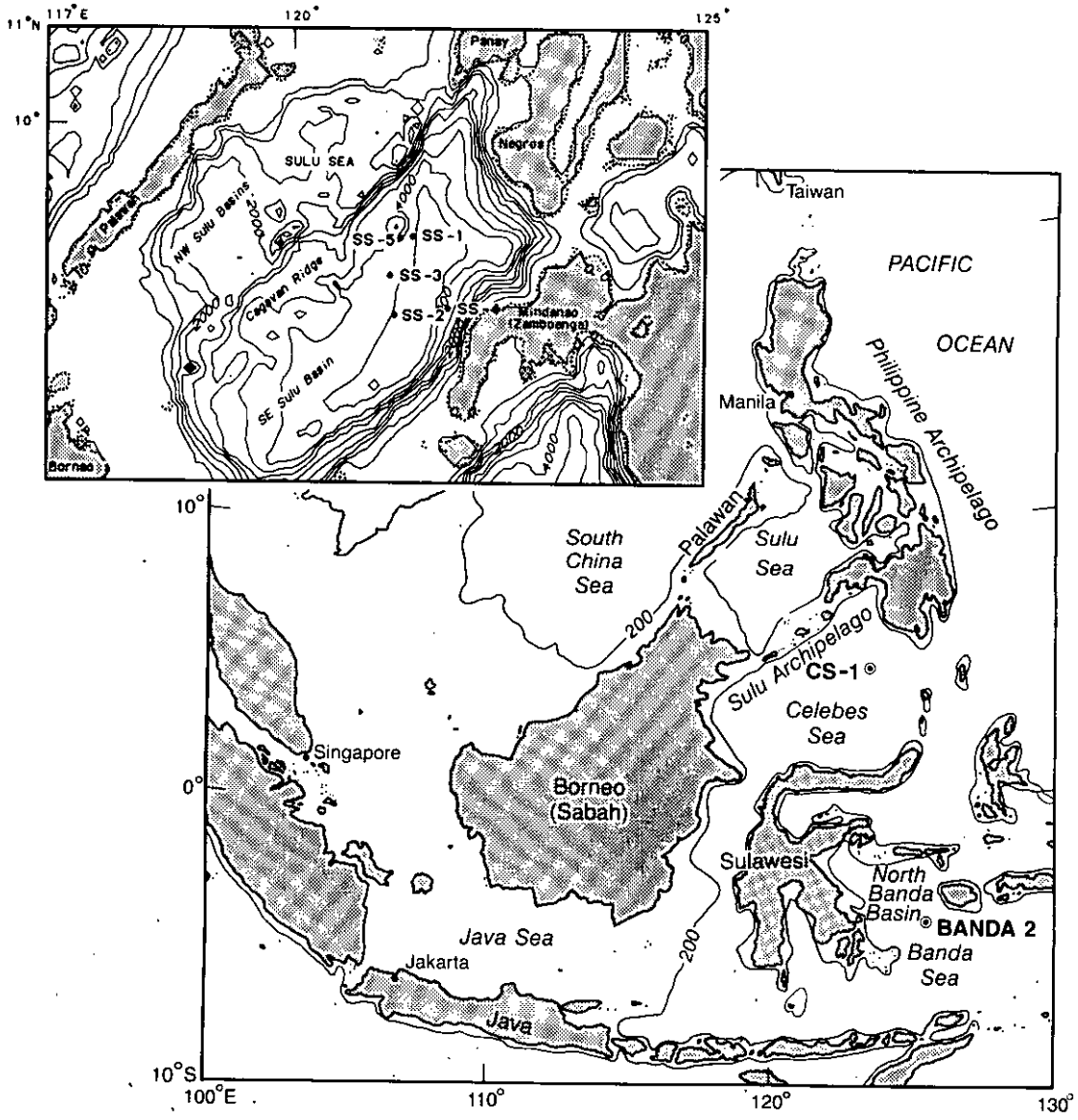

Figure 1. Location map of the Southeast Asia marginal basins showing the sites proposed for drilling on ODP Leg 124. Insert shows proposed site locations in the Sulu Sea (bathymetric contour interval = 500 m)..

that fluids from the accretionary wedge are moving along stratigraphic levels toward the Sulu Trench.

The southeast Sulu basin has been interpreted either as the result of backarc spreading (Mitchell et al., 1986; Holloway, 1981; Hamilton, 1979) or entrapment of a piece of a previously continuous ocean basin from the Banda Sea to the Sulu Sea. Lee and McCabe (1986) interpreted magnetic anomalies in the southeast Sulu basin as seafloor spreading anomalies 17-20 (41-45 Ma). Their interpreted anomaly 20 lies on the Sulu Archipelago. If the hypothesis of Lee and McCabe (1986) is correct, this oceanic crust could have been partly the source of the obducted ophiolite complexes present onshore in Borneo, Palawan, and the Philippine mobile belt.

Alternatively, according to Mitchell et al. (1986), northwestward subduction of the Celebes Sea beneath the Sulu Archipelago initiated in the Paleogene with arc volcanism on the Cagayan Ridge. In the early Oligocene (30-37 Ma), the Sulu Arc migrated southeastward and the southeast Sulu basin opened as a back-arc basin behind the Sulu Arc. The southeast Sulu basin began to subduct eastward in the middle or late Miocene (7-14 Ma). If both this hypothesis and that of McCabe et al. (1982) are valid, coexistence of collision processes and extension with rifting and seafloor spreading in the Sulu Sea would be established.

SE Sulu Basin Drilling Objectives

Five locations for ODP drilling have been proposed in the southeast Sulu basin (SS-1 through SS-5). Three of these five sites are designed to investigate the age and nature of the oceanic crust and the paleoenvironment and sedimentation in a restricted ocean basin. These sites are SS-3, SS-2 (alternate site) and SS-1 (alternate site). The objectives of SS-3 are these:

1. To determine the age of the oldest southeast Sulu basin in order to establish the time of drifting and to test various proposed models for its origin;
2. To establish the stratigraphic and history of the basin, part with respect to whether its environment reflects a basin open, closed, or restricted circulation, and to the timing of major volcanic, collisional, and paleoceanographic events.
3. To determine regional stress orientation in the SE Sulu basin, to discern whether subduction- or collision-related forces predominate

The objective of proposed site SS-4 is to determine the age and nature of a regional slab of inferred oceanic crust forming the "backstop" against which the Sulu accretionary wedge accretes. This crustal slab may very well represent the oldest portion of the actively subducting southeast Sulu basin.

The objective of the proposed site SS-5, located at the southeastern edge of the Cagayan Ridge, is to determine the paleoenvironment of rift and drift sedimentary sequences of the southeast Sulu basin.

CELEBES SEA

The Celebes Sea is a small (270,000 km^2) ocean basin bounded in the north by the Sulu Archipelago and in the south by Sulawesi (Figure 1). It has an abyssal plain of 5,000-5,500 m depth (Mammerickx et al., 1976). Deep bathymetric depressions off the southwest margin of Mindanao and along the northern margin off Sulawesi are trenches of the active Cotabato subduction zone and North Sulawesi subduction zone, respectively.

The volcanic arc (Sulu Arc) extends from Borneo through the Sulu Archipelago to the Zamboanga Peninsula of Mindanao (Exon et al., 1981). The presence of ultramafic and mafic rocks and associated melanges within the Sulu Arc is explained by two subduction episodes, the first related to northward subduction of the Celebes Sea, and the second related to southward subduction of the southeastern Sulu basin (Hamilton, 1979).

The results of three seismic lines collected by Murauchi and

the Celebes Sea is oceanic (Murauchi et al., 1973). Heat-flow values of 1.5-1.6 HFU have been determined, and N65°E trending magnetic anomalies have been recognized in the southwestern part of the Celebes Sea. Weissel (1980) interpreted them as seafloor-spreading anomalies 18-20 (42-47 Ma). In contrast, Lee and McCabe (1986) interpreted these magnetic lineations as Mesozoic anomalies 30-36 (65-72 Ma), and they regard the Celebes Sea as a trapped portion of a previously continuous oceanic basin from the Banda Sea to the Sulu Sea.

The primary scientific questions in the Celebes Sea, namely those of determining the age and nature of the oceanic crust and the paleoenvironment in the restricted basin, can be solved by drilling at the location of proposed site CS-1 (Figure 1). The oceanic crust lies at a depth of approximately 1000 mbsf at this site, and it dips gently towards the east. At the Cotabato Trench, approximately 100 km to the east, the oceanic crust descends beneath an accretionary wedge. Measurements of stress orientation will be made to distinguish whether dominant forces on the Celebes Sea are due to subduction or to edge effects of collision.

BANDA SEA

The Banda Sea is one of a series of marginal basins in the western Pacific region (Figure 1). Many of these basins are thought to have formed by back-arc spreading (Karig, 1971), but other processes are now known to be important as well, such as entrapment (Uyeda and Ben-Avraham, 1972; Cooper et al., 1976) and plate-edge tectonics (Taylor and Karner, 1983).

In their synthesis of the evolution of marginal basins, Taylor and Karner (1983) classified both the age and origin of the Banda Sea as unknown. Recent studies of the Banda Sea, however, have revealed an origin related to slivering of continental margin fragments and trapping of oceanic crustal slices (Silver et al., 1985). This process is significant for two major reasons. First, the kinematic evolution of the Banda Sea will provide a crucial constraint on the development of the complex collision zone of eastern Indonesia, a process that has been compared with the evolution of the ancient cordillera mountain system of western North America. The second reason is that this proposed model --constructional origin of a marginal sea through strike-slip faulting of continental and oceanic crustal fragments-- provides a new modern analog for rock associations in ancient mountain systems, and a system for understanding possible histories of amalgamation of tectonostratigraphic terranes.

The primary objectives for drilling BANDA-2 are:

1. To determine the stratigraphy of the basin, as a record of the complex tectonic and paleogeographic events that have shaped the Banda Sea in Cenozoic time. The sedimentary section over basement will provide significant information on the history of this basin. If the basin is old Indian Ocean crust, then the early part of the section should be similar to that of the eastern Indian Ocean up until (or very near) the time that this segment became trapped behind the arc. The volcaniclastic history of the section should also corroborate this date. In addition, the time of construction of water flow between the Indian and Pacific oceans should be recorded in these sediments.

2. To determine the age and nature of basement underlying the north Banda basin. If it is trapped Indian Ocean crust, correlative with that of the eastern Indian Ocean, then it should be oceanic (MORB) and Cretaceous in age.

3. To determine in-situ regional stress in the Banda Sea. Recent seismologic and marine geophysical studies of the Banda Sea and Sunda Arc have raised significant questions concerning the distribution and orientation of regional stresses associated with the collision between the arc and Australia. McCaffrey (in press) determined numerous focal-mechanism solutions within the Banda Sea and concluded that the collisional deformation is distributed --

the Banda Sea and Sunda Arc system, rather than focused on the zone of initial accretion at the trench. Stress orientation from drilling will be measured by the orientation of borehole breakouts using the downhole televiewer. Stress measurements are expected also from the Argo Abyssal Plain on Leg 123. The combined data set will be the first set of measurements to be carried out systematically in this region, or in any continent-arc collision zone. These measurements will be compared with stress-modeling studies carried out by Cloetingh and Wortel (1985).

LEG 124 OPERATIONS PLAN

There are two scenarios for drilling on Leg 124, subject to whether or not clearance is received from Indonesia to drill BANDA-2. The two options are shown in Tables 1a and 1b. Leg 124 is scheduled to depart Singapore on 6 November 1988 and end in Manila on 4 January 1989.

Proposed site SS-3 in the Sulu Sea is located on line S049-05 at shotpoint 2180. The JOIDES Pollution Prevention and Safety Panel (PPSP) has also approved a location at shotpoint 2250 on the same line as an alternative for drilling at this site. The drilling strategy will be a combination of advanced hydraulic piston coring and extended core barrel (APC/XCB) coring to 540 mbsf, followed by rotary core barrel (RCB) coring for a total penetration of 1350 mbsf (including 50 m of basement). At the conclusion of drilling, standard Schlumberger logs and the borehole televiewer (BHTV) will be run. There is also the option of running vertical seismic profile (VSP) measurements at this site. Proposed sites SS-1 and SS-2 are alternate sites for SS-3.

If clearance is not received from Indonesia to drill at the BANDA-2 site, the ship will drill in the Celebes Sea at proposed site CS-1, before drilling at SS-3. The JOIDES PPSP has approved drilling to basement at CS-1 between the range of shotpoints 100-300 on seismic line S049-02. The most complete section is observed at shotpoint 200, which is presently the preferred location for the site. Penetration to 570 mbsf using APC/XCB coring is anticipated, followed by RCB coring for a total penetration of 1050 mbsf (including 50 m of basement). Standard Schlumberger logging and BHTV runs will follow.

BANDA-2 is located on R/V KANA KEOKI line 23 at 0600Z/8 April 1983. If Indonesian clearance is received, this site will be drilled first. Penetration to 370 mbsf using APC/XCB coring is anticipated. Drilling to basement will then be accomplished using the RCB on a second hole (washed to about 370 mbsf), for a total penetration of 1050 mbsf (including 50 m of basement). This will be followed by standard Schlumberger logging and borehole televiewer (BHTV) runs for stress measurements.

After completing the two deep sites (SS-3 and either CS-1 or BANDA-2), the Co-Chief Scientists will decide on options and strategies for drilling lower priority sites SS-4 and SS-5.

Proposed site SS-5 is located on the Cagayan Ridge, on seismic line S049-07, at shotpoint 624. The main objective of this site is to study Neogene sedimentation and paleoenvironment in a restricted basin. This site was chosen on the assumption that the sedimentary column comprises a pelagic/ hemipelagic sequence representing oxic/anoxic events in the basin. There is, however, the possibility that the sediments are primarily shallow-marine carbonates, which would prevent accomplishing the main objectives at this site. This area will be dredged during an upcoming cruise in July/August. Data gathered during the cruise will clarify the nature of the sediments and the desirability of drilling at this site. In the event of drilling, APC/XCB coring to 400 mbsf is anticipated.

Proposed site SS-4 is located on line S049-05 at shotpoint 4000, which overlies the edge of a buried uplifted crustal slab. The main drilling objective at this site is to determine the age and nature of the slab. There are two possible drilling strategies, the choice of which will depend on the time available: APC/XCB and RCB coring through the entire sedimentary

TABLE 1a
SE ASIA BASINS

Option if clearance from Indonesia for BANDA-2 is not received

Number	Latitude	Longitude	Water Depth (m)	Total Penetration (mbsf)	Priority	Drilling	Logging & BHTV	Total	Cumulative	Comments
						Days				
Singapore to CS-1 (through Balabac Strait) = 5.5 days[a]										
CS-1	04°44'N	123°28'E	4885	1050[b]	1	16.4	3.5	19.9	5.5 25.4	
Transit CS-1 to SS-3 = 1 day[a]										
SS-3	08°25'N	121°11'E	4270	1350[b]	1	20.4	3.5	23.9	26.4 50.3	
SS-1	08°49'N	121°27'E	4615	1300[b]	2	22.1	3.5	25.6	–	Alternate site to SS-3
SS-2	08°00'N	121°14'E	4320	1200[b]	2	18.1	3.5	21.6	–	Alternate site to SS-3
SS-4	08°04'N	121°53'E	3885	1200[b]	2	10-18[c]	2-3[c]	12-21[c]	57.5[d]	
SS-5[e]	08°48'N	121°20'E	3375	400	2	3.4	1.0	4.4		
Sulu Sea to Manila = 1.5 days[a]									59	

a. Transit assumes average speed of 10 kt.
b. Includes 50 m of basalt.
c. Drilling and drilling strategy at SS-4 depend on time available.
d. Option of drilling depends on time available.
e. Originally called Sulu-4.

TABLE 1b
SE ASIA BASINS

Option subject to clearance from Indonesia

Number	Latitude	Longitude	Water Depth (m)	Total Penetration (mbsf)	Priority	Drilling	Logging & BHTV	Total	Cumulative	Comments
						Days				
Singapore to BANDA-2 = 5 days[a]									5	
BANDA-2	04°50'S	125°03'E	4900	1050[b]	1	17.9	2.0	19.9	24.9	
Transit BANDA-2 to SS-3 = 3 days[a]									27.9	
SS-3	08°25'N	121°11'E	4270	1350[b]	1	20.4	3.5	23.9	51.8	
SS-1	08°49'N	121°27'E	4615	1300[b]	2	22.1	3.5	25.6	-	Alternate site to SS-3
SS-2	08°00'N	121°14'E	4320	1200[b]	2	18.1	3.5	21.6	-	Alternate site to SS-3
SS-4	08°04'N	121°53'E	3885	1200[b]	2	10-18[c]	2-3[c]	12-21[c]		
SS-5[e]	08°48'N	121°20'E	3375	≤400	2	3.4	1.0	4.4	57.5[d]	
CS-1	04°44'N	123°28'E	4885	1050[b]	2	16.4	3.5	19.9		
Sulu Sea to Manila = 1.5 days[a]									59	

a. Transit assumes average speed of 10 kt.
b. Includes 50 m of basalt.
c. Drilling strategy in SS-4 depend on time available.
d. Option of drilling depends on time available.
e. Originally called Sulu-4.

section, or single bit, spot coring to basement. In both cases, 50 m of basement will be recovered to fulfill the main objective at this site. Logging strategies will also depend on time available, with the minimum of a two-string Schlumberger suite planned. If drilled, a cross line over SS-4 would be shot to confirm the northward basement slope plan inferred from profiles parallel to line S049-05.

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LEG 124E ENGINEERING PROSPECTUS

In January 1989, the first dedicated ODP engineering development leg will begin operations near the West Mariana Ridge and Mariana Trough. The JOIDES Planning Committee approved a 37-day leg, to precede the drilling campaign in the Pacific, in order to test major engineering and logging developments for ODP. A complete description of operations plans for 124E is available from ODP/TAMU [ODP Engineering Prospectus, No.1, August 1988].

INTRODUCTION

The engineering and technology requirements of the JOIDES community have grown immensely over the past few years. Achievement of previously unattainable scientific goals requires a high level of cooperation between ODP and JOIDES. Key factors in the cooperative effort are: improved communications between development engineers and JOIDES panels; advanced planning (3- to 4-year plans) to better define technical requirements and scientific goals; more thorough shore- and sea-based test programs; and, finally, adequate funding levels for critical development projects and equipment.

The concept of a dedicated engineering leg to conduct the necessary sea-based tests has been discussed for many years, both within ODP and its predecessor, DSDP. The opportunity to utilize the JOIDES RESOLUTION for testing developmental tools and evaluating new operational techniques, is indeed timely. The effects of vessel motion (operational handling and deployment considerations), marine corrosive atmosphere and ambient downhole conditions of temperature and pressure are rarely modeled effectively in a shore-based test. Proper testing at sea is critical to development of any efficient and reliable operational system.

Leg 124E is an important step in improving ODP sea trials. The cruise is scheduled to depart Manila on 9 January 1989 and arrive in Guam on 15 February 1989. The leg will complete a transit across the Philippine Sea and includes sites near locations drilled during DSDP Legs 59 and 60 (Figure 1). A minimum of three sites (ENG-1, ENG-2, and ENG-3) will be drilled (Table 1). If time permits, a fourth site (ENG-4) will be included for an evaluation of the deep-water operating capabilities of the JOIDES RESOLUTION. Each site has been selected to meet the required geologic and oceanographic conditions for the planned engineering and logging tests, while making optimum use of ship time.

ENGINEERING OBJECTIVES

The major engineering objectives of Leg 124E include:

- Shallow-water concept evaluation of the new Diamond Coring System (DCS);
- Continued operational evaluation of the developmental Navi-Drill Core Barrel (NCB);
- Prototype testing of the Pressure Core Sampler (PCS) (Phase I);
- Comparison performance testing, in parallel holes, of the newly redesigned Extended Core Barrel (XCB);
- Performance evaluation of ODP's most advanced coring systems (NCB, new XCB, etc.) in deep-water chert sequences; and
- Testing and evaluation of LDGO/Borehole Research Group (BRG) logging technology.

SCIENTIFIC OBJECTIVES

Although the scientific objectives of Leg 124E are of secondary priority, engineering test results will enhance the success of future ODP science. Drilling at Site ENG-3, in particular, will be in the type of deep-water chert expected at some western and eastern Pacific sites. Staffing for the leg includes shipboard scientists and curatorial personnel.

