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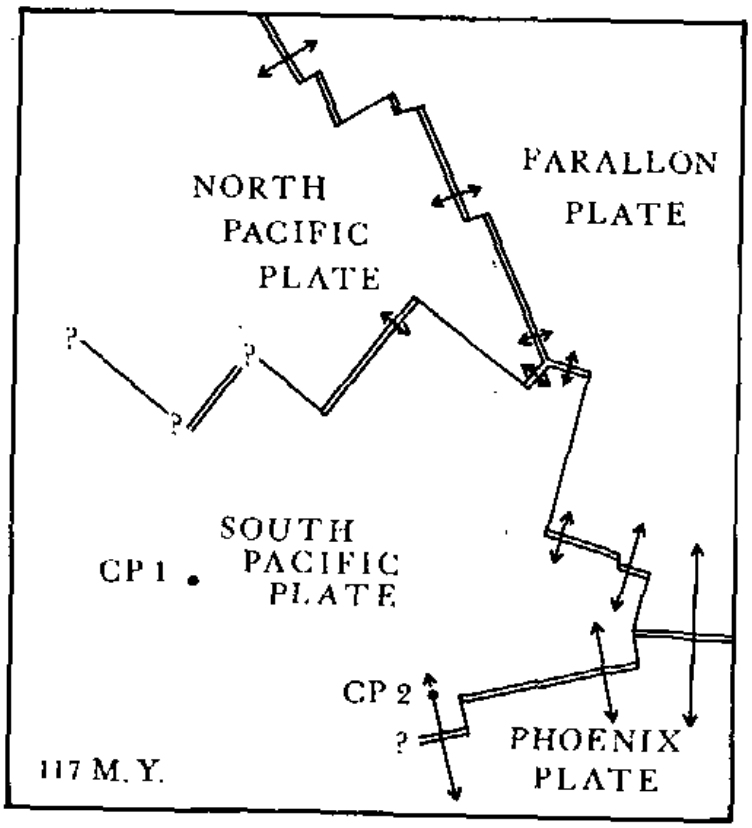

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PUBLICATION STATEMENT

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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.

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BACK ISSUES

Copies of the following back issues of JOIDES JOURNAL are available from the JOIDES 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)

ERRATA

The following errors should be noted in the JOIDES JOURNAL, Vol. III, No. 2, September 1977.

On page 4, the first item is incorrectly noted as an "Ocean Geodynamics" workshop, sponsored by JOI, Inc. Rather, the workshop was on "Ocean Crustal Dynamics" and JOI, Inc. was not involved in organizing it.

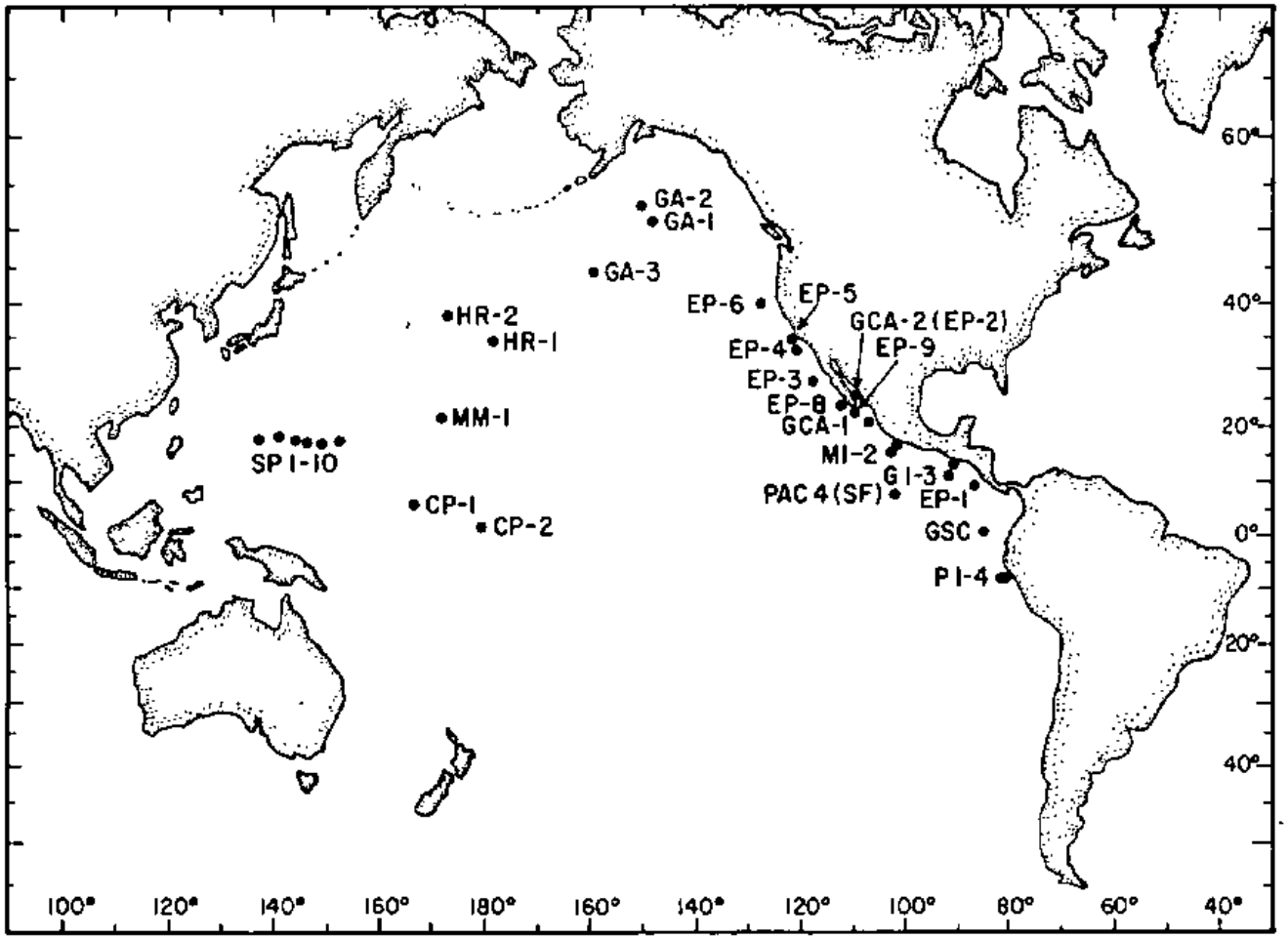
On page 16, the Repositories Report incorrectly notes that all post IPOD I cores should be stored at Scripps. No action has yet been taken on this matter by either the Executive Committee or the Planning Committee.

TENTATIVE SCHEDULE - IPOD

Leg	Begin	End	Days at Sea	Purpose*
58	11 Dec, Yokohama	30 Jan, Okinawa	50	Shikoku Basin, N. Philippine Sea (NP-0 through 7)**
59	3 Feb, Okinawa	15 March, Guam	42	S. Philippine Sea (SP-6, 7, 8)**
60	21 March, Guam	16 May, Guam	58	S. Philippine Sea (SP-1 through 5)**
61	22 May, Guam	6 July, Honolulu	50	Nauru Basin (CP-1, 2, 3, MM-1)**
62	8 July, Honolulu	4 Sept, Port Angeles	56	N. Pacific Paleoenvironment (HR-1, 2, GA-1, 2, 3)
63	12 Sept, Port Angeles	3 Nov, Manzanillo	51	E. Pacific Paleoenvironment (EP-3 through 9)
64	8 Nov, Manzanillo	27 Dec, Mazatlan	49	Gulf of California (GCA-1, 2)
65	2 Jan 1979, Mazatlan	21 Feb, Manzanillo	50	Gulf of California (GCA-1, 2)**
56	26 Feb, Manzanillo	18 April, Manzanillo	50	Middle America Trench (M-1, 2)**
67	23 April, Manzanillo	11 June, San Jose	50	Middle America Trench (G-1, 3, EP-1)
68	16 June, San Jose	5 August, Guayaquial	49	Mounds Area, Galapagos (GSC)
69	10 August, Guayaquial	28 Sept, Balboa	49	Old Costa Rica Ridge (GSC)

*Sites are shown on accompanying map.

**Re-entry scheduled for this leg.



Proposed sites for IPOD drilling in the Pacific Ocean

FUSOD REPORT PUBLISHED IN JANUARY 1978

The report of the JOIDES Subcommittee on "The Future of Scientific Ocean Drilling" (FUSOD) has been published by the JOIDES Office. Subjects covered in the report include drilling within the framework of solving scientific problems, proposals on future drilling by the JOIDES Subject Panels, some aspects of the future drilling program, costs and management structure, and conclusions and recommendations. Included in the publication is the report on "Scientific Ocean Drilling in the Atlantic Ocean during the Period 1979-1981," the proposal prepared by the JOIDES Planning Committee for research during IPOD.

Copies of the FUSOD Report and the attached proposal for the 1979-81 drilling program can be obtained by request from:

JOIDES OFFICE
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Seattle, Washington 98195 USA

SYMPOSIA

The IGP has endorsed the idea of holding a symposium on the nature and origin of chert. J. Gieskes and E. Suess will act as conveners, and Gieskes will organize the symposium as a part of the IAPSO-sponsored symposium on "The Geochemistry of the Sea" for the IUGG meetings in Canberra in 1979.

An AAPG-SEPM Symposium is planned in 1979 with E. Winterer and R. Douglas as conveners. 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.

CHANGE IN JOIDES TRAVEL ARRANGEMENTS

Beginning 1 July 1978 all JOIDES travel will be handled by the JOI, Inc. Office at 2600 Virginia Avenue, Suite 512, Washington, D. C. 20037. After 1 July 1978 DSDP will be responsible only for DSDP related travel. All JOIDES travel should be arranged with Mr. John H. Clotworthy at the JOI, Inc. Office.

REPORT FROM THE EXECUTIVE COMMITTEE (11-12 October 1977)

Review of Japan's IPOD Program

Since Japan joined IPOD in 1972 more than $1,000,000 has been spent inside Japan on site surveys and other activities. So far more than 150 scientists have participated in the effort, and other agencies, such as the Geological Survey of Japan and the Hydrographic Office have also participated. Thanks and appreciation for the initiation of IPOD and wishes for continuing success and cooperation were expressed.

CHALLENGER Drydocking

The yard work on the CHALLENGER was carried out at San Pedro, California and included an extra $250,000 provided by NSF. Facilities that have been improved include:

1. Refurbishing the Pit Log.
2. Thrusters overhauled.
3. Pipe rack rebuilt.
4. Hull reinforced.
5. New threads on the bottomhole assembly.
6. 3.5 khz bottom sounder installed.
7. Overspeed control installed on thrusters.
8. Living quarters refurbished.
9. Omega navigation system installed.

Tests of the "DEMET" coating on the inside of the drill string have proven it to be of value, and more coating will be attempted. A new drive mechanism is also necessary for the extended core barrel. DSDP is revising the bit release mechanism. New joints should be put into the drill string in about a month. DSDP has a 9000 foot-long drill string from the U.S. Geological Survey that it is holding in standby preparedness.

Site Planning

A letter requesting specific sites for the 1979-81 drilling period was sent to all subject panels from the JOIDES Office 9 August 1977. The Executive Committee recommended that the Planning Committee proceed with planning and consider and compose a plan for drilling in the 1979-81 period and make appropriate recommendations to the Executive Committee.

Status of the 1979-81 Drilling Proposal

The Executive Committee endorsed the Scripps proposal for the 2 years of drilling (beginning operations in FY 1980), but as an integral part of a longer term drilling program as envisaged in the FUSOD report. The FUSOD report in particular stresses the following points with regard to CHALLENGER type drilling:

1. Important scientific problems require shallow drilling up to about 1984 which should be carried out by a less expensive CHALLENGER type vessel;
2. A CHALLENGER type vessel should be strengthened and improved at an estimated cost of about $3 million in order to accomplish this program;
3. It is imperative that the drilling program be carried out in the context of a total scientific program which involves funding for geophysical problem definition, site surveys, and sample analysis studies.

Reactions to the financial statement are expected in about April and May from Congress.

Site Surveys

In order to meet the Site Survey Panel objectives for the present program, the Executive Committee recommends DSDP request from NSF that the full amount originally in the budget be made available in FY'78. In view of the importance of adequate site surveys, JOIDES recommends to NSF that funds be made available in FY'78 to begin site surveys necessary for future drilling even before the specific drilling programs are approved.

Recommendations on Repositories

The Executive Committee accepted recommendations 15, 17, and 19 of the ad hoc committee on repositories. The Executive Committee also recommended that the East Coast Repository be subcontracted to Lamont-Doherty Geological Observatory, and that the senior curatorial person be approved by the curator of DSDP.

U.K. Participation in IPOD

U.K. participation in IPOD which had been planned until 30 September 1978 is now scheduled to extend to 30 September 1979.

REPORT FROM THE PLANNING COMMITTEE (3-6 October 1977)

Aluminum Drill Pipe

A 2,000-foot length of 5-inch aluminum drill pipe has been budgeted for FY '78. This will be a test section to be incorporated into the steel drill string to evaluate handling, corrosion, and wear in the DSDP operations. Allowing time for procurement, shipping, and field tests, the evaluation should be completed in about 9-12 months. DSDP has acquired its own computer program which can be used to estimate stresses and longitudinal motions of mixed aluminum-steel drill pipe strings.

Drilling Depth Limitations for GLOMAR CHALLENGER

The new drilling depth limitations for the GLOMAR CHALLENGER are presented below. They were adopted from considerations of stress levels and operating experience. The conditions are as follows:

1. Heavy wall pipe in horn during drilling.
2. Average wall thickness = 90%.
3. Overpull allowance for stuck pipe = 100,000 lbs.
4. Dynamic load = 40,000 lbs. (moderate weather).
5. Bottomhole assembly = 45,000 lbs.
6. Bending stresses during tripping = 25,000 lbs.

A. Hard drilling (indurated sediments, basalt), rate of penetration less than 5m per hour.

Stress levels (as percent of yield)
Drilling 86%
Tripping 93%

Maximum drill string length
6402 meters (21,000 ft)

B. Soft drilling - rate of penetration less than 5m per hour.

Stress levels
Drilling 91%
Tripping 97%

Maximum drill string length
6860 meters (22,500 ft)

Status of 1979-81 Drilling Proposal

The 1979-81 drilling proposal was received by the National Science Foundation in September in preliminary form as it had not yet been approved by the Regents of the University of California at San Diego. The National Science Foundation has submitted the proposal for staff review, and the Foundation will return the proposal to the University of California for amendments. A Blue Ribbon Panel will be appointed by the National Science Foundation to review the proposal.

The budget has been passed on to the Office of Management and Budget. By December 1977 the review panel should have been established, and amendments to the 1979-81 proposal will have been made. The FUSOD Report ("The Future of Scientific Ocean Drilling"), the two-year proposal, and evaluations of the SEAPROBE, the CHALLENGER, and the EXPLORER, will all be reviewed at this time.

