Archive Copy

JOIDES Journal

Vol. VI No. 3 Oct. 1980

BUNDESANSTALT fur GEOWISSENSCHAFTEN und ROHSTOFFE, FEDERAL REPUBLIC of GERMANY

UNIVERSITY of CALIFORNIA at SAN DIEGO, SCRIPPS INSTITUTION of OCEANOGRAPHY

CENTRE NATIONAL pour L'EXPLOITATION des OCEANS, PARIS

COLUMBIA UNIVERSITY, LAMONT-DOHERTY GEOLOGICAL OBSERVATORY

UNIVERSITY of HAWAII, HAWAII INSTITUTE of GEOPHYSICS

UNIVERSITY of MIAMI, ROSENSTIEL SCHOOL of MARINE and ATMOSPHERIC SCIENCE

NATURAL ENVIRONMENT RESEARCH COUNCIL, LONDON

OREGON STATE UNIVERSITY, SCHOOL of OCEANOGRAPHY

UNIVERSITY of RHODE ISLAND, GRADUATE SCHOOL of OCEANOGRAPHY

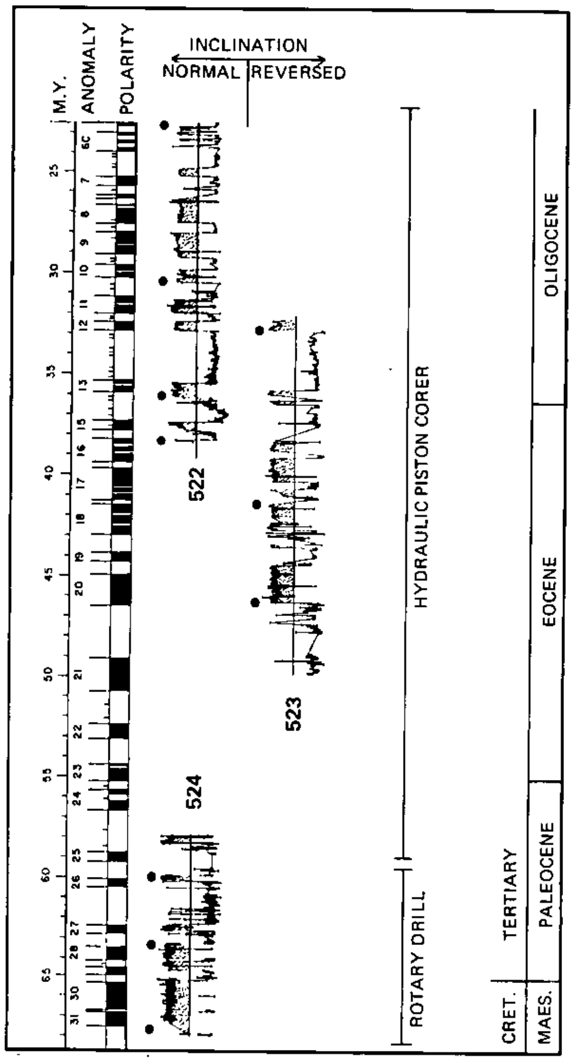
TEXAS A&M UNIVERSITY, DEPARTMENT of OCEANOGRAPHY

UNIVERSITY of TOKYO, OCEAN RESEARCH INSTITUTE

USSR ACADEMY OF SCIENCES

UNIVERSITY OF WASHINGTON DEPARTMENT of OCEANOGRAPHY

WOODS HOLE OCEANOGRAPHIC INSTITUTION



Magnetostratigraphy in the South Atlantic, Leg 73

Leg 73 Co-Chief Scientists Ken Hsü and John LaBrecque examine hydraulic-piston-core 25 from Hole 522 containing a 30-cm thick interval of *Braarudosphaera* ooze. Monospecific blooms of this middle Oligocene (magnetic anomaly 10) calcareous nannofossil may be linked to important paleoceanographic events associated with tectonism; their distribution in the South Atlantic suggests a west to east flowing current reminiscent of the present circum-polar current.

Cover: Detailed Paleogene and upper Cretaceous magnetostratigraphy at three sites in the South Atlantic drilled during Leg 73. Time scale after LaBreque et al. (1977); dots mark points used to calibrate inclinations and ages. Data represent shipboard measurements of discrete samples taken from approximately 480 meters of sedimentary section. The remarkable preservation of the magnetic reversal pattern attests to the undisturbed nature of hydraulic piston cores (HPC) in soft sediments and suggests that HPC sampling of Cretaceous sediments is well within the realm of possibility.

Reference: La Brecque, J. L., Kent, D. V. and Cande, S. C., 1977, Revised magnetic polarity time scale for Late Cretaceous and Cenozoic time. Geology, 5, 330-335.

TABLE OF CONTENTS

VOL. VI, NO. 3, OCTOBER 1980

NEWS BRIEFS

1981-83 Drilling Proposal

In early August, The Natiional Science Foundation convoked two *ad hoc* panels to review the 1981-83 *Challenger* drilling proposal and its companion site-survey proposal. One panel (NSF Climate Program Office Review Panel) comprises experts drawn largely from the climatology community. They addressed chiefly the potential relevance of the proposed drilling to the U.S. Climate Program. The other panel (NSF *Ad Hoc* Review Panel) was made up of people from a broad spectrum of specialties in the earth sciences. The Ad Hoc Review Panel was very supportive and its recommendations were mainly directed at improving the proposal by adding fuller treatments of our plans for addressing certain categories of problems, e.g., convergent margins and global organic carbon budgets, and by adding a narrative tying together the model cruise track with the scientific problems we are trying to solve: The Climate Panel review questioned the relevance of our plans to the U.S. Climate Program, which is concerned largely with climates over the past centuries and on into the "historical" past, with 1 million years being about the limit of interest.

On September 4, DSDP and JOI, Inc., with extensive help and advice from JOIDES, submited detailed responses to the points raised in the *ad hoc* reviews. The panels will consider these responses in September and prepare their final recommendations so that NSF can go forward to the U.S. National Science Board with the Proposals at an early date, probably the third week of November. (E. Winterer)

JOIDES Office Move

Dr. **Edward L. (Jerry) Winterer**, Scripps Institution of Oceanography, became chairman of the JOIDES Planning Committee 1 July 1980.

The JOIDES Office also began operations 1 July at SIO. **Paula Worstell** is science coordinator and **Michiko Hitchcox** is administrative assistant.

JOIDES Office (A-012)
Scripps Institution of Oceanography
La Jolla, CA 92093
(714) 452-2360

NSF Personnel Change

President Carter nominated **John B. Slaughter** to the post of **Director of National Science Foundation** (replacing Richard C. Atkinson) and the Senate has confirmed this nomination.

D. Langeberg is the new **Deputy Director** of the **National Science Foundation**.

Peter Flawn (Univ. of Texas), a geologist, has been nominated to the **National Science Board**.

Bilal Haq became the NSF liaison to JOIDES and DSDP in September 1980, replacing Fritz Theyer. Fritz Theyer has returned to the Hawaii Institute of Geophysics (Univ. of Hawaii).

LEGS 75-82 *GLOMAR CHALLENGER* TENTATIVE SCHEDULE[1]

LEG	DEPARTS	DEPARTURE DATE	TOTAL	DAYS OPERS.	STEAMING	TERMI-NATES AT	ARRIVAL DATA	PORT DAYS	RE-ENTRY	PURPOSE
75	Walvis Bay	26 Jul 80	47	32	15	Recife	7 Sep 80	1	No	Angola Basin
--	Recife	8 Sep 80	18	0	18	Norfolk	26 Sep 80	14	--	Transit & dry dock
76	Norfolk	6 Oct 80	47	42	5	Ft. Lauderdale	26 Nov 80	4	Yes	Blake-Bahama Basin & Outer Ridge
77	Ft. Lauderdale	30 Nov 80	54	45	9	San Juan	23 Jan 81	5	No	Florida Straits and West Caribbean
78	San Juan	28 Jan 81	30	26	4	Fort-de-France	27 Feb 81	0.5	No	Barbados Ridge
78A	Fort-de-France	27 Feb 81	28	14	14	Las Palmas	27 Mar 81	5	Yes	Mid-Atlantic Ridge/ Downhole experiments
79	Las Palmas	1 Apr 81	46	33	13	Brest	17 May 81	5	No	West Africa/Portugal
80	Brest	22 May 81	45	41	4	Southampton	6 Jul 81	5	Yes	Bay of Biscay
11	Southampton	11 Jul 81	52	41	11	St. John's	1 Sep 81	3	Yes	Rockall Bank
2	St. John's	4 Sep 81	37	29	8	Norfolk	11 Oct 81	--	Yes	East Coast US

npiled 5 September 1980

SHIPBOARD SCIENTIFIC PARTIES

Leg 74

T. Moore	Co-Chief Scientist	USA - URI
P. Rabinowitz	Co-Chief Scientist	USA - L-DGO
P. Borella	DSDP Representative/ Sedimentologist	USA - SIO
G. Duee	Sedimentologist	France - Inst. Sci. & Tech.
D. Futterer	Sedimentologist	FRG - U. Kiel
A. Lever	Sedimentologist	UK - U. East Anglia
N. Shackleton	Isotope Specialist	UK - U. Cambridge
A. Chave	Paleomagnetist	USA - WHOI
A. Boersma	Paleontologist (foraminifers)	USA - L-DGO
M. Jiang	Paleontologist (nannofossils)	USA - Texas A&M
H. Manivit	Paleontologist (nannofossils)	France - BRGM
S. O'Connell	Igneous Petrologist	USA - WHOI
S. Richardson	Igneous Petrologist	USA - MIT
K. Kleinert	Physical Properties Specialist	FRG - U. Tubingen

Leg 75

W. Hay	Co-Chief Scientist	USA - JOI, Inc.
J.-C. Sibuet	Co-Chief Scientist	France - Centre Ocean. Bretagne
R. Boyce	DSDP Representative/ Physical Properties Specialist	USA - SIO
E. Barron	Sedimentologist	USA - RSMAS
W. Dean	Sedimentologist	USA - USGS, Denver
R. Schallreuter	Sedimentologist	FRG - U. Hamburg
D. Stow	Sedimentologist	UK - British Nat'l Oil
M. Nohara	Sedimentologist/ Inorganic Geochemist	Japan - Geol. Survey of Japan
S. Brassell	Organic Geochemist	UK - U. Bristol
A. Huc	Organic Geochemist	France - U. D'Orleans
P. Meyers	Organic Geochemist	USA - U. Michigan
C. McNulty	Paleontologist (foraminifers)	USA - U. Tex.,Arlington
J. Steinmetz	Paleontologist (nannofossils)	USA - U. So. Florida
H. Stradner	Paleontologist (nannofossils)	Austria - Geol. Survey, Austria
B. Keating	Paleomagnetist	USA - HIG

Leg 76

F. Gradstein	Co-Chief Scientist	Canada - Bedford Inst. Oceanography
R. Sheridan	Co-Chief Scientist	USA - U. Delaware
T. Shipley	DSDP Representative/ Sedimentologist	USA - SIO
B. Bliefnick	Sedimentologist	USA - UCSC
H. Kagami	Sedimentologist	Japan - Ocean Res.Inst.
J. Kostecki	Sedimentologist	USA - L-DGO
A. Robertson	Sedimentologist	UK - U. Edinburgh
L. Barnard	Organic Geochemist	USA - Texas A&M
P. Jenden	Organic Geochemist	USA - UCLA
E. Keenan	Organic Geochemist	USA - U. Delaware
K. Kvenvolden	Organic Geochemist	USA - USGS
D. Habib	Paleontologist (dynoflagellates)	USA - Queens College
M. Moullade	Paleontologist (foraminifers)	France - U. Nice
P. Roth	Paleontologist (nannofossils)	USA - U. Utah
J. Ogg	Paleomagnetist	USA - SIO
L. Wells	Log Analyst	USA - Sci. Software Corp.

Leg 77

R. Buffler	Co-Chief Scientist	USA - UTMSI
W. Schlager	Co-Chief Scientist	USA - RSMAS

Leg 78

B. Biju-Duval	Co-Chief Scientist	France - Inst.France du Petrol.
C. Moore	Co-Chief Scientist	USA - UCSC

DEEP SEA DRILLING PROJECT

CRUISE SUMMARIES

Leg 71[1]
Falkland Plateau

Leg 71 began in Valparaiso, Chile on 3 January 1980, and ended in Santos, Brazil on 21 February. Most of the scientific party and technical staff boarded on 10 January during a brief stop at Punta Arenas.

Six holes drilled at 4 Sites (511-514) sampled upper Mesozoic and Cenozoic sequences to record the history of the development of the Falkland Plateau and its influence on changes in Cenozoic oceanic circulation.

Background and Objectives

Leg 71 was the first of five Legs planned to study late Mesozoic and Cenozoic environments in the south Atlantic Ocean.

The geography of the high latitude South Atlantic and Antarctic oceans was greatly altered during the Mesozoic and Cenozoic producing a pronounced climatic change from temperate during the late Mesozoic and Paleogene to frigid during the Neogene. This climatic change has been the most significant factor controlling deep and surface water circulation between the southern and more northern parts of the Atlantic. Changes in oceanic circulation probably occurred during this period in response to the initial opening and enlargement of the south Atlantic, the development of bottom water passageways through the ridges and fracture zones near the Falkland Plateau, the opening of Drake Passage, and the climatic evolution of Antarctica and the southern ocean.

Our objectives were four-fold: to (1) learn more about the geologic history of the Falkland Plateau and its influence upon oceanic circulation during the Cenozoic; (2) study the history of bottom water flow through the region during the Cenozoic on the basis of its erosional, transportational, and depositional record and changes in calcium carbonate dissolution, and oxygen isotopics; (3) recover a Cenozoic biostratigraphic record for the South Atlantic; and (4) provide, if possible, the sequence of Mesozoic sediments needed to define the oceanographic conditions existing during the early opening and development of the Atlantic Ocean.

Because of periods of adverse weather (dual swell directions, strong currents, flotillas of icebergs and gale-force winds) we were unable to spud in at Site AB-3 or complete drilling at Site AB-lC'b. We achieved varying degrees of success at Sites AB-1B (511), AB-1C'b (512), AB-4B (513) and AB-4A (514) (Fig. 1). Table 1 shows objectives and priorities and Table 2 summarizes the drilling results of Leg 71.

Site 511

Site 511 (51°00.28'S; 46°58.30'W) is about 10 km south of Site 330 (DSDP Leg 36) in the basin province of the Falkland Plateau. We drilled and continuously cored to a sub-bottom depth of 632 meters, and heat flow measurements were conducted in unconsolidated sediments at sub-bottom depths of 52.5 and 113 meters. From top to bottom, the sediments consist of the following lithologic units (Figure 2):

Unit 1 is 3 meters of gray to olive gray Pliocene to Recent siliceous ooze and thin foraminifer ooze containing manganese nodules and ice-rafted pebbles and grains.

Unit 2 comprises a 192-meter section divisible into two sub-units. *Sub-unit 2a* comprises 182.5 meters of olive to dark gray muddy diatomaceous ooze and muddy nannofossil diatomaceous ooze spanning the upper Eocene-lower Oligocene interval. *Sub-unit 2b* encompasses 9.5 meters of which only the uppermost 72 cm were recovered. It consists of Paleocene to Eocene greenish gray pelagic clay with minor amounts of glauconite, chert, and volcanic ash.

Unit 3 is 14 meters of upper Campanian to middle Maestrichtian gray, calcareous ooze and zeolitic foraminifer ooze with a few chert pebbles and minor amounts of disseminated glauconite.

Unit 4 is 203.5 meters of Coniacian to Campanian-lower Maestrichtian gray to greenish gray zeolitic clay and claystone with intercalations of nannofossil and foraminifer claystone.

Unit 5 is 80 meters of lower Albian to Turonian variegated, often reddish brown claystone, nannofossil claystone, and muddy nannofossil chalk.

[1]Abridged from a preliminary Leg 71 report prepared by William J. Ludwig, Valery Krasheninnikov (Co-Chief Scientists), Ivan A. Basov, Ulf Bayer, Jan Bloemendal, Brian Bornhold, Paul Ciesielski, Elaine Goldstein, Christian Robert, John Salloway, John Usher, Hans von der Dick, Fred M. Weaver, Sherwood Wise.

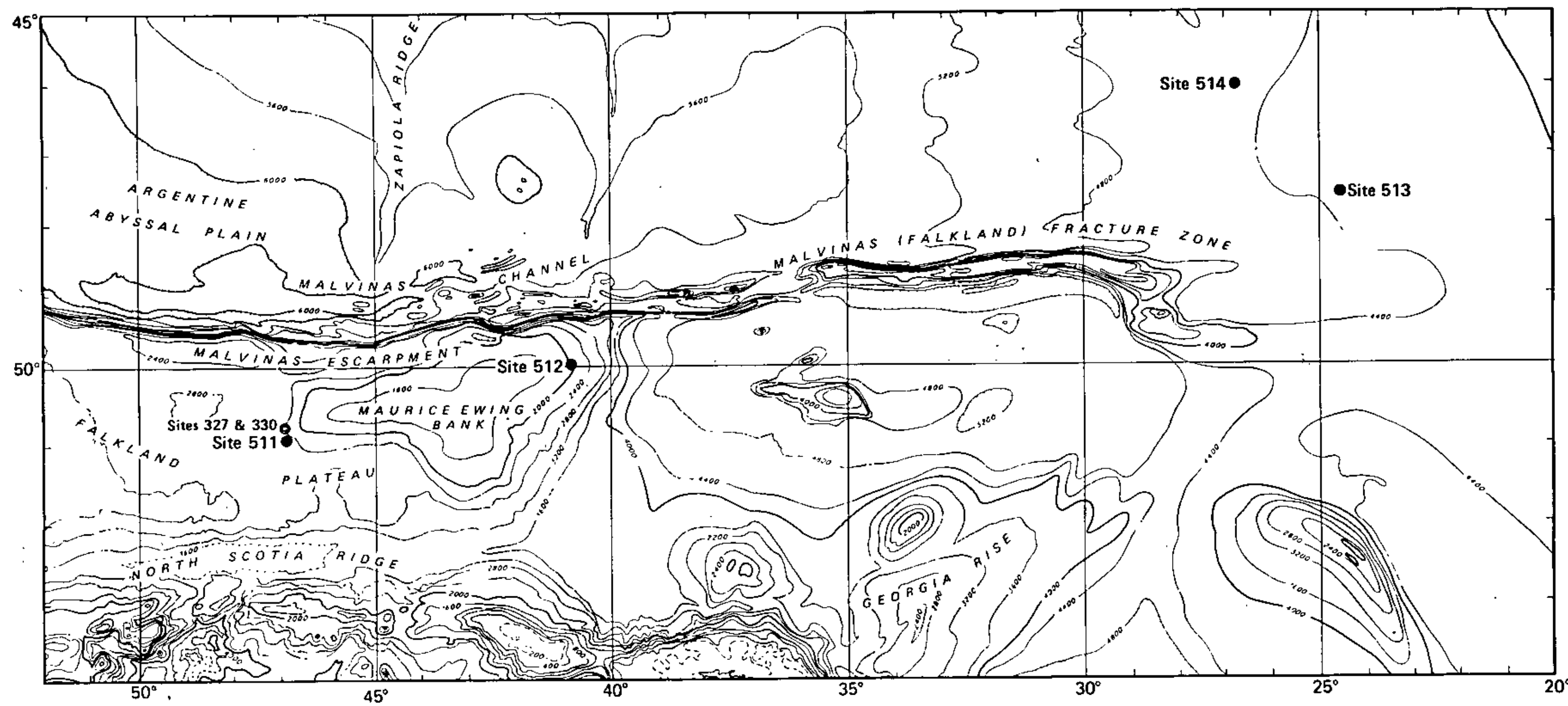


Figure 1. Location of Leg 71 Sites 511, 512, 513 and 514, and Leg 36 Sites 327 and 330.