Where cores are collected at Sites ENG-1, ENG-3, and ENG-4, the nature,

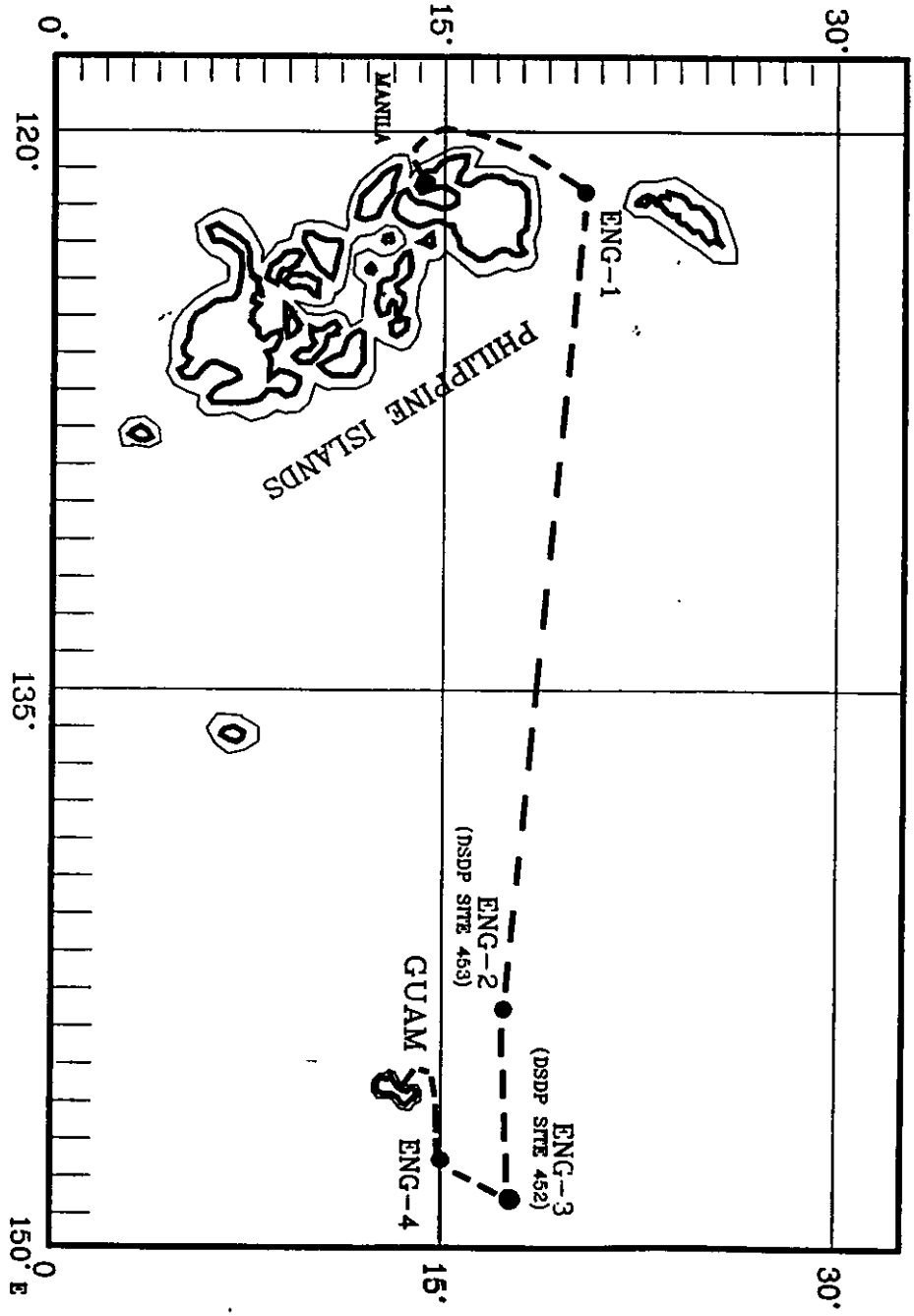


Figure 1. Locations of sites proposed for dilling on ODP Leg 124E.

TABLE 1

LEG 124E ENGINEERING TEST PROGRAM

Site	Location	Water Depth (m)	Drill Depth (m)	Drill Time (days)	Logging Time (days)	Total Time (days)
FIRST PRIORITY SITES						
ENG-1	20°12.20'N/121°38.6'E	1650	350-450	15.3	0	15.5
ENG-2 (DSDP Site 453)	17°54.42'N/143°40.95'E	4703	655	1.5[a]	5.0	6.5
ENG-3 (DSDP Hole 452A)	17°40.17'N/148°37.75'E	5872	---	2.5	0	2.3
SECOND PRIORITY SITE						
ENG-4	15°N/147°30'E	8250	30-50	1.5[b]	0	1.5
Subtotal						25.8
Operational Days						9.2
TOTAL						35.0[c]

[a] Dedicated hole for Lamont/Borehole Research Group test program.

[b] This site is lower in priority and will be drilled only if time remains after all test objectives at Sites ENG 1-3 have been satisfied.

[c] At the August 1988 PCOM meeting, two extra days were added to Leg 124E to fully test chert/chalk drilling configurations at ENG-3. Total leg time is now 35 days.

age, degree of drilling disturbance, and physical properties characteristics of the recovered material will be documented. This drilling will add to the geologic understanding of regions drilled during DSDP Legs 59 and 60. It will also provide valuable information for interpreting the effects of varying coring systems and drilling parameters.

Where logs are collected at Site ENG-2, logging data will serve to augment previous coring results at Site 453 (DSDP Leg 60), where core recovery averaged 39%.

A number of the cores collected over the course of the engineering tests will be dedicated to a geriatric core study. TAMU/ODP curatorial representatives will conduct the study. They will systematically monitor changes in faunal assemblages, chemistry, and physical properties over time, beginning with initial core recovery aboard ship. Repeated subsampling and measurements of the dedicated cores will be conducted after the cores are stored in the ODP repository.

OBJECTIVES OF PROPOSED SITES

Site ENG-1

Site ENG-1, located just north of the Philippine Islands (Figure 1), will be occupied for approximately 15.5 days while testing the Diamond Coring System (DCS), Pressure Core Sampler (PCS), Navi-Drill Core Barrel (NCB), and the latest version of the Extended Core Barrel (XCB).

The first hole drilled at this site ("A" hole) will be an XCB (possible re-entry pilot) hole to basement. After locating and spudding the mud line with the APC system, the new XCB will be used to core through the volcaniclastic material anticipated, to basement. One or two runs with the prototype Pressure Core Sampler (PCS) will be made, depending on formation conditions and tool performance. Upon reaching basement (possibly earlier if conditions warrant), the NCB will be deployed for several cores. The "drill ahead by adding drill rod" method will be evaluated both for technical feasibility and time optimization. The objective is to drill at least 30 m into basement.

Results of the first test hole (Hole "A") will determine if a re-entry cone and 11 3/4-inch surface casing run to basement is necessary for the Diamond Coring System (DCS) test, or whether the DCS can be deployed through a slightly modified bottom-hole assembly (BHA) drilled down to basement.

The DCS test (Hole "B") will consist of continuously coring 100-200 m into indurated rock and/or basement lithologies. The soft overlying sediments and volcaniclastic material will not be cored using this system. The intention is to calculate the usefulness of a high-speed (400-600 rpm), low-bit-weight (4,000-12,000 lb), narrow-kerf diamond coring system through 5 1/2-inch drill pipe to successfully core from a floating vessel. A diagram of this prototype system and drilling platform is shown in Figure 2. Of primary importance is the evaluation of the DCS secondary heave compensation system's ability to control the DCS weight on bit (WOB) to a maximum $\pm$1,000- lb load fluctuation.

A third hole (Hole "C") may be continuously cored at ENG-1 after the DCS test. This hole, a duplicate of Hole A, will allow comparison with the XCB system. Coring a second hole in the same formation will permit varying XCB design options/operational parameters and evaluating the resulting coring system performance. One or two additional runs with the PCS are considered, depending on tool status and formation conditions. The NCB will again be drilled into basement to continue gathering information on operating parameters, refining deployment/handling techniques, and learning more about the interpretation of rig operating data.

Site ENG-2

Site ENG-2 is approximately 1257 nautical miles (nmi) due east of ENG-1 (Figure 1). A total of 1.5 days will be spent drilling a hole dedicated to testing LDGO/BRG developmental logging tools. Five days will then be spent deploying and testing those tools.

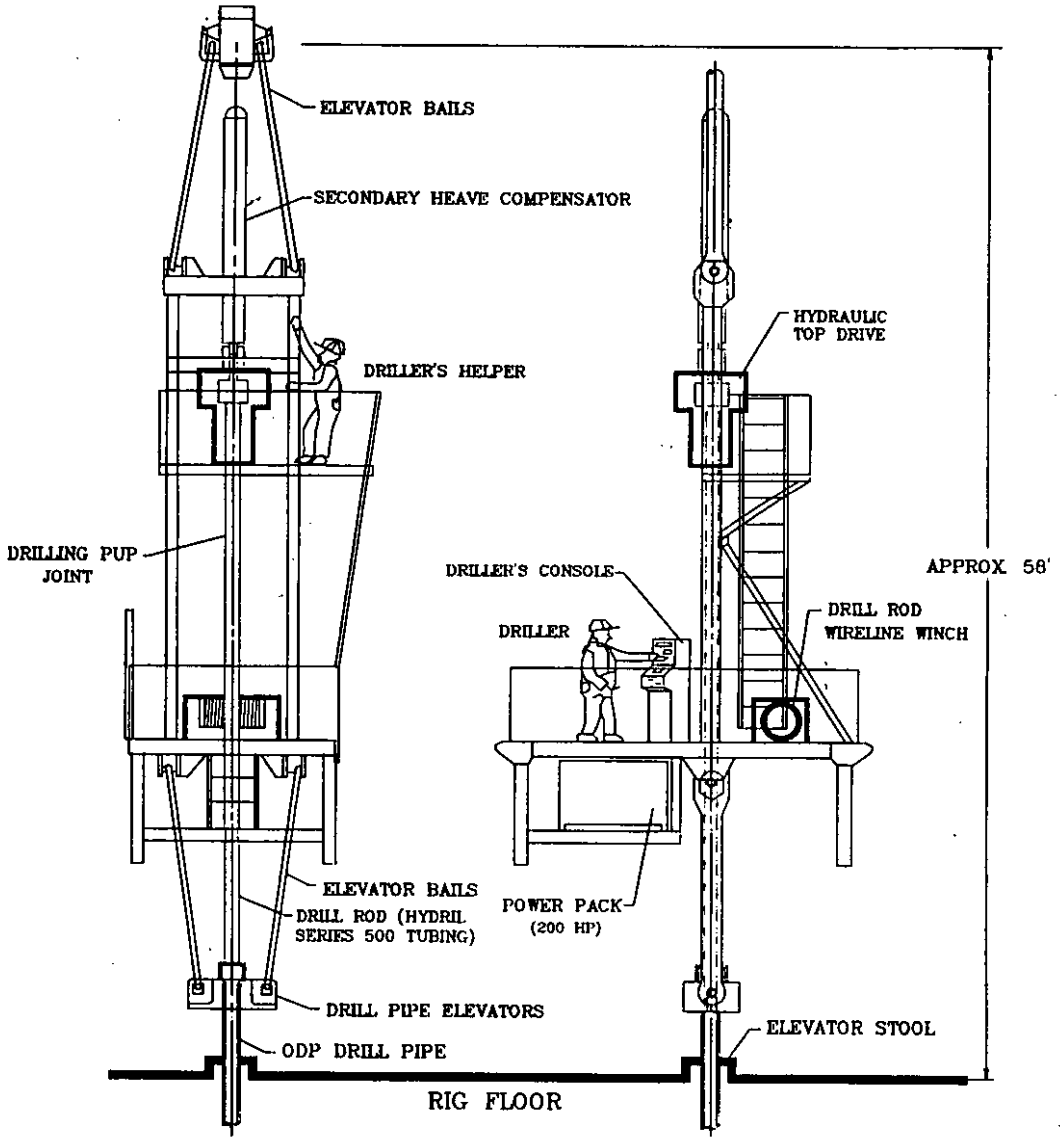


Figure 2. Diamond Coring System platform configuration.

A 9 7/8-inch hole will be drilled approximately 200 m into basement at ENG-2 to evaluate logging tools. There will be no coring operations at this site (previously cored DSDP Site 453). Approximately 450 m of mud, silt, and volcaniclastic material overlies basement at this site (Shipboard Scientific Party, 1981). Total basement penetration of 200 m is planned through metagabbroic breccia, metabasalt, and serpentinite. Heat flow of 2.4 m cal/cm^{2}s at this site should produce a bottom-hole temperature in excess of 50°C.

An evaluation is scheduled also of the Sidewall Entry Sub (SES) as a potential method of cooling downhole logging tools with circulating drill fluid during logging operations in high-temperature environments.

Geochemical logging tool configurations:

Engineering tests planned at Site ENG-2 will begin with several experiments with the geochemical logging tool suites. Future WPAC logging plans require the combination of several very complex nuclear logging measurements into one tool string.

The combination of (1) natural spectral gamma ray, (2) aluminum activation, and (3) gamma ray spectroscopy tools with (4) lithodensity has produced cross-activation problems in two previous deployments (ODP Legs 111 and 116). Experimental configurations of the lithodensity with the seismic stratigraphy, phaser induction, and natural gamma spectroscopy tools will also be tested to see which combination produces the most reliable, accurate, and rapid logging results. A full day of logging is planned with different tool combinations, including first-use of the new Schlumberger, high-temperature lithodensity tool.

Wireline packer tests:

Initial sea-trial testing of the TAM International Wireline Packer will occupy 48 hours at Site ENG-2. Packer and geochemical tests will be conducted simultaneously. This will allow breaking down the tools and evaluating the packer's performance to proceed on deck while the geochemical tool is downhole, and vice-versa. Recovering fluid samples from basement, hard lithified sediment, and soft unconsolidated sediment will also be attempted.

Wireline heave compensation tests:

Testing of the Wireline Heave Compensator (WHC) will be conducted by first logging with the WHC on, then off. When seas are calm, the WHC has been shown to produce "artificial ship heave" by overcompensating for vertical acceleration of the ship. Twelve hours of experimentation with various driving functions of the WHC will be conducted with accelerometers.

Sidewall entry sub hot hole evaluation:

The Sidewall Entry Sub (SES) will be added to the drill string and the Auxiliary Measurement Sonde (AMS) lowered into open hole beneath the pipe to monitor temperature. The drill pipe and logging cable will then be pulled at the same speed while pumping at various circulation rates. Changes in temperature of the logging tool will be measured and compared against predictions from theoretical studies of the cooling effect of such a circulate-while-logging technique. The effect of halted circulation during pipe trips, while joints are disconnected, will also be observed. Methods of streamlining assembly and disassembly of the SES will also be investigated during these tests.

Borehole televiewer/magnetometer tool:

The Borehole Televiewer/Susceptibility /Magnetometer/Gyro tool combination will be tested at Site ENG-2, pending availability of those tools and if all other borehole tests have been completed.

Site ENG-3

Site ENG-3 lies northeast of Guam near the location of DSDP Site 452, (Figure 1). Difficult drilling conditions at this site, deep-water chert with very limited (20-50 m) sediment cover, prevented achieving DSDP science objectives. Approximately 2.3 days will be spent attempting to core at this site. The XCB (if sufficient

sediment cover is found) and/or NCB holes drilled at this site will attempt to recover samples of this deep-water chert accumulation. Several holes will be spudded at the site.

Site ENG-4

Site ENG-4 lies south of ENG-3, in the general direction of the island of Guam (Figure 1). This site is located within the Mariana Trench, and will be drilled only if time remains after completing the objectives at the higher priority sites. It is anticipated that several shallow holes, with either the APC/XCB or RCB coring system, will be attempted.

The primary objective is to confirm capability and readiness of the JOIDES RESOLUTION to perform routine coring operations in deep (8250+ m) water. Of primary interest is functioning of the vessel's hoisting equipment (i.e., draw works and coring winch) and dynamic positioning system (i.e., deep-water beacon performance). A drill-pipe bending stress test, such as that conducted on ODP Leg 117, is also planned to obtain additional bending stress data. Although the ship has been designed for operations in over 9150 m (30,000 ft) of water, the longest ODP drill string deployed to date has been less than 5500 m (18,000 ft). With test operations conducted at ENG-4, ODP plans to confirm a deep-water capability before such a leg is planned into the science schedule.

WIRELINE SERVICES CONTRACTOR REPORT

The Leg 120 report below was prepared by Elizabeth Pratson, Lamont logging representative on Leg 120. Craig Wilkinson, Lamont logging representative on Leg 121, prepared the Leg 121 report. Site summaries from Leg 120 appeared in Vol.XIV, No.2 of the JOIDES Journal, and a summary of leg 121 results appears in this issue on p.5. For further information, contact the Borehole Research Group, Lamont-Doherty Geological Observatory, Palisades, NY 10964.

LEG 120: KERGUELEN STRATIGRAPHY REFINED BY LOGGING

Leg 120 completed the transect of drill sites initiated on Leg 119 between Kerguelen Island and Prydz Bay, Antarctica. Logging objectives of the transect were to collect a continuous record of the physical properties and construct a stratigraphic section of the Kerguelen Plateau, one of the world's largest submarine plateaus.

The logging schedule developed at the pre-cruise meeting called for three logging runs at four drill sites. However, due to a combination of bad weather and time constraints, only two sites (747C and 750A) were logged, each with a single run. The logging run at each site consisted of multi-channel sonic, induction resistivity, natural gamma ray and caliper log.

Logs proved very useful in refining stratigraphic boundaries and aiding in the lithologic interpretations on Leg 120. Rough weather conditions significantly affected core recovery, due to constant pounding of the drill bit. Gamma ray and resistivity well logs were able to piece together the core data, providing a more complete stratigraphic section. The sonic log was useful in providing preliminary velocity information, and post cruise processing of the sonic waveforms should improve this velocity information with synthetic seismograms. The synthetic seismograms from both Legs 119 and 120 will be used to ground-truth the regional cross sections of the Kerguelen Plateau constructed from reflection profiles collected during the pre-cruise site surveys.

Site 747C

Site 747 is located on the southern portion of the Northern Kerguelen Plateau. The raw logs for Hole 747C are markedly affected by ship movement (4m heave). Several attempts were made to use the wireline heave compensator but ship motion proved to be beyond the working capacity of the compensator. Despite the induced motion of the tool, quality of the gamma ray (NGT) and resistivity (DITE) data was good over the entire section. The sonic log (SDT) was badly affected by tool noise, causing zones of cycle skipping. Preliminary onboard reprocessing improved the quality of this log, allowing a synthetic seismogram to be computed. Further post-cruise reprocessing is in progress.

Due to poor core recovery, the logging data were used to supplement the lithologic information in order to develop a more accurate stratigraphic interpretation. Changes in character in the log response were used to divide the logged interval into four discrete units (Figure 1). Core recovery was good in Units 1 and 3, consisting of fairly homogeneous sections of calcareous ooze and chalk, respectively.

Lithologic interpretation from cores proved more useful in Units 2 and 4 where core recovery decreased greatly. Unit 2 is interpreted as a volcaniclastic unit of varying thickness. Site 747-A was drilled through Log Unit 2, to the top of Log Unit 3. Roughly 85% of the core was recovered in this interval and lithology was described as a fairly consistent calcareous ooze. Site 747-C was washed down to the middle of Log Unit 1, then rotary cored. Core recovery in Log Unit 2 of this hole was less than 10%, consisting of volcaniclastic sands mixed with calcareous ooze found in the core catcher.