It will probably be one year before the review is complete.

Status of the Hydrofracturing Experiment

The hydrofracture experiment is planned for Leg 61 using the present Lynes packer. Space will be reserved for a Lynes engineer on this leg.

Status of the Electrical Resistivity Experiment

The electrical resistivity experiment will be tried on Leg 60. The time involved is approximately one (1) day, and the experiment requires modified logging cable.

Eastern Pacific-Caribbean Sites

The Active Margin Panel has reviewed the Caribbean proposal and expressed unanimous approval of all elements and recommended drilling. The Active Margin Panel considers the Caribbean as a possibility if the Gulf of California is not drilled. However, the Caribbean is an accreting margin like Japan, so it has a lower priority in the Active Margin Panel than the Middle American or Peru-Chile trenches.

The Active Margin Panel sites for the Middle America trench have been moved slightly to take advantage of a newly discovered submarine canyon.

If it is not possible to drill in the Gulf of California, the Active Margin Panel suggests:

A. Extend drilling in the Middle America Trench,
B. Drilling the Caribbean Sea transect,
C. Drilling the Peru-Chile Trench.

If the Middle America Trench cannot be drilled, more work on the Peru-Chile Trench is favored. The Caribbean does not replace present high-priority Active Margin Panel sites. The Active Margin Panel feels it should only be drilled if additional time is available, if the Gulf of California cannot be drilled, or if the Active Margin Panel is given an extra leg by the Planning Committee.

Gulf of California Sites

The proposal for site survey plans for FY '78 was presented. Concern was expressed whether Safety Panel requirements could be met in the Guaymas Basin, especially considering recent experiences. The Safety Panel looks at both the petroleum potential and the occurrence of trapping structures, and the survey data must have enough resolution to be able to detect such structures. The concern is not with the center of the basin, but rather with the flanks of the basin. The Site Survey Panel has directed the surveyors to provide an adequate survey so the Safety Panel will be able to make a decision.

Abandonment Procedures

Procedures have been established for abandonment for certain DSDP holes without cementing. These procedures are outlined in Article VIII of the Safety Manual (JOIDES Journal, Special Issue, March, 1976). Clarification was requested from the Safety Panel as to how to detect variations in fluid pressure during DSDP drilling.

REPORT FROM THE ACTIVE MARGIN PANEL (AMP) (1-3 August 1977)

The AMP decided it could look at other Middle America Trench sites, at the Peru-Chile Trench and/or the Caribbean within the logistical constraints of planning for the following legs of the GLOMAR CHALLENGER. The AMP also requests that the available data for the New Hebrides and Tonga regions be presented to an AMP meeting to be held in the near future. The request is made to cover the possible need for major rescheduling of Legs if changes have to be made in the E. Pacific program.

South Philippine Sea

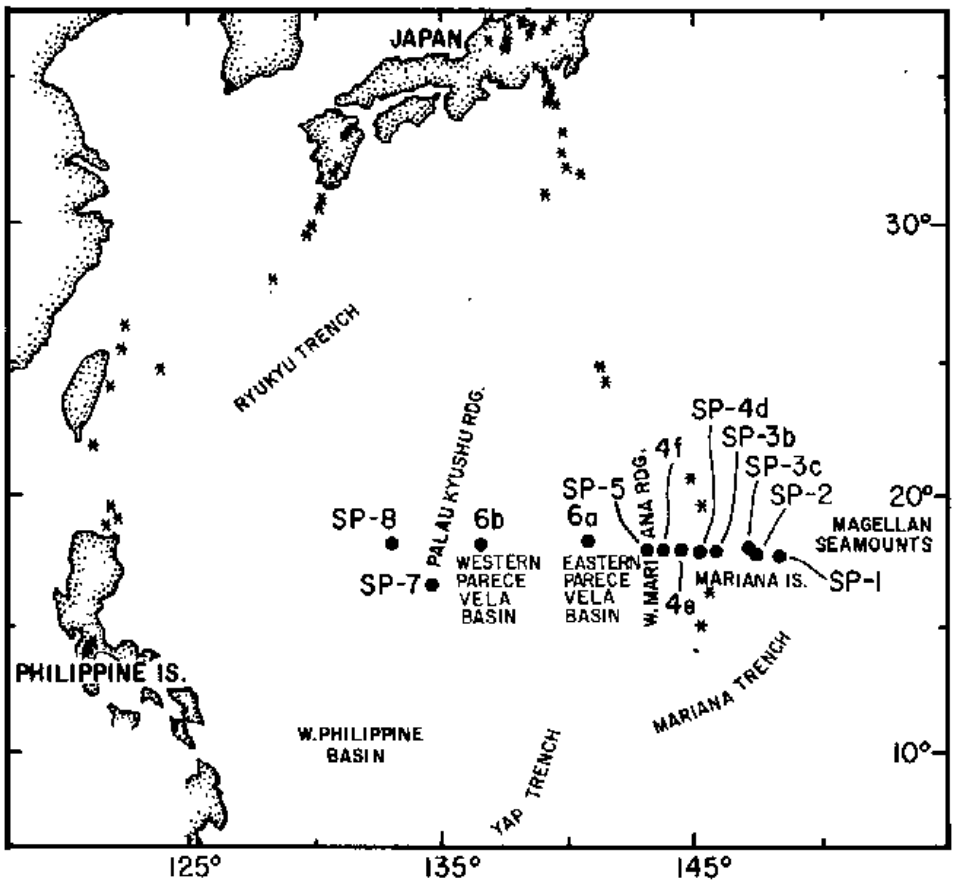
A Summary of the objectives of SP Sites is given below. For specific information see the minutes of the South Philippine Sea Working Group.

SA 8A	Control site for central Philippine Sea basin
SP 7, 5 + 3B	Attempt to reach ridge core
SP 6A + 6B	E and W sides of Parece Vela basin
SP 4 series	History of Mariana basin
SP 2	Frontal part of upper trench slope
3A	Frontal part of upper trench slope
SP 1	Material that is going down Benioff zone

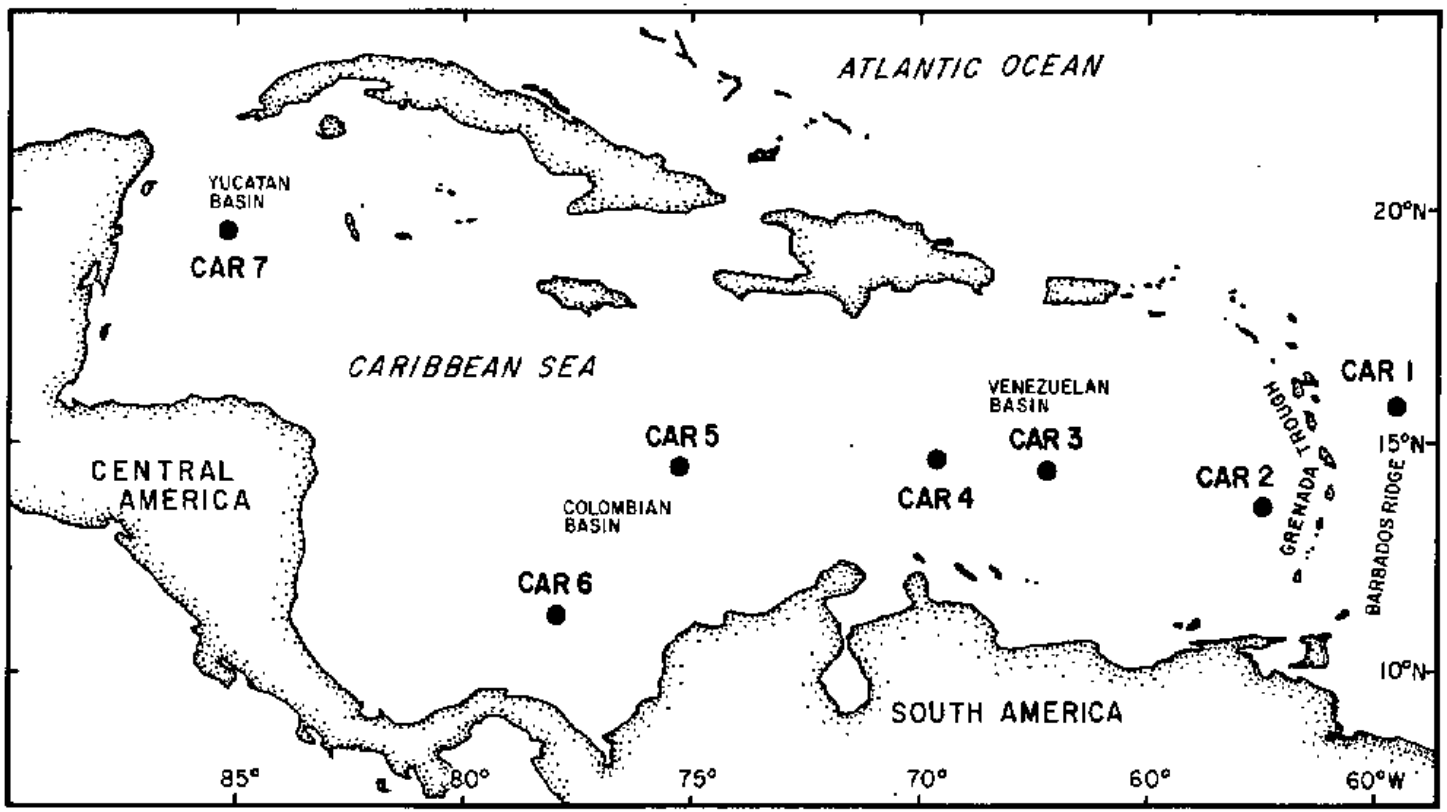
The AMP proposes to drill the South Philippine Sea Transect by the scheduled series of single bit holes. If conditions permit the co-chiefs may decide to make 3C or one of the 4 series a re-entry hole.

Caribbean

The AMP agrees that the proposed Caribbean transect clearly offers priority scientific objectives for the AMP that are uniquely within the present capability of the CHALLENGER. The AMP will discuss with other panels the exceptional value of a drilling program in the Caribbean. The AMP endorses the Mediterranean-Caribbean Sub-Panel proposal and strongly urges that the PMP, OCP and OPP also consider the recommendations contained in the proposal for the Caribbean. Furthermore, the AMP strongly recommends to the Planning Committee that a proposal of drilling in the Caribbean be scheduled. The following potential drill sites are described in the Sub-Panel proposal.



Revised IPOD drilling sites in the South Phillppine Sea



Proposed drilling sites in the Caribbean Sea

Sites	Location	Water Depth	Sub-bottom Penetration	Objectives
CAR 1 CEPM profile A3	15°35'; 58°44°44'W shot point 5160	4950 m	1300-1400 m	FRONT OF THE BARBADOS OUTER HIGH To document tectonic character of the accretionary prism, to get information about the age and lithology of sediments deposited on the Atlantic abyssal plain; to find the age of the Atlantic oceanic crust. This knowledge would provide geologic constraints as to the amount and rate of consumption of the Western Atlantic at the Caribbean Active Margin.
CAR 1A IFP-CNEXO profile A1D	15°32'N; 58°44'W shot point 300	4875	1000	
CAR 1B IFP-CNEXO profile A1C	15°42'N; 58°43'W shot point 420	5360	800	
CAR 2 IFP-CNEXO profile A2B	13°42'N; 62°28'W shot point 570	3000	1200	GRENADA BASIN - AVES RIDGE Age, lithology and sedimentation history, age and nature of the basement sequence of the basin. Evolution and history of the Eastern Caribbean Margin since the Mesozoic to allow comparison with land geology in Venezuela.
CAR 3 (Re-entry) IFP-CEPM profile 120A	14°22'N; 67°06'W shot point 3450	4995	1400-1500	VENEZUELAN BASIN The age of the basement in the Venezuelan basin. To investigate what lies beneath B". The relationship of B" to basement.
CAR 4 IFP-CNEXO profile A3A	14°30.5'N; 69°27.5'W shot point 530 and (UTMSI profile 06-1	4390	180-200 above B", B", and Formation below B"	
CAR 5 IFP-CNEXO profile A4C	15°07'N; 74°35.5'W shot point 2550	4125	1200 m	COLOMBIA BASIN Sedimentary history of the basin. Nature and age of the basement rocks. To compare the history of late Cretaceous to recent water masses on the Caribbean and Pacific sides of the Isthmus of Panama.
CAR 5A IFP-CNEXO profile A4E	14°50'N; 74°43'W shot point 750	4125	1200 m	
CAR 5B IFP-CNEXO profile A4Y	14°17'N; 75°23.5'W shot point 2088	4125	1200 m	
CAR 6	11°12'N 78°00'W	3550	1200-2000	YUCATAN BASIN To investigate the nature, origin and age of the crust in the Yucatan basin. To reach the basement on a possible fossil spreading center. To determine the age and facies of the overlying sedimentary sequence. To establish a minimum age for opening of the Yucatan basin.
CAR 7	19.42° 51'W 85°32.04'W	4574	1000	
CAR 7A	19.22°22'N 85°11.27'W	4570	1500	

The panel reviewed the site survey data and took notice of the problem of the apparent areal variations in the nature of the layers below B" in the Venezuela basin, and in particular, the problem of the relationships of sub-B" layers and basement. The nature of sub-B" layering and its relation to basement in a regional context must be solved before drilling can be expected to yield meaningful results. Additional Multichannel survey tielines in a N-S direction must be obtained either before or after drilling. The panel wants to know if B" lies considerably above true basement and is considerably younger than basement, or if B" is coincident or nearly coincident with basement and is only somewhat older than the Coniacian age determined by JOIDES drilling. Additional site survey work is needed in the Colombia and Yucatan basins in order to select the prime drill sites.

The particular value of deep drilling in the Caribbean Sea is the good control already available from both the land-and sea areas.

Middle America Region

Multichannel survey lines shot off Guatemala reveal a canyon which has cut through shelf strata and would permit a drill site to reach a lower level. The AMP suggests using downhole instruments in this region, putting instrument packages into both the ocean crust and trench wall and, if possible, into the accretionary toe.

The zone of present seismicity needs a local OBS network with 10-20 km spacing between instruments. The AMP recommends installation of the network to study long-term natural seismicity in the trench slope region in the area of proposed drilling off Guatemala and off Mexico.

The Nicoya Peninsula ophiolite-like complex on the west coast of Costa Rica is overlain by Campanian-Maestrichtian flysch (volcaniclastics) and is possibly an uplifted part of a fore-arc basin.

Priorities for AMP

If the Gulf of California cannot be drilled, the AMP priorities are as follows:

1. Add time to the Middle America Trench drilling program, contingent upon results of site survey data.
2. Drill a Caribbean Sea Transect.
3. Drill a Peru-Chile Trench Transect.