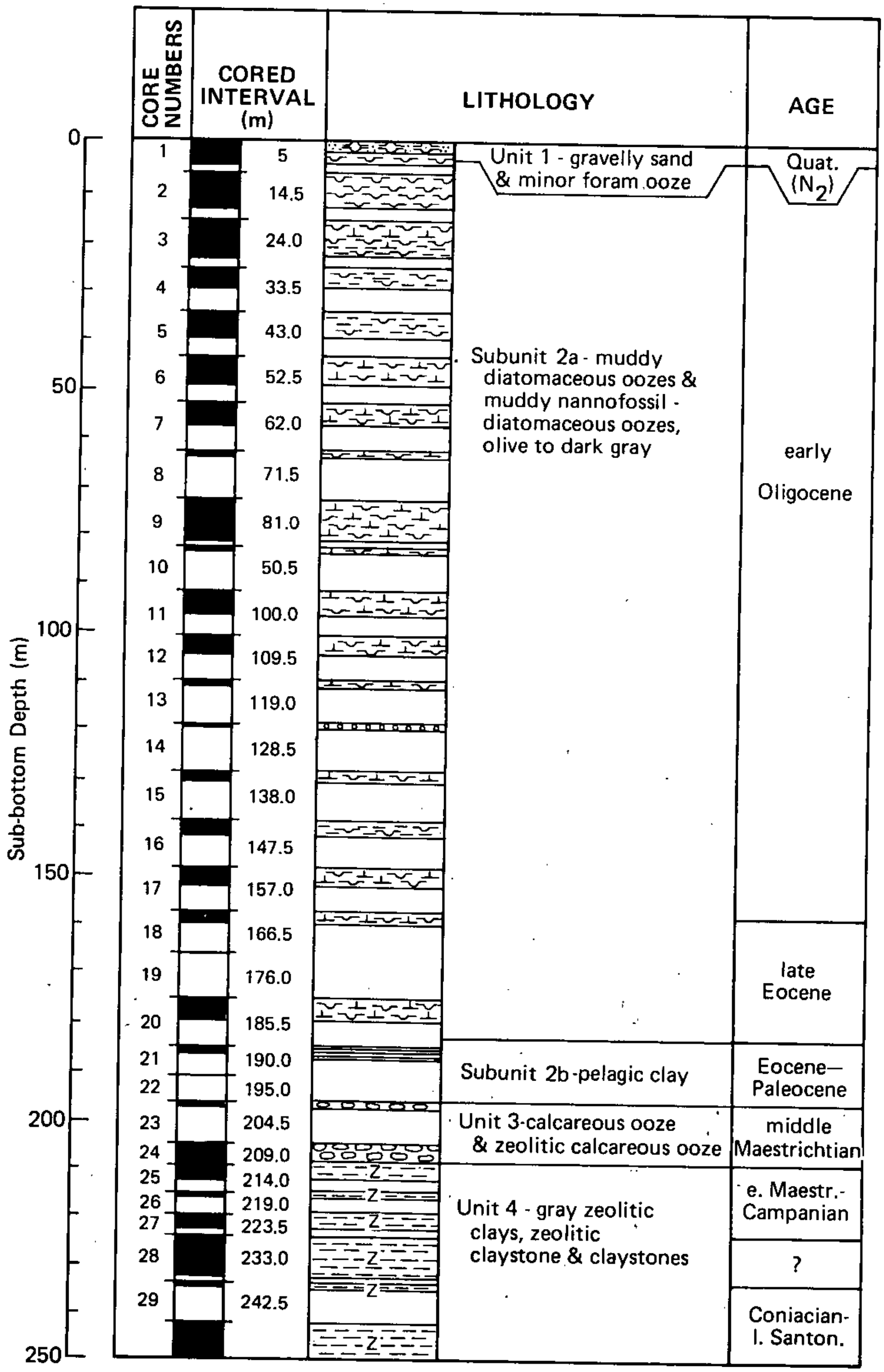
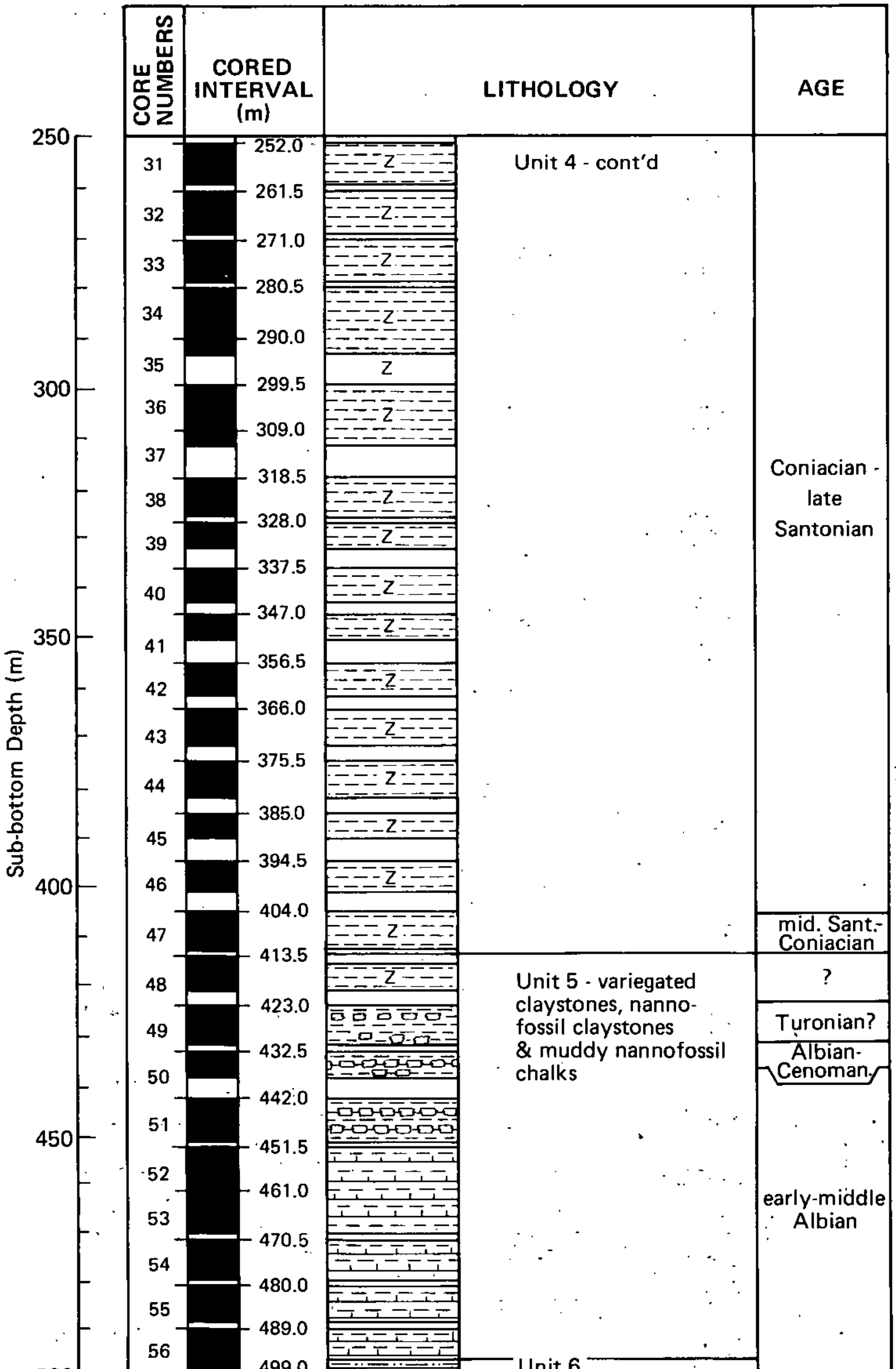


Figure 2. Columnar section of Site 511.


CORE NUMBERS
CORED INTERVAL (m)
LITHOLOGY
AGE
Sub-bottom Depth (m)
250
300
350
400
450
500
31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
252.0
261.5
271.0
280.5
290.0
299.5
309.0
318.5
328.0
337.5
347.0
356.5
366.0
375.5
385.0
394.5
404.0
413.5
423.0
432.5
442.0
451.5
461.0
470.5
480.0
489.0
499.0
Unit 4 - cont'd
Unit 5 - variegated claystones, nanno-fossil claystones & muddy nannofossil chalks
Unit 6
Coniacian - late Santonian
mid. Sant.-Coniacian
?
Turonian?
Albian-Cenoman.
early-middle Albian

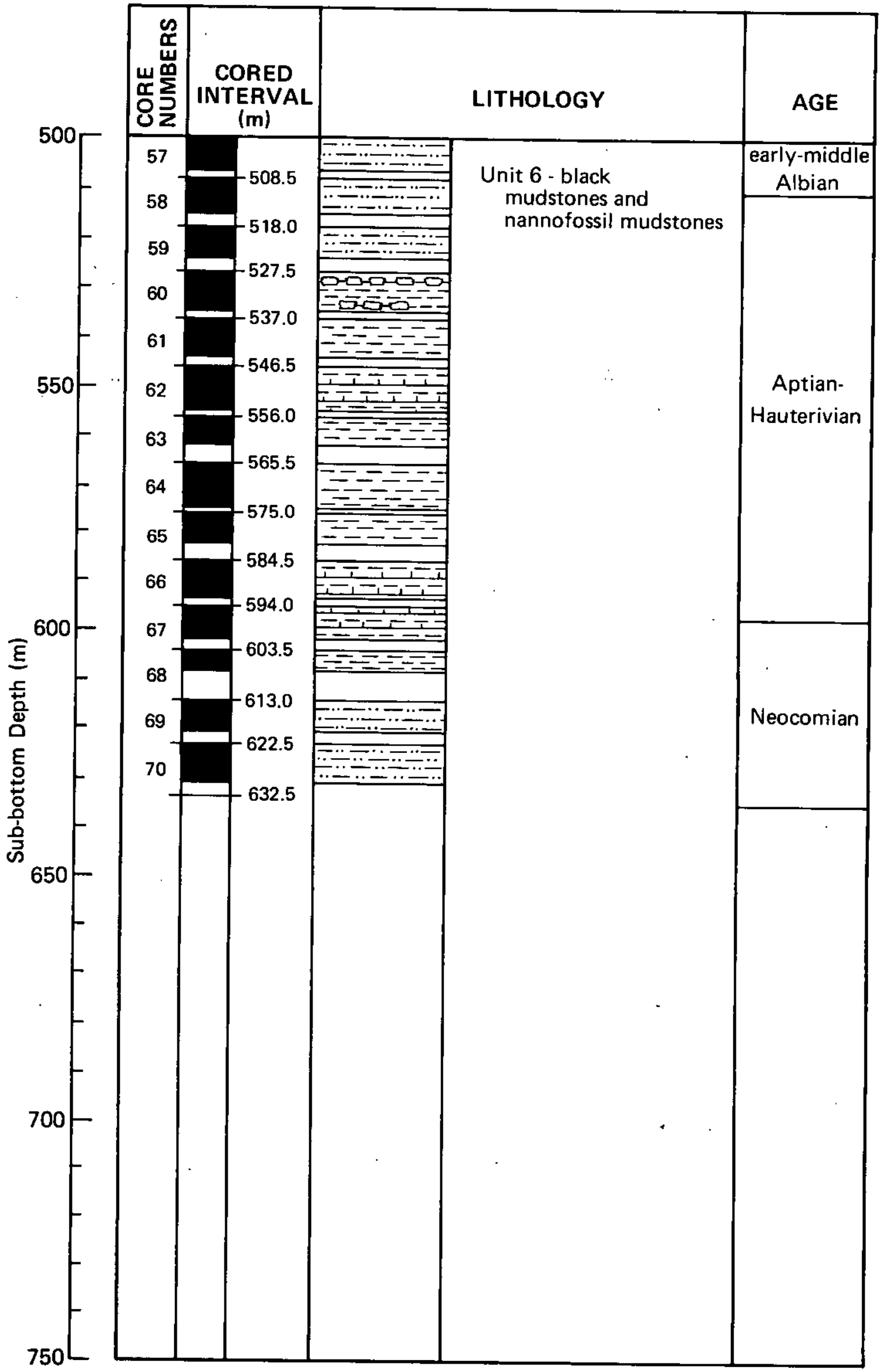

CORE NUMBERS
CORED INTERVAL (m)
LITHOLOGY
AGE
Sub-bottom Depth (m)
500
550
600
650
700
750
57
58
59
60
61
62
63
64
65
66
67
68
69
70
508.5
518.0
527.5
537.0
546.5
556.0
565.5
575.0
584.5
594.0
603.5
613.0
622.5
632.5
Unit 6 - black mudstones and nannofossil mudstones
early-middle Albian
Aptian-Hauterivian
Neocomian

Table 1. Proposed Drilling Sites for DSDP Leg 71

SITE	PRIORITY	POSITION	WATER DEPTH (m)	PROBABLE PENETRATION TO OBJECTIVE (m)	OBJECTIVES
AB-1C'b	1A	49°52.5'S 40°48.5'W	1728	600	Define major Tertiary and Mesozoic erosional events and fluctuations of the CCD. Establish biostratigraphy of calcareous microfossils and their correlation with paleomagnetics.
AB-1B	1B	51°03'S 47°02'W	2592	700	Establish nature and age of sediments in the basin province of the Falkland Plateau.
AB-1D - (alternate)	2	49.82°S 51.66°W	2520	200	Establish nature and age of sediments above and below a major erosional unconformity which probably marks the opening of the Scotia Sea. HPC only.
AB-3	1	49.74°S 21.35°W	3962	800	Examine Cenozoic evolution of the Polar Front.
AB-4A	1	45.79°S 27.08°W	4537	200	Same as Site AB-3; HPC only.
AB-4B - (alternate)	2	47.59°S 24.73°W	4360	200	Same as Site AB-3; HPC only.
AB-10	1	28.16°S 43.19°W	3750	200	Obtain paleotemperature record of Brazil current from isotope studies.

Unit 6 is 140 meters of Neocomian to Aptian black, massive, thinly laminated mudstone and nannofossil mudstone. In places it is highly petroliferous indicative of anoxic conditions. Pyrite is common. Belemnite rostrums are common, as are microcoquinas of *Inoceramus* and *Aucellina*(?). Benthic microfossils, however, are virtually absent.

A reflector occurring at an estimated subbottom depth of 700 meters may be the base of the petroliferous claystone, corresponding to the Jurassic (Oxfordian) silty clay and clayey siltstone cored at Site 330.

We recognized hiatuses within this succession at the Quaternary/Pliocene, Pliocene/lower Oligocene, Paleocene or Eocene/Maestrichtian and Turonian/lower Cenomanian boundaries. The unconformity that truncates the southward-dipping sheets of sediment on the plateau lies between Units 2 and 3 at Site 511. It probably corresponds to the Paleocene/Maestrichtian hiatus and represents a major erosional surface caused by bottom current scouring. We could not, however, determine its maximum duration from study of the cores.

Microfossils occur in nearly all of the cores. We collected the following biostratigraphic sequences:

1) 154 meters of lower Oligocene and upper Eocene diatom ooze with exceptionally well preserved and diverse diatoms, radiolarians, and silicoflagellates together with sufficient numbers of calcareous nannofossils and foraminifers to correlate it with lower latitude zonations and the well established New Zealand stages.

2) 174 meters of Santonian-Coniacian biogenic sediments containing rather rich and diverse planktonic foraminifer and nannofossil forms. These are the first of their kind found in the high latitudes of the southern hemisphere.

3) continuous sequence of cores including most of the Lower Cretaceous (Neocomian-Albian) black oil shale and claystone which will enable stratigraphers, on the basis of palynologic data, to subdivide the biostratigraphic sequence and further refine reconstructions of the Cretaceous geographic history.

Data from benthic foraminifer assemblages, along with those of other floral and faunal groups, demonstrate that the Falkland Plateau subsided at distinctly accelerated rates at or near the end of the early Cretaceous.

Variable accumulation rates of biogenic sediments attest to the highly episodic nature of sedimentation of the Falkland Plateau; times of exceptionally rapid sedimentation separated by hiatuses or condensed intervals seem to typify the area. A very high sedimentation rate during the late Eocene-early Oligocene (about 44 m/m.y.) indicates high productivity of siliceous and rather high sedimentation rate of at last 29 m/m.y. marks the Coniacian-Santonian interval.

Tertiary through Albian sediments contain only small quantities of organic carbon. In contrast, the underlying Neocomian (and older?)-Aptian black shales contain 1.7 to 4.1 per cent organic carbon which, by pyrolysis/-fluorescence analysis, showed a high potential for generating petroleum. Ratios of gaseous hydrocarbons and the pyrolysis/fluorescence data suggest that (1) the black shales are already fairly mature, (2) the oil and gas presently in the black shales were formed *in situ*, i.e. the shale is both the source *and* the host rock, (3) gases generated during the main generation stages at the temperature required for catagenesis have largely diffused toward the surface through overlying rock, leaving primarily the liquids, and (4) chalks and interbedded shales in the upper part of the section form a cap rock for the migrating liquids.

We measured a geothermal gradient of 7°C/100 meters at Site 511 through two lowerings of the Uyeda downhole temperature probe. Oil could thus have matured in the black shales at a depth of 700 meters, assuming subsequent erosion of 200 meters or more of overburden above the Tertiary/Cretaceous unconformity.

