JOIDES JOURNAL

Vol. IV, No. 2
June 1978

BUNDESANSTALT für GEOWISSENSCHAFTEN und ROHSTOFFE, FEDERAL REPUBLIC of GERMANY

UNIVERSITY of CALIFORNIA at SAN DIEGO SCRIPPS INSTITUTION of OCEANOGRAPHY

CENTRE NATIONAL pour L'EXPLOITATION des OCÉANS, PARIS

COLUMBIA UNIVERSITY LAMONT-DOHERTY GEOLOGICAL OBSERVATORY

UNIVERSITY OF HAWAII HAWAII INSTITUTE of GEOPHYSICS

UNIVERSITY of MIAMI ROSENSTIEL SCHOOL of MARINE and ATMOSPHERIC SCIENCE

NATURAL ENVIRONMENT RESEARCH COUNCIL LONDON

OREGON STATE UNIVERSITY SCHOOL of OCEANOGRAPHY

UNIVERSITY of RHODE ISLAND, GRADUATE SCHOOL of OCEANOGRAPHY

TEXAS A&M UNIVERSITY DEPARTMENT of OCEANOGRAPHY

UNIVERSITY of TOKYO OCEAN RESEARCH INSTITUTE

USSR ACADEMY OF SCIENCES

UNIVERSITY of WASHINGTON DEPARTMENT of OCEANOGRAPHY

WOODS HOLE OCEANOGRAPHIC INSTITUTION

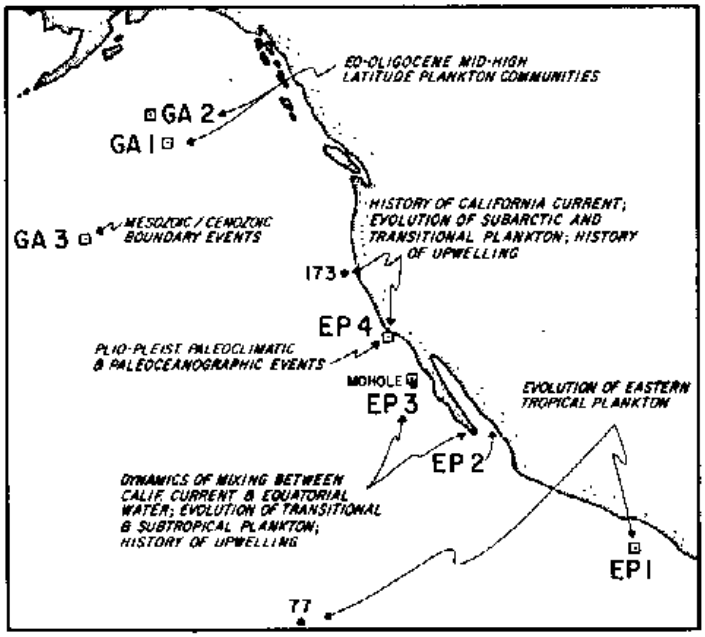


TABLE OF CONTENTS: Vol. IV, No. 2, June 1978

LIST OF FIGURES:

PUBLICATION STATEMENT

JOIDES JOURNAL is printed and distributed by the JOIDES Office at the University of Washington for the International Phase of Ocean Drilling (IPOD) under a grant provided by the National Science Foundation and administered through the Deep Sea Drilling Project at Scripps Institution of Oceanography.

The purpose of JOIDES JOURNAL is to serve as a means of communication among the JOIDES Committees and Advisory Panels, the National Science Foundation, the Deep Sea Drilling Project and interested earth scientists.

The information contained herein is preliminary and privileged and should not be cited or used except within the JOIDES organization or for purposes associated with IPOD. This Journal should not be used as a basis for other publications.

Comments and suggestions concerning the content of this issue of JOIDES JOURNAL should be directed to: Dr. Richard J. Stewart, JOIDES Office, Department of Oceanography WB-10, University of Washington, Seattle, Washington 98195 USA.

Because this is the last issue of the Journal to be published at Seattle, additional copies of this issue and available back issues should be requested from: JOI, Inc., Suite 512, 2600 Virginia Avenue, Washington, D. C. 20037 USA. Future issues will be published by JOI, Inc.

BACK ISSUES

Copies of the following back issues of JOIDES JOURNAL are available from the JOI, Inc. office.

November 1975	Edition 1975/3
March 1976	No. 4 1976/1 (Special Issue: Manual on Pollution Prevention and Safety)
September 1976	No. 6
January 1977	Vol. III, No. 1
September 1977	Vol. III, No. 2
October 1977	Vol. III, No. 3 (Special Issue: Initial Site Prospectus)
February 1978	Vol. IV, No. 1
April 1978	Supplement Number One (for Special Issue published October 1977; Vol. III, No. 3)

PUBLICATION HISTORY

Volume I of JOIDES JOURNAL was composed of the following issues:

May 1975	Edition 1975/1
August 1975	Edition 1975/2
November 1975	Edition 1975/3.

Volume II of JOIDES JOURNAL was composed of the following issues:

March 1976	No. 4	1976/1
April 1976	No. 5	1976/2
September 1976	No. 6	

Volume III of JOIDES JOURNAL was composed of the following issues:

January 1977	No. 1
September 1977	No. 2
October 1977	No. 3 (Special Issue: Initial Site Prospectus; Supplement Number One distributed in April 1978).

To date, Volume IV is composed of the following issues:

February 1978	No. 1
June 1978	No. 2.

JOIDES OFFICE MOVES TO WHOI ---------- JOURNAL TO BE PUBLISHED AT JOI, INC.

Effective July 1978, the responsibilities of the JOIDES Office will be divided between Woods Hole Oceanographic Institution and JOI, Inc. Dr. James Heirtzler of WHOI will assume chairmanship of the JOIDES Planning Committee and all aspects of the JOIDES Office except the publication of JOIDES JOURNAL will be carried out by Dr. Heirtzler's personnel.

Beginning with an issue scheduled for late summer-early autumn, JOIDES JOURNAL will originate from the JOI, Inc. office at Washington, D. C. Requests for copies of back issues of the journal should be addressed to:

JOI, Inc., Suite 512
2600 Virginia Avenue
Washington, DC 20037.

In addition, all JOIDES related travel has been transferred from DSDP to the JOI, Inc. office. All travel associated with GLOMAR CHALLENGER legs will continue to be arranged by DSDP.

TENTATIVE SCHEDULE - IPOD

Leg	Begin	End	Days at Sea	Purpose*
61	22 May, Guam	9 July, Majuro**	48	Nauru Basin (CP-1,2,3; MM-1)***
62	9 July, Majuro	5 Sept, Seattle	58	N. Pacific Paleoenvironment (HR-1, 2; GA-1, 2,3)
63A	13 Sept, Seattle	4 Oct, Los Angeles+	21	E. Pacific Paleoenvironment (EP-3 through 9)
63B	4 Oct, Los Angeles	13 Nov, Mazatlan	40	
64	18 Nov, Mazatlan	5 Jan, Guaymas	48	Gulf of California (GCA-1, 2)
65	10 Jan 79, Guaymas	1 Mar, Manzanillo	50	Gulf of California (GCA-1,2)***
66	6 Mar, Manzanillo	25 April, Manzanillo	50	Middle America Trench (M-1,2)***
67	30 Apr, Manzanillo	18 June, San Jose	49	Middle America Trench (G-1,2,3; EP-1)***
68	23 June, San Jose	12 Aug, Guayaquial	49	Mounds Area, Galapagos (GSC)**
69	17 Aug, Guayaquial	5 Oct, Balboa	50	Old Costa Rica Ridge (GSC)***

*Sites are shown on accompanying map.
**Cruise change only.
***Re-entry scheduled for this leg.
+Global Marine cruise change only.

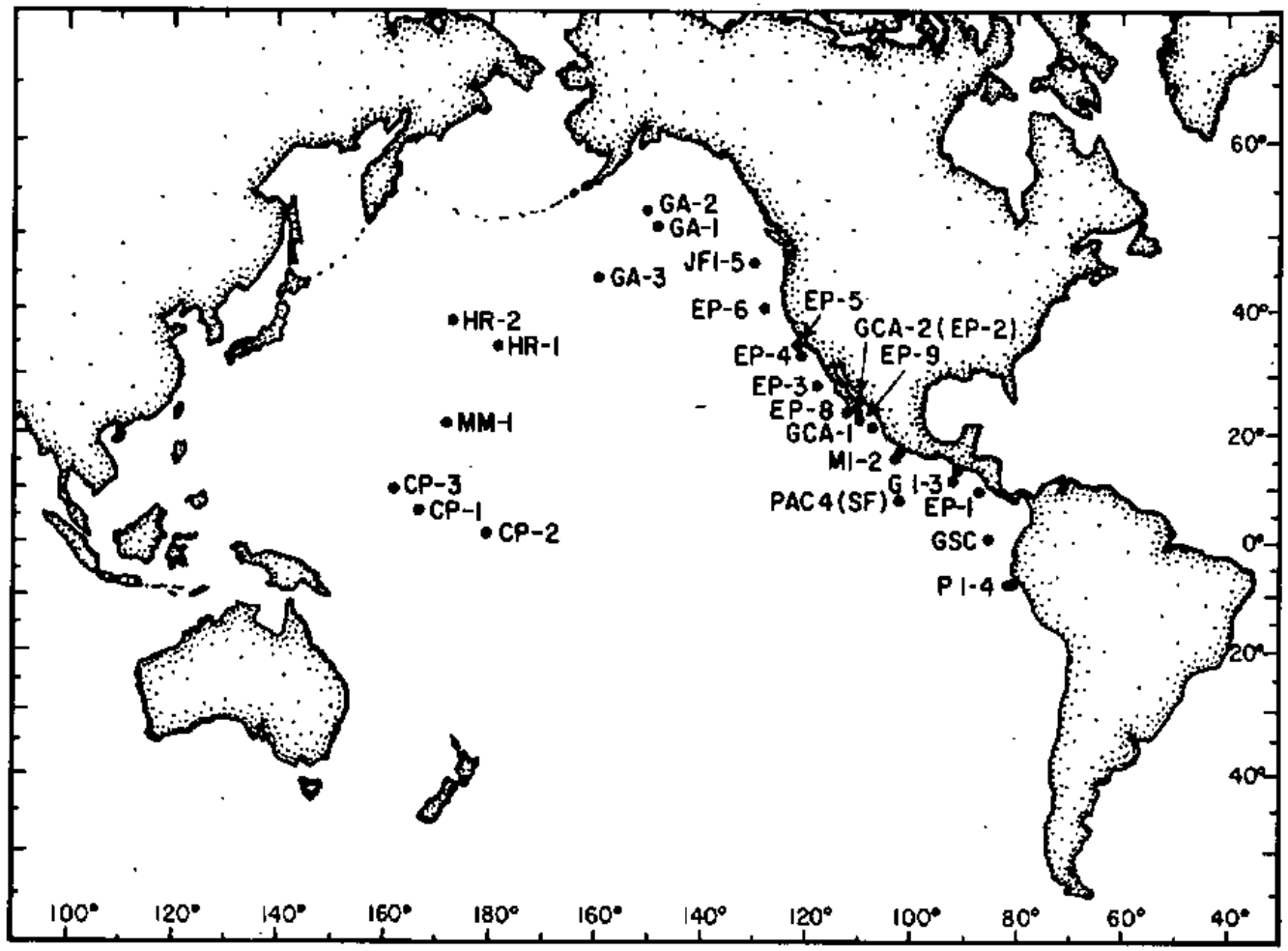
SITE DESIGNATIONS (from PCOM minutes, 5-7 October 1976, Appendix IX)

1. The sites will be designated when a scientific objective and a suitable regional target area have been defined. For example, NP-1: The NP designates the general geographic locality (North Philippine Sea) suitable for drilling to answer a general problem and the numeral one (1) designates the location (area) to solve a scientific objective.

2. When an exact location has been determined, the site is designated by a small letter, for example, NP-1a.

3. If further data dictates modification, then the new site(s) is designated with subsequent letters: for example, NP-1b, NP-1c, etc. All of these would represent alternate sites for solving NP-1 objectives.

4. In summary: NP-1 (x)
where, NP - region chosen to solve a scientific objective
1 - area (or objective)
x - target or exact location



Proposed sites for IPOD drilling in the Pacific Ocean

REPORT FROM THE EXECUTIVE COMMITTEE (25-26 January 1978)

Challenger capabilities

A letter has been received suggesting that further technical review of the capabilities of the GLOMAR CHALLENGER is unnecessary. It appears that future utilization of the CHALLENGER will be somewhat more heavily influenced by budgetary considerations.

Logging

A RFP for logging has been sent out, and DSDP is now in negotiations. Logging will be done on Legs 60, 61, and 63 in FY 1978.

FUSOD distribution

Approximately 1000 copies of the FUSOD report will be distributed by the JOIDES Office, and approximately 1000 copies are available to other interested scientists. Copies of the document may be obtained by writing the JOIDES Office, Department of Oceanography WB-10, University of Washington, Seattle, WA 98195.

CHALLENGER drilling

Drilling by the CHALLENGER is progressing well and the Japan Trench legs were very successful. GMI has maintained its established maintenance program, and since the drydock at San Pedro the breakdown rate has only been 0.7 percent. GMI has a maintenance and reliability plan, and is reorganizing its entire fleet.

FY 1979 budget

The FY 1979 budget is for $16.65 million, which is virtually the same as FY 1978. The budget is a phase-down budget written in terms of the present contract. Included in the budget is $800,000 for site surveying.

IPOD extension through FY 1979

The UK has sent a strong letter of intent to participate in the extension, and NSF has replied. Japan and Germany have informally indicated an intent to continue. France is in the process of formalizing a statement of intent to participate. There has been a request from the Swiss for participation in IPOD.

Report from DSDP

At Site 441 over 6000m of drill string were used. The Gerhardt-Owen logging tools require two people to operate the equipment, resulting in the loss of one science berth. However, the computer associated with the logging tools is usable by the scientists on the ship and can be used to manipulate data in real time.

Budgets

The status of the budgets:

1. The FY 1978 program plan has been approved.
2. The FY 1979 first draft of the program plan has been prepared. The final draft is due by 1 July.
3. The two-year proposal has been submitted.
4. The budget for the GLOMAR EXPLORER program for 6 years, including sea trials, has been prepared (see FUSOD document, page 9).

5. The proposal for FUSOD case 2 = #3 + #4, and has not yet been written.
6. The budget for FUSOD case 3c has been prepared.

The schedule of operations is given in the FUSOD document, page 9. The budget for FUSOD case 3c does not include geophysics and is additive to the two-year proposal. Part of the expenses result from OSDP taking over a GFE (Government Financed Equipment) vessel, and that the budgets are escalated by 7 percent per year. Costs are estimated at approximately $65,000/day, with a rented crew and all consumables, which is considerably less than the $150,000/day costs for a commercial vessel of comparable capability.

The cost estimates in the FUSOD document are in 1976/77 dollars and do not include potential inflation. The revised figures, taking into account possible inflation are:

Case	Millions of $ Total Cost*	Millions of $ Total Cost**
1	396.5	626
2	375.6	584
3	351.6	555
3a	280.3	443
3b	319.1	504
3c	395.7	625
4	447.9	707

*Figures from FUSOD document, Table 3, page 9
**Figures from FUSOD document multiplied by 1.58

It was noted that geophysics, sample analysis and interpretation are not contained in the revised estimates.

FUSOD case 3c is the most favored plan because there are many targets that could still be hit by the CHALLENGER. The OPP has identified 50 non-riser sites, many in the Antarctic.

The Executive Committee resolved to:

1. Reiterate its position of firmly backing the FUSOD document,
2. Recognize that continuity of the program is imperative from the non-U.S. point of view,
3. Express the need for a swift response from NSF for the backing of the two-year proposal,
4. Reiterate the urgent need for the formulation of geophysical plans for the identification of specific site objectives,
5. Support the need for technical assessment of the EXPLORER,
6. Commence formulation of scientific problem definition, especially for the deeper holes.

REPORT FROM THE PLANNING COMMITTEE (16-18 January 1978)

Report from DSDP

Drilling on Legs 55 through 58 - Leg 55 drilled the Emperor Seamounts and was extraordinarily successful. The results of drilling verified the hot spot theory for the origin of the Hawaiian-Emperor Seamount chain. Legs 55 and 57 were the Japan Trench transect and disproved ideas on accretionary wedges and uplifting margins. Apparently the margin of the Japan Trench is an Oligocene emergent terrane with land fossils, sand, etc., and its history is one of subsidence, not accretion and uplift.

Sites 438 and 439 provide good biostratigraphic control for fluctuations in the Kuroshio and Oyashio currents. Sites 438 and 439 encountered acidic rocks only 90km from the present Japan Trench. This implies the existence of an ancient acidic arc east of the present arc. Site 439 also contains pervasively fractured hemipelagic sediments. Two cores are from below the Oligocene sediments and contain Mesozoic benthic foraminifera. These may possibly be accreted sediments.

The results of Legs 56 and 57 will be published together with one volume a site description book and the other reporting the results of scientific investigations carried out on the recovered cores.

Logging was very useful during Legs 56 and 57, and the scientists were able to move one site to a better location because of the results of logging.

At site (441) in the Japan Trench over 6000m of drill string were successfully used.

Logging - DSDP has selected Gerhardt-Owen for logging for the rest of FY 1978 and Legs 60, 61, and 63 will be logged. The Gerhardt-Owen equipment requires a logging engineer and a computer operator on board. Having these extra personnel and a re-entry technician on logging legs decreases the berths available for science. Leg 59 will not be logged because of lack of lead time. Leg 62 will not be logged because it is not as high a priority as Legs 60 or 63. After Leg 63 DSDP will budget money for logging and will also budget for logging in FY 1979.

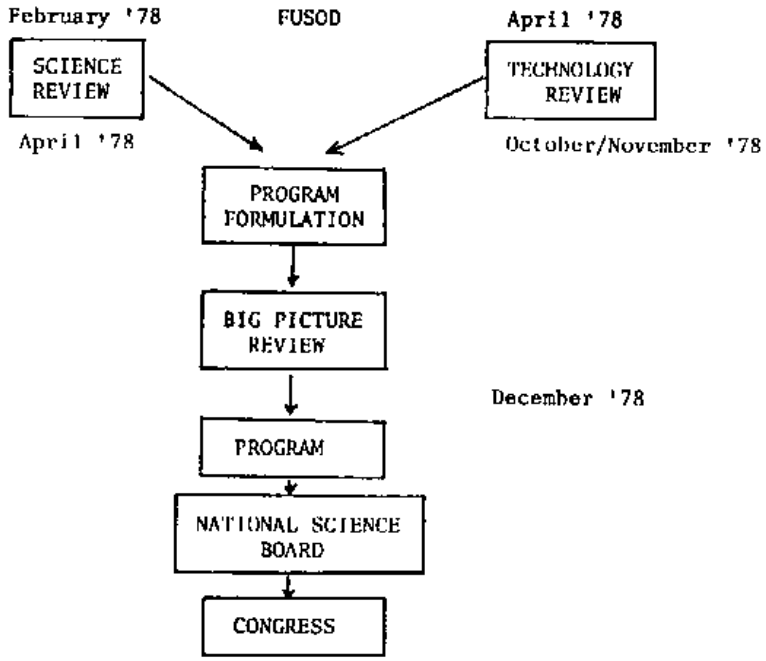
Length of drill string - DSDP has a contractural agreement with GMI for a drill string 25,000 ft long (7600m). As a practical consideration this exceeds the actual capability because it is based on using "brand new" pipe, rather than the "premium grade" pipe currently in use. "Brand new" pipe has no visible pitting, whereas in "premium grade" pipe all pits are shallower than 20 percent of the wall thickness, and 80 percent of the wall remains. If DSDP were to use 4000 ft (1219m) of "brand new" pipe above "premium grade" pipe, calculations suggest a string 24,500 ft (7467m) long is possible.

Report from NSF

Review of the new program - The basis of the review of the new programs will be the FUSOD document and the two-year proposal. The review will be a two-step process involving consideration of the scientific merit and technological requirements, followed by program formulation, and finally a "big picture" review. The product of this review will be the final program plan, which will be presented to the National Science Board. If it receives a favorable review from the Science Board it will be presented to Congress.

The technology review will be done by an outside contractor to be selected by April 1978.

The technology review will probably be done by the Marine Board of the National Research Council Assembly of Engineering. A part of the technical review will be a reevaluation of the studies done on the technological requirements for ocean margin drilling and on the conversion of the GLOMAR EXPLORER and will be done by an outside contractor. Results should be available by October or November. The science review will be done by a new federal advisory panel set up especially for this task. This panel will meet for the first time in February and should complete its work in three months. The "big picture" review should be started before the science review is complete, and should report its results by the end of 1978.



Report from the Downhole Measurements Panel

DMP activities - There have been two successful legs with logging in crustal rocks, and three successful legs with logging in thick sediments. DSDP is now getting very high quality logs. Funding for logging has been provided by the UK, Japan, DSDP, and Schlumberger. The program on measuring heat flow has not been active since Leg 48. The oblique seismic experiment was carried out on Leg 52. The Pore Water Sampler was used successfully on Legs 47B, 49, and 56.

Logging - Having logging with on board computer allows shipboard scientists to work in real time with the logging data. The only known problems appear to be those associated with computer failure. However, the computer appears to be very reliable.

The present Gearhardt-Owen density tool does not fit the drill pipe requiring development of a new tool which should be ready by March, in time for Leg 60.

The DMP recommends that logging be carried out in as many holes as possible.

Heat flow - The heat flow program had been successful earlier, but no measurements have been taken in the past year. Only one of a number of questions has been answered reasonably well, namely that standard shallow-penetration ocean probe measurements do represent the deeper heat flux. Temperature is critical for estimates of in-situ values for most physical properties, for mineralogy, and for alteration both in sediment and in crustal rocks. Temperature and heat flow measurements in crustal holes provide the most important data for outlining the extent and pattern of hydrothermal circulation in the ocean crust. We have valid measurements so far only in 2 or 3 holes, and not to great depth. Heat flow is also a critical diagnostic parameter for processes in trenches, providing a major constraint on the many thermal models of subduction zones. We have no good temperature data in the active margin holes drilled so far.

The AMP recommended that DSDP buy the Quick Thermal Conductivity Meter (QTM) which was loaned for use on Leg 55. Apparently it has been quite successful, and the AMP still suggests DSDP purchase it. However, downhole temperature values are needed in addition to conductivity in order to get the best heat flow results. Thermal conductivity should be measured on all hard rocks. The DMP recommends that DSDP acquire the QTM and take over, on a routine basis, the measurements of thermal conductivity.

Downhole magnetometer- Expert commentary, mostly favorable, has been received by DSDP on the downhole magnetometer. The PCOM gives it lesser priority than logging. The comments will be sent to the DMP together with the availability and cost of the instrument. The DMP recommends that DSDP purchase the downhole magnetometer.

Oblique seismic experiment - The DMP recommends that more experiments should be encouraged.

Large scale resistivity experiment - The DMP feels this is a very valuable experiment. There is no other effective large scale resistivity measurement technique that can be compared to small scale sample and logging resistivities to give large scale crack and fissure porosities. Such porosities are important to our understanding of hydrothermal circulation in the crust and the availability of water for alteration. The experiment is scheduled for Leg 60 and the equipment has been flown to DSDP where it will be checked for compatibility, etc. The experiment is planned for a site in the Mariana Trough.

Permeability and hydrofracturing experiment - The experiment would be extremely valuable scientifically if reliable data were obtained. Permeability is a critical (and virtually unknown) parameter for our understanding of hydrothermal circulation in the oceanic crust. Hydrofracturing would give measurements of in-situ stress and thus information on the driving forces in the lithosphere.

Report from the Industrial Liaison Panel

A report was distributed on whether JOIDES is demanding more of the CHALLENGER than she is capable of delivering. The report points out that future utilization of the ship will be dictated by monetary qualifications rather than technical capability.

Report from the Information Handling Panel

Summary maps - The IHP strongly supports the recommendation of the SSP that a series of maps be prepared by Site Survey Management (SSM) (or the responsible individual at the institution contracted to do the survey) summarizing the information obtained from each site survey, and recommends that:

1. A summary map be prepared for each site survey which was contracted for by SSM, whether or not the site was subsequently drilled.
2. These maps should be collected and published as folios whenever a sufficient number has been completed, and those maps representing sites chosen for drilling should be included both in the folios and in the appropriate IR's.
3. The SSM summary maps should include text stating what kinds of data were obtained, who obtained the data, where the data are, and how interested scientists can get the data.
4. A uniform format should be adopted for the summary maps, and non-U.S. groups making site surveys should be encouraged to produce summary maps in the same format.
5. Publication of the site survey map folios should be coordinated with the DSDP Science Services group to take advantage of their editorial skills and publishing experience, and to achieve compatibility with the IR's where possible.

The IHP encourages SSM and the SSP to pursue the publication of site survey results and interpretations in synthesis volumes, using journals outside normal DSDP publications. It is understood that these publications should incur no direct costs to DSDP.

Site survey core data - The IHP recommends that a plan should be prepared of what should be done to collect and encode site survey core data and to relate them to drill sites. For this work it will be necessary to develop an equivalency table for all the various designations that have been assigned to a site.

Shipboard computer - DSDP has obtained a small computer specifically for acquisition and calculation of GRAPE data. Because we do not have a continuous core, GRAPE data are the best way of getting back into the logging data.

Request for data base - The USSR is exploring the possibility of establishing a duplicate of the entire data base at the Institute of Sea Geology and Geophysics, USSR Ministry of Geology at Riga. Programs written for the UCSD computer would be of no use but write-ups of program design could assist USSR programmers in developing their own software. Data from a selected hole will be copied and sent to the USSR as a test to see if such an idea is practical.

Future planning - The IHP recommends that by October 1979 all data bases should be completely up to date and that there should be no backlog. All programs should be completed and documented, and provisions made for the continuation only of production work - adding new data and performing searches. To accomplish this, no new design or software projects should start after March 1979. By October 1981 the data bases should be complete.

The IHP recommended that the NSF should be encouraged to plan for long term continuation of funding to maintain the integrity of the core and data collections.

Report from the Inorganic Geochemistry Panel

Bulk chemistry of sediments - Some concern was expressed regarding sampling strategies and standards. The IGP recommends that each contribution to the IR's on the chemical composition of solids should report, on a blank basis, the analysis

of at least one internationally recognized standard (USGS or equivalent).

Euxinic environments - The IGP is very interested in geochemical studies of carbonaceous shales, an exciting area of research through which geochemists can provide answers to questions about ancient euxinic environments.

The IGP strongly recommends that geochemical studies be emphasized during legs sponsored by the OPP, and the IGP can provide liaison.

In-situ sampler - The in situ sampler has generated much interest, and part of the water collected is partially analyzed on ship, and part of the sample is sealed in glass for later analysis.

Pore water sampler - The pore water sampler was used on Legs 47B, 49 and 56.

Both the in situ sampler and the pore water sampler have been donated to DSDP. Samples from these instruments could prove valuable for organic geochemists. Requests for use of these instruments should come through DSDP.

Geothermal drilling - The IGP has great interest in the hydrofracturing experiment. The packer can easily be adapted to contain a geochemical sampling device. This should yield valuable information on the composition of "interstitial" fluids in the basalts. The Panel also recommends a large logging and downhole experiment program, including heat flow and conductivity measurements. Sediment recovery should be complete at all sites drilled, with at least two in situ interstitial water samples obtained at each site. The IGP also wants to have a geochemist on the Gulf of California and Galapagos legs.

Report from the Ocean Crust Panel

State of planning - The OCP Working Groups are now functioning well. How to proceed with planning will be taken up at the next OCP meeting. The OCP has no site survey problems.

Items of interest for the PCOM:

1. The OCP requests that crustal holes should, whenever possible, be left uncemented.
2. The OCP does not support the idea of regional panels, and prefers regional working groups and subject panels.
3. The OCP requests that the PCOM appoint the Co-chief scientists for legs 68 and 69 now, and suggests similar action soon on the Gulf of California legs.
4. The OCP priorities on the South Philippine Sea transect are for the MR site at SP-4 and single bit sites at SP-6A and SP-3B.
5. The OCP is now in agreement with all parties on recommendations for planning for Leg 61, with provisions made if basement is not reached in the Nauru Basin.
6. The OCP recommends that GA-1 be drilled until the bit fails.
7. The OCP supports reentry at site GCA-1.
8. The OCP is unable to give a very high priority to drilling in the Venezuela Basin.
9. The OCP views on the use of the SEAPROBE are being submitted.
10. The OCP reiterates its request that substantial basement penetration should happen in all holes meeting basement, both because of the scientific usefulness, and so as to be able to give good advice on the nature of the basement.

11. The OCP has produced a revised set of mandates.
12. The OCP has considered the hydrofracturing experiment, and suggests a different timing for the preliminary experiment.
13. The OCP reminds the PCOM that PAC-5 and PAC-6 still exist, and have a high scientific priority.

The PCOM reaffirmed the prior decision that if "basement" is encountered, that DSDP is to drill at least to the life of the bit or the first 100m, whichever comes first.

Report from the Active Margin Panel

QTM instrument - The Quick Thermal Conductivity (QTM) instrument has proven to be useful during Legs 56 and 57 and is the instrument the AMP requested DSDP to purchase. Even apart from the heat flow program, thermal conductivity of core samples, and especially of hard rocks, should be measured as a basic physical property, and measurement by the QTM can be performed routinely.

AMP priorities - The AMP's priorities for future legs in the event of no drilling in the Gulf of California are stated in the minutes for 3-6 August 1977, and consist of additional drilling in the Middle America trench and transects in the Peru-Chile Trench and Caribbean Sea.

AMP request for interlocking legs - The AMP asks DSDP to ensure in the future that on two interlocking legs the cores from the first legs should be available for examination by scientists of the second of the two related legs. The problem of storing and offloading cores was noted, which creates many problems for the technicians when too many cores are allowed to accumulate on board.

Drilling off Middle America -

1. The AMP endorsed the Middle America Trench Working Group Report.
2. The AMP has confirmed unanimously that the areas off southern Mexico and off Guatemala still remain the AMP priority objectives in the Middle America Trench region.
3. The AMP has endorsed unanimously the emplacement of downhole geophones in holes off Mexico and Guatemala.
4. The AMP recommends that if only one strain meter is available, it should be placed in a hole that provides the best opportunity to measure the strain in the tectonic accretion zone of a subduction system in the Middle America Trench region.
5. The AMP recommends that if two strain meters are available, the second meter should be emplaced on the same traverse as the first, but on the oceanic plate.

Alcoa SEAPROBE - Assuming stability and station keeping characteristics of the vessel permit effective drilling, then the AMP considers the SEAPROBE could have a useful potential for downhole experiments, provided the hole remains operational. However, this support has to take into account the limited depth capability of the vessel.

Caribbean drilling - The AMP is interested in two sites that may possibly intersect a subduction complex, CAR-1A, 1B, 1C and CAR-2.

Report from the Passive Margin Panel

Report from the Gulf of California Working Group:

Site surveys - The forthcoming site survey cruise on the R/V THOMAS WASHINGTON will be concentrated in two areas, the mouth of the Gulf and the Guaymas Basin. The cruise will conduct underway geophysical surveying, rock dredging, piston coring, heat flow measurements, and dissolved helium sampling in the water column. Surveying efforts will be directed toward planning two transects of drilling sites. The transect in the mouth of the Gulf will extend from the youngest possible crust near the crest of the East Pacific Rise toward the tip of Baja California across successively older crust and onto the continental crust of Baja California. A second transect in the Guaymas Basin is aimed at identifying sites where it will be possible to look at "proto Gulf" sediments, the late Miocene to Pliocene sediments deposited prior to the rifting of the Gulf.