If drilling in the Middle America Trench sites off Mexico is not possible within our present schedule, then the AMP regards the Peru-Chile region as its first priority.

Results of USSR Survey in GUAM-YAP Trench Region

Dredging in the Mariana and Yap trenches has provided a wide suite of ophiolite type rocks, which were brecciated in the lower part of the section. According to K-Ar dating, alkali basalt from the Mariana trench near Guam, at a depth of 5500m, has an age of 102my. Plagioclase phyric basalt from the same location is 49my old. The intrusive basic rocks of the Yap trench have ages less than 15-20my and some volcanic rocks are less than 5my old. In the Palau trench the age of gabbro is 31my and basalt is 24my. Some of Yap trench rocks are very similar to those of Yap Island. Recommendations were expressed to drill the NP transect from west to east and the SP transect from east to west. More detailed petrographic studies of crystalline rocks of the ocean floor should be undertaken, and in particular, some experimental petrological techniques (study of inclusions etc.) should be applied to find out the physical and chemical conditions of the genesis of these rocks.

REPORT FROM THE INORGANIC GEOCHEMISTRY PANEL (IGP) (27-28 June 1977)

Interstitial Water Program

During the last meeting in La Jolla the panel endorsed the revised interstitial water program, which now consists of the shipboard determination of alkalinity, calcium, magnesium, chloride and salinity. In addition, a resistivity tester for sediments will be purchased by DSDP. The IGP intends to sponsor a routine measurement program of sediment electrical resistivity. These data will enable analysis of interstitial water profiles and their significance with regard to possible reaction zones in or underlying the sediments. Also, the in situ sampling of dissolved gases is highly recommended.

Alkalinity analyses are carried out on 5 or 10 ml aliquots, which, after titration with 0.1 N HCl, are stored in sealed plastic vials for possible further analyses. The quantity used for the remaining shipboard analyses is less than 1 ml. In deeper parts of a hole where interstitial waters are recovered in quantities less than 2 ml, samples should not be analysed on board, but rather should be stored in a sealed glass vial. Non-acidified samples should also be stored in sealed glass vials.

The shipboard program is designed to yield information for direct use in sampling strategies for solids. A combination of interstitial water profiles with diffusion considerations (using the electrical resistivity data) will yield information on the presence of active reaction zones. This is true especially in sediments with accumulation rates of 3 cm/1000 years. The interstitial water program should be carried out to the greatest depths possible in sites where significant changes in composition are noticed with depth. Quantities as small as 0.5 ml can be analysed accurately for a large array of constituents.

Special Geochemical Leg 35

A preliminary report on Leg 35 was published in Nature. The results emphasize that a large amount of quantitative information on diagenesis of deep sea sediments and the underlying basalts can only be gained by the proper combination of chemical, mineralogical and isotopic studies of pore waters and solids.

The Panel has sponsored two comprehensive geochemical programs, Leg 15 and Leg 35. There is little doubt that these programs have helped to set the stage for future geochemical investigations of material available from the first 55 legs of DSDP. Interstitial water data are available on most sites and sufficient quantities of material are in storage for further study. The next program that the Inorganic Geochemistry Program will sponsor, along with the Ocean Crust Panel, is the geothermal program in the Galapagos area. Here special attention will be given to basalt alteration processes.

The recent cruise of R.V. "Alvin" in the Galapagos area uncovered 4 hot spring fields roughly 100m in diameter with active vents. Flow rates could be as high as 15 liters per minute and trends in chemical compositions are in agreement with experimental predictions. Drilling attempts in the mounds area of the Galapagos hot spring field (sites 424 and 425) encountered hydrothermal deposits in 424A, but the small amount of basalt recovered was very fresh and unaltered. On the other hand, sediment in 425 showed no "metalliferous" deposits, but the basalt showed evidence of hydrothermal alteration.

Of great importance during the future geothermal drilling legs will be the emphasis on basalt alteration studies. If hydrothermal waters will be encountered during drilling, equipment should be available to recover it. A packer is already available to DSDP. Much information, however, will be gained from alteration products.

At present, two geothermal legs are envisioned and the Inorganic Geochemistry Panel intends to sponsor at least two scientists on each leg, who will sample not only for themselves but also for land based scientists.

Bulk Chemistry of Sediments

Several panel members expressed their concern about routine analysis of the bulk chemical composition of recovered sediments. The Panel decided that a synthesis of available data should be carried out and objectives should be clearly defined. Especially great interest in such routine programs has been generated among Soviet scientists.

Some concern was expressed with regard to sampling strategies and also with regard to standards. The Inorganic Geochemistry Panel concluded that each contribution on the chemical composition of solids, whether of major elements or minor elements, should report on a blank basis the analysis of at least one internationally recognized standard (USGS or its equivalent).

The Panel considers this a most important matter and urges the various editors of DSDP volumes that this recommendation be adhered to.

Euxinic Environments

The Inorganic Geochemistry Panel expressed great interest in geochemical studies of carbonaceous shales. This is an exciting area of research, where geochemists can provide answers to questions relating to ancient euxinic environments. Important questions best answered by geochemical means are: What kind of an environment led to the deposition of these shales? Were they deposited under closed system conditions? Why is the enrichment in trace metals proportional to sea water concentrations?

The Panel strongly recommends that during legs sponsored by the Paleoenvironment Panel geochemical studies should be emphasized. The Inorganic Geochemistry Panel can serve as a liaison in this matter.

Geothermal Drilling

The Panel re-emphasized the importance of studies on alteration products, but also expressed great interest in hydrofracturing experiments. The packer can be easily 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 heatflow and conductivity measurements. Sediment recovery should be complete in all sites to be drilled, with at least two in situ interstitial water samples obtained at each site.

X-Ray Diffraction

The Panel is strongly in favor of the purchase of a small desk top X-ray diffractometer, which again will vastly improve scientific sampling on board ship.

Scientific Achievements: Leg 55

During Leg 55, 11 holes were drilled at four sites on the Emperor Seamount Chain including a multiple re-entry hole on Suiko Seamount. Of the four sites drilled, significant data was recovered at three sites situated on Ojiin, Nintoku, and Suiko Seamounts.

The principal objective of Leg 56 was to test the "hot spot" hypothesis of the origin of the Hawaiian and Emperor Chains. Of particular concern was whether the Hawaiian melting anomaly, presently located beneath Kilauea and Mauna Loa had persisted throughout the Tertiary. To fulfill this objective, five principal goals were set for Leg 55. The nature of these goals and the results obtained at the three sites where meaningful data was derived is as follows:

To determine the minimum age of cessation of volcanism by paleontological means aboard the ship and by K-Ar dating later. At the sites the paleontological age of the lowest sediments above the basalt lie approximately on a linear geochron connecting their ages with that of Meiji Seamounts to the south. The slope of this geochron represents an average rate of volcanic propagation of 9.0 ± 1.5 cm/yr. The basalts at the three sites appear to be suitable for radiometric dating.

To determine whether the chemical composition of the basalts is within the range of compositional variation existing in the Hawaiian and Emperor Seamount Chains. The chemical studies indicated that indeed this is the case except that at Suiko Seamount the barium and strontium are less abundant than expected from Hawaiian data.

To determine an approximate paleolatitude of formation of Suiko Seamount from the paleomagnetic inclinations. The mean inclination observed in the Suiko basalts is 42°, which corresponds to a latitude of formation of $25° \pm 4°$N.

To determine the emergence/submergence histories of the seamounts. The presence of vesicular and oxidized flow tops and bottoms for many of the basalts and red lateritic soils between several flows indicates subaerial eruptions for all three seamounts. Coralline deposits were also found on all three seamounts.

To determine the history of sedimentation and paleoenvironment. Limited data was derived here because of unconformities and poor core recovery. However, paleo water temperature data was derived at Suiko Seamount. Based on nannofossils, it indicates a warm water early Miocene period although a scarcity of planktonic forams suggests cool water. Upper Miocene and Pliocene microfossils suggest that a cooler period prevailed during that period.

In summary, the data confirms a "hot spot" origin of the Emperor Seamount Chain.

REPORT FROM THE OCEAN CRUST PANEL (9-11 November 1977)

News from GLOMAR CHALLENGER

Of particular interest is Leg 55, which drilled the Emperor Seamounts. Three seamounts were drilled, Ojiin and Nintoku with single bit holes and Suiko with a 380-m re-entry hole. Age of volcanism showed a steady progression along the chain as predicted by the hot-spot model for Hawaiian volcanism. The hole on Suiko recovered nephelinite overlying alkalic basalt overlying tholeiite, just as is observed on the mature Hawaiian islands today. The mean paleolatitude for the 67 flow units penetrated was 25±4°, somewhat farther north than the present latitude of Hawaii.

Leg 56 drilled a site (J10) outside the Japan Trench on the Pacific plate, but basement was not reached. The other sites on Legs 56 and 57 are in the accretionary prism on the Japanese side of the trench. None have yet reached basement. One re-entry hole was abandoned because of inability to penetrate a shale horizon. OCP is concerned with the loss of re-entry holes through problems with drilling shales, and notes that these may prevent basement objectives being reached on Leg 61 and on other legs.

Shore-based Investigations: Legs 45, 46, 49, 51-53, and 54

Among the more interesting results to be reported for Legs 45 and 46 are those on magma-mixing. Many phenocrysts in the basalts are not in equilibrium with the liquid in which they are found, and must have formed in a different, more basic magma. Inclusions of basic glass in the phenocrysts support this idea. Mixing of batches of contrasting magmas seems to have been an important process in generating the liquids now seen. Comparison of the geochemistry of Legs 45 and 46 with that of Leg 37 shows striking differences attributable both to differences in mantle source and in the structure of crustal reservoirs.

The most striking result to emerge from Leg 49 is the direct evidence of inhomogeneities in the mantle. The rare-earth pattern varies considerably within individual holes, especially 407 and 410, while the Zr/Nb ratio varies most strikingly over larger distances. Particularly apparent is the contrast between the FAMOUS area and the region a few degrees to the south. The Atlantic north of about 30°N seems to form a distinct geochemical province, with relatively low Zr/Nb, Hf/Th and other ratios. The geochemistry of the mantle supplying basalt at the sites on the Reykjanes Ridge transect has been constant for the last 40 m.y.

The lavas in the holes drilled on Legs 51-53 are all very close in composition and show little evidence for variation in degree of evolution during their production. Alteration of the basalt provides an important story. There is a clear contrast between two main types of alteration, an oxidizing K-enriching process and a reducing process which does not lead to such marked K-enrichment.

Most of the basalts recovered on Leg 54 are enriched in Fe and Ti relative to Atlantic basalts, but some variation is present that may be related to an origin on the Galapagos spreading center or the East Pacific Rise.

Philippine Sea Transect

OCP's highest priority sites on this transect are as follows:

1. A multiple re-entry site in the Mariana Trough, at one of the SP-4 sites. The chief objective of such a site would be to determine the structure of the crust of a marginal basin, and its relation to normal mid-ocean ridge crust and ophiolite structure. Such comparisons are particularly important in understanding crustal processes, and OCP is very interested in seeing this site drilled as a multiple re-entry site. However, it was felt that to attempt re-entry at site SP-4e in young crust was not particularly wise in view of the problems recently experienced. OCP recommends that re-entry is most likely to be achieved at Site SP-4f on the western margin of the Mariana Trough.

2. A single bit site at SP-6a through the volcaniclastic apron on the east side of the Parece Vela Basin. Three important objectives here are the structure of the apron, its significance for the history of arc volcanism, and the nature and age of the underlying crust. The volcaniclastics should make a stable hole and should allow deeper sediment penetration and better recovery. The sedimentary objectives at this site are important enough for the hole to be sited where the sediments are as thick as possible but still penetratable for basement sampling.

3. A single bit site at SP-3b on the axis of the volcanic arc. The objective of such a site would be to examine the structure of arc basement away from one of the central volcanoes. This site is especially significant because of the limited samples available so far from active arcs, almost all of which are from islands. It is possible that fragments of arc environments are present in the geological record of the continents without being recognized as such, and a knowledge of what to look for would be very useful. The material recovered at this site would also be very useful for examining arc genesis.

Nauru Basin/Central Pacific Basin

The latest interpretation of the Nauru Basin site survey (CP1) is: water, 5160m; radiolarian ooze and calcareous turbidites, V_p = 1.7 km/s, 400m; limestone (very little chert), V_p = 3.5 km/s, 300m; limestone, V_p approximately 5.5 km/s, x m thick; basalt, V_p approximately 5.5 km/s, (2600-x) m thick. The value of x is not clear. It could be zero, in which case the depth to basement agrees with the Sclater-Francheteau depth curve corrected for loading, but layer 2 would be very thick. It could be up to 1 km, at which depth a low-frequency reflection is seen. The reflection from the top of the 5.5 km/s layer is rather smooth for basalt, suggesting that x is not zero, but not indicating how great it is.

OCP sets a very high priority on obtaining a good basement section at this site. The equivalent section in the Atlantic has already proven of considerable scientific importance. A comparable section in the Pacific is very important for comparison with the Atlantic section formed at a much slower spreading rate. OCP thus recommends that, if basement is not reached at site CP-1, the ship should move to site CP-2 in the Central Pacific Basin, where the sediment is thinner and known to be drillable. Site CP-3 is not recommended because the unknown thickness of sediment will not allow basement to be reached with current drill-string lengths.

OCP also recommends that, to save steaming time, the termination port for Leg 61 should be Majuro. This would allow reoccupation of the old basement sites in the event of technical problems.

NE Pacific Drilling

The possibility of a re-entry site in the NE Pacific during Legs 62 or 63 was considered. However, a weather summary for the period 10 September to 10 October at 50°N, 145°W suggests that there is a high risk of not being able to drill a multiple re-entry hole during that period. Among other factors, winds over 27 kt can be expected over 25% of the time. A better return can be anticipated from a re-entry hole in the mouth of the Gulf of California.

Some return from the Gulf of Alaska is desirable because of the opportunity for a site on fast-spread crust formed at a high latitude. Site GA-1 should be drilled until the bit is destroyed. The Panel is willing for the time required for this to be subtracted from that allocated to the re-entry hole in the mouth of the Gulf of California, if necessary.

Gulf of California Drilling

The preliminary deep-tow results suggest interesting targets for single bit sites in the Tamayo Fracture Zone. OCP suggests that these sites should be considered when detailed planning for the Gulf of California is possible, in the light of their scientific importance and the accessibility of the sites for the ship.

The scientific returns from GCA will be great, because it is a near zero-age hole in crust of relatively fast spreading rate. Technically there are grounds for supposing that drilling will not meet the same problems as at the Siquieros sites. Near the Tamayo Fracture Zone the ridge crest is rifted with pillow lavas on its floor and volcanic edifices similar to those in the Atlantic. The sedimentation rate is high and the pillow lavas should be separated by sediment, which may hold them more firmly in place.