Drilling at Site 511 provided data that significantly built upon the results obtained from drilling on the Maurice Ewing Bank during Leg 36. They indicate that, with some exceptions (caused by periods of erosion), lithostratigraphic units were continuous across the bank and the basin province of the plateau. Further, major erosion took place at or near the beginning of the Tertiary, suggesting a circum-Antarctic/Australia current may have been in the area prior to the opening of the Drake Passage during the Oligocene-middle Miocene interval. This in turn suggests that a passageway existed for currents between east and west Antarctica existed during the late Cretaceous and early Tertiary. The existence of a passage has already been inferred from paleomagnetic data.

Site 512

Site 512 (49°52.19'S; 40°50.71'W) lies in the northeastern part of the Maurice Ewing Bank, in 1846 meters of water. Earlier drilling at DSDP Site 327 (Leg 36) showed that the bank consists of a thick Tertiary through Neocomian carbonate and siliceous sequence in which at last two major erosional events are recorded. Site 512 was chosen to further investigate the depositional and erosional history of the Falkland Plateau.

We took a continuous series of hydraulic piston cores to a sub-bottom depth of 77.9 meters, and rotary cores to a depth of 89.3 meters. We had to abandon the site, however, when strong surface currents, dual opposing swells, and bad weather prevented further operations.

The biogenic-sedimentary sequence at Site 512 is divided into two lithologic units (Figure 3):

Unit 1 is a thin 0.93-meter upper Pleistocene to lower Pliocene olive gray to light gray, gravelly, foraminifer-rich, quartzose sand. It is more diatomaceous and lighter colored in the lowermost 11 cm. Abundant angular to subangular ice-rafted terrigenous material in the upper portion of the unit consists of mixed igneous, metamorphic and sedimentary pebbles and sand. The base of the unit is sharply unconformable on Unit 2. In addition to the basal unconformity, this very thin unit contains two other hiatuses. The topmost hiatus, at about 36 cm, separates upper Pleistocene from middle Pliocene sediments; the second, at about 79 cm, marks a middle Pliocene/lower Pliocene break; the hiatus at the base of Unit 1 separates lower Pliocene from the lower part of the upper Miocene sediments of Unit 2.

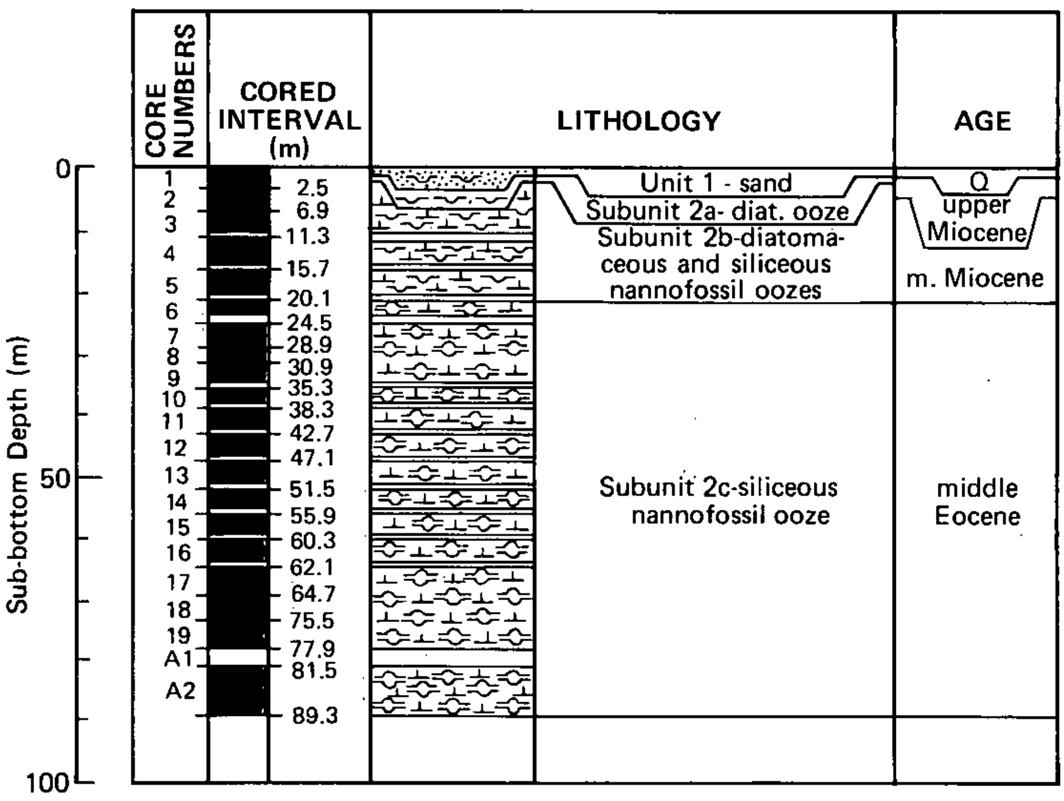


Figure 3. Columnar section of Site 512.

Unit 2, consisting of pelagic biogenic sediments, is subdivided into three sub-units on the basis of color and carbonate content. *Sub-unit 2a* comprises 10 cm of lower upper Miocene, pale olive, soft, non-calcareous diatomaceous ooze. *Sub-unit 2b* (19 m) includes massive upper-middle and middle Miocene white to olive gray diatomaceous and siliceous nannofossil ooze. Large concentrations of siliceous diatoms sometimes give a cottony appearance to the split core surface. In these zones the carbonate content is as low as 7 per cent whereas average carbonate values for the sub-unit are 38-48 per cent. *Sub-unit 2c* (69 m) is middle Eocene and differs from Sub-unit 2b only in induration and color of the siliceous nannofossil ooze. Sub-unit 2c is generally more firm, greenish gray to light greenish gray, and contains an average of 54 per cent carbonate.

The record thus shows that throughout most of Eocene-Pleistocene time Site 512 was above the carbonate compensation depth (CCD) and far from a terrigenous source. The upper and middle Miocene interval is characterized by a low biogenic sedimentation rate (6.6 m/m.y.); sedimentation rates in the middle Miocene were considerably higher — up to 32 m/m.y.

The four unconformities recognized at Site 512 (upper Pleistocene/middle Pliocene, middle/lower Pliocene, lower Pliocene/upper Miocene, and middle Miocene/middle Eocene) appear to correspond to periods of intensified circumpolar currents which prevented deposition, or eroded sediments, on the northeastern part of the Maurice Ewing Bank.

Although short, the Cenozoic section cored at Site 512 provides valuable stratigraphic and paleontologic information. Mild climates during the middle Eocene account for the coexistence of various groups of calcareous and siliceous microfossils. Comparison of zonal schemes on the basis of planktonic foraminifers, nannofossils, radiolarians, diatoms, and silicoflagellites, and correlation with other DSDP sites and those of New Zealand sections, will improve middle Eocene biostratigraphy of the temperate Southern Hemisphere. The climate was much more severe during the late middle and late Miocene as shown by very low planktonic foraminifer and nannoplankton species diversities. The more abundant siliceous microfossils found in that part of the section are consequently of considerable stratigraphic significance.

Site 513

We had planned to drill Site 513 at proposed site AB-3 (49.74°S; 21.35°W) on the western flank of the Mid-Atlantic Ridge. We had dropped a beacon and begun to lower pipe when sea conditions became too severe to continue. As a field of icebergs was moving into the area, we moved the *Challenger* northward to about 3.5 miles west of alternate Site AB-4B. Here, Site 513 (47°34.99'S; 24°38.40'W) was spudded on the lower Mid-Atlantic Ridge flank, east of the Argentine Basin in 4383 meters of water.

We continuously cored Hole 513 to 104 meters sub-bottom, but again, had to pull the pipe after waiting almost 48 hours for acceptable weather conditions. A second hole, 513A, was washed to 70 meters and continuously cored until terminated in basement basalt at 587 meters sub-bottom.

Site 513 is about 150 miles north of the present-day Antarctic Convergence (Polar Front). The principal drilling objective was to obtain a complete upper Paleogene-Neogene biostratigraphic sequence and, from study of mixed siliceous and calcareous fauna, to determine the history of the Polar Front during the late Cenozoic.

The stratigraphic section at Site 513 consists, from top downward, of the following four lithologic units (Figure 4):

Unit 1 is 180 meters of muddy diatomaceous ooze with some interlayered diatomaceous clays occurring down-section. Subangular to angular pebbles, of varying lithologies occur in the upper part of the unit. These pebbles, of up to 4 cm diameter, were apparently ice rafted. The sequence is lower Miocene to Pleistocene with two, and possibly three, hiatuses in the lower part of the section.

Unit 2 comprises 53.9 meters of Oligocene to early Miocene muddy diatomaceous nannofossil ooze and diatomaceous nannofossil ooze. It is transitional between Units 1 and 3 and the contact is somewhat arbitrary. It is divided into an upper more muddy and diatomaceous unit (2a), and a lower more calcareous unit (2b). *Sub-unit 2a* consists of 42.5 meters of upper Oligocene-lower Miocene muddy diatomaceous clay and muddy diatomaceous ooze; colors range from very pale brown to brownish gray. *Sub-unit 2b* consists of 11.4 meters of upper

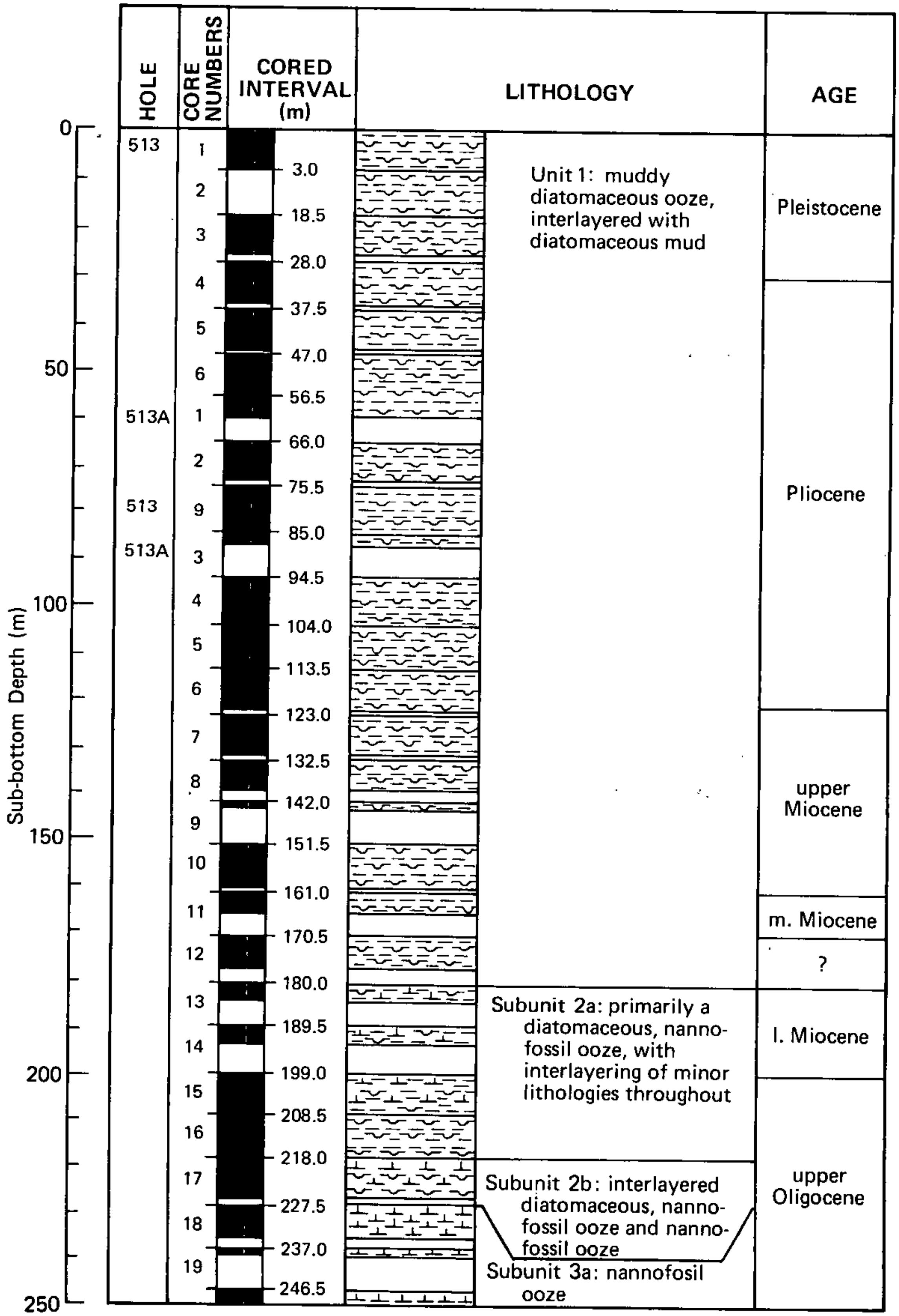
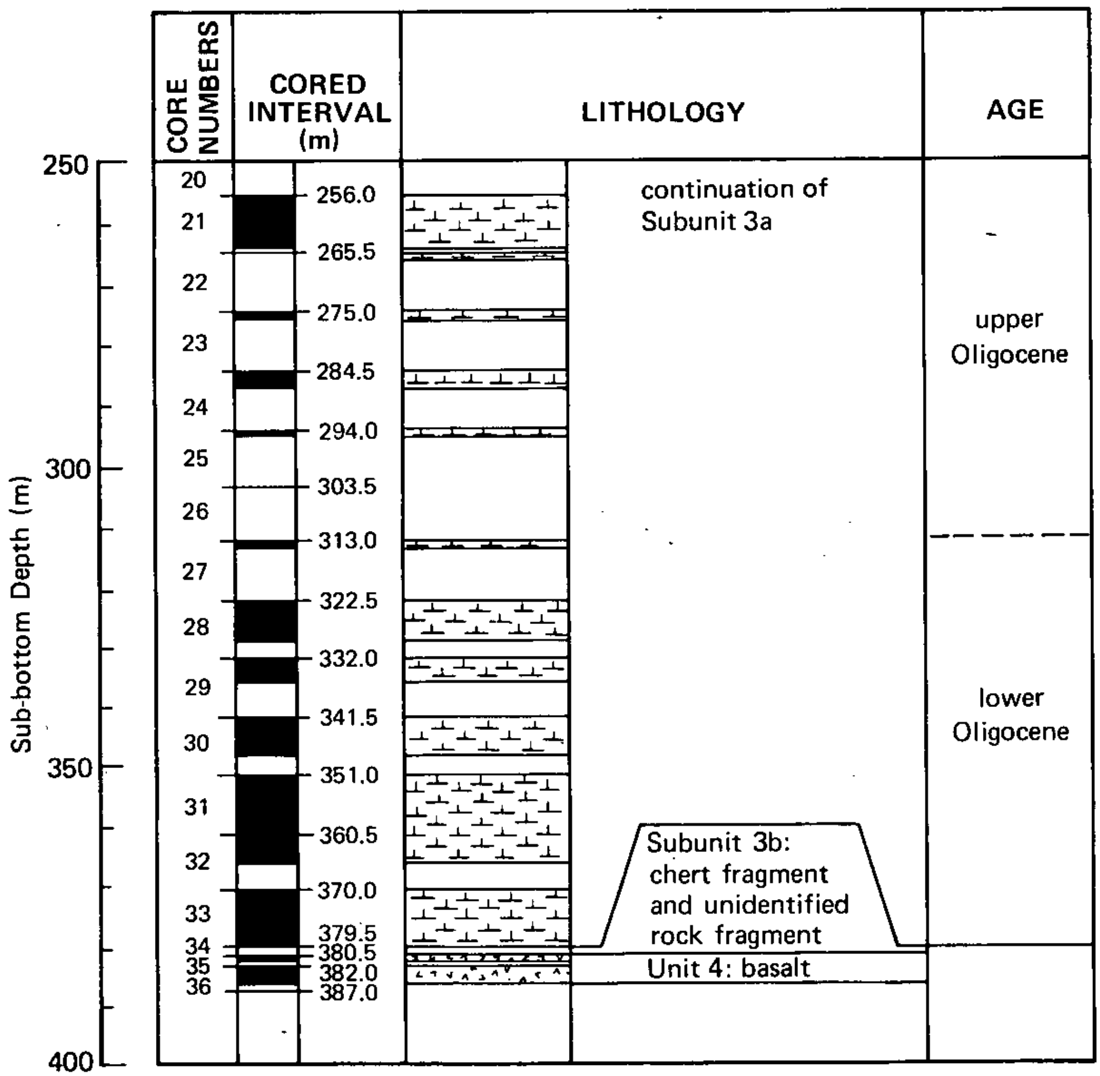


Figure 4. Columnar section of Site 513.


CORE NUMBERS
CORED INTERVAL (m)
LITHOLOGY
AGE
Sub-bottom Depth (m)
250
300
350
400
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
256.0
265.5
275.0
284.5
294.0
303.5
313.0
322.5
332.0
341.5
351.0
360.5
370.0
379.5
380.5
382.0
387.0
continuation of Subunit 3a
Subunit 3b: chert fragment and unidentified rock fragment
Unit 4: basalt
upper Oligocene
lower Oligocene

Oligocene light gray to white diatomaceous nannofossil ooze alternating with nannofossil ooze.

Unit 3 comprises 145.5 meters of Oligocene, light gray and white nannofossil ooze with some zones of indurated chalk. We recovered a single, white chert fragment of undetermined age from the core catcher of the bottommost Unit 3 core.

Unit 4 comprises 6 meters of fine-grained phyric basalt, interpreted to be basement rock.

Unit 2 reflects the change from calcareous to muddy diatomaceous deposition in early Miocene time and may very well correspond to the opening of the Drake Passage and oceanic subsidence, and possibly to the major CCD fluctuation, as well. The middle Pliocene section contains a 1.0 - 1.2 million year hiatus, and a possible hiatus of several million years occurs between middle and lower Miocene sediments. These unconformities do not obviate the high stratigraphic resolution of diatom and radiolarian zonation that is inherent in this siliceous Neogene section.

Overlapping sections from Sites 511 and 513 provide the most complete Oligocene biostratigraphic sequence thus far obtained in southern high latitudes. The abundant siliceous microfossils, together with the somewhat more limited calcareous microfossils permits correlations with the New Zealand zonal scheme and possibly with the temperate/sub-tropical zonation. Study of the different microfaunas of Sites 511 and 513 will help scientists to reconstruct Oligocene climates. Diatom, and particularly radiolarian, assemblages show that temperatures fluctuated and were warm during latest Miocene-earliest Pliocene time and subsequently deteriorated.

Important information has been gained on on the Oligocene depths of the CCD and foraminiferal lysoclines from the Site 513 data. During the early Oligocene, deposition at the site was above the CCD and the planktonic foraminifer lysocline; in the late Oligocene it was below the planktonic foraminifer lysocline but above the benthic calcareous foraminifer lysocline; during the Neogene it was well below the CCD.