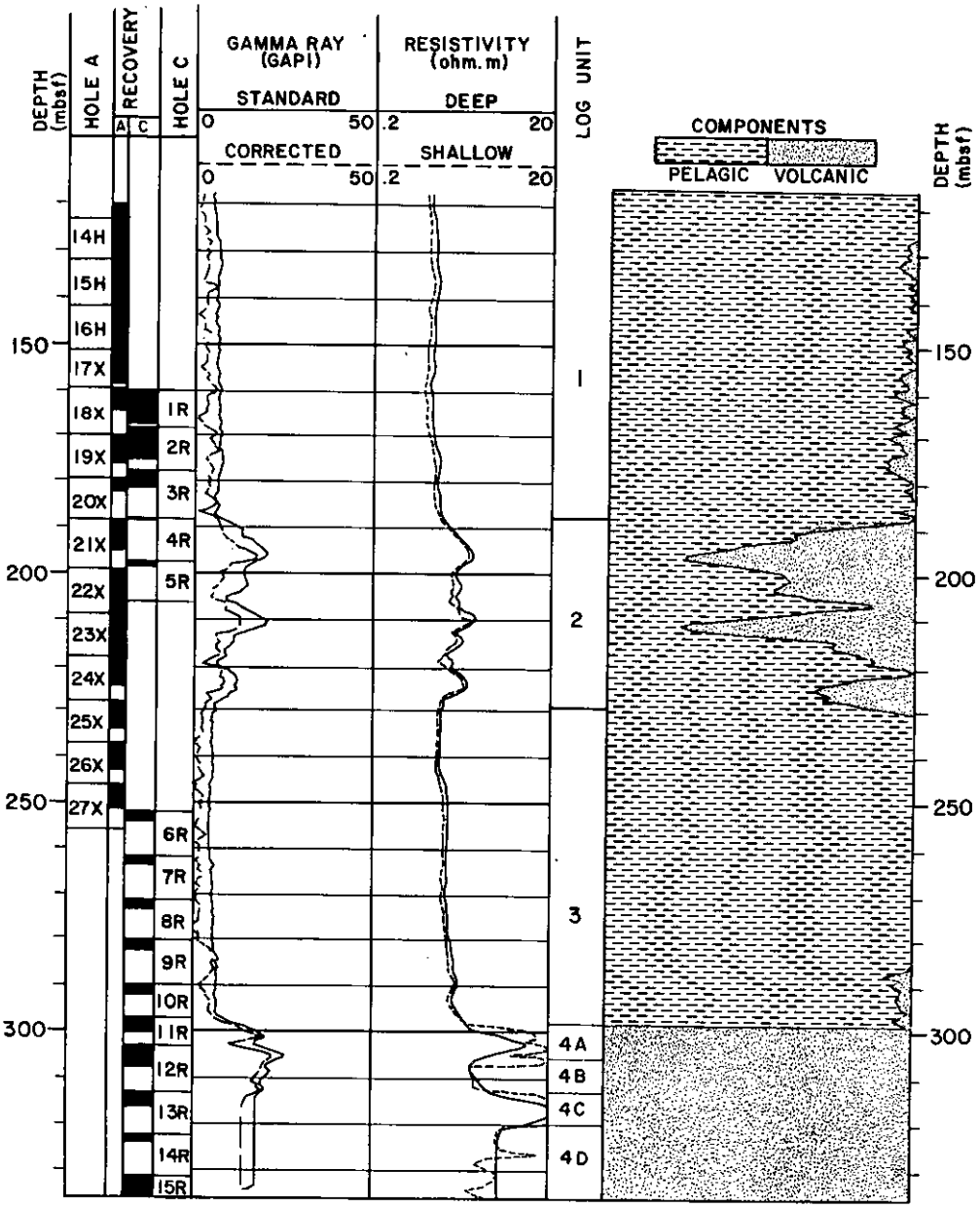


Figure 1. Selected logs from Hole 747C, Leg 120. Both gamma ray and resisitivity logs proved useful in determining ligholotic units and a simplified lithologic column. Unit 2 consists of at least three stringers of volcaniclastic sands not recovered in the core.

At this point it was unclear if the volcaniclastic sands were in place or if they were cavings from above. Subsequent logging through this interval revealed a 44 meter unit of volcaniclastic sands mixed in with the calcareous ooze. The gamma ray and resistivity log responses of this unit suggest that multiple pulses (at least 3) of volcaniclastic debris were locally dumped into the area. This unit shows up on the synthetic seismogram as a strong reflector which can be traced locally on the seismic section. By tying the sparse core recovery with the well-logs and seismic section, this unit is interpreted as a localized debris unit with a source to the east.

In the basement section, Log Unit 5, core recovery was roughly 42%. The gamma ray and particularly the resistivity curves were useful in defining depth intervals of the cores. Marked fluctuations on the resistivity log ar thought to correlate with alternating layers of basalt flows and highly altered, possibly subaerially exposed, basalt units as seen in core.

Site 750-A

Hole 750A was drilled on the Southern Kerguelen Plateau in the Ragatt Basin. The caliper log shows that the hole exhibits frequent washout zones, particularly over the upper section of the hole where the formation is less competent. Both gamma ray and resistivity logs recovered in this well are good quality and relatively unaffected by rough seas and hole conditions. However, raw sonic curves are of poorer quality, as they were badly affected by ship motion and washout zones. Again, preliminary shipboard reprocessing enhanced data quality; more sophisticated post-cruise reprocessing of the waveforms is needed to get reliable velocity data.

Based on the cores, the logged section consisted of a relatively homogeneous calcareous ooze/chalk. The resistivity curves proved most useful in this well in defining three log-based lithologic units. Unit 1 is an unconsolidated calcareous ooze. The log response of this unit is characterized by a shallow focused resistivity (SFLU) reading less than the deep (ILD) and medium (ILM), typical in unconsolidated sediments. Log Unit 2 is recognized by a slight increase in resistivity and by agreement of the resistivity logs. Log Unit 3 exhibits a progressive separation of all three resistivity curves, showing a classic example of invasion by mud filtrate into the formation.

A fresh-water based mud was used to condition the hole. The low salinity freshwater mud (5,000 ppm NaCl) displaces the higher salinity formation water (36,000 ppm NaCl) from around the wellbore, creating an invaded zone around the wellbore. Because the depth of investigation for the shallow focused resistivity is much less than for the medium and lesser still than the deep focused resistivities, a contrast occurs in profiles between the three resistivity curves.

The Cretaceous/Tertiary (K/T) boundary is picked from cores at a depth of 359.5 mbsf. This depth coincides with the top of the invaded zone seen on the resistivity curves. Core recovery across the K/T boundary showed an impermeable clay layer just above the contact. An overlying impermeable zone could explain the log invasion profile that is restricted to below the K/T boundary.

LEG 121: CRETACEOUS/TERTIARY BOUNDARY RECOVERED AND LOGGED

Objectives and Logging Operations

The main objectives of drilling at Broken Ridge were to determine the timing of the uplift of Broken Ridge (and the initiation of seafloor spreading) by studying the spatial relationships between pre-rift and syn-rift sediments. This was accomplished by a number of shallow holes through the dipping sequence which would be unified using seismic profiles and synthetic seismograms from logging.

The main objectives of Ninetyeast Ridge drilling were to investigate the relationship between the Kerguelen hotspot and Ninetyeast Ridge geochemistry, to make a north-south transect for paleoclimate and paleontology studies

detailed motion curve for the Indian plate to help understand Himalayan tectonic mechanisms.

Logging goals were achieved at Sites 752 and 754 on Broken Ridge and at Site 758 at the northern site of Ninetyeast Ridge by providing continuous measurements of formation properties and depth-time ties using synthetic seismograms to relate core data to regional seismic surveys. Time required for these logging opertions was about 1.2 days for each Broken Ridge site and almost 2 days for logging at the Ninetyeast site.

Broken Ridge Sites

Site 752. Site 752 penetrated 435 m of Pleistocene through upper Maestrichtian age sediments composed of foraminifer and nannofossil oozes and nannofossil calcareous chalks with silica-rich sections. Some ash, porcellanite, and chert layers were found as well. The logs obtained are of good quality and include natural gamma, resistivity, sonic velocity, neutron porosity, bulk density, and geochemical logs, recovered over much of the section.

The depth of the Cretaceous/Tertiary (K/T) boundary zone, located at 358.17-358.77 mbsf by core inspection is estimated at 357.0-358.5 mbsf based on logs (Figure 2). This discrepancy is not surprising in view of the 52% core recovery in this interval. In this case, the continuous nature of the logs provides a direct means of locating the boundary zone in relation to its surroundings with certainty. The ash layers above the K/T boundary are evident by their low resistivities, low velocities, and high gamma response. This high gamma response is due primarily to potassium (K), as uranium (U) and thorium (Th) show little increase in this interval. A thin limestone bed between the thinner (2m), upper ash layer at 353 mbsf and the thicker (4.5m), lower ash layer, is indicated by an increase in resistivity and velocity. Below the K/T boundary zone lies the chalk, chert, and porcellanite in the uppermost upper Cretaceous sediment.

The estimated width of the K/T boundary zone is 1.5 m (357.0-358.5 mbsf) based on the logs. This boundary is overlain by a distinctive interval composed primarily of ash from 357.0-351.0 mbsf. The relative abundance of ash in this interval is apparent both from logging and from core descriptions, and attests to the time interval during which the calcareous biota recovered from environmental stress during the K/T "event".

Site 754. Logs of good quality in open hole were obtained at Site 754 from 170-320 mbsf in Pleistocene to Campanian(?)- Maestrichtian foraminifer and nannofossil ooze, nannofossil ooze, calcareous chalk, limestone, and chert. The data include sonic, resistivity, natural gamma, neutron, and geochemical logs.

Logs indicate a low velocity zone from 227-260 mbsf with a relatively high gamma response. This interval corresponds to a limestone with an ash content of 10-25%. The presence of this low velocity zone is important to the seismic stratigraphy interpretation, which is based in part on the synthetic seismogram generated from the logging data. Resistivity, silicon abundance, and rapid porosity changes indicate the location of the chert stringers recovered below 300 mbsf. The continuous nature of logging makes it possible to determine the correct positioning for these chert layers in this interval where core recovery averages 25%.

Ninetyeast Ridge Site

Logging at Site 758 was accomplished over about 60% of the available 675 m section, including nannofossil ooze and calcareous nannofossil chalk, and basalts (borehole televiewer logs only). Data quality is good throughout the interval and includes natural gamma, resistivity, sonic, and geochemical logs.

The borehole televiewer (BHTV) accomplished two up-logs in the basalts, covering the interval 525-610 mbsf. Data quality is good but there were no conclusive indications of wellbore breakouts or fractures in the photographic records. Post-cruise digitizing and filtering of the video record is underway.

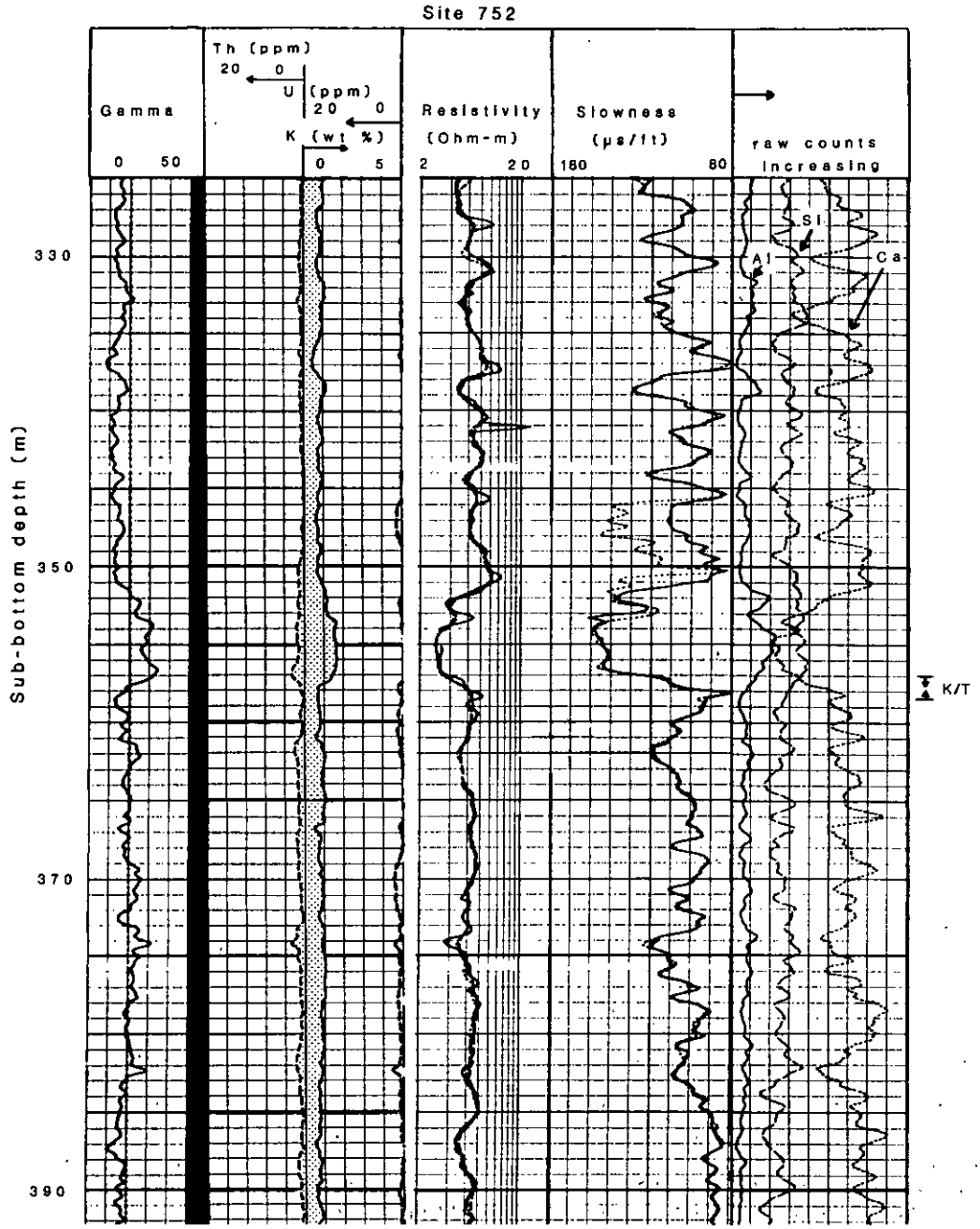


Figure 2. Plot of natural gamma radiation (API), Th (ppm), K (weight percent), U (ppm), electrical resistivity (Ohm-m), sonic slowness (microseconds/foot), adn raw counts (relative measure only) of Al, Si and Ca. Interval shown in Site 752, Hole B, 320-390 mbsf.

Logging sonic velocities for Site 758 agree with velocities used in the seismic stratigraphic model to get TWT (two-way time) to match the cored recovery. Due to rapidly deteriorating hole conditions, much of the logging planned for this site could not be carried out.

High porosity values and decreasing clay content downward from 50 mbsf to 122 mbsf in the nannofossil ooze are evident on the gamma, Th, and K logs, and show the effects of changes in terrigenous input connected with Himalayan uplift. A sharp increase in sonic velocity, porosity, resistivity, and gamma values, and an increase in Th/U and Th/K ratios, marks the Eocene hiatus and a change from bulk densities averaging 1.7 gm/cm^3 above 250 mbsf to bulk densities averaging 1.9 gm/cm^3 below 260 mbsf. The location of chert and volcanic clays, where core recovery is low, is possible from the logging data.

Conclusion

Geophysical well logging on Leg 121 confirmed the lithostratigraphic boundaries and delineation of the properties of strata in poorly recovered intervals. A full set of geochemical logs was recovered across the K/T boundary zone, and a low velocity zone (Site 754) was detected which significantly affects the seismic stratigraphic interpretation. An excellent time-depth tie was also provided by the generation of synthetic seismograms.

PLANNING COMMITTEE REPORT

The Planning Committee met 23-25 August 1988 at the Department of Earth Sciences, Oxford University, U.K. Long-range planning for ODP and the revised JOIDES panel structure were the focus of the discussions. Highlights of the Oxford meeting appear below. At PCOM's next meeting (28 November-2 December 1988 in Miami), a drilling schedule for FY90 will be finalized.

JOIDES ADVISORY STRUCTURE

A JOIDES subcommittee proposed revisions to the JOIDES science advisory structure at the Nov-Dec 1987 PCOM meeting (see JOIDES Journal, Vol.XIV, No.2 for details). PCOM endorsed these suggestions, which included formation of a new thematic panel for sediment processes and diagenesis, replacing regional panels with Detailed Planning Groups, and adding a Shipboard Measurements Panel. At its May meeting EXCOM approved the new panel structure and asked for revised Terms of Reference for the advisory structure.

At this meeting, PCOM drafted new Terms of Reference and mandates for the panels and recommended chairmen for them. In drafting the mandates, PCOM addressed operations and reporting of the proposed Detailed Planning Groups (DPGs). The flow of advice from the panels was also tightened up, especially advice from service panels which may have budgetary impact for ODP. Issues which arose during this discussion were:

- Need to maintain balance of expertise and representation on panels.
- The need for having science lead the ship rather than having the ship lead the science.
- Recognition that panel mandates guide but do not restrict panels' science input.

PCOM revisions to the JOIDES Advisory Structure Terms of Reference were reviewed at the September EXCOM meeting. The final Terms of Reference appear on p.47. Key changes and concerns in the final version include:

- Renaming the proposed Ocean Paleoenvironment and Paleobiology Panel to Ocean History Panel (OHP)
- Renaming the proposed Diagenesis and Sediment Process Panel to Sedimentary and Geochemical Processes Panel (SGPP).
- Recognition that the Shipboard Measurements Panel (SMP) should have sufficient membership to cover pertinent disciplines, maintain close liaison with TAMU and other service panels, and meet only when major shipboard instrumentation issues arise.
- Inclusion of a mandate for the Budget Committee (BCOM).
- Updating of PCOM and EXCOM Terms of Reference.

During PCOM's discussions of the panel mandates, the following issues and suggestions also arose:

- The current WPAC and CEPAC panels should operate as DPGs in future planning.
- Creation of the new panels and designation of chairmen are essential to keep on track for the long-range planning document.
- Recognition that non-US members need to consult with their national organizations before final membership recommendations can be made.
- CEPAC should report on its further planning to all thematic panels.

PCOM recommended that the new panel structure take effect 1 January 1989.

LONG-RANGE PLANNING DOCUMENT

In early 1989, a draft ODP long-range planning document, outlining ten years of drilling plans, is required for NSF review (see Vol.XIV, No.2 of the JOIDES Journal for details). This document will also be used in negotiating new Memoranda of Understanding with the ODP member countries and consortia for the post-FY92 program.

At this meeting, PCOM divided into three subgroups to review the long-range planning input from the thematic panels. These groups were to:

1) Discuss the scientific priorities for the long-range plan, considering the input from COSOD I and II, thematic panels and other sources.
2) Develop a strategy for defining the technical/logistical requirements of the program(s).
3) Adapt scientific priorities to several possible levels of effort to achieve these priorities, clearly indicating any trade-offs.

The three subgroup leaders, D.Cowan (for tectonics objectives), J.Malpas (for lithosphere objectives) and G.Brass (for sediment and ocean history objectives) reviewed thematic objectives for long-range drilling. Suggestions for implementing the major drilling priorities were forwarded, including ways to attack problems requiring extensive technology development.

The White Paper of the Lithosphere Panel, which appeared in Vol. XIV, No.2 of the JOIDES Journal, was updated by LITHP and reviewed at this meeting. It included a summary of the panel's thematic objectives, coupled with a phased-in approach (to the year 2000) of how to achieve them. PCOM commended the panel for this approach and recognized the plan as a model for the other thematic panels in expanding their draft White Papers, which were also reviewed at this meeting. [Note: the Tectonics Panel and Sediment & Ocean History Panel White Papers will appear in future issues of the JOIDES Journal.]

After PCOM's discussions of the scientific input to the Long-Range Planning document, the three subgroup leaders agreed to serve, along with N.Pisias, as a drafting committee for the document. A representative from NSF will also join the group for a meeting on 17-18 October 1988 in Corvallis, Oregon, to further define a 10-year science plan for ODP. A first draft of the plan will be available for PCOM review at the Annual Meeting in Miami.

POST-PACIFIC DRILLING PLANS

In a previous motion, PCOM had proposed, for planning purposes, an 18-month drilling campaign in the Central and Eastern Pacific. At this meeting, PCOM reviewed recommendations of the full Central and Eastern Pacific prospectus (see CEPAC planning report below and prospectus abstract in Vol.XIV, No.2 of the JOIDES Journal).

Since a minimum of 15 legs will be required to accomplish the CEPAC program, PCOM began a scheduling process for the program, as well as planning for post-Pacific, thematically-reviewed drilling.

PCOM discussed several options for completing the Pacific phase of drilling, focussing on how to drill mature, thematically-reviewed CEPAC programs, some of which need significant engineering development and preparation, such as conditioning Hole 504B for deepening, setting hardrock guidebases for the Pacific Rise drilling and achieving better recovery in chert/chalk sequences.

PCOM agreed that the science community must have advance notice as to the status of post-Pacific plans in order to have mature proposals for JOIDES review if drilling programs are to be ready as early as FY91.

PCOM forwarded a set of guidelines to the drilling community in order to begin a flow of new and updated proposals for JOIDES review. EXCOM, at its September meeting, further refined these guidelines and passed the following motion which outlines the process for future planning:

" At the November, 1989 Annual PCOM meeting, and at subsequent meetings, PCOM will examine thematically-reviewed proposals in any ocean in order to plan a general direction of the vessel in the period after 1991."

In order to move the JOIDES Planning structure into the thematic mode, future planning will proceed, in practice, in the following manner:

1. At the annual PCOM meeting in November, 1989, PCOM will choose a firm schedule for FY91, consisting of drilling in the Pacific.

2. At subsequent annual meetings, schedules will be chosen based upon thematic values of the proposals

which have reached the mature stage. Modifications may be made in order to adapt the schedule to logistical and technological capabilities of the ODP.