Drilling plans - As now planned, two legs will be devoted to drilling the Gulf, the first leg being a series of single bit holes and the second being two multiple reentry holes. The single bit holes will be in two transects, 5 or 6 holes across the mouth of the Gulf, and 5 or 6 in the Guaymas Basin. Of the two multiple reentry sites, one will be on the East Pacific Rise in the youngest possible oceanic crust, and the second will be on the bottom of the Guaymas Basin. The drilling in the Guaymas Basin will require approximately 5 single-bit holes; one in zero age crust over what is interpreted as being a magma chamber in the rift sector of the basin; two on slightly older crust but still on the basin bottom; and at least two up on the flanks of the Gulf on either the mainland or Baja California side in proto-Gulf sediments, providing locations can be found where these older sediments outcrop at the sea floor updip of the drilling site.

Logging - The Working Group recommends that logging be done on the first leg of single bit sites when the logging capability is present on the ship. Heat flow will also be run in the holes, and the program will be coordinated with the ROSE experiment. The Working Group will request that the reentry sites be left open for instrumentation because the area is so active tectonically and because of the proximity of the sites to shore.

PMP recommendation - The PMP recommends that a X-ray diffraction apparatus be purchased for use on board GLOMAR CHALLENGER.

Proposed PMP drilling programs -

1. Plan A: Plan A is a proposal for the use of the time tentatively allocated for passive margin study in the two year continuation program of drilling without a riser, assuming that it will be funded, with or without a hiatus. In this plan the PMP recommends:

   a. Three legs drilling off eastern North America, including the Delaware, Blake Plateau, and Grand Banks areas.
   b. Three legs drilling off northwest Europe, including Biscay, Galicia, and Rockall areas.
   c. One leg drilling in the Venezuela Basin. The Venezuela Basin is a high priority drilling area for the PMP.

2. Plan B: Plan B assumes that the continuation will not be funded and that the project will terminate in late 1979. In this plan the PMP recommends that three legs of the remaining part of the IPOD-I program be directed to drill-

ing in the eastern margin of North America and in the Venezuela Basin, in addition to one leg of passive margin drilling in the Gulf of California. In addition to these areas, in which the PMP specifically recommends a survey and drilling program, the PMP recognizes the importance of a number of problems on mid-low latitude margins in the North Atlantic area. If weather, safety, and logistic conditions should result in drilling time being made available, the fullest consideration should be given to these areas, including NW Africa, the Demerara Rise, the Grenada Basin, and the Barbados Ridge.

Areas of interest to the PMP -

1. Caribbean: The PMP continues to support drilling in the Caribbean, even though these are not passive margin sites. The PMP accepts the White Paper generated by the Mediterranean-Caribbean Working Group and places their sites in approximately the following priority order: Venezuelan Basin highest, Barbados Ridge, Grenada Basin, Colombia Basin, and Nicaragua Rise, in descending order.

2. Northeast Atlantic: The two areas of major interest to the PMP for the IPOD-I Extension and IPOD-II are the northeastern and northwestern Atlantic. The PMP proposes to continue programs already started in these areas and add to existing knowledge, planning all future drilling along several transects, which would then hopefully be completed by deep riser drilling during IPOD-II. The margin of the northeastern Atlantic, particularly in the Rockall, Biscay, and Galicia areas, contrasts with the margin of the northwestern Atlantic in that it is a starved margin, generally distinguished by the absence of a thick prograding sediment cover of Cretaceous and Tertiary age. The underlying structure can be seen in multichannel seismic data to consist of a series of tilted and rotated fault blocks bounded by listric faults. These faults converge at depth, with a deep, flat-lying reflector lying close to a 7.0 to 7.5 km/sec refractor and just above the MOHO.

3. Northwest Atlantic: The ultimate target of the passive margin survey and drilling program is the east coast continental margin of North America. It will be essential to the success of the IPOD program, either with or without the two-year continuation and IPOD-II, that more drilling be done in this margin. Some targets can safely be reached with the present capabilities of the GLOMAR CHALLENGER and are proposed for the IPOD-I continuation of the last legs of the presently funded drilling program, should the project be permitted to terminate in late 1979. These hopefully would be followed by IPOD-II drilling to complete the transects started during this earlier phase. Specific areas of interest are the Blake Plateau, Delaware continental slope and rise, and the Grand Banks area, but much more surveying is necessary before specific sites can be proposed.

4. Northwest Africa: The PMP fully recognizes logistical problems with planning a two-year continuation program approximately half devoted to the North Atlantic and half devoted to the South Atlantic. Because of limited good weather during the summer in each ocean, and the necessity to transit the mid and low latitudes, some logistical compromises may be necessary to maximize scientific return of the program. If this should be the case, northwest Africa is a secondary target for the PMP program, to continue and complete transects started during the JOIDES and earlier IPOD phases. Important passive margin and paleoceanographic problems may be solvable in this region.

5. West Central Atlantic: As another secondary target, should weather, safety, and logistic conditions result in modification of the ideal program, the PMP continues to look at the importance, largely paleoceanographic, of establishing the relationship between oceanic sections and the well established land and shore

sections in such places as the Demerara Rise, Barbados Ridge, and Grenada Basin.

6. South Atlantic: The PMP strongly supports the interest of the OPP in considering the depositional environment along continental margins. The southwest African continental margin and the oldest parts of the Walvis Ridge are unique targets for studying the horizontal and vertical gradients of black shale environments. The South Atlantic Working Group of the PMP is prepared to participate with the OPP South Atlantic Working Group to propose sites in this area, which may also provide information on the evolution of those continental margins.

Report from the Ocean Paleoenvironment Panel

Scheduling of South Atlantic legs - For scheduling purposes in the South Atlantic the OPP wishes to complete the Southeast Atlantic program prior to the Southwest one. The Southeast program stands by itself, whereas the Southwest is linked in part to the Southern Ocean program which was to have been drilled during the present phase. It was delayed because of schedule changes and an assurance that a continuation of drilling was highly probable. Experience gained while drilling in the Southeast Atlantic transect will be useful in ranking the order of sites to be drilled in the Southwest Atlantic.

Scheduling of Legs 61, 62, and 63 - Leg 61 (Nauru Basin) represents a unique chance to obtain the only early Mesozoic record of the environment of the world ocean outside of the young opening Atlantic. Implications for understanding the early evolution of the Atlantic and of the Tethys margins now uplifted in Tertiary fold belts are of outstanding importance. The OPP recommends that the highest priority be given to Site CP-1 in the Nauru Basin, and that a major effort at deep penetration be attempted at that site. Site CP-2 is of no interest for the OPP because it lies on younger crust and in the vicinity of Site 166. Site CP-3 (Mariana Basin) is the only alternate site presently supported by the OPP.

Hydrofracturing experiment - The OPP expressed reservations toward such an experiment scheduled for Leg 61 because that leg might need all the time available for drilling. The OPP suggests that this experiment could be conducted later in the program, during Leg 62, or, preferably, in the Gulf of California.

Caribbean sites - Caribbean sites will be ranked by priority by the OPP after all pertinent data have been considered. They may add additional sites.

Geotimes article - The draft of the Geotimes article has been received. It is a condensed and extensively revised version of the OPP White Paper.

Priorities for Leg 62 - The OPP noted that site MM-1 is a very high priority site. The sites on the Hess Rise will be presented to the Safety Panel in March. The OPP would rather not have extensive basalt penetration at all Gulf of Alaska sites.

Leg 63 sites - The primary purpose of Leg 63 is to follow and characterize the California Current. A geological summary and priority ranking for each site from north to south is noted below. Estimated drilling times are shown. Transit consumes about 7-9 days. This is the first discussion of several new sites.

Site	Summary of geological setting	Priority
EP 6 (ex EP-E)	Located near 39°N in 4400 meters water, distal Delgado Fan, just south of Mendocino F-Z, Northernmost site along path of California Current. Comparison with Sites 34 and 173 for cross-current transect. Scan survey available. Sediment thickness about 350 meters.	2 (4-5 days)
EP 7 (ex EP-F)	Distal Monterey Fan. Apparently pelagic-filled basin overlain by distal fan sediment.	3 (6-7 days)
EP 4B	Northern Tanner Basin (Patton Basin). Unique expanded late Neogene section for this latitude.	1 (8-10 days)
	Further multichannel survey is planned	
EP-4A	On Patton slope (escarpment). Not as attractive as EP 4B (thinner section). Considered as alternate to EP 4B if safety problems insurmountable.	1 (4-5 days)
EP 5 (ex EP-D)	At foot of Patton escarpment. No safety problems. Part of transect with EP 4B(4A) for study of lateral variations in California Current flow.	1 (6-7 days)
EP 3	Near Guadalupe. Very close to experimental Mohole test site, in area of current mixing. No apparent safety problems.	1 (10 days)
EP 8 (ex EP-B)	Off Southern Baja, California. Site located just north of area of strong gradient on sea surface temperature.	2 (4-5 days)
EP 9 (ex EP-A)	San Lucas Fan, at tip of Baja Peninsula. Site is essentially same as one site proposed by PMP for transect near mouth of Gulf of California.	3 (6-7 days)
EP 1	Guatemala Basin, eastern tropical Pacific. Deep-water site on early Tertiary crust. Section mostly pelagic.	1 (4-5 days)

If maximum days for each site are summed and added to transit time it is apparent that Site EP 7 must be dropped early in the leg. The PCOM must consider working EP 1 into a later leg.

Discussion on EP 4. This site is one of the most important targets for Leg 63 for the following reasons:

1. It is located at a hinge point in the current system which is very sensitive to oceanographic changes.
2. It is beneath a zone of mixing between high and low latitude faunas, characterized by important ecological stress, and is therefore very useful in evolutionary and biostratigraphic studies.
3. It is an area in which there exists a solid geological and geophysical background of knowledge which will be greatly enhanced by the results expected from a site probably characterized by a greatly expanded sequence of fine grained sediments.

Location of Southeast Atlantic sites - Many of the sites in the Southeast Atlantic lie close to 50°S, and it was inquired as to how rigid the insurance limit was. The insurance requirements will be checked.

Report from the Organic Geochemistry Panel

OGP manuscript prepared - A manuscript on "The Role of Organic Geochemistry in DSDP/IPOD" has been prepared by the OGP. It will be condensed and submitted to Science. Copies of the manuscript can be obtained by writing the JOIDES Office.

Organic geochmistry - Legs 1-44 - A list showing the authors, leg, volume, and pages has been compiled for Legs 1-44, including a short description of the organic geochemistry that has been done on each leg. The OGP emphasizes that routine sampling should always be performed on each leg. Forms indicating interest by organic geochemists in upcoming legs have also been prepared, and indicating intent to sample frozen samples. If there is no shipboard organic geochemist, then the OGP chairman will prepare the report on the organic geochemistry of the samples.

GSA symposium - The Proceedings of the GSA Symposium on "Organic Geochemistry of DSDP Cores", held in 1976, have been prepared for publication in Science Press.

Procedures in operations handbook -

1. Routine sampling for organic geochemistry - Organic geochemistry samples are usually taken at each site by the chemistry technician for shore-based studies. Fifty (50) cm sections of the core may be removed every 50 m, with the exception of igneous rocks. Sampling of material of high interest to the organic geochemistry community (i.e., black shales) may be increased to one section every two cores, if full recovery, at the discretion and approval of the Co-chief scientists and Staff representative of the appropriate leg.

2. Gassy sediments sampling program - Samples of gassy sediments are to be collected in No. 2 metal cans for determinations in shorebased laboratories of the concentration and molecular and isotopic composition of gas and gasoline-range hydrocarbons. One set of duplicate samples should be collected, if possible, from every gassy core. Details of collection procedure are to be found on pages 4 and 5 of the 6 November 1977 minutes of the OGP.

Instrumentation -

1. Pyrolysis-Flame Ionization - The instrument has been purchased and installed on the ship. It should be used routinely only if there is an organic geochemist on board.

2. Freeze Dryer - There are problems with freeze drying samples, including the introduction of artifacts during the freeze drying process (new compounds formed), and backstreaming from the compressor if the system is not properly protected.

3. Back-up Compressor - The OGP recommends the purchase of a back-up compressor so that if the shipboard compressor fails, the samples can be kept frozen.

4. Pressure Core Barrel - The OGP recommends that a committee be established to determine the use of the pressure core barrel, with representatives from OGP, IGP, and PPSP. The pressure core barrel will be used on Leg 60. A group will meet and report to the PCOM on whether to proceed further with the pressure core barrel.

Report from the Sedimentary Petrology and Physical Properties Panel

Ad hoc committee on symbolic coding of sedimentary structures - The purpose of this committee is to develop an improved symbolic code of sedimentary structures for use aboard the CHALLENGER. The committee has submitted a 10-page report to the SP4.

Technical manual - The SP4 feels that the manual should be published. Authors need to be reminded that manuscripts should be submitted before the Leg 44 IR appears, and there will be an opportunity to make appropriate revisions up to and including Leg 44.

X-ray diffraction - The SP4 supports the request for access to XRD equipment on the CHALLENGER as long as the following conditions are met by the sedimentary petrology participants:

1. It should not be used on a routine basis. Rather, it is intended for the use of participants who have a specific requirement for XRD data at the time of sampling and who can operate the equipment themselves.
2. A desk top film (camera) unit should not be acquired, as it is inconvenient to use and very time consuming.
3. An XRD spectrometer, with strip chart output, should be acquired. Because the need to use this instrument for qualitative checking of smear slide identifications and not for resolving difficult mineralogical problems, a relatively low cost, non-stabilized generator will suffice. The cost is tentatively assigned at $40,000 for a complete unit.

X-ray fluorescence equipment - The SP4 cannot support the special purchase of XRF equipment. Sample preparation for sediment work is extremely time-consuming and by no means routine. This is not the case for hard-rock (i.e., basalts) analyses. Because the CNEXO equipment has been successfully used on ocean crust legs, and is apparently still extant, the SP4 suggests that the use of this equipment be requested for appropriate use on forthcoming legs. A desk-top XRF unit would only be good for qualitative analyses and could not be justified for sediment work.

X-radiograph unit - The SP4 has no objections to utilizing the DSDP's x-radiographic equipment for occasional use aboard the CHALLENGER, providing that (1) it be operated with regard to appropriate safety regulations, (2) film development can be accommodated in the dark room, and (3) space is available. It is assumed that the existing Faxitron equipment is in operating condition. The purchase of equipment having a regular fluoroscrope-type screen is not recommended. The resolution of such equipment is very poor compared to film x-radiography. On the other hand, electronic image-intensification-type fluoroscopy with either CRT or TV-tube output is practical and probably has the required minimum resolution. Such equipment is expensive, however, and purchase for DSDP use is not warranted without full justification by potential users.

Color photos of drill cores - Color photos at a 1/3 scale have been superseded by 8 x 10 in. prints at a scale of 1/10, which are poor for detailed studies. This is especially important because this is the only way in which these data can be preserved, as the cores fade with time. There is a tremendous loss in resolution and quality in the present system. If this is documented it definitely needs further investigation.

Large samples - The SP4 agrees in principle that large samples should be made available to bona fide users provided that each request is evaluated on its own merits relative to other possible users.

Tephra - The SP4 has discussed the overlap in interest between OCP and SP4 concerning the occurrence of sedimented pyroclastic material in DSDP cores. The panel members believe that there is a legitimate interest in such sedimentary components and are anxious to ensure that adequate attention is paid to such components in the normal shipboard work. The SP4 requests that where sufficient material is available some routine shipboard and shore laboratory analyses (especially carbonates and water content) be performed. It is recognized that this matter also is of direct concern on ocean crust legs, where specialized studies would presumably be undertaken, and that there also may be some interest in these materials to the IGP as sedimented tephra influences the bulk chemical composition of such sediments.

The OCP feels that the problem with tephra should be an AMP problem, and should be reviewed as to how it is handled, especially because a great deal of data on the history of volcanism are contained in this material.

Core quality - The SP4 continues to recommend that the best obtainable sediment samples be raised at all times. Particular care to obtain the sedimentary section overlying igneous rock is especially requested.

Syringe technique - The SP4 recommends that the syringe wet bulk density, porosity, and water content techniques should be terminated immediately. The syringe technique should immediately be replaced by 15-20 g core subsamples. taken from representative lithologic units having minimum disturbance,and placed in well-sealed vials reserved for shorebased testing. Water content and specific gravity (density) measurements are to be made in the shore laboratory as soon as possible after receipt. Wet bulk density and porosities can be determined readily using standard techniques. These measurements are critical for grain densities from major lithologic units for the control of GRAPE and other essential scientific and engineering wet bulk density and porosity calculations.

The PCOM accepted the suggestions of the SP4 on the syringe technique.

Non-standard data - The SP4 recommends that all such data are to be clearly and unequivocally labeled in the IR's, in the DSDP data bank, and when they are sent to any requestor that they are non-standard and cannot be directly compared to standard data. The SP4 strongly goes on record that under no avoidable circumstances should non-standard data be collected instead of standard data.

The SP4 recommends that the Co-chief Scientists require a signed statement, on a suitable form, from all members of the scientific party to the effect that they will perform all relevant DSDP standardized and required measurements and/or observations, insofar as possible, as a prerequisite to being permitted to join the ship.

The Science Representatives aboard the CHALLENGER will be informed of these suggestions and will monitor the activity on the ship to be sure data are collected correctly.

Special techniques - The SP4 recommends that shipboard scientists and engineers should be encouraged to experiment with non-standard measurements, and should communicate recommendations for improvement to the chairperson of applicable JOIDES Advisory Panel(s) and to the DSDP Chief Scientist.

Funding of an ad hoc physical properties meeting - The SP4 requested that funds be made available for the SP4 ad hoc committee on review of physical properties to meet for two days at DSDP sometime during the first half of 1978; if not possible during this period, then as soon afterwards as can be arranged or funded. At this meeting physical property problems in science and engineering will be bounded and an action plan formulated that subsequently can be carried out by mail or conducted at a professional society meeting.

The PCOM accepted the request of the SP4 for funding of a meeting of the SP4 ad hoc committee on review of physical properties.

Report from Site Survey Panel

Site surveys to be conducted in 1978 - French and German plans are for surveys in the Southeast Atlantic, mostly in the Walvis Ridge area. The Japanese plan a post-drilling survey in the Japan Trench, and the U.S. site surveys will be concentrated in the Gulf of California, the Middle America Trench, and in the Galapagos area. A post drilling survey is planned by WHOI at the AT-2 sites (Legs 51-53).

Publication of site survey results - SSM has initiated the compilation of a summary map in which the primary results are presented. Principal investigators have been asked to prepare similar maps for their areas. These maps could be published as a folio, for example, one for the Atlantic and one for the Pacific.

The PCOM requested SSM to prepare an inventory of all U.S. and non-U.S. IPOD site surveys as far as is possible.

Lead time for site surveys - The major problem of inadequate lead time between site surveys and actual drilling was noted. The SSP has a difficult problem in that their operations require very long lead times, often as much as two years. The Panel Chairmen need to be alerted to the fact that the SSP cannot respond on short notice.

Report from the Stratigraphic Correlations Panel

Review of shipboard collections - The SCP has conducted an inventory of use and status of the shipboard collections. The SCP judgment is that a major overhaul would be required to make them useful. At present the usage is minimal, and there have been only two complaints. The SCP recommends that no action be taken now. However, the other reference materials (charts and reprints) are being updated. Shipboard participants should be carefully selected and advised to carry their own reference slides on board, which is now a common practice.

Stratigraphic gaps - The SCP would like to alert all subject panels on the upcoming legs that the following portions of the stratigraphic section are poorly represented in coring to date, and stratigraphic control in these sections is minimal:

1. Horizon A Interval in calcareous sections (Paleocene to M. Eocene)
2. The Jurassic/Cretaceous boundary and the Lower Cretaceous in general.
3. The Upper Eocene and Lower Oligocene.
4. The Mesozoic/Cenozoic boundary in the North Atlantic (starved margins).

Regions of special interest to the SCP - The following are regions of special interest to the SCP:

1. The Venezuelan Basin and the Demerara Rise.
2. The South Atlantic, especially a transect across the Walvis Ridge to penetrate beneath the euxinic zone.

SCP working groups - The following is a list of the SCP's working groups. First reports are due from them in May. Interim reports show sampling, chart preparation, and testing in progress.

1. Confidence limits
2. Correlation into margins with benthonics
3. Problems in high latitudes
4. Record gaps.

Symposia - An AAPG-SEPM symposium is planned in 1979. The tentative title is "A Decade of Deep-Sea Drilling". Planning is in an advanced stage. Four keynote speakers are planned in four sections: tectonics and structures; sediment cover; biostratigraphy; and paleoenvironments.

Publication standards - A letter of complaint was sent to DSDP about the quality of photographic plate reproduction in Volume 39.

Reference centers - Representatives of the Smithsonian, NSF, and the SCP have met to discuss the problems of establishment of a U.S. "Reference Center." It was agreed that if DSDP can assist in slide preparation, that the Smithsonian can begin with formation of such a center. The SCP recommends that the Committee on Reference Centers continue into the next phase with consideration of a Japanese Center and invite Japanese participation in the next meeting.

Under the proposed plan the U.S. would prepare the nanno slides (5 duplicates), Basel would prepare the foram slides (5 duplicates), and the rads would be prepared by another reference center (5 duplicates). The cost of limited travel, one assistant, and some apparatus is estimated as $30,000/yr for the first year and $20,000/yr each year after that. The present plan is to have the nanno slides prepared at DSDP on a time-available basis.

Symposium, 1980 International Geological Congress

The Commission for Marine Geology is arranging its symposia to be held at the 26th International Geological Congress in Paris in 1980. A symposium, tentatively titled, "Evolution of Subduction Complexes in the Light of Deep Drilling in the Pacific Active Margins," is planned. The PCOM agreed to co-sponsorship of the IGC symposium.

Ewing Symposium

Letters of invitation to speakers and special guests have been sent out, and announcements have been sent to all JOIDES Committee and Panel members. Letters of inquiry are being held until 1 February. So far only a small number of graduate students have applied. Manuscripts are due from the invited speakers by 1 June.

Detection of Overpressured Zones

With DSDP equipment, it may not be possible to detect overpressured zones, and the engineers at DSDP are requested to provide advice. (see PCOM Agenda, 16-19 January, Attachment 6). It was noted that there are all degrees of over-pressuring, and that DSDP should cement any holes showing any evidence of over-pressuring.

SEAPROBE Review

Panels should respond to the request for a review of the ALCOA SEAPROBE, if they have not yet done so (Item 149, X, PCOM meeting of 12-14 July 1977).

JOI, Inc

The address of the JOI, Inc. office is:

JOI Office
Suite 512
2600 Virginia Avenue
Washington, D. C. 20037

JOI, Inc. will take over all JOIDES travel beginning 1 July 1978. JOI will take over just JOIDES travel and not DSDP travel. JOI, Inc. will also take over visa problems, etc., according to the letters of agreement.

Future Leg Planning

The OCP objectives at CP-1 are to sample old Pacific crust and compare it with old Atlantic crust sampled on Legs 51-53. Also, the Pacific site is on significantly older crust than the Atlantic sites and it would yield important data on aging of the crust. Significant penetration is required, on the order of 200 m. The problem is that Leg 61 may have to ask for a few days' extension if they cannot get 200m into "basement." If the sediments at CP-1 are undrillable, the OCP would like PCOM approval to dash to the Central Pacific Basin and stab through well-known sediments to get 200m penetration into the "basement."

At Site CP-1 the sedimentary column is 700-1200m thick and is expected to be limestone with minor chert. With a penetration rate of 2 m/hr it should take about 24 days of drilling to get to 1000m. With 8 days of steaming time and 45 days at sea for the leg, this leaves 13 days for "basement" penetration, hydrofracturing and logging. At 30 m/day of "basement" penetration, the drilling should get 200m of penetration in 7 days.

If the drilling has not reached the necessary 300m of penetration in the allotted time, the PCOM's priorities are:

1. Slip the schedule 3-4 days
2. Take 2-3 days from time allotted for "basement" penetration in the Gulf of Alaska
3. Drop either GA-1 or GA-2.

Legs 63, 64, and 65 - The objectives of Leg 63 are to follow the California Current with time and latitude and longitude. Site EP-2 is any site in the Gulf of California, and has a lower priority in the OPP than any site outside of the Gulf. OPP Site EP-4 is now EP-4b. One GCA site will be put into the oxygen minimum zone to capture laminated diatomite and attempt to get an actualistic model of the Monterey Formation of California and its diagenesis. DSDP is recommended to use Guaymas instead of Manzanillo as an intermediate port between legs.

The RISE and ROSE operations are separated because sediments are ponded against the EPR in the area selected for drilling, and permit the drill to be spudded in. The sediments die out rapidly to the south, permitting OBS's to be placed directly on the bottom. It was suggested that the proponents and SSM put together a map showing where the 100-m isopach is in the ROSE area. The consensus of the PCOM was to leave the drilling site as is and attempt to coordinate with the ROSE operation.

Legs 66 and 67 - Site EP-1 is at approximately 10^{0}N, 90^{0}W. Multichannel seismic data will not be available until October. The objectives of the transect are to look at a subducting margin where the accretionary front is missing. Presumably it has either been subducted or displaced by strike-slip faulting. The objectives of the Guatemala section are a transect to look at an accretionary section. The reentry site on the Guatemala transect has a good chance of penetrating through the accreted sediments and into the underlying subducting plate. Each transect will have a continental reference hole, and downhole experiments, including the emplacement of strainmeters, are planned. The Guatemala site will also have an oceanic crust reference site.

Site EP-1 has strong support from the OPP and SCP but stands apart from the Leg 63 sites. The shortest steaming times would be possible if it were attached to the Middle America Trench where the legs have long operating times. It was suggested that the site be moved closer to shore and be the outer part of the Guatemala transect. EP-1 should be the last site on Leg 67.

Legs 68 and 69 - Planning for these legs is still in the initial stages and is being coordinated by the Geothermal Working Group. The objectives of Leg 68 are to sample a young, open hydrothermal system that vents into the sea in the Mounds area of the Galapagos, while Leg 69 will sample a sealed circulation system in the Costa Rica Rift. Both legs will use closely spaced, single-bit holes to locate the proper zones, and 1 reentry site to study the deeper zones. At present the Galapagos survey is complete and the Costa Rica Rift needs surveying, which will probably be done this year.

If at the May meeting the PCOM has an unfavorable prognosis for continuing drilling, it will reconsider all legs beyond Leg 62. The PCOM requested that the subject panel chairmen prepare in writing for the May 1978 PCOM meeting:

1. A plan for one leg of drilling, on the assumption that only one leg would be available to them after Leg 62, and

2. An order of priority of the drilling targets contained in their white papers.

REPORT FROM THE DOWNHOLE MEASUREMENTS PANEL (December 1977)

Recent Results - Logging

Crustal holes were logged successfully on two Atlantic legs, Leg 46 into young crust on the Mid-Atlantic ridge and Leg 51 into old ocean crust in the western Atlantic. There were considerable technical difficulties but on both legs very valuable data were obtained. The results show that there is extensive large scale crack and fracture porosity in young oceanic crust so that core samples do not give physical properties that are representative of the bulk physical properties of the drilled crustal sections. The seismic velocities, densities and electrical resistivities from logging are all much lower than those obtained on core samples. In contrast, the large scale porosity of the old upper crust is small, the voids and fractures largely being filled, so that the physical properties from core samples approach those from the logging. These new results are an important complement to the surface geophysical data on the aging of the upper oceanic crust.

Deep holes into sediments were logged with excellent data on Leg 48 in the northeastern Atlantic margin and on Leg 57 in the Japan Trench. The logs were particularly valuable on Leg 48 in stratigraphic correlation between sites and with seismic reflectors. On Leg 57, tectonic fracture development in the hemipelagic sediments landward of the trench axis was well outlined by the logs, as were the main lithologic changes.

Experiments and Downhole Measurements

Heat flow - The heat flow program using the downhole recording heat probe was last active on Legs 46 and 48. This important scientific program has been neglected recently and needs vigorous attention.

Oblique seismic experiment - The oblique seismic experiment was successfully carried out on Leg 52 in the western Atlantic. For this experiment a 3-component geophone was clamped successively at several different depths in the hole while 10kg explosive shots were fired by an independent ship at directions and distances up to 10km from GLOMAR CHALLENGER. The experiment permits a high accuracy velocity-depth profile of the upper oceanic crust over a 20km diameter area to be obtained. The results complement core sample measurements, downhole logging and seismic refraction for the determination of the velocity structure of the upper oceanic crust.

Pore water sampler - An in-situ sediment pore water sampler has been constructed and used very successfully on Legs 56 and 57. The data generally show high alkalinities throughout the drilled sections. The results confirm that the water squeezed from core samples is generally representative of in-situ pore water with only slight dilution by seawater.

Future Plans and Proposals

Logging - Downhole logging has received considerable emphasis over the past year and a half. Routine logging is a very costly operation for which adequate funding has been difficult to obtain. The Project has recently received two serious proposals for continued logging. One of the bids has some significant

downhole tool deficiencies, but is for a much lower cost than has been previously paid. It may permit routine logging to be carried out on most future drilling legs. The DMP has recommended that logging be carried out on as many deep holes, particularly reentry holes, as is technically feasible.

Heat flow - After several years of very successful measurement programs in both sediment and crustal holes, no heat flow measurements have been carried out during the past year. In view of the scientific importance of temperature and heat flow data, this is an unfortunate omission. For example:

1. Accurate regional measurements of temperature and heat flow are critical for estimates of in-situ values of most physical properties, for mineralogy and for alteration both in sediments and in crustal rocks.

2. Temperature and heat flow measurements in deep crustal holes provide the most important available data for outlining the extent and pattern of hydrothermal circulation in the oceanic crust. We have valid measurements so far only in 2 or 3 holes and not to very great depth.

3. Heat flow is a critical parameter in trenches, providing a major restraint to many thermal, tectonic and petrologic models of subduction zones. It is unfortunate that no good temperature data have been obtained in active margin holes drilled so far.

Additional heat flow specialists for GLOMAR CHALLENGER should be sought, particularly for the remaining active margin sites and for drilling in geothermal areas of the Galapagos region and the Gulf of California.

Some inhole temperature data may be obtained in deep holes through the high resolution temperature (HRT) log of the commercial package, but useful data in sediment holes and probably in crustal holes requires a specialized instrument. A new instrument is being constructed, but it is desirable for the downhole temperature and core thermal conductivity equipment to be maintained and operated by DSDP personnel.

Downhole magnetometer - A downhole magnetometer logging tool has been proposed. Tests done in land boreholes into basalt lava flows suggest that such an instrument would detect magnetic field reversals as well as variations in the magnetic properties of crustal rocks. The results of such a tool should be scientifically important and the Panel has recommended that the Project purchase or rent a downhole tool if a supplier can be found. It would be used primarily in deep crustal holes.

In-situ pore water sampler - The in-situ sediment pore water sampler appears to work well, giving important geochemical data. It is recommended that the Project take over maintenance and routine operation of this instrument. It probably will be in frequent demand and the cost and the DSDP personnel time should be modest.

Oblique seismic experiment - This important experiment carried out on Leg 52 should be attempted again. The Tamayo fracture zone sites off the Gulf of California, to be drilled in 1979, are appropriate since a detailed seismic and bottom study is planned for this area. The main operational difficulty is the funding of a suitable ship to do the shooting at a time that cannot be well defined in advance.

Large scale resistivity experiment - A large scale resistivity experiment has been proposed that will give the bulk electrical resistivity of a large volume of the upper oceanic crust. It employs widely spaced electrodes suspended in the hole on a special cable. The data from this experiment combined with logging and sample electrical measurements will give estimates of the large scale porosity. There is no other large scale resistivity measurement technique (for example comparable to seismic refraction for sonic velocity) that can give large scale crack and fissure porosity and its variation with depth and crustal age. Such porosity is important to our understanding of hydrothermal circulation in the crust and of the availability of water for alteration and metamorphism. The data should complement large scale porosity estimates based on seismic studies.