We calculated a sedimentation rate of about 14.25 m/m.y. for the early Oligocene-early Miocene, and about 15 m/m.y. for the late Miocene. In latest Miocene and possibly earliest Pliocene (pre-Gilbert event "C") the rate increased dramatically to 58 m/m.y. The sedimentation rate decreased in the early Miocene (upper Gilbert event) prior to erosion in the middle Pliocene, and finally remained nearly constant at 21 m/m.y. throughout the rest of the Neogene.

Site 513 is on magnetic anomaly 15 (37.5 m.y., latest Eocene). If we assume the average sedimentation rate (14.25 m/m.y.) was constant for the entire Oligocene sequence, the base of the section would be approximately 36.5 million years old and correspond to magnetic anomaly 14, immediately above the Eocene/Oligocene boundary. The sediment accumulation data thus closely corroborate the magnetic anomaly data.

Because the percentage of organic carbon appears to decrease to very low but constant values in the Site 513 sediments wherever the carbonate content increases, we conclude that the organic carbon content is sensitive to bioproductivity changes induced by the onset and fluctuations of the Polar Front. The upper part of the section at Site 513 (i.e. middle Miocene to Recent) is enriched in organic carbon deposited below the CCD, whereas the lower part is depleted in organic carbon. High productivity associated with advances of the Polar Front appears to have caused an increased sedimentation rate which, through fast burial, protected the organic material from oxidation.

The increase in carbonate content in the lower (Oligocene) part of the section is reflected in increasing bulk densities and decreasing porosities in the sediments. Fluctuations in carbonate content seem to cause variations in physical properties which may account for the closely spaced, parallel reflections recorded on the seismic record of the area.

Site 514

Site 514 (46°02.77'S; 26°51.30'W) is on the lower west flank in of the Mid-Atlantic Ridge on the east side of the Argentine Basin in 4318 meters of water. The site is about 250 miles north of the present-day position of the Polar Front and about 150 miles north of Site 513.

Pliocene-Quaternary sediments were cored with a hydraulic piston corer to a depth of

150.8 meters. They consist of a rather monotonous sequence of gray, greenish gray, and dark greenish gray diatomaceous clay and muddy diatomaceous ooze. Fine laminations in which laminae couplets of greenish gray over dark gray are common throughout the section. Bioturbation is also common but is usually not intense; locally it is heavy. The section has a higher quartz-sand and -silt content (5-7% in the upper part of the section) than do Holes 513 and 513A.

A single lithologic unit with sub-units were recognized (Figure 5):

Sub-unit Ia comprises 130.0 meters of olive brown, greenish gray and gray muddy diatomaceous ooze and diatomaceous clay. Bioturbation is minor to moderate. Disseminated manganese and quartz silt and sand are present in the upper part of the sub-unit; lower parts are often finely laminated. The clay content increases down section. Near the base of the sub-unit one core section contains small (~ 4 cm) pale olive clasts with large percentages of unspecified carbonate.

Sub-unit Ib comprises 7.3 meters of gray to dark greenish gray, faintly laminated, firm mud which contains a few diatoms and local concentrations of nannofossils and foraminifers; 150 cm of dark greenish gray nannofossil mud occur near the middle of the unit.

Sub-unit Ic comprises 9.5 meters of stiff, dark greenish gray, diatomaceous mud containing one 35-cm layer of white, muddy nannofossil chalk. bioturbation is moderate to intense; faint laminae are common throughout.

We recognized all high latitude Pliocene-Quaternary diatom zones and all but one radiolarian zone at Site 514. The nannoplankton and foraminifers present, although comprising few species of limited stratigraphic value, are very useful in reconstructing paleoenvironments. On the basis of paleomagnetic measurements, we identified the Brunhes epoch, the Matuyama epoch with Jaramillo and Olduvai events, the Gauss epoch with the Kaena and Mammoth events, and the Gilbert epoch with the Cochiti event. Correlation of the paleomagnetic time scale with siliceous fossil zonations is perhaps the most significant achievement of drilling at Site 415.

We detected only one hiatus (within the diatom *Nitzschia interfrigidaria* Zone and the radiolarian *Helotholus vema* Zone) in the otherwise continuous Pliocene-Quaternary sequence. The hiatus represents the 0.8 million year interval between upper Gilbert (3.9 my) and lower Gauss (3.1 my) epochs and appears to be regional in asmuch as it developed at the time of cooling in East and West Antarctica and of the first glaciation in Argentine Patagonia. A second hiatus may exist in the Brunhes sequence.

By analyses of siliceous and calcareous planktonic groups researchers can determine oceanographic changes connected with latitudinal migrations of the Polar Front. The Pliocene-Quaternary section recovered from Site 514 contains species which lived in Antarctic cold water, sub-Antarctic cool/temperate and mixed cold/warm water. Their succession in time clearly demonstrates climatic fluctuations (Figure 6). The most southern positions (warmings) of the Polar Front during the 4.2 million-year record drilled at Site 514 probably occurred during the upper Gilbert and middle Gauss epochs. These two warm periods were apparently regional; as they have been identified in sediments from the Tasman Sea (DSDP Site 283), in the Ross Sea (DSDP Site 274), and the near East Antarctica (DSDP Site 266). Cool/temperate sub-Antarctic assemblages of siliceous microfossils, compartively abundant well preserved and diverse nannofossils, and planktonic and benthic foraminifers characterize sediments of these epochs.

The warm periods were separated by a cool interval (uppermost Gilbert-lower Gauss epochs) marked by accumulation of diatomaceous clay with cold water siliceous microfossil assemblages and a lack of calcareous plankton. Intensification of bottom currents and resulting erosion caused the above-mentioned hiatus. Climatic oscillations of minor amplitude occurred within the cooling interval.

The late Pliocene to Quaternary (upper Guass, Matuyama and Brunhes epochs) was a time of pronounced cooling evidenced by all the microfossil groups. This climatic deterioration corresponded to the onset of late Pliocene-Quaternary glaciation in the northern hemisphere, increasing glaciation in the southern hemisphere, and to the general lowering of sea level. The cooling trend was interrupted by some brief periods of warmer climates near the end of the Pliocene (upper Matuyama) and at the end of the Quaternary (uppermost Matuyama-upper Brunhes).

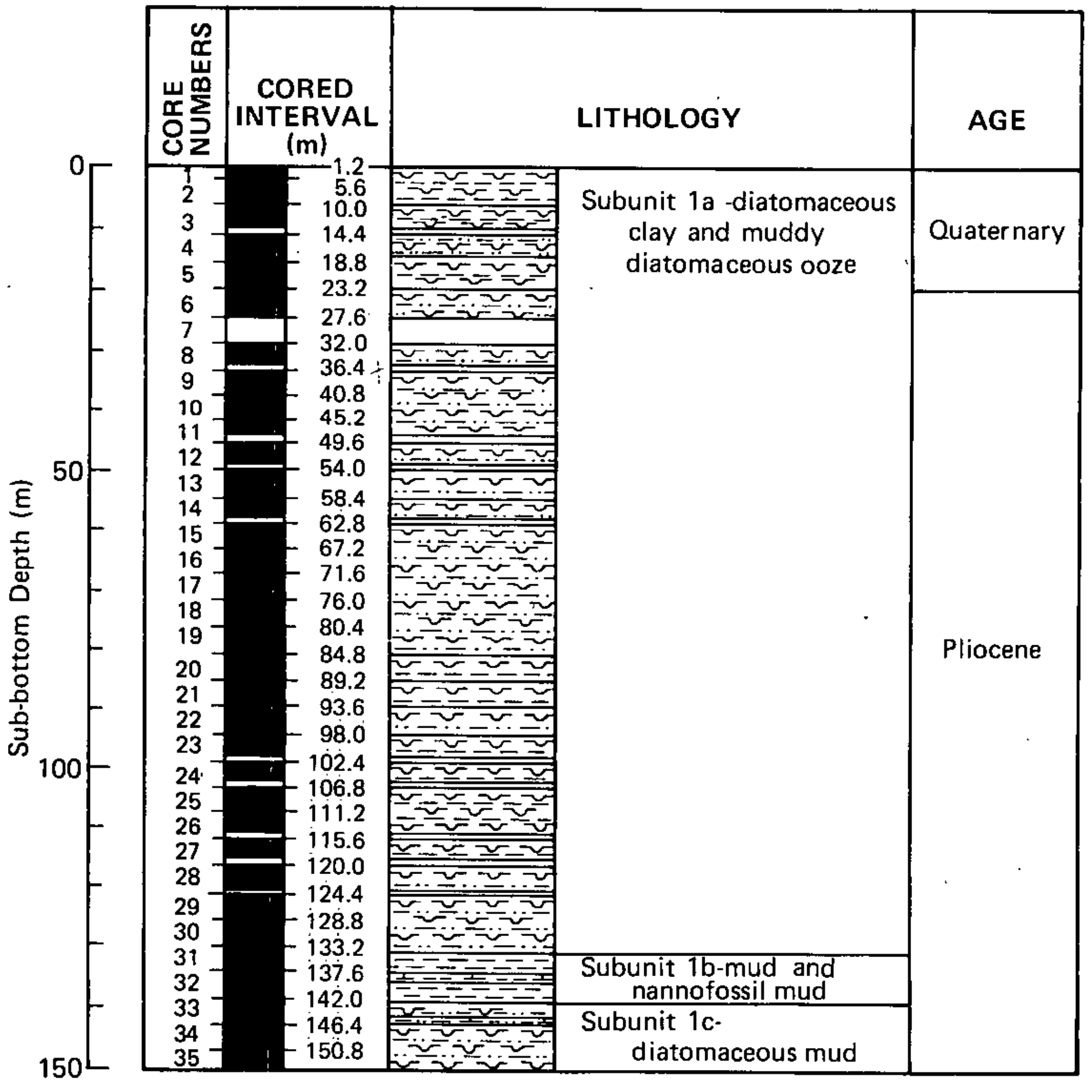


Figure 5. Columnar section of Site 514.

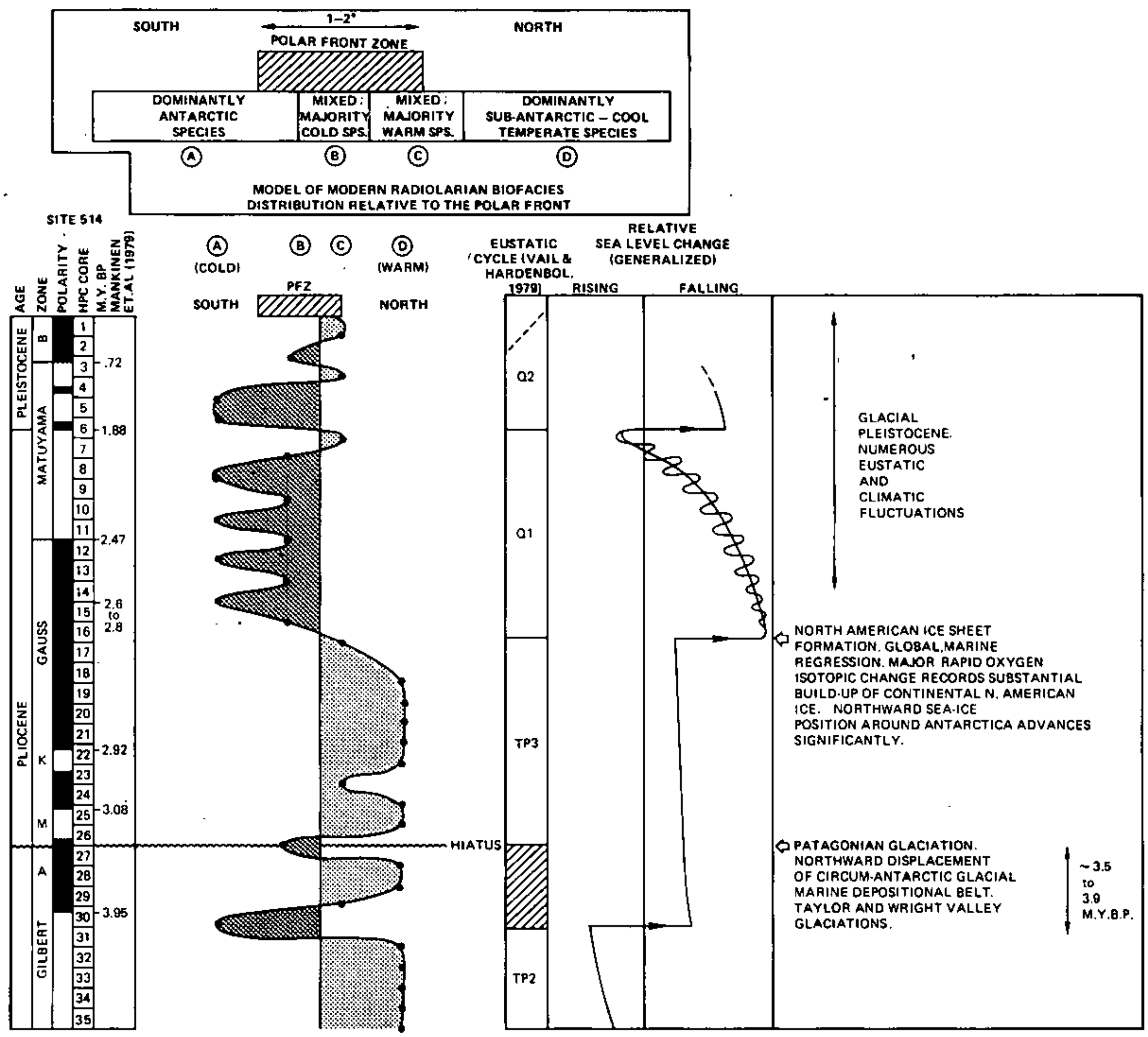


Figure 6. Analysis of Pliocene/Pleistocene environments at Site 514.

The sedimentation rate during the Pliocene and Quaternary in the area of Site 514 reflects, with minor variances, shifts of the Polar Front. In the early Pliocene, Gilbert epoch, it was enormously high — 180 m/m.y. During the late Pliocene, Gauss epoch, it decreased to 69.4 m/m.y. A further, sharp diminution to 8.61 m/m.y. took place during the early Pleistocene, Matuyama epoch and in the latest Matuyama it increased to 33.4 m/m.y. The lowest sedimentation rate, 2.3 m/m.y., occurred in the early Brunhes and it did not exceed 17 during late Brunhes.5 m/m.y.

The average value of organic carbon in the sediments at Site 514 is about 1.5 times greater than the average value in modern deep sea sediments (0.3%). This high organic carbon content is attributed to the high sedimentation rates that protected the carbon from oxidation through fast burial, and the relatively constant environmental conditions in the area of Site 514.

Physical properties in poorly consoliated, uniform sediments, (e.g. diatomaceous clay and ooze) are most sensitive to subtle changes in sediment composition. Acoustic variation may show up on the seismic records but distinctions are not always obvious in visual examination of the core. Variations in the physical properties may be interpreted, however, by careful lithologic examination and description. The evaluation of smear-slide data from Site 514 clearly relates the observed fluctuations in bulk density and water content to sediment composition. Clay content and diatom content are negatively correlated; clay maxima distinctly correspond with bulk density maxima. In contrast, water content is reduced with increasing clay content whereas it increases parallel to the diatom content. Wide scattering of bulk density data from one horizon in Site 514 is associated with the co-occurrence of a relatively high quartz content and a narrower period of clay-diatom alternation. Even where the quartz content is very low it seems to modulate the physical properties. The Vane shear strength also appears to decreased with an increased clay content. Careful correlation of lithology and physical properties undoubtedly aid in the interpretation of the seismic record.

Leg 72[1]
Brazil Basin and Rio Grande Rise

Leg 72 began in Santos, Brazil on 26 February 1980 and ended in Santos on 8 April 1980. Twelve holes were drilled at four sites (515-518) to study the geologic development of the Rio Grande Rise and the Cenozoic history of water circulation in the Atlantic Ocean. (Table 3, Fig. 7).

Background and Objectives

The history of oceanic circulation in the southwestern Atlantic during the Cenozoic is inextricably tied to the tectonic development and subsequent evolution of the Rio Grande Rise, one of the world's major aseismic ridges. Accordingly, we focussed on two principal aspects in formulating the scientific objectives of DSDP Leg 72: paleoceanography, and the evolution of a mid-plate rise. Drilling sites were chosen so that a broad spectrum of specific questions could be addressed at each site.

The Rio Grande Rise rises over 4 km above the seafloor, and intersects all of the major intermediate and deep water masses of the southwestern Atlantic. We know from previous dredging and coring results. (DSDP Legs 3 and 39) that portions of the Rise were near or above sea level for much of the Rise's early history, and perhaps until as recently as the Oligocene. The rise has subsided significantly since its formation; it presently rests beneath more than 700 meters of water. An understanding of this subsidence history would resolve two principal questions.

1) Are the mid-plate rises rigidly attached to the "normal" oceanic crustal plates which surround them, and so subside at rates identical to those for normal oceanic crust?

   The geochemistry, and thus probable mantle source areas, of volcanic basement beneath rises is quite distinct from that of

---

[1]Condensed from a preliminary Leg 72 report prepared by Peter F. Barker, Richard L. Carlson, David A. Johnson (Co-Chief Scientists), Pavel Cepek, William Coulbourn, Luiz A. Gamboa, Norman Hamilton, Ubirajara Melo, Claude Pujol, Alexander N. Shor, Alexey E. Syzyumov Leonard R. C. Tjalsma, William H. Walton.