3. PCOM will actively solicit proposals, responsive to themes in the white papers, for drilling in all ocean basins.

4. Thematic panels will reconsider those proposals already submitted for drilling in regions outside of the central and eastern Pacific area.

These instructions will guide the JOIDES advisory structure in planning through the transition phase. Once mature proposals have been received from all oceans, PCOM can proceed with a thematic four-year planning cycle.

CENTRAL & EASTERN PACIFIC PLANNING

At this meeting, PCOM discussed the status of the 14 programs presented in the CEPAC Prospectus. In its discussions, PCOM concentrated only on those aspects of the Prospectus which were ranked by the Thematic Panels. PCOM examined deficiencies identified by CEPAC and other panels and examined the "maturity" of each program.

PCOM watchdogs for CEPAC programs outlined the status of the prospectus programs. Based on PCOM discussions, the following issues were forwarded to the thematic panels, CEPAC and appropriate working groups for further definition.

Flexure of the Lithosphere

This program is considered immature with two major deficiencies:

a) the resolution with which the sediments can be dated to test different models of lithospheric flexure needs to be more precisely defined, and

b) information as to the ability to date sediments collected in the Hawaiian moat must be determined.

TECP is asked to provide CEPAC and PCOM with an evaluation of the models, determine the criteria by which they can be differentiated, and to examine the validity of the model's assumption with respect to the loading history of the lithosphere. Proponents must provide evidence on the nature of the sediments and the degree to which they can potentially be dated. Site selection for this program needs to be evaluated in light of new GLORIA survey data from the region. CEPAC should consider requesting an updated proposal from the proponents.

Chile Triple Junction

This is an immature proposal. PCOM recognizes the importance of examining the collisional processes represented by this region, but the existing proposal does not adequately define the drilling strategy required to address these problems. PCOM asks TECP and CEPAC to contact proponents and encourage the submission of a mature drilling proposal.

Cascadia Accretionary Prism

This is a very highly-ranked theme but at present the proposals are immature. Input from the working group on accretionary prisms is needed.

Old Pacific: M-series Dating and Jurassic Crust

PCOM views the objective of dating anomaly M-18 as that of lowest priority. Significant data is available for dating this anomaly. PCOM accepts the advice of the panels that geochemical reference drilling cannot be adequately covered by Old Pacific Drilling. Given the maturity of proposals for drilling in the Old Pacific, CEPAC is asked to formulate a mature one-leg program with Jurassic Quiet Zone and M-37 drilling as the highest priority.

Sea Level and Subsidence: Atolls and Guyots

This program was not discussed in detail as the PCOM watchdog was absent from the meeting. Based on written input, this program is worthy of a leg but remains immature until site specific information is provided by proponents. Evaluation of recently acquired site survey data may solve this problem. Drilling in this envi-

ronment is likely to be extremely difficult. It is possible that logging could greatly enhance the success of this program if sediment recovery remains low. SOHP is asked to provide input as to the value of this program if recovery can not be greatly improved.

Ontong Java Plateau Depth Transect

This program is recognized as high priority but still remains immature. Given upcoming site survey cruises this deficiency is expected to be corrected and this leg could possibly be inserted in the early part of CEPAC drilling. CEPAC is asked to focus the discussion of Ontong Java drilling to the depth transect. Tectonic objectives have not been highly ranked and upcoming site survey work will not be able to add new insights on tectonic objectives.

Neogene Paleoceanography of the Eastern Equatorial Pacific

This is a nearly mature program. Site survey data is needed for the WEQ-1 and WEQ-2 sites. Logging and drilling time need to be updated as logging time has been overestimated. SOHP is asked to examine the impact on this program if WEQ-1 and WEQ-2 cannot be drilled.

North Pacific Neogene

Sites in the northwest Pacific and central gyre seem to be adequate to address problems in this region. It is not clear that the objectives in the northeast Pacific can be addressed by a single site. SOHP needs to better define the objectives of this drilling program and how they are addressed by the proposed sites.

Bering Sea High Latitude Paleoceanography

This program is not sufficiently supported by the thematic panels and should be removed from the Prospectus.

Shatsky Rise Anoxic Events

PCOM recognizes the importance of understanding the nature and cause of anoxia in the world's oceans during the Cenozoic, however, this program is considered immature. A number of questions arise as to this program's ability to test models of anoxia and to document changes in the oxygen minimum zone. Specifically:

a) the SHAT-1 site may not be in the correct position to determine the paleo-position of the top of the oxygen minimum zone;

b) insufficient site survey data are available to determine the regional context of the proposed sites and whether the correct sections are represented in both sites and;

c) severe technically difficulty is expected in drilling the Shatsky Rise chert/chalk sequences.

SOHP and CEPAC are asked to determine if shallower sites can be found on the Shatsky Rise with sufficient site surveys. Results from Leg 124E will provide important information on the ability to drill in the environments expected on the Shatsky Rise. It is possible that logging could greatly enhance the success of this program if sediment recovery remains low. SOHP is asked to provide input as to the value of this program if recovery can not be greatly improved.

Lower Crust: Penetration of Layer 3

PCOM recognizes the high priority objectives of this program and accepts the outlined 1.5 legs needed to solve the "junk" problem at site 504B, and then to deepen the site. LITHP is asked to provide some input on scientific advantages of twinning 504B rather than diverting the present hole.

East Pacific Rise Bare Rock Drilling

PCOM again recognizes the high priority objectives of this program. A meeting of the EPR Working Group is requested after the completion of engineering Leg 124E. At this meeting, the planning group is also asked to begin site selection for drilling on the EPR and to address the question of what temperatures will be expected during the drilling of this program. It is viewed by PCOM that 400 degree temperatures are an underestimate if deep drilling is to be successful.

Together, 504B and EPR drilling are expected to require on the order of 3.5 legs, excluding engineering developments needed for the mining-coring system.

Hydrothermal Processes at Sedimented Spreading Centers

The extensive drilling times outlined in the Prospectus were not clearly justified. For example, no justifications for triple APC were given. LITHP is asked to examine the input from the sedimented ridge working group and to provide two options:

a) what are the scientific objectives that can be achieved with a single leg program; and
b) what is the optimal two leg program?

Finally, LITHP is asked to comment on sedimented ridge drilling in case bare-rock drilling on the EPR cannot be completed due to technical problems, i.e. sedimented ridges as a backup to EPR.

Early Stages of Hot Spot Volcanism: Loihi

PCOM watchdogs were named for this program and a report is expected for the next PCOM meeting. PCOM notes that in the four-year program plan, funds for additional guide bases for this program are not included in the long-range budget figures. LITHP is asked to define the number of guide bases and bare-rock sites expected prior to the end of FY92. Finally, the success of drilling on Loihi is fully dependent on the ability to drill in very young, fractured, hot rock.

WESTERN PACIFIC PLANNING UPDATE

PCOM reviewed plans for Western Pacific drilling. No significant changes in status were reported for Leg 125 (Bonins-Marianas) or Legs 127 and 128 (Japan Sea I and II).

PCOM determined that the priorities for Leg 124 (SE Asia Basins) will not changed from those previously stated at the last Annual Meeting. These are the three basin sites with basement penetration: Banda (BNDA-2), Celebes Sea (CS-1) and a Sulu Sea site (SS-1, SS-2, or SS-3, all equivalent sites), and a Cagayan Ridge site proposed by SOHP, now numbered SS-5 in the drilling prospectus.

For Leg 126 (Bonins), PCOM asked that WPAC, TECP and LITHP review the BON-1 site and propose an alternate to it as high heat flow (up to 300°) may be encountered. A November safety review for this program is planned.

PCOM reviewed logging plans for the Leg 129 Nankai Trough drilling program. PCOM agreed that a subgroup of the Downhole Measurements Panel should carefully review the logging plans at the 6-7 October 1988 DMP meeting. Twenty days of logging are planned, although some experiments are dependent on technology still under development at this time. An early safety review is planned for November.

FUTURE MEETING SCHEDULE

The Annual PCOM Meeting will be held 28 November through 2 December, 1988 in Miami. The annual Panel Chairman's meeting will precede the PCOM meeting 27 November.

The next international meeting of PCOM will take place on 2-4 May, 1989, with the ESF Consortium hosting in Oslo.

Tentative dates of 22-24 August 1989 were chosen for the following meeting, with University of Washington in Seattle as the likely host.

EXECUTIVE COMMITTEE REPORT

The Executive Committee met on 13-15 September at the British Geological Survey in Edinburgh, U.K. Meeting highlights appear below. See the Bulletin Board for future meetings.

JOIDES ADVISORY STRUCTURE

EXCOM reviewed the revised Terms of Reference and mandates for the JOIDES Advisory Panels and Committees. These had been updated by PCOM at its summer meeting to reflect changes made in the JOIDES advisory structure.

In particular, EXCOM revised the mandate of the Budget Committee, a subcommittee which reports to EXCOM on ODP fiscal matters. EXCOM made minor changes in the way the Site Survey Panel reviews proposals and updated the Terms of Reference for EXCOM itself. The complete Terms of Reference, as approved by EXCOM, appear on p.47. The revised Terms of Reference and new panel structure will take effect 1 January 1989.

LONG-RANGE PLANNING

EXCOM reviewed PCOM recommendations regarding the post-Pacific drilling schedule for ODP. PCOM had forwarded instructions for proposal and program review at its summer meeting in order to begin planning the FY92 and FY93 drilling schedule (see p.39).

Generally, EXCOM favored PCOM's approach, and formulated the following motion to further inform the ocean drilling community of the shiptrack for the JOIDES RESOLUTION:

> At the November 1989 Annual PCOM Meeting, and at subsequent meetings, PCOM will review thematically-reviewed proposals, in any ocean, in order to plan a general direction of the vessel in the period after 1991.

NEW ODP CONSORTIUM

Dr.Christopher Barnes, Canadian EXCOM member, announced Canada's intentions to enter into an ODP membership consortium with Australia. Barnes circulated a draft agreement between the countries, which will be based on a 2:1 Canada/Australia contribution. Plans are for the new consortium to be in effect by 1 October 1988, pending signature of the agreement by the Ministries of the two countries. Dr.Peter Cook, Australian Bureau of Mineral Resources, attended this EXCOM meeting as an observer.

EXCOM responded to the news with a recommendation that the consortium be accepted as a member of JOIDES; the Canadian membership will be superceded when an appropriate Memorandum of Understanding between the consortium and NSF is signed.

USSR MEMBERSHIP

In October 1986, the Soviet Academy of Sciences announced that it was prepared to join ODP, but decisions within the U.S. government precluded any further negotiations for this membership (see JOIDES Journal, Vol. XIII, No.2, p.31 for further details).

At this meeting, EXCOM reaffirmed a previous resolution and recommended that the U.S. government take appropriate steps to secure full membership in ODP for the USSR. In its resolution EXCOM referred to the USSR's long and distinguished record of accomplishments in earth science, and its active and valued partnership in the International Phase of Ocean Drilling.

SUCCESSFUL RE-ENTRY OF DSDP HOLE

Bernard Biju-Duval, French EXCOM member, announced the successful re-entry of DSDP Hole 396B this August using a submersible and the Nadia platform. Five entries were made, including two runs with the Scripps water sampling tool and two runs with the French temperature tool. The hole was clean and excellent results were obtained. A full report on the re-entry operations will be circulated to the ocean drilling community.

A DRILLING STRATEGY FOR SEDIMENTED RIDGE CRESTS EAST PACIFIC RISE WORKING GROUP REPORT

The East Pacific Rise Working Group met July 26-28, 1988 at the Pacific Geoscience Center in Sidney, British Columbia to discuss scientific objectives, drilling strategies, technical requirements and site selection criteria for drilling at sedimented ridge crests. Discussions were guided by scientific objectives outlined in earlier reports (e.g. COSOD I and II, LITHP White Paper), and a review of existing data from sedimented ridge crests of the eastern Pacific. Below is an executive summary of the specific recommendations and drilling strategy for sedimented ridge crests developed by the working group for the upcoming phase of CEPAC drilling.

Scientific Objectives

The working group identified three fundamental problems that can be addressed by drilling at sedimented ridge crests:

* hydrogeology and geochemistry of a sediment-dominated hydrothermal system
* structure and formation of sediment-hosted sulfide bodies
* magmatic and tectonic processes associated with crustal accretion.

Although the working group recognized that hydrothermal and magmatic processes are closely inter-related, it felt the primary focus of drilling at sedimented ridge crests should be hydrothermal problems. Specifically, the working group agreed that the two highest priority drilling objectives at sedimented ridge crests should be:

1. Three-dimensional characterization of the fluid flow within the hydrothermal system, including quantification of chemical fluxes within the high-temperature reaction zone, and
2. Systematic investigation of the styles of sulfide mineralization in a variety of geologic and tectonic settings.

Strategy

Sedimented ridge crests provide a unique opportunity to investigate an active submarine hydrothermal system. Sediments are easily drilled, recharge and discharge zones can be readily identified using conventional heat flow measurements, and the critical high-temperature reaction zone is probably located within a few hundred meters of the basalt-sediment interface making it feasible to reach using conventional drilling technology. In order to characterize the major components of a sediment-dominated hydrothermal system, we propose a suite of six holes. The highest priority is a single basement re-entry hole with the objective of drilling into the high-temperature reaction zone of an active system. This hole, which would be drilled at least 300 m into basement, should be located on crust covered with 200-500 m of sediment in a well-defined high heat flow zone near, but not directly on, an active vent. Complementing this hole would be an array of five shallower holes to define the three-dimensional pattern of fluid flow over a 10 km x 20 km area. These holes would be designed to penetrate to, but not substantially below, basement and would be located on areas of high and low heat flow within both active discharge and recharge zones. At least two of these holes should be outfitted with re-entry cones for potential subsequent deepening into basement.

Extensive logging, fluid sampling and borehole experiment programs are recommended for all six holes, and plans should be made to seal the three re-entry holes for possible later hydrogeological and geochemical experiments.

Sulfide deposits forming along mid-ocean ridges are an important modern analogue of the large, economically important ore deposits found on land. Drilling can sample the internal

structure of these deposits while they are forming, thus providing critical information on their origin that can be obtained in no other way. These deposits, however, vary significantly in size and composition. In order to understand the processes involved, and the nature of this variability, we recommend drilling sulfide deposits in a variety of geologic and tectonic settings. Sites that should be investigated include sediment-hosted deposits forming in areas with and without outcropping extrusives, deposits associated with sill-dominted sedimentary sections, and volcanic-hosted deposits. In most areas, sulfide bodies can be studied by drilling 1-3 shallow, single-bit holes to depths of 200-300 mbsf. Logging and fluid sampling should be carried out in each hole.

Engineering Requirements

Nearly all proposed holes will involve drilling in high temperature conditions up to 400°C. This will require some modifications to existing drilling systems, including high-temperature seals and metal core liners. Substantial improvements are also needed in ODP's high-temperature logging capabilities. The feasibility of using the side-entry sub to run the standard logging suite while maintaining circulation in the hole should be explored. However, even if this is possible, modifications must still be made to a number of other tools including the wireline packer, drillstring packer, sediment pore water sampler, VSP/OSE and OEM instruments, and the GEOPROPS and Kuster samplers in order to use them under high-temperature conditions. PCOM should immediately charge the L-DGO Borehole Research Group with developing and testing these new high-temperature tools since their availability is critical to the success of a drilling program at sedimented ridge crests.

High recovery (>90%) is required when drilling in sulfides where problems may be encountered with alternating hard and soft layers. This will necessitate improved bit and core catcher design. Crustal drilling at sedimented ridge crests may be feasible using conventional roller cone bits and the top-drive system. However, thermo-mechanical failure of the hole due to the large temperature difference between the hot wall rocks and the circulating drilling fluids may require use of the mine coring system now under development.

Improved fluid sampling techniques, especially for basaltic crust, would be desirable. Instrumentation for monitoring temperature, pressure, conductivity, and flow rate during and after drilling is also needed. A means of sealing off a drilled hole for later hydrogeological and geochemical experiments should be developed.

Steam flashing and blow-out safety problems are not expected for the water depths of all potential drilling sites, however specific conditions at proposed sites should be modeled and necessary safety precautions taken.

Site Selection and Survey Requirements

The working group reviewed available data from the three principle targets for sedimented ridge crest drilling in the eastern Pacific: Guaymas Basin in the Gulf of California, Escanaba Trough on the southern Gorda Ridge and Middle Valley on the northern Juan de Fuca Ridge. All three areas have been extensively studied and, in the long term, drilling should be carried out in each area since they are associated with distinctive geological settings and styles of hydrothermal and magmatic activity. However, in the short term, the working group strongly favored a thorough characterization of the hydrogeological system at a single site over a comparison of systems in two or three different areas. For reasons of simplicity, and the level of site documentation, Middle Valley was preferred for the experiment described above to characterize the three-dimensional fluid flow within a sediment-dominated hydrothermal system.

In contrast, a comparative drilling strategy was favored for investigating different styles of sulfide mineralization at sedimented ridge crests. Potential drilling sites were identified in Middle Valley, the NESCA area of Escanaba Trough (one fault-related, one associated with an intrusive volcanic dome), the Guaymas Basin near a large sill complex close to DSDP

Site 477, and in the volcanic-hosted deposits on the Endeavour ridge segment. In Guaymas the highest priority is a single deep re-entry hole through the sill complex into basement; all other holes are relatively shallow (200-300 m), single-bit sedimentary holes.

The level of site documentation in all of these areas is excellent. The most important deficiencies are the need for detailed heat flow measurements in Escanaba Trough comparable to that available in the other areas, and multichannel seismic reflection data in all three areas to resolve basement and sub-basement reflectors, especially the presence or absence of an axial magma chamber.

Drilling Time Requirements

Achieving both major drilling objectives identified by the working group will require two separate drilling legs, one to characterize the hydrogeology and geochemistry of the hydrothermal system, the other to investigate the structure and formation of sediment-hosted sulfide bodies. Both objectives are of the highest thematic priority to ODP, and both should be included as part of the upcoming phase of CEPAC drilling.

The breakdown of drilling time is approximately as follows:

Leg 1 - Hydrogeology Experiment

* 12 days to drill the array of six holes (2 days each), plus 18 days for logging and borehole experiments (3 days each hole)
* 9 days to wash down to basement and set three re-entry cones
* 9 days to extend one hole 300 m into basement, plus an additional 7 days for logging, borehole experiments and sealing of the three re-entry holes

Total time - 55 days

Leg 2 - Sulfide mineralization

* 30 days for drilling and logging 6 single-bit holes in the NESCA area of Escanaba Trough
* 15 days for drilling and logging 3 single-bit holes in Middle Valley, Juan de Fuca Ridge
* 5 days for drilling and logging one hole on Endeavour Ridge
* 10 days for drilling two single-bit holes in Guaymas Basin, plus 7 days for a basement re-entry hole

Total time - 67 days

TERMS OF REFERENCE

JOIDES Executive Committee
for the Ocean Drilling Program (ODP)

1. This committee shall formulate scientific and policy recommendations with respect to the Ocean Drilling Program (ODP). It shall conduct the ODP planning, as well as evaluation and assessment of the Program as to its accomplishments as compared to the goals and objectives which have been established. It may be assigned managerial and operational responsibilities for appropriate tasks.

2. The members of this committee shall be representatives of oceanographic and marine research institutions or other organizations which have a major interest in the study of the sea floor and an adequate capability in terms of scientific manpower and facilities to carry out such studies.

3. The membership of this committee is now comprised of one representative of each of the six non-U.S. countries or consortia with an active Memoranda of Understanding (MOU) with the National Science Foundation (NSF) [Canada, European Science Foundation, France, Federal Republic of Germany, Japan, and the United Kingdom] and one representative of each of the ten JOI U.S. institutions [University of California at San Diego, Columbia University, University of Hawaii, University of Miami, Oregon State University, University of Rhode Island, Texas A&M University, University of Texas at Austin, University of Washington, and Woods Hole Oceanographic Institution]. The appointment of additional members will be determined by the JOI Board of Governors on the recommendation of the JOIDES Executive Committee. In the case of representatives of non-U.S. country participants, the existence of a valid MOU with NSF is a prerequisite to membership.

   Membership of any member may be cancelled by the JOI Board of Governors on the recommendation of the JOIDES Executive Committee or in the event of a non-U.S. country participant ceasing to have a valid MOU in existence.

4. Each institution or organization designated for participation on this committee by the Board of Governors shall provide one voting member, normally the director or senior deputy thereto.

5. The Executive Committee shall reach all its decisions by the affirmative vote of at least two-thirds of all members, including members from at least three non-U.S. members. A quorum shall constitute two-thirds of the Executive Committee. If a member of the Executive Committee is absent from a duly called meeting of the Executive Committee, he or she may designate an alternate with full authority to act for him or her in his or her absence.