There are significant technical difficulties in this experiment, but most can be readily overcome. A first test is planned for Leg 60.

Permeability and hydrofracturing experiment - It has been proposed that: (a) in-situ permeability be determined by isolating sections of a hole with inflatable packers and measuring flow rates with increasing and decreasing pressure, and (b) the direction and magnitudes of the principle horizontal stresses in the upper oceanic crust be determined by increasing the pressure in a sealed portion of the hole until the rock fractures. A borehole sonic televiewer is required to determine the orientation of the fracture.

This experiment would be extremely valuable scientifically if reliable data could be obtained. Permeability is a critical and virtually unknown parameter for our understanding of hydrothermal circulation in the oceanic crust. Hydrofracturing could give us the in-situ stress and thus information on the driving forces operating on the lithosphere and on the sources of intraplate earthquakes. However, both of the experiments have been difficult to carry out even in land boreholes where conditions are much easier than at sea. The technical difficulties are very serious.

As a first test it is planned to pump against the one Lynes packer (MINIBOP) at present owned by DSDP to see if the packer will provide an adequate seal in the hole and to see if the CHALLENGER pumps can provide adequate pressure to the sealed portion of the hole.

Long term instrumentation of holes - The building of downhole instrument packages to be left behind in completed holes has been proposed. Data would be telemetered to the surface. The initial packages planned are (2) the dilatometer for use as a strainmeter and seismometer along with downhole temperature sensors, and (b) a short period three component geophone. Later development will include broad band seismometers.

The proposed instrumentation obviously would be scientifically very valuable, particularly for global seismic studies. The technical difficulties are very great but appear to be manageable. Significant support in technical assistance and associated costs will be needed from DSDP. It is hoped that the first hole can be instrumented on Leg 64.

Logging and experiments in old holes - A GLOMAR CHALLENGER leg in the Atlantic devoted to logging and inhole experiments in existing reentry holes into the oceanic crust has been proposed. Four reentry holes are available in the mid and western Atlantic: 395A (Leg 45), 396B (Leg 46), 417D (Legs 51 and 52) and 418A (Legs 52 and 53). Previous experience suggests that these holes could be re-entered. The suggested program includes: standard logging, an oblique seismic experiment, a large scale resistivity experiment, permeability and in-situ stress measurements using packers, and long period instrumentation.

REPORT FROM THE INFORMATION HANDLING PANEL (5-6 January 1978)

1977 Work

Once again, the Panel is unanimously in accord that the staff of the DSDP Information Handling Group deserves the highest praise for their consistently high performance and sense of responsibility. It is remarkable that a group of this kind has retained such a stable personnel force for so many years. Much of the success is due to their long term familiarity with the project.

Site Surveys

The present status and methods of operation among the subject panels, the SSP and SSM, was outlined. Most of the remarks concern the data on surveys for Legs 44 and beyond. Data from earlier legs are still available and located at DSDP and/or EDS in Boulder. Those earlier data at EDS probably came from the Institution which made the survey and are not specifically labeled as DSDP data and are filed together with all other survey data.

The data are classified into three kinds:

1.	Underway data	- Bathymetry, magnetics, gravity, seismic reflection and navigation
2.	Station data	- Cores, dredges
3.	Special experiments	- Seismic refraction, sonobuoys, OBS, deep tow hydrophones, heat flow

The underway data are stored at Lamont and are retrievable. Requests for these data are generally received at DSDP and forwarded to Lamont. There has been previous discussion on the importance of getting the piston core data into the same format as the regular core data and into the data base. The data from special experiments are less consistent; some are still held by the investigator (e.g., heat flow).

The IHP strongly supports the recommendation of the SSP that a series of maps be prepared by SSM (or the responsible individual at the institution contracted to do the survey) summarizing the information obtained from each site survey.

1. A summary map should be prepared for each site survey which was contracted for by SSM, whether or not the site was subsequently drilled.
2. These maps should be collected and published as folios whenever a sufficient number have been completed; and those maps representing sites chosen for drilling should be included both in the folios and in the appropriate IR's.
3. Site survey summary maps should include text stating what kinds of data were obtained, who obtained the data, where the data are, and how interested scientists can get the data.
4. A uniform format should be adopted for site survey summary maps, and non-U.S. groups making site surveys should be encouraged to produce summary maps in the same format.
5. Publication of the site survey map folios should be coordinated with the Science Services group to take advantage of editorial skills and publishing experience and to achieve compatibility with the IR's where possible.

The IHP also encourages SSM together with the SSP to pursue the publication of site survey results and interpretations in synthesis volumes, using journals outside normal DSDP publications. It is understood that these publications should incur no direct costs to DSDP.

Initial Report Errata

Responses have been received from about 20 percent of the authors queried about errors in the IR's. These will be published as a soft cover report at DSDP. It is suggested that these be bound so that corrections for different pages in IR's be on separate pages in the errata volume. If this is done then the user has the choice of keeping the errata volume intact or of removing the pages and inserting them at the proper place in his IR volumes.

Index to Volumes 1-44

Work is proceeding on the merged 44-volume index which will be in the form of the keyword index rather than a typical book index.

It is the feeling of the Panel that microfiche is preferable, largely because of cost. If any money is available for costly publications, then the Panel would clearly prefer that it be spent on site survey map folios than on a hard copy index.

A further advantage of this approach is that periodic (say, once a year) updates of the index can be issued at low cost. If this is done, we will not have to wait for the end of any specific phase to create a new index. Each issue will be a complete cumulative index to date, so that there will not be a separate hard copy 1-44 index and then, much later, another index for 45-69.

Hard Rock Data Base

A general outline of the hard rock data base and the file content have been developed. This was done essentially within DSDP but based on considerable discussion with other people. The content will be extensive. Exact format remains to be designed; it is estimated that it will be over a year until this system is operational.

Downhole Data Bases

Logging data are submitted to DSDP in analog display and on a Schlumberger-formatted digital magnetic tape. A program is being written to unpack and translate the Schlumberger tape. Care is being taken to see that no data are lost.

Sediment Data Base

This is the oldest of the data bases and is essentially up to date. Many programs exist to search the numerical data and are operational. However, many data requests now are for retrievals of smear slide and visual description data and the necessary programs are not yet ready.

Core Repositories and Lists of Distributed Samples

A summary of the actions taken by the Executive Committee in July and in October 1977, relating to the recommendations of the ad hoc Committee on Repositories was distributed. Recommendation 10 was endorsed last year by this Panel and work is going ahead on completing the list of distributed samples. It is now estimated that it will be late 1978 before the backlog is handled and the list is complete and maintainable up to date. Recommendations 14, 15, and 17 can be handled by the curator.

Most of the discussion centered on recommendation 16 (which was tabled by PCOM) to send a complete list of all prior samples from the same barrel and a keyword sorted list of prior investigations in the same subject area with all samples distributed. It is the opinion of this Panel that this may become a burdensome task to the curator and agrees with PCOM that it should be tabled until an opinion is obtained. In any event, this could not be done until the file is complete later this year.

The Panel recommends that at the present time, the curator should always distribute the available keyword index on fiche together with distributed samples. The investigator will then be responsible for doing his own search of the subject area. In special cases, depending on curatorial wisdom as is done now, the curator will notify the investigator of other samples from the same core.

Data and Program Security

The Panel recommends that the Information Handling Group should continue to make sure that all programs are documented to the highest standards and that copies are kept at different locations for protection.

Very Old Data

The Panel recommends that these data should be brought to DSDP, encoded and entered into the data base.

Site Survey Core Data

The Panel recommend that a plan should be prepared of what should be done to collect and encode such data and relate them to drill sites. For this work, it will be necessary to develop an equivalency table for all the various designations that have been assigned to a site. No more than a month's time should be spent on this first phase and no substantive work should proceed without prior Panel review.

After October 1979, what?

The Panel recommends that by October 1979, all data bases should be completely up to date; there should be no backlog. All programs should be completed and documented, and provisions made for the continuation only of production work - adding new data and performing searches. To accomplish this, no new design or software projects should start after March 1979. By October of 1981 the data bases should be complete.

For the longer term, the Panel believes that the data base and the programs to work it should remain with the cores. Analytical capability and data management capability should be kept intact and integrated with the curatorial function for an indefinite time into the future. Provisions should be made for continuing improvements in data management techniques and curatorial processes. Only with such improvements can the cores and data continue to be a valuable national resource.

The NSF should also be encouraged to plan for long term continuation of funding to maintain the integrity of the core and data collections.

REPORT FROM THE ACTIVE MARGIN PANEL (10-12 January 1978)

Abandonment Procedures

There is a need to establish guidelines so as to facilitate reentry for abandoned holes. The AMP recommends that every effort should be made to make the abandoning procedure such that future reentry of abandoned holes are facilitated.

Report on Legs 59 and 60

Logging - Agreement has been reached for Gearhardt-Owens to log Legs 60, 61, and 63 (not 62), using their Direct Digital Acquisition system so that the results can be available to shipboard scientists. However, this requires two technicians on board. Logging tools will include: sonic, caliper, gamma, compensated density, neutron, lateral, induction, maximum temperature, temperature log.

Shikoku Basin - Sites 443 and 444 results indicate basement age of 15 MY BP which is at variance with magnetic age.

Drill string - 24,500 ft (7467m) of drill string can be used (if the upper 4000 ft of pipe is new). The AMP requests that DSDP provide sufficient new pipe to allow the use of maximum drill string of 7467m on both Legs 60 and 67. AMP notes that the appropriate length of sand line should also be available for these legs.

Middle America Trench Working Group

Two types of active margins may be identified here: (1) normal accretion with imbricate structure and (2) a margin with very narrow accreted zone. The transition zone between the accreting toe on oceanic basement and the slope above continental basement is the principal target off Oaxaca. It is intended to drill in the canyon off Guatemala to try to reach the Cretaceous section and to test by paleontological evidence the uplift due to imbrication and also tie in with an offshore well of 12,000 ft TD.

Funds have been requested for maxipulse lines off the Mexico, Guatemala, and Costa Rica sites. It is anticipated that a close network of strain meters, seismometers, and geothermal studies will be set up onshore in Mexico and Guatemala. AMP recommends that if only one strain meter is available, it should be emplaced in a hole which provides the best opportunity to measure strain in the tectonic accretion zone of a subduction system in the Middle America Trench region. The AMP recommends that if two strain meters are available, the second meter should be emplaced on the same traverse but on the oceanic plate.

Alcoa SEAPROBE

Assuming stability and station-keeping characters of the vessel permit effective drilling, the panel considers the Alcoa SEAPROBE could have a useful potential for downhole experiments, provided the hole remains operational.

Future Drilling for Active Margins

It was agreed that the results of the Japan Trench drilling emphasize the need for drilling to fully penetrate the toe of the hanging wall of a subduction zone. There now appears to be a major gap in the understanding of the subduction process which requires a study of the processes involved in the structural development of the accreting prism and downgoing ocean plate. The AMP agreed to postpone final

prioritization of sites for the Middle America, but endorsed a general plan of additional site survey work as proposed by the Working Group. It was emphasized that a high scientific priority should be placed on achieving penetration of the toe of the accretionary prism.

Report from the Middle America Working Group

The Mexican coast northwest of the Tehuantepec fracture zone exhibits evidence of discontinuous accretion and indirect evidence of disposed crust, in contrast with the region southeast of the Tehuantepec fracture zone which exhibits evidence of continuous accretion. The principal objective of the drilling program is the collection of data contributive to an understanding of the mechanics of accretion and possibly the periods of non-accretion.

Oaxaca - Seismic reflection data from the Oaxaca (non-accreting) region off southwestern Mexico show that the margin consists of 3 zones:

1. an inner zone characterized by low-velocity sediments overlying a strong reflector thought to be the surface of a continental igenous-metamorphic complex;
2. a 5-15 km transition zone, and
3. a 15-25 km wide subduction complex zone overlying a discontinuous reflector correlative with the igneous ocean crust seaward of the trench. Ocean-crust magnetic stripes appear to extend landward beneath the subduction complex.

A low-velocity sedimentary apron overlies the inner (continental) zone and the transition zone, but not the subduction complex. A change in character of magnetic anomalies suggestive of termination of oceanic crust occurs near the subduction complex-transition zone boundary.

Objectives - The Working Group suggests that the highest priority objective in the Oaxaca area is the nature of the transition zone. Is the transition zone continental or oceanic in character? Is there evidence of missing crust and two-stage evolution? What is the age of deformation in the transition zone? What is the stress:strain relationship between zones?

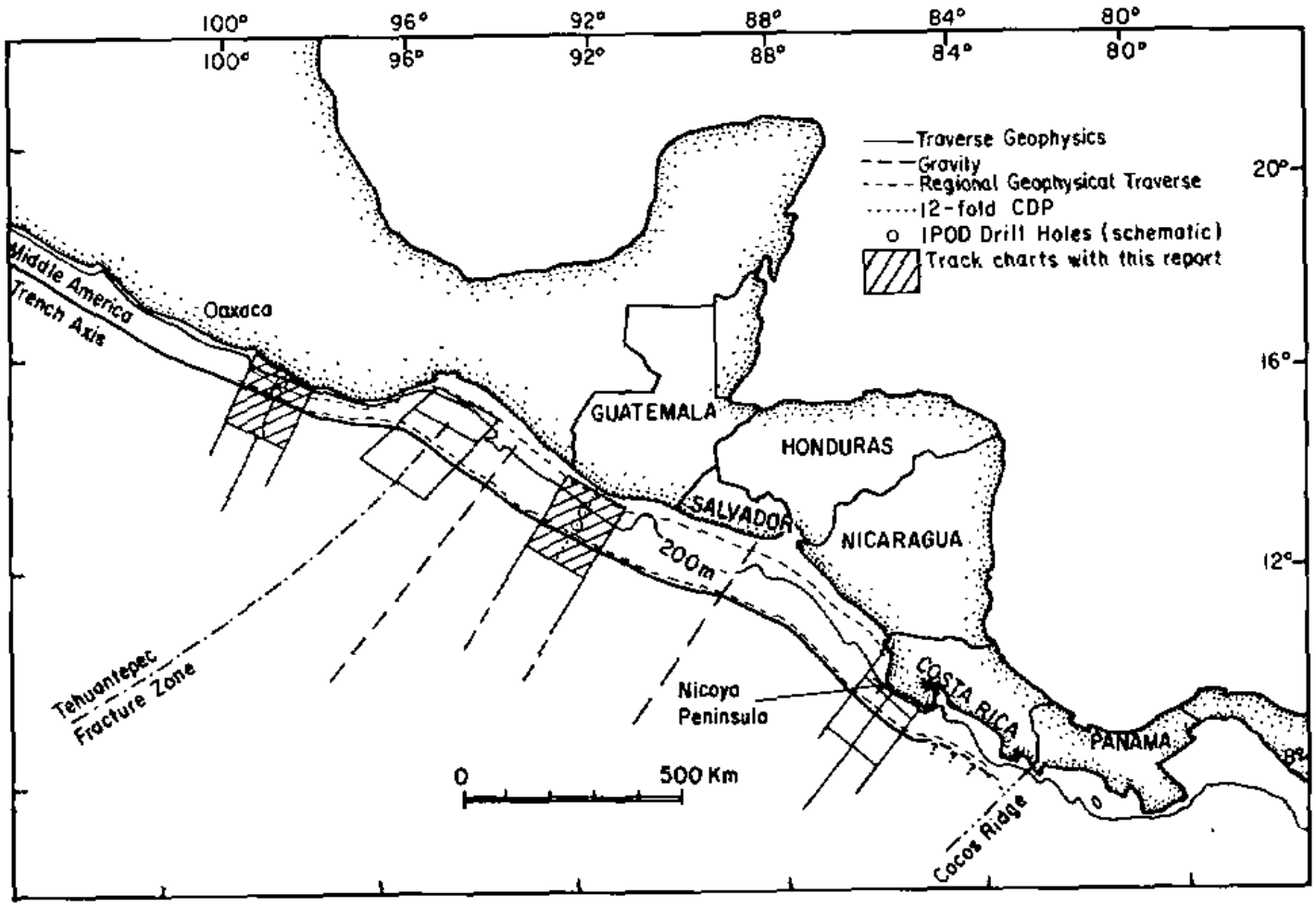
The subduction complex is a lower priority. Some evidence suggests major slumping, whereas other evidence suggests accretion in this zone. The group would like to know the physical and acoustic properties of rocks of this zone, ages of sediments, and type of structure responsible for reflectors observed in seismic data as well as lithology and level of diagenesis within the zone.

Reference holes in undisturbed apron and trench sediments are essential to determine the relative inputs of terrigenous and pelagic sediments, to calculate the sediment budget, and to obtain an adequate sequence of paleontological datums.

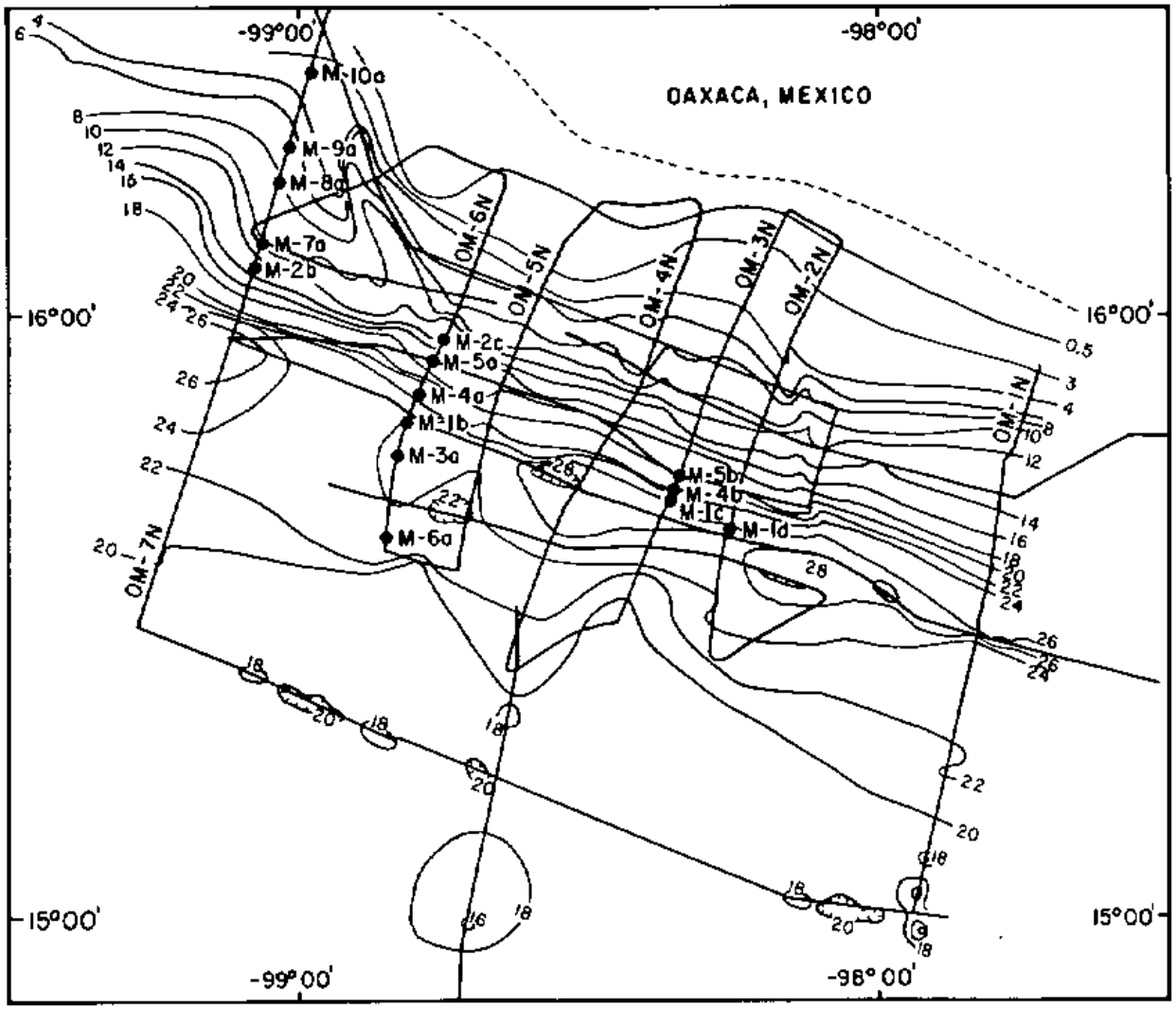
Hole locations - To attain the above objectives, the Working Group proposes a transect of 4 single-bit holes across the trench and subduction complex and 5 holes across the transition zone between the continental and oceanic zones. The transect is offset near its center because of poor seismic definition of targets on parts of each line. Six alternate holes, some offline, are also recommended.

Additional site surveying - The Working Group recommends the following to optimize scientific return and to meet Safety Panel requirements:

1. Intersecting multichannel seismic cross-lines to demonstrate safe drilling conditions for each site on the transition and continental zones.



Location chart of geophysical data in the Middle America Trench region



Track charts and proposed IPOD drill sites off Oaxaca, Mexico

PROPOSED DRILLING SITES OFF OAXACA, MEXICO

	ESTIMATED DRILLING TIME (40 m/hr) DAYS	HOLE	LOCATION	WATER DEPTH (meters)	SUBBOTTOM PENETRATION (sec	m)	APPROXIMATE DISTANCE FROM SHORELINE (miles)
		M-6a (Alternate)	Line OM6N 2243, 09 June 15°38.1'-98°51.4'	4240	0.4	300	47
Second Priority	5	M-3a	Line OM6N 2036, 09 June 15°46.6' - 98°50.4'	4860	0.6	600	39
	14	M-1b	Line OM6N 1939, 09 June 15°50.2'- 98°49.4'	4740	1.0	1250	35
	13	M-4a	Line OM6N 1857, 09 June 15°53.0' - 98°48.1'	4305	1.0	1250	33
	11	M-5a	Line OM6N 1808, 09 June 15°55.8'- 98°46.5'	3260	1.0	1250	28
	—	M-2c (Alternate)	Line OM6H 1733, 09 June 15°58.0'- 98°45.1'	2550	1.0	1250	25
	43						
First Priority	10	M-2b (Poss. re-entry)	Line OM7N 2042, 30 June 16°04.6'- 99°04.8'	2580	1.0	1250	33
	9	M-7a	Line OM7N 2120, 30 June 16°07.1' - 99°04.0'	1800	1.0	1250	30
	5	M-8a	Line OM7N 2304 30 June 16°14.6' - 99°01.6'	1440	0.5	625	22
	5	M-9a	Line OM7N 2345, 30 June 16°18.0' - 99°00.5'	1260	0.5	750	20

Proposed Drilling Sites Off Oaxaca, Mexico, Cont'd

DAYS	HOLE	LOCATION	WATER DEPTH (meters)	SUBBOTTOM PENETRATION (sec	m)	APPROXIMATE DISTANCE FROM SHORELINE (miles)
5	M-10a	Line OM7N 0118, 01 July 16°25.2' - 98°58.0'	525	1.2	920	11
34	M-1c (Alternate)	Line OM3N 0523, 11 June 15°42.2'- 98°21.9'	4760	1.0	1250	32
	M-4b (Alternate)	Line OM3N 0536, 11 June 15°43.0'- 98°21.5'	4500	1.0	1250	31
80 +7	downtime	includes logging all holes but no transit (-2 days)				
87						
	M-5b (Alternate poss. re-entry)	Line OM3N 0558 11 June 15°44.3' - 98°20.8'	3825	1.0	1250	30
	M-1d (Alternate)	Line OM2N 1916 11 June 15°43.9' - 98°14.3'	3375	1.0	1250	29

2. A multichannel dip line 25-50km NW of line OM-7N and adequate strike lines to tie it to the main grid. Data from these lines will provide information about lateral extent and structure and reflectors targeted in OM-7N.

3. Dredging exposed slopes of OM-7N, OM-1N, and OM-3N where some targeted drilling horizons may outcrop.

4. Short (10-15 km), reversed, sonobuoy refraction strike lines at each primary hole on OM-7N and OM-6N to provide additional velocity control.

5. Detailed analog sparker surveys around each primary hole location so that horizons in drill holes can be extended regionally. Del Norte or Teledyne sparker systems are recommended because of high-quality results in comparable surveys elsewhere.

6. Precise location using a land-based Miniranger or comparable system. The structure offshore Oaxaca changes markedly over short distances. The Working Group strongly believes that non-shore based navigation systems are inadequate for hole location in this area.

7. Coordinate with field geologists mapping onshore.

8. Request aeromagnetic coverage to supplement and extend marine coverage.

Guatemala - Guatemala data are more typical of convergent margin models showing a 30-50 km wide subduction complex underlain by igneous oceanic crust. Anomalously high velocity material (5 km/sec) characterizes the area of diffuse reflections presumed to be the subduction complex resting on the ocean-crust reflector. Magnetic anomalies observed over the upper slope may have their sources within the subduction complex. A low-velocity sedimentary apron covers the upper two-thirds of the slope, pinching out downslope. The forearc basin is well developed landward of the subduction complex.

A result of coring off Guatemala was the discovery of fresh, angular basalt fragments in a midslope core. This sample may indicate an outcrop nearby.

A well in the northwest corner of the area of investigation, located near the shelf break, was drilled to over 12,000 ft and bottomed in Conacian sediments possibly equivalent to the Rivas Formation of the Nicoya peninsula of Costa Rica. A study of faunal data from the well and seismic stratigraphy in the vicinity of the well suggests initial deposition of Cretaceous or older sediments on oceanic crust at abyssal depths. A thick Late Tertiary seaward-pinching sedimentary wedge over a constant thickness Early Tertiary sequence indicates regional uplift during the Early Tertiary. This may be the initial period of accretion. A late Oligocene-Middle Miocene hiatus preceded deposition of flat-lying late Tertiary sediments.

An analysis of gravity anomalies off Central America shows excess mass located in the upper part of the subduction complex. Landward-dipping reflectors beneath upper slope may be related to gravity and magnetic anomalies over the upper slope. Refraction velocities of about 5 km/sec within reach of the drill beneath the upper slope may also be an expression of excess mass. In the Isthmus of Tehuantepec the gravity high turns abruptly inland and apparently terminates.

Objectives - Investigation of the subduction complex is the principal objective of drilling off Guatemala. A number of targets of approximately equal priority were identified. These include:

1. Reference holes on oceanic crust, trench fill, and at the slope-shelf break to obtain paleontologic and sedimentologic baseline data for comparison with material in the subduction complex.

2. Drilling into high-velocity, high-density material beneath the cover of continental slope materials in several places to determine lithology, structure, and age of the subduction complex. Penetration of sloping reflectors thought to be imbricate thrust planes is of particular importance. The resulting data will provide a test of the imbricate-accretion model which predicts steeper dips, increasing age, and greater induration with increasing distance landward on the slope.

3. Drilling into basement beneath the slope-shelf break. The reflector zone postulated to be Mesozoic basement underlying initial sediments may be reachable. The importance of reaching basement is fundamental to convergent margin theory as well as important to the establishment of the time of onset of subduction here.

4. Determine slope sediment apron stratigraphy.

5. Drilling into oceanic crust beneath toe of subduction complex.

A test of convergent margin segmentation is important but the data are not sufficient to adequately test this hypothesis by drilling during the leg allocated to Guatemala drilling.

Hole locations - A transect of 11 holes including one or two possible reentry sites is recommended. The transect lies within a canyon roughly 750-1000m deep. In this canyon much of the apron has been eroded away, leaving in most cases <500m of sediment overlying the subduction complex. The transect provides an excellent opportunity to investigate the subduction complex since thick aprons elsewhere have impeded sampling of subduction complexes.

A hole on oceanic crust seaward of the trench is intended primarily for emplacement of downhole instrumentation. Reference holes are proposed for the trench and shelf-slope break to provide paleontologic and stratigraphic baseline data. The upper reference "hole" consists actually of two complementary holes, one drilled in the canyon axis and one drilled on the adjacent canyon wall to sample sediment eroded from the canyon. Other holes target areas of suspected basalt, high-velocity rock, and dipping reflectors.

Additional site survey recommendations -

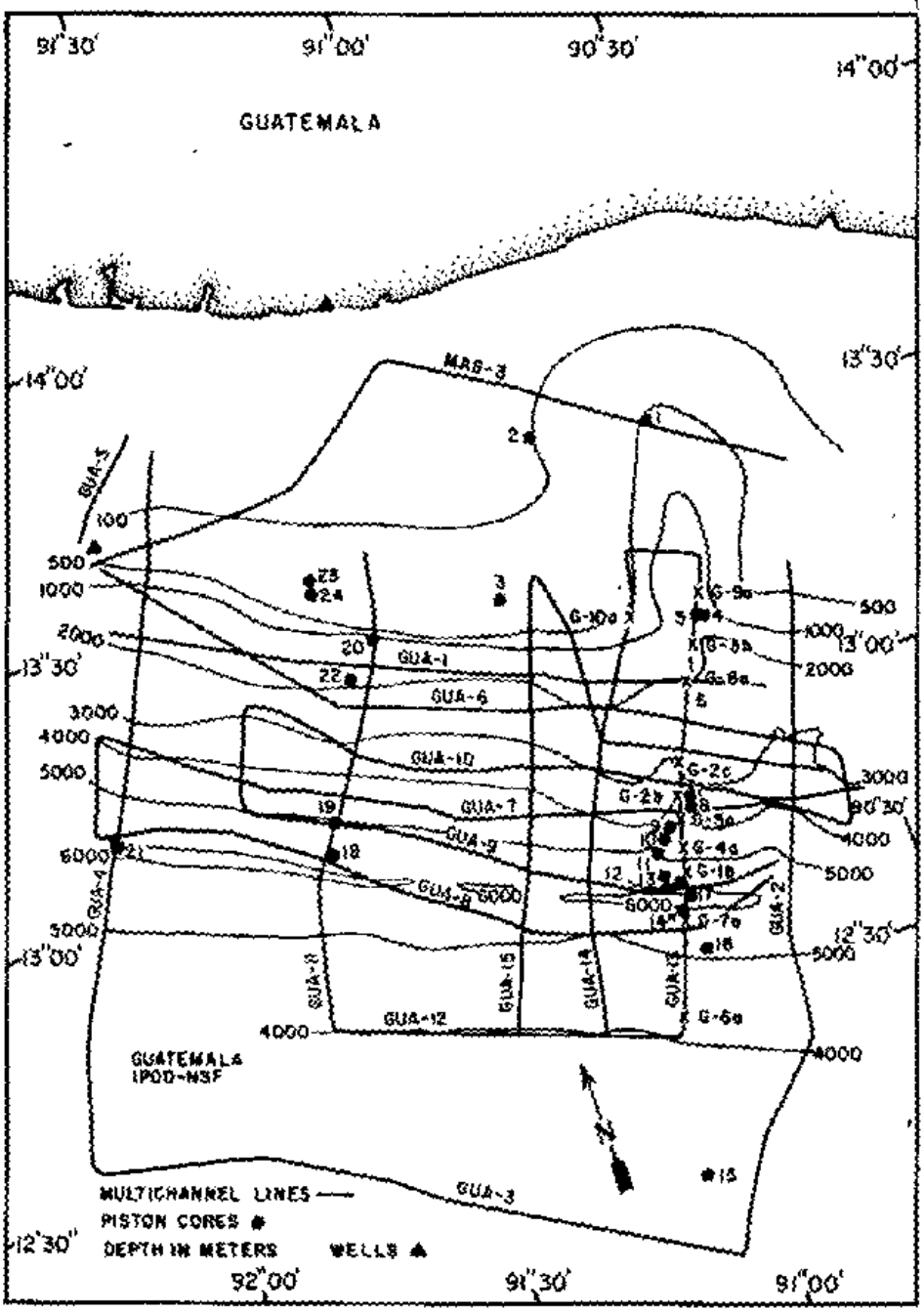
1. A multichannel seismic reflection tie line to the well.