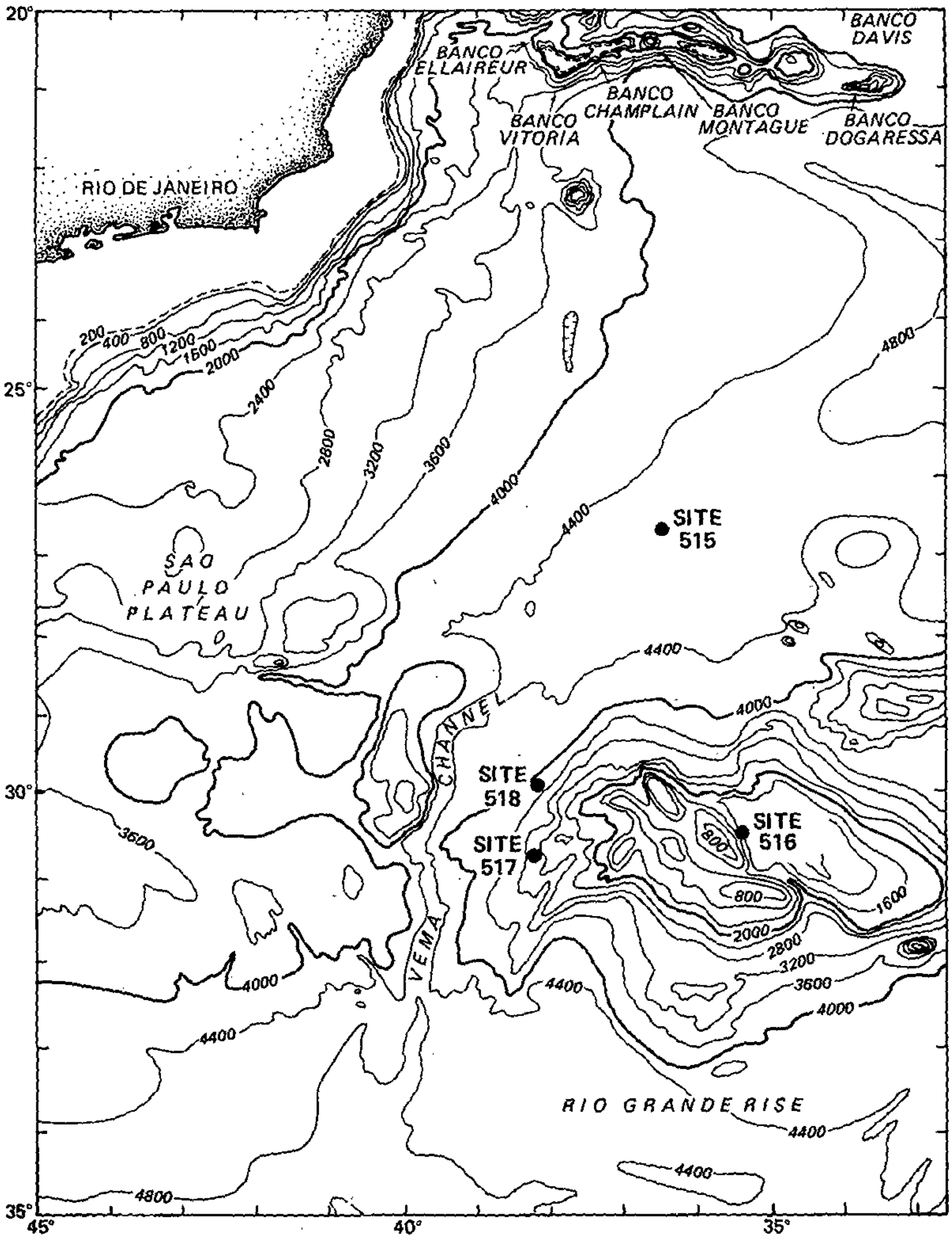


Figure 7 Location of Sites Drilled During Leg 72.

Table 3 Leg 72 Coring Summary

HOLE	DATES (1980)	LATITUDE	LONGITUDE	WATER DEPTH* (m)	PENETRATION (m)	NO. OF CORES	METERS CORED	METERS RECOVERED	PERCENT OF RECOVERY
515	1 March	26°14.33'S	36°30.17'W	4250.4	55.5	3	17.5	5.45	31
515A	2-4 March	26°14.31'S	36°30.17'W	4252.0	107.9	27	107.9	95.69	89
515B	4-9 March	26°14.32'S	36°30.17'W	4252.0	636.4	57	541.5	429.10	79
516	11-12 March	30°16.59'S	35°17.11'W	1313.0	183.3	44	183.3	148.07	81
516A	12-13 March	30°16.59'S	35°17.11'W	1313.0	69.5	16	69.5	61.10	88
516B	13 March	30°16.59'S	35°17.11'W	1313.0	23.2	1	7.6	4.52	59
516C	13 March	30°16.59'S	35°17.11'W	1313.0	20.6	1	6.5	0.00	0
516D	14 March	30°16.59'S	35°17.11'W	1313.0	90.1	0	0.00	0.00	0
516E	15 March	30°16.59'S	35°17.11'W	1313.0	90.1	0	0.00	0.00	0
516F	17-29 March	30°16.59'S	35°17.11'W	1313.0	1270.6	128	1101.5	691.72	63
517	30-31 March	30°56.81'S	35°02.47'W	2963.0	50.9	12	50.9	48.49	95
517	2-4 April	29°58.42'S	35°08.12'W	3944.0	76.7	19	76.7	59.57	78

*water depth from sea level

normal tholeiitic crust. The rate of extrusion, total volume, and geochemistry of the volcanic rocks beneath these rises, together with the rheology of the upper mantle, may create a set of conditions where "normal" subsidence rates cannot be applied to these particular types of features.

Our present interpretation of the age, geochemistry, and subsidence history of the Rio Grande Rise are limited by the lack of basement rock samples, a continuously cored depositional sequence, and sufficiently abundant depth indicators to define a subsidence curve. A primary objective of Leg 72 was, therefore, to drill the Rio Grande Rise to recover its entire depositional record, as well as samples of the underlying volcanic basement.

2) To what extent has the development of the Rio Grande Rise influenced the Cenozoic evolution of the southwestern Atlantic circulation? The question is asked to address the broader question, to what extent do tectonic movements versus climatic changes control major changes in circulation patterns?

The circulation of the world's major water masses is to a large extent constrained by physiographic features such as ridges, channels and sills. We drilled Leg 72 sites to learn more about the plate tectonic movements which alter the configurations of these topographic barriers and their influence upon circulation patterns.

Site 515

We drilled Site 515 to sample a complete sequence of sediment deposited under the influence of Antarctic Bottom Waters which enters the Brazil Basin through the Vema Channel about 200 km south of the Site (Figure 7). Variations in the flow of Antarctic bottom water should reflect both short-term "Milankovich", and long-term climatic variations, as well as the development of the Vema Channel itself, and changes in sill depths at the other barriers to bottom water flow farther south. We would expect these flow variations to produce changes in the grain size, composition of terrigenous detritus, sediment fabric, sedimentation rate, carbonate content, and the nature and state of preservation of siliceous microfossils. Marine geologists hold that Antarctic bottom water was first produced quite suddenly about 37 million years ago (the Eocene/Oligocene boundary) when the Cenozoic global cooling had proceeded far enough to permit seasonal sea ice production at the Antarctic margin. The resulting invigorated thermohaline circulation was thus responsible for the widespread hiatus spanning this boundary. We identified this hiatus as a prominent, well defined and regionally discordant seismic reflector lying at 0.74 seconds.

Technical difficulties forced us to abandon Hole 515 after only 3 cores were taken. We sampled Hole 515A to 107.9 meters with the hydraulic piston corer (HPC) and rotary drilled Hole 515B to 636.4 meters, some 20 meters beneath the 0.74 second reflector.

Recovery was high in both holes (515A=89%, 515B=79%) except for the occasional loss of an entire core when the core-catcher dogs jammed closed in the sticky clay. The hydraulic piston cores were not deformed except for a 10-50 cm soupy interval at the top caused by washing the bit down Hole 515.

We divided the sedimentary section at Site 515 into three units.

Unit I. The uppermost unit is a grayish brown terrigenous mud extending to 180 meters. It was deposited during the late Miocene or early Pliocene to Quaternary at a mean sedimentation rate of between 20 and 35 m/my. The uppermost 40 meters (~ 2 my) contain some layers rich in calcareous microfossils. Elsewhere, carbonates are rare, and we found no other firm evidence of variations in the flow regime. The contact between Unit I and Unit II is gradational.

Unit II. Unit II comprises 351 meters of middle Miocene to upper Oligocene dark greenish gray siliceous mud and mudstone. The uppermost *sub-unit IIA* contains up to 15 per cent of mostly fragmented radiolarians, diatoms, and sponge spicules: thin horizons contain up to 10 per cent calcareous material. Bioturbation increases downward, as do small-scale sedimentary structures indicating deposition during more variable and energetic bottom circulation. The proportion of silt-size material is small, however, and the mean sedimentation rate is a high 40 m/my.

Sub-unit IIB conprises 86 meters of upper Oligocene dark greenish gray terrigenous mudstone. It is distinguished from Sub-unit IIA by the virtual absence of siliceous microfossils and its somewhat more faint laminae containing calcareous microfossils. These characteristics, along with an alternation between calcareous and agglutinated benthic foraminiferal assemblages, record a time fluctuating bottom currents. As far as we can ascertain the mean sedimentation rate was also high during deposition of Sub-unit IIB.

Unit III is a hard, lower Eocene (49-53 my) calcareous, zeolitic mudstone. The boundary between Unit II and Unit III, spans 20 to 25 million years and is marked by a 20 cm-thick of lag deposit sand-size grains of quartz, biotite, assorted heavy minerals, glauconite, and fish teeth. Bioturbation is common in this and in the underlying calcareous zeolitic mudstone. We estimate that the carbonate compensation depth was below 3665 meters during the early Eocene, and above 4200 meters during the Oligocene.

Although we obtained little *direct* evidence of Antarctic bottom water entering the Brazil Basin via the Vema Channel from sediments cored at Site 515, the characteristics of Units I and II are consistent with such an origin. The accumulation rate of Unit III (~ 6 m/my) is normal for pelagic sediments; but transportation by bottom currents from the south more easily accounts for the much higher rates of Units I and II. The presence of fragmented siliceous microfossils in Sub-unit IIA suggests erosion and redeposition. The small-scale sedimentary structures and intercalated thin carbonate horizons near the base of Sub-unit IIA and in Sub-unit IIB suggest deposition in a regime of energetic and variable bottom currents.

The correlation between the hiatus separating Units II and III and the generally accepted timing of the onset of energetic transport further indicates that subsequent deposition at Site 515 was influenced by Antarctic bottom water. The hiatus, unfortunately, is broad, and we cannnot refine the possibly naive concept that bottom water production suddenly began at the Eocene/Oligocene boundary. We infer from the magnetic properties of the Site 515 sediments that a good stratigraphic correlation will emerge following more careful demagnetization. The magnetic intensities correspond well with the lithologic units; and seem to reliably reflect the terrigenous component.

Study of the siliceous microfossils should provide biostratigraphic data and could yield vital information on provenance and fluctuations in bottom current strength.

One puzzling aspect of the work concerns the *differences* between Units I, IIA and IIB. For example, the siliceous microfossils of sub-unit IIA are not present in I or IIB. Diagenetic effects may be responsible in the more deeply buried unit, but certainly not in the shallower interval. Why does the sedimentation rate change between Units I and II? Is there a short hiatus here? A generally cooling climate in the high latitudes, has, of course, influenced the production of both Antarctic Bottom Water and North Atlantic Deep Water which lies above it. Tectonic events, such as the subsidence of the Iceland-Faeroes Ridge and the opening of Drake Passage, have also influenced bottom water transport and possibly its production. The Vema Channel itself has evolved through the period represented by the sediments recovered at Site 515. The channel perhaps migrated westward and, when bottom water was more plentiful, formed additional subsidiary channels to the west (Figure 7). Analysis of the reflection profiles, which show an excellent correlation with the lithologic units described above, will help us assess these possible influences.

We also drilled Site 515 to improve our understanding of how bottom water transport responds to the "Milankovich" orbitally-induced climatic variation. More detailed carbonate-content and grain-size studies of the somewhat attenuated Pleistocene sequence may yet permit correlation, on the basis of fluctuating carbonate content, with the shallower sites of Leg 72.

Site 516

Site 516 is located in 1313 meters of water on the notheast flank of the Rio Grande Rise. During the 19 days on the site, we drilled seven holes, four of which, because of bad weather, or equipment malfunction, were abandoned with little or no recovery. We continuously cored Hole 516 with the hydraulic piston corer to 183.3 meters, with 81 per cent recovery. At Hole 516A we re-cored the upper 69.5 meters (88% recovery) in anticipation of a heavy demand for samples. Hole 516F was washed to 169.1 meters, then continuously cored with the rotary drill to 1270.6 meters. We successfully measured the heat flow at Hole 516F but were unable to log because of caving at 184 meters. Drilling at Hole 516F established a new DSDP single-bit rotation record of 157.4 hours.

The shipboard sedimentologists recognized

Table 4. Summary of Lithologic Units, Leg 72

UNIT	DEPTH (m)	LITHOLOGY	TIME-ROCK UNIT
1	0-198	Foraminifer and nannofossil ooze	Recent to Lower Miocene
2	198-332	Foraminifer-nannofossil semi-consolidated ooze and chalk	Lower Miocene-Upper Oligocene
3	332-610	Nannofossil and foraminifer-nannofossil chalk	Upper Oligocene-Upper Eocene
4	610-875	Nannofossil and foraminifer chalks and limestone with turbidites and ash layers	Middle Eocene
5	875-950	Microcrystalline limestone	Middle Eocene-Lower Paleocene
6	950-1100	Limestone and marly limestone	LowerPaleocene to Maestrichtian/Campanian
7	1100-1240	Limestone, marly limestone, claystone	Campanian to Coniacian/ Santonian
8	1240-1270	Calcareous and volcanogenic breccia over basalt	Undetermined

eight lithologic units on the basis of (1) degree of lithification and diagenesis in an essentially continuous pelagic carbonate succession, and (2) degree of contamination by mainly volcanogenic material. The units are described on Figure 8 and Table 4.

We cored eighteen meters of basalt below 1252.6 meters, recovering 14.7 meters. Three flow units are probably present, as evidenced by thin brecciated zones interpreted as flow tops. The upper 5-10 meters of basalt have a calcitized groundmass, but fresh rock beneath offers good prospects for geochemical analysis and radiometric dating. The presence of large vesicles and abundant coralline algae, as well as echinoid, bryozoan, and mollusk fragments in cracks and in the overlying breccia suggests that the eruption occurred in shallow water.

A sharp transition above Unit 8 to the (?Upper) bathyal Coniacian-Santonian limestones at the base of Unit 7 may also encompass the magnetic polarity change of anomaly 34. The normal magnetization of the basalt confirms other evidence showing that it is not a sill, and suggests that it subsided rapidly, shortly after eruption. Clearly, we have an excellent chance to extract the subsidence history of the rise following detailed study of the basal section,

The sediment column above Unit 8 is dominated by pelagic biogenic carbonate which becomes progressively more lithified and recrystallized down section. Unit 4 is an interesting exception. Here a 275-meter middle Eocene formation which, although dominantly calcareous, contains beds of up to 30 per cent altered ash and volcaniclastic turbidites, and is floored by a 15-meter slumped mass of Maestrichtian limestone. We infer from these sediments that the upper part of the Rio Grande Rise (now at ~ 700 meters depth) was subjected to subaerial erosion and volcanic eruptions from nearby sources during the middle Eocene. The compressional wave velocities are higher in the limestones within this sequence (particularly those near the base) than in sediments to some depth below Unit 4. This unit corresponds to the strong, irregular composite reflector forming the "mid-section domes" of the UTMSI multichannel seismic profiles. These domes were previously thought to be crystalline basement. Silicification of the calcareous material by silica-enriched fluids derived from the volcanogenic material (which itself yields abnormally *low* velocities) probably causes the high velocities. Thus the "domes" may be diagenetic fronts associated with, and confined to, the immediate vicinity of turbidites and slumps. This interpretation is consistent with the disposition of the domes in the region around the site.

The carbonate sequence recovered at Site 516 appears, with the exception of a minor unconformity in the mid to upper Miocene (5-12 mybp), to be continuous from Santonian-Coniacian to Recent deposition. We recovered several important boundaries intact, including the Cretaceous/Tertiary, the Eocene/Oligocene, and the early Pliocene glacial to interglacial boundaries. Age determinations made on the basis of foraminifer and nannofossil assemblages conform to recognized absolute ages for Tertiary epochs. The Cretaceous nannofossil succession is consistent in part with that suggested by van Hinte, but agrees better with results from nearby Site 357.

Sedimentation rates exceed 10 m/my (uncorrected for compaction) except within the Paleocene and parts of the Neogene section. The sediments appear stably (though weakly) magnetized and the site could well become a biostratigraphic and magnetostratigraphic type section. The calcareous microfossils are very well preserved from the Recent to the middle Miocene, well to moderately well preserved from that level to the middle Eocene, moderately well to poorly preserved through the middle Eocene of Unit IV, and well to moderately well preserved from that level into the upper Maestrichtian sediments. Preservation rapidly deteriorates below the upper Maestrichtian to the base of the hole. The high sedimentation rate, however, should permit detailed paleontologic studies including those of (1) fluctuations of benthic assemblages, in a mid-slope (bathyal) environment, largely free from downslope reworking, (2) productivity ratios of planktonic versus benthic foraminifers, (3) variations in oxygen and carbon isotope in assemblages above the middle Eocene sediments, and (4) precise comparison of benthic assemblages with the computed subsidence history.