6. The Executive Committee may establish subcommittees for cognizance of certain components of the Ocean Drilling Program. Areas of cognizance and the terms of reference for each subcommittee shall be defined by the Executive Committee. In particular a Planning Committee and a Budget Committee shall be established.

7. The Executive Committee, and all subcommittees thereto, shall keep written records of their proceedings.

8. Members of the Executive Committee, and members of subcommittees duly appointed thereby, while acting within the terms of reference, shall be indemnified, and held harmless by JOI, Inc. from and against any and all liabilities, damages and demands, losses, costs and expenses arising from acts or omission related to performance as committee members.

9. These Terms of Reference, upon ratification by members of the existing JOIDES Executive Committee and adoption by JOI, Inc. will supercede all previous JOIDES agreements.

Ratified by EXCOM: 15 September 1988
Adopted by JOI Board of Governors: 15 September 1988

TERMS OF REFERENCE

JOIDES Budget Committee
for the Ocean Drilling Program (ODP)

1. General Purpose. The Budget Committee (BCOM) provides JOIDES overview and first review of the ODP Program Plan and budgets therein.

   The ODP Program Plan is compiled by JOI, Inc., the ODP prime contractor. In it, a one-year Science Plan, developed by PCOM and the JOIDES advisory structure, is presented. Budgets in the Program Plan include those of the Science Operator and Wireline Logging Contractor. The Program Plan also includes a list of scientific and technological development needs, including estimated costs, which have been reviewd by the JOIDES Science Advisory Structure and which are required for successful completion of the Plan.

   The ODP Program Plan (including budgets) is then submitted in draft form to the National Science Foundation (NSF). BCOM meets as occasion demands, according to a program plan and budget timetable, in order to provide continuous guidance in developing the final version of the budget in the program plan. The committee consults with JOI, Inc. and the subcontractors if budget questions or problems arise. BCOM reports to EXCOM at its spring meeting (the joint EXCOM/ODP Council meeting). At that time the full EXCOM approves the final ODP Program Plan and a detailed budget for the upcoming fiscal year. BCOM's written reports are also submitted to PCOM.

2. Mandate. The Budget Committee is to review the ODP Program Plan and budgets therein and evaluate how well the program plan and budget address the priorities which have been defined by EXCOM and PCOM. This review is to be reported to EXCOM and PCOM. BCOM also acts on behalf of EXCOM on budget matters that EXCOM delegates to it.

   BCOM can request that liaisons from the ODP subcontractors, JOI or NSF attend its meetings.

3. Meetings. BCOM meets in accordance with a schedule for developing the ODP Program Plan (Appendix 1). Up to three meetings per fiscal year may be necessary to provide input on the ODP Program Plan and Budget. Meetings may be required in the entire phase of developing the budget and program plan.

4. Membership. BCOM consists of five members: three EXCOM members (2 non-U.S. and 1 U.S.) and two PCOM members, one of whom is the present PCOM Chairman. The second PCOM member is a U.S. member, ideally the immediate past PCOM Chairman. A quorum shall consist of two of the EXCOM members and one of the PCOM members. BCOM members are appointed by EXCOM. EXCOM or PCOM members representing JOIDES institutions with major ODP subcontracts will not be appointed.

Ratified by EXCOM: 15 September 1988
Adopted by JOI Board of Governors: 15 September 1988

JOIDES Budget Committee
for the Ocean Drilling Program

Appendix 1

Time table for developing Budget and Program Plan:

Aug/Sep	EXCOM advice to PCOM
Dec	PCOM plan & advice to JOI/EXCOM
Jan 5	NSF budget to JOI/JOIDES
Feb 2	JOI outline to NSF/JOIDES budget committee (BCOM) If no problems mail to EXCOM, if problems BCOM proposes solution
Feb	EXCOM meeting (if necessary)
April 1	JOI plan for NSF administrative review (includes JOIDES suggestions, if required)
April 7	JOI Revisions
April 15	JOI plan and NSF concerns to JOIDES BCOM, EXCOM and ODP council (Note: This is a draft program plan)
May 10	JOI review with JOIDES BCOM*
May 15	EXCOM/ODP Council meeting: JOI/BCOM give their input to EXCOM, EXCOM gives advice to NSF/JOI, ODP Council is consulted
July 15	NSF final review of revised JOI plan
July 22	JOI final modifications (if necessary)
Aug 1	NSF executes contract, JOI informs EXCOM and ODP Council (justifies changes), JOI informs PCOM
Oct 1	Start of contract year

* Meeting Scheduled only as needed.

TERMS OF REFERENCE

Science Advisory Structure of JOIDES
for the Ocean Drilling Program (ODP)

The purpose of the ODP Science Advisory Structure of JOIDES is to enable the formulation of the most productive scientific plan for the program. JOIDES is open to suggestions and proposals from the entire scientific community, and its plans shall be open to continued review and revision.

1. Science Advisory Structure

The Science Advisory Structure of JOIDES will consist of a Planning Committee, a Technology and Engineering Development Committee, four thematic panels and five service panels. *Ad hoc* Detailed Planning Groups (DPGs) may be approved by the Planning Committee as requested by the panels or by the Planning Committee itself.

2. Committees, Panels, and Detailed Planning Groups

Each committee, panel and detailed planning group will operate under a mandate, along with guidelines as to membership and frequency of meetings. Mandates, guidelines, and amendments to them, for the standing panels, shall be proposed by the Planning Committee for approval by the Executive Committee. Mandates, guidelines and duration of operation for the short-lived Detailed Planning Groups will be specified by PCOM as required.

3. Planning Committee

3.1 General Purpose. The Planning Committee reports to the Executive Committee and advises JOI, Inc., the Science Operator and Wireline Services Operator, of plans designated to optimize the scientific productivity and operational efficiency of the drilling program.

More specifically, the Planning Committee is responsible (a) for long-term planning on the order of 5 to 10 years utilizing input from COSOD-type conferences and thematic panel input; (b) for developing a general science plan and general track of the drilling vessel about four years in advance of drilling; (c) for fostering communications among and between the general community, the panels, the Science Operator, the Wireline Logging Contractor and itself; (d) for soliciting, monitoring, and coordinating the evaluation of drilling proposals; and (e) for maintaining a 12 to 18 month scientific plan and for drafting a scientific drilling program at the Planning Committee Annual Meeting to be incorporated into the Program Plan for the next fiscal year.

3.2 Mandate. The Planning Committee is responsible for the mandates of the various panels and planning groups and their membership. It approves their meetings and agendas and may assign special tasks to them. The Planning Committee sponsors and convenes COSOD-type conferences at intervals determined by long-term science plans for ODP. PCOM, through the JOIDES Office, assigns proposals to thematic panels, DPGs and, if relevant, to service panels, for review. PCOM sets the scientific objectives of the proposals into final priority after they are reviewed by the panels. The Planning Committee nominates chief scientists to the Science Operator, who ultimately chooses them.

PCOM periodically reviews the JOIDES advisory structure in the light of developments in science and technology and recommends amendment of its panel

structure and mandates. Much of the working of the Planning Committee is carried out by the commissioning of reports from the panels, the detailed planning groups, *ad hoc* subcommittees of its own membership, and by its chairman at the JOIDES Office.

3.3 Structure. The Planning Committee is empowered to establish an infrastructure appropriate to the definition and accomplishment of tasks described in its annual program plan as approved by the Executive Committee and the National Science Foundation.

Communication with the panels and active DPGs is maintained by having their chairmen meet with the Committee annually, and by assigning committee members as non-voting liaison members to its panels and working groups. Where counsel and communication are deemed important, other individuals may be asked *ad hoc* to meet with the Committee or a panel.

3.4 Membership. Each member of the Executive Committee shall designate one member of the Planning Committee and an alternate to serve in the absence of the designated member. One quarter of the Planning Committee members shall rotate off the Committee annually, so that its membership is replaced every four years. Reappointment shall be made only in exceptional circumstances.

All appointees to the Planning Committee shall satisfy the fundamental criteria of having the ability and commitment to provide mature and expert scientific direction to the program. Balance of fields of specialization on the Planning Committee shall be maintained as far as possible. The chief scientists of the Science Operator and Wireline Logging Services Contractor, the JOI program director and an appointee of the NSF are non-voting, liaison observers.

3.5 Organization. The planning Committee meets at least three times a year, normally in November, April and August, based on the timetable for producing the ODP Program Plan. Robert's Rules of Order govern its meetings.

3.6 Vote and Quorum. Within the framework of the Memoranda of Understanding with each non-U.S. participating country (or consortium designee), it is intended that the U.S. members shall constitute at all times at least a majority of members. Substantive issues decided by formal vote require the vote of a majority of all members. A quorum shall consist of at least two-thirds of the non-U.S. members and at least two-thirds of the U.S. members.

3.7 Chairmanship. The Chair of PCOM shall rotate with the JOIDES Office among the U.S. JOIDES institutions, excluding the Science Operator and Wireline Logging Services Contractor institutions. The term of office is normally two years.

4. Thematic Panels

4.1 General Purpose. Thematic Panels are mainly, but not exclusively, process orientated. They are established by the Planning Committee to develop scientific drilling objectives based on COSOD-type conferences. The Thematic Panels play an important role in defining the long-term scientific objectives of ocean drilling.

Thematic Panels are composed of a number of members from U.S. institutions and one member from each non-U.S. participant. PCOM approves the panel membership including size and balance of expertise. Panelists will serve three years, with one-third of the panelists being replaced each year. The chairmen are appointed by PCOM. Thematic panels meet at least twice a year, but may meet more frequently as requested by PCOM. PCOM convenes the panel meetings and approves their meeting dates, locations, and agendas. The mandates are guidelines and do not restrict panels. Considerable overlap in thematic

coverage has evolved and is expected to continue to evolve. The Planning Committee may ask Panels to take up topics not in their original mandates.

4.2 Specific Responsibilities. Each thematic panel will be responsible for planning the drilling of sites at the following levels:

(a) Long-range identification of objectives and problems that are best solved by ocean drilling;

(b) Review proposals submitted to JOIDES, followed by written evaluations to PCOM for each proposal reviewed;

(c) Make recommendations for necessary site surveys needed to achieve the scientific objectives of a traget area;

(d) Make recommendations to PCOM for establishing Detailed Planning Groups for further developing drilling plans for specific target themes and/or regions;

(e) Advise the Planning Committee on the selection of possible co-chief scientists;

(f) Provide advice to PCOM on requirements for technical drilling operations, downhole measurements, and shipboard/shore-based sample handling (in consultation with the appropriate service panel, if necessary);

(g) Provide advice to PCOM on technical development needs required to achieve long-range scientific objectives.

4.2.1 In the course of the work specified in paragraph 4.2, the Thematic Panels will maintain the close contact with the appropriate DPGs and provide PCOM with written evaluations of the recommendations made by these planning groups.

4.2.2 Each Thematic Panel is responsible to the Planning Committee, and will respond directly to requests from it, as well as reporting to it on a regular basis.

4.2.3 The Thematic Panels will act as a means of disseminating and correlating information in the appropriate problem areas by:

(a) Monitoring the progress made by ODP cruise participants and other scientists on the results from shorebased research on samples; encouraging shore-based laboratory work on samples recovered through ODP drilling;

(b) Encouraging its members to contribute to symposia at which the results of drilling will be discussed;

(c) Publishing progress reports in the open literature to inform and encourage participation in the project;

(d) Generating "White Papers" as requested by PCOM;

(e) Providing input to PCOM for the summary of scientific achievements of ODP for inclusion in the ODP Program Plan.

4.3 Lithosphere Panel: Mandate

The Lithosphere Panel is concerned with the origin and evolution of oceanic crust and mantle. In particular, important areas of investigation are volcanic, metamorphic, hydrothermal, structural and alteration processes occurring in the ocean crust. Also of importance to the Lithosphere Panel are

mantle-crust interactions, mantle dynamics and composition, and solid-earth geochemical cycles.

(a) Processes of submarine volcanology, intrusion and plutonism; crustal construction at spreading axes; petrology, geochemistry, mineralogy, and magnetic and other physical properties of igneous and metamorphic rocks from the ocean floor, from seamounts, from oceanic plateaus, from volcanic arcs and from basins adjacent to volcanic arcs.

(b) Processes of submarine hydrothermal circulation; petrology, geochemistry and mineralogy of hydrothermally altered rocks and hydrothermal deposits from the ocean floor; geochemistry and physical properties of hydrothermal solutions; aging of ocean lithosphere.

(c) Processes of mantle convection and melting and their relationship to basaltic rocks of the ocean basins. Mapping of mantle (geochemical) reservoirs and domains. Implications of solid earth geochemical cycles and fluxes of the global plate tectonic cycle. Mass balance problems.

4.4 Tectonics Panel: Mandate

Tectonics Panel is concerned with large-scale structural features and processes of deformation, including those active today at plate boundaries and those recorded in structures and sediments of former plate boundaries.

The Panel is also interested in the origin and evolution of large-scale constructional crustal features. The drilling-based tectonic studies that are evaluated and promoted by the Tectonics Panel fall into six groups, each listed below with some specific (but not exclusionary) examples:

(a) Passive (extensional) margins - rifting history, rift-drift evolution and associated igneous activity, structure and origin of continent-ocean boundary zones; structural symmetry/asymmetry of conjugate margins; passive margins in back-arc basins; structural variability along-strike; thermal and mechanical evolution; history of vertical crustal movements; post-rift subsidence, tectonism and sea-level history, their interrelations, and their effects on the sedimentary record; tectonic synchroneity.

(b) Sheared (translational) margins - deformational history including crustal extension, shortening and vertical movements; structure and evolution of continent-ocean boundary zones; effect of tectonics on syn-rift and post-rift sedimentary record.

(c) Active (convergent) margins - mechanics, kinematics, and mechanisms of deformation within accretionary wedges; thermal evolution and fluid flow; history of island-arc magmatism; sedimentation and deformation in fore-arc and back-arc basins; collision-associated deformation.

(d) Divergent oceanic plate margins - structural evolution of mid-ocean ridge axes along "normal" spreading segments; origin and evolution of ridge-axis discontinuities (small offsets, overlapping spreading centers, transform faults, etc.); tectonic segmentation along mid-ocean ridges; origin of structural/tectonic asymmetries across spreading centers and ridge-axis discontinuities.

(e) Origin and history of submarine plateaus, microcontinents, aseismic ridges, seamount chains, and other large-scale features constructed, fragmented, or deformed during ocean-basin evolution; history of vertical motion of these features and its relation to eustacy.

(f) Plate driving forces and sub-lithospheric structures and processes: Global stress measurements to evaluate plate-driving forces; global seismic network to monitor stress accumulation and release and; measurements of rates and magnitudes of strain at active plate margins and at deforming zones within plates.

4.5 Ocean History Panel: Mandate

The Ocean History Panel is concerned with the historical aspects of the sedimentary record in the oceans. Specifically included are:

(a) Long-term history and driving mechanisms of the evolution of the ocean, atmosphere and biosphere. Central to this theme are relations among plate tectonics and ocean paleocirculation, sedimentation patterns, global paleoclimates, glacial and ice-sheet evolution, sea level change and its effect on marine sedimentation and evolution of marine life.

(b) Short-term variability of the earth's ocean circulation and climate and their relationship to boundary conditions and external forcing.

(c) The processes and mechanisms of evolution of the marine biota.

(d) The biostratigraphic record and its relationship to chronostratigraphy, including radiometric dating, magnetostratigraphy, isotope and chemostratigraphy, lithostratigraphy and sequence stratigraphy.

4.6 Sedimentary and Geochemical Processes Panel: Mandate

This panel is concerned with marine sedimentation and diagenetic processes, origin and evolution of marine sediments and seawater chemistry, global sediment and geochemical mass balances, hydrothermal processes in sedimented regions.

Specifically included are:

(a) Sedimentary processes, facies and physical properties - The sedimentary processes of terrigenous, biogenic, volcanogenic and chemical sediments; sedimentation and tectonics, e.g. evolution of submarine fans, and evolution of basins; factors controlling the nature of sedimentary facies; the origin of unconformities, disconformaties, hiatuses and sedimentary cycles; slope stability and redeposition and; physical properties of sediments.

(b) Organic and inorganic sedimentary geochemistry and diagenesis - The rates and nature of early to late diagenetic processes; the evolution of sediment to rocks; geochemistry of interstitial and formation waters; petrology, mineralogy, magnetic and other physical properties, and geochemistry of diagenetic phases of bulk sediments; and chemical paleoceanography.

(c) Temporal and spatial global mass balances of sediments and cycling of elements - How much and what types of sediments being subducted; relationship of sediments to tectonic and paleoceanographic processes such as sea level fluctuations and anoxic events; unconformities and disconformities; the carbon, sulfur and phosphorus cycles; marine evaporites in early rifting systems and evaporite giants.

(d) Fluid circulation and geochemical budgets - Magnitudes and rates and plumbing systems of gravity and tectonically driven circulation in passive and active continental margins; chemical fluxes, biological activity, physical, mineralogical and geochemical alteration of margin sediments induced by fluid flow; interaction between submarine hydrothermal fluids and sediments, mineralogy, petrology, physical and geochemical properties

of the hydrothermally altered sediments, and the geochemical evolution of the hydrothermal fluids; the origin and distribution of base metal deposits in continental margins and sedimented hydrothermal systems.

(e) The aging of the oceanic crusts - Low to moderate temperature alteration of oceanic crust; rates and types of reactions and associated chemical fluxes; changes in physical properties and fluid circulation with age.

5. Technology and Engineering Development Committee: Mandate

The Technology and Engineering Development Committee (TEDCOM) is responsible for ensuring that the proper drilling tools/techniques are available to meet the objectives of ODP drilling targets, especially those for achieving highly-ranked objectives identified in ODP long-range planning.

TEDCOM identifies, within a proper time frame and within budgetary constraints, the new drilling tools/techniques to be developed, helps JOI and the Science Operator write RFPs for engineering firms which lead to the development of the tools/techniques, and monitors the progress of their development.

Members of the TEDCOM are engineers nominated by PCOM. Liaison should be maintained between TEDCOM and the Downhole Measurements Panel. An ODP/TAMU engineer is assigned to act as Science Operator liaison with TEDCOM.

6. Detailed Planning Groups: Mandate

6.1 General Purpose. Detailed Planning Groups are short-lived planning groups which may be created by the Planning Committee, in response to requests by the Thematic Panels or by the Planning Committee itself, for more intensive study of certain aspects of planning that may arise. The Detailed Planning Groups will be held to the minimum necessary membership and travel expenses. DPGs provide written documents to those thematic panel(s) specified by PCOM. The DPG documents are transmitted to PCOM with the written evaluation of the appropriate thematic panel.

6.2 Structure of Detailed Planning Groups.

The Detailed Planning Groups are responsible for:

(a) Helping Thematic Panels to translate their broad thematic programs and highly-ranked ODP proposals into concrete drilling plans;

(b) Recommending integrated drilling programs for their assigned topics and regions of interest;

(c) Advising on regional and site surveys needed for future drilling;

(d) Preparing drilling prospectuses which synthesize all thematic and site survey input.

6.3 Membership. PCOM chooses DPG members for their expertise and experience with respect to the assigned thematic topics and in regions where these topics can be addressed. Members are recommended by the thematic panels and by PCOM and are appointed by PCOM or by the PCOM Chairman if necessary. The chairmen are appointed by PCOM.

The DPGs are composed of a number of members from U.S. institutions, and should maintain full representation, if possible, from the non-U.S. JOIDES institutions. A maximum number of 16 members is suggested.

Active DPGs meet at the request of PCOM as frequently as required by ship scheduling and routing. PCOM establishes liaison between standing DPGs and

Thematic Panels by the appointment of non-voting liaisons.

7. Service Panels

7.1 General Purpose. Service Panels provide advice and services to the JOIDES Advisory Structure, and to the various entities responsible for the processing, curation and distribution of samples, data and information (including publications) to the scientific community. The Service Panels can respond to specific requests from the Science Operator, the Wireline Logging Contractor, or JOIDES panels, but in all cases, must report their findings to the Planning Committee as well. When recommendations from the service panels involve fiscal decisions or major programmatic changes, these must be channeled through PCOM.

The Service Panels, beyond their help to the JOIDES Advisory Structure, are not directly involved with selection of drilling targets or definition of cruise objectives.

Service Panels have specific mandates. Service panels meet at least once a year or as requested by PCOM. PCOM appoints the chairman and panelists and keeps membership, including representation from the non-U.S. JOIDES institutions, under review.

7.2 Site Survey Panel; Mandate

7.2.1 General Purpose. The Site Survey Panel is to provide information and advice to the Planning Committee on the adequacy of and need for site surveys in relation to proposed drilling targets.