Geothermal Drilling in the Galapagos Area

Present plans are: a) Leg 68 to sample a young, open hydrothermal system in the mounds area of the Galapagos spreading center, and b) Leg 69 to sample an older, sealed hydrothermal system on the Costa Rica rift. Both legs would consist of a series of closely-spaced single bit holes, with extensive in situ sampling and experimentation, followed by one re-entry hole on each leg.

Drilling in the Caribbean

Site CAR 3 will require the full allowable drill-string length of GLOMAR CHALLENGER before penetrating more than a few meters into basement. Site CAR 4 seems to require 200m of sediment penetration followed by about 500m of penetration of the flood basalt unit until the sub-B" reflector is reached. Significant penetration of basement beneath this reflector will be necessary to contribute new science.

Alcoa SEAPROBE

OCP received a proposal for logging existing holes in the Atlantic. Much of this work could be done as well by SEAPROBE now as by CHALLENGER. Pumping capability exists already on SEAPROBE, and rotation is not strictly necessary for the task. The downhole instrumentation capability seems higher than CHALLENGER for this task. The best holes for this purpose are 395A and 396B, in shallow

water near the ridge crest. The question of fitting the Bedford submersible drill on the SEAPROBE string for detailed drilling of shallow holes was examined. Some updating of the drill will be necessary, and some modifications may have to be made to SEAPROBE's electronics.

Basement Penetration in OPP and PMP Holes

OCP requests substantial basement penetration, indicated by driving into basement until the bit fails, at all sites where basement is encountered. The reasons for this are as follows:

1. Such samples are very important for examining spatial and temporal variation in crustal processes and mantle composition, an aspect that is proving one of the most important to arise out of crustal drilling to date. They are also important for looking at aging of the crust and its progressive alteration.

2. If crustal scientists are to give good advice on the nature of the basement they need several tens of meters penetration to do so. A sample only a few centimeters long from a meter of penetration cannot indicate if a sill or a flow has been penetrated, if volcanism is of ridge-crest type or off-axis, or if basement is oceanic or not. All of these questions can be very important in paleoenvironmental and other interpretations.

3. This request is seen as complementary to that requiring continuous coring of all sediment sections. OCP expects the scientific returns to be at least equivalent to those of sediment coring.

Plans for Crustal Drilling in Iceland

Current plans are for a 2 km hole, costing approximately $200,000 with the costs equally shared between the participating countries. The favored place is in Reydarfjordur, in a deep valley cut 1.5 km into the lava pile. A 2 km hole would thus give a 3.5 km total section of the lava pile. Logging will add to the cost and applications for extra financing are being made separately.

OCP endorses the proposal. It is essentially complementary to oceanic drilling plans. The bottom of the deepest oceanic crustal holes reach stratigraphic levels roughly equivalent to those in which the Iceland hole will start. Despite the considerable differences between Iceland and normal ocean crust, OCP expects the Iceland drilling results to help in understanding the changes beginning at the bottom of our oceanic holes. This is particularly true for metamorphic effects and structural problems such as the relative importance of dikes and inclined sheets in the deeper section.

Hydrofracturing Experiment

The OCP recommends that one day be set aside for a feasibility test of the hydrofracturing experiment, involving inflation of the packer, pumping against it, and deflation afterwards. This experiment should be the last thing done in the hole because of the uncertainty as to whether the packer will readily deflate. OCP is very enthusiastic about the potential of this experiment for solving important questions about the state of stress in the crust. The Gulf of California might be as good a place to conduct the experiment as the Costa Rica rift, and a comparison of results between the two places might be particularly valuable.

A Logging Leg in the Atlantic

A paper proposing the use of one leg for logging existing holes in the Atlantic was presented. OCP regards this operation as having a high scientific priority, and suggests that this task is very appropriate for the Alcoa SEAPROBE, especially the two holes in shallower water.

Sites PAC5 and PAC6

Sites PAC5 and PAC6, between the Gulf of California and Hawaii, are well-surveyed and approved by the Safety Panel. They are part of the trans-Pacific transect as originally envisaged by OCP, and could also provide good sites for drilling in lower Tertiary-upper Cretaceous fast-spread crust. Since it is possible that logistic considerations might allow one or the other to be drilled, OCP would emphasize the high scientific priority it gives to these sites. Of the two, PAC6 is preferable because of the better-developed magnetic lineations in its vicinity. PAC5 is, however, nearest to the currently proposed track of the CHALLENGER.

OCP Request

Wherever Safety Panel requirements are met, all crustal holes should be left uncemented. It is of the utmost importance that holes are as accessible as possible, especially in view of the increasing interest in downhole experiments. A heavy mud plug can be removed by pumping alone without rotation, and this may be achieved by vessels of lesser capability (and cost) than CHALLENGER.

Proposal to Drill Single Bit Holes in the Tamayo Fracture Zone

Oceanographic investigations over the last ten years have convincingly demonstrated that ridge-transform-ridge plate boundaries are numerous and can occur along some plate boundaries at a density of one every 50 km. Oceanic transform boundaries are characterized by lineated zones of ridges and troughs of considerable width (10-30 km). Analyses of rocks dredged from transform environments indicate the distribution of rock types is complex. These rocks often have experienced a complex strain history as a consequence of transform tectonics. Except for one hole sited on a talus ramp within the Vema transform, the Deep Sea Drilling Project has yet to locate a hole within the transform domain. The Gulf of California transect offers an opportunity to enhance our understanding of transform geology because the transect is adjacent to the Tamayo Fracture Zone.

The Tamayo Fracture Zone affects the East Pacific Rise over a distance of approximately 150 km. It is characterized by a band of NW trending ridges and troughs 20-30 km wide with relief of several hundreds of meters. In preparation for a geophysical and geological investigation, two deep tow surveys have been completed within the Tamayo Fracture Zone. One site is located within the center of the transform and one site is located near a ridge crest-transform fault intersection. These two surveys provide the background information for a planned submersible investigation of the transform beginning in Spring 1978.

The deep tow results identify two ideal drilling objectives:

1. The central portion of the Tamayo transform, like many other transform faults, is characterized by a linear median ridge that strikes parallel to the transform and extends for 60 km along the central portion of the transform fault. The ridge rises 700 m above the floor and is blanketed by a thin veneer of sediment. Flat lying turbidites pond around the ridge and provide the opportunity to

drill on the flank of the ridge. The composition and structural history of this ridge is unknown; a sampling of this body could provide important information on the composition of the ridge and the strain history of the rocks.

2. The active tectonic zone of the Tamayo Fracture Zone is marked by mounds or diapirs that have pushed vertically through the sediment column displacing turbidite layers. These diapir-like bodies are associated with very large magnetic anomalies (up to 3000γ). A preliminary interpretation is that these bodies represent hydrated ultramafic serpentinite masses that have migrated along faults associated with the transform domain. In situ sampling of a diapir will provide important information about the tectonic style of these bodies and perhaps may clarify whether they were intruded hot or cold. Also, samples of unaltered upper mantle may be recovered that could provide constraints on upper mantle compositions.

Proposal for a Downhole Experiment Leg Using Existing Atlantic Basement Holes

Four holes with intact re-entry cones are available in the Atlantic. These are 395A (Leg 45), 396B (Leg 46), 417D (Legs 51 and 52), and 418A (Legs 52 and 53). The only previous geophysical work in these holes consists of logging in Holes 396B and 417D and the oblique seismic experiment in Hole 417D.

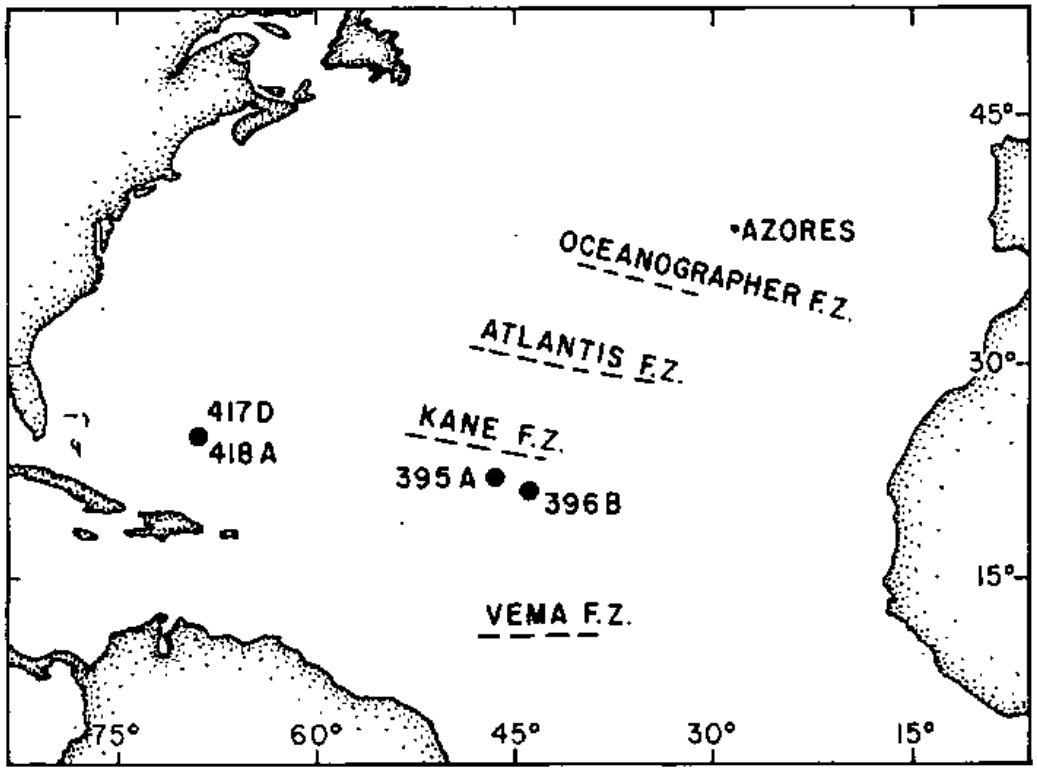
A program for logging these holes could be designed using existing or already planned equipment including standard downhole logging, magnetometer logging, an oblique seismic experiment, a large scale resistivity experiment, a packer experiment to measure permeability, fracture strength, and fracture orientation, and long term instrumentation of the holes to collect a variety of data. Many of these experiments are either untried or not yet built and it is possible that they will not be successful. However, a program consisting of just logging and the oblique seismic experiment would be extremely valuable, especially since such a Leg could be relatively short.

It will probably be necessary to use the CHALLENGER or a comparable ship because of the need to pump, rotate, and clean the holes. One operational problem will be finding the re-entry cones without an operating beacon. Leg 53, however, showed that this can be done using only satellite navigation and the re-entry tool. One other difficulty will be the need for a second ship to drop charges for the oblique seismic experiment. The best time for the Leg would be when the seas are calm.

A tentative plan is for a leg to begin in San Juan and go first to the Site 417-418 area, then to 395, then to 396. The general plan will be to clean each hole, run the oblique seismic experiment, run any other short term experiments, and then emplace a long term instrument package.

If time or funds are limited, the best plan would be to study Holes 418A and 395A, since these will be relatively easy operationally and most productive scientifically; 395A is open and 418A is at worst blocked by a potentially removable logging tool and may, in fact, be open. Both holes are deep (500+m) basement holes; 395A is young crust, 418A in old crust.

The program, including steaming time, will take from 34 to 54 days, depending upon the work that is done at each hole; 54 days includes the complete program, whereas 34 days includes only 395A and 418A. If no long term instrument packages are set, this would eliminate 3 to 4 days per site from the above estimates.



Proposed sites for downhole experiment leg using existing Atlantic basement holes

Tools that will be used include sonic velocity (including integrated velocity), gamma-gamma density, neutron porosity, electrical resistivity at several distances from the hole, natural gamma ray activity, and high resolution temperature. This suite of tools gives a wide spectrum of data for comparison with laboratory and marine geophysical data. Other logging tools that may be available include a spectral gamma ray tool for determining potassium, uranium and thorium content and a magnetometer.

DSDP Holes with Re-entry Cones Still Open

146, Leg 15, Caribbean: 762m sub-bottom, 22m sub-basement. Hole open. Old style cone. No logging or in-hole geophysics done.
332B and 333A, Leg 37, MAR-"FAMOUS" Area: Also have cones (old style), but cannot be entered. 332B has the casing parted from the cone, and 333A has a blown-off BHA permanently stuck.
395A, Leg 45, 22°45.35'N, 46°04.90'W, MAR: 664m sub-bottom, 576m sub-basement, 120m casing (cemented into basalt). Hole open, sinker bar (undrillable) at bottom. No in-hole geophysics done.
396B, Leg 46, 22°59.14'N, 43°30.90'N, MAR: 405.5m sub-bottom, 255m sub-basement, 163m casing (cemented into basalt). Hole open; no gear in hole, but lost because of sand and gravel in bottom. Logged, but no positioning devices used (should be redone).
415A, Leg 50, Morocco Basin: It has a cone, but the hole was in such poor condition when abandoned it probably cannot be re-entered.
417D, Legs 51 and 52, 25°06.69'N, 68°02.82'W, Bermuda Rise: 708.5m sub-bottom 363m sub-basement. Top 250m of hole in basement open, but bottom 100m plugged by lost BHA. BHA possibly fishable. Sediments and top 125m of basement logged (except for density). Oblique seismic experiment run in top 230m of basement.
418A, Legs 52 and 53, 25°02.08'N, 68°03.45'W, Bermuda Rise: 868m sub-bottom, 544m sub-basement. Hole status uncertain; hole may be blocked by potentially retrievable logging tool or may be open (tool may have fallen outside). Status could not be determined nor fishing attempted because of insufficient cable. No in-hole geophysics done.

REPORT FROM THE ORGANIC GEOCHEMISTRY PANEL (6 November 1977)

Summary of Panel Recommendations to DSDP/IPOD

1. Purchase of freezer-dryer should be considered for preparation of frozen samples for long term storage. Choice of a specific freezer-dryer should be reviewed before actual purchase is made.

2. A back-up compressor should be obtained for the present freezer-locker at Scripps to protect the frozen sample collection.

3. Commercial freezer storage should be considered as an alternative if present storage capacity is exceeded.

4. A committee should be organized composed of one member each from OGP, IGP, and PPSP to define objectives in deployment of the wire line pressure core barrel.

5. Requests for obtaining samples from routine collection of frozen samples on each future leg should be sent both to DSDP and to the Chairman of OGP, two months before the leg begins.