Site 517

Site 517 (AB-7) is one of a series planned to traverse the Rio Grande Rise to study Cenozoic lithofacies, carbonate dissolution, temperature, productivity, and ocean circulation at different water depths. We chose an intermediate depth on the Rise (~ 2950 meters), from which the piston core, CHN 115-88, containing a continuous late Pleistocene oceanographic

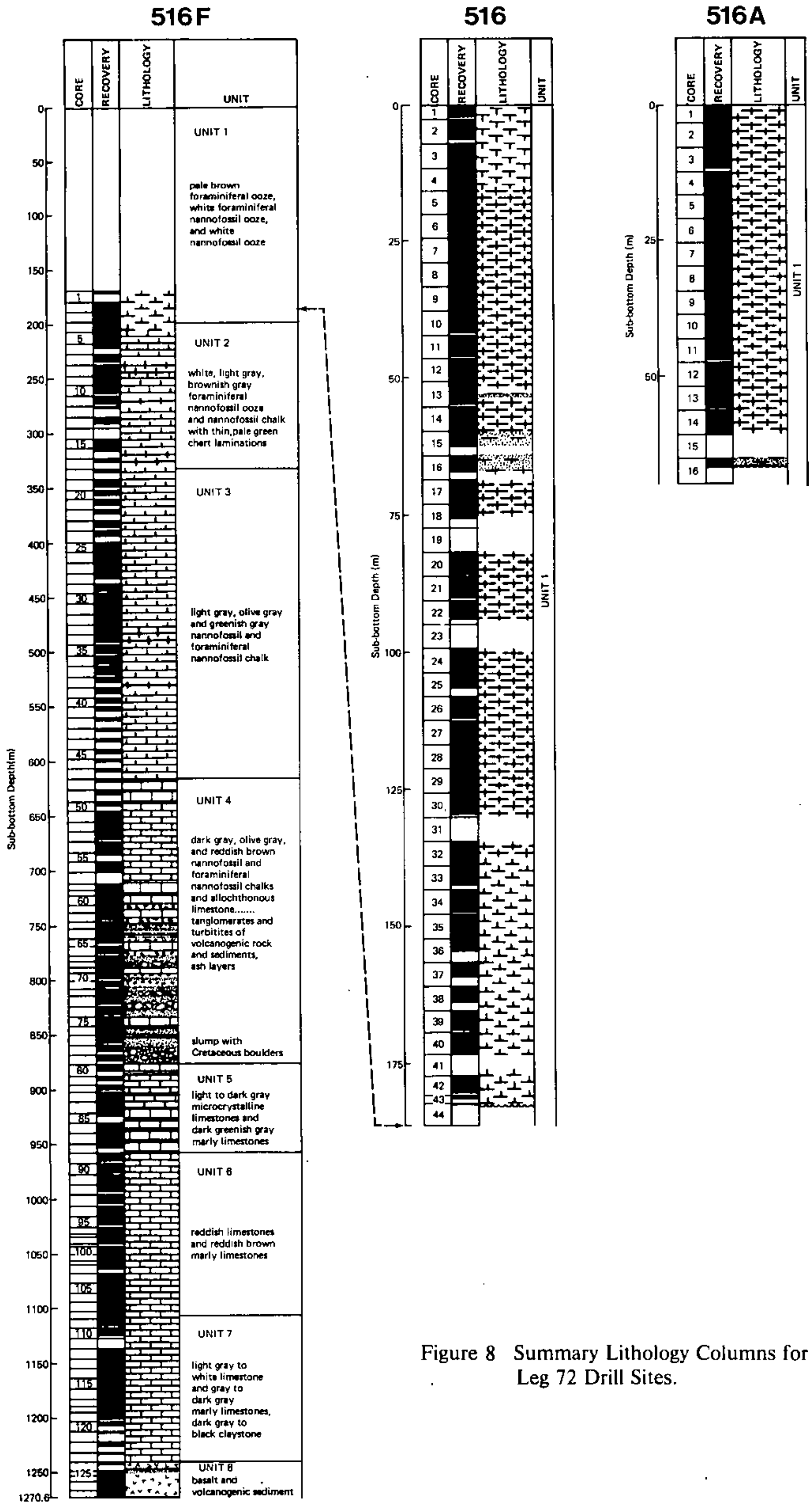
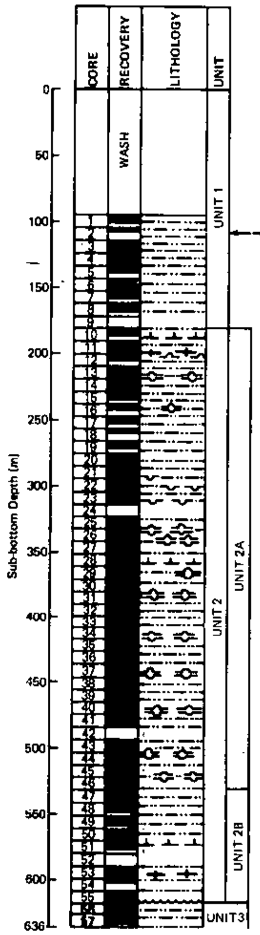
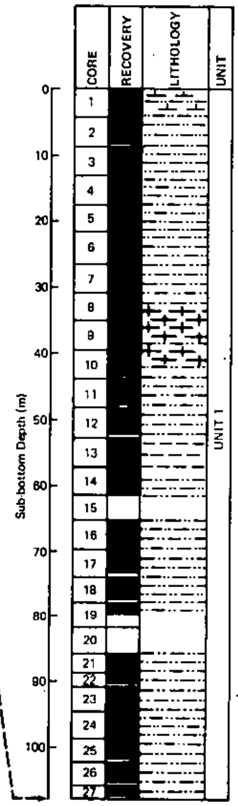


Figure 8 Summary Lithology Columns for Leg 72 Drill Sites.

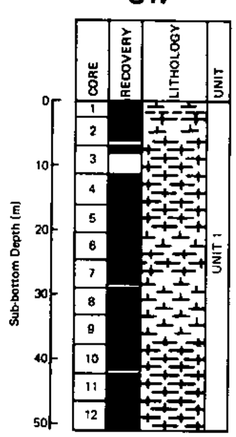
515B



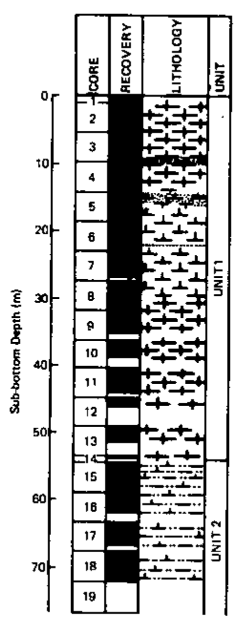
515A



517



518



record had been recovered to continuously core to the Cenozoic sediments to provide a lithologic and paleontologic record complementing that of the shallower Site (516) and deeper proposed Site (AB-8) on the Rise. Owing to time required to complete the drilling objectives at the previous site (516), we had to modify our objectives at Site 517 to hydraulic piston core only to the base of the upper Miocene. Adverse weather conditions forced premature termination of coring at Site 516, however. Drilling penetrated to only 48.4 meters and the oldest material recovered was mid-Pliocene (Zone NN15).

We recovered foraminifer-nannofossil ooze containing a few scattered pteropods and aragonite needles which attest to the excellent preservation of the calcareous components. Core 1 evidently penetrated the sea floor interface at last four times, as evidenced by a repeated lithologic succession of gray pteropod ooze overlying brown foraminifer-nannofossil ooze. Moreover, the drillers accidentally extruded several tens of centimeters of sediment from the liner into the barrel or onto the rig floor. Core recovery, consequently, is not uniformly high, and minor "unconformities" are probably artifacts of core handling.

Microfossils are uniformly well preserved throughout the cored interval; we saw no evidence of slumping or of reworked older material. Foraminifers are fragmented to varying degrees, possibly as a consequence of pulses in the production of the CO_2-rich NADW. The chronology of these dissolution pulses in the late Cenozoic will be further studied by fragmentation, dissolution, and oxygen isotope studies. We hope that the Site 518 sequence will contain the 3.2 million year datum at which isotopic data suggests that glaciation began in the northern hemisphere.

The assemblges of Pliocene benthic foraminifers are quite distinct from those of the Quaternary. They are dominated by *Epistominella umbonifera* rather than the expected *Globocassidulina subglobosa*. The former species is most diagnostic of AABW environments today, whereas the latter is more characteristic of NADW. Consequently, these cores may contain evidence for substantial shallowing of AABW during the late Pliocene.

Site 518

Site 518 (AB-8C) is between the Vema Channel terrace and the west flank of the Rio Grande Rise in 3944 meters of water — approximately at the interface between northward-flowing AABW and southward-flowing NADW. We planned to core the site to extend the previous interpretations of Pleistocene fluctuations of the AABW/NADW transition zone into the Neogene, and to integrate these results with those from Site 515.

At Site 518 we cored a single hole with the hydraulic piston corer. The hole penetrated to the lower Miocene Zones NN4/5 and N6 (approximately 18 to 19 m.y.b.p.) at 71.94 meters sub-bottom (Core 18).

We recognized two lithologic units. **Unit 1** (Cores 1-14; 0-54 m sub-bottom) consists of foraminifer-nannofossil ooze containing a few foraminiferal sand layers (turbidites?), Cores 5-7 were extensively reworked. Unit 2 (Cores 15-18; 54-71.9 m sub-bottom) comprises terrigenous mud and marly nannofossil ooze, with small amounts of zeolites, detrital mineral grains, and volcanic glass.

We detected four stratigraphic gaps within the sequence cored at Site 518. From youngest to oldest they are:

1) the upper Pliocene/lower Pleistocene; Zones NN17/18, and PL5/6 may be condensed or missing entirely,

2) the Pliocene/Miocene boundary; Zones PL1a/PL1b and NN12/13 may be condensed or missing,

3) most of the upper Miocene; Zones NN9 (part), NN10, and NN11 (part) appear to be missing,

4) part of the middle Miocene; Zones NN5-7 and N14-16 may be missing.

The late Miocene history is generally consistent with that inferred from drilling at Sites 357 and 516 near the crest of the Rise.

Carbonate analyses of Site 518 samples indicate that high-amplitude fluctuations of carbonate content extended throughout the entire Pleistocene, and perhaps back into the Neogene. Carbonate analyses studies on more closely spaced samples together with isotopic stratigraphy and studies of carbonate dissolution indices, will allow us to better evaluate the climatic significance of the carbonate data.

Benthic foraminifers at Site 518 are sufficiently abundant and well preserved to be potentially reliable as water mass indicators. The Quaternary sediments at Site 518 are characterized by relatively abundant *N. umbonifera* which may indicate presence of the AABW; the species is rare in the middle Pliocene to common in the lower and possibly upper Pliocene. At Site 517, however, the Quaternary sediments are dominated by *G. subglobosa*, one of the several taxa indicating NADW. In the upper Pliocene *N. umbonifera* is dominant.

If these taxa are closely associated with NADW and AABW, respectively, the AABW may have extended much further up the slope during the late Pliocene, and was perhaps as intense at Site 517 (depth 2963 meters) as at Site 518 (depth 3944 meters). During the middle Pliocene the NADW possibly extended further downslope into the vicinity of Site 518. Alternatively, the generally good correlation found between the occurrences of *N. umbonifera* and preservational state of the planktonic foraminifers at Site 518 suggests that the relative abundance of *N. umbonifera* may be an artifact of selective carbonate dissolution. If so, the species may be an indicator of intensity of flow or corrosiveness of the water, rather than strictly characteristic of the AABW per se.

We intended to drill another site directly beneath the axis of the Vema Channel, but were foiled by bad weather, and had to return to port one day early.

Leg 73[1]
Mid-Atlantic Ridge (Southern Latitudes)

Glomar Challenger left Santos, Brazil on 13 April 1980 and returned to Capetown, South Africa on 1 June 1980. Thirteen holes were drilled at six sites along a 1500-kilometer transect on the eastern flank of the mid-Atlantic Ridge. Much of the 1051 meters cored was sampled with the newly developed hydraulic piston corer. Table 5 summarizes the Leg 73 coring operations.

[1]Abridged from preliminary Leg 73 report prepared by Kenneth J. Hsü, John L. La Brecque (Co-Chief Scientists), Max F. Carman, Jr., Andrew M. Gombos, Jr., Anne-Marie Karpoff, Judith A. McKenzie, Stephen F. Percival, Nikolay P. Petersen, Kenneth A. Pisciotto, Richard Z. Poore, Edward Schreiber, Lisa Tauxe, Peter Tucker, Helmut J. Weissert, Ramil Wright.

Background and Objectives

Our primary goals on Leg 73 were to obtain samples with the newly developed hydraulic piston corer for detailed magnetostratigraphy and shore-based studies of temperature gradients, circulation patterns, water chemistry, biology and environments of the ancient oceans.

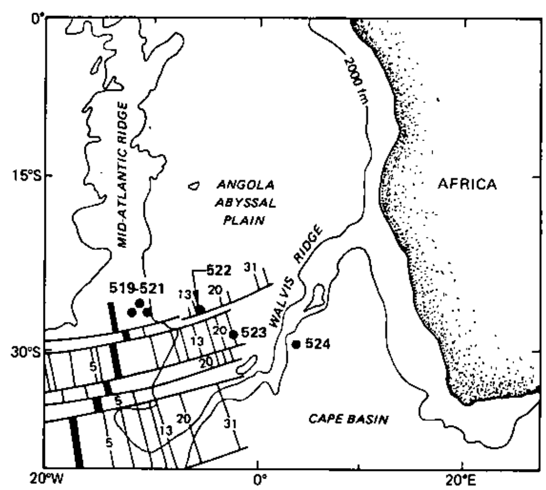


Figure 9. Location map showing positions of Leg 73 Sites, marine magnetic anomalies and the 2000-fathom bathymetric contour.

The Mid-Atlantic Ridge in the south Atlantic was last drilled during DSDP Leg 3 (1968-69) to determine the age of basement and to test the then new hypothesis of sea-floor spreading. The success of Leg 3 was a much cited achievement of the Deep Sea Drilling program. Samples obtained during that cruise, however, were greatly disturbed by rotary drilling, and none of the holes was continuously cored. Today, we can secure undisturbed samples to a depth of about 200 meters with the hydraulic piston corer (HPC), and improved rotary drilling allows us to continuously core an entire sedimentary sequence.

Recovery of undisturbed samples allows us to refine magnetic and biostratigraphic zonations and develop a precise time scale by which global phenomena may be correlated. Workers have previously developed a precise magnetobiostratigraphy for post-Miocene sequences, but greater precision on the magnetobiostratigraphy for much of the remaining Cenozoic has awaited development of the HPC.

Table 5. Leg 73 Coring Summary

HOLE	LATITUDE	LONGITUDE	WATER DEPTH (m)	HOLE DEPTH (m)	NO. OF CORES	METERS CORED	METERS RECOVERED	% OF RECOVERY	OLDEST SAMPLE	MAGNETIC EPOCHS	SEAFLOOR ANOMALY	AGE m.y.
519	26°08.20'S	11°39.97'W	3778.5	151.6	37	151.6	138.4	91.3	Upper Mio.	10	5^R	10.1
519A	26°08.20'S	11°39.97'W	3778.5	180.0	7	84.6	61.4	73.1	Basalt	10	5^R	10.1
520	25°31.40'S	11°11.14'W	4217.0	458.5	31	246.5	69.4	28.1	Middle Mio-Langh.	—	$5B^R$	14.3
520A	25°31.40'S	11°11.14'W	4217.0	18.5	1	2.4	2.4	100	Quat.	—	—	—
521	26°04.43'S	10°15.87'W	4141.0	84.0	21	84.0	75.4	89.7	Middle Mio-Langh.	16	$5C^N$	15.9
521A	26°04.54'S	10°15.59'W	4141.6	71.1	17	71.1	64.3	90.4	Middle Mio-Langh.	16	$5C^N$	15.9
522	26°06.84'S	05°06.78'W	4456.6	148.7	39	148.7	137.7	92	Upper Eoc.	C-16	16^N	38.4
522A	26°06.84'S	05°06.78'W	4456.6	156.0	31	106.0	97.9	89.9	Upper Eoc.	C-16	16^N	38.4
522B	26°06.84'S	05°06.78'W	4456.6	170.4	6	40.5	25.3	62.6	Upper Eoc.	C-16	16^N	38.4
523	28°33.13'S	02°15.08'W	4572.0	193.5	51	182.5	149.2	81.9	Middle Eoc.	$C\text{-}20^N$	51.0	
524	29°29.05'S	02°30.74'W	4805.0	348.5	35	306.5	199.4	65	Upper Cret.	$C\text{-}31^r$	?	71
524A	29°29.05'S	02°30.74'W	4805.0	47.5	2	19.0	9.9	52	Upper Cret.	$C\text{-}31^r$	?	—
524B	29°29.07'S	02°30.74'W	4804.5	29.5	7	29.5	20.7	7	Upper Cret.	$C\text{-}31^r$	?	—

Before availability of the hydraulic piston corer, only ages for basal sediments above known magnetic anomalies and occasionally those from sedimentary sections on land could be used for Paleogene correlations. The samples obtained from the HP cores not only allow expanded Paleogene correlations, but also permit detailed study of Cenozoic geomagnetic field phenomenon such as intensity fluctuations, short events, and anomalous skewness.

Sampling Principles

To sample sediments which could be precisely dated for paleoceanographic study we established certain sampling principles. We needed to penetrate complete sequences in which the fossil record was well preserved. Leg 3 drilling revealed that the calcareous planktonic assemblages had been dissolved in much of the middle Miocene sequence. To alleviate this dissolution effect we tried to position the Leg 73 drill sites at places where sediments had been deposited in shallower water or near the ridge crest; but because the HPC can penetrate to only about 200 meters sub-bottom, we had to choose sites at which the *younger* sediments had been removed by dissolution or erosion.

Normally subaqueous slumping precludes sampling on the slope of a basin for paleoceanographic studies. The possibility of drilling a continuous sequence in the bottom of the valley is even less; not only would slumped materials confuse the fossil record, but we would not expect the hydraulic piston corer to efficiently sample thick sequences of ponded facies. We discovered, however, that because turbidites hinder dissolution of calcareous and siliceous fossils, we could detect certain paleoceanographic events — registered by easily soluble fossils — only in a ponded sequence.

After drilling the first three sites we noted that lateral changes in dissolution facies were less pronounced than envisioned during the planning. We therefore chose to obtain a duplicate set of samples (from two HPC holes) at one site to obtain a precise stratigraphic record rather than core two similar, but incomplete, sections from closely adjacent sites. By doing so, we had enough time to complete the traverse of the Cenozoic section by drilling one last site in the Cape Basin.

Our samples should thus provide high-resolution reference sections for Cenozoic stratigraphy. They can be used to determine the timing and duration of specific oceanographic events: (1) the terminal Cretaceous crisis, (2) the middle Eocene events, (3) the terminal Eocene crisis, (4) the middle Oligocene events, (5) the middle Miocene dissolution events, (6) the terminal Miocene-Messinian crisis, and (7) the Pliocene-Quaternary events.

Stratigraphy and Lithology

The stratigraphic sections penetrated at the six drill sites are shown diagramatically in Figure 10. The sediments at Sites 521, 522, and 523 are mainly pelagic. Those at Sites 519, 520 and 524 are mainly ponded sequences, but are also pelagic at the lowermost parts of Sites 519 and 520, and the uppermost part of Site 524.

At all ridge-flank sites (519-523) the Quaternary and upper-middle Pliocene sediments are biogenic ooze, whereas the lower Pliocene and Miocene sediments are marl ooze, nannofossil clay, or red clay. Oligocene and Eocene nannofossil ooze and marly ooze are present at Sites 522 and 523. At Site 524, sediments younger than early Eocene are absent; the lower Eocene, Paleocene, and Maestrichtian sediments there comprise ooze, marl, volcaniclastic sand or sandstones, and basalt flows and/or sills near the base of Hole 524.

We continuously sampled Sites 519, 521, 522, and 523 with the hydraulic piston corer, and obtained additional data with rotary drilling at Sites 520 and 522.

At Sites 519 and 521, we obtained good correlation between the magneto-biostratigraphy down to middle Gilbert or lower Pliocene sediments. Either site could serve as a reference section for this interval in the mid-latitude South Atlantic. Miocene and lowest Pliocene correlations are poor because the section is condensed by dissolution and we cannot easily recognize stratigraphic signals. But shore-based studies should give sufficiently refined magnetostratigraphic data to date samples needed for paleoceanographic studies.