7.2.2 Mandate. The Site Survey Panel is mandated to:

(a) Review site survey data packages prepared by the ODP Site Survey Databank and to make recommendations as to their adequacy to the Planning Committee in light of the needs defined in mature proposals of the Detailed Planning Groups and thematic panels;

(b) Identify data gaps in proposed future drilling areas and to recommend appropriate action to ensure that either 1) sufficient site survey information is available for pinpointing specific drilling targets and for interpretation of drilling results, or 2) that sites not be drilled;

(c) Provide guidelines for proponents and panels as to required site survey data and to examine the opportunities and requirements for the use of new technologies for surveying potential drill sites;

(d) Promote international cooperation and coordination of site surveys for the benefit of the Ocean Drilling Program, particularly between participating ODP nations' survey activities;

(e) Promote the lodging of all data used for planning drilling targets with the ODP Databank.

7.2.3 Liaison. The Panel maintains liaison with the ODP Site Survey Data Bank Manager and the non-U.S. liaison at the JOIDES Office, who both attend SSP meetings.

7.3 Pollution Prevention and Safety Panel: Mandate

7.3.1 General Purpose. The general purpose of the Pollution Prevention and Safety Panel is to provide independent advice to the Planning Committee and to the Ocean Drilling Program with regard to safety and pollution hazards that may

exist because of general and specific geologic circumstances of proposed drill sites.

7.3.2 Mandate. All drilling operations involve the chance of accident or pollution. The principal geologic safety and pollution hazard in ocean drilling is the possible release of substantial quantities of hydrocarbons from subsurface reservoir strata. In most deep sea regions, the risk of hydrocarbon release can be reduced or eliminated by careful planning and proper site surveys. Additionally, safety problems may arise in drilling hot hydrothermal systems for lithosphere targets.

Those who plan each Ocean Drilling Program cruise and select its drilling sites are initially responsible to propose only sites that are considered reasonably safe. The JOIDES Pollution Prevention and Safety Panel independently reviews each site to determine if drilling operations can be conducted safely.

The preliminary site survey information and the operational plan are reviewed for each site. Advice is communicated in the form of: (1) site approval, (2) lack of approval, or (3) approval on condition of minor site relocation or amendment of the operational plan. Approval is based on the judgment of the Panel that a proposed site can be safely drilled in light of the available information and planning.

7.3.3 Liaison. The Pollution Prevention and Safety Panel maintains liaison with the Site Survey Panel, and a designated SSP member attends its meetings. A representative from the Science Operator also attends the meetings. The Planning Committee Chairman is a non-voting member of the Panel and normally attends meetings.

7.4 Information Handling Panel: Mandate

7.4.1 General Purpose. The general purpose of the Information Handling Panel is to provide information and advice to the Planning Committee and the Ocean Drilling Program with regard to satisfying the needs of the scientific community for timely access to data, samples and publication and to assist program managers in setting priorities.

7.4.2 Mandate. The Information Handling Panel is mandated to advise PCOM on:

(a) Types of publications to be produced; publication formats; schedules and deadlines; publications policy and goals of the ODP publications program;

(b) The operation of the core repositories; curatorial policy; filling of sample requests; curatorial data management; long-term goals for the preservation of the core materials and other physical samples obtained by ODP and DSDP; and establishment and operation of the various micropaleontology reference centers;

(c) The types and contents of the databases to be maintained by ODP; treatment of raw data; establishment of uniform procedures and standards for data handling and processing; structure, philosophy and goals of the information systems produced by the program; and management of databases, information systems and data centers. This last topic also includes coordination between various data centers established by ODP and those for DSDP archives;

(d) The minimum standards of quality and completeness necessary for data to be included in the various data bases and information systems, including data recording, transcribing and checking procedures;

(e) Shipboard and shore-based computer facilities, equipment and procedures; software development; data collection techniques; and meeting the computational needs of shipboard and shore-based scientists, as well as providing access to data bases for all interested parties. Input from the Shipboard Measurements Panel on these issues, if necessary, should be reviewed;

(f) Long-term preservation of the raw data generated by ODP and DSDP; preservation of all past records bearing on sample history; and preservation of any other records of the program which might benefit future workers;

(g) The relationship between the ODP and DSDP data centers and national depositories such as the National Geophysical Data Center, World Data Center A for Marine Geology and Geophysics, etc., and the fulfillment of statutory obligations for data transfer. It also includes transfer of data to data centers established by ODP member countries, such as the one in France, and to the Micropaleo Reference Centers.

7.5 Downhole Measurements Panel: Mandate

7.5.1 General Purpose. The general purpose of the Downhole Measurements Panel is to advise JOIDES on methods and techniques for determining the physical state, chemical composition, and dynamic processes in ocean crust and its sediment cover from downhole measurements and experiments. Areas of responsibility include: routine logging (including industry standard and special tools widely used in ODP); routine data processing and interpretation; new and adapted logging tools, techniques, and data processing; downhole experiments and data acquisition (including downhole recording).

7.5.2 Mandate. The Downhole Measurements Panel is mandated to:

(a) Report to and advise PCOM on logging and downhole measurement programs of ODP;

(b) Advise on and recommend to the ODP Wireline Service Contractor the required logging facilities;

(c) Advise PCOM on the the scientific desirability and technical feasibility of proposed programs;

(d) Monitor progress reports, results, tools and techniques from U.S. and international downhole instrumentation development groups;

(e) Solicit and expedite new logging capabilities and experiments;

(f) Evaluate new technology and recommend future measurement directions.

7.5.3 Membership. Membership consists of a well-balanced representation with approximately half being logging and other downhole technologists and half having scientific backgrounds and interests. The Wireline Services Operator and Science Operator of ODP shall each be represented by non-voting members on the Panel.

7.6 Shipboard Measurements Panel: Mandate

7.6.1 General Purpose. The Shipboard Measurements Panel is concerned with the inventory, operation, condition of scientific instrumentation on board the JOIDES RESOLUTION and data handling for onboard measurements.

7.6.2 Mandate. The objectives of the panel are:

(a) To provide expert advice and make recommendations to the Planning Committee regarding the inventory and utilization of scientific equipment on the drillship;

(b) To represent the interests of the ODP user community with respect to the scientific procedures and equipment on the RESOLUTION;

(c) To direct panel activities, via PCOM, toward acquiring and maintaining the best possible shipboard scientific capability within the constraints of the ODP budget.

The panel is concerned with general types of instrumentation and issues: (a) Underway geophysical equipment; (b) Equipment for handling core samples; (c) Physical properties, paleomagnetics and geotechnical measurements; (d) Petrological, mineralogical, sedimentological, biological, organic and inorganic geochemistry analysis and equipment for performing these measurements such as microscopes; (e) Computers managing data from shipboard equipment (in consultation, if necessary, with the Information Handling Panel); (f) Utilization of laboratory space on the RESOLUTION.

7.6.3 Membership. The panel will consist of members from U.S. institutions and from non-U.S.JOIDES members or consortiums. Representation from all non-U.S members should be maintained, if possible. The number of members should not exceed 15 and these should be appointed so as to represent the range of disciplines within the scope of the panel's activities.

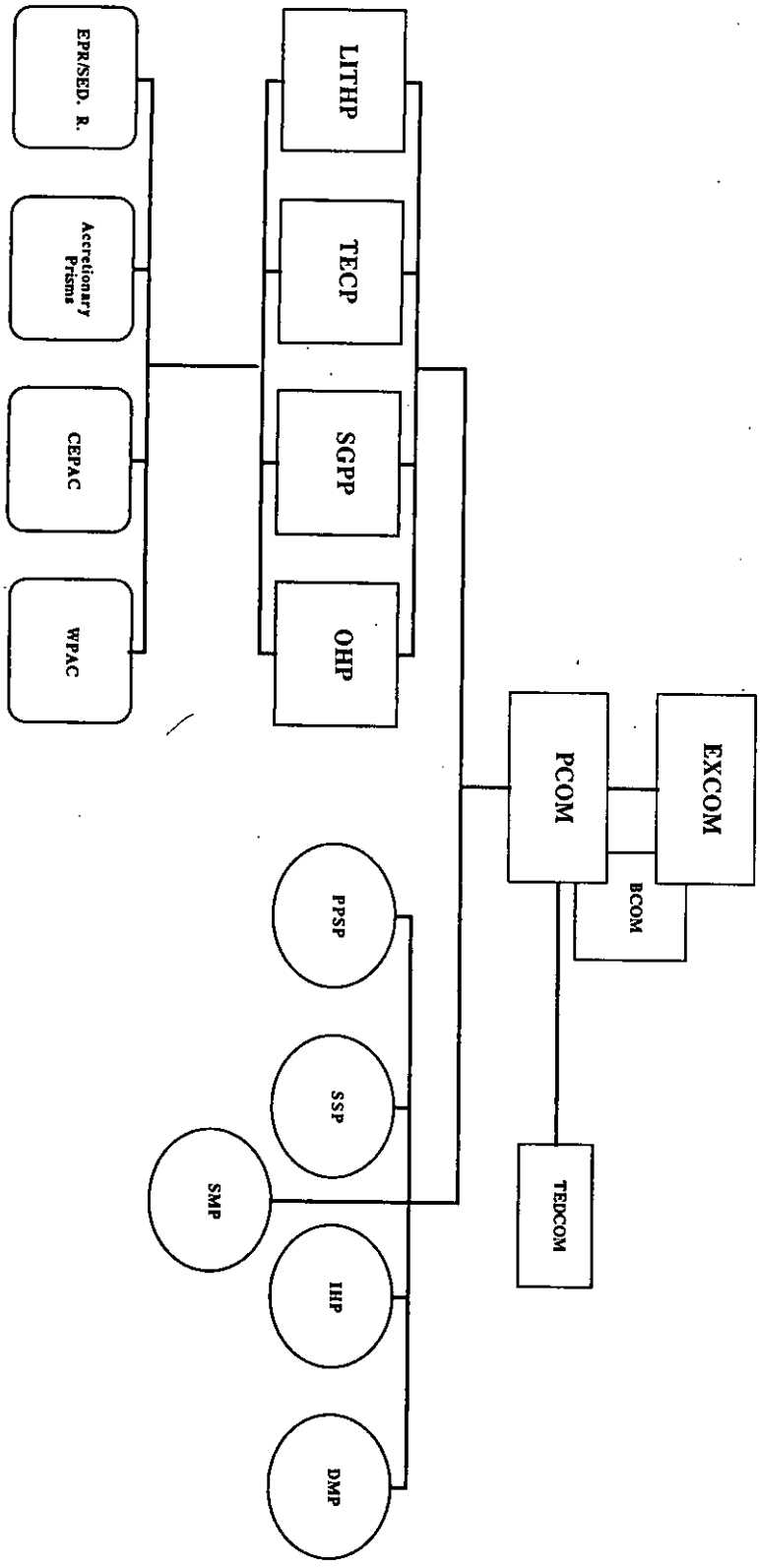
Ideally, a majority of those serving on the panel should have participated on a cruise of the RESOLUTION.

7.6.4 Liaison. The SMP must maintain continuing liaison with the Planning Committee, the Science Operations of ODP/TAMU (in consultation with ODP/TAMU marine technicians and engineers), the Information Handling Panel, and the Downhole Measurements Panel. Ex-officio liaison representatives of these panels and organizations should attend each meeting.

7.6.5 Scheduling. As the SMP will normally not deal with time-critical issues, two meetings per year should suffice. Meetings at ODP/TAMU in College Station at regular intervals is recommended and occasional meetings that include a visit to the RESOLUTION would be valuable.

Ratified by EXCOM: 15 September 1988
Adopted by JOI Board of Governors: 15 September 1988

ORGANIZATION OF REVISED JOIDES PANEL STRUCTURE



PROPOSALS RECEIVED BY THE JOIDES OFFICE

1 June, 1987 - 31 August, 1988

Ref. No.	Date Rec'd.	Title	Investigator(s)	Inst.	Site Survey Avail. Data	Site Survey Future Need	Panel Reference	PCOM Ref.	Remarks
				CENTRAL & EASTERN PACIFIC OCEAN					
306/E	6/24/88	Old Pacific History	Y.Lancelot et al.	UPMC, URI UT Austin	Yes	Yes	SOHP 7/88 TECP 7/88 LITHP 7/88 CEPAC 7/88		Strongly related to 261/E; see also 285/E
307/E	7/7/88	Cross Seamount, Hawaiian Swell	B.Keating	HIG	Yes		TECP 7/88 SOHP 7/88 LITHP 7/88 CEPAC 7/88		
308/E	7/14/88	Seamounts in the Line Island Chain	B.Keating	HIG	Yes		TECP 7/88 SOHP 7/88 LITHP 7/88 CEPAC 7/88		
				GENERAL AND INSTRUMENTAL					
304/F	6/1/88	ODP Nankai Downhole observatory Nankai Trough ODP sites	H.Kinoshita et al.	several Japanese Institutions			DMP 6/88 TECP 6/88 SOHP 6/88 WPAC 6/88		
305/F	6/20/88	Arctic Ocean Drillling	P.Mudie et al.	GS of Canada Survey		Yes	TECP 6/88 SOHP 6/88 LITHP 6/88 CEPAC 6/88 ARP 6/88		

JOIDES/ODP BULLETIN BOARD

JOIDES MEETING SCHEDULE

Date	Place	Committee/Panel
4-6 October	Swansea, UK	SSP
4-6 October	Milan, Italy	SOHP
5-7 October	Hannover, FRG	TECP
6-7 October	Palisades, NY	DMP
17-19 October	Ann Arbor, MI	CEPAC
25-26 October	Palisades, NY	Lau-WG
27-29 October	Palisades, NY	WPAC
10-11 November	Honolulu, HI	PPSP
27 November	Miami, FL	PanChm (Annual Mtg)
28 Nov-2 Dec	Miami, FL	PCOM (Annual Mtg)
2-4 May 89	Oslo, Norway	PCOM
31 May-2 Jun 89	Palisades, NY	EXCOM/ODP Council
22-24 August 89	Seattle, WA	PCOM
3-5 October 89	The Netherlands	EXCOM

* Tentative meeting (not yet requested or approved) (8/25/88)

JOIDES OFFICE ROTATION

As of October 1, 1988 the JOIDES Office will rotate from Oregon State University to the University of Hawaii Institute of Geophysics. As of October 1, 1988 all correspondence to the JOIDES Office should be addressed to Dr. Ralph Moberly, Hawaii Institute of Geophysics, 2525 Correa Road, Honolulu, HI 96822.

CALL FOR ODP DRILLING PROPOSALS

Although the planning structure of JOIDES is undergoing changes, ODP remains a proposal-driven program. Through proposals, individual scientists and groups have the opportunity to respond to the major thematic drilling priorities for ODP and contribute their expertise. These priorities are being developed by the JOIDES thematic panels and are published in the JOIDES Journal. The COSOD II report is another major input for defining the direction of ODP science.

The listing of proposals received by the JOIDES Office has traditionally been organized by oceans. Aside from its non-thematic filing system, the JOIDES Office does forward new drilling proposals to the appropriate thematic panels (and to service panels when necessary) for full consideration of their relevance to ODP drilling objectives. Proponents are asked to supply as complete a data base as possible and note upcoming surveys.

The guidelines for submission also require that proponents forward ten copies of a proposal to the JOIDES Office. [Note: Keep fold-outs to a minimum as they slow down copying and mailing of proposals.] For further information on requirements for submission of proposals to ODP, contact the JOIDES Office.

LOGGING SCHOOLS

GSA: Saturday, October 29, 1988, Denver, CO
AGU: Sunday, December 4, 1988, San Francisco, CA

For the first time in the U.S., USSAC is sponsoring a shortcourse that has been designed to introduce the scientific applications of downhole logging used in the Ocean Drilling Program to scientists of varying disciplines.

ODP logging specialists from the Borehole Research Group at Lamont-Doherty Geological Observatory will demonstrate how logging data are being used to solve scientific problems of paleoenvironment, stratigraphy, geochemistry, basement structure, hydrogeology, geomechanics, and tectonics.

The first shortcourse will be held at the GSA Annual Meeting in Denver, CO on the Saturday before the meeting (29 October 1988). The second shortcourse is co-sponsored by AGU and will be held at the AGU Annual Meeting in San Francisco, CA on the Sunday before the meeting (4 December 1988) with a follow-up logging poster session during the meeting.

Don't miss these opportunities to discover the versatile applications of logging. There is **no cost** for the shortcourse but preregistration is required. Limited per diem reimbursement for U.S. scientists is available from USSAC. For more information contact Robin Smith at JOI, Inc., 1755 Massachusetts Ave., NW, Suite 800, Washington, DC 20036, (202) 232-3900, telemail: R.Smith.JOI (omnet).

WORKSHOP SCHEDULED

CONFERENCE ON DEEP OCEAN CRUST AND UPPERMOST MANTLE

A JOI/USSAC conference on deep crustal and shallow mantle drilling has been scheduled for 7-9 March 1989 at Woods Hole Oceanographic Institution. Additional conference support and funds for non-U.S.participants' travel will be contributed by the W.M.Keck Marine Geodynamics Program of Woods Hole.

The conference will include invited and contributed papers on studies of deep crustal and upper mantle rocks and properties. A one and one half day working session will explore the range of problems and approaches for these studies, including how best the JOIDES RESOLUTION can be used for them.

For more information on the conference, contact:

Dr.Henry J.B.Dick, Convener
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543 USA
Telex: 95169 Telemail: WHOI.GEOL.GEOPH

For information on USSAC funding for U.S. participants, contact Dr.Ellen Kappel at JOI, Inc. (Telemail: E.Kappel).

WORKSHOP REPORTS AVAILABLE

The following reports are now available. For copies please write to: JOI/USSAC Workshop Report, 1755 Massachusetts Ave. NW, Suite 800, Washington, DC 20036.

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

Vertical Seismic Profiling (VSP) and the Ocean Drilling Program (ODP), Drs. John Mutter and Al Balch, conveners

Dating Young MORB?, Drs. Rodey Batiza, Robert Duncan and David Janecky, conveners

REQUEST FOR PROPOSALS

JOI issued a Request for Proposals (RFP) in July, 1988 entitled, "Development and Operation of a Wireline Re-Entry System for Use in Deep Sea Drill Holes." The purpose of the solicitation is for proposals from individuals or organizations within the United States to lead a program to design, develop, and operate a system capable of re-entering boreholes and installing a wide range of scientific experiments and instruments without the use of a drill ship. Support for the wireline re-entry program comes from USSSP funds. In order to obtain a copy of the RFP, or for more information on the scope of the RFP, write or call Ms. Tracy Hurlbut at JOI, Inc., 1755 Massachusetts Ave., NW, Suite 800, Washington, DC 20036, (202) 232-3900.

DSDP DATA AVAILABLE SOON ON CD-ROM

The National Geophysical Data Center (NGDC) is currently working on a project to produce a set of CD-ROMs (Compact Disk-Read Only Memory) of available digital data from the Deep Sea Drilliing Project (DSDP) which should be available this winter. Some of the information to be included on the CD-ROMs is: all digital geophysical data provided to the NGDC by DSDP, all digital DSDP well log data, all digital underway geophysical data, and the DSDP index. The CDs and accompanying floppy disks with a selection of software will be available to U.S. scientists free of charge. If you are interested in obtaining a set of the CDs, contact Dr.Ellen Kappel at JOI, Inc., 1755 Massachusetts Ave., NW, Suite 800, Washington DC 20036, (202) 232-3900. Funding for this project has been made available through the JOI-USSSP.

JOI/USSAC FELLOWSHIP

JOI, Inc., in cooperation with USSAC, is continuing to support its new Ocean Drilling Graduate Fellowship Program. The fellowship will provide an opportunity for scientists of unusual promise and ability in residence at a U.S. institution to conduct research compatible with that of the ODP. Award for doctoral candidates is $18,000, to be used for stipend, tuition, benefits, research costs and incidental travel. Applications are reviewed three times per year in January, May and September. Applications for upcoming legs should be submitted to JOI, Inc. according to the following schedule:

Leg	Application Deadline
Shorebased work	1 January 1989

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

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, Telephone: (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.

ODP SAMPLE DISTRIBUTION

The materials from ODP Legs 116 and 117 are now available for sampling by the scientific community. The twelve-month moratorium on cruise-related sample distribution is complete for Ocean Drilling Program Legs 101-117. Scientists who request samples from these cruises (after October 1988) are no longer required to contribute to the ODP Proceedings.

Preliminary sample record inventories for ODP Legs 101-121 are now in searchable database structures. The Sample Investigations database which contains records of all sample requests, the purpose for which the samples were used and the institute where the samples were sent, has reached steady state. At present, the most efficient way to access this database is to request a search by contacting the Assistant Curator at ODP.