2. Multichannel air gun cross-tie lines at locations G-9, G-10, and G-11 to demonstrate site safety.

3. High resolution sparker surveys around primary site locations as previously recommended for Oaxaca.

4. Miniranger site location where possible. Miniranger location is not as essential here as it is off Oaxaca. However, the system should be used to improve location accuracy if it is available.

5. Sonobuoy refraction lines at each site location as recommended for Oaxaca.



Track charts and proposed IPOD drill sites off Guatemala

PROPOSED DRILLING TIME OFF GUATEMALA

HOLE NUMBER	WATER DEPTH	HOLE DEPTH	NO. DAYS OF* DRILLING
G-6a (Strain meter)	4125	1000	10
G-7a	6053	770	10
G-1b	5400	1300	15
G-4a	4500	1300	14
G-5a	4028	1300	13
G-2b	3300	1200	11
G-2c (Alternate)	2775	1300	11
G-8a	2063	1300	10
G-3b	1800	1300	9
G-10a	638	1300	7
G-9a	1650	1300	9
		TOTAL DAYS	119

*using: Boyce formula

assume: no reentry
40m/hour drilling rate
no bit changes
no special experiments
no bad weather or unexpected breakdowns.

PROPOSED DRILLING SITES OFF GUATEMALA

HOLE	LOCATION	WATER DEPTH (meters)	SUBBOTTOM PENETRATION (sec	m)	APPROX. DISTANCE FROM SHORELINE (n. m.)
G-6a (Strain meter)	Line GUA 13 0800 8 May 12°29' N - 91°02' W	4125	0.6	1000	86
G-7a (Reference)	Line GUA-13 1033 8 May 12°39.5' N - 90°57.5' W	6053	0.4	1770	75
G-1b (Reentry)	Line GUA-13 1136 8 May 12°44' N - 90°56' W	5400	1.0	1300	70
G-4a (Reentry)	Line GUA-13 1232, 8 May 12°48' N - 90°55' W	4500	1.0	1300	67
G-5a (Reentry)	Line GUA-13 1314, 8 May 12°50.4' N - 90°54' W	4028	0.9	1300	64
G-2b	Line GUA-13 1346 8 May 12°52.2' N - 90°53' W	3300	0.8	1200	62
G-2c (Alternate)	Line GUA 13 1442 8 May 12°56' N - 90°51.2' W	2775	0.8	1300	58
G-8a (Reentry)	Line GUA-13 1642, 8 May 13°03.8' N - 90°47.5' W	2063	0.8	1300	50
G-3b (Reentry)	Line GUA-13 1800 8 May 13°08.8' N - 90°45' W	1800	0.7	1300	45

REPORT FROM THE PASSIVE MARGIN PANEL (15-18 March 1978)

Status of GLOMAR EXPLORER

GLOMAR EXPLORER is now leased to an industrial deep-sea mining consortium headed by Global Marine. Terms are for a one-year lease with four possible six-month extensions, of which the third and fourth require prior Navy approval. GLOMAR EXPLORER could be available as early as summer 1979 or summer 1980. The advantage is that the ship will be properly recommissioned with this lease.

The four-year period necessary for riser development was discussed, with reference to availability of GLOMAR EXPLORER. The industry view is that a 12,000 ft riser is now feasible. The disadvantage of a non-buoyant riser is that it needs to be tapered and requires a considerable number of spare parts. CHALLENGER will be kept operational until a larger vessel is available. The GLOMAR EXPLORER refit will be done so that a riser can be put on when available. DSDP is currently reviewing holes that could be drilled by EXPLORER but not by CHALLENGER, e.g., high-latitude sites, long drill string, and targets of opportunity. GLOMAR EXPLORER can carry reverse circulation. It was noted that the 6800m unit was a severe constraint on CHALLENGER drilling off E. N. America. This limit can be extended to 7500m by using 4000m of new drill string, but that early notification to OSDP would be necessary.

Recovery of Undisturbed Sediments

The hydraulically operated barrel, designed to take 30 ft cores, is under development at DSDP. The principles of operation and design were presented to the panel. It should be available by November.

Pressure Core Barrel

The pressure core barrel will be deployed on Leg 62, but supporting technicians are competing for space on the ship. It is now under construction and will go to sea following land tests. Its importance was emphasized as gas apparently fractionates in open cores. Development for clathrate studies was urged and field trials should be prioritized.

White Paper

The PCOM has suggested publication of the White Papers. Other panels are publishing very condensed versions. However, it was felt that this would emasculate the White Paper. The importance of an interior high in rifting basins was noted. Such a high may explain the difference in age of the salt off E. N. America and N. W. Africa. The significance of the East Coast magnetic anomaly was noted. It was agreed to prepare a shortened version of the White Paper for the Royal Society and a separate draft for GEOTIMES by early autumn.

Alcoa SEAPROBE

The PMP considers that the fundamental problems of passive margins are not likely to be resolved by drilling from Alcoa SEAPROBE, due to the fact of drilling capability and stability. However, the vessel may prove useful in studies of superficial and outcrop geology.

South Atlantic Proposal

The draft proposal prepared by the PMP was sent to the OPP. The black shale problem is of lower priority than the Neogene, although the Working Group has been asked to look at the problem. Sites proposed in the Angola Basin have been revitalized by OPP and OGP.

Surveys of the Walvis Ridge have been made. The U.S. proposes to make multi-channel lines from the Cape Basin to the Angola Basin with tie lines to the margins. CHARCOT is scheduled in the area by late 1978. The data should be collected for site selection by OPP and PMP. The relevant OGP meeting at Boca Raton on 13-14 June and the OPP meeting on 22-23 June at SIO were noted. Survey needs could then be defined by June (SSP will also define these).

Gulf of California

The working group proposal remains for transects at the mouth of the Gulf from the East Pacific Rise to the continent-ocean boundary. The site there will use multiple re-entry and re-examine fluctuations in the California Current, perhaps recorded in the Lucas Fan. A second re-entry is planned in the Guaymas Basin. The remainder will be single-bit holes.

Other relevant programs are:

RISE - Deep-tow (USA) and submersible (France)

ROSE - Crustal study using OBS

Logging is proposed for Leg 64, but not for the re-entry holes of Leg 65.

The importance of logs in generating synthetic seismograms was emphasized. NSF has verbally assured DSDP that money will be available for logging for FY'79. Logging costs could be reduced if the logging tools and engineer are on board only for the logging operation. The feasibility of using a helicopter or boat shuttle will be assessed.

The PCOM is requested to support a comprehensive logging and downhole instrumentation program in uncemented re-entry holes for Legs 64 and 65 in the Gulf of California.

Caribbean Proposal

Two OPP Caribbean sites have been proposed. These are:

CAR 2 -- Panama Rise. Site is above dissolution depth and will be a comparison with the Pacific to study the Caribbean-Pacific connection.

CAR 1 -- is to recover a complete Tertiary sequence above the CCD (hitherto not recovered) close to Site 151.

The PMP recommends to the PCOM that drilling during the Caribbean leg should be given priority as follows: the prime site should be the Venezuelan Basin. As second priorities, the Barbados Outer Ridge or CAR 3 should be drilled, depending on time available.

The PMP noted the support of the AMP for holes in the Barbados Outer Ridge and Grenada Basin.

North West Atlantic

All sites lie within 6800m drill string limit and are based on 15,000km of multi- and single-channel seismic. The following comments were made:

1. Seismic correlation should be made with discontinuities rather than reflections.
2. The map in the proposal should show DSDP + COST wells, and IPOD-II sites should also be shown for DSDP and PCOM.
3. There is a problem in identifying clathrates as opposed to relict clathrates, and of the nature of the diagenetic zone and its migration.
4. Improved velocity data would be a prerequisite in defining total depth accurately at sites close to the drill string limit. Use of a longer drill string may help date the Blake Spur anomaly and determine nature of basement.

The N. W. Atlantic group will confer with DSDP engineers in constraining design study and providing a semi-quantitative table with drill string and riser requirements.

IPOD-II

A prime objective would be to reach J_3 sediments and basement at a total depth of 11km. The FUSOD document contains the essence of the proposal. There is also a strong interest in drilling carbonate banks.

The AGU meeting of the U.S. Geodynamics Committee will include COCORP and a sub-panel on plate boundaries. It was agreed that a tie between COCORP and offshore multichannel lines is highly desirable.

The PMP requests that COCORP make every effort to join the land transect onto the proposed drilling transects of the margin, to provide a complete calibrated seismic profile from the continent to the adjacent ocean basins.

A series of sites offshore Nova Scotia and on the Newfoundland Ridge were presented. Principal objectives were to test nature of diapirs on Nova Scotian rise, northwest of the Neogene section, and deep reflectors on the Newfoundland Ridge.

North West Africa

The region is now of second priority and is likely to be drilled only depending on weather and logistics.

1. Problems are already comparable with the N. W. Atlantic; i.e., nature and age of reflectors, erosion, facies changes, etc.
2. Results of E. Atlantic drilling should be combined and compared with N. W. Atlantic. The FDR is anxious to determine location of transects off the US to constrain those off N. W. Africa.
3. New multichannel seismic profiles across the continent-ocean boundary off Morocco were presented. With other geophysical studies, these show a large fault zone coincident with a magnetic anomaly and a deep 7.1 km/sec refractor absent east of the fault. Proposed holes would test the nature of the diapiric structures and the deep Jurassic faulted reflector off Morocco and to penetrate the Upper Cretaceous off Mauritania.
4. Attention was drawn to surveys on the Walvis Ridge and planned surveys on the Guinea Plateau and Mauritania.

North East Atlantic

In the Bay of Biscay, the main objective would be to penetrate syn- and pre-rift sediments and to drill on either side of the clearly identified continent-ocean boundary. The implications for rifting, subsidence, and attenuation of the deep reflector close to the MOHO beneath the listric faults of Biscay and Galicia were emphasized. Drilling would calibrate the subsidence during rifting and afterward on a margin not subjected to loading. In the case of Rockall, it is desirable to penetrate the syn- and pre-rift sequence adjacent to the continent-ocean boundary and the adjacent ocean crust. The tilted and rotated fault blocks are not observed here, suggesting a different process of rifting and attentuation. Drilling along transform faults of Rockall was emphasized as a means of studying vertical decoupling in space and time in relation both to rifting and spreading. Re-entry holes would be required for the majority of these sites. The importance of completing a thorough study of starved margins was emphasized, as these offered a tangible means of resolving many problems of passive margins.

Plan B

The PCOM requested the various panels to:

1. list the prime objectives of one leg only should drilling terminate prematurely, and
2. list in order of priority drilling targets of the Panel.

The PMP recommends that if only one leg is available, it be dedicated to drilling the following high-priority targets listed in order: 1) the Venezuelan Basin and 2) the Blake-Bahama Basin. If further time is available, it should be dedicated to drilling the rise off the Eastern US and the starved margin of the Bay of Biscay, where the continent-ocean boundary can be drilled.

Although requested to list drilling targets for Plan B, the PMP requests that the PCOM note that the following objectives are considered to have the highest priority in any remaining drilling program. These are: the nature of the transition in space and time from rifting to spreading, the evolution of the post-rift section of thickly sedimented margins, and early Atlantic history. The Panel wishes to list the following targets in order of priority to achieve these objectives:

1. Blake-Bahama Basin
2. Venezuela Basin
3. Biscay, e.g., Site 400
   Biscay-- old ocean crust
4. Ocean-continent transition--Gulf of California
   Guaymas Basin re-entry
5. Rockall rifted margin
6. Continental slope of E. USA
7. Continental rise and slope of N. W. Africa
8. Continental rise of USA
9. Rockall transform margins
10. Continental rise off E. Canada

Plan A -- 1979-81 Extension

Logistically the ship cannot spend 6 months in high N and S latitudes without traversing the central N. Atlantic, and the clear relevance and importance of paleoenvironment studies of drilling off E. N. America was emphasized.

Flexibility should be used in planning legs, so that completion of objectives should be given the highest priority at all times, and that redundant time be used to transit to other margins or to drill secondary sites.

The PMP requests that the PCOM implement the following policy of Passive Margin Drilling in the North Atlantic during the IPOD-I extension. The seven legs of passive margin drilling should be divided into three legs in the N. E. Atlantic three off E. N. America, and one in the Venezuela Basin. Sites off N. W. Africa should be drilled on an opportunity basis to complement those drilled off the east margin of the E. USA.

The scientific objectives and priorities of these legs are as follows. The objective of the Venezuelan Basin leg is to occupy a multiple reentry hole, penetrating to the old crust observed beneath horizon "B". The hole will provide fundamental constraints on the early opening of the Atlantic and the evolution of the Caribbean Sea. Should time permit, holes will also be drilled on the Barbados Outer Ridge to test the hypothesis of imbrication at the trench or close to Site 151, to obtain a complete Tertiary biostratigraphic record for the Caribbean. The drilling off E. N. America is designed as a precursor to an IPOD-II phase by occupying a series of sites in the Blake-Bahama Basin on the slope and rise off New Jersey, and on the Laurentian Fan. These holes will document the early history of the Western N. Atlantic and the relationship between facies changes, transgressions, regressions, and associated erosional hiatuses.

The drilling program in the N. E. Atlantic will be dedicated to drilling on the starved margins of Biscay and Rockall. In Biscay, a fundamental understanding of the process and nature of crustal attenuation during rifting can be gained by drilling into tilted and rotated blocks, formerly the upper part of a thinned crust, above a shallow MOHO. Candidate sites are situated on either side of the continent-ocean boundary of Biscay and Rockall.

It was noted that continental margin sites require much more information and documentation than the brief forms generally used for deep-sea sites.

REPORT FROM THE OCEAN PALEOENVIRONMENT PANEL (12-13 December 1977)

Site Surveys

Site survey needs will be defined by the South Atlantic Working Group and transmitted directly to SSM as soon as possible so that surveys can be scheduled and/or ships of opportunity used during 1978.

In general, information about site survey requirements can be obtained in the following ways:

1. OPP site proponents identify clearly area of interest (the smaller the better) and transmit this information to SSM.
2. SSM makes available a map of existing tracks in the area.
3. OPP site proponents select specific tracks and ask SSM for selected seismic profiles.
4. In view of available data, OPP site proponents request additional surveys (if needed) from the SSP. Requirements and scientific objectives should be very specific.

Review of Pacific Program

Port of call between Leg 61 and Leg 62 - The prime site for both OPP and OCP is site CP 1 (Nauru Basin) and all efforts should be made in order to obtain complete sampling and deep penetration at that site. Site CP 2 (Central Pacific Basin) is of no interest to OPP. The only alternate site compatible with OPP objectives is site CP 3 (Mariana Basin).

Mandatory scheduling of site MM 1 (Mid Pacific Mountains) for Leg 61 does not appear reasonable in view of the time that might be required for deep penetration at CP 1 in order to satisfy OCP objectives. MM 1 should be drilled during Leg 61 only if objectives have been satisfactorily met at CP 1 (or CP 3) and enough time is still available. As this appears unlikely the choice of port-of-call for the end of Leg 61 becomes critical.

OPP reiterates the very high priority attributed to all Leg 61 and 62 drill sites. They are all part of an integrated specific program (evolution of the planktonic communities in relation to changes in oceanographic conditions).

This program is essential for our understanding of the concepts that will allow a much more efficient application of biostratigraphy to paleo-oceanography. OPP stresses that in view of the general orientation of the future drilling programs, this is probably the last chance to approach this fundamental paleoceanographic problem.

Status of Leg 61 sites - Site CP 1 (the highest priority site) has been presented to both Safety Panels (JOIDES and Scripps) and has been found to present no problem.

Hydrofracturing experiment - OPP considers that Leg 61 will need all time available for drilling and would prefer this experiment to be conducted later either during Leg 62 (Gulf of Alaska) or during one of the two Gulf of California legs.

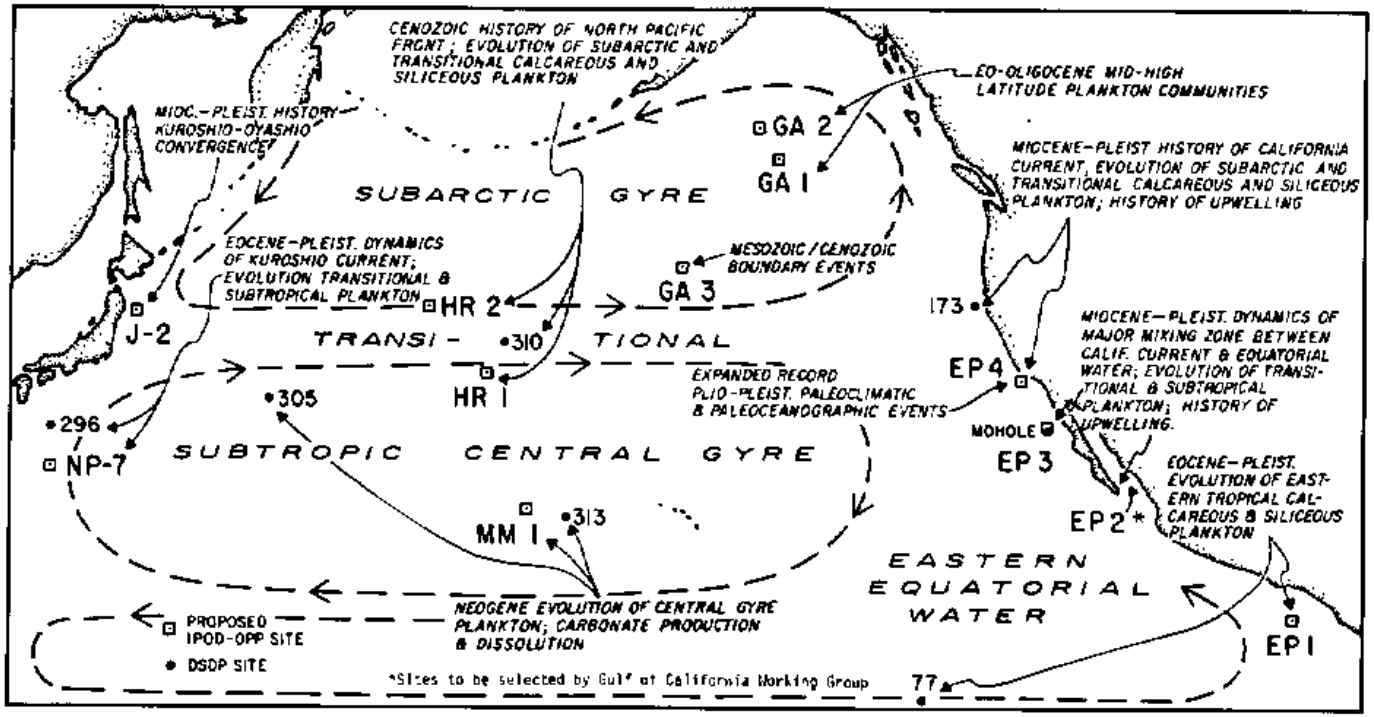
Leg 62 -

Site MM-1 (Mid Pacific Mountains): this site, documented by a single crossing seismic profile, is apparently completely safe and should present no problem. Total sediment thickness is about 650m. Basement should be reached and substantial penetration can probably be achieved with a single bit.

Site HR-1 and HR-2 (Hess Rise): these sites are also documented by single crossings and apparently present no problem. New data might have been acquired by Leg 55 when transiting over Hess Rise. Final site selection should consider these new data. Some flexibility exists for final choice within the limits of the objectives (proposal) as defined on the site proposal sheets.

Site GA-3 (Western Gulf of Alaska, K/T boundary): the objective is to sample the boundary as close to basement as possible in the hope that carbonates were deposited on top of basement prior to thermal subsidence. Therefore it is essential to look for the shallowest paleodepth possible at the time of the boundary.

After considering recent revisions of the magnetic time scale it was decided to locate site GA-3 near the older end of anomaly 31. It may be necessary to drill several quick holes to achieve this objective. This should not be a major problem considering the relatively thin sediment section (about 350m).



Summary of Ocean Paleoenvironment Panel Objectives in the North Pacific Ocean

Site GA-1 and GA-2 (Gulf of Alaska, Eocene/Oligocene boundary): the same methodology as above will be used to try to sample the boundary in a ridge-flank setting as high as possible (in paleodepth).

After considering again the latest views on magnetics it was decided to locate both sites (one is alternate to other) on the old side of anomaly 15. Again flexibility will be given to shipboard scientists to achieve the objective and several holes might have to be drilled.

Leg 63 -

Several new sites have been documented by the N. Pacific working group. They were designated by letters and are hereafter presented with numbers, together with previously documented sites EP 1-4 in order to comply with the standard JOIDES rule (letters are indicated in parentheses so as to avoid confusion. Panel members are invited to check their files and replace letters by numbers). Each of the Leg 63 potential sites presented below from North to South, have been assigned a priority ranking from 1 to 3.

Site	Summary of geological setting	Priority
EP-6 (ex EP-E)	located near 39°N in 4400 m of water depth, distal Delgada fan, just south of Mendocino F-Z, Northern-most site along path of California current. Comparison with sites 34 and 173 for cross current transect. Scan survey available. Sediment thickness approx. 350 m.	2
EP-7 (ex EP-F)	Distal Monterey Fan. Apparently pelagic filled basin overlain by distal fan sediments.	3
EP-4b	Northern Tanner Basin (Patton Basin). Unique expanded late Neogene section for this latitude.	1
EP-4A	On Patton slope (escarpment). Not as attractive as EP-4 (thinner section). Considered as alternate to EP-4.	1
EP-5 (ex EP-D)	At foot of Patton escarpment. Part of transect with EP-4 (4A) for study of lateral variations in California current flow.	1
EP-3	Near Guadalupe. Very close to experimental Mohole test site, in area of current mixing. Need a single channel crossing.	1

EP-8 (ex EP-B)	Off Southern Baja California. Site located just north of area of strong gradient on sea surface temperature.	2
EP-9 (ex EP-A)	San Lucas fan, at tip of Baja Peninsula. Site is essentially same as one site proposed by PMP for transect near mouth of Gulf of California.	3
EP-1	Guatemala Basin, Eastern tropical Pacific. Deep water site on early Tertiary crust. Section mostly pelagic.	1

Discussion on EP-4

This site is one of the most important targets for Leg 63 for the following reasons:

1. it is located at a hinge point in the current system which is very sensitive to oceanographic changes,
2. it is beneath a zone of mixing between high and low latitude faunas, characterized by important ecological stress and is therefore very useful in evolutionary and biostratigraphic studies,
3. it is an area in which there exists a solid geological and geophysical background. This background knowledge will be greatly enhanced by the results of this site expected to be characterized by a greatly expanded sequence of fine grained sediments.

South (East) Atlantic -

The OGP expressed a strong interest in the OPP program in the South East Atlantic. It is generally recognized that coordination should be improved between the two panels. This will be best achieved at the working group level for the details of site proposals.

OGP would like to obtain: 1) more samples, from a wider geographic area than what is presently available from leg 40; 2) samples of larger size; 3) on board OGP representatives not only to make shipboard measurements but also to interact more directly with shipboard sedimentologists and paleontologists. This should help the geochemists on their sampling and would ensure a much better definition of common objectives in terms of paleoenvironments.

In general OGP needs to both explore the possible use of various organic compounds and to relate their occurrence directly to environment of deposition and post depositional evolution. Such studies are believed to provide feed back information on paleoenvironments as well as information on the sources of the organic components, relation with climate, etc...

REPORT FROM POLLUTION PREVENTION AND SAFETY PANEL (7 June and 10 November 1977)

The PPSP met twice during 1977; at LDGO on 7 June to review Legs 55-58, and at SIO on 10 November to review Legs 59-61.

At the June meeting, three proposed Leg 56 sites in the Sea of Okhotsk were judged too risky and were disapproved. The Panel was unanimously of the opinion that the danger of low volume, high pressure gas was too great, that too little was known about the geology of the area, and that the data presented were not sufficient to overcome the uncertainties involved in these sites.

Subsequent to that meeting, some additional information on the geology and petroleum possibilities of the region were submitted and the Panel was asked if it wished to reconsider its decision. The consensus was that the new information, although enlightening, was not a sufficient basis for approval of the Okhotsk sites.

At the November meeting, the PPSP approved all sites for Legs 59, 60, and 61. We were then asked to make a preliminary review of proposed site EP-4 for Leg 63 in the Patton Basin of the California Borderland. Since it was not a formal site proposal, EP-4 was neither approved nor disapproved, but the Panel recommended that its proponents ascertain whether or not the hole would be permitted before anything else was done.

INORGANIC GEOCHEMISTRY PANEL ANNOUNCEMENT

The Inorganic Geochemistry Panel on 27-28 June 1977 recommended preparation of a list of standard samples available to laboratories performing extensive chemical analyses on DSDP-IPOD materials. The Panel further recommended that individuals and laboratories publishing analytical data utilize the standard samples to provide a check on analytical technique, and permit better inter-comparison of data. As syntheses of the deep drilling information progress, such checks will serve an important purpose.

A list of appropriate standards for all Panel members and also for other affected Panel chairmen has been prepared. Also available is a copy of U.S. Geological Survey Professional Paper 840, which provides an extensive listing of analytical data on standard samples available free from the USGS.

Dr. Frank T. Manheim, Office of Marine Geology, U. S. Geological Survey, Woods Hole, Massachusetts 02543, has a limited number of these reports for distribution.

SITE REPORTS

Leg 58

Co-Chief Scientists G. Klein and K. Kobayashi report:

Site 442 (NP-3B) Lat. 28°59.04'N; Long. 136°03.43'E; Water Depth: 4644.5m.

Site 442 is located in the west-central part of the Shikoku Basin on magnetic anomaly 6. The stratigraphic section consists of 164m of Pleistocene mud and clay, 45m of Pliocene mud, 67m of Late Miocene mud/volcanic ash, 9.7m of Early Miocene zeolitic clay/claystone, 0.4m of Early Miocene limestone, 66m of massive basalt flows with normal polarity, and 92m of pillow basalt flows with normal polarity in the upper part and reverse polarity in the lower part. Continuous sedimentation started with pelagic limestone and clay and was then dominated by hemipelagic processes, at or near the CCD. The basement age of Early Miocene (18-21 m.y.) agrees with the age for magnetic anomaly 6. Basaltic basement shows higher than normal vesicularity and is characterized by the absence of olivine.

Site 443 (NP-2B) Lat. 29°19.64'N; Long. 137°26.36'E; Water Depth: 4683m.

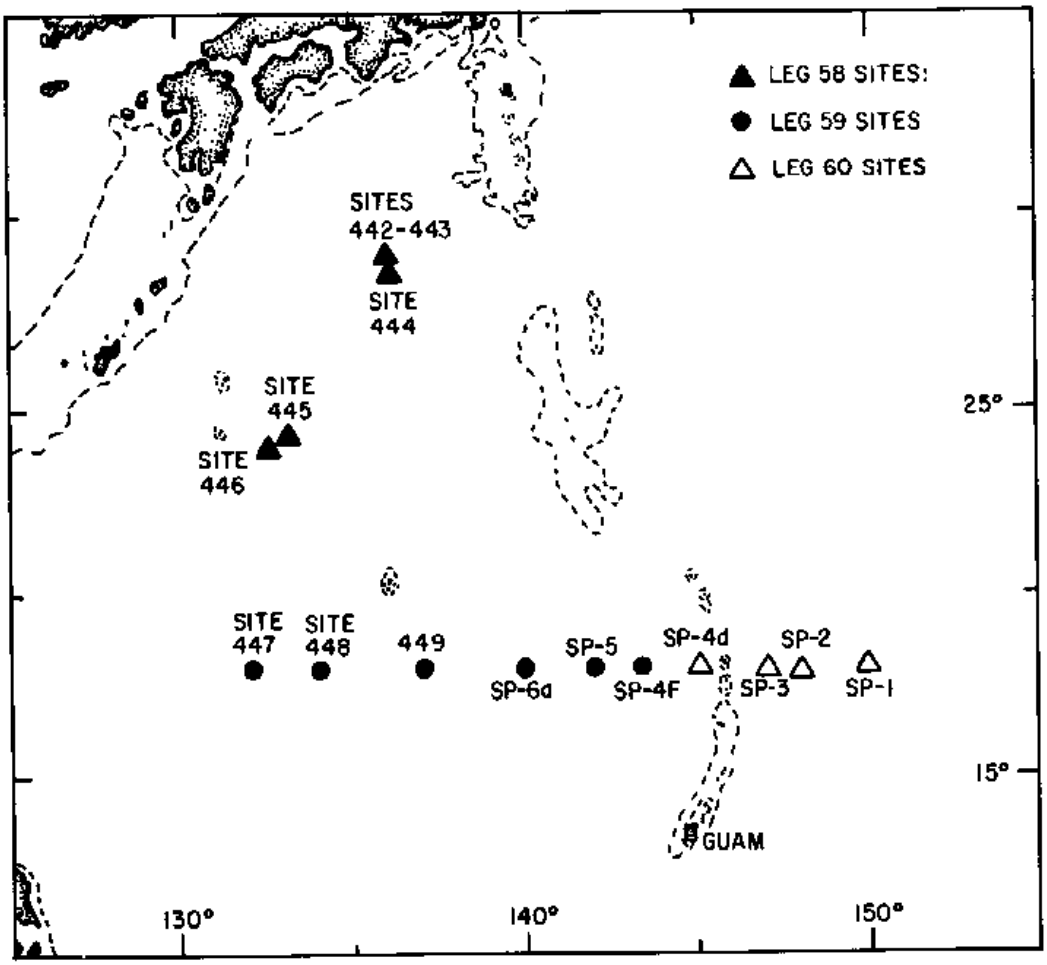
Site 443 is located in the east-central part of the Shikoku Basin. The stratigraphic section consists of 45m Upper Pleistocene mud, 76m Lower Pleistocene nannofossil clay, clayey nannofossil ooze and ash, 57m Upper Miocene mud and nannofossil ooze; 31m of Upper Miocene mudstone, 45m of Middle Miocene nannofossil chalk and mudstone, 98m of Lower-Middle Miocene claystone, mudstone, ash and chalk, 35m of phyric olivine basalt flows with hydrothermal veins, 34m of pillow lavas, and 47m of interbedded phyric basalt flows and pillow lavas. Continuous sedimentation started with Middle Miocene resedimentation of volcaniclastic, hemipelagic and pelagic sediments and was then dominated by post-Middle Miocene hemipelagic processes slightly above the CCD. The age of the oldest sediment is 15 m.y.BP providing a basement age at variance with the magnetic anomaly age. The basalts show a combination of reversed and normal magnetic polarity with both high and low inclinations.

Site 444 (NP-2C) Lat. 28°38.3'N; Long. 137°41.0'E; Water Depth: 4852m.

Site 444 is located in the east-central part of the Shikoku Basin, 45 n.mi. southeast of Site 443. The stratigraphic section consists of 52m of interbedded mud, vitric mud, ash, and clayey nannofossil ooze of Pleistocene age, 32m of Pliocene mud, ash, and vitric mud; 110m of Upper Miocene mud, ash, vitric mud, nannofossil ooze, radiolarian ooze, quartz sand, and siliceous mud; and 69m of Middle Miocene mudstone, ash, nannofossil ooze, and radiolarian mudstone cut by a 10m basalt sill. Basement consisted of 19m of amygdaloidal porphyritic basalt flows followed by a 19m aphanitic aphyric basalt flow. An early Pliocene-latest Miocene hiatus occurs in the section. The dominant sediment motif is one of mixed hemipelagic and ash deposition. Basement age is 15 m.y. BP which is at variance with the magnetic anomaly age for the site.