6. Future sampling should include one leg a major part of which will be devoted to organic geochemistry.

Sampling for OGP

Originally, organic geochemical samples were taken for measurement of ephemeral properties. Although these properties are still considered, the program has expanded to include measurements of other properties. Both refrigerated and frozen samples are useful for organic geochemistry and both kinds of samples should continue to be taken. For example, pyrolysis experiments can be done on small quantities of refrigerated samples. The frozen samples are especially valuable for the future and care must be taken for their preservation. New methods of containing the samples must be considered. Sedimentological descriptions of the frozen intervals should be obtained. The frozen sample collection must coordinate with the refrigerated collection. Freeze drying was considered as a possible procedure for preparing samples for long term storage. Only a part of the sample collection would be preserved in this way. The OGP recommends that the purchase of a freeze-dryer be considered. If possible, the freeze-dryer should be of a design such that it can be used at Scripps or on the ship.

OGP recommends that a back-up compressor be obtained for the freezer-locker at Scripps so that the present frozen collection can be protected.

OGP also advises that the use of commercial freezers represents an attractive alternative for sample storage should the present capacity be exceeded or should there be a mechanical breakdown before a back-up compressor can be acquired.

Future Sampling

There should be more "organic geochemistry" holes. Where there is a leg devoted to organic geochemistry, dual holes at a site should be obtained.

Discussion of Papers Destined for the Initial Reports

The porphyrins in Cretaceous Black Shales from Legs 40, 41, 42b, and 50 are different from those in Legs 43, 44, 47a, 47b, and 48. In the South Atlantic, Ni and V porphyrins were found. At the other sites, Cu porphyrins are believed to be present. On Leg 47a, below 1000m, the anomalous presence of unsaturated pentacyclic hydrocarbons has been observed.

Sediments from Legs 47a, 47b, and 50 are characterized as immature and contain high contents of humic acids. Legs 47 and 48 contain degraded terrestrial organic material derived from subaerial degradation. Because of the high content of degraded organic material, few conclusions can be made regarding the environment of deposition. Samples from Leg 51 on the Bermuda Rise show reasonable amounts of extractable organic material having many non-normal hydrocarbons with a maximum of about C_{30}. The material is believed to be contaminated.

The organic material recovered on Leg 47a apparently was mainly terrestrially derived. The presence of unsaturated pentacyclic hydrocarbons can be attributed to bacterial workover. The high geothermal gradient, and thus, high heat flow, provides the basis for a model for the preferential survival of terrestrial organic matter.

On Leg 56, samples on the west wall of the Japan Trench were anoxic and characterized by high methane concentrations. Samples from the east wall were oxidizing and had little methane.

Pressure Core Barrel

A new Mod II wireline pressure core barrel is scheduled for sea trials on Leg 61. The design is a modification of the pressure core barrel that was successfully used one time on Leg 42b. Two obvious uses of the new device will be to sample gas hydrates should they be encountered and to sample systematically down hole where gases are present and where there is a critical need to know *in situ* gas concentrations. The need was stressed for a pump and recording system as well as a means to measure internal temperatures. OGP urges that a committee be organized, to be composed of one member each from the OGP, IGP, and PPSP, to define objectives in deployment of the wire line pressure core barrel.

Report of Proponents

Gulf of California: A site in the Guaymas Basin will be especially interesting because the heat flow is thirty times that of normal. Other subjects of importance will be possible accelerated diagenesis and sources of organic material.

Atlantic Ocean: A practical opportunity exists to attempt to solve the black shale problem. The Angola Basin is a prime target. The proposed transect is near the border between Angola and Namibie. The drill scheme includes the possibility of testing a range of depths.

Inventory of OGP Samples

The following is a brief summary of the current inventory:

Leg	Site	# of samples	Leg	Site	# of samples
15	147a	4	40	364	19
15	147b	56	40	365	3
15	147c	17	41	366	1
22	211	1	41	366a	4
22	214	1	41	367	3
22	217	9	41	368	9
23	222	2	41	369	1
25	239	2	41	369a	11
25	242	1	41	370	2
30	289	20	42a	376	1
35	324	2	42a	378	1
38	336	13	42a	378a	2
38	337	1	42b	379a	142
38	338	1	42b	379b	20
38	342	5	42b	380	28
38	343	5	42b	380a	60
38	345	9	42b	381	43
38	346	3	43	382	5
38	348	13	43	384	4
38	349	1	43	385	4
38	350	4	43	386	18
38	352	2	43	387	10
39	354	4	44	388a	4
39	356	8	44	390	1
40	360	18	44	390a	4
40	361	7	44	391	2
40	362	10	44	391a	14
40	363	15	44	391b	1

Leg	Site	# of samples	Leg	Site	# of samples
44	391c	15	50	416a	7
47a	397	31	51a	417a	2
47a	397a	5	51b	417d	1
47b	398d	43	52	418a	1
48	402a	7	56	434	4
48	403	3	56	434b	1
48	404	2	56	435	2
50	415	1	56	436	6

REPORT FROM THE PASSIVE MARGIN PANEL (21-23 October 1977)

The Ocean Paleoenvironment Panel Report to the PMP

The OPP gave almost "carte blanche" to the proposed drilling program in the Gulf of California. The OPP plans to sample the ocean through a range of depths and emphasizes the need for collaboration with the PMP. The North Atlantic Ocean has not been adequately sampled from the OPP viewpoint. The OPP has a new interest in PMP margin objectives, and is also interested in high southern latitude drilling. The OGP also has proposals to examine the black shale problem in the South Atlantic.

The Stratigraphic Correlations Panel Report to the PMP

The SCP has looked at the relationship between oceanic sections and well established land and shore sections. The SCP believes that a tropical section would be useful off the Demerara Rise. Sections across E. N. America, in the Angola and Cape Basins and off N. W. Africa are useful as offshore well data could be available. The Caribbean was felt to be of important regional interest.

The Inorganic Geochemistry Panel Report to the PMP

Studies of the bulk geochemistry of sediments should include routine geochemical analyses at 5m intervals. Data reporting should be standardized.

The IGP recommends purchase of X-ray diffraction for GLOMAR CHALLENGER and also the use of the X-ray fluorescence set already on board. The PMP also recommends that a compact table top X-ray diffraction apparatus be purchased for use on board GLOMAR CHALLENGER.

The IGP recommends that a symposium on chert be convened at the IUGG Symposium. in Melbourne; there will be a Penrose Conference on chert and also a session on chert at the International Sedimentological Conference in Jerusalem in 1978.

The Organic Geochemistry Panel Report to the PMP

An abbreviated version of the paper on the role of organic geochemistry in IPOD has been prepared for Geotimes. The OGP has interests in the Gulf of California and in the Cretaceous South Atlantic Ocean, where organic carbon varies from 1-13% with types I, II and III present. The OGP favors the Angola and Cape Basins. The OGP would drill holes specifically for geochemical purposes. Shipboard facilities include a Hewlett-Packard gas analyzer and a pyrolysis analyzer. The OGP also requests a resume of individuals who wish to participate to assess experience.

Gulf of California

An OBS refraction survey of the mouth of the Gulf has been made and a cruise involving multichannel seismic reflection, dredging, heat flow, and helium sniffing is planned. The PMP has identified the following targets: a) a transect from the margin at the mouth of the Gulf to the crest of the East Pacific Rise and b) the high heat flow zone in the Guaymas Basin where a secondary objective would be proto-Gulf sediments.

The PMP considers the Gulf of California a prime candidate for drilling but the drilling program should be a transect across the continent-ocean boundary to include holes in the adjacent ocean crust. These holes should be instrumented for strain measurements. Flexibility should be maintained in planning to allow drilling of ocean crust holes in the Gulf of California. The proposed drilling program includes a transect from 1.7×10^9 m.y. old crust to the base of the slope of Baja California. Two holes will be drilled on younger crust. Three sites are envisaged in the Guaymas Basin, one on the margin to penetrate proto-Gulf sediments and two in the basin.

Future Passive Margin Drilling Program

N.W. Africa. One hundred and seventy million years ago the old and mature passive continental margin of N.W. Africa was in contact with the eastern side of North America. This old rift traces a Paleozoic mobile belt between cratons, but despite their common origin both continental margins developed fundamental differences during their history.

Parts of the N.W. African continental margin were deformed during alpine orogenesis and affected by Tertiary offshore volcanism. Several coastal basins are filled by transgressive and regressive sequences because of differential vertical tectonic movements.

Potential problems suitable for solving by drilling include: a) possible differences along the northern and southern continental margin of the mesozoic latitudinal circum-global seaway; b) differences between the eastern and western side of a Cenozoic longitudinal ocean basin; c) deep and shallow water circulation and their consequences for the sedimentary record.

Possible transects for drilling include off Morocco and off Senegal/Mauratania.

Western Europe. Important objectives include transects across the identifiable continent-ocean boundary on margins of different structural style. Mid-latitude sites will be good candidates for riser drilling. Non-riser sites can be drilled as the ship transits from the North to the South Atlantic. In this context, the Demerara Rise is a possibility.

The PMP recommends that three legs of the IPOD-I extension be dedicated to N.E. Atlantic margins and three to the margins off N.W. Europe. In view of the direct relevance of the Venezuela Basin to understanding the early evolution of the North Atlantic, the PMP strongly recommends that one leg be dedicated to drilling in the Venezuela Basin.

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 additional drilling time being made available, the fullest consideration should be given to drilling these sites. Such areas include N.W. Africa, the Demerara Rise and objectives such as the Grenada Basin and Barbados Ridge.

The PMP strongly supports the interest of the OPP in considering the depositional environment along continental margins. The S. W. African continental margin and the oldest parts of the Walvis Ridge are unique targets to study the horizontal and vertical gradients of black shale environments. The South Atlantic Working Group of the PMP is prepared to propose sites in the area.

The PMP recommends that, if the IPOD-I extension is not funded, three legs of the remaining part of the IPOD-I program be directed to drilling in the E margin of North America, and in the Venezuela Basin in addition to one leg of passive margin drilling in the Gulf of California.

REPORT FROM THE SEDIMENTARY PETROLOGY AND PHYSICAL PROPERTIES PANEL (1-2 December 1977)

Panel Recommendations

XRD. The Sedimentary Petrology and Physical Properties Panel (SP4) supports the request for access to XRD equipment on the CHALLENGER. The following conditions apply to its use by sedimentary petrology participants:

1. That it is not to be used on a routine basis. 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. That a desk-top film (camera) unit not be acquired. This would be most inconvenient to use and very time-consuming.

3. That an XRD spectrometer, with strip-chart output, be acquired. Since the need is to use such an instrument for qualitative checking of smear-slide identifications and for resolving difficult mineralogical problems, a relatively low-cost, non-stabilized generator will suffice. This will also mean that a smaller floor area will be required than that occupied by a more expensive unit. A cost is tentatively assigned at $40,000 for a complete unit (generator, vertical goniometer, electronics and recorder).

XRF. 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., basalt) analyses. Since the CNEXO equipment has been successfully used on ocean crust legs, and is apparently still extant, we suggest 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-radiographic Unit. The SP4 has no objection to utilizing the DSDP's X-radiographic equipment for occasional use aboard the CHALLENGER, providing that a) it be operated with regard to appropriate safety regulations, b) film development can be accommodated in the darkroom, and c) space is available. It is assumed that the existing Faxitron equipment is in operating condition. The purchase of equipment having a regular fluoroscope-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 prints at a 1/3 scale have been superseded by 8 x 10 in. prints at a scale of 1/10, which are considered poor for detailed studies. It is understood that suitable gratis prints are provided for members of shipboard parties if required in their investigations and that others can have prints made by request. The cost for the latter follows the usual DSDP policy.

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.

For many large sample requests, core material is not destroyed and can be reclaimed by the DSDP archivist. The SP4 requests that the problem of core quality be brought to the attention of each requestor of large quantities of core samples, who may not appreciate the fact that relatively good quality core samples may not be obtainable from fixed sampling intervals.

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. Where sufficient material is available some routine shipboard and shore laboratory analyses (especially carbonates and water content) should 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.

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 syringe wet bulk density, porosity, and water-content technique 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 a well-sealed vial reserved for shore-based 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 for other essential scientific and engineering wet bulk density and porosity calculations.

Non-standard Data. All such data is to be clearly and inequivocally labeled in the IR's, in the DSDP data bank, and when it is sent to any requestor, that it is non-standard and cannot be directly compared to standard data.

Non-standard Data Replacing Standard Data. The SP4 strongly goes on record that under no avoidable circumstances should non-standard data be collected instead of standard data.

Special Techniques. Shipboard scientists and engineers are encouraged to experiment with non-standard measurement techniques and procedures, in addition to the required standardized measurements, and to communicate recommendations for improvement to the chairperson of applicable JOIDES advisory panel(s) and to the DSDP Chief Scientist.

Non-standard Data. The Chief Scientist is requested to 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.

SP4 Shipboard Records. Each person performing physical property measurements aboard the ship is to complete a form before leaving the vessel so that an adequate record can be kept of who carries out the work.

SP4 members consider it appropriate to undertake a major review of shipboard and shore-based sedimentary petrology and physical properties measurements and procedures prior to IPOD II. It is not anticipated that many changes or modifications will be required following the SP4 review. On the other hand, it is clear that a thorough review of the physical properties measurements and procedures is urgently required.

REPORT FROM THE SITE SURVEY PANEL (4 June 1977)

Philippine Sea Studies

Two cruises in the area had been completed since the December meeting. New data include OBS refraction measurements in the Mariana Basin, reflection studies in the west end of the Philippine Sea transect, and two multichannel lines across the Trench and Basin.

Middle America Trench

The studies off Guatemala have just been completed. These studies include transects of three planned re-entry sites off Guatemala, including multichannel reflection lines, OBS studies, sonobuoy refraction studies, coring and dredging. Five OBS instruments are still deployed and earthquake data recorded will supplement data acquired by the land network in Costa Rica.

The panel notes the need for locating a hole seaward of the Middle America Trench so that comparison of sediments could be made with those obtained in the inner slope. Comparison of the oceanic crust seaward of the trench with possibly altered crustal rocks under the slope would be valuable.

The Program in the Galapagos

The Site Survey Panel recommends additional studies in the area: OBS studies to enhance the seismic model studies of crust in the area, detailed mapping of heat flow in the mounds area (20 km^2), dredging in the Costa Rica rift, and side scan studies. WHOI plans to return to the area in 1979 with R/V ALVIN. Drilling in the mounds area encountered similar problems to those encountered in young fresh basalts elsewhere - limited penetration with bits wearing out after limited penetration into the basement.