Request processing (number of weeks to receive samples) during the period January - July 1988:

Repository	Avg. # Wks Processing	Total # Samples
ECR	15	10,746
GCR	8	3,454
WCR	11	1,650

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, 1000 Discovery Drive, College Station, TX 77840, Tel: (409) 845-4819

NEW EDITION OF "INSTRUCTIONS FOR CONTRIBUTORS"

The ODP/TAMU publication entitled "Instructions for Contributors to the Proceedings of the Ocean Drilling Program" has been updated. This booklet is available to anyone who is preparing contributions to the Proceedings. If you would like an updated copy, please write to ODP Publications Distribution, 1000 Discovery Drive, College Station, TX 77840 or call (409) 845-2016.

DSDP AND ODP DATA AVAILABLE

ODP Data Available

ODP databases currently available include all DSDP data files (Legs 1-96), geological and geophysical data from ODP Legs 101-114, and all DSDP and ODP core photos (Legs 1-116). See table below for data available.

Most data are available as paper and microfilm copies of original data collected aboard the JOIDES RESOLUTION. Underway geophysical data are on 35 mm microfilm; all other data are on 16 mm microfilm.

All DSDP data and most ODP data are contained in a computerized database (contact the ODP Data Librarian to find out what data are available electronically available). Data can be searched on almost any specified criteria. Files can be cross-referenced so a data request can include information from multiple files.

Computerized data are currently available on hard-copy printouts, magnetic tape, or through BITNET.

Photos of ODP/DSDP cores and seismic lines are also available. Seismic lines, whole core and closeup core photos are available in black and white 8x10 prints. Whole core color 35 mm slides are also available.

The following are also available: (1) ODP Data Announcements containing information on the database; (2) Data File Documents containing information on specific ODP data files; (3) ODP Technical Note #9, "Deep Sea Drilling Project Data File Documents", which includes all DSDP data file documents.

To obtain data or information contact: Kathe Lighty, Data Librarian, ODP/TAMU 1000 Discovery Dr., College Station, TX 77840, Tel: (409) 845-8495, Tx: 792779/ODP TAMU, BITNET: %DATABASE @TAMODP, Omnet: Ocean.Drilling.TAMU

Small requests can be quickly answered free of charge. If a charge is made an invoice will be sent and must be paid before the request is processed.

Data Available from National Geophysical Data Center (NGDC)

DSDP data files can be provided on magnetic tape according to user specifications (see table below). NGDC can also provide correla-tive marine geological and gephysical data from other sources. NGDC will provide a complimentary inventory of data available on request. Inventory searches are tailored to user's needs.

Information from DSDP Site Summary files is fully searchable and distributable on floppy diskette, as computer listings and graphics, and on magnetic tape. NGDC is working to make all 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, NGDC can provide analog geological and geophysical information from DSDP on microfilm. Two summary publications are available: (1) "Sedimentology, Physical Properties, and Geochemistry in the Initial Reports of Deep Sea Drilling Project Vols. 1-44: An Overview", Rept. MGG-1; (2) "Lithologic Data from Pacific Ocean Deep Sea Drilling Project Cores", Rept. MGG-4.

Costs for services are: $90/magnetic tape, $30/floppy diskette, $20/microfilm reel, $12.80/copy of Report MGG-1, $10/copy of report MGG-4. 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 VISA, Mastercard or American Express. A $10 surcharge is added to all shipments ($20 for foreign shipments), and a $15 fee is added to all rush orders.

Data Announcements describing DSDP data sets are available at no charge. For details, call (303) 497-6339 or write to the address below. For additional information contact: Marine Geology & Geophysics Div., Natl. Geophysical Data Center, NOAA E/GC3 Dept. 334, 325 Broadway, Boulder, CO 80303, Tel: (303) 497-6338

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.		

BIBLIOGRAPHY OF THE OCEAN DRILLING PROGRAM

The publications below are available from ODP Subcontractors. Items from ODP/TAMU are available at 1000 Discovery Drive, College Station, TX 77840. Items from LDGO can be obtained from the Borehole Research Group, LDGO, Palisades, NY 10964.

TEXAS A&M UNIVERSITY

1. Proceedings of the Ocean Drilling Program, Initial Reports

Volumes 101/102 (combined) Dec 86
Volume 103 published Apr 87
Volume 104 published July 87
Volume 105 published Aug 87
Volume 107 published Oct 87
Volume 108 published Jan 88
Volumes 106/109/111 (combined) Feb 88
Volume 110 published Apr 88
Volume 112 published Aug 88

2. Technical Notes

#1 Preliminary time estimates for coring operations (Rev. Edition Dec 86)
#2 Operational and laboratory capabilities of JOIDES RESOLUTION (June 85)
#3 Shipboard scientist's handbook (rev. July 87)
#4 Five papers on the Ocean Drilling Program from "OCEANS '85" (May 86)
#5 Water Chemistry Procedures aboard JOIDES RESOLUTION (Sep 86)
#6 Organic Geochemistry aboard JOIDES RESOLUTION - An Assay (Sep 86)
#7 Shipboard Organic Geochemistry on JOIDES RESOLUTION (Sep 86)
#8 Shipboard Sedimentologists' Handbook (Aug 88)
#9 Deep Sea Drilling Project data file documents (Jan 88)
#10 A Guide to ODP Tools for Downhole Measurement (June 88)

3. Scientific Prospectuses

#13 (Oct 86) Leg 113
#14 (Feb 87) Leg 114
#15 (May 87) Leg 115
#16 (May 87) Leg 116
#17 (June 87) Leg 117
#18 (June 87) Leg 118
#19 (Sep 87) Leg 119
#20 (Oct 87) Leg 120
#21 (Mar 88) Leg 121
#22/23 (June 88) Legs 122 & 123
#24 (Aug 88) Leg 124

4. Preliminary Reports

#0 (May 86) Leg 100
#13 (May 87) Leg 113
#14 (June 87) Leg 114
#15 (Sep 87) Leg 115
#16 (Sep 87) Leg 116
#17 (Nov 87) Leg 117
#18 (Feb 88) Leg 118
#19 (Mar 88) Leg 119
#20 (June 88) Leg 120
#21 (Aug 88) Leg 121

5. Engineering Prospectuses

#1 (Aug 88) Leg 124E

6. Other Items Available

- Ocean Drilling Program brochure (also French, Spanish, German or Japanese)
- Onboard JOIDES RESOLUTION (new ed., 24 p.)
- ODP Sample Distribution Policy
- Instructions for Contributors to ODP Proceedings (rev. ed., Apr 88)
- ODP Engineering and Drilling Operations
- Multilingual brochure with a synopsis of ODP in English, German, French, Japanese and Spanish

LAMONT-DOHERTY GEOLOGICAL OBSERVATORY

Wireline Logging Manual (2nd Edition, Dec 86)

DIRECTORY OF JOIDES COMMITTEES, PANELS AND WORKING GROUPS

As previously reported, the entire directory will now be published once annually. New panel/committee members and address changes will are listed below. Please refer to the complete Directory in the February 1988 issue of the JOIDES Journal (Vol. XIV, No. 1) when making these corrections. As always, the JOIDES Journal staff appreciates your help in keeping Directory listings up to date.

EXCUTIVE COMMITTEE (EXCOM)

New Chairman:

Helsley, Dr. Charles E.

New Member:

Barnes, Dr. Christopher R.
Replacing Dr. Michael J. Keen
Geological Survey of Canada, 580 Booth St., Ottawa, Ontario K1A 0E4, Canada, Tel: (613) 992-5265

New Alternate:

Frieman, Dr. Edward A.
[Alt: Dr. Marvin Moss, Tel: (619) 534-2836]

Other Changes:

Caldwell, Dr. Douglas R.
Change telephone to: (503) 754-3504

PLANNING COMMITTEE (PCOM)

New Member and Chairman:

Moberly, Dr. Ralph
Replacing Dr. William T. Coulbourn
Hawaii Inst. of Geophysics, Univ. of Hawaii, 2525 Correa Rd., Honolulu, HI 96822, Tel: (808) 948-8765, Tx: 7238285/HIGCM HR, Tmail: Hawaii.Inst

ATLANTIC REGIONAL PANEL (ARP)
No Changes

CENTRAL & EASTERN PACIFIC REGIONAL PANEL (CEPAC)

New Information:

Beiersdorf, Dr. Helmut
[Alt: Dr. H-J. Brumsack, Tel: (49) 551-393-981, Tx: 96703/UNI GEO D]

DOWNHOLE MEASUREMENTS PANEL (DMP)

New Information:

Kristensen, Dr. Age
[Alt: Dr. Benedikt Stingrimsson, Tel: (354) 836-00, Tx: 2339/ORKUST IS]

INDIAN OCEAN REGIONAL PANEL (IOP)
No Changes

INFORMATION HANDLING PANEL (IHP)
No Changes

LITHOSPHERIC PANEL (LITHP)
No Changes

POLLUTION PREVENTION & SAFETY PANEL (PPSP)

New Address:

Ball, Dr. Mahlon M., Chairman
U.S. Geological Survey, Petroleum Geology Branch, Box 25046 MS/940, Denver Fedl. Center, Denver, CO 80225, Tel: (303) 236-5784

New Alternate:

Haseldonckx, Dr. Paul
[Alt: Dr. Dietrich Horn, DEMINEX, Dorotheenstr. 1, 4300 Essen, Federal Republic of Germany, Tel: (49) 201-726-3905, Tx: 8571141/DX D]

SEDIMENTS & OCEAN HISTORY PANEL (SOHP)

New Address:

Mayer, Dr. Larry, Chairman
Dept. Geologie Dynamique, Univ. Pierre et Marie Curie, 4 Place Jussieu, Tour 26, 75252 Paris Cedex 05, France, Tel: (33) 43-29-61-84 Tx: 200145/UPMC SIX F

SITE SURVEY PANEL (SSP)

New Address:

Suyehiro, Dr. Kiyoshi
Ocean Research Institute, Univ. of Tokyo, 1-15-1 Minamidai, Nakano-ku, Tokyo 164, Japan, Tel: (81) 3-376-1251, Tx: 25607/ORIUT J, Tmail: ORI.Tokyo

SOUTHERN OCEANS REGIONAL PANEL (SOP)
No Changes

TECHNOLOGY & ENGINEERING DEVELOPMENT COMMITTEE (TEDCOM)
No Changes

TECTONICS PANEL (TECP)

New Alternate:

Hinz, Dr. Karl
[Alt: Dr. Jan H. Behrmann, Geologisches Inst. der Univ., Senckenbergstr. 3, 6300 Giessen, Federal Republic of Germany, Tel: (49) 641-702-8367, Tx: 482956/UNI GI D]

New Information:

Westbrook, Dr. Graham K.
Tel: (44) 21-414-6153

WESTERN PACIFIC REGIONAL PANEL (WPAC)

New Information:

Thunell, Dr. Robert C.
Dr. Thunell has resigned from WPAC. Please remove him from the listing of WPAC membership.

ALPHABETIC TELEPHONE/TELEX DIRECTORY

[* Indicates that telemail address is listed under panel directory]

NAME	PANEL	TELEPHONE	TELEX/ANSWERBACK
Almazan, J.	ODPC	(34)1-450-02-50	48207/SCEG E
Anderson, R.*	LDGO	(914)359-2900x335	7105762653/LAMONTGEO
Aoki, Y.*	PPSP	(81)3-584-0511	25607/ORIUT J
Austin, J.*	ARP	(512)471-0450	9108741380/UTIG AUS
Avocato, N.	TEDCOM	(713)230-2650	9108814851/CHEVRON GT HOU
Backman, J.	IOP	(44)223-333430	81240/CAMSPL G
Baecker, H.	IOP,EPR-WG	(49)511-5105-320	175118325/PREMT D
Baker, J.*	JOI	(202)232-3900	257828/BAKE UR
Ball, M.*	PPSP	(303)236-5784	
Baragar, R.	LITHP	(613)995-4864	not available
Barker, P.	SOP	(44)223-61188	817725/BASCAM G
Barnes, C.	EXCOM	(613)992-5265	
Batiza, R.	LITHP	(312)491-3238	not available
Becker, K.*	LITHP,EPR-WG	(305)361-4661	17454/VOFM RSMAS MIA
Behrmann, J.	TECP	(49)641-702-8367	482956/UNI GI D
Beiersdorf, H.	CEPAC	(49)511-643-2412	923730/BGR HA D
Bell, S.	DMP	(403)284-0336	03825686/ISPG CGY
Berger, W.*	SOHP	(619)534-2750	9103371271/UCWWD SIO SDG
Biju-Duval, B.*	EXCOM,ODPC	(33)47-23-55-28	610775/IFREMER F
Bonnasse-Gahot, J.	TEDCOM	(33)47-44-45-46	615400/ELFA F
Bosellini, A.	IOP,ODPC	(39)532-35968	510850/UNIV FE I
Bostrom, K.	LITHP	(46)8-31-74-09	8105199/S
Bourgois, J.	CEPAC	(33)43-36-25-25	200145/UPMC SIX F
Bowman, J.*	ODPC	(44)0793-40101	444293/ENVRE G
Boyd, R.	IOP	(902)424-2362	01921863/DALUNIVLIB HFX
Brass, G.*	PCOM	(305)361-4690	317454/VOFM RSMAS MIA
Brenner, C.*	LDGO	(914)359-2900x542	7105762653/LAMONTGEO
Briden, J.*	EXCOM	(44)793-40101x501	444293/ENVRE G
Broglia, C.*	LDGO	(914)359-2900	7105762653/LAMONTGEO
Brooks, K.	WPAC	(45)1-11-22-32	19066/JJUTEL DK
Browning, P.*	LITHP	(44)223-333416	81240/CAMSPL G
Brumsack, H-J.	CEPAC	(49)551-393-981	96703/UNI GEO D
Buck, R.*	TECP	(914)359-2900x592	7105762653/LAMONTGEO
Bryan, W.	EPR-WG	(617)548-1400x2582	951679/OCEANIST WOOH
Burns, A.*	JOI	(202)232-2900	257828/BAKE UR
Cadet, J-P.	PCOM	(33)43-36-35-12	200145/UPMC SIX F
Caldwell, D.*	EXCOM	(503)754-3504	5105960682/OSU COVS
Campbell, G.	PPSP	(613)993-3760x328	0534366/EMR RMCB OTT
Cande, S.*	SOP	(914)359-2900x346	7105762653/LAMONTGEO
Cann, J.	EPR-WG	(44)632-328-511x3090	53654/UNINEW G
Cant, D.*	ARP	(902)426-6186	01931552/BIO DRT
Carson, B.	DMP	(215)758-3660	7106701086/LEHIGH UNIV UD
Cathles, L.	LITHP	(607)255-7135	6713054/WUI
Chase, R.	CEPAC	(604)228-3086	0454245/GEOP UBC VCR
Chenevert, M.*	TEDCOM	(512)471-3161	9108741305/UTINTERNAT AUS
Ciesielski, P.	SOP	(904)392-2109	not available
Claypool, G.	PPSP	(214)851-8460	205638/MDRL DAL
Cochran, J.*	IOP	(914)359-2900x396	7105762653/LAMONTGEO
Collins, W.	ODPC	(709)737-4708	0164101/MEMORIAL SNF
Cooper, A.	SOP	(415)354-3132	176994/MARFAC
Cooper, P.*	JOIDES	(808)948-8765	7238285/HIGCM HR

Cotten, W.	TEDCOM	(713)230-2650	9108814851/CHEVRON GT HOU
Cowan, D.	PCOM	(206)543-4033	9104740096/UW UI
Cronan, D.	WPAC	(44)1-589-5111	261503/IMPCOL G
Dalziel, I.*	TECP	(512)471-0431	9108741380/UTIG AUS
Davies, T.*	IOP	(512)471-0409	9108741380/UTIG AUS
Davis, D.	TECP	(516)632-8217	5102287767/SUNNADMIN ST8K
Davis, E.	CEPAC,EPR-WG	(604)356-6453	0497281/DFO PAT BAY
Delaney, J.*	EPR-WG	(206)543-4830	9104740096/UW UI
Delas, C.	PPSP	(33)42-91-40-00	615700/F
DeMaster, D.	SOP	(919)737-7026	not available
Dennis, B.	TEDCOM	(505)667-5697	660495/LOS ALAMOS LAB
Detrick, R.*	LITHP,EPR-WG	(401)792-6926	257882/DETR UR
D'Ouzouville, L.*	JOIDES	(808)948-8765	7238285/HIGCM HR
Droxler, A.	SOHP	(713)527-4880	not available
Duce, R.	EXCOM	(401)792-6222	257580/KNAU UR
Duennebier, F.*	SSP	(808)948-8711	7238285/HIGCM HR
Duerbaum, H.	EXCOM	(49)511-643-3247	923730/BGR HA D
Duncan, R.*	IOP	(503)754-2296	5105960682/OSU COVS
Eade, J.	WPAC	(679)381139	2330/SOPACPRO FJ
Elderfield, H.*	LITHP	(44)223-337181	81240/CAMSPL G
Eldholm, O.	PCOM	(47)2-45-66-76	79367/ESCON N
Elliot, D.	SOP	(614)422-6531	not available
Embley, R.	SOHP	(503)867-3011x276	5105960682/OSU COVS
Engebretson, D.	TECP	(206)676-3581	not available
Erzinger, J.	LITHP	(49)641-702-8390	482956/GRIWOTY UNIGI D
Falvey, D.	IOP	(61)62-49-9327	248404/AUST UR
Fisk, M.*	SOP	(503)754-2296	5105960682/OSU COVS
Flower, M.	CEPAC	(312)996-9662	253846/UNIV ILL CCC CGO
Floyd, P.	CEPAC	(44)782-62-1111	36113/UNKLIB G
Forster, C.	EPR-WG	(801)750-1247	3789426/UTAHSTATEU LOGAN
Francheteau, J.	CEPAC,EPR-WG	(33)43-54-13-22	202810/VOLSISM F
Francis, T.*	PCOM	(44)42-879-4141	858833/OCEANS G
Franklin, J.	LITHP	(613)995-4137	not available
Fricker, P.	ODPC	(41)31-24-54-24	33413/CH
Frieman, E.*	EXCOM	(619)534-2826	9103371271/UCWWD SIO SDG
Froelich, F.	SOHP	(914)359-2900x485	7105762653/LAMONTGEO
Fuetterer, D.*	SOP	(49)471-4831-200	238695/POLAR D
Fujii, T.*	LITHP	(81)3-812-2111x5751	25607/ORIUT J
Fujimoto, H.*	TEDCOM	(81)3-376-1251	25607/ORIUT J
Garrison, L.*	ODP/TAMU	(409)845-8480	792779/ODP TAMU
Garrison, R.	SOHP	(408)429-2114	9105984408/UC SC LIB SACZ
Gartner, S.*	PCOM	(409)845-8479	792779/ODP TAMU
Gibson, I.	IHP	(519)885-1221x3231	06955259/UOFW WTLO
Gill, J.	WPAC	(408)429-2425	9105984408/UC SC LIB SACZ
Goldhaber, M.	SOHP	(303)236-1521	9109370740/GSA FTS LKWD
Golovchenko, X.*	LDGO	(914)359-2900x336	7105762653/LAMONTGEO
Gradstein, F.*	SOHP	(902)426-4870	01931552/BIO DRT
Grassick, D.	TEDCOM	(44)1-930-1212	8950611/EPRISE G
Green, A.	PPSP	(713)965-4172	9108813649/USEPR TEX HOU
Gross, G.*	NSF	(202)357-9639	257653/NSFO UR
Harding, B.*	ODP/TAMU	(409)845-5204	792779/ODP TAMU
Harrison, C.*	EXCOM	(305)361-4610	317454/VOFM RSMAS MIA
Haseldonckx, P.	PPSP	(49)201-726-3905	8571141/DX D
Hayes, D.*	EXCOM,PCOM	(914)359-2900x470	7105762653/LAMONTGEO
Heath, G.	EXCOM	(206)543-6605	9104740096/UW UI
Heinrichs, D.*	EXCOM,ODPC	(202)357-7837	257653/NSFO UR
Helsley, C.*	EXCOM	(808)948-8760	7238285/HIGCM HR