Site 445 (NP-7B) Lat. 25°31.36'N; Long. 133°12.49'E; Water Depth: 3382m.

Site 445 is located in a small basin on the Daito Ridge in the Northwestern Philippine Sea. The stratigraphic section consists of 141.5m of Pleistocene and Pliocene foraminiferal-nannofossil ooze; 247m of Lower Pliocene through Lower Miocene foraminiferal-nannofossil chalk; 275.5m of Lower Miocene through Upper Eocene Limestone with chert nodules in the lower part; 71m of Middle Eocene mudstone and sandstone with thin conglomerate beds; and 167m of Middle Eocene sandstone and conglomerate. A hiatus in sedimentation occurred during the Early



Leg 58, 59 and 60 sites

Oligocene. The occurrence of Nummulities boninensis is limited to resedimented debris flow conglomerate beds. The carbonate sediments, mudstones, sandstones, and conglomerates are dominated by a history of resedimentation by slumping, debris flow, and turbidity currents. Shipboard analyses of paleomagnetic inclination indicate Site 445 to have migrated from an equatorial latitude to its present position over the last fifty million years.

Site 446 (NP-5) Lat. 24°42.04'N; Long. 132°46.49'E; Water Depth: 4980m.

Site 446 is located in the Daito Basin south of Daito Ridge in the northwestern Philippine Sea. The sedimentary section consists of 14m of Pliocene terrigenous mud and clay which overlies 158.5m of Pliocene, Miocene, Oligocene and Upper Eocene pelagic clay. This is underlain by 190m of middle to upper Lower Eocene mudstone, claystone, siltstone, conglomerate and ash intruded by 16 post-Lower Eocene basalt sills. Shipboard paleomagnetic analysis shows that Site 446 has migrated from an equatorial latitude over the past 52 m.y. The age of the basement of the northwestern Philippine Sea is possibly as young as Early Eocene.

Site 447 (SP-8) Lat. 18°00.88'N; Long. 133°17.37'E; Water Depth:6031m

Site 447 is located on the eastern side of the West Philippine Basin, between the Central Basin Fault and the Kyushu-Palau Ridge. Hole 447 was abandoned when the core catcher of the punch-core contained only manganese nodules and fragments of manganiferous crust. Adjacent Hole 447A was successfully cored to a depth of 297.5m.

The stratigraphic sequence consists of barren pelagic clay (37.5m), upper middle Oligocene to lower upper Oligocene nannofossil ooze (9.5m) overlying a nannofossil chalk breccia (9.5m), a middle Oligocene unit of recrystallized carbonate chalk-breccia (9.5m) and sedimentary breccia (19m), barren variegated clay (2.5m), a 25.5m unit of basalt-derived sedimentary breccia, including a 4.5m middle subunit of basaltic sandstone dated at middle Oligocene, overlying 183.5m of basalt flows. The upper part of the sedimentary sequence was deposited well below the carbonate compensation depth, but the lower portion was deposited close to that depth.

The tholeiitic basalts consist of 18m of plagioclase phyric flows and pillow lavas, a 10.0m aphyric pillow lava, 43.5m of olivine-plagioclase-clinopyroxene phyric pillow lava/flow units, a 9.5m aphyric basalt flow, 14.5m of olivine-plagioclase-clinopyroxene phyric pillow lava/flows, 38.0m of olivine-plagioclase phyric pillow lava/flows, 35.5m of plagioclase-olivine phyric pillow lavas and 14.5m of similar basalt containing plagioclase megacrysts and gabbroic xenoliths. Increasing abundance and size of gabbroic xenocrysts and zenoliths with depth suggest the proximity of gabbros at the bottom of the hole. Seismic data show an unusually thin Layer 2 at Site 447.

Site 448 (SP-7) Lat. 16°20.46'N; Long. 134°52.45'E; Water Depth: 3503m

Site 448 (Holes 448 and 448A) is located on the western edge of the Kyushu-Palau Ridge. Penetration was successful to a depth of 914.5m. Lithologic units were differentiated from top to bottom as follows: Unit 1, upper Oligocene to middle Miocene pale brown nannofossil ooze (107.5m); Unit 2, upper Oligocene nannofossil chalk (64.0m); Unit 3, upper Oligocene sequence of alternating tuffs and chalks (14.0m); Unit 4, middle to upper Oligocene tuffs and basaltic ashes (95m); Unit 5, middle Oligocene sequence of alternating tuffs and chalks (57.0m); below this horizon volcanic flows alternate with volcaniclastic sediments.

Nine basalt units are aphyric to olivine-two pyroxene-plagioclase phyric and seven volcaniclastic units are yellowish-brown to dark green basalt breccia and

tuff containing copper veinlets and calc-alkalic volcanic and intrusive clasts (basalts total 179.5 and average 20.0m in thickness, breccias total 177.5m and average 25.3m in thickness). Below 694.0m seven dikes and sills (?) alternate with ten flows and ten volcaniclastic and three hydrothermally altered breccias containing disseminated pyrite and chalcopyrite(?). The dikes and sills total 22.0m averaging 3.1m thick along the core axis, whereas the flows total 84.5m and average 8.5m in thickness. The volcaniclastic sedimentary breccias total 113.5m and average 8.7m in thickness. The paleontological age at about 100m from hole bottom is still middle Oligocene. The strata are inclined from 15 to 45 degrees increasing down-section.

Site 449 (SP-6B) Lat. 18°01.48'N; Long. 136°32.19'E; Water Depth:4727.5m

Site 449 is located on the western side of the Parece-Vela Basin. One hole was drilled and successfully penetrated a depth of 151.5m. Within the sequence encountered, the following units were differentiated from top to bottom:

Unit 1 Pleistocene to latest Middle Miocene dark brown to yellowish-brown pelagic clays with manganese nodules on the surface (40.9m).

Unit 2 Middle Miocene dark yellowish-brown radiolarian ooze with volcanic glass and pumice (6.6m).

Unit 3 Middle Miocene interbedded brown radiolarian-rich pelagic clays and yellowish-brown radiolarian-bearing nannofossil ooze containing pumice (11.0m).

Unit 4 Middle Miocene to Early Miocene dark yellowish-brown to very dark pelagic clay with ash layers and manganese nodules (38.7m).

Unit 5 Early Miocene to Late Oligocene partially lithified mottled yellow and brown nannofossil ooze (13.8m).

Unit 6 Plagioclase-olivine phyric tholeiitic pillow basalt (23.5m).

Unit 7 Plagioclase phyric tholeiitic basalt flow (17.0m).

This appears to be a normal pelagic oceanic sedimentary sequence on normal tholeiitic oceanic crust probably emplaced in Late Oligocene time.

SUMMARY OF DEEP SEA DRILLING PROJECT RESULTS: Legs 57 and 58

Leg 57

The Japan Trench transect is the first of three IPOD transects across active margins. These transects are designed to study the effects of plate convergence at continental and island arc margins through geophysical techniques and GLOMAR CHALLENGER sampling. Leg 57 completed the Japan Trench transect (begun on Leg 56) that was designed to sample reference sections on each side of the zone of accretion, and sites in the zone. At one reference site east and seaward of the trench, material entering the zone of convergence from the seaward side was sampled (Site 436*), and at two others, material entering the zone from the landward side was sampled (Sites 438 and 439). Four sites were drilled in the vicinity of the zone of accretion on the trench inner slope (Sites 434*, 435*, 440, 441).

The Japan Trench transect crosses an island arc system in which the insular continental crust rifted from the Asian mainland. Between Asia and Japan is a back-arc basin. On the Pacific side of the islands is the fore-arc area which extends to the Japan Trench. In preparation for IPOD drilling, two 24-channel seismic reflection records across the area most favorable for study were made. In addition, single channel and multichannel records were available.

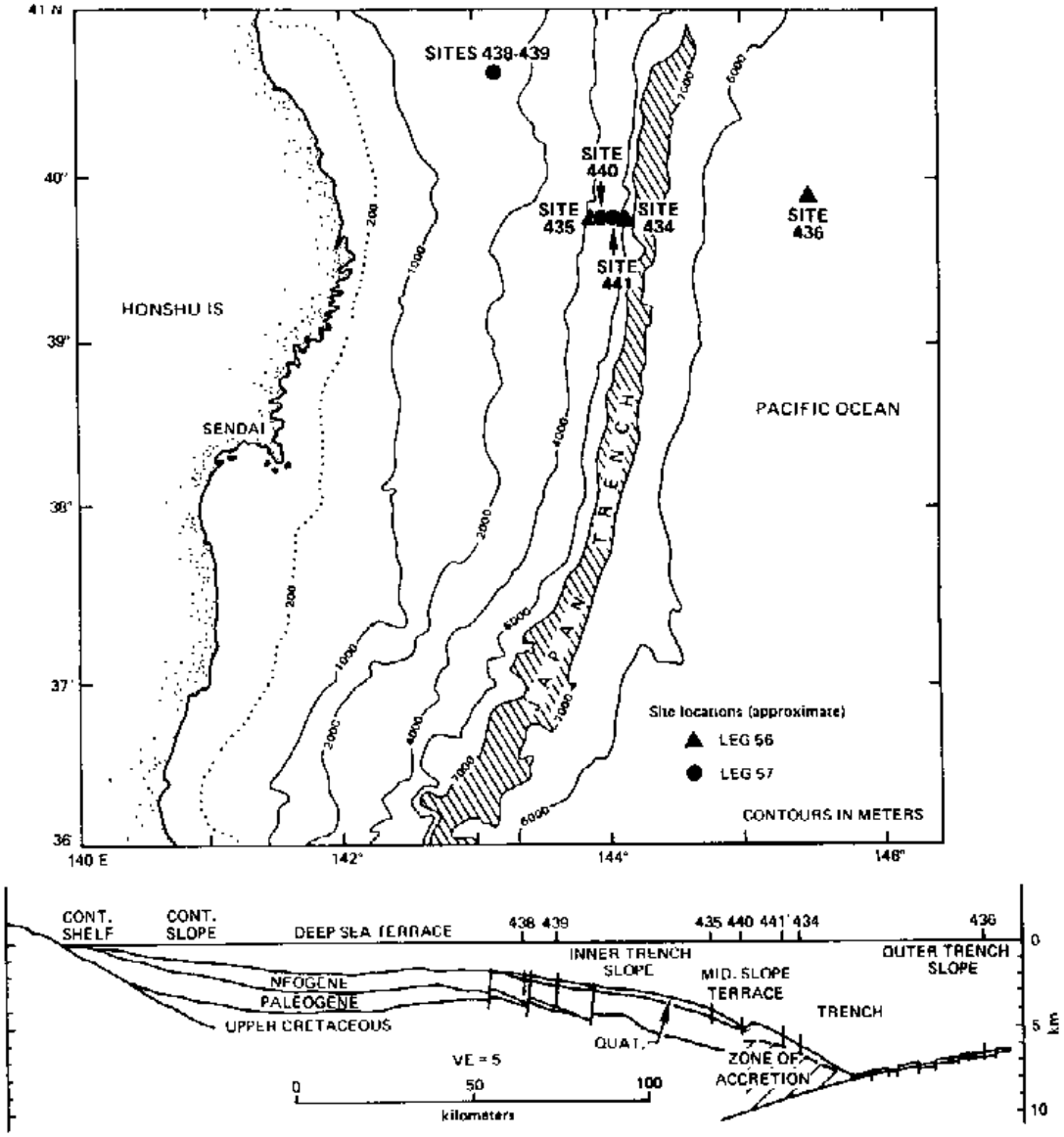
Seismic records along the transect indicate that the nonfolded Paleogene sedimentary sequence inferred from samples near shore rests unconformably on acoustic basement, and extends from the shore to the vicinity of the trench inner slope. The Paleogene sequence is in turn overlain by a Neogene sequence that extends even farther across the trench slope. Seaward of the nonfolded sequence are deformed strata in the zone of preseumed accretion, adjacent to the trench.

Leg 57 drilling began at a reference site (Sites 438,439) where a complete biostratigraphic zonation and the terrigenous lithology could be established. Sites 438 and 439 are essentially a single site just landward of the trench inner slope in a section that has been little affected by the compressional stress of convergence as indicated by small extensional faults. The remaining Leg 57 sites are on the trench inner slope in a zone presumably stressed by convergence. This zone should contain the boundary between tectonically accreted oceanic material and non-accreted slope material of the present convergent tectonic epoch. Site 440 is on the relatively narrow mid-slope structural terrace. The midslope terrace is underlain by a short sequence of gently dipping unfolded weak reflections similar in character to the reflective sequence landward. Below, at great depth, the terrace is underlain by a strong reflection from igneous crust of the oceanic plate. Site 441, down the trench slope from Site 440, is on rough terrain of the zone of accretion. The zone of accretion is recorded as many diffractions and sparse lower tilted reflections that are overlain by short or discontinuous reflections subparallel to the sea floor. The upper sequence of reflections is much less faulted than the oceanic basement suggesting rapid slope sedimentation or down slope mass movement.

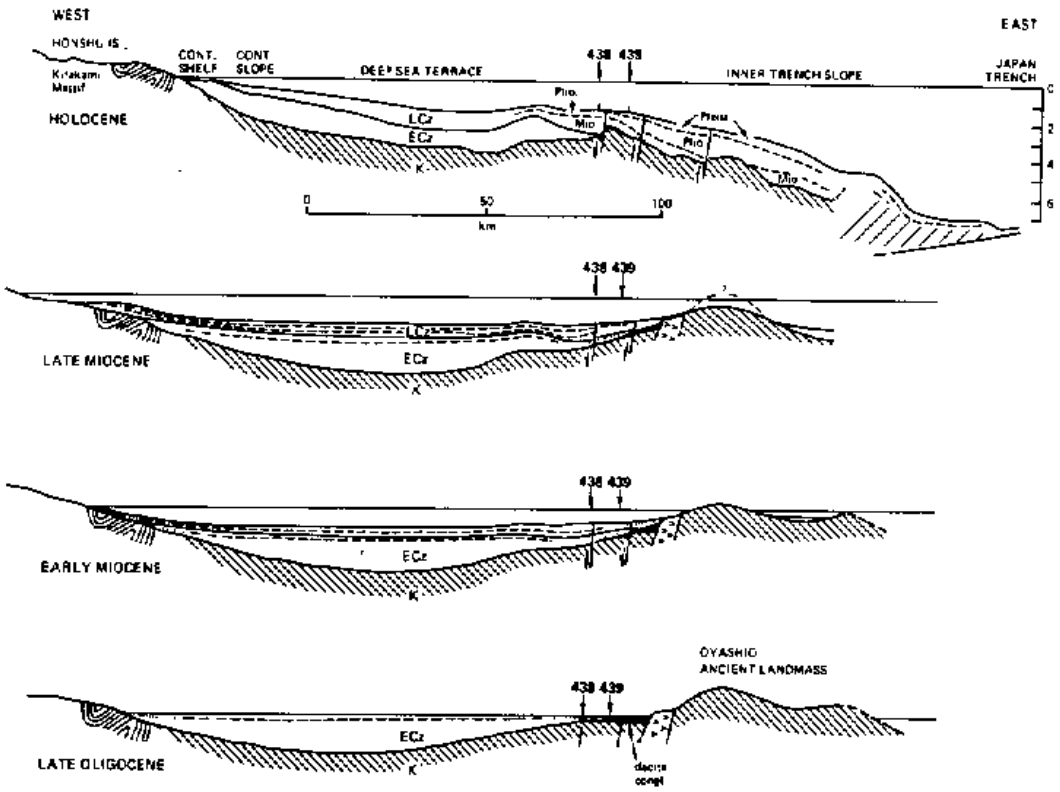
Biostratigraphy

DSDP Leg 57 sites lie within the mixing area of the cold Oyashio and warm Kuroshio currents. During the Neogene, fluctuations in these currents resulted in deposition of a succession of warm water, temperate, and cold water faunal and floral assemblages. Consequently, Leg 57 sites provide an opportunity for

*Sites drilled on Leg 56



Schematic cross section showing drill site locations for DSDP Legs 56 and 57



Leg 57 - Sites 438 and 439

correlation of high latitude and low latitude microfossil zonations.

Studies of DSDP cores, piston cores, and outcrop samples have established a relatively complete microfossil biostratigraphic zonation for the North Pacific. In addition, Neogene paleoclimatic events throughout the North Pacific have been identified from planktonic foraminiferal assemblages. The microfossil datums and paleoclimatic events have been tied to paleomagnetic stratigraphy and to the absolute time scale. The composite record from Holes 438A and 439 illustrates the excellent control of microfossil biostratigraphy available in beds of Pleistocene to upper Oligocene age. Microfossil control is best between 0 and 3 m.y., scant between 3 and 4.5 m.y., and moderate from 4.5 to 16.5 m.y. Only benthic foraminifera are present in the upper Oligocene and Upper Cretaceous sections. The sediment recovered from Holes 438A and 439 provide a good upper Oligocene to Holocene reference section for the northwest Pacific.

Microfossil control between all sites is excellent, particularly for the Neogene sections. Leg 57 sites show no paleontological evidence for structurally repeated sections. Paleoclimatic events can be recognized in cores from all Leg 57 sites, and the correlation of these events further supports the biostratigraphic correlations.

Pronounced hiatuses are present in the lower Pleistocene of Sites 438, 434, and 441. Overall sediment accumulation rates are similar for all sites on the inner trench slope and deep sea terrace; however, this is misleading because no correction has been made for differences in consolidation history.

Lithology

The series of environments interpreted from this lithologic sequence at Sites 438 and 439 begins with an emergent Oligocene terrane of black silicified Upper Cretaceous claystone and pre-upper Oligocene dacite. Clastic debris of this lithology was covered in late Oligocene time by sand transported from a nearby surf zone into more quiet marine water of less than 500m depth. The terrain continued to subside through early Miocene time as interbedded turbidite sand and clay layers were deposited. Distance from sources of coarse-grained eroded material apparently increased because in early Miocene time deposition of turbidite units gave way to sedimentation of mud and diatomaceous mud. The area of the sites reached upper middle bathyal depth at the beginning of early Miocene time and lower bathyal depth in late Miocene time, and was essentially isolated from coarse-grained terrigenous material from middle Miocene until late Pleistocene time. This sequence of events can be extrapolated to either side of the site assuming that the time horizons can be extended along seismic horizons in the multichannel records across the sites. The multichannel records were joined with the section in order to extend the horizons to shore, thereby forming a complete reconnaissance cross section of the margin. The inundation of the landmass began in lower Paleogene time west of Sites 438 and 439 and progressed through early Neogene time. The subsidence of this ancient landmass, named the Oyashio ancient landmass, is puzzling in view of the prevailing ideas of tectonic accretion at convergent margins and the island arc volcanism presumed to have been active since late Oligocene time. Underthrusting of oceanic crust at the continental crust is generally thought to be associated with uplift of the outer continental margin, yet the data suggest that uplift is only local and of latest Cenozoic age.

Perhaps the most unexpected discovery at Sites 438 and 439 are the boulders of acidic igneous rocks only 90km from the Japan Trench. The presently active arc is 300km from the trench. A nearby source for the boulders from the Oyashio

landmass is suggested by the size and angularity of the clasts, the monolithologic character of the deposit and the difficulty of transporting these materials from Honshu or Hokkaido Islands. From this discovery it can be implied that a magmatic or volcanic arc of a previous tectonic epoch lay near the site or about 200km farther east than the present arc. The sites are on a southern projection of north-trending metamorphic belts on Hokkaido Island containing remnants of a volcanic arc of Cretaceous age. However, it is premature to draw conclusions regarding the relationship of these belts to the acidic igneous rocks at Site 439 until the rocks from this site have been radiometrically dated and studied further.

Site 440

From the cores, downhole logs and seismic records, the stratified sequence beneath the midslope terrace at Site 440 is interpreted as consisting of a nonfolded upper continental slope section rather than a deep ocean basin sediment accreted at the leading edge of the insular lithosphere. The sequence is more than a superficial slump block from higher on the slope. It is an orderly sequence of terrigenous sediment in beds at least 1600m thick that have been rotated until they tilt landward. If the rate of sedimentation in the drilled section is assumed to continue without a hiatus in the unsampled lower part of the section, as it does at Sites 438 and 439, the estimated minimum age at the base of the sequence is early Miocene. The estimated age is a minimum one because no allowance for compaction was made. The intense fracturing is evidence that abnormal stress, probably from plate convergence, is communicated to the midslope area. The stress is superimposed on a section originally deposited in a normal continental slope environment. At the scale of resolution in seismic records, however, deformation from the stress has not yet disrupted the reflecting horizons to produce compressional folds or to mask structure with extensive diffractions.

Site 441

The beds sampled are claystone of late Miocene to Pleistocene age with varying amounts of diatoms and volcanic ash, much the same as the other sites on this transect. The intervals between paleontological datums are virtually the same as at Site 440 except for one middle Pliocene interval that is about one-third thicker than the equivalent interval farther upslope. Persistent recovery of drill cuttings composed of less than 1 cm-sized lithic chips, which readily crumble, characterizes the cores below about 140m from Site 441. The rare massive core pieces are cut by fractures with a variety of orientations that divide the coherent materials into blocks. Some fractures are clearly faults, but many appear to be partings or joints, and at least some may have been induced by drilling. Another material is in the form of sedimentary breccia consisting of mudstone chips in a mudstone matrix. In some cores the clasts were paleontologically dated as chips of lower middle Miocene rocks floating in a matrix of Pliocene age. These lithic chips must have been transported downslope. In one coherent section, the lithic chips are squeezed together with little if any apparent intervening matrix. Also sampled was tectonic breccia that apparently developed in place. The relative importance of each of these fabrics cannot be determined because the highly fragmented core material could originally have been any one of the types mentioned and because of poor recovery.

There is no evidence from the cores that a section from the oceanic plate was drilled. However, the hemipelagic section sampled here and at Site 434 (Leg 56) is more intensely fractured than any other section sampled on the Japan Trench transect. Therefore, it is thought to be stressed by tectonism associated with plate convergence and to be part of the accretionary zone, in a dynamic sense.

Laboratory and In-Situ Physical Properties Measurements

The combined data from downhole logging and laboratory physical properties measurements show lithologic variation not readily apparent from visual study of the cores. Particularly notable are the effects of fracturing which are reflected in the Formation Density Log and bulk density measurements. The onset of pervasive brittle fracturing occurs at increasingly shallower depths at sites near the trench; for example, at Site 438 it begins at 700m, at Site 440 it begins at 387m, and at Site 441 it begins at 132m. The formation density log shows anomalous density decreases having the same trend, not exactly at the onset of fracturing but as the process of fracturing progressed. The data indicate that consolidation at Site 438 is normal, whereas, at Sites 440 and 441, the deposits are overconsolidated. A preliminary interpretation of these data from the latter sites suggests that as sediment density increases down-section the sediment deforms plastically, consolidates and dewaters through anastomozing veins, and responds to stress by brittle fracture. At some point a sudden anomalous decrease of density seen in the logs and physical properties measurements probably marks the point where a pronounced secondary fracture porosity develops. The density then remains at a constant value until lithostatic pressure begins to close fractures. The highly fractured character of the rock is also shown by the consistent poor core recovery experienced as highly fractured intervals were penetrated.

Rates of sediment accumulation along the Japan transect that are uncorrected for differences in water content are misleading because the consolidation histories of the sediment sections are different. Eliminating differences in water content from the accumulation rates and separating biogenic from terrigenous components on the basis of smear slides results in a much different comparative rate of sediment accumulation between sites in the zone of convergence and outside of it. The rate of terrigenous sediment accumulation in the zone of convergence is generally twice as great as it is either seaward or landward and at 6 m.y. it reached 8 times the normal rate.

The increased accumulation is not readily explained by a single mechanism but it could be caused by either sedimentation or tectonism. It seems likely that both are involved, but the evidence for each of these processes has not yet been derived from a complete synthesis of the available data.

The rates of sediment accumulation could vary with differences in topography, currents, and the distance from source. It seems difficult to deposit sediment more rapidly on the trench slope than on the adjacent flat area landward which is closer to the terrigenous sediment source. Immediately adjacent to the thickened slope section is the trench axis which is essentially without any ponded sediment, a similarly difficult situation to explain if sedimentary processes alone were causing thickened slope deposits. Although the effects of sedimentary processes have not yet been determined, tectonic processes seem to be required.

Tectonism can produce thickened sediment in a number of ways. Large scale imbrication and tilting of imbricate slices from a horizontal to a near vertical position and isoclinal folding are often shown in models of convergent margins. However, evidence form this investigation does not indicate large scale imbrication in the section penetrated. Imbrication is not ruled out elsewhere in the zone of accretion because the igneous basement is broken by large faults spaced 5 to 10km apart, but in the sections penetrated the rates of sedimentation are generally uniform, the paleontological sequences are orderly and lack repeated zones, and the seismic reflections are parallel to the ocean floor. There is

stronger evidence that thickening is accomplished by a combination of repeated downslope mass movement, and by tectonic compression. Mass movement is particularly evident where microfossils in breccia clasts indicate displacement of the clasts from upslope and where syndepositional folding has occurred. Tectonic compression is evident from the dewatering, consolidation, and pervasive fracturing of materials from Sites 440 and 441. Perhaps the sequence of structures from dewatering veins through closely spaced fracturing, tectonic brecciation, and the development of pervasive fissility may be an initial stage of tectonic consolidation in mudstone sequences. However, tectonic consolidation is a poorly defined and understood process and just how much thickening can be accomplished in this manner is unknown. The development of tectonic thickening will be one of the study topics of the post cruise period.

Summary

IPOD geophysical data and drill sampling along the Japan Trench transect have placed limits on the volume of material tectonically accreted during the present convergent episode to a surprisingly small zone. These limits seem well established by the seaward extent of crust with continental thickness and lithologies, and by the age and thickness of a terrigenous slope apron covering the presumed but unsampled accreted oceanic material.

The evidence for crust of continental affinities is anchored in part to the geologic history on land and, as presently interpreted, the geologic history at Site 439 correlates with the history of Honshu Island. The Cretaceous unconformity, widely recognized on land, has now been observed 130km east from the coast at Site 439. In outcrop and sampled sections, the unconformity cuts across an ancient landmass and, therefore, the former extent of the landmass is probably indicated by the extent of the unconformity in seismic records. In addition, there is possible evidence that the landmass extended much farther east than Site 439 because a volcanic arc like the one inferred to be near Site 439 is usually associated with a trench 100 to 200km farther seaward. If this is true, a pre-Oligocene fore-arc area once extended hundreds of km seaward of Site 439.

The unconformity can be traced from the Kitakami Massif on land, across the inner part of the continental margin. It can be continued seaward in multichannel seismic records across Sites 438 and 439, where it is clearly recorded, and farther seaward at least to the middle of the inner trench slope where it is presently at a depth of 6km. Therefore, it is likely that remnants of the Oyashio landmass, which was probably crust of continental thickness during a previous tectonic episode, extends at least to the seaward limit of the unconformity as recorded by the seismic reflection surveys.

The seaward limit of the unconformity is unclear because it becomes difficult to follow about 15km upslope from the midslope terrace in the seismic record across Sites 440 and 441. However, the overlying slope deposits extend farther seaward and merge into the zone of accretion. Therefore, the sedimentary environments reflecting subsidence of the Oyashio landmass and deposition of terrigenous material on a deep sea terrace and trench slope extend to the midslope terrace at Site 440. There is no folding of this section in the multichannel records. The accretionary zone, characterized by highly diffracted reflections and a series of dipping reflections, begins immediately seaward. Therefore, the acoustically definable accretionary zone extends approximately 25km landward of the trench axis to the vicinity of the midslope terrace. The base of the section beneath Site 440, which is virtually in contact with the oldest part of the zone of accretion, is estimated to be no younger than early Miocenian age.

This minimum age estimate is close to the late Oligocene age of initial volcanism associated with the present episode of convergence. At Site 441 accretion can be no younger than the upper Miocene age of the trench slope deposits.

The term accretion should probably be used in a broader sense here and not be restricted only to materials scraped off the oceanic plate. Along the Japan Trench, a great deal of terrigenous material moving down the slope never reaches the trench or oceanic plate before it is involved in compressional tectonic environment, for instance, the over-compacted sediment at Site 440. Even at sites closer to the trench, no material from the oceanic plate was recognized, and yet a much greater amount of sediment has accumulated here than at the reference sections landward and seaward. Although some of this greater thickness of sediment may be due to local differences in rates of sedimentation, there is evidence in cores and downhole logs of tectonic stresses that may thicken the section, and therefore accretion in the dynamic sense of the term must here include trench slope deposits.

Imbrication is the accretionary process most commonly associated with convergent margins and some imbricate faulting is interpreted from the seismic records (Leg 56, summary report). In addition, downslope mass movement is indicated by hiatuses at the Pliocene-Pleistocene boundary of sites on the trench slope, by evidence of some intervals of transported material, by syndepositional folding, and by scars and other evidence of slumping in the seismic records (Leg 56, summary report). Not so easily recognized, but perhaps an important mechanism in tectonic thickening, is tectonic consolidation, which is a process that is as yet poorly defined and understood. The preliminary findings indicate that dewatering and development of pervasive fracturing are two important processes in the initial stage of tectonic consolidation of the mudstone encountered in Leg 57 cores.

Preliminary calculations indicate that the zone of accretion associated with the Japan Trench is not large enough to accommodate all the sediment carried there in Neogene time by the subducted plate at the convergence rate of 8 to 10 cm/yr despite a liberal allowance for compaction. Nor does a great deal of the stress across the slip plane between the upper and lower plates seem to be communicated landward of the midslope terrace, at least in the upper 2 to 3km of the continental margin. Some of the puzzling problems raised by the preliminary study of the cores from Leg 57 and geophysical data across the sites are: the fate of the subducted and accreted oceanic (and continental) material; the possible fate of the outer part of the Oyashio landmass; the mechanism whereby massive subsidence of the leading edge of the continental plate can take place during presumed addition of oceanic crust to continental crust; and the very low frictional forces that allow many thousands of km of oceanic crust to be thrust beneath the continental crust without deforming the upper plate extensively. The results from this first transect in the IPOD Active Margins drilling program suggest that much more variability in structure may exist between convergent margins than has previously been recognized.

Leg 58

Leg 58 of the Deep Sea Drilling Project drilled five sites in the northern Philippine Sea. Drilling objectives included the understanding of the tectonic evolution of the Shikoku Basin and the Daito Ridge-and-Basin province, the nature of the basaltic basement in these areas, the relationship of sediment types to the tectonic history of the region, and the paleoceanography and biostratigraphy of the region. In the Shikoku Basin, three sites (442, 443, and 444) were drilled, whereas two sites (445 and 446) were drilled in the Daito Ridge-and-Basin province.

Shikoku Basin

The sedimentology and stratigraphy of the Shikoku Basin sites were similar. All sections consisted of hemipelagic clays with accessory nanno ooze. During deposition, the basin floor was at or near the CCD. A pelagic red clay with nannofossils occurred at the base of the sedimentary sequence on top of basalt at each site.

The petrographic composition of the Shikoku Basin basalts shows that at Sites 443 and 444 they are similar to oceanic tholeiitic basalts, whereas at Site 442, the basalts differ from normal oceanic tholeiites because they lack olivine and are highly vesicular. Magnetic inclination of sedimentary rocks showed that paleolatitude in the Shikoku Basin appears to have been located nearly 500km south of the present position of the basin 15 m.y. ago. Paleomagnetic measurements of the basalts showed that the source of the magnetic anomaly signal is well below the depth of maximum penetration.