Drilling at Site 522 gave a complete magnetostratigraphic record from the Quaternary to the upper Eocene, although the correlation with the biostratigraphy is not good in the condensed Miocene section. The samples from the top of the Oligocene (magnetostratigraphic Epoch C6R) to the bottom of the upper Eocene (Epoch C16N) yielded good biostratigraphic, and excellent magnetostratigraphic, data. This sequence is remarkably free of unconformities and of contamination caused by

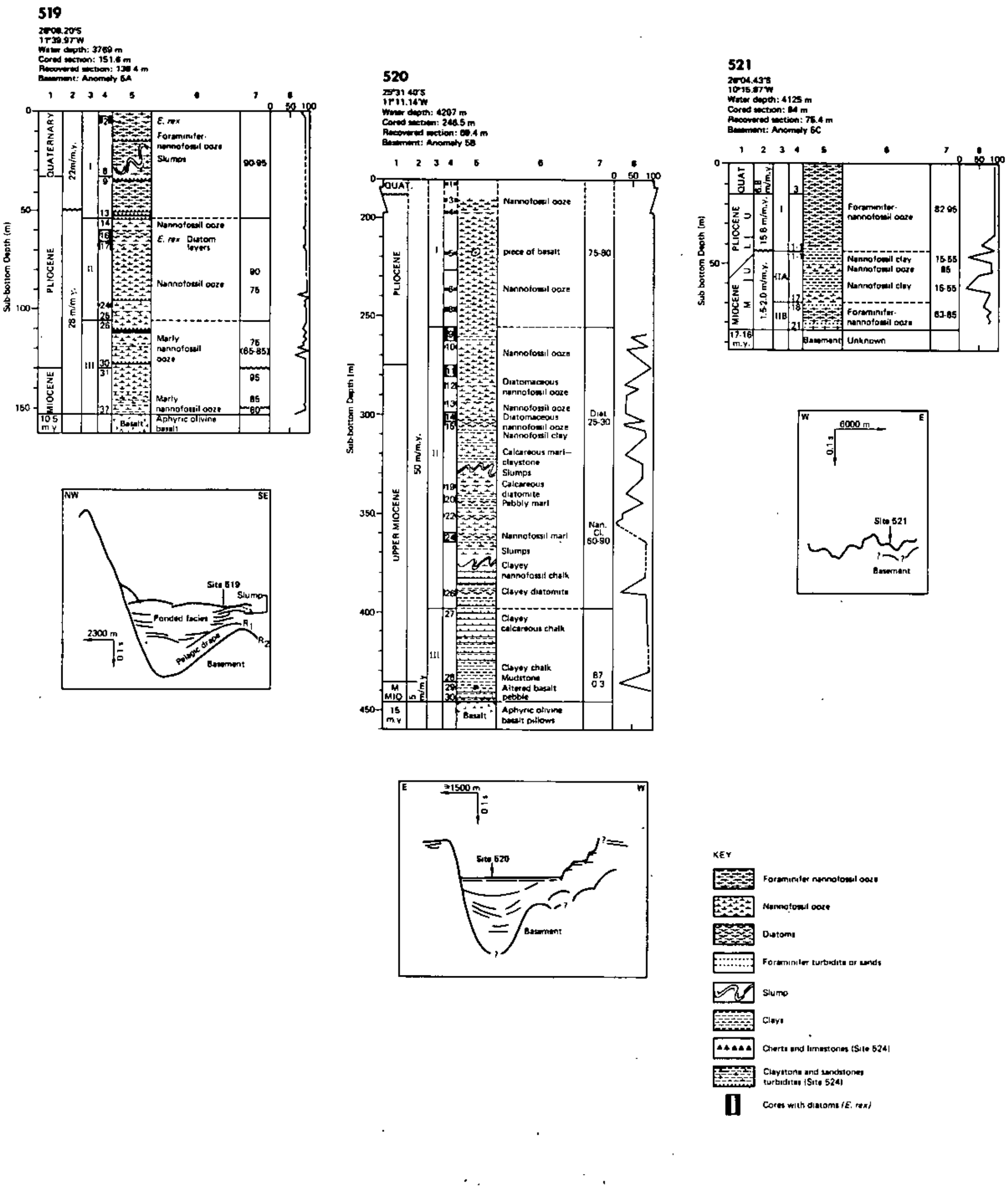
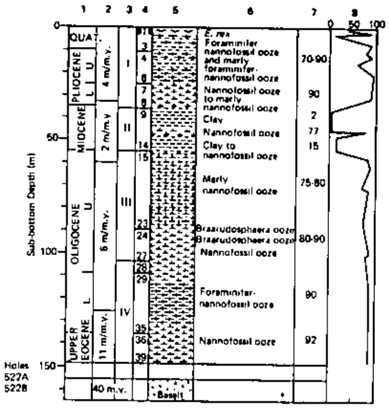
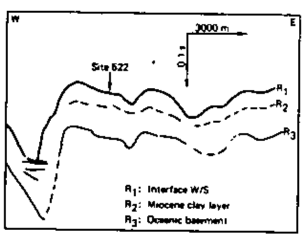


Figure 10. Stratigraphic summary of Leg 73 Sites with sketches of corresponding seismic sections.

522

26°06.84'S
05°07.78'W
Water depth: 4441 m
Cored section: 148 m
Recovered section: 137.7 m
Basement: Anomaly 16

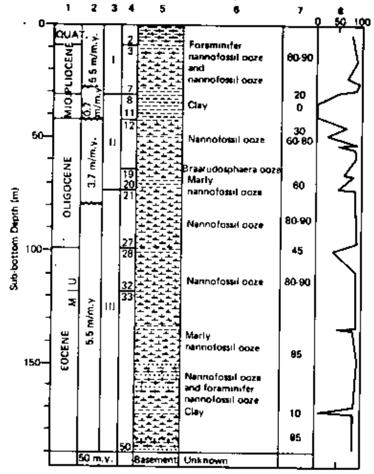


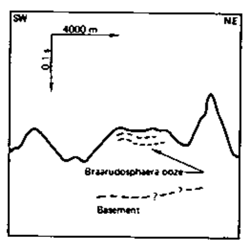


1. Biostratigraphic age (Nanno/Foram)
2. Sedimentation rate by biostratigraphy
3. Sedimentological units
4. Number of cores
5. Bulk sediment symbols
6. Bulk sediment name
7. Average % $CaCO_3$ (on board)
8. $CaCO_3$ (%)

523

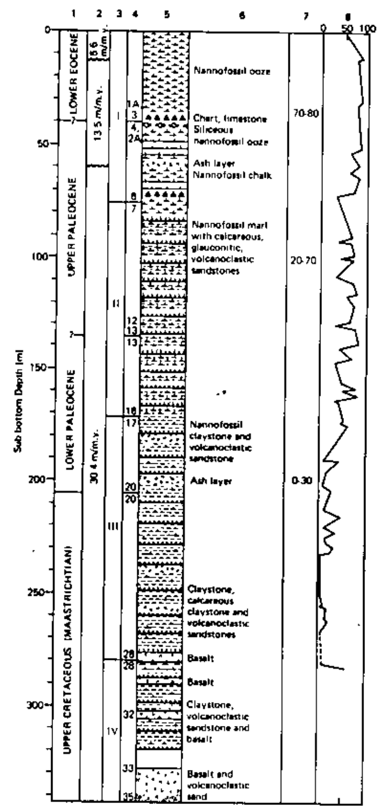
28°33.13'S
02°15.07'W
Water depth: 4563 m
Cored section: 182.5 m
Recovered section: 148.2 m
Basement: Anomaly 21

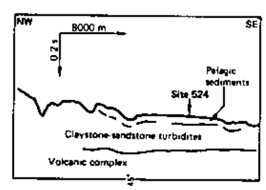




524

29°29.05'S
03°30.74'E
Water depth: 4796 m
Cored section: 306.5 m
Recovered section: 199.4 m
Basement: ?





resedimentation. We sampled the section twice with the hydraulic piston corer, and expect it to provide a standard reference section for this part of the geologic time scale.

Drilling at Site 523 extended the correlation between the biostratigraphy and magnetostratigraphy down to lower middle Eocene (Epoch C20R). The sequence is mainly pelagic, but its value as a reference section for first and last appearance datums is somewhat marred because some key fossil species in the upper Eocene sediments have been dissolved. At Site 524, we further extended the correlation between the two time scales to the middle Maestrichian (Epoch C31R), with a short interruption in the lower Eocene (Epochs C21N-C22R). (See also front cover.)

Figure 11 shows an example of the precise stratigraphy which is possible using the magnetostratigraphic potential of the HPC cores. The preliminary data show the sediment accumulation rates for Site 522 interpreted on the basis of magnetostratigraphic data. This precision could not have been achieved without the magnetostratigraphic data and demonstrates the variation in accumulation rates associated with the various oceanographic events discussed later. Note that by using the magnetostratigraphic data we were also able to date the *Braarudosphaera* chalk as C10R and detect a possible oceanographic event in the mid-Oligocene following the *Braarudosphaera* bloom.

Magnetostratigraphy and Sea Floor Anomalies

We obtained excellent correlation between the magnetostratigraphy and the sea floor anomalies at all ridge-flank sites (519-523). The magnetostratigraphic correlation at sites underlain by Miocene crust is so good it provides more accurate basement ages than does biostratigraphic dating. This is because the magnetostratigraphic signals persist through the dissolution facies. The correlation of the long normal-polarity interval of Epoch 9 with Anomaly 5, for example, gives an age for basement of 10 million years B.P. at Site 519; the oldest sediments could not be dated more accurately than late Miocene. The basement at Sites 520, 521, 522, and 523 could only be dated on the basis of biostratigraphic zones, each spanning one or two million years. In contrast, the basement could be more precisely dated to within less than one million years by correlation with sea floor magnetic anomalies. At three of the five ridge-flank sites where basalt was cored, the basalt, and the immediately overlying sediments, have the same magnetic polarity. Furthermore, in Holes 519, 522, and 523 we were able to trace the convergence of the magnetic polarity sequences of both the sediments and basement as they aged toward the basement contacts. The excellent correlation between the magnetostratigraphy and sea-floor magnetic anomalies leaves little doubt that the oldest overlying sediment gives a reliable age for the basement, and lends support to paleontologically derived interpretations of the history of sea-floor spreading.

At Site 524, we drilled into a series of sills and flows interbedded with sediments; but failed to reach the oceanic basement which lies one or two kilometers deeper. We were able to determine unequivocally the magnetostratigraphy across the Cretaceous/Tertiary boundary which will greatly aid in correlating events across that boundary on a global scale.

The dating of the basement at the ridge flank sites is consistent with linear spreading in the South Atlantic during the last 50 million years (since Epoch C20N). Unfortunately, we did not have enough time to drill anomaly 24 to test the hypothesis of slightly nonlinear spreading during the early Eocene and late Paleocene.

Paleoceanographic Events

Terminal Cretaceous Crisis We cored an expanded record of the transitional Cretaceous/Tertiary boundary at Site 524. The interval, in Core 20, Section 3, is represented by red mud deposits with intercalated turbiditic sand layers. The mud immediately above the uppermost Upper Cretaceous biogenic sediment is mainly volcanic detrital clay and silt and contains a few planktonic fossils reworked from the underlying Cretaceous formations. A few chitinous nannofossil *Thoracosphaera* spp. and benthic foraminifers may be the only indigenous biota. The nannofossil zone NP1 is identified by the first occurrence of *Markalius inversus* near the top of Core 20, Section 1; NP2 is recognized by the first occurrence of *Conciplacolithus tenuis* in Core 19, Section 4. The overlying Cores 12-18 contain a thick NP3 zone (*Chiasmolithus danicus*).

The transitional interval seems to record a sudden extinction of rich Cretaceous faunas and floras and a gradual appearance of Tertiary species. Although such a transition has been described from land sections, the interval at Site 524 is unusually thick and

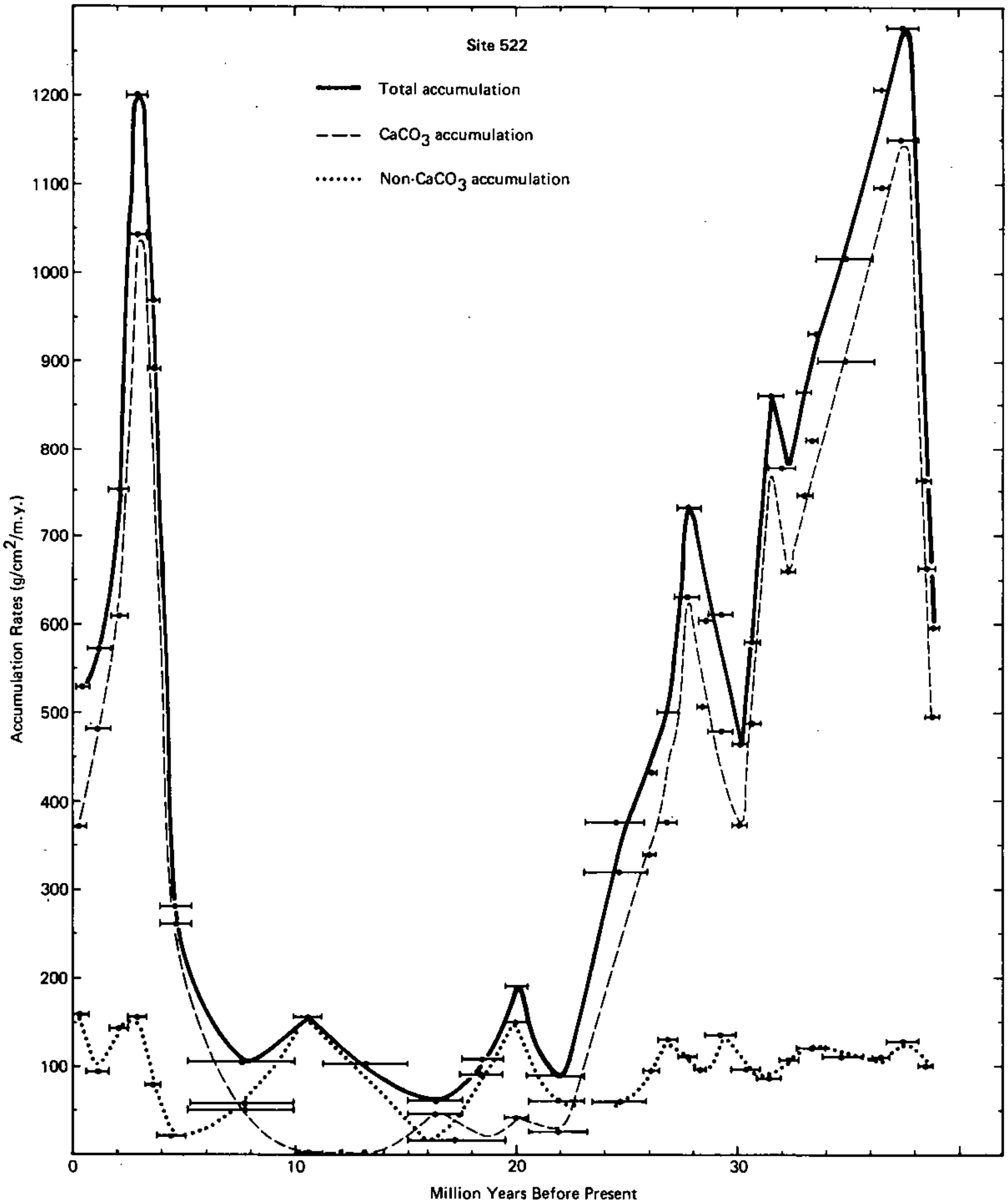


Figure 11. Accumulation rate curves for Site 522.

studies of the physical and chemical changes across the Cretaceous/Tertiary boundary.

Middle Eocene Events We continuously sampled middle Eocene sediments with the hydraulic piston corer at Site 523. We detected evidence for two middle Eocene dissolution events from the preliminary shipboard analyses.

Terminal Eocene Crisis We sampled upper Eocene and lower Oligocene sediments at Sites 521 and 522. Several previous studies have indicated that a cooling period occurred at the end of the Eocene. Shore-based investigators should be able to determine the extent and duratiion of that interval.

Middle Oligocene Events The *Braarudosphaera* chalk layers sampled at Site 521 may have been deposited during a time of high productivity. Shore-based investigators will study oceanographic changes associated with the monospecific blooms of this nannofossil. We suspect that this is related to the tectonic evolution of the Drake Passage.

Middle Miocene Dissolution The carbonate lysocline must have risen repeatedly above 2500 meters during the middle Miocene; sediments deposited during this time have been subjected to extensive dissolution everywhere. Shipboard analyses indicate that the rise of the carbonate compensation depth (CCD) may have started in the early Miocene and that highest level of the lysocline was reached during the Serravalian (NN7). We do not know what caused this CCD rise but suspect that the extensive dissolution may be related to weak bottom water circulation which permitted the generation of corrosive bottom waters through the production of CO_2 from the decay of organic matter.

Terminal Miocene Crisis The carbonate lysocline fluctuated during the early late Miocene (early Tortonian) and again rose to a very high level during the latest Miocene (Messinian) and earliest Pliocene. Two or more dissolution maxima are manifested by carbonate-poor sediments at Sites 519 and 520 but at Sites 519 and 520 but at Sites 521 and 522 only one dissolution event, represented by a red nannofossil clay formation, occurred during the Miocene.

Pliocene-Quaternary Events The great Miocene CCD rise ended abruptly during the early Pliocene. On the basis of the benthic fauna we infer that the first major invasion of the Antarctic Bottom Waters (AABW) to this part of the South Atlantic occurred at this time. The active bottom circulation may have flushed away corrosive CO_2-rich waters and thus caused a general depression of the CCD in the South Atlantic. At times, however, the AABW seemed to have been slightly more corrosive and to flow more vigorously.

Shore-based investigators will further study stable isotopes of benthic foraminifers to learn more about the fluctuations of the Atlantic-Antarctic Bottom and North Atlantic Deep waters.

Paleoceanographic Circulations The occurrences of a monospecific diatom (*Ethmodiscus rex*) oozes in the Pliocene and upper Miocene, and of the monospecific nannofossil (*Braarudosphaera* sp.) oozes in the Oligocene sedimens are probably a combined result of surface blooms, and of the species relative resistance to dissolution.

The occurrence of *Ethmodiscus* ooze is usually associated with subtropical currents off the west African margin during the Quaternary glacial stages. *Ethmodiscus* ooze occurs in the Pliocene and Quaternary sediments at Sites 519-522, and is absent at two more easterly sites. We assume that its distribution is related to the circulation of nutrient-rich surface currents during those times.

The *Braarudosphaera* chalk is commonly present in South Atlantic mid-ocean sites drilled on crust older than the middle Oligocene. Its distribution seems to suggest a west to east flowing current reminiscent of the circulation of the present-day southern current. We are investigating the possibility that the South Atlantic drill sites were previously at higher latitude.

The discovery of upper Miocene laminated diatomites similar to those found in regions of coastal upwelling (e.g. Monterey diatomite), in a present-day gyre was perhaps the greatest surprise of the cruise. The diatomites were preserved in an anoxic (presumably silled) basin. Their presence indicate that diatom production during the late Miocene in the south Atlantic may have been far more extensive than available records suggest, and encouraged us to look for "missing signals" in turbidite basins.