Hemleben, C.	ARP	(49)7071-292-496	7262867/UTZV D
Herb, R.	SOP	(41)31-65-87-63	33228/UNI BE CH
Hertogen, J.	IHP	(32)16-20-10-15	23674/KULEUV B
Hey, R.	SSP	(808)948-8711	723825/HIGCM HR
Hinz, K.	TECP	(49)511-643-3244	923730/BGR HA D
Howard, S.*	EPR-WG	(409)845-8480	792779/ODP TAMU
Howell, D.	TECP	(415)856-7141	176994/MARFAC
Howell, E.	DMP	(214)422-6857	794784/ARCO PLNO
Hsu, K.	TECP	(41)1-256-36-39	817379/EHHG CH
Humphris, S.*	LITHP	(617)540-3954	951679/OCEANIST WOOH
Hyndman, R.	WPAC	(604)656-8438	0497281/DFO PAT BAY
Ignatius, H.	ODPC	(358)0-469-31	123185/GEOLO SF
Ingersoll, R.	IHP	(213)825-8634	3716012/UCLA LSA
Iwamura, H.*	JOIDES	(808)948-8765	7238285/HIGCM HR
Jarrard, R.*	LDGO	(914)359-2900x343	7105762653/LAMONTGEO
Jenkins, G.	SOP	(44)908-74066	825061/OUWALT G
JOIDES Office*		(503)754-2600	258707/JOID UR
Jones, E.	SSP	(44)1-387-7050	28722/UCPHYS G
Jones, M.	IHP	(44)51-653-8633	628591/OCEANB G
Kaminuma, K.*	SOP	(81)3-962-4711	25607/ORIUT J
Kappel, E.*	JOI	(202)232-3900	257828/BAKE UR
Karig, D.	DMP	(607)255-3679	6713054/CORNELL ITCA
Karson, J.	ARP	(919)684-2731	802829/DUKTELCOM DURM
Kastner, M.*	PCOM	(619)534-2065	9103371271/UCWWD SIO SDG
Keen, C.*	ARP	(902)426-3413	01931552/BIO DRT
Kennett, J.	SOP	(805)961-3764	not available
Kent, D.*	SOHP	(914)359-2900x544	7105762653/LAMONTGEO
Kidd, R.	SSP	(44)792-295-149	48358/UCSWAN G
Kinoshita, H.*	DMP	(81)3-472-51-1111	25607/ORIUT J
Kobayashi, K.*	EXCOM,PCOM	(81)3-376-1251	25607/ORIUT J
Kristensen, A.	DMP	(47)7-96-70-11	55278/STATD N
Kristjansson, L.	ODPC	(354)1-213-40	2307/ISINFO IS
Kristoffersen, Y.	SOP	(47)5-21-30-50	42877/UBBRB N
Kroenke, L.*	CEPAC	(808)948-7845	7238285/HIGCM HR
Kudrass, H.	WPAC	(49)511-643-2787	0923730/BGR HA D
Langseth, M.*	PCOM	(914)359-2900x518	7105762653/LAMONTGEO
Larsen, B.	SSP	(45)288-40-22x3210	37529/DTHDIA DK
Larsen, G.	ODPC	(45)6-12-82-33	64767/DK
Larsen, H-C.	ARP	(45)1-11-88-66	19066/JJUTEL DK
Larson, R.*	PCOM	(401)792-6165	7400188/LARS UC
Last, A.	PPSP	(44)1-588-8000	884614/TRIOIL G
Latremouille, M.*	IHP	(902)426-5947	01931552/BIO DRT
Laughton, A.*	EXCOM	(44)42-879-4141	858833/OCEANS G
Leclaire, L.	SOP	(33)60-87-07-54	270686/LOPMNHN F
Leinen, M.*	PCOM	(401)792-6268	257580/KNAU UR
Levi, S.*	PCOM	(503)754-2296	5105960682/OSU COVS
Lewis, B.	EXCOM	(206)543-6487	9104740096/UW UI
Lewis, S.	SSP	(415)856-7096	171449/PCS USGS MNPK
Loeblich, A.	IHP	(231)825-1563	3716012/UCLA LSA
Louden, K.*	SSP	(902)424-3557	01921863/DALUNIVLIB HFX
Loughridge, M.	IHP	(303)497-6487	258169/WDCA UR
Ludden, J.	IOP	(514)343-7389	0524146/BIBPOLYTEC MTL
Luna Sierra, E.	TEDCOM	(34)1-409-3010	45947/E
MacDonald, K.*	EPR-WG	(805)961-4005	258976/KMAC UR
MacKenzie, D.	PPSP	(303)794-4750	not available
Maldonado, A.	ARP	(34)3-310-64-50	59367/INPB E
Malfait, B.*	NSF	(202)357-9849	257653/NSFO UR

Malpas, J.	PCOM	(709)737-4382	0164101/MEMORIAL SNF
Manchester, K.*	TEDCOM	(902)426-3411	01931552/BIO DRT
Maronde, D.	ODPC	(49)228-885-2328	17841228312/DFG
Marx, C.	TEDCOM	(49)5323-72238	953813/TU ITE D
Mascle, J.	ARP	(33)93-80-75-80	not available
Mauffret, A.	SSP	(33)43-36-25-25x5172	200145/UPMC SIX F
Maxwell, A.*	EXCOM	(512)471-4860	9108741380/UTIG AUS
Mayer, L.*	SOHP	(33)43-29-61-84	200145/UPMC SIX F
McLerran, A.	TEDCOM	(619)481-0482	not available
McNutt, M.*	LITHP	(617)253-7304	921473/MIT CAM
Merrell, W.*	EXCOM	(409)740-4403	not available
Merrill, R.*	ODP/TAMU	(409)845-9324	792779/ODP TAMU
Mevel, C.	LITHP	(33)43-36-25-25	200145/UPMC SIX F
Meyer, A.*	ODP/TAMU	(409)845-2197	792779/ODP TAMU
Meyer, H.	SSP	(511)643-3128	0923730/BGR HA D
Meyers, P.	SOHP	(313)764-0597	8102236056/UOFM AA
Michot, J.	ODPC	(32)2-649-00-30	23069/B
Millheim, K.	TEDCOM	(918)660-3381	284255/CDFTU UR
Moberly, R.*	EXCOM	(808)948-8765	7238285/HIGCM HR
Moore, G.*	WPAC	(918)592-6000x3090	7400459/GMTU UC
Moore, T.	IHP	(713)973-3054	9108813649/USEPR TEX HOU
Moss, M.*	EXCOM	(619)534-2836	
Mottl, M.*	EPR-WG	(808)948-7006	7238285/HIGCM HR
Mountain, G.*	SSP	(914)359-2900x541	7105762653/LAMONTGEO
Moussat, E.	IHP	(33)98-22-40-40	940627/OCEAN F
Mudie, P.*	SOP	(902)426-8720	01931552/BIO DRT
Munsch, B.	ODPC	(33)88-35-30-63	890440/ESF F
Mutter, J.*	LITHP	(914)359-2900x525	258294/MCSP UR
Natland, J.*	WPAC	(619)534-3538	9103371271/UCWWD SIO SDG
Nemoto, T.*	EXCOM,ODPC	(81)3-376-1251	25607/ORIUT J
Nickless, E.	NERC	(44)793-40101	444293/ENVRE G
Nobes, P.	DMP	(519)885-1211	not available
Normark, W.	SOHP	(415)856-7045	171449/PCS USGS MNPK
Nowak, J.	IHP	(49)511-643-2815	922739/GFIZ D
NSF (ODP)*		(202)357-9849	257653/NFSO UR
O'Connell, S.*	DMP	(409)845-0507	792779/ODP TAMU
ODP/TAMU*		(409)845-2673	792779/ODP TAMU
ODP Databank*	LDGO	(914)359-2900x542	7105762653/LAMONTGEO
Ogawa, Y.*	TECP	(81)92-641-1101x4320	25607/ORIUT J
Okada, Hakuyu*	CEPAC	(81)92-641-1101x4301	25607/ORIUT J
Okada, Hisatake*	ARP	(81)236-31-1421x2588	25607/ORIUT J
Olhoeft, G.	DMP	(303)236-1302	9109370740/GSA FTS LKWD
Orcutt, J.*	LITHP	(619)534-2887	9103371271/UCWWD SIO SDG
Ottosson, M-O.	EXCOM,ODPC	(46)8-15-15-80	13599/RESCOUN S
Pascal, G.	DMP	(33)98-46-25-21	940627/OCEAN F
Paxton, A.	TEDCOM	(44)224-574555	739721/BRTOIL G
Pearce, J.	LITHP	(44)632-328511	53654/UNINEW G
Pereira, C.	SOP	(709)737-4382	0164101/MEMORIAL SNF
Perfit, M.	LITHP,EPR-WG	(904)392-2128	not available
Peirce, J.*	SSP	(403)296-5809	03821524/PETROCANRS CGY
Peveraro, R.	DMP	(44)41-226-5555	777633/BRTOIL G
Piccardo, G.	LITHP	(39)10-51-81-84	
Pisias, N.*	PCOM	(503)754-2600	258682/PISI UR
Porter, R.	DMP	(206)543-6515	9104740096/UW UI
Pozzi, J-P.	DMP	(33)43-29-12-25	202601/NORMSUP F
Prell, W.*	IOP	(401)863-3221	952095/BRNTLXCTR PVD
Premoli-Silva, I.	SOHP	(39)2-23-88-13	320484/UNIMI I
Puchelt, H.	LITHP		
Pyle, T.*	JOI	(202)232-3900	257828/BAKE UR

Rabinowitz, P.*	ODP/TAMU	(409)845-2673	792779/ODP TAMU
Raleigh, B.*	EXCOM	(914)359-2900x345	7105762653/LAMONTGEO
Rangin, C.	WPAC	(33)43-36-25-25x5257	200145/UPMC SIX F
Rea, D.	CEPAC	(313)936-0521	not available
Renard, V.	SSP	(33)98-22-40-40	940627/OCEAN F
Riddihough, R.	TECP	(613)995-4482	not available
Riedel, K.*	ODP/TAMU	(409)845-8480	792779/ODP TAMU
Rischmueller, H.	TEDCOM	(49)511-654-2669	923730/BGR HA D
Roberts, D.	PPSP	(44)1-920-8474	888811/BPLDNA G G
Robertson, A.	TECP	(44)31-667-1081	727442/UNIVED G
Roure, F.	TECP	(33)47-52-68-13	203050/IFP A F
Rucker, D.*	JOI	(202)232-3900	257828/BAKE UR
Saito, T.*	SOHP	(81)236-31-1421x2585	25607/ORIUT J
Sancetta, C.*	CEPAC	(914)359-2900x412	7105762653/LAMONTGEO
Sarg, R.	SOHP	(713)966-6005	9108813649/USEPRTX HOU
Sarnthein, M.	ARP	(49)431-880-2851	
Sartori, R.	SSP	(39)51-22-54-44	511350/I
Saunders, J.	IHP	(41)61-25-82-82	not available
Sawyer, D.*	ARP	(512)451-4238	9108741380/UTIG AUS
Schaaf, A.	SOHP	(33)98-03-16-94x328	941439/SEGALEN F
Schilling, J.	EXCOM	(401)792-6102	257580/KNAU UR
Schlanger, S.	CEPAC	(312)491-5097	not available
Schlich, R.	IOP	(33)88-41-63-65	890518/IPGS F
Schrader, H.	CEPAC	(47)5-21-35-00	42877/UBBRB N
Schuh, F.	TEDCOM	(214)380-0203	794784/ARCO PLNO
Scott, S.	WPAC	(416)978-5424	0623887/GEOLOGY TOR
Scrutton, R.	IOP	(44)31-667-1081	727442/UNIVED G
Segawa, J.	IOP	(81)3-376-1251x259	25607/ORIUT J
Sengor, A.	CEPAC,ODPC	(90)1-433-100	23706/ITU TR
Serocki, S.*	ODP/TAMU	(409)845-2099	792779/ODP TAMU
Shackleton, N.*	SOHP	(44)223-334871	81240/CAMSPL G
Shipley, T.*	PCOM	(512)471-6156	9108741380/UTIG AUS
Sibuet, J-C.	ARP	(33)98-22-42-33	940627/OCEAN F
Sliter, W.	CEPAC	(415)853-8300	171449/PCS USGS MNPK
Small, L.	EXCOM	(503)754-4763	5105960682/OSU COVS
Smith, R.*	JOI	(202)232-3900	257828/BAKE UR
Smythe, D.	ARP	(44)31-667-1000	727343/SEISED G
Sondergeld, C.	DMP	(918)660-3917	200654/AMOCO UR
Sparks, C.	TEDCOM	(33)47-52-63-95	203050/IFP A F
Speed, R.	ARP	(312)492-3238	not available
Srivastava, S.*	TECP	(902)426-3148	01931552/BIO DRT
Stanton, P.	TEDCOM	(713)940-3793	9108815579/USEPRTX HOU
Steele, J.*	EXCOM	(617)548-1400x2500	951679/OCEANIST WOOH
Stein, R.	SOHP	(49)641-702-8365	482956/GRIWOTY UNIGI D
Steingrimsson, B.	DMP	(354)836-00	2339/ORKUST IS
Stel, J.	EXCOM,ODPC	(31)70-82-42-31	20000/MEMO NL
Stephen, R.*	DMP,EPR-WG	(617)548-1400x2583	951679/OCEANIST WOOH
Storms, M.*	ODP/TAMU	(409)845-2101	792779/ODP TAMU
Summerhayes, C.	SOHP	(44)9327-762672	296041/BPSUNA G
Sutherland, A.*	NSF	(202)357-9849	257653/NSFO UR
Suyehiro, K.*	SSP	(81)3-376-1251	25607/ORIUT J
Svendsen, W.	TEDCOM	(612)331-1331	210685/LYHQ UR
Taira, A.*	PCOM	(81)3-376-1251x256	25607/ORIUT J
Tamaki, K.*	SSP	(81)3-376-1251	25607/ORIUT J
Taylor, B.*	WPAC	(33)43-36-25-25x5257	200145/UPMC SIX F
Thierstein, H.	PCOM	(41)1-256-3666	53178/ETHBI CH
Traeger, R.	DMP	(505)844-2155	9109891600/SANDIA LABS
Tucholke, B.*	PCOM	(617)548-1400x2494	951679/OCEANIST WOOH

Van Lieshout, R.	ODPC	(31)2159-457-39	890440/ESF F
Veis, G.	ODPC	(30)1-777-36-13	215032/SATGEO GR
Villinger, H.*	DMP	(49)471-483-1215	238695/POLAR D
Vincent, E.	IOP	(33)43-36-25-25x5162	200145/UPMC SIX F
Vogt, P.	TECP	(202)767-2024	897437/NRL LIMA WSH
von Rad, U.	PCOM	(49)511-643-2785	923730/BGR HA D
Vorren, T.	SOHP	(47)83-70011	64251/UBIBG N
Vrellis, G.	TEDCOM	(30)1-80-69-314	219415/DEP GR
Watts, T.*	TECP	(914)359-2900x533	7105762653/LAMONTGEO
Wefer, G.	SOHP	(49)421-218-3389	245811/UNI D
Weigel, W.	SSP	(49)40-4123-2981	214732/UNI HH D
Westbrook, G.	TECP	(44)21-414-6153	338938/SPAPHY G
Westgaard, L.	ODPC	(47)2-15-70-12	not available
White, R.	IOP	(44)223-333-400	817297/ASTRON G
Whitmarsh, R.*	ARP	(44)42879-4141	858833/OCEANS G
Wilkins, R.*	DMP	(808)948-6513	7238285/HIGCM HR
Winterer, E.*	PCOM	(619)534-2360	9103371271/UCWWD SIO SDG
Wise, S.	SOP	(904)644-5860	5106000494/FSU OCEAN
Wortel, R.	TECP	(31)30-53-50-74	40704/VMLRU NL
Worthington, P.	DMP	(44)9327-63263	296041/BPSUNA G
Zeigler, P.	PPSP	(31)70-773-203	36000/NL
Zierenberg, R.	EPR-WG	(415)329-5437	171449/PCS USGS MNPK

PUBLICATION STATEMENT

The JOIDES Journal is printed and distributed by the Joint Oceanographic Institutions, Inc., Washington, DC, for the Ocean Drilling Program (ODP) under the sponsorship of the National Science Foundation and participating countries. The material is based upon research supported by the National Science Foundation under Prime Contract ODP 83-17349.

The purpose of the JOIDES Journal is to serve as a means of communication among the JOIDES Committees and Advisory Panels, the National Science Foundation, the Ocean Drilling Program, JOI Subcontractors thereunder, and interested earth scientists.

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Additional copies of the current issue and available back issues should be requested from: Joint Oceanographic Institutions, Inc., 1755 Massachusetts Avenue, NW, Suite 800, Washington, DC 20036.

PUBLICATION HISTORY

The JOIDES Journal is published in yearly volumes which normally consist of three issues published in February (No. 1), June (No. 2), and October (No. 3). Publication commenced in 1975 with Volume I and has continued since then. Volume XIV covers 1988.

In addition, there are occasional special issues of the JOIDES Journal which are listed below:

Special Issue No. 1: Manual on Pollution Prevention and Safety, 1976 (Vol. II)

Special Issue No. 2: Initial Site Prospectus, Supplement One, April 1978 (Vol. III)

Special Issue No. 3: Initial Site Prospectus, Supplement Two, June 1980 (Vol. VI)

Special Issue No. 4: Guide to the Ocean Drilling Program, September 1985, (Vol. XI)

Special Issue No. 4: Guide to the Ocean Drilling Program, Supplement One, June 1986 (Vol. XI)

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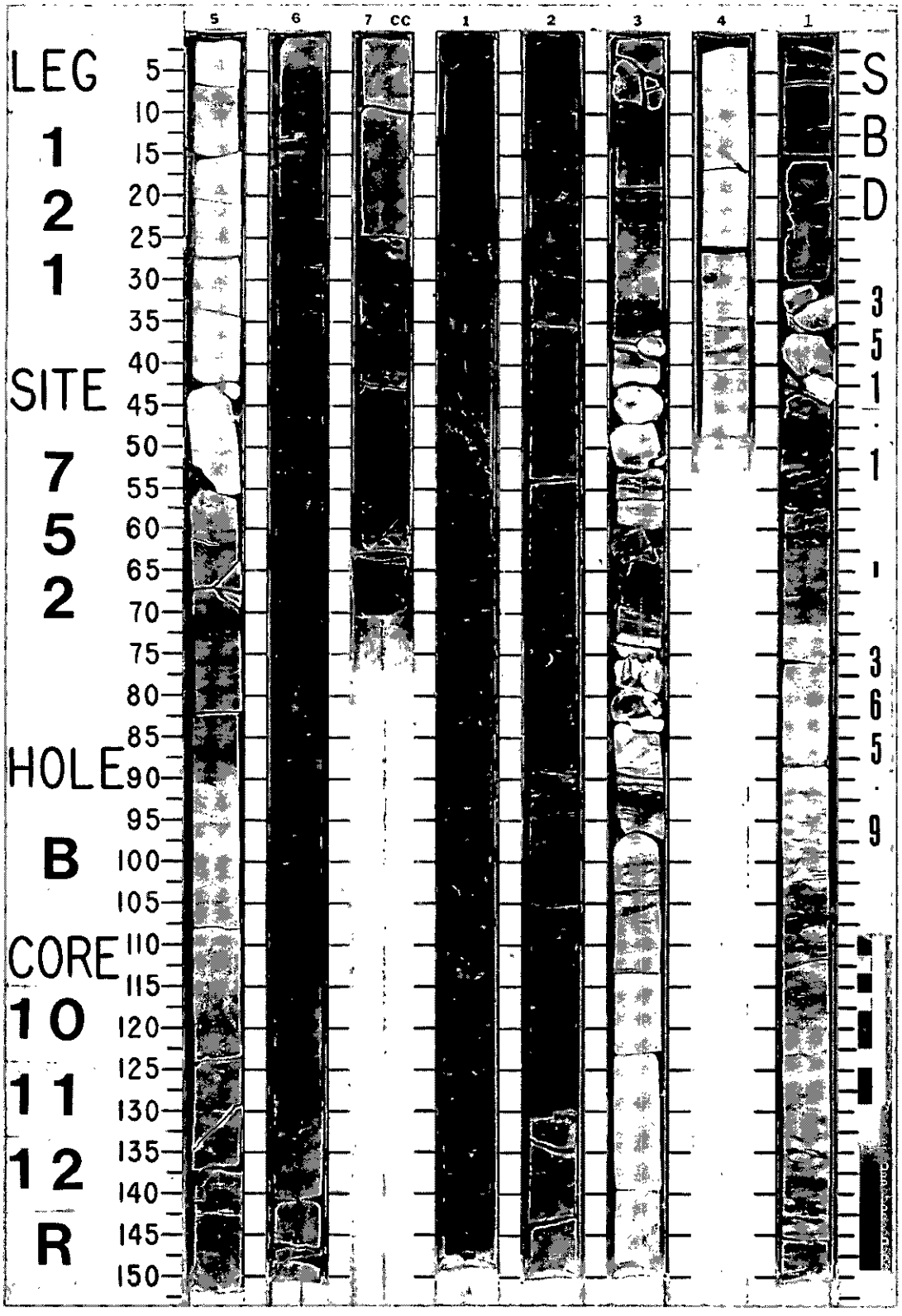
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