The age of the oldest sediment recovered at each site was 18-21 m.y. BP (Site 442) and 14-15 m.y. BP (both Sites 443 and 444). The oldest sediment age at Site 442 is in agreement with the magnetic anomaly (anomaly 6) for the site, but is at variance with the magnetic anomaly age (anomaly 6A) at Sites 443 and 444. Prior magnetic mapping disclosed that the basin ceased spreading at 17 m.y. BP, but the drilling disclosed that volcanism continued beyond that time into 14 to 15 m.y. BP and closed with an intrusion of a sill into middle Miocene sediments at approximately 13 to 14 m.y. BP. The results indicate that the Shikoku Basin was characterized by a history of later off-ridge volcanism and that this volcanism has obscured the possibility of using the age of the oldest sediment to assist in determining the validity of tectonic interpretations made from prior mapping of magnetic anomalies. Although prior magnetic mapping suggested that the Shikoku Basin formed by a process of symmetrical spreading, the drilling results are compatible with several modes of spreading, such as symmetrical, single-limb, or asymmetrical. Perhaps other modes of spreading, or multiple episodes of spreading, may have existed during the evolution of the basin.

Daito Ridge-and-Basin Province

The stratigraphic and sedimentological framework of deposition of the two sites is quite different, but despite the difference in setting, the two sites show much similarity. The younger part of the section (post Eocene) at both sites consists of pelagic sediments, whereas the Eocene at both sites consists of well-developed terrigenous mudstones, siltstones, sandstones, and (at Site 445) conglomerates. These Eocene sediments were deposited by the complete range of subaqueous gravity processes.

The terrigenous Eocene rocks at Site 445 tend to be much coarser than those at Site 446 and include debris flow and fluidized sediment flow conglomerates, as well as sandstones. Conglomerates of this origin were found at only one or two

horizons at Site 446. These conglomerates contain clasts of basalt, andesite, limestone, and granodiorite, a finding suggesting derivation from the Daito Ridge because similar materials have been recovered by dredging from there. These conglomerates also contain resedimented fragments and complete tests of the Eocene shallow-water larger foraminifer Nummulites boninensis, which are mixed together with fragments of bivalves, oysters, bryozoans and echinoids (also of shallow-water origin). Most of these shallow-water fossils were emplaced by debris flow and derived from shallow-water and shoreline areas of a nearby island arc such as the Daito Ridge. Their occurrence as debris flow clearly indicates reworking, rather than subsidence, and it is concluded that Site 445 shows no evidence of subsidence at all. It is inferred that the Daito Ridge subsided from sea level to its present elevation (around 1200m) independent of depositional and tectonic events at Site 445.

Igneous rocks were recovered only from Site 446 in the Daito Basin and consisted of 16 tholeiitic sills intruding late early Eocene mudstones. These tholeiites contain altered olivine and hornblende. The exact age of this post-Eocene volcanic event occurred in the Daito Basin is unknown.

The age of the oldest sediment recovered at both sites is late early Eocene (52 m.y. BP). Although basement was not reached at either site, it may have been immediately below the penetration depth in the Daito Ridge, suggesting an age for it as young as earliest Eocene. Shipboard paleomagnetic analysis shows that both sites migrated from an early Eocene equatorial latitude to their present latitude, a distance of 1000km. That shift in paleolatitude suggests that the basement in the Daito Ridge-and-Basin province formed during the earliest stage (Paleogene) of two-limb spreading of the west Philippine Basin.

REPORT FROM SITE SURVEY MANAGEMENT

Data Bank

The following data have been received:

RV METEOR (BGR) cruise report on Morocco Basin survey
South Philippine seismic records V3402 cruise sites 5-8
Blake-Bahama Basin (mcs) preliminary cruise report
Site MP2: copies of 34 reflection profiles - KK770317
Site AT 10: Sonographic mosaic-Gloria survey
Site North Philippine: Map of local magnetic anomaly profiles - Shikoku Basin
Site Blake Bahama Basin: Printout of magnetic data from eastward IPOD survey of BBB
Map of bathymetry of East and Southeast Asian seas
Six sheets of mcs profiles - Mid America Trench
IDOE Report 10C - "Geology, Geophysics and Resources of the Caribbean"
Contoured bathymetric map of Site MP2 - Central Pacific
JOIDES Pollution Prevention and Safety Panel check sheets for Leg 62 Pacific sites (EP 1, 3, 5, 6, & 8; HR 1 & 2; MM1; GA 1, 2, & 3).
Original IPOD line monitor records

SHIPBOARD SCIENTIFIC STAFFING: LEGS 59 and 60

Leg 59

L. Kroenke	Co-chief Scientists	USA	HIG, University of Hawaii
R. Scott		USA	Texas A&M University
J. Usher	Staff Representative	USA	Scripps Inst. Oceanography
A. Migdisov	Sedimentologist	USSR	Academy of Sciences
K. Rodolfo	Sedimentologist	USA	University of Illinois
R. Sartori	Sedimentologist	ITALY	Lab. Geol. Marina del C.N.R.
T. Ishii	Igneous Petrologist	JAPAN	University of Tokyo
D. Mattey	Igneous Petrologist	UK	University of London
G. Zakariadze	Igneous Petrologist	USSR	Georgian Acad. of Sciences
M. Heiman	Paleontologist (foraminifera)	USA	Mobil Oil Company
E. Martini	Paleontologist (nannofossil)	FDR	Johann-Wolfgang-Goethe Univ.
F. Theyer	Paleontologist (radiolaria)	USA	HIG, University of Hawaii
B. Keating	Paleomagnetist	USA	HIG, University of Hawaii
S. Brassell	Organic Geochemist	UK	University of Bristol
P. Chotin	Physical Properties Specialist	FRANCE	Pierre et Marie Curie Univ.

Leg 60

D. Russang	Co-chief Scientists	USA	HIG, University of Hawaii
S. Uyeda		JAPAN	University of Tokyo
J. Natland	Staff Representative/ Igneous Petrologist	USA	Scripps Inst. Oceanography
P. Fryer	Igneous Petrologist	USA	HIG, University of Hawaii
A. Meijer	Igneous Petrologist	USA	University of Arizona
A. Sharaskin	Igneous Petrologist	USSR	Academy of Sciences
R. Blanchet	Sedimentologist	FRANCE	Univ. Bretagne Occidentale
G. Packham	Sedimentologist	AUSTRALIA	University of Sydney
K. Nakamura	Volcaniclastic	JAPAN	University of Tokyo
C. Ellis	Paleontologist (nannofossil/fora-minifera)	USA	Marathon Oil Company
S. Kling	Paleontologist (radiolaria)	USA	Scripps Inst. Oceanography
U. Bleil	Paleomagnetist	FGR	Ruhr Universitat
K. Horai	Heat Flow Specialist	USA	Lamont-Doherty Geol. Obs.
T. Francis	Geophysicist/Physical Properties Specialist	UK	Inst. Oceanographic Sciences

MANAGEMENT OF DEEP SEA DRILLING INFORMATION (by Melvin A. Rosenfeld and Thomas A. Davies)

INTRODUCTION

This paper has been written as a chapter for the *Technical Manual* being prepared by the JOIDES Advisory Panel on Sedimentary Petrology and Physical Properties. The manual will not be completed until late 1978 after Volume 44 of the *Initial Reports* is issued. It is likely that a large portion of the many participants in various and widespread JOIDES activities are not aware of the full range of information handling activities at DSDP. For these reasons it seems appropriate to present this paper now in the *JOIDES JOURNAL*.

Information handling comprises both the calculations necessary to generate data from a given observation or experiment and the later manipulation and management of complete files of data. Here we attempt to summarize the events which befall the data subsequent to their generation and calculation by the techniques used on board ship or in shore laboratories. The forthcoming manual will describe changes which have occurred over the years in the sampling, experimental and calculation techniques. Such changes may significantly influence the interpretation of results. On the other hand, the consideration of data management in this paper requires no such extensive retrospection; the original data values are never lost or changed during the evolution of the information handling system.

The total responsibility for all activities concerning data collected under the scientific program of the Deep Sea Drilling Project lies with the Scientific Services Section at DSDP. The functions of this section are shown on Figure 1; advice and guidance are given by the JOIDES Advisory Panel on Information Handling. Some of the associated independent programs (e.g., heat flow and organic geochemistry) at present maintain their own data files.

During 1967, when the original JOIDES Panel on Sedimentary Petrology and Geochemistry was selecting parameters to be measured and developing techniques and procedures, subsequent data handling and processing were considered vital and integral to the process. In October of that year it was decided to form a sub-panel to consider specifically the problems of data processing, programming and distribution. From this beginning, in early 1968 the JOIDES Panel on Information Handling was formally constituted. Information handling at DSDP became an important functional part of the operation.

It is much to the credit of these early planners that a uniform system of core and sample designation and identification was developed. This has continued unchanged and provides a solid basis for correlation of observed and measured core properties. Also, considerable early attention was given to source recording procedures always with a view to the requirements of later data processing. Although shipboard data gathering operations and recording forms have undergone evolutionary changes over the past ten years, the original provisions for subsequent data handling have not been impaired. Considering the large mass of data, the number and variety of properties and the individual preferences of hundreds of participating scientists, there was always a potential for gross mismanagement of the data. It is gratifying to know that this has not happened.

At present the data-related responsibilities at DSDP include the following broad categories:

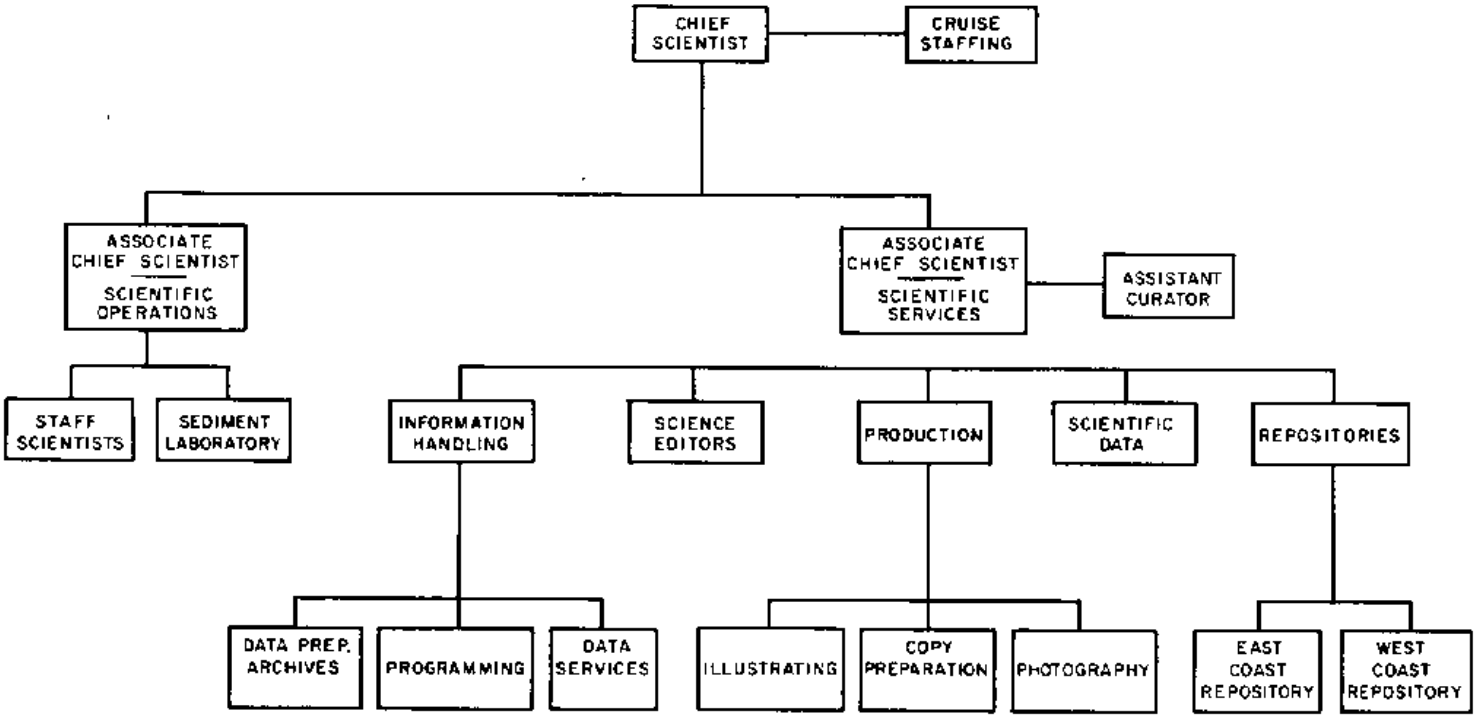


FIGURE 1 ORGANIZATION OF THE SCIENTIFIC SERVICES SECTION AT DSDP

Archiving

- To preserve, as much as possible, the original raw data records including all observations by the participating scientists.

- To encode many of these data into computer compatible form suitable for retrieval and analysis.

Distributing

- To publish certain primary documents (*Initial Core Descriptions* and *Initial Reports*) on a regular basis as soon as possible after the completion of a leg.

- To furnish, upon request from members of the scientific community, selected segments or combinations of the data at any required level of search.

Processing

- To prepare the data files and computer programs necessary to support a rational scheme of archiving, to facilitate publication, and to provide easy means to accomplish direct searches for specifically requested data.

- To write more advanced programs which will provide the capability for more sophisticated use of the data. For example, inverted searches by combinations of parameters are now possible. Also, the ability now exists, using the original raw data, to change the rock name of a sediment if the classification scheme should be changed. Increasingly there will be demands for the continuing development of processing programs which will aid scientists in their use of the data for geologic syntheses and other investigations.

Assisting Researchers

- To publish, from time to time, guides which describe, in condensed form, the actual core material available for research use. These provide potential users with the information necessary to specify their requirements for both material and more detailed data.

- To maintain a record of the distribution of core materials and to publish, from time to time, a guide to the investigators who have these materials and for what research purposes they have the material.

- To develop, publish and keep up-to-date a comprehensive index of publications resulting from work on DSDP materials. This will provide investigators who receive samples with information about what has been published both in the *Initial Reports* and in the open literature.

At this point it is necessary to say something about data quality in general. In the processing of data by the Information Handling and Publication Production groups at DSDP every effort has been made to avoid errors of

transcription and editing. However, even with care, some errors occur when such large amounts of data are being prepared within tight time constraints. Now under preparation is a document correcting those errata which have been detected in the *Initial Reports*.

As for the merit of the data (precision and accuracy), neither the Information Handling Group nor the Panel has had the resources - nor, in fact, the mandate - to investigate these properties. To be sure, we have over the years, been greatly concerned that the formality of publication and the carefully designed computer-based files bestow a perhaps underserved mantle of correctness upon the data. Nevertheless, these are the data which exist; the technique descriptions and error assessments to be presented in the *Technical Manual* should provide a basis for judgment.

INFORMATION HANDLING CONCEPTS

Basic Principles

In the early states of DSDP it was not entirely clear what the ultimate role of the information handling system would be, although the goals of archiving the data and publishing the *Initial Reports* were clearly identified. Form the outset, however, all data-related activities, from archiving to publications, were considered to be simply different facets of a single unified system. This concept dictated the adoption of certain basic principles:

- The original observational (raw) data should never be changed or lost from the system, regardless of any subsequent processing.
- There would be no attempt to design a highly sophisticated and complex system which would be all things to all users. Rather, we would strive for a system which could evolve as user needs became better defined.
- Whatever approach was adopted, it should be flexible enough to adapt to the needs of the scientists and not vice versa.
- Data should be captured in a way which would facilitate later machine processing.

Application of these principles led to the concept of acquiring the package of routine observational data on standard data sheets and developing a *Master Data File* which would form the principal archive and the source for the data appearing in the published *Initial Reports* (besides being the ultimate resource file for any subsequent activities). In fact the *Master Data File* was to be a system of coordinated files, continually evolving through various stages of growth from hard-copy to fully computerized. At any one time different files would be in different stages of evolution, depending on user needs and the status of software development. Thus, GRAPE data were early candidates for computer processing, whereas only recently have visual core descriptions moved from hand-written data sheets to computer manageable files. All the files, however, would be coordinated by the common system of core and sample/observation designation. In practice the core/sample label is often converted by a standard algorithm into a subbottom depth, and the data manipulated and displayed in a subbottom depth framework. However, the determination of subbottom depths corresponding to specific observations is an interpretive exercise, and the original core/sample label remains the ultimate link among the different files.

It was recognized that the first demand on the information handling system would be the preparation of the *Initial Reports*. These were originally conceived as catalog-like publications of all of the data regarding the cores which would, in effect, obviate the need for anything more than a publication production facility at DSDP. However, it became quickly apparent that publication of all of the data was unrealistic, indeed undesirable, and the present format of data synopsis and preliminary interpretation was adopted. This change in publication philosophy meant that the data storage and retrieval facet of DSDP information handling activities immediately assumed considerable importance.

The demand of a rigorous publication schedule has resulted in the development of procedures and software unique to DSDP and the UCSD computer system. This has been considerably simpler to develop and manage than any interactive system with multiple remote-access capability. However, despite the obvious limitation, the Information Handling Panel concluded that, in the absence of any clearly demonstrated need for a multiple user remote-access facility, the simpler system would meet adequately the needs of the scientific community.

Problems of Implementation

Implementation of such an apparently simple concept produced problems of various complexities. These are broadly grouped into problems of (a) data capture; (b) data reliability; and (c) changing user priorities.

GLOMAR CHALLENGER has limited scientific computing capabilities. Thus the shipboard demand for immediately available hard copy data more or less precluded the direct recording of data in machine-readable form. Consequently all data capture and subsequent manipulation on board ship were done manually. Exceptions to this general rule were some of the underway data and physical properties data which were directly recorded as analog records on paper strip-charts. To simplify the task of recording data accurately and consistently for possible future machine processing we have attempted to use standard data recording forms, and this attempt has been moderately successful. The principal problems have come from three sources: poor design of the original forms; the reluctance and, in some cases, out and out refusal of some scientists to use anything that looks remotely like a standard form; and finally the fact that a surprising number of original records are not written legibly, so that future transcription becomes difficult if not impossible.

The decision was made at the outset that the design of the data recording forms should place as few constraints as possible on the person making the observations, and that any problems of formatting should be dealt with by DSDP personnel in subsequent processing. This approach, while complicating the task of information handling at DSDP, has to a great extent mitigated the problems of poor design of forms and observer resistance. Some of the data recording forms, especially those for numerical data, have changed little from their original design; others, for example smear slide and visual core description forms, have ranged all the way from rigid complex forms to essentially blank sheets of paper, and back again. Even so it has been possible to accommodate all the variations successfully into the DSDP system. The problem of illegible handwriting has so far proven insoluble.

A second problem associated with data capture has resulted from the lack of any generally acceptable scheme of lithologic nomenclature for deep-sea sediments. Indeed it was not until DSDP had been operating for more than three years that any consistency began to appear. This problem has now, to a great extent, been overcome by using automated techniques to classify the sediments into a uniform scheme developed by the JOIDES Panel on Sedimentary Petrology

and Physical Properties (Davies, et al., 1977).

The problems of data reliability are much more complex. There are, of course, those errors of technique and interpretation which may affect the accuracy of the data. It is to allow the scientific community an opportunity to understand these techniques and their limitations that the *Technical Manual* will be prepared. Then there are the random errors of sampling and observation which determine the precision of the data and, in principle, could be treated statistically. Finally, there are many opportunities for human error in the recording and transmittal of data. Figure 2 shows the series of steps through which data must pass before entering a computer readable form, or becoming enshrined in the *Initial Reports;* with each step are listed some of the possibilities for the introduction of discrepancies. Everything possible is done to screen out these errors, and little more can be said about them, other than that the user of DSDP data should be cognizant of these possible pitfalls.

A particularly troublesome source of error has been in the assignment of subbottom depths. There are two sources of discrepancy: the assignment of depths to the cored inverval, and the assignment of depths to the material recovered from the cored interval. In each case the problem originates on the ship as one of communication between drillers and scientists and within the scientific party. Ultimately it is resolved, in an admittedly arbitrary fashion, by reference to the core/sample label and an agreed-upon table of subbottom depths of cored intervals. However, many preliminary manuscripts and reports by individual scientists contain a significant number of apparently unavoidable discrepancies.

As user priorities have changed, so the information handling activities of DSDP have changed. Thus, in the early stages emphasis was almost entirely upon preparation and publication of the *Initial Reports*. An elaborate publication production shop was established, devoted to strenuous efforts to meet a somewhat unrealistic publication schedule. The handwritten data-recording forms were archived, but virtually all data processing activity was directed toward the *Initial Reports* preparation. Later, as publication preparation became routine and the volume of published material swelled, the emphasis switched toward finding ways to assist the user in locating core material or data relevant to his particular research interests. Now the effort is devoted to the problems of a full-scale data storage and retrieval system, generating processed output to meet the needs of investigators with broad regional interests.

PRESENT PROCEDURES

In the introduction the data-related activities of DSDP were summarized as the archiving, processing and distribution of data, and the preparation of guides and other aids to research. In this section we will discuss some of the important features of the overall information handling scheme shown in Figure 3. Further details of the procedures and capabilities of the Information Handling Group are published in a series of bulletins (*Data Data*) designed to aid the prospective user.

The archiving and processing activities of the Information Handling Group at DSDP are so interwoven that they can best be described together. The distribution activities can be divided into publications, a function of the Publication Production Group with support from the Information Handling Group (IHG), and responding to requests for specific data, a function of the IHG. The preparation of the various aids to research is carried out jointly by the curatorial staff and the IHG.

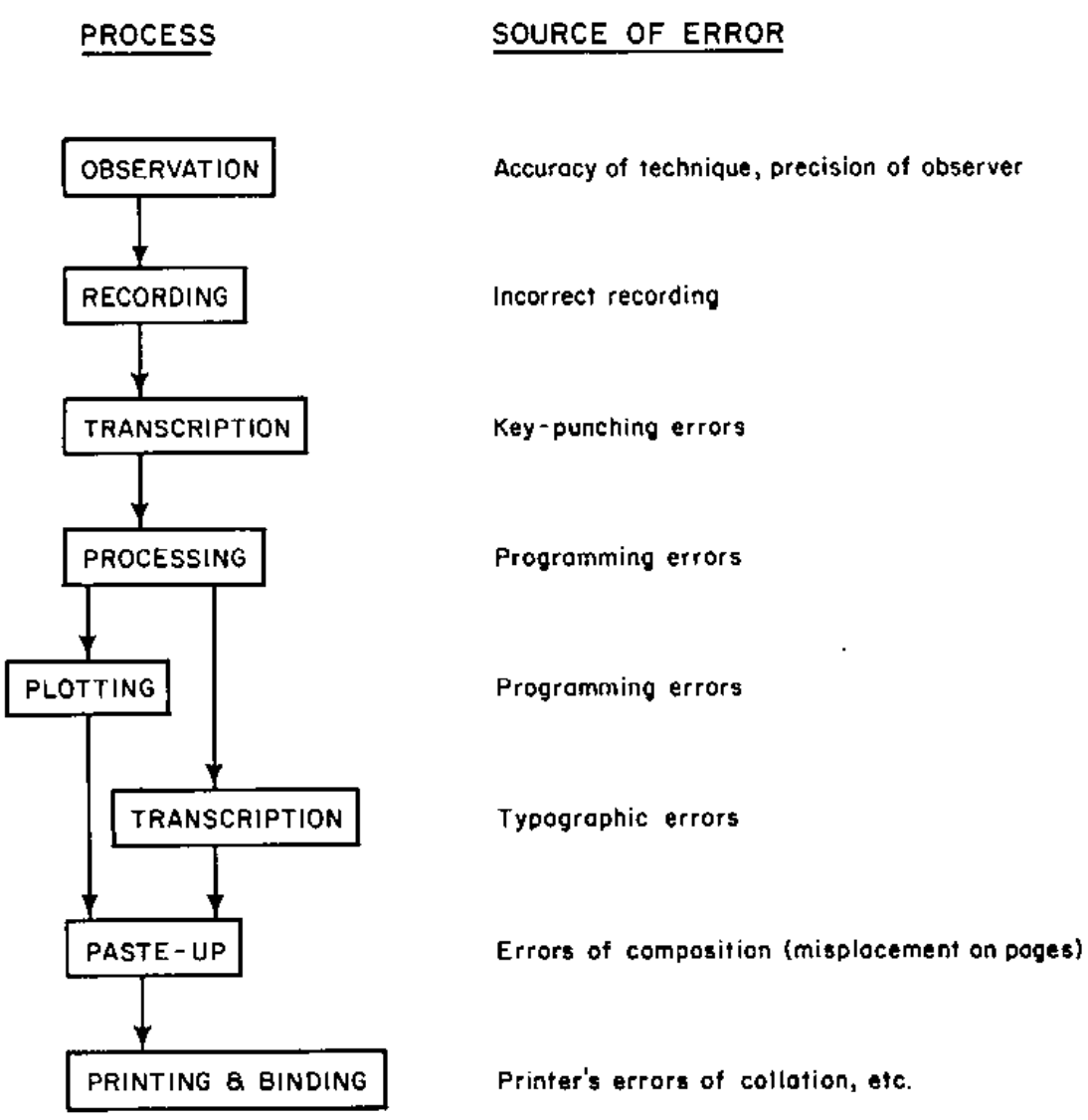


FIGURE 2 GENERAL SCHEME OF DATA FLOW IN ASSEMBLY OF INITIAL REPORT TO ILLUSTRATE POTENTIAL SOURCES OF ERROR

Archiving and Processing

Virtually all of the original data ever recorded aboard GLOMAR CHALLENGER are available, in one form or another, in archives at DSDP and at Lamont-Doherty Geological Observatory. The exceptions are data, such as heat flow, gathered aboard the ship as part of special programs ancillary to DSDP, and some X-radiographs of cores which were discarded as valueless after consultation with several experienced sedimentologists. All of the data exist as hard copy raw data (a program to convert paper data records to microfilm form has been completed), but many have also been computer-processed to a greater or lesser degree. It should be emphasized, however, that even for data which have been processed, the original raw data are preserved so that the observations may be re-examined and re-processed by other procedures at any time. Following are descriptions of procedures for handling the various categories of data.

Underway data

While underway between sites, bathymetric, magnetic and sub-bottom profiles are recorded on board GLOMAR CHALLENGER. Processing of these underway data is handled jointly by DSDP and SIO Geological Data Center.

- Navigation: Satellite fixes and course and speed changes are recorded aboard GLOMAR CHALLENGER from data in the Underway Geophysical Log. The data are keypunched on shore and put through a navigation smoothing program, edited on the basis of reasonable ship and drift velocities, and a deck of corrected navigation points is punched out for later merging with the depth and magnetic data.

- Magnetics: Analog records produced on the Varian magnetometer are digitized in gammas at 5-minute intervals on an Oscar XY digitizer, put through a profile program, and edited by comparison with the original analog records.

- Depth: The depths scaled from the fathograms are recorded at sea at 5-minute intervals. The depths are keypunched on shore and edited in the same fashion as the magnetics.

- Subbottom profiles: These records are photographed at DSDP and then microfilmed at the SIO Geological Data Center.

Commencing with leg 22 of DSDP, processed data are summarized in a *Preliminary Report and Index of Navigation, Depth, Magnetic and Subbottom Profiler Data* which contains an explanation of what forms of data are available from whom, an index chart giving the track of the cruise and the boundaries of the depth compilation plots, and track charts annotated with dates and hour ticks. Copies of this preliminary report are distributed through the SIO Geological Data Center, DSDP, and the National Geophysical Data Center. Original records, plots and lists of the processed data are held at DSDP for subsequent publication and for use by prospective investigators.

Physical properties and other quantitative core data

Several physical properties of the sediments are routinely recorded

on GLOMAR CHALLENGER as the cores are brought on board. These measurements include: (a) water content, porosity, bulk density by the syringe method; (b) density and porosity by the GRAPE method; (c) acoustic velocities by the Hamilton Frame method; (d) overall core section density (by weighing). At the DSDP shore laboratory, sediment samples are analyzed for grain size (sand-silt-clay) and carbon/carbonate content, and the laboratory at U.C. Riverside has in the past examined sediment samples for mineral content by X-ray diffraction. The techniques for all of the above measurements will be described in the *Technical Manual*.

All of the classes of data mentioned above are routinely converted to computer readable form and exist either on card or on magnetic tape in simple Fortran or Algol readable formats, the choice of storage medium being determined by the volume of the class of data in question. The density and porosity data from the GRAPE device and the X-ray mineralogy data are the only two properties presently routinely stored on magnetic tape. All of the quantitative data are processed by a series of data reduction programs. These programs reduce the raw data to the appropriate quantitative units and scan for points which are apparently in error. Both a printed report and a clean card deck or tape are generated for each set of data. After further inspection and correction, a final clean report is prepared. The data reduction programs also convert the standard DSDP labeling notation to a subbottom depth in meters, to provide a more readily interpretable location for the sample (see Figure 3).

One of the most convenient methods for comparing sets of coordinated data taken on particular core samples is graphical display against a common depth axis. To do this, an extremely flexible graphics package (MUDPAK) has been developed using the standard Fortran Calcomp routines. MUDPAK permits precise location of any data curve in a composite plot which may contain several curves derived from separate files. For purposes of publication we have constructed plots containing up to ten parameters derived from five separate data files in one coordinated plot presentation. The capability for specifying placement of the data curves permits superposition of like parameters measured by different methods.

Lithologic data

Many scientists with different backgrounds have participated in the cruises of D/V GLOMAR CHALLENGER. Despite efforts to encourage them to adhere to uniform standards, there has resulted a considerable variability in lithologic description and nomenclature. Such non-uniform information seriously hampers any attempt to discover regional patterns and trends, and indeed can render such attempts meaningless unless treated with extreme caution. For this reason we have been concerned with bringing uniformity to the lithologic data gathered by DSDP.

Gross lithologic features of the DSDP cores are described from visual observation. Lithologic names are assigned after microscopic examination of smear slides. The visual core descriptions have been encoded using a simple data grammar and a minimum of editing. The resulting computer readable files can be processed to generate an index of terms, or searched for specific keywords.