Igneous Petrology and Origin of the Walvis Ridge

Preliminary analyses indicate, that the basement rocks cored at Sites 519, 520, and 522 are weathered to fresh tholeiitic basalts. On the basis of paleomagnetic data we also suspect that these rocks were significantly rotated by tectonic processes.

Coring at Site 524, located 15 km east of the central Walvis Ridge, penetrated the upper layers of a 1.7 km-thick sequence of intercalated lava flows and sills of apparently alkalic basalt. The composition of the lavas appears to vary with depth but the age of the flows is compatible with a Maestrichtian age for the central Walvis Ridge. The relation between basalt petrology to the history of sea-floor spreading and to the origin of the Walvis Ridge will be analyzed by shore-based investigators.

The members of the scientific staff would like to express their appreciation of the energy and dedication shown by the *Glomar Challenger*'s drilling crew and technical staff. Both DSDP and Global Marine personnel showed interest in our objectives and provided us with the support (and sometimes prodding) which we needed to achieve those objectives.

SITE SUMMARIES

Leg 74, Walvis Ridge

Co-Chief Scientists: Theodore C. Moore, Jr. and Philip D. Rabinowitz

Site 525 (SA II-1)
Hole 525

Latitude: 29°04.24'S
Longitude: 2°59.12'E
Water depth: 2461 meters

Site 525 is located on the broad, relatively flat crest of a NNW-SSE trending block of the Walvis Ridge on crust of magnetic anomaly 32. Three holes were drilled which give a complete section from the seafloor to the top of a basement complex at 574 meters sub-bottom. An additional 103 meters were drilled into the basement complex.

Three major sedimentary lithologic units are observed. The top of Unit 1 (1-A) consists of a very homogeneous nannofossil and foraminifer-nannofossil ooze. The base of Unit 1-A coincides with a color change and a major hiatus between upper Oligocene and middle Eocene sediments at 270 meters sub-bottom. The bottom of Unit 1 (1-B) consists of nannofossil and foraminifer-nannofossil ooze and chalk which terminate at a well preserved Cretaceous/Tertiary boundary at 452 meters sub-bottom. Chert fragments were found near the base of Unit 1-B. The carbonate content in Unit 1 is greater than 90 per cent except near the base of the Unit where it drops a small amount.

The sediments in Unit 2 extend from the Creraceous/Tertiary boundary at 452 meters to the basement complex at 574 meters sub-bottom and consist of a cyclical pattern of nannofossil marly chalk and siltstone to sandstone of turbidite and/or slump origin. The oldest sediments are upper Maestrichtian to upper Campanian. The carbonate content of this unit is generally less than fifty per cent. Beautifully preserved biogenic sedimentary structures are present throughout the section. At the base of Unit 2 and overlying the basement complex is a spectacular, six-meter thick, classical turbidite section.

Unit 3 consists of 0.2- to 2.0-meter sections of bioturbated marly limestone and volcanogenic sediment, interlayered within the basaltic basement complex.

We drilled 103 meters into the basement complex consisting of basalt with interlayered sediment. The upper approximately twenty meters is a greenish gray, aphyric, vesicular and highly altered basalt. The remainder of the basalts are gray to black, moderately altered, predominantly aphyric, vesicular flows and pillows with glassy margins and numerous calcite veins. Most of the large vesicles are filled with calcite and minor amounts of pyrite. The groundmass consists predominantly of plagioclase and clinopyroxene (augite) with minor alteration products. The biostratigraphy and shipboard paleomagnetic results are consistent with crustal formation at the time of magnetic anomaly 32.

Engineering tests of the pressure core barrel and the drill bit motion indicator were continued. A downhole heat-flow experiment was successfully completed.

Site 526 (SA II-7)
Holes 526, 526A, 526B, 526C

Latitude: 30°7.4'S
Longitude: 3°8.3'E
Water depth: 1054 meters

Site 526 (SA II-7), located on crust magnetic anomaly 31-32, is the shallowest site drilled on the Walvis Ridge transect. Our primary objective was to recover a relatively complete and well preserved Neogene and upper Paleogene calcareous sedimentary section. The objective was very satisfactorily accomplished. In particular, the poorly preserved upper Miocene and Oligocene sections encountered at other sites were continuously cored and well preserved calcareous fossils were recovered.

The site was piston cored to a sub-bottom depth of 229 meters for a recovery rate of 98 per cent. We then rotary cored to 356 meters sub-bottom with a recovery rate of 38 per cent before the hole was terminated in a thick sand formation which created unstable hole conditions.

Five major lithologic units were observed: Unit 1, from the mud line to about 130 meters sub-bottom, consists of a very homogeneous lower Miocene white foraminifer and foraminifer-nannofossil ooze. Bioturbation is slight. The carbonate content is 97 per cent. Unit 2, from 130 meters to about 195 meters sub-bottom, is a homogeneous, lower Oligocene very pale orange to pinkish gray nannofossil ooze with a few chalk layers. Bioturbation is slight. The carbonate content is 92 per cent. Unit 3, from 195 meters to about 225 meters sub-bottom, is an upper Eocene homogeneous, pinkish gray foraminifer-nannofossil ooze. No bioturbation was seen. The carbonate content is 92 per cent. Unit 4 is a thin white limestone layer with oncoliths. Unit 5, from about 242 to 356 meters sub-bottom, is a calcareous sand with fragments of bryozoa, pelecypods and echinoids, indicating very shallow water conditions.

The pressure core barrel (PCB) worked successfully at this site.

Site 527 (SA II-5)
Hole 527

Latitude: 28°02.49'S
Longitude: 01°45.80'E
Water depth: 4437 meters

Site 527 (SA II-5), located on crust of magnetic anomaly 31, is the deepest site drilled on the western flank of the Walvis Ridge transect. The hole was rotary drilled, giving a complete sedimentary section from the seafloor to the top of a basement complex at 341 meters sub-bottom. An additional 44 meters were drilled in the basement complex. Engineering tests of the PCB were performed. Only density was successfully logged before the hole caved in.

Five major sedimentary units are observed. Unit 1, from 0 to 102 meters sub-bottom, consists of a Pleistocene to upper Miocene, very homogeneous, white nannofossil and foraminifer-nannofossil ooze. The carbonate content is 95 per cent. Unit 2, from 102 to 142 meters sub-bottom, is an upper Miocene to upper Eocene brown marly nannofossil ooze to nannofossil clay with a carbonate content ranging from 20 to 95 per cent. A cyclic sedimentation pattern begins in this unit. A major decrease or hiatus in sedimentation is observed between the mid-Miocene and the lower Oligocene within this unit. Unit 3, from 142 to 275 meters sub-bottom, consists of alternating beds of nannofossil chalk and ooze with the chalk beds increasing with depth. The carbonate content is 85 per cent. Unit 4 extends from near the Cretaceous boundary (which is well preserved) at about 275 meters sub-bottom to the top of the basement complex at 341 meters and is a reddish brown muddy nannofossil chalk. The non-calcareous components consist mainly of volcanogenic sediments. Unit 5 consists of 0.02, 0.60, and 3.50 meter thick sections of nannofossil limestone and carbonate mudstones interbedded within the basaltic basement complex. A very sharp increase in calcium and a decrease in magnesium within the pore fluids are observed in this unit. The oldest sediment obtained, both above and within the basement complex, is mid-late Maestrichtian.

We drilled 44 meters of basalt. Five units are defined. The upper three are slightly altered, medium-grained plagioclase, olivine and clinopyroxene-phyric basalts with large plagioclase and much finer grained plagioclase, olivine and clinopyroxene-phyric basalts. All units consist of massive flows. The few vesicles observed are generally filled with clay minerals.

The biostratigraphy and shipboard paleomagnetic results are consistent with crustal formation at the time of magnetic anomaly 31.

Site 528 (SA II-3)
Holes 528, 528A

Latitude: 28°31.49′S
Longitude: 2°19.44′E
Water depth: 3791 meters

Hole 528A

Latitude: 28°31.16′S
Longitude: 2°18.97′E
Water depth: 3809 meters

Site 528 is located midway up the western flank of the Walvis Ridge between magnetic anomalies 31 and 32. Two holes were drilled which give a complete section from the seafloor to the top of a basement complex at 474 meters sub-bottom. An additional eighty meters were drilled in the basement complex. The sonic velocity was logged throughout the hole.

Four lithologic units are observed. Unit 1, from the seafloor to 160 meters sub-bottom, consists of lower Miocene-upper Oligocene, dominantly white, nannofossil and foraminifer-nannofossil ooze. The calcium carbonate content is 90 per cent.

Unit 2, from 160 to 383 meters sub-bottom consists of lower Paleocene, pinkish-gray, nannofossil ooze and chalk in which the latter increases with depth. Chert fragments were found near the base of the unit. The calcium carbonate content is 85 to 90 per cent.

Unit 3, from 183 meters sub-bottom to the basement complex at 474 meters sub-bottom, consists of lower Paleocene alternating sedimentary layers of light gray to reddish brown nannofossil chalk and greenish gray volcanigenic sandstone to mudstone. Turbidites are observed near the base of the unit. The carbonate content varies from 30 to 90 per cent.

Unit 4 consists of approximately 0.5 to 5.0-meter sections of nannofossil chalk, carbonate mudstone and volcanigenic sediment interbedded within the basement complex. The oldest nannofossil zone recognized in the sediments, both above and within the basement complex, is in the *A. cymbiformis* Zone (Maestrichtian).

We drilled eighty meters of the basalt complex. Seven Units ranging in thickness from three to seventeen meters were defined, each separated by the sediment described in Unit 4 above. The seven units are of two basic types. The first is a medium- to fine-grained, slightly to moderately altered, highly plagioclase-pyric massive flow somewhat similar to the material found at Site 527. The few vesicles observed are generally filled with green clay minerals. The second type consists of aphyric to sparsely plagioclase-pyric, vesicular, moderately altered basalt flows. Both types have subophitic texture.

The biostratigraphy and shipboard paleomagnetic results are consistent with crustal formation between the ages of magnetic anomalies 31 and 32.

Site 529 (SA II-2)
Hole 529

Latitude: 28°55.8′S
Longitude: 2°46.1′E
Water depth: 3039 meters

Site 529 (SA II-2), located on crust of magnetic anomaly 31-32, is on the upper part of the slope of the Walvis Ridge. Our primary objective was to recover complete, well preserved, sections where these had been missed at other sites of the transect. This objective was very satisfactorily accomplished. In particular, an eighty-meter, nearly fully recovered and well preserved Oligocene section was penetrated. The hole was continuously cored to a sub-bottom depth of 417.0 meters before being terminated in order to return to port. The recovery rate was 74 per cent.

Three major lithologic units were observed: Unit 1 extends from the mud line to about 160 meters sub-bottom and consists of a lower Oligocene, very homogeneous, white to pinkish gray foraminifer-nannofossil ooze. Bioturbation is slight. The carbonate content is 95 per cent. A hiatus is observed from the lower Pliocene to the middle Miocene and probably within the middle Miocene. Evidence of slumps or mass movements occurrs in the lower Pleistocene and Miocene sediments. Unit 2 extends from 160 to about 284 meters sub-bottom and consists of upper Paleocene pink nannofossil ooze and chalk with the chalk increasing with depth. Bioturbation is slight to moderate. The carbonate content is 90 per cent. Minor diagenetic chert layers occur in the bottom half of the unit. Unit 3 extends from 284 to 417 meters and consists of light to olive gray, foraminifer-nannofossil chalk, the oldest of which is upper Maestrichtian. The biogenic sedimentary structures are excellently preserved. The carbonate content is 85 per cent. Chert layers are found in the upper half of the unit. A large scale slump is observed in the upper Paleocene sediments; other small scale slumps are observed, including one near the very well preserved Cretaceous/Tertiary boundary. Volcaniclastic sediments are abundant in the lower part of the unit.

This site, together with the others drilled on the Walvis Ridge transect, contain the well preserved and continuous calcareous biostratigraphic intervals necessary to resolve many of the important objectives of the Paleoenvironmental Panel as well as objectives relating to the evolutiion of the Walvis Ridge.

Leg 75, Walvis Ridge

Co-Chief Scientists: William W. Hay and Jean-Claude Sibuet

Site 530 (SA 1-1C)
Holes 530, 530A, 530B

Latitude: 19°11.26′S
Longitude: 9°23.15′E
Water depth: 4629 meters

Site 530, the deep penetration site scheduled for Leg 75, was located near the base of the north flank of the Walvis Ridge, about 160 nautical miles from the coast of Africa. Three holes were drilled at this site: We terminated Hole 530 at 125 meters sub-bottom after recovery of only two cores because a bent heat-flow probe could not be freed from the bit; we continuously cored Hole 530A from 125-1121 meters with 108 cores taken, after which the hole was logged and plugged with cement; Hole 530B was drilled 200 feet from Hole 530A using the hydraulic piston corer (HPC) from the mudline to 180.6 meters sub-bottom.

Pleistocene sediment extend to 117 meters and consist of diatom-nannofossil marl and ooze, and sediments up to 1.3 meter-thick debris-flow deposits with clasts up to 20 centimeters in diameter. The Pliocene and upper Miocene section consists of nannofossil clay, marl, and ooze with debris flow deposits in the Pliocene and uppermost Miocene sediments. The thickest debris flow is at least 32 meters thick with clasts and basalt cobbles of up to 60 cm in diameter. The base of the upper Miocene is at about 310 meters. The middle and lower Miocene and upper Oligocene sediments are red and green muds deposited below the carbonate compensation depth. Hiatuses or condensed sections are present in the lower Oligocene and upper and middle Eocene at about 465 meters. The lower Eocene is present but thin, consisting of multicolored mudstone, marlstone, chalk, and clastic limestone containing shallow-water carbonate debris (including benthic reef foraminifers, shell fragments, calcareous algae and bryozoans) and volcanic rock fragments. The base of the Eocene is present at 500 meters sub-bottom. The same lithology is characteristic of the Paleocene.

The Cretaceous/Tertiary boundary is at 592.5 meters with zone NP1 above, and the *Micula mura* zone below. The normal (Paleocene) to reversed (Maestrichtian) paleomagnetic boundary is below the base of NP1. Cretaceous nannofossils reoccur above the base of NP1. The Maestrichtian extends to 650 meters, and contains mudstone, marlstone and coarse clastic limestone layers. Large fragments of *Inoceramus* are present in the mudstones and occur sporadically throughout the Cretaceous section. The Campanian section consists of dark green mudstone, marlstone, coarse clastic limestone, and siliciclastic sandstone, terminating at about 790 meters. The base of the Santonian is at about 855 meters. The dominant lithology is greenish black, glauconitic sandstone occurring as graded turbidites with many complete Bouma sequences. Below 831 meters, the dominant lithology is red claystone with interbeds of green, red, and purple siltstone and green sandstone comprising numerous turbidite sequences. The Coniacian/Turonian boundary at 1010 meters is probably a hiatus with the upper Turonian missing. The lithology from 940 to 1103 meters consists of red and green claystone and marlstone with embedded black shales. Microfossils are very sparse from the base of the Turonian at 1020 meters to the bottom of the sedimentary sequence, but Cenomanian and late Albian species are present at 1030 and 1100 meters, respectively. The top of the basement was reached at 1103 meters. Nineteen meters of basalt were cored, the last core requiring 12 hours to cut. Hole 530A was terminated at 1122 meters.

The organic carbon content is generally 3 to 5 per cent in the Pleistocene-Pliocene sequence, but is otherwise very low, except in a few black shale layers containing up to 12 per cent organic carbon.

Site 531 (SA I-4C)
Holes 531, 531A

Latitude: 19°38.44′S
Longitude: 9°35.31′E
Water depth: 1267 meters

Site 531 is located on the crest of the Walvis Ridge, only 130 nautical miles from the coast of Africa. We were unable to spud in on either of two attempts because of a hard bottom at this location. In the first attempt (Hole 531) the single core recovered contained a few centimeters of Holocene-Pleistocene foraminifer ooze. In the second attempt (Hole 531A, located 1000 feet to the southeast on a bearing of 105°), we recovered 21 cm of Holocene-Pleistocene foraminifer ooze and a 1-cm fragment of rounded grains of coralline algae, coral (?) fragments, and volcanic rock indicating that the topographic feature drilled was capped by a reef. From subsidence estimates, this reef must be Cretaceous and is 5 degrees further south in paleolatitude than any other previously known.

Site 532

Latitude: 19°44.61′S
Longitude: 10°31.13′E
Water depth: 1341 meters

Site 532 is located about 10 miles south of previously drilled Site 362 on the Walvis Ridge. We took three sets of hydraulic piston cores at this site. The first set, consisting of 61 cores and reaching to 250.8 meters sub-bottom, was opened, studied and sampled. The second set, consisting of 47 cores and reaching to a depth of 199.6 meters, was taken for physical property studies at the request of the Sedimentary Petrology and Physical Properties Panel and was left unopened. The third set consisted of 74 cores reaching to 291.3 meters sub-bottom; Cores 1-56 were sampled for interstitial water studies and then frozen for further organic geochemistry studies; Cores 57-74 were opened, studied and sampled.

The section consists of 76 meters of Pleistocene foraminifer-nannofossil marl with increasing diatom and organic carbon content downward. The Pliocene/Miocene boundary is at 257 meters, significantly deeper than at Site 362. The diatom and organic carbon content is highest in the lower Pliocene nannofossil marl. All sediments were thoroughly bioturbated, but the organic carbon content reached 6 per cent.

The entire history of the southwest African upwelling system appears to be reflected in these sediments. The sequence shows many interesting diagenetic effects owing to the decomposition of organic matter and reactions with interstitial water.

PLANNED *CHALLENGER* DRILLING[1]

Leg 76

Blake-Bahama Basin and Outer Ridge

Norfolk to Ft. Lauderdale, 6 October — 26 November 1980. Co-Chief Scientists: Felix Gradstein and Robert E. Sheridan

Objectives

JOIDES/DSDP has defined three major objectives for Leg 76: (1) sample the Upper to Middle Jurassic sediments (oldest sediments overlying basement) in the Blake-Bahama Basin off the Blake escarpment, (2) study gas hydrates believed to be concentrated in the upper part of the Blake-Bahama Outer Ridge, and (3) determine the age and origin of the erosional surface underlying the upper part of the sediment sequence on the continental slope and upper rise northwest of the Blake-Bahama Outer Ridge.

Blake-Bahama Basin

The Blake-Bahama Basin, on the eastern North American margin, has been sediment starved and eroded during much of the Tertiary. It is now a deep abyssal plain with a relatively thin sediment cover.

During Leg 76 a multiple re-entry site (ENA-1) will be drilled near Site 391 (Leg 44) to sample the lowermost part of the sediment column and basement. Previous attempts to reach basement in the basin during Leg 44