SITE REPORTS

Leg 55

Co-chief Scientists E.D. Jackson and I. Koizumi report:

Site 431 (55-1) Lat. 42°25.42'N; Long. 170°32.68'E; Water Depth: 1714.5m

Site 431 was drilled in faulted terrace deposits on a small seamount north of Nintoku Seamount. The hole penetrated 9.5m from which 3.3m of cm-sized Fe-Mn oxide sand and gravel, ice-rafted pebbles of granite, andesite, schist, etc., were recovered. These are the first exotic rocks seen to date. All fossils are Quaternary. During the next penetration the bottom sub sheared, dropping the bit and core barrel. Hole 431A was offset 500ft, 230° true from Hole 431 and penetrated 17m. 4.4m of Fe-Mn oxide-zeolite sand above a zeolite-calcareous-Fe-Mn oxide sand and silt were recovered. All fossils are Quaternary except middle to late Eocene forams which were found in Core 2 CC. Another bottom sub sheared during the next penetration again dropping the bit and core barrel.

Site 432 (55-5) Lat. 41°20.03'N; Long. 170°22.74'E; Water Depth: 1320m (DPM)

Site 432 was drilled on Nintoku Seamount in The Emperor Chain, about 1300km southwest of Rat Island. Hole 432 recovered 3.0m of unconsolidated Quaternary pelagic sediments containing planktonic foraminifera, nannofossils and radiolarians. During a subsequent penetration, a failure in the bottom hole assembly occurred at a subsea depth of approximately 20m. Hole 432A was then offset 500m and washed down 39m in soft sediments. In the 41.5 to 74m cored interval, the following units were encountered: well-indurated, calcite cemented conglomerate with basalt pebbles; the crushed and limited fossil assemblage which was present may be Eocene(?)-Paleocene in age and is indicative of a sublittoral warm environment; three flow units of basalt, with a minimum thickness of unit 1-0.6m, unit 2-2.0m and unit 3-9.0m. Units 1 and 2 are alkalic basalt, whereas unit 3 is a Hawaiite. Red clay soils occur above flow units 1 and 3. All flows are subareal.

During coring below 74.0m, the pipe became stuck. After freeing and pulling pipe, it was discovered that a break had occurred in a lower bumper sub. Therefore, the hole was abandoned. The interpretation for the site is the same as at Site 430 but with a much poorer recovery, especially in the sedimentary section. Paleomagnetic studies show remanent magnetism is variable in the sediments, and very stable in basalt. However, a paleolatitude determination will not be possible for Nintoku Seamount.

Site 433 (55-2) Lat. 44°46.99'N; Long. 170°01.25'E; Water Depth: 1872m

Site 433 is located in a deep sediment pond on the NW shoulder of Suiko Seamount. Hole 433 washed the upper 45m in 18.5 min. for a casing length determination. A 5m core of Pliocene foram-diatom ooze was taken to establish the mud line. Hole 433A was then spudded and cored continuously. The hole penetrated 163.5m of sedimentary rocks and 7.5m of basalt. The sedimentary section consists of five lithologic units: 1) Late Pliocene foraminiferal-nannofossil ooze from 0 to 5.0m (the absence of Quaternary deposits here may be due either to the sediment being too thin to core, or to erosion by bottom currents); 2) Late Pliocene through Late Miocene diatom-nannofossil ooze to marly siliceous nannofossil ooze from 5.0 to 43.0m (this unit contains a hiatus at least as long as the entire Middle Miocene); 3) Early Miocene calcareous ooze to calcareous chalk from 43.0 to 52.0m; 4) Early Miocene tuffaceous sandy mud from 52.0 to 52.5m that probably

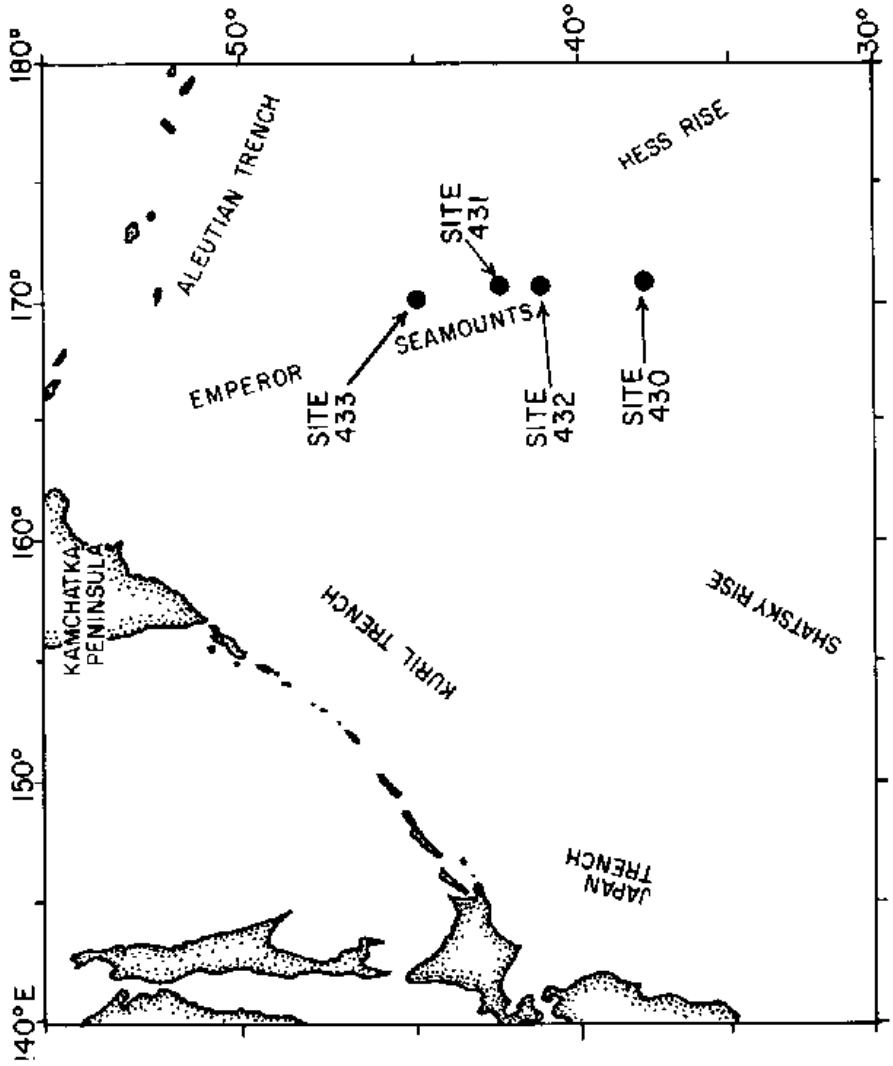
represents an altered volcanic ash layer; and 5) Late Oligocene and Early Eocene-Late Paleocene reefal assemblage of carbonate sand and sandy mud with algal nodules and reefal calcarenite from 52.5 to 163.5m. Unit 5 includes a hiatus of Middle Eocene through a major part of Oligocene time. Basalt lays directly beneath the reefal limestone. Hole 433A was abandoned because a wad of discarded fishing net and line fouled the stern thrusters. Hole 433B was spudded at 44°46.63'N lat., 170°01.23'E long. in a water depth of 1874.0m in order to complete the pilot hole. This hole was washed to a depth of 128.5m sub-bottom, recored in the lower 34.5m of sedimentary rock and finally penetrated 23.5m of basement. The sedimentary section consists of reefal carbonate, poorly to moderately well sorted sand and calcarenites of Early Eocene to Late Paleocene. The sediment directly in erosional contact with basalt consists of a well rounded, well sorted and indurated reefal sand. Hole 433C was spudded in as a multiple re-entry hole. The hole was washed to a depth of 163.0m sub-bottom and continuously cored to a total penetration depth of 550.5 meters of which 387.5 meters were almost entirely basalt. There were three re-entries and approximately 67 flow units were identified on board, but the number of individual flow and flow lobes in the cored section is undoubtedly greater. The basalt section consists of three units: 1) alkalic basalt and ankaramite from 163.0 to 187.0m (the two uppermost flow units are separated by beach sand); 2) a transitional zone consisting of both alakalic basalt and tholeiite from 187.0 to 261.5m; and 3) tholeiite, from 261.5 to 550.5m. More than 300 measurements of magnetic inclination were made on board. The mean inclination in the Suiko basalts is 42°±4° (95 percent confidence level), which corresponds to a latitude of formation of 25°, about 58 m.y. ago. The measurements seem likely to confirm the northward (latitudinal) component of motion required by the hot spot hypothesis.

Leg 56

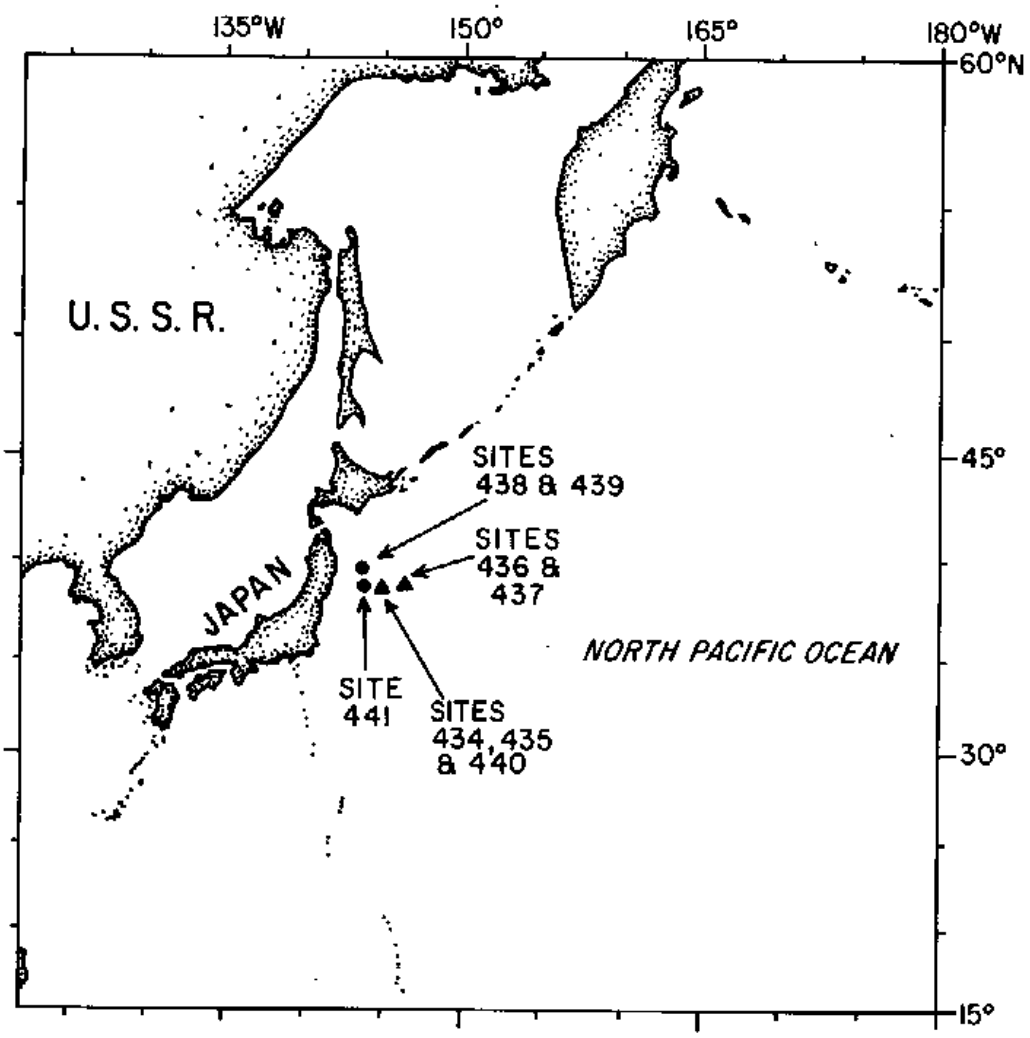
Co-chief Scientists M. Langseth and H. Okada report:

Site 434, Holes 434, 434A, and 434B (Site J-1A) Lat. 39°44.8'N
Long. 144°06.1'E; Water Depth: 5990m

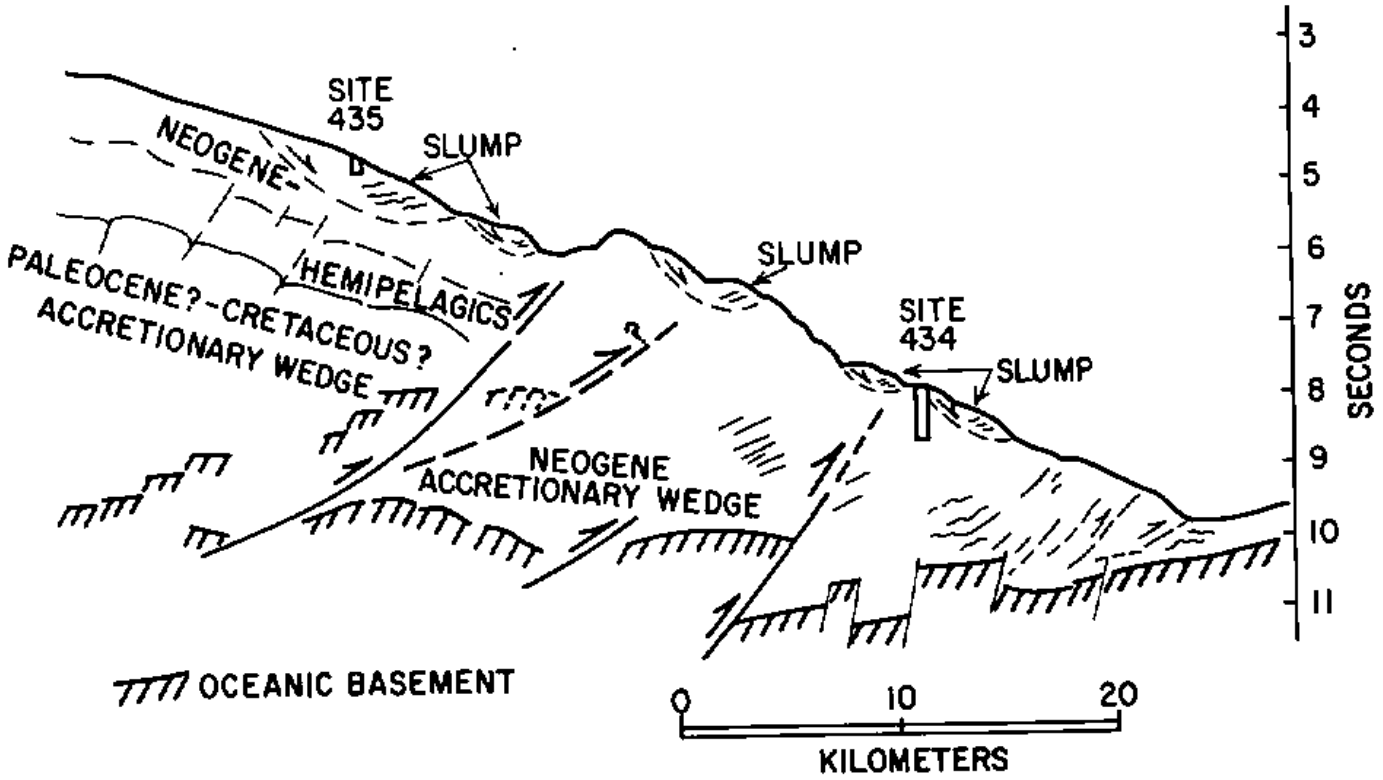
The average percent core recovery was 19%, with a penetration of 637.5m subbottom. The oldest sediment cored was Upper Miocene. The Pleistocene section is extremely thin, found only in a mudline core. The Early Pleistocene is probably missing. The upper 101m, which is Pliocene except for the upper ten meters, is a uniform diatomaceous ooze with some ash layers. A second lithologic unit, from 101 to 103m, is comprised of a diatomaceous mudstone with common ash layers and two volcaniclastic sand layers. Diatom stratigraphy suggests four repeated sequences possibly representing imbricate thrust sheets. This entire unit is lower Pliocene in age. A significant increase in vitric ash occurs from 300 to 456m and defines a third unit which includes a minor but persistent amount of a carbonate component. Erratic pebbles of marlstone and limestone are common. Ash beds are less common than in the unit above. Intact segments of core contain sheared and fractured zones that have been recemented. Vitric ash comprises on the average about 40% of the section from 456 to 609m. Microfossils are rare and some zones are barren. The Miocene-Pliocene boundary occurs near the top of this unit. The lower 30m of the hole is similar to the third unit; diatoms are common and the vitric ash decreases. This zone was poorly sampled with very low recovery and highly disturbed cores.