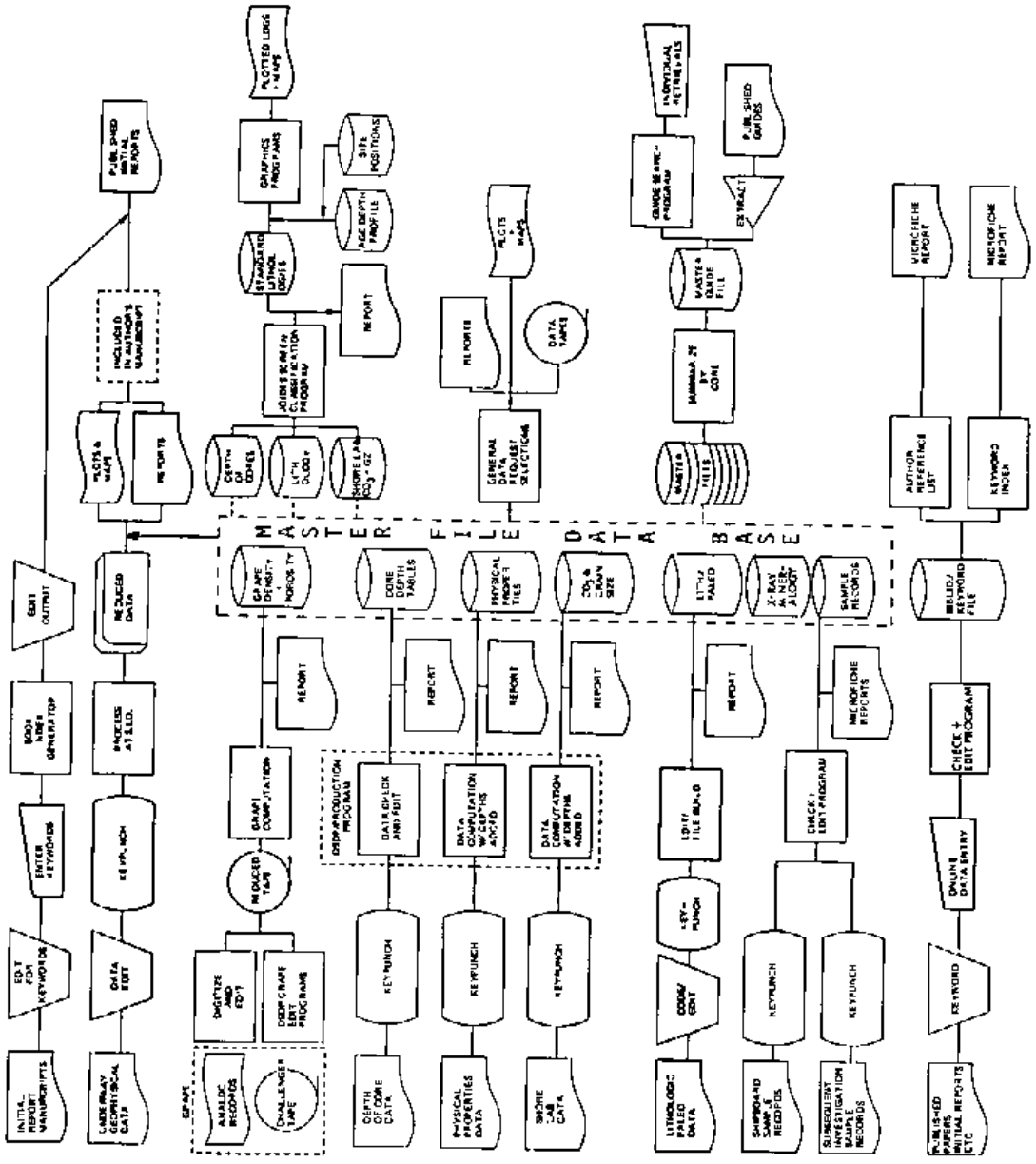


FIGURE 3 INFORMATION FLOW FOR DEEP SEA DRILLING DATA

The smear slide data are available for further processing as component/abundance couplets. The processed smear slide file can also be used to generate a selective or exhaustive index by component. The IHG has developed a program which uses the existing body of observational data and, by using computer processing techniques, reclassifies the sediments according to the standard scheme. This uses a modification of a classification scheme developed by a working group from the JOIDES Advisory Panel on Sedimentary Petrology and Physical Properties (van Andel, et al, 1973). The basic visual description prepared by the shipboard geologist is retained but the smear slide data are processed by the classification program (JOIDESSCREEN) to rename the rock types. This technique operates with reasonable success, giving sensible consistent rock and sediment names and substantially reducing the number of names used. Failures are usually due to incomplete or inadequate data, rather than to failure of the classification logic.

It must be emphasized that the JOIDESSCREEN program is a flexible one; changes, even to the extent of incorporating an entirely new classification scheme, can be incorporated subject to the limitations imposed by the original data. A more comprehensive account of the treatment of lithologic data is given by Davies, et al (1971). Using results from JOIDESSCREEN in conjunction with MUDPAK and other graphics programs, standard logs of the drilling results can be prepared (Davies et al, in preparation).

Paleontologic data

Treatment of paleontologic data at DSDP has only begun to proceed beyond the stage of simply archiving the original handwritten shipboard records. It is expected that this development for paleontologic raw data will follow a scheme similar to that used for lithologic data. Since the early 70's procedures have been developed by T. R. Worsley (Cenozoic data) and P. Cepek (Mesozoic data) to utilize the stratigraphic ranges of selected species to develop age/depth relationships at DSDP sites, using the methods of probabilistic stratigraphy (Worsley, et al, in press).

Hard-rock data

During the first three phases of DSDP the recovery of igneous and metamorphic rocks was relatively insignificant. However, substantial amounts of igneous rocks have been recovered during the IPOD Phase of DSDP and these rocks are now being archived and processed at DSDP in a manner which attempts to encode all physical, chemical, and magnetic properties.

Distribution of Data

The first means for distribution of the DSDP data is through formal and informal publications. A second, though not less important, means of distribution is by responding to requests from individual investigators for copies of original or partly processed data from the archives. Responding to such requests is a function of the IHG and, at the present time, resources are adequate to handle requests on an individual, relatively informal basis. Data are freely available to the scientific community approximately twelve months after completion of the cruise on which the data were gathered. This is in accordance with the data and sample distribution policy approved by NSF.

Charges will be made to cover the costs of responding to unusually large or complex requests.

Publications are the responsibility of a separate Publication Production Group (see Figure 1). This group consists of scientific and technical editors, and a small graphics unit for preparation of illustrations and copy paste-up. Type-setting is done by a subcontractor working under the direction of DSDP. The U.S. Government Printing Office, under the direction of NSF, prints and distributes the formal *Initial Reports of the Deep Sea Drilling Project*. Printing and distribution of informal publications is done under the supervision of DSDP.

These *Initial Reports*, a volume for each leg, were originally conceived as comprehensive presentations of all of the observational data concerning the core material. They have evolved, however, into what might be best described as comprehensive descriptions of the core material, with presentations of the key data preliminary interpretations of the results of drilling on each leg. It is clearly impractical, and indeed would render the reports so massive as to be incomprehensible and unmanageable, to publish <u>all</u> of the observational data.

In addition to the formal *Initial Reports* there are also seven more or less informal preliminary publications (see Figure 4). These are: (a) a Short *Site Summary* message about the results of drilling at each site, transmitted by radio and distributed by DSDP to JOIDES members and other interested parties; (b) a *Summary of Deep Sea Drilling Project - Leg nn*, prepared by the shipboard scientific party at the conclusion of each leg, summarizing their findings. Also, at the end of each leg the Cruise Operations Manager procudes (c) an *Operational Resume* which describes the ship activities and drilling operations. These two reports are also distributed by DSDP to JOIDES members and others. The scientific *Summary* (b) is then edited and published as (d) a short article in *Geotimes* in order that the results of drilling may quickly reach the wider geological community. Discussed earlier was (e) *Preliminary Report and Index of Navigation, Depth, Magnetic and Subbottom Profiler Data.* A comprehensive description of the core material, including graphic displays and preliminary interpretations, is presented on board ship by the scientific party. These (f) *Summary of Scientific Results* (not shown on Figure 4) are distributed by DSDP only to individuals actually working on material for inclusion in the *Initial Reports*. Finally, the graphic core descriptions from the *Summary* (f) are updated by members of the scientific party, redrafted at DSDP and distributed to approximately 250 libraries around the world about ten months following the cruise as (g) *Initial Core Descriptions* (green books). These are designed to form the basis for sample selection by outside investigators pending publication of the appropriate volume of the *Initial Reports*. All of these publications (except the *Operational Resume)* are interim and are rendered obsolete by publication of the *Initial Reports*. We will therefore not discuss them further.

The *Initial Reports* are in two parts: individual site reports, and more specialized topical papers. The site reports consist of a descriptive text followed by a series of graphic displays showing the core material recovered at the site. The graphic displays are updated versions of those prepared on board ship and are the same as those published in the *Initial Core Descriptions*. The drafting and much of the data preparation for the *Initial Reports*, especially the graphic displays (which use the MUDPAK programs), are done at DSDP. The ultimate responsibility for the contents of the *Initial Reports* rests with the shipboard chief scientists, who work in close collaboration with a shipboard scientific representative. The scientific representative is a DSDP staff scientist who serves as a member of the shipboard scientific party and who, on

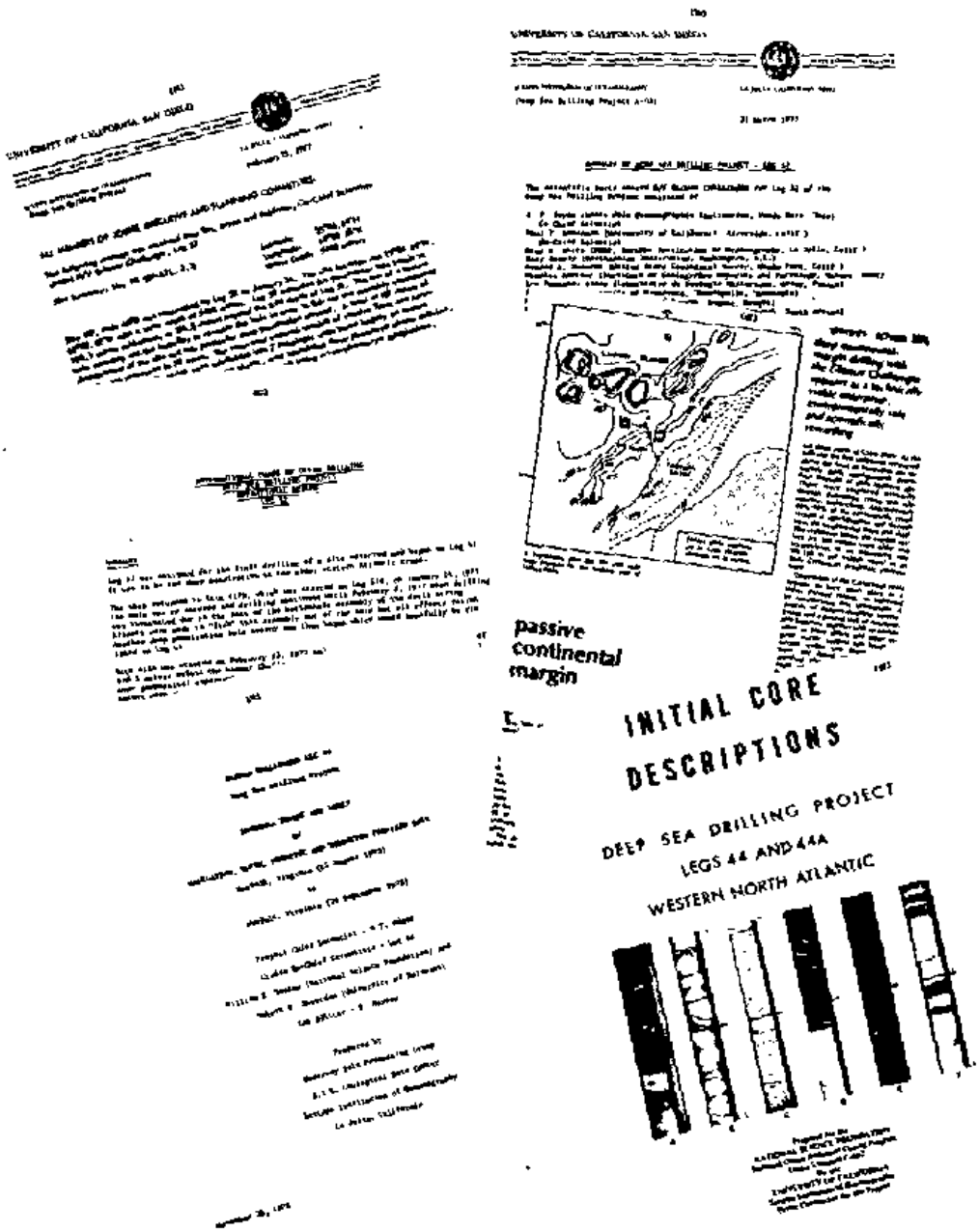


FIGURE 4 INFORMAL PRELIMINARY PUBLICATIONS OF DSDP

shore, acts as an intermediary between the contributors to the *Initial Reports* and the editorial, data preparation, drafting and copy preparation staffs at DSDP. His role is more that of a coordinator than an editor in the traditional sense of the word. The contents of the site reports is the joint responsibility of the shipboard scientific staff. The specialized papers are individually authored by members of the shipboard party or by invited colleagues in instances where the shipboard party did not include the necessary specialists. Through Phase III of DSDP there was no formal mechanism for review of contributions to the *Initial Reports*, although authors were encouraged to have their contributions reviewed by colleagues before submittal, and science editors frequently submitted papers informally to colleagues for opinions. Beginning in 1976 efforts were started to institute a more formal method of refereeing papers.

Since volume 21, the *Initial Reports* have contained a brief index. This is not a comprehensive index in the bibliographer's sense of the word. Rather it is an alphabetic listing of references to key topics. It is prepared at DSDP by a member of the IHG from suggestions for suitable entries submitted by authors. The following items are always indexed:

- Geographic locations
- Formation names
- Paleontologic Zones
- Common minerals or rocks which are discussed
- Unusual minerals or rocks which are just mentioned or discussed
- Generic names of macrofossils (e.g., Inoceramus)
- Sedimentary and tectonic structures (e.g., slump folds, faults)
- Appendices that contain subject matter that is pertinent but not included in the main body of the text

Aids to Research

In addition to responding to specific requests for original data, DSDP has developed a number of tools designed to aid researchers in locating core materials and data relevant to their studies. A few of these are described below (see Figure 5).

Guide to DSDP cores

The large volume of core material being accumulated by DSDP, and the great amount of information contained in the *Initial Reports* are such that it has been found advisable to prepare a summary of the core material and available information to guide researchers in locating materials.

The *Guides*, covering core material gathered during Phase I and II of DSDP from the Atlantic, Pacific, and Indian Oceans, are now available and work is proceeding on the incorporation of material gathered during Phase III. As a complement to the *Guides* a computerized search system called GUIDESEARCH has been developed.

In consultation with a number of sedimentologists, paleontologists and stratigraphers, some 30 categories of data have been selected as giving the information most generally useful for the selection of core material. For each category the range of values within each core is tabulated (i.e., each entire core is reduced to a

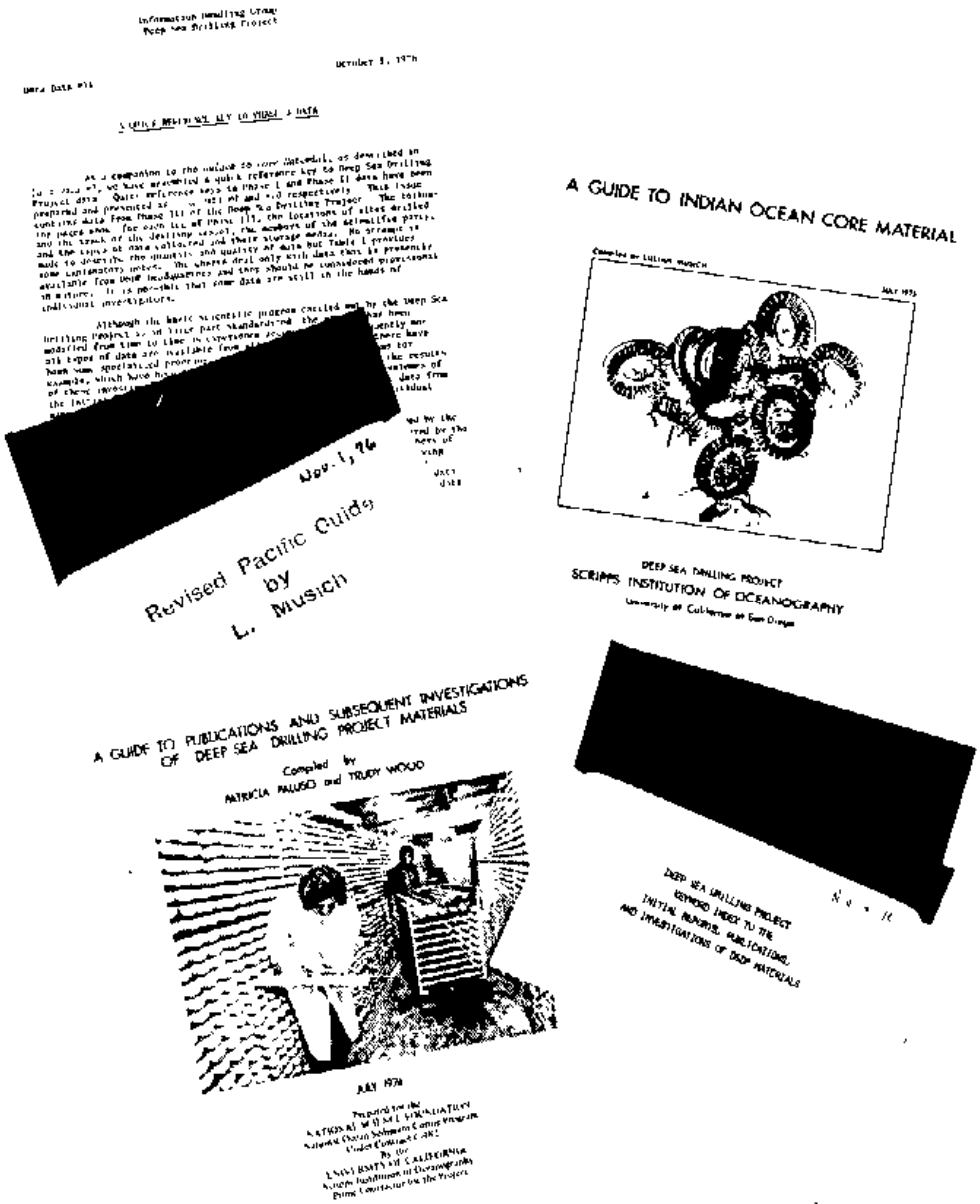


FIGURE 5 AIDS TO RESEARCH ON DSDP MATERIALS

single line of entries in the *Guides).* The data have been extracted manually from the published volumes of the *Initial Reports* and should be considered only as a guide to these volumes and to the cores. The appropriate parts of the *Initial Reports* should be consulted for qualifying format of the *Guides*. Since samples used to determine different parameters are taken at different levels within a core, these parameters are often not precisely correlatable. The *Guides,* however, do provide a general, tabular summary of what may be found within each specific core.

At the present time copies of the *Guides* may be obtained by writing to DSDP. It is hoped that in the near future copies will also be obtainable through the National Technical Information Service.

GUIDESEARCH is a data retrieval program designed to search the *Master Guide File* (MGF) and extract records for cores which fit a user-defined set of conditions. Thus it is possible for the researcher to request a list of those cores which are, for example, "Miocene in age, have a carbonate content less than 25 per cent, and contain 25 per cent or more montmorillonite". There is no limit to how many parameters may be specified in the request.

DSDP welcomes requests for searches of the MGF. Search requests may be submitted as narrative descriptions of the search conditions or the type of geological environment to be defined. These requests will be translated into GUIDESEARCH retrieval statements and submitted for processing.

Users who wish to exercise more direct control over their requests may want to submit them directly as GUIDESEARCH statements. A complete document describing the syntax used with GUIDESEARCH is available from DSDP.

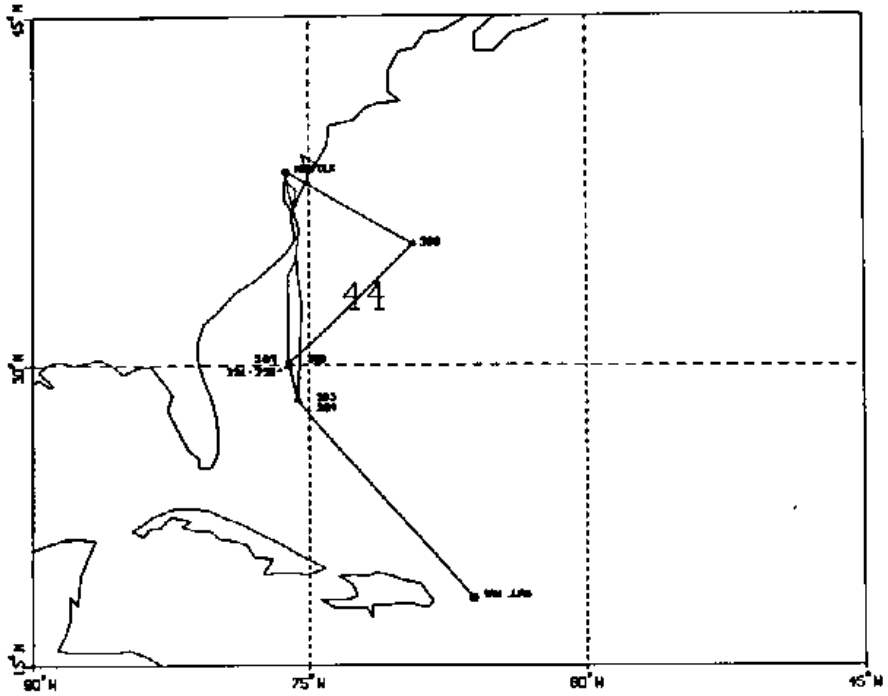
Quick reference key to core data

As a companion to the *Guides, Quick Reference Keys* to Phase I through III data have been issued as *Data Data* publications numbers 6, 10, 11. These tabulate, for each leg of the project, the locations of sites drilled and the track of the drilling vessel, the members of the scientific party, and the kinds of data collected and their storage media. The tables deal only with data that are presently available from DSDP. To our knowledge, these *Quick Reference Keys* are the only place where this amount of information about a given leg is reduced to two pages (see Figure 6).

Information about samples and publications

After the preparation of the initial shipboard description of the core material, samples of cores gathered by DSDP are made available to qualified investigators wishing to conduct their own detailed studies. In response to a growing need for information pertaining to such subsequent sample requests, DSDP has devised a system whereby necessary information can be quickly and efficiently retrieved. The data base is built from the sample request and bibliography files of the West Coast Repository and was initially used in the preparation of a computer generated listing made available to investigators under the title of *A Guide to Publications and Subsequent Investigations of DSDP Materials.*

LEG 44



LEG 44
SITES 388 to 394
Norfolk, Virginia
to
Norfolk, Virginia

Site	388	389	390	391	392	393	394
LATITUDE & LONGITUDE	35°21.33'N 69°23.70'W	30°06.51'N 71°05.57'W	30°06.54'N 76°06.74'W	28°13.7'N 75°16.9'W	29°24.61'N 76°10.68'W	29°11.74'N 75°55.98'W	28°11.70'N 78°55.76'W
DSDP PRIME DATA							
Carbon Carbonate	-	-	-	-	-	-	-
Core Barrel Inventory	C	C	C	C	C	C	C
Core Log	N	N	N	N	N	N	N
Core Section Weight/Density	-	-	-	-	-	-	-
Grain Size	C	-	C	C	C	-	-
I.C.H.A.P.S.							
Interstitial Water	N	-	N	-	-	-	-
Paleont. / Biostrat.	N	N	J	N	N	-	-
Sampling Record	T	T	T	T	T	N	N
Smear Slide Description	N	N	N	N	N	N	N
Sonic Velocity	C	C	C	C	C	-	-
Visual Core Description	N	N	N	N	N	N	N
Water Content	C	-	C	C	C	-	-
SPECIAL STUDIES DATA							
DSDP UNDERWAY DATA							
Geophysical Log	N						
Magnetometer	A						
P D R	N						
Profiler EDO #1	N						
Profiler EDO #2	N						
Processed by DSDP/SIO	Yes						

N - hard copy
C - punched cards
A - analog records
T - magnetic tape
M - microfilm

Thermal Conductivity Data - Stored at Woods Hole Oceanographic Institute
X-Ray Mineralogy Data - Logs 10-37 only on master searchable tape.
Microfilmed data is also available in hard copy.

PARTICIPANTS

Co-Chief Scientist
William B. Benson

Co Chief Scientist
Robert E. Sheridan

Sedimentologist/
Editorial Rep.
Paula Weiteil

Sedimentologist
Leo Pastouret

Sedimentologist
Paul Enos

Sedimentologist
Tom Freeman

Sedimentologist
J.O. Wirdman

Paleontologist-Forams
Felix Gradstein

Paleontologist-Nannos
Ronald E. Schmidt

Paleontologist-Rads
Fred N. Weaver

Geochemist
Daniel N. Stuermer

FIGURE 6 EXAMPLE OF A QUICK REFERENCE KEY TO CORE DATA (REPRINTED FROM DATA/DATA NO. 11)

Until January, 1976, it was periodically updated in the hard copy printed form. In July, 1976, this was combined with and superseded by a microfiche publication entitled *DSDP Keyword Index to the Initial Reports, Publications, and Investigations of DSDP Materials.*

The *Keyword Index* includes information on investigations in progress and on completed studies reported in the *Initial Reports* and in the open literature. The index consists of two parts:

a) Index of Keywords - Citations

The index has four facets - viewpoint from which the author investigated his material, nature of the material investigated, geographic area, and age of the material investigated. Generally, each item (published paper or investigation underway) is described in four or more terms, one or more for each of these facets. A short referral citation consisting of authors' names, year and serial, type code of the reference and an identification number follows the keywords. This referral citation allows location of the proper reference in the Author-Reference list.

b) Author-Reference List

This is a bibliographic listing of all publications and investigations of DSDP materials. For any one author/ investigator, all published papers are listed first followed by his studies in progress. For all junior authors/ investigators there is a short referral to the complete citation. After each complete citation is a list of keywords used and sites investigated.

ACKNOWLEDGEMENTS

We thank Peter Woodbury and Lillian Musich of the Deep Sea Drilling Project at Scripps Institution of Oceanography for their invaluable assistance in preparing this paper.

REFERENCES

Davies, T.A., Musich, L.F. and Woodbury, P.B. (1977) Automated classification of deep sea sediment: *J. Sed. Petrol., 47, 650-656.*

Davies, T.A., Musich, L.F. and Woodbury, P.B. (in preparation) Lithologic data from Pacific Ocean deep sea drill sites: *Rosenstiel School of Marine and Atmospheric Science, U. Miami, Preliminary Analyses of the Deep Sea Drilling Project Data, Volume III.*

van Andel, Tj.H., Winterer, E.L. and Duncan, J. (1973) Report of the subcommittee on sediment classification of Advisory Panel on Sedimentary Petrology and Physical Properties. *Unpublished JOIDES Report.*

Worsley, T.R., Blank, R.G. and Suchland, C. (in press) Cenozoic biostratigraphy and age-depth relationships of Pacific Ocean deep sea drill sites; *Rosenstiel School of Marine and Atmospheric Science, U. Miami, Preliminary Analyses of the Deep Sea Drilling Project Data, Volume II.*

CALENDAR: January 1978 to December 1978. Readers of the JOIDES JOURNAL are reminded that the dates and places of meetings indicated on this calendar are subject to change. Persons interested in particular meetings are requested to verify this information with the Panel Chairmen or the JOIDES Office.

1978

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
EXCOM	25-27 LaJolla				9-11 England			15-17 WHOI or	R.I.			11-13 SAN FRANCISCO OR HONOLULU
PCOM	16-19 Mexico				1-4 England		18-20 WHOI				6-9 Hawaii	
OCP				13-15 Miami					21-23 Albany N.Y. or Cambridge			
AMP	10-12 Galveston									26-28 Toronto		
PMP			16-18 LaJolla									
OP						22-24 LaJolla						
SSP				13-14 Miami								
SED. PET.								23-24 DSDP				
IGP										?		
OGP						19-20 Boca Raton						
STRAT. CORR.					22-24 Wa.D.C.							
DOWNHOLE		24 LaJolla										
SAFETY PANEL			16-17 LaJolla				13-14 Gulf Calif.					
IHP												
LEG MEETINGS												
LEG		59		60		61		62		63		64

DIRECTORY OF JOIDES COMMITTEES AND PANELS

Executive Committee (EXCOM)

Dr. Maurice Rattray, Jr., Chairman
(Alternate: Dr. Joe S. Creager)
Department of Oceanography WB-10
University of Washington
Seattle, Washington 98195
Tel: 206-543-5189 (543-5099)

Professor Dr. F. Bender
(Alternate: Prof. Dr. H. J. Durbaum)
Bundesanstalt fur Geowissenschaften
und Rohstoffe
3 Hannover 51, Postfach 510153
Federal Republic of Germany
Tel: 0511, 64681

Dr. John V. Byrne
(Alternate: Dr. George Keller)
Oregon State University
School of Oceanography
Corvallis, Oregon 97331
Tel: 503-754-3437 (754-4763)

Dr. Paul M. Fye
(Alternate: Dr. Arthur E. Maxwell)
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel: 617-548-1400

Dr. William W. Hay
(Alternate: Dr. C. G. A. Harrison)
Rosenstiel School of Marine and
Atmospheric Science
4600 Rickenbacker Causeway
Miami, Florida 33149
Tel: 305-350-7519

Dr. Charles E. Helsley
(Alternate: Dr. Ralph Moberly)
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822
Tel: 808-948-8760 (948-8765)

Sir Peter Kent, F.R.S.
(Alternate: Dr. P.F.G. Twinn)
Natural Environment Research Council
Alhambra House
27-33 Charing Cross Road
London WC2H 0AX, England
Tel: 01-930-9232

Dr. John A. Knauss
(Dr. Jean-Guy Schilling)
University of Rhode Island
Kingston, Rhode Island 02881
Tel: 401-792-6222 (792-6102)

Monsieur Yves LaPrairie
(Alternate: Monsieur Jacques Debyser)
C.N.E.X.O.
B. P. 107, Paris, 16 France
Tel: 723 5528, ext. 420

Dr. Ryuzo Marumo
(Alternate: Dr. Noriyuki Nasu)
Ocean Research Institute
University of Tokyo
Nakano, Tokyo 164, Japan

Dr. William A. Nierenberg
(Alternate: Dr. Charles E. Merdinger)
Scripps Institution of Oceanography
University of California, San Diego
La Jolla, California 92093
Tel: 714-452-2826 (452-2836)

Dr. Worth D. Nowlin, Jr.
(Alternate: Dr. William J. Merrell)
Department of Oceanography
Texas A&M University
College Station, Texas 77843
Tel: 713-845-7211 (845-2153)

Dr. M.N.A. Peterson (DSDP Rep.)
(Alternate: Dr. D. G. Moore)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3500 (452-3521)

Academician A. V. Sidorenko
(Alternates: Dr. Gleb Udintsev and
Dr. V. Krasheninnikov)
Academy of Sciences of the USSR
Leninski prospect 14
Moscow V-71, USSR
(Udintsev Tel: 234 9686)

Dr. Manik Talwani
(Alternate: Dr. Dennis E. Hayes)
Lamont-Doherty Geological Observatory
Palisades, New York 10964
Tel: 914-359-2900

Planning Committee (PCOM)

Dr. Joe S. Creager, Chairman
(Alternate: Dr. Dean A. McManus)
Department of Oceanography WB-10
University of Washington
Seattle, Washington 98195
Tel: 206-543-5099am; 543-4130pm
(543-5099)

Dr. Helmut Beiersdorf
(Alternate: Dr. U von Rad)
Bundesanstalt fur geowissenschaften
und Rohstoffe
3 Hannover 51, Postfach 510153
Federal Republic of Germany
(0-511-6468-788)

Dr. William R. Bryant
(Alternate: Dr. Stefan Gartner)
Texas A & M University
Department of Oceanography
College Station, Texas 77843
Tel: 713-845-2153 (845-2154)

Dr. J. Dymond
Oregon State University
School of Oceanography
Corvallis, Oregon 97331
Tel: 503-754-2296

Dr. Dennis E. Hayes
(Alternate: Dr. Marc Langseth)
Lamont-Doherty Geological Observatory
Palisades, New York 10964
Tel: 914-359-2900

Dr. C. G. A. Harrison
(Alternate: Dr. Wayne D. Bock)
Rosenstiel School of Marine and
Atmospheric Science
4600 Rickenbacker Causeway
Miami, Florida 33149
Tel: OSU: 503-754-3504 (305-350-7211)

Dr. Ted Moore
Graduate School of Oceanography
University of Rhode Island
Kingston, Rhode Island 02881

Dr. James R. Heirtzler
(Alternate: Mr. John Ewing)
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel: 617-548-1400

Dr. Anthony S. Laughton
(Alternate: Dr. D. H. Matthews)
Institute of Oceanographic Sciences
Wormley, Godalming, GU8 5UB
Surrey, England
(University of Cambridge
Dept. of Geology & Geophysics
Madingley Rise, Madingley Road
Cambridge CB3 0EZ)

Dr. Xavier LePichon
(Alternate: Dr. Yves Lancelot)
C.N.E.X.O.
B.P. 107, Paris 16, France
Tel: 723-5528

Dr. Ralph Moberly
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822
Tel: 808-948-8766

Dr. D. G. Moore (OSDP Rep.)
Deep Sea Drilling Project A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3521

Dr. Noriyuki Nasu
Ocean Research Institute
University of Tokyo
1-15-1 Minamidai
Nakano, Tokyo 164, Japan

Dr. L. Nikitin
(Alternate: Dr. V. Krashenninikov)
Institute of Earth's Physics
10, B. Gruzinskaya
Moscow, USSR
(Academy of Sciences of the USSR
Leninsky prospect 14
Moscow, 234-9686)

Dr. William Riedel (ex-officio, Curator)
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. E. L. Winterer
(Dr. William Riedel)
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-2083 (714-452-4386)

Downhole Measurements (DMP)

Dr. R. Hyndman, Chairman
Pacific Geoscience Centre
Dept. Energy, Mines and Resources
9860 West Saanich Road, P.O. Box 6000
Sidney, B. C. V8X 3X3 Canada
Tel: 604-388-3208

Dr. Heinz Beckmann
Geologisches Institut
Technische Universitat Claustahl
3392 Clausthal-Zellerfeld 1,
Leibnizstrasse 10, F. R. G.
Tel: 05323/722-2235

Dr. N. Christensen
Dept. Geological Sciences AK-20
University of Washington
Seattle, Washington 98195
Tel: 206-543-7143

Dr. J. R. Heirtzler (ex-officio)
Department of Geology and Geophysics
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel: 617-548-1400

Mr. A. H. Jageler
Amoco Production Research Company
Post Office Box 591
Tulsa, Oklahoma 74102

Dr. Y. Neprochnov
(Alternate: Dr. V. Dubrovskiy)
P.P. Shirshov Institute of Oceanology
USSR Academy of Sciences
1, Letnyaya, Lublino
Moscow 109387, USSR
(Institute of Earth's Physics
USSR Academy of Sciences
10, B. Gruzinskaya, Moscow, USSR)

Dr. A. F. Richards
Marine Geotechnical Laboratory
Lehigh University, #17
Bethlehem, Pennsylvania 10815
Tel: 215-591-7000 ext. 618

Dr. O. Serra
ELF-ERAP, 7 Rue Nelation
75739 Paris Cedex, France

Mr. J. R. Severns
McCulloh Oil Corporation
10880 Wilshire Blvd.
Los Angeles, California 90024
Tel: 213-879-5252

Industrial Liaison (ILP)

Mr. W. A. Roberts, Chairman
Executive Vice President
Phillips Petroleum Company
Bartlesville, Oklahoma 74004
Tel: 918-661-3833

Mr. R. L. Adams
Executive Vice President
Continental Oil Company
High Ridge Park
Stamford, Connecticut 06904
Tel: 203-359-3500

Professor Vsevolod V. Fedynskiy
Ministry of Geology of USSR
4/6 Bolshaya, Gruzinskaya
Moscow 123812 USSR

Mr. Melvin J. Hill
Vice President and Coordinator
Gulf Oil Corporation
P. O. Box 1166
Pittsburgh, Pennsylvania 12530
Tel: 412-391-2400

Dr. Ing. Guenter Peterson
Deutxche Schachtbau-und
Tiefborhrgesellschaft mbH
Postfach 1360
D-4450 Lingen (Ems) Germany

Monsieur Gilbert Rutman
Societe Nationale des Petroles
D'Aquitaine
Tour D'Aquitaine - Cedex No. 4
92080 Paris La Defense, France

Mr. G. Williams
UK Offshore Operators Association, Ltd.
192 Sloane Street
London SW1 90X England
Tel: 01-235-0762

Information Handling (IHP)

Dr. M. A. Rosenfeld, Chairman
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel: 617-548-1400, ext. 409

Dr. D. W. Appleman
Department of Mineral Sciences
Natural History Building
Smithsonian Institution
Washington, D.C. 20560
Tel: 202-381-6331

Mr. J. G. Barr
Standard Oil Company of Califronia
Room 538, 130 Sutter
225 Bush Street
San Francisco, California 94120
Tel: 415-894-3385

Dr. Joe S. Creager (ex-officio)
Department of Oceanography WB-10
University of Washington
Seattle, Washington
Tel: 206-543-5099am; 543-4130pm

Dr. H. Glashoff
Documentation Service
Bundesanstalt fur Geowissenschaften
und Rohstoffe
3 Hannover 51, Postfach 510153
Federal Republic of Germany

Dr. A. Loeblich, Jr.
Department of Geology
University of California
Los Angeles, California 90024

Dr. M. S. Loughridge
Marine Geology and Geophysics Branch
National Geophysical and Solar
Terrestrial Data Center
Code D621 NOAA
Environmental Data Center
Boulder, Colorado 80302

Dr. J. Usher (DSDP Rep.)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3529

Dr. V. V. Zdorovenin
(Alternate: Dr. V. S. Svcherbakov)
Institute of Physics of the Earth
USSR Academy of Sciences
10, B. Gruzinskaya
Moscow, USSR 123810
(Ministry of Geology of USSR
4/6 B. Gruzinskaya
Moscow, USSR)

Inorganic Geochemistry (IGP)

Dr. Joris M. Gieskes, Chairman
Scripps Institution of Oceanography A-015
University of California, San Diego
La Jolla, California 92093

Dr. W. B. Clarke
Department of Physics
McMaster University
Hamilton, Ontario
Tel: (416) 525-9140 (ext. 4634)

Dr. D. S. Cronan
Department of Geology
Royal School of Mines
Prince Consort Road
London SW7 2BP, England
Tel: 01-589-5111

Dr. V. Holodov
(Alternate: Dr. Gordeev)
Institute of Geology
USSR Academy of Sciences
7, Pyzhevskiy pereulok
Moscow, USSR
(USSR Academy of Sciences,
1, Letnyaya, Moscow 109387 USSR)

Dr. Frank T. Manheim
U. S. Geological Survey
Woods Hole, Massachusetts 02543
Tel: 617-548-1400

Dr. Ralph Moberly, ex-officio
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822
Tel: 808-948-8765

Dr. S. Savin
Case Western Reserve University
Cleveland, Ohio 44106
Tel: (216) 368-3690

Dr. Erwin Suess
School of Oceanography
Oregon State University
Corvallis, Oregon 97331
Tel: 503-754-2296

Dr. Y. Tardy
Laboratoire de Pedologie et
Geochimie
38, rue des Trente-six Ponts
31078 Toulouse, France
Tel: (61) 53-35-33

Dr. K. K. Turekian
Department of Geology &
Geophysics
Yale University
Box 2161
New Haven, Connecticut 06520
Tel: 203-436-0377

Dr. K. H. Wedepohl
34 Gottingen
Geochemisches Institut der
Universitat
Goldschmidstrasse 1
Federal Republic of Germany

Ocean Crust (OCP)

Dr. J. R. Cann (Chairman)
Department of Geology
The University
Newcastle-upon-Tyne
NEL 7RU U.K.

Dr. J. Bischoff
U. S. Geological Survey
345 Middlefield Road
Menlo Park, Claifornia 94025
Tel: 415-323-8111 ext. 2629

Dr. N. Bogdanov
(Alternate: Dr. Leonid V. Dmitriev
Institute of Geology
USSR Academy of Sciences
7, Pyzhevskiy pereulok
Moscow, USSR
(Institute of Geochemistry
USSR Academy of Sciences
47 a Vorobiovskoe shosse
Moscow, USSR

Dr. Paul J. Fox
Department of Geological Sciences
State University of New York at Albany
1400 Washington Avenue
Albany, New York 12222
Tel: 518-457-3974

Dr. Jean Francheteau
Centre Oceanologique de Bretagne
B. P. 337
29273 Brest Cedex, France
Tel: 98 80-46-50

Dr. J. M. Hall
Department of Geology
Dalhousie University
Halifax, Nova Scotia, Canada
Tel: 902-424-6510

Dr. C. G. A. Harrison (ex-officio)
Rosenstiel School of Marine and
Atmospheric Science
4600 Rickenbacker Causeway
Miami, Florida 33149
Tel: 305-350-7400

Dr. James R. Heirtzler (ex-officio)
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel: 617-548-1400

Dr. E. D. Jackson
U. S. Geological Survey
345 Middlefield Road
Menlo Park, Claifornia 94025
Tel: 415-323-8111 ext. 2968

Dr. Roger Larson
Lamont-Doherty Geological Observatory
Palisades, New York 10964
Tel: 914-359-2900 ext. 346

Dr. Jim Natland (DSDP Rep.)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3538

Dr. John Orcutt
Geological Research Division, A-015
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3499

Dr. M. Ozima
(Alternate: Dr. Ikuo Kushiro)
Geological Institute
Faculty of Science
University of Tokyo
Bunkyo-ku, Tokyo 113, Japan

Dr. H. U. Schmincke
Institute fur Mineralogie
Rhur-Universitat
Postfach 102148, D-4630 Bochum 1
W. Germany
Tel: 0234-7003520

Dr. M. Treuil
Institute Phyisque du Globe
Universite Paris 6
4, Place Jussieu
Paris Cedex 05, France
Tel: 336-2525

Ocean Margin Active (AMP)

Dr. Roland Von Huene, Chairman
U. S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025
Tel: 415-323-8111

Dr. Michael Audley-Charles
Geology Department
Queen Mary College
Mile End Road
London E1 4NS England
Tel: 01-980-4811

Dr. Rene Blanchet
Lab. Oceanologie et Geodynamique
Universite de Bretagne Occidentale
29279 Brest Cedex France
Tel: (98) - 03-16-94 ext. 330

Dr. Creighton Burk
Marine Sciences Institute
University of Texas
Post Office Box 7999
Austin, Texas 78712
Tel: 512-471-4816

Dr. Joe S. Creager (ex-officio)
Department of Oceanography AB-10
University of Washington
Seattle, Washington 98195
Tel: 206-543-5099am; 543-4130pm

Dr. W. R. Dickinson
Department of Geology
Stanford University
Stanford, California 94305
Tel: 415-497-3226

Dr. D. M. Hussong
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822
Tel: 808-948-7796

Dr. Daniel Karig
Department of Geological Sciences
Cornell University
Ithaca, New York 14853
Tel: 607-256-3679

Dr. Kazuo Kobayashi
Ocean Research Institute
University of Tokyo
Nakano, Tokyo, Japan
Tel: 03-396-1251

Dr. I. P. Kosminskaya
(Alternate: Dr. Yu. Dmitriev)
Institute of Earth's Physics
USSR Academy of Sciences
10, B. Gruzinskaya
Moscow, USSR
(Institute of Geochemistry and Mineralogy
USSR Academy of Sciences
Moscow, USSR)

Dr. Keith Kvenvolden (OGP Rep.)
U. S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025
Tel: 415-323-8111, ext. 2513

Dr. D. G. Moore (DSDP Rep.)
Deep Sea Drilling Project A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3521

Dr. James Natland (DSDP Rep.)
Deep Sea Drilling Project
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3538

Dr. Hansjust Walter
Bundesanstalt fur Geowissenschaften
und Rohstoffe
Stillewag 2, D-3000 Hannover
Federal Republic of Germany
Tel: 0511-64681

Ocean Margin Passive (PMP)

Dr. J. R. Curray, Chairman
Scripps Institution of Oceanography
A-015
La Jolla, California 92093
Tel: 714-452-3299

Dr. Helmut Beiersdorf (ex-officio)
Bundesanstalt fur Geowissenshaften
und Rohstoffe
3 Hannover 51, Postfach 510153
Federal Republic of Germany

Professor Dr. D. Bernoulli
Geologishes Institut der Universitat
Bernoullistrasse 32
4056 Basel, Switzerland
Tel: 24-40-10

Dr. William R. Bryant (ex-officio)
Texas A & M University
Department of Oceanography
College Station, Texas 77843
Tel: 713-845-2153

Mr. John I. Ewing
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel: 617-548-1400

Dr. John Grow
U. S. Geological Survey
Woods Hole, Massachusetts 02536
Tel: 617-548-8700

Dr. K. Hinz
Bundesanstalt fur Geowissenschaften
und Rohstoffe, Abt. Geophysik
3 Hannover 51, Postfach 510153
Federal Republic of Germany
Tel: 0511-6468330

Dr. J. M. Hunt (OGP Rep)
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel: 617-548-1400

Dr. H. Kagami
Ocean Research Institute
University of Tokyo
Nakano, Tokyo 164, Japan
Tel: 03-376-1251

Dr. L. Montadert
Institute Francais du Petrole
Division Geologie
1 et 4, Avenue de Bois-Preau
B.P. 18, 92 Rueil-Malmaison, France
Tel: 967-11-10, 976-17-66

Dr. D. G. Moore (DSDP Rep.)
Deep Sea Drilling Project A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3521

Mr. D. G. Roberts
Institute of Oceanographic Sciences
Brook Road, Wormley, Godalming
Surrey GU8 5UB England
Tel: 042-879-4141

Professor Dr. E. Seibold
(Alternate: Dr. Von Stackleberg)
Geologisch-Palaontologisches Institut
Universitat Kiel
Olshausenstrasse 40/60
D-23, Kiel, Federal Republic of Germany
(Bundesanstalt fur Geowissenschaften un
Rohstoffe, 3 Hannover 51, Postfach
510153, FRG)

Dr. Robert Sheridan
Department of Geology
University of Delaware
Newark, Delaware 19711
Tel: 302-738-2569

Dr. S. Snelson
Shell Oil Company
P. O. Box 481
Houston, Texas 77001

Dr. J. Thiede
Institut for Geologi
Universitetet I Oslo
Postboks 1047
Blindern, Oslo 3, Norway
Tel: 46-6800, ext. 9692

Dr. P. R. Vail
Exxon Production Company
P. O. Box 2189
Houston, Texas 77001

Dr. S. Zverev
(Alternate: Dr. A. Yunov)
c/o Dr. G. Udintsev
Institute of Earth's Physics
10, B. Gruzinskaya
Moscow, USSR

Ocean Paleoenvironment (OPP)

Dr. Y. Lancelot, Chairman
C.N.E.X.O.
B.P. 107, Paris 16, France
Tel: 723-5528

Dr. W. H. Berger
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-2750

Dr. Geoffrey Eglinton (OGP rep)
University of Bristol
School of Chemistry
Bristol BS8 1TS, England

Dr. Kenneth Hsu
Geologisches Institut der E.T.H.
Sonneggstrasse 5,
Zurich 6, Switzerland
Tel: (01) 32-62-11, ext. 3669

Dr. James C. Ingle
Department of Geology
Stanford University
Stanford, California 94305

Dr. H. C. Jenkyns
Department of Geology and Mineralogy
University of Oxford
Parks Road
Oxford OX1 3PR, England

Dr. A. Lisitzin
Institute of Oceanology
USSR Academy of Sciences
1, Letnyaya
Moscow 109387 USSR

Dr. I. Murdmaa
Institute of Oceanology
USSR Academy of Sciences
1, Letnyaya
Moscow 109387 USSR

Dr. T. C. Moore
Graduate School of Oceanography
University of Rhode Island
Narrangansett Bay Campus
Kingston, Rhode Island 02881

Dr. Michael Sarnthein
(Alternate: Dr. Gerhard Einsele)
Geol.-Paleontol. Inst. der Univ. Kiel
23 Kiel, Olshausenstrasse 40/60
Federal Republic of Germany
(Geologisches Institut
Sigwartstr. 10
7400 Tuebingen
Federal Republic of Germany)

Mr. W. V. Sliter
U. S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025
Tel: 415-323-8111 ext. 2160

Dr. Y. Takaynagi
(Alternate: Dr. Hakuyu Okada)
Geol. & Paleont. Inst., Tohoku Univ.
Sendai, Japan
(Geoscience Inst., Shizuoka Univ.
Shizuoka 422, Japan)
Tel: 0542-37-1111

Dr. H. Thierstein
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. J. Usher (DSDP Rep.)
Deep Sea Drilling Project
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. E. L. Winterer (ex-officio)
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-4386

Organic Geochemistry (OGP)

Dr. Keith Kvenvolden, Chairman
U. S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025
Tel: 415-323-8111, ext. 2817

Dr. Earl W. Baker
Dean of Science
Florida Atlantic University
Boca Raton, Florida 33432

Dr. Ellis E. Bray
Mobil Oil Company, Inc.
Post Office Box 900
Dallas, Texas 75221
Tel: 214-331-6531

Mr. Geoffrey Eglinton (OPP Liaison)
University of Bristol
School of Chemistry
Bristol BS8 1TS, England

Dr. J. Gordon Erdman
Phillips Petroleum Company
Bartlesville, Oklahoma
Tel: 918-336-6600

Dr. E. Galimov
(Alternate: Dr. E. Romankevich)
Institute of Geochemistry
USSR Academy of Sciences
47 A, Vorobiovskoe shosse
Moscow, USSR
(USSR Academy of Sciences,
1, Letnyaya, Moscow 109387 USSR)

Dr. John M. Hunt
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel: 617-548-1400

Dr. J. Kendrick
Shell Development Company
P. O. Box 481
Houston, Texas 77001
Tel: 713-663-2626

Dr. Erwin Suess
School of Oceanography
Oregon State University
Corvallis, Oregon 97331
Tel: 503-754-2296

Dr. B. Tissot
Institut Francais du Petrole
1 et 4, Avenue de Bois-Preau
B.P. 18
92502 Rueil Malmaison, France

Dr. Dietrich Welte
(Alternate: Dr. E. Degens)
Lehrstuhl fur Geologie, Geochemie,
und Lagerstatten des Erdols un der
Kohle
Rhein-Westf. Techn. Hochschule
51-Aachen
Federal Republic of Germany
(Dept. Geologie, Univ. of Hamburg
Hamburg, Germany)

Mr. Oscar Weser (DSDP Rep.)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3524

Dr. E. L. Winterer (ex-officio)
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-2083

Pollution Prevention and Safety (PPSP)

Dr. Louis E. Garrison, Chairman
U. S. Geological Survey
P. O. Box 6732
Corpus Christi, Texas 78411
Tel: 512-888-3247

Dr. George Claypool
(Dr. Keith A. Kvenvolden)
U. S. Geological Survey
Branche of Oil & Gas Resources
Denver Federal Center
Denver, Colorado 80225
Tel: 303-234-3561
(U. S. Geological Survey
Menlo Park, California 94025
Tel: 415-323-8111 ext. 2817)

Dr. Joe S. Creager (ex-officio)
Department of Oceanography WB-10
University of Washington
Seattle, Washington 98195
Tel: 206-543-6099am; 543-4130pm

Dr. Joseph R. Curray
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3299

Dr. H. Grant Goodell
Department of Environmental Sciences
University of Virginia
Charlottesville, Virginia 22901
Tel: 804-924-7761, ext. 219

Dr. Arthur E. Green
Exxon Production Research Laboratory
P. O. Box 2189
Houston, Texas 77001
Tel: 713-965-4712

Dr. B. T. R. Lewis (ex-officio)
Department of Oceanography WB-10
University of Washington
Seattle, Washington 98195
Tel: 206-543-6043

Dr. Alfred Mayer-Gurr
Eichhaldestr, 79
D 7417 Urach
Federal Republic of Germany

Dr. G. A. Pommier
Director Dept. of Assistance Research
Total CFP - 39 Quai A. Citroen
75739 - Paris Cedex 15 France

Dr. Maurice Rattray, Jr. (ex-officio)
Department of Oceanography WB-10
University of Washington
Seattle, Washington 98195
Tel: 206-543-5189

Dr. E. Vekilov
Minstry of Geology of USSR
4/6, B. Gruzinskaya
Moscow, USSR

Dr. Ronald Von Huene (active margin sites only)
U. S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025
Tel: 415-323-8111

Mr. Oscar E. Weser (DSDP Rep.)
Deep Sea Drilling Project
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3524

Sedimentary Petrology and Physical Properties (SPP)

Dr. A. Richards, Chairman
Marine Geotechnical Laboratory
Lehigh University, #17
Bethlehem, Pennsylvania 18015
Tel: 215-691-7000, ext. 618

Dr. R. Bennett
NOAA
AOML
15 Rickenbacker Causeway
Miami, Florida 33149
Tel: 305-361-3361, ext. 318, 319, 320

Mr. E. Boyce (DSDP Rep.)
Deep Sea Drilling Project
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-2778

Dr. S. E. Calvert
Institute of Oceanographic Sciences
Wormley, Surrey GU8 5UB, England
Tel: 042-879-2122

Dr. C. J. Clausen
Nyropsgade 43
1602 Copenhagen V, Denmark

Dr. J. Conolly
Era North America Inc.
200 Railroad Avenue
Greenwich, Connecticut 06830
Tel: 203-622-9130

Dr. John M. Handin
Center for Tectonophysics
Texas A & M University
College Station, Texas 77843

Dr. G. deVries Klein
Department of Geology
University of Illinois
Urbana, Illinois 61801
Tel: 217-333-3540

Dr. F. Melieres
Laboratoire de Geologie Dynamique
Universite Pierre et Marie Curie
75230 - Paris - Cedex 05 France
Tel: 336-2525 - Poste 5157

Dr. Ralph Moberly
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822
Tel: 808-948-8765

Dr. Peter Rothe
Geographisches Institut
Abt. fur Geologie der Universitat Schloss
D-6800 Mannheim, Federal Republic of Germany
(Alternate: Dr. Peter Stoffers)
Laboratorium fur Sedimentforschung der Universitat
Berliner Strasse 19
D-6900 Heidelberg 1, Federal Republic of Germany

Dr. O. H. Pilkey
Department of Geology
Duke University
Durham, North Carolina 27708
Tel: 919-684-2206

Dr. P. O. Timofeev
Institute of Geology
USSR Academy of Sciences
7, Pyzhevskiy pereulok
Moscow, USSR

Site Surveying (SSP)

Dr. Brian T. R. Lewis, Chairman
Department of Oceanography, WB-10
University of Washington
Seattle, Washington 98195
Tel: 206-543-6043

Dr. Elizabeth T. Bunce
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel: 617-548-1400

Dr. LeRoy M. Dorman
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-2406

Dr. Edgar S. Driver
Gulf Science & Technology Company
Post Office Box 2038
Pittsburgh, Pennsylvania 15230

Dr. Davis A. Fahlquist
Texas A & M University
Department of Geophysics
College Station, Texas 77843
Tel: 713-845-1371

Dr. Dennis Hayes, (ex-officio)(East Coast)
Lamont-Doherty Geological Observatory
Palisades, New York 10964
Tel: 914-359-2900

Dr. Wilfried Weigel
Institut fur Geophysik der
Universitat Hamburg
Bundeskasse 55
D-2000 Hamburg 13
Federal Republic of Germany

Dr. Donald M. Hussong
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822
Tel: 808-948-7796

Dr. A. Beresnev
(Alternate: Dr. B. Bondarenko)
Institute of Earth's Physics
USSR Academy of Sciences
10, B. Gruzinskaya
Moscow, USSR
(Ministry of Geology of USSR
4/6 B. Gruzinskaya
Moscow, USSR)

Dr. Philip Rabinowitz (ex-officio)
Lamont-Doherty Geological Observatory
Palisades, New York 10964
Tel: 914-359-2900

Dr. Ralph Moberly (ex-officio), West
Coast (see Planning Committee)

Dr. Shozaburo Nagumo
(Dr. Sadanori Murauchi)
Earthquake Research Institute
The University of Tokyo
Bunkyo-ku, Tokyo Japan (113)
(Dept. of Earth Sciences, Chiba Univ.,
Yayoi-cho, Chiba, Japan 280)

Dr. Vince Renard
Centre Oceanologique de Bretagne
B.P. 337, 29273 Brest Cedex, France
Tel: 80-46-50

Dr. Roland Schlich
Inst. de Physique du Globe,
Observatoire
Geophysique du Parc, St.-Maur, 4
Avenue de Neptune,
94 St.-Maur-Des-Fosses, France
Tel: 833-46-50

Dr. G. Stober
DEMINEX, Deutsche Erdolversorgungs-
gesselschaft mbH
Dorotheenstrasse 1, 43 Essen 1
Federal Republic of Germany

Dr. Joel Watkins
Gulf Research & Development Company
11111 South Wilcrest Drive
P. O. Box 36506, Houston, Tx. 77036
Tel: 713-778-5431

Dr. S. White (DSDP Rep.)
Deep Sea Drilling Project A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3503

Dr. Roland von Huene
U. S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025
Tel: 415-323-8111

Stratigraphic Correlations (SCP)

Dr. R. H. Benson, Chairman
E-206, NHB
Smithsonian Institution
Washington, D. C. 20560
Tel: 202-381-6400

Dr. W. A. Berggren
Department of Geology and Geophysics
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel: 617-548-1400, ext. 593

Professor D. H. M. Bolli
Eidg. Technische Hochschule Zurich
Geologisches Institut
Sonneggstrasse 5, CH-8006 Zurich
Switzerland

Dr. D. Bukry
U. S. Geological Survey, A-015
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. P. Cepek
bundesanstalt fur Geowissenschaften
und Rohstoffe
3 Hannover 51, Postfach 510153
Federal Republic of Germany

Dr. R. G. Douglas
Department of Geological Sciences
University of Southern California
Los Angeles, California 90007

Dr. Stefan Gartner
Department of Oceanography
Texas A & M University
College Station, Texas 77843
Tel: 713-845-2154

Dr. S. R. Hammond
Hawaii Institute of Geophysics
2525 Correa Road
Honolulu, Hawaii 96822

Dr. C. G. A. Harrison (ex-officio)
Rosenstiel School of Marine and
Atmospheric Science
4600 Rickenbacker Causeway
Miami, Florida 33149
Tel: 305-350-7400

Dr. N. Hughes
Department of Geology
Sedgwick Museum, Downing Street
Cambridge CB2 3EQ England

Dr. V. Krasheninnikov
(Alternate: Dr. V. Basov)
Institute of Geology
USSR Academy of Sciences
7, Pyzhevskiy pereulok
Moscow, USSR
(Ministry of Geology of the USSR
4/6 B. Gruzinskaya
Moscow, USSR)

Dr. W. R. Riedel
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. J. B. Saunders
Naturhistorisches Museum Basel
CH-4051, Basel, Augustinergasse 2
Switzerland

Dr. John Usher
Deep Sea Drilling Project A-031
Scripps Institution of Oceanography
La Jolla, California 92093
Tel: 714-452-3529

JOIDES Working Groups

Gulf of California:

Dr. Augustín Ayala-Castañares
Coordinacion de la Investigacion Cientifica
Universidad Nacional Autonoma de Mexico
Mexico 20, D. F., Mexico

Dr. J. R. Curray (PMP)
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. Roger Larson (OCP)
Lamont-Doherty Geological Observatory
Palisades, New York 10964

Dr. Brian T. R. Lewis (SSP)
Department of Oceanography
University of Washington
Seattle, Washington 98195

Dr. David G. Moore (DSDP)
Deep Sea Drilling Project A-031
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. Tj. H. Van Andel
Department of Geology
Stanford University
Stanford, California 94305

Mediterranean/Caribbean Sea:

Dr. Mahlon M. Ball
Rosenstiel School of Marine and Atmospheric Science
University of Miami
Miami, Florida 33149

Dr. A. W. Bally (PMP)
Shell Oil Company
P. O. Box 2099
Houston, Texas 77001

Dr. Kenneth Hsu (OPP)
Geologisches Institut der E. T. H.
Sonneggstrasse 5,
Zurich 6, Switzerland

Dr. William J. Ludwig (OPP)
Lamont-Doherty Geological Observatory
Palisades, New York 10964

Dr. L. Montadert (PIP)
Institut Grancais du Petrole
Division Geologie
1 et 4, Avenue de Bois-Preau
B.P. 18, 92 Rueil Malmaison, France

Dr. I. Premoli-Silva (OPP)
Instituto di Paleontologie
Piazzale Gorini 15
20133 Milano, Italy

Dr. W. Schreyer (OCP)
Institut fur Mineralogie
Rugh-Universitat Bochum
D463, Bochum-Querenburg
Universitatstrasse 150
Postfach 2148
Federal Republic of Germany

Dr. Joel Watkins (SSP)
Gulf Research & Development Co.
11111 South Wilcrest Drive
P. O. Box 36506
Houston, Texas 77036

Middle America:

Dr. C. Burk
University of Texas
Marine Sciences Institute
P. O. Box 7999
Austin, Texas 78712

Dr. J. Watkins
Gulf Research & Development Co.
11111 South Wilcrest Drive
P. O. Box 35606
Houston, Texas 77036

Dr. R. Couch
School of Oceanography
Oregon State University
Corvallis, Oregon 97331

Dr. R. von Huene
U. S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

Dr. J. C. Moore
Department of Earth Sciences
University of California, Santa Cruz
Santa Cruz, California 95060

Dr. D. Sealy
Exxon Production Research Company

Dr. L. Sykes
Lamont-Doherty Geological Observatory
Palisades, New York 10964

South Philippine Sea:

Dr. R. Anderson
Lamont-Doherty Geol. Observatory
Palisades, New York 10964

Dr. D. Bibee
Scripps Inst. of Oceanography
La Jolla, California 92093

Dr. D. Hayes
Lamont-Doherty Geol. Observatory
Palisades, New York 10964

Dr. D. Hussong
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822

Dr. M. Langseth
Lamont-Doherty Geol. Observatory
Palisades, New York 10964

Dr. W. Ludwig
Lamont-Doherty Geol. Observatory
Palisades, New York 10964

Dr. G. Shor
Scripps Inst. of Oceanography
La Jolla, California 92093

Southwest Atlantic and Southern Ocean:

Dr. T. C. Moore, Chairman
Graduate School of Oceanography
University of Rhode Island
Kingston, Rhode Island 02881

Dr. P. F. Barker
University of Birmingham

Dr. R. Dingle
Geology Department
Cape Town University
Rondebosch
Cape Town, South Africa

Dr. D. Hayes
Lamont-Doherty Geological Observatory
Palisades, New York 10964

Dr. D. Johnson
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

Dr. J. Kennett
Graduate School of Oceanography
University of Rhode Island
Kingston, Rhode Island 02881

Dr. J. LaBrecque
Lamont-Doherty Geological Observatory
Palisades, New York 10964

Dr. R. Schlich
Institute de Physique du Globe
Observatoire Geophysique du Parc
St.-Maur, 4 Avenue de Neptune
94 St.-Maur-Des-Fosses, France

Dr. J. Sclater
Department of Earth and Planetary Sciences
Massachusetts Inst. of Technology
Cambridge, Massachusetts

Dr. Tj. J. Van Andel
Department of Geology
Stanford University
Stanford, California 94305

Dr. S. Wise
Department of Oceanography
Florida State University
Tallahassee, Florida 32306

Geothermal:

Dr. Joris M. Gieskes (IGP)
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. James Hall (OCP)
Deep Sea Drilling Project A-031
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. J. Laurence
Lamont-Doherty Geological Observatory
Palisades, New York 10964

Dr. P. Lonsdale
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. David G. Moore (DSDP)
Deep Sea Drilling Project A-031
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. James Natland (DSDP)
Deep Sea Drilling Project A-031
Scripps Institution of Oceanography
La Jolla, California 92093

Mr. S. Serocki (DSDP)
Deep Sea Drilling Project A-031
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. James R. Heirtzler
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543