Leg 55 drill sites



IPOD drill sites, Legs 56 and 57



An interpretation tracing of a multichannel seismic line across the landward wall of the Japan Trench

Anoxic conditions persisted throughout the hole. The upper 250m had significant H_2S at greater depths, and in situ biogenic methane was common. The poor recovery and difficult drilling conditions can probably be attributed to the highly fractured mudstones below the lower slope. The hole caved while the string was being removed and the lower 300m of the drill string had to be severed to retrieve the pipe.

Site 435 (J-1E) Lat. 39°44.09'N; Long. 143°47.53'E; Water Depth: 3413m

Hole 435 was cored from 0 to 151 subbottom. Hole 435A was cored from 150 to 245m subbottom. The sediment section recovered comprises one lithologic unit consisting of hemipelagic grayish olive diatom ooze at the top grading to a muddy diatomite at the bottom of Hole 435A. Well-rounded pebbles of igneous rocks and argillites occur sporadically throughout the section. Pumice fragments are more abundant near the top. Age assignments for the sediment are: Pleistocene, 0-84m, Late Pliocene, 84 to 110m, Early Pliocene, 110 to 245m.

Small quantities of biogenic methane (C_1/C_2, 20,000 to 30,000 ppm) were encountered from 65 to 244m. In the last core taken at Hole 435A, the gas pressure was relatively high and showed 85 percent methane. No hydrogen sulfide was encountered at this site. Lack of porous sediment in the bottom three cores where maximum methane occurred and the appearance of extensive gas cracks in softer sediment confirms the gas formed in situ. Both holes had to be abandoned because of severe winds and seas.

Site 436 (J-10) Lat: 39°56.0'N; Long. 145°33.0'E; Water Depth: 5248m

Hole 436 was continuously cored from 0 to 397.5m subbottom with 60% recovery. The first 245.5m is a grayish olive green diatomaceous ooze with variable amounts of disseminated vitric ash. From 245.5m to 302m is a greenish gray diatomaceous vitric mudstone. This is preceded by moderate yellow brown diatomaceous mudstone from 302m to 366m and a nonfossiliferous brownish black pelagic clay from 366m to 379m. The last two cores at the site, from 379m to 398m, recovered several dark cherts which appear to be Cretaceous in age. The change from oxidizing to reducing conditions occurs at the 302m depth change in lithology.

Coarse sand-size ash beds (six cm thick) are found at the top of the section. These become finer and thinner downhole and are not present below 340m. A few erratic pebbles of pumice and argillite are scattered in the upper part of the section.

Age assignments for the sediment are: Quaternary, 0 to 93.5m; Pliocene, 93.5 to 227m; Upper Miocene, 227 to 331m; Middle Miocene, 331 to 366m; 366 to 379m are barren; Cretaceous, 379 to 398m.

Site 437 (J-10) Lat. 39°53.9'N; Long. 145°39.0'E; Water Depth: 5227m

No sediment was recovered from this site. Drilling terminated due to bad weather conditions.

Leg 57

Co-chief Scientists R. von Huene and N. Nasu report:

Site 438 (J-12) Lat. 40°37.80'N; Long. 143°14.80'E; Water Depth 1574.5m

At Site 438, three holes were drilled, the deepest reaching 1040m. A total of 122 cores were recovered. At maximum depth, the rocks are of Lower Miocene age. The Pliocene and Pleistocene boundaries are at 380 and 52m, respectively.

Hole 438 penetrated sandy, silty clay with erratic pebbles. Drilling at this hole was terminated at 110m because of a medical emergency.

Hole 438A was cored and logged to 868m through a generally uniform diatomaceous silt and clay section divided as follows: from 50 to 364m, homogeneous olive gray Pliocene sediment ranging from a diatomaceous clay to a diatom ooze with numerous ash layers and uniformly straight log traces; 364 to 593m, mostly upper Miocene diatomaceous claystone to clayey diatomite of variable induration which gave highly variable log traces; 593 to 818m, largely middle Miocene claystone, diatomaceous claystone and calcareous claystone with some limestone beds; 818 to 878m, largely lower Miocene sandy and diatomaceous claystone, in part vitric, marked by a pronounced shift in all log traces.

Hole 438B was a re-entry hole which was washed to 850m and cored to 1040m prior to hole failure in a highly fractured claystone. The section consisted of lower Miocene diatomaceous claystone with highly vitric sandy-silty claystones to 976m. From 976 to 1040m the samples consist of a highly fractured, well indurated, dark clayey siltstone. This section is similar to other Neogene sections drilled on northeastern Pacific margins. Hole 438B ended 250m short of the main objective at this site, an acoustical basement that may establish the boundary of oceanic and continental crust between the Japan Trench and the continental shelf. This objective is thought to be more easily attained at Site 439, approximately 5km to the east.

Site 439 (J-12) Lat. 40°37.61'N; Long. 143°18.63'E; Water Depth: 1665m

Core and logs from Site 439, which extend down section from those at Site 438, were recovered to study the base of a more than 1000m thick reflective section and acoustic basement near the top of the Japan Trench inner wall. This reflective sequence, largely of Neogene age, shows only mild tectonism and rests on a deep, 130km wide terrace. Rapid subsidence of a Paleogene continental landmass to bathyal depth by Early Miocene time is indicated by the following sequence of lithologies near the bottom of the hole:

1) Cretaceous dark silicified silty claystone cut by an erosion surface near or below the acoustic basement reflector.

2) Boulder-conglomerate and breccia, 48m thick, in which most of the clasts are porphyritic dacite from a nearby source and dark silty claystone.

3) Massive Oligocene sandstone, 105m thick, with numerous megafossils, many still articulated, and upper bathyal benthonic foraminifera.

The lithology then changes abruptly to a fine-grained turbidite-claystone sequence, 78m thick of Early Miocene age, overlain by a 850m thick sequence of hemipelagic diatomaceous claystone deposited at bathyal depth and studied at Site 438.

The sequence of environments interpreted from these lithologies begins with an Oligocene or older emergent terrain that included silicified claystone and dacite outcrops. Subaerial conglomerate and breccia were covered in Oligocene time by sand transported from a nearby surf zone into more quiet but shallow

waters. As subsidence continued, the distance from terrigenous sources increased and turbidites became increasingly distal. The area of the drilling sites reached bathyal depth at the beginning of Early Miocene time and was then essentially isolated from all but some very fine-grained terrigenous materials until a renewed influx of terrigenous material in Late Pliocene and Pleistocene time. The presence of dacite in this setting, far from the modern volcanic arc, suggests that a magmatic arc lay east of Japan between Upper Cretaceous and Oligocene time.

Site 440 (J-1B) Lat. 39°44.13'N; Long. 143°55.74'E; Water Depth: 4517m.

Site 440 is on the landward slope of the Japan Trench, 28km from its axis and on the midslope terrace. Core recovery and biostratigraphic zonation were good and a suite of downhole logs contributed greatly to interpretation of lithology and structure. Beneath the midslope terrace is a nonfolded continental slope section rather than material accreted at the leading edge of the upper plate. The sediment section is a uniform hemipelagic mudstone similar in composition to that at sites further upslope, and its character is consistent with the very uniform rate of sedimentation over the nearly 800m section ranging in age from Late Miocene through Early Pleistocene.

The only breaks in continuous sedimentation are three or more periods of slumping in the Miocene and Pliocene. Ponding of turbidites, consistent with the present topography of the midslope terrace, is recorded only in Late Pleistocene time. The section was deposited at bathyal depths and near or below the CCD. Tectonic events that could change the sediment source or dispersal paths are not obvious from the history recorded here. However, a stress environment of unknown age has tectonically brecciated the section at depths where the rock has undergone brittle deformation. Although microfracturing was observed at other sites in the transect, it was not as intense and pervasive at the relatively shallow depths observed here. The section is at least 1600m thick. The oldest sediment is Early Miocene, if sedimentation continued without a hiatus and at a nearly constant rate during the Neogene, as it did at sites upslope.

The tectonic history that allowed a continental slope segment to be so far down the inner trench slope of a convergent margin is not fully apparent from the seismic records and the cores. A nonfolded block 1.6km thick and 6km wide is not likely to have slumped very far. The seismic records and cores show a continuous Neogene continental slope section from Site 440 landward across the deep sea terrace almost to the shore. Therefore, active Neogene accretion seems to have been restricted to the lower trench slope.

Site 441 Lat. 39°45.05'N; Long. 144°04.59'E; Water Depth: 5656m

Site 441 was selected to sample the accretionary zone associated with the Japan Trench. It is 15km landward of the trench axis near Site 434. Three holes were attempted but periods of weather calm enough for drilling were too short to allow penetration as deeply as planned or to obtain more than one logging run. The lithology sampled is hemipelagic slope sediment of Late Miocene to Pleistocene age, much the same as at the other sites on this transect. The lithologic intervals are about 1/3 thicker than equivalent ones farther upslope. Uniform rates of sedimentation and lack of repeated paleontological zones argue against thickening through imbrication. More likely is a combination of repeated small slumps, particularly for intervals where reworked microfossils

were recovered, and tectonic thickening along pervasive microfractures. The volume increase by slumping and tectonic thickening cannot be estimated from the cores because they are mainly fine drill cuttings, derived either from brittle, intensely fracture rock, tectonic breccia, or redeposited breccia, all of which are the lithologies recovered in rare coherent sections.

There is no evidence that a section from the oceanic plate was drilled. However, the hemipelagic section sampled is far more intensely fractured than any other section on the Japan Trench Transect. Therefore, it is thought to be over-stressed by tectonism associated with plate convergence and to be part of the accretionary zone, particularly in a dynamic sense. Fracture development is best illustrated by interpretation of the formation density log. Near the surface the density increases as sediment deforms plastically, consolidates, and dewaters. At greater depth the sediment responds to stress by brittle fracture which imparts a secondary porosity and anomalously low density. Dewatering, fracturing and microfaulting may be the principal initial mechanisms in tectonic consolidation and volume reduction of the accreted sediment along the Japan Trench.

SUMMARY OF DEEP SEA DRILLING PROJECT RESULTS: LEGS 55 and 56

Leg 55

The principal objective of Leg 55 was to test the "hot spot" hypothesis of the origin of the Hawaiian and Emperor chains, and several of its more important corollaries. Of particular interest was the question of whether or not the Hawaiian melting anomaly, presently located beneath the active volcanoes of Kilauea and Mauna Loa, has persisted throughout the Tertiary, and whether or not it has remained fixed with respect to the magnetic and geographic poles of the earth. To fulfill this objective, the principal scientific goals of Leg 55 were divided into five categories:

1. To determine the minimum age of cessation of volcanism at seamounts of the Emperior Seamount chain by paleontological methods, and to obtain samples of basaltic rocks for radiometric dating.

2. To determine the chemical composition of the basaltic rocks and to determine if they are within the range of compositional variation known to exist in the Hawaiian and southern Emperor Seamount chains.

3. To determine the paleomagnetic characteristics of basalts and to determine an approximate paleolatitude of formation of Suiko Seamount from the paleomagnetic inclinations.

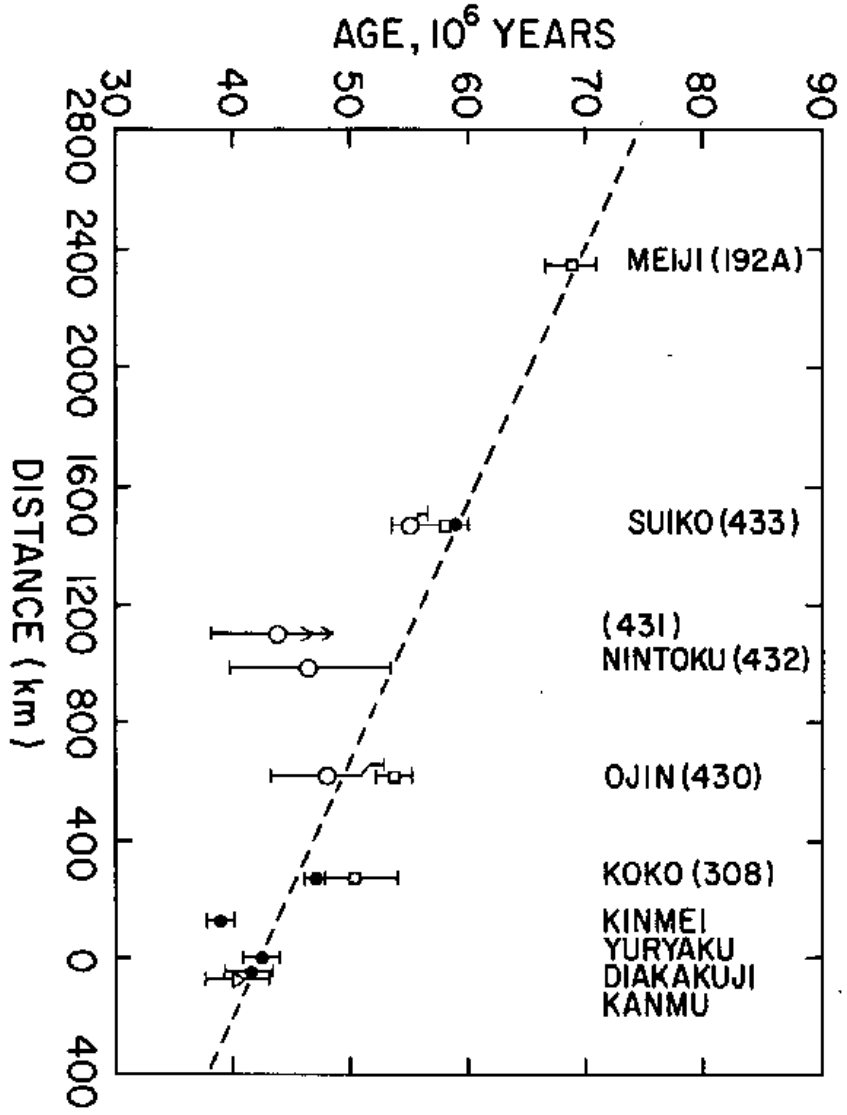
4. To determine whether the Emperor Seamounts once rose above the sea as islands and whether coral reefs once grew atop the seamounts before submergence; if so, to determine the time and cause of extinction of those reefs.

5. To investigate the Neogene-Paleogene history of sedimentation and paleoenvironment, and to establish the biostratigraphic zonation on seamounts of the Emperor chain.

Nearly all of these objectives were fulfilled and the leg was an unqualified success. Successful holes were drilled on Ojiin (Site 430), Nintoku (Site 432), and Suiko (Site 433) seamounts and the re-entry hole on Suiko is the deepest ever drilled into basement in the Pacific. In terms of the goals outlined above, the accomplishments are:

1. Basalt was penetrated at all three sites, and the paleontological age of the lowest sediment above basalt lies approximately on a linear geochron connecting the ages of Meiji Seamount to the north, and Koko and Yuryaku seamounts to the south. The slope of this geochron, which represents an average rate of volcanic propagation along the Emperor chain, is 9.0 ± 1.5 cm/yr. The basalts at all three sites appear to be suitable for radiometric dating.

2. The chemical composition of the upper four basalt flow units cored at Ojiin Seamount (Site 430) indicate that they are typical hawaiites, and a sample of tholeiite was recovered from the bottom of the hole. At Nintoku Seamount (Site 432) three flow units of alkalic basalt of the Hawaiian type were penetrated, and pebbles in a conglomerate above the basalt included both hawaiite and alkalic basalt. At Suiko Seamount (Site 433) the drill penetrated 387.5m of volanic rocks and more than 90 flow units. The composition of the basalts progressed from alkalic basalts and ankaramites downward through a transitional zone of mixed alkalic basalts and tholeiites to the tholeiitic core of the Suiko edifice. All of these basalts are within the compositional



Geochron for seamounts in the Emperor Seamount chain

range of their Hawaiian counterparts except that barium and strontium are less abundant than expected from Hawaiian data.

3. The lava flows from Ojiin (Site 430), Nintoku (Site 432) and Suiko (Site 433) have NRM that is relatively stable to a.f. demagnetization as expected of oceanic island basalts. More than 300 measurements of paleomagnetic inclination were made at Site 433. On a plot of inclination versus depth about 15 maxima and minima were observed, yet all of the flows have reversed polarity, suggesting that the lavas accumulated within a time span of 10^4 to 10^5 years. The magnetic data indicate that secular variation has been adequately sampled so that average inclinations are statistically meaningful. The mean inclination observed in the Suiko basalts is 42°, which corresponds to a latitude of formation of $25^{\circ}\pm4^{\circ}$ (95 percent confidence interval). This is consistent with the expected magnetic latitude at the time Suiko formed and the latitudinal translation required by the hot spot hypothesis.

4. Many of the basalts at all three sites have vesicular and oxidized flow tops and bottoms, and red lateritic soils are present between several flows. These observations indicate that the flows were erupted subaerially and that Ojiin, Nintoku, and Suiko volcanoes once stood above sea level. Coralline deposits were also found on all three seamounts. At Ojiin Seamount (Site 430) nearly 50m of coralline ooze and sand were cored, interbedded near its base with coralline and volcanic sand. These sediments contain Late Paleocene fossils near the basalt contact and Early Middle Eocene fossils in the upper part. These are immediately overlain by Quaternary pelagic deposits. Apparently a reef complex was formed on Ojiin as the island subsided, and continued subsidence resulted in a shallow lagoonal basin containing calcarenites, bryozoa, echinoderms, small gastropods, bivalves and algal nodules. As the seamount continued to subside, some connection with the open ocean was established and the calcareous mud containing some planktonic life forms was deposited. Unfortunately the Late Eocene to Pliocene record is missing at this site. At Nintoku Seamount (Site 432) repeated failures in the bottom hole assembly at Site 431 dictated that the drill string be washed down nearly to basement before coring and an invaluable part of the stratigraphic record was lost, including information on the subsidence history of the seamount. Nevertheless, coralline sands and conglomerates of Paleogene age were recovered above the basaltic basement. Shallow-water fossils, including larger foraminfers, bryozoans, gastropods, echinoid spines and calcareous algae, indicate a shallow marine fore-reef environment. Surface cores at Nintoku were composed of Quaternary foraminiferal ooze. The stratigraphic record at Site 433 indicates that Suiko was emergent and had fringing reefs by Middle Paleocene time. In the sediment above the uppermost basalt flow there is good evidence of back reef and lagoonal conditions near a reef complex. A coarse beach sand of coralline and volcaniclastic origin was found between the two uppermost basalt flows. Reef growth continued until the late Oligocene or Early Miocene, but there is a major hiatus in the record from the Middle Eocene through most of the Oligocene.

5. Inasmuch as Quaternary pelagic sediments lay directly on Late Eocene reefal sediments at Ojiin Seamount (Site 430), little Neogene paleoenvironmental information was obtained. The Quaternary planktonic assemblages indicate a temperate oceanic environment for the overlying watermass. At Nintoku Seamount (Site 432) the sedimentary section was not cored because of difficulties with the bottom hole assembly, but a surface core containing Quaternary fossils suggests that the overlying watermass had a middle latitude, transitional character. At Site 433, however, an excellent section was obtained. Pelagic sedimentation began in the Lower Miocene. The Lower Miocene nannofossils indicate a warm water habitat and suggest either that Suiko Seamount had no northward component of

motion until Middle Miocene time or that Pacific Ocean temperatures were warmer than today. The scarcity of Miocene planktonic forams, on the other hand, suggests that the watermass over Suiko was cool during Miocene time. There is a Middle Miocene hiatus but Upper Miocene and Pliocene pelagic microfossils suggest that a cooler paleoecological environment prevailed during this period. In spite of two successful attempts for surface cores, no Pleistocene sediments could be recognized.

In a general way, the "hot spot" origin of the Emperor Seamount chain has been confirmed. The oldest fossils above basalt on Ojiin, Nintoku, and Suiko Seamounts become progressively younger to the south, as predicted. The age of extinction of these edifices appears to lie on an approximately linear geochron with a slope of about 9 cm/yr, which is close to the 8-9 cm/yr geochron along the Hawaiian chain between Yuryka Seamount and Kilauea volcano. Paleontological evidence suggests that the rate of volcanic progression in the Emperor chain may have been episodic in detail, a feature noted sometime ago in the Hawaiian chain. Preliminary studies of volcanic rocks from the Emperor chain suggest that they erupted subaerially. Their major element contents are similar to those of the basalts of the principal Hawaiian islands and their sequence in the drill cores show that the order of evolution, from oceanic island tholeiites through alkalic basalts and ankaramites, to more siliceous rocks including hawaiites, is also the same. There are, however, some differences in minor element contents, particularly Ba and Sr, between the Emperor and Hawaiian basalts. Paleolatitude determinations at Suiko show that the volcano formed at a magnetic latitude of about 25°±4°N. In any event, the major latitudinal component of motion required by the hot spot hypothesis, i.e., large northward movement, is confirmed. The presence of coral reefs and the long life of the reef complex at Suiko are independent evidence that the Emperor Seamounts formed at low latitudes, and moved northward slowly. Conditions under which subsidence of the Emperor chain occurred were obtained only at Suiko, where it appears that reef development was halted by subsidence and not because northward movement had carried the seamount into cold surface waters.

Leg 56

Leg 56 drilled holes at three locations near the Japan Trench, part of a transect of the trench to be completed on Leg 57. The Leg 56 work concentrated on the landward wall of the trench and the outer rise. The most interesting results were found at the first site, Site 434, on the lower slope of the landward wall. The holes at this site were drilled in 6000m of water on a small terrace that breaks the otherwise uniform slope of about 7°. The Pleistocene section is only a thin surficial layer, less than 10m thick. The Pliocene is 450m thick. Within this section, one biostratigraphic sequence is repeated four times, indicating either successive reverse faulting or repeated gravity slides. Below 100m, the semiconsolidated sediments were highly fractured. Slickensides on some surfaces gave evidence that sediments had been subjected to stress.

Site 435 is located on the more gently dipping upper slope, at a depth of 3400m. The site was drilled to a depth of 250m and yielded a normal sequence of Neogene hemipelagic sediments, mainly composed of diatoms and vitric ash. In composition these sediments bear a stronger resemblance to sediments at Site 434, deep on the inner trench wall, than to the sediments cored at Site 436, on the crest of the trench's outer swell.

At Site 436, a continuous Neogene section of pelagic diatomaceous sediments with abundant ash layers was cored. The bottom of the Neogene section is tannish radiolarian mudstone of Middle Miocene age overlying a 20m section of manganese rich abyssal clay. The hole bottomed in chert containing Late Cretaceous radio-

laria. This site is west of DSDP Sites 303 and 304, drilled on Leg 32, so that the Pacific Plate motions should have carried Site 436 beneath the high productivity zone of the Northwestern Pacific earlier than the Leg 32 sites. However, cores from Site 436 show that high sedimentary rates begin in the Mid-Miocene, at the the same time as Sites 303 and 304, suggesting that the high biological productivity did not begin until the Middle Miocene in the Northwest Pacific.

The fact that the Pleistocene section is missing at Site 434 points to slumping as an important process in shaping the slope morphology and the structure of the near surface sediments. Based on results at Site 435, the Pleistocene section should be about 90m thick. The repetition of biostratigraphic sequences of Early Pliocene below 100m, and the extensive fracturing of all lithified sediments certainly indicates that the sediments have been stressed and deformed. However, no evidence was found at this site to indicate that these sediments represent overthrusted pelagic sediments scraped from the oceanic plate. The lithology of these sediments bears a greater affinity to those sampled at Site 435 upslope than to the outer rise sediments at Site 436. For example, numerous erratic pebbles in the Pliocene section at Site 434 are almost missing seaward of the trench, but are found in the Pliocene section on the upper slope. In addition, the great abundances of ash found in the Late Miocene sediments at Site 434 are not found on the outer rise of the trench. The cores indicate that the section penetrated at Site 434 contains a mixture of materials from higher on the slope and hemipelagic sediments deposited onto the lower slope. The hole penetrated nearly one quarter of the thickness of the wedge and no clear evidence of "scraped off" oceanic pelagic sediments was found.

If the sediments at Site 434 are not part of an accreting stack at the foot of the slope, the origin of the deformation evident in the sequence must be explained. Seismic reflection profiles suggest that a major reverse fault in the basement cuts through the sedimentary wedge and emerges near the terrace at Site 434. Thus, the holes at Site 434 could have penetrated sheared sediments associated with this fault zone. Drilling difficulties were certainly consistent with penetration of a highly brecciated and sheared zone. The repetition of the biostratigraphic sections could also be produced if relatively flat lying beds were cut obliquely by a series of closely spaced reverse faults. However, equally likely, slumping could have produced the repeated sequences, but it is hard to see how slumping could produce the observed deformation. Holes away from major fault zones are needed to further differentiate between these possible sources of deformation.

Although the seismic data suggest some dislocation of layers below the upper slope as well as evidence for slumping, the normal hemipelagic sequence of sediments drilled on the upper slope at Site 435 indicates that tectonically this part of the margin is relatively quiet and has been so during the Neogene and possibly the Paleogene. The margin landward of the large fault zone associated with the midslope terrace appears to tectonically act as a unit.

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REPORT FROM SITE SURVEY MANAGEMENT

Data Bank

The following data have been received:

Kurile Trench (KUR): MG & G surveys, bathymetry, gravity, seismic refraction, continuous seismic profiles and dredging report and charts and maps.
South Philippine structural cross-section index map.
Track chart and write-up for West Philippine Sea Basin site locations.
GLOMAR CHALLENGER Leg 51 tracks, bathymetry, magnetics, seismic.
GLOMAR CHALLENGER Leg 52 tracks, bathymetry, magnetics, seismic.
GLOMAR CHALLENGER Leg 53 tracks, bathymetry, magnetics, seismic.
Nauru Basin data (navigation, magnetic wiggles along track, bathymetry, and some seismic records).
2 rolls of magnetic tape: a) Nauru & Central Pacific Basins; b) 1976 Philippine Transect & Pac 6.
Reproductions of 2 seismic profiles and site location map for CP2 (Central Pacific Basin).
Reproductions of navigation for KANA KEOKI cruise 770317 and seismic profiles taken during cruise; bathymetric maps, table of core descriptions and safety check-sheets for Leg 60.
3 rolls of microfilm: SILAS BENT navigation and seismic data from North Philippine Sea, Japan Trench, and North Pacific-Kamchatka.
Navigation and seismic profiles from HAKUHO MARU cruise KH-77-1, Japan Trench.
Multichannel seismic profiles from ROBERT CONRAD cruise 2006, South Philippine Transect (14 profiles).
SPI-4 Survey Report.
Preliminary Report on proposed Leg 62.
21 track charts of magnetic data, North and South Pacific.

NEWS

New Office for JOI, Inc.

The Board of Governors of JOI, Inc. is pleased to announce that Robert M. White has agreed to serve as President of JOI, Inc. In addition, Mr. John Clotworthy has accepted the position of General Manager of JOI, Inc. and Doris Rucker will be the JOI, Inc. Secretary. The JOI, Inc. has moved to Suite 512, 2600 Virginia Avenue, Washington, D. C. 20037.

In Memoriam

All members of the JOIDES community were saddened to hear that Norman D. Watkins died on November 2, 1977. Dr. Watkins was Professor of Oceanography of the Graduate School of Oceanography of the University of Rhode Island and had served as Director of the Division of Earth Sciences of the National Science Foundation. A memorial scholarship fund has been established at the University of Rhode Island and details can be obtained from the University. Our deepest sympathy is extended to his family and many colleagues.

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
ENCOM	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			
ANP	10-12 Galveston									26-28 Toronto		
PMP			16-18 LaJolla									
OP						22-24 LaJolla						
SSP				13-14 Miami								
SED. PET.								22-23 Boulder				
IGP												
OGP						19-20 Boca Raton						
STRAT. CORR.					22-24 Wa.D.C.							
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IHP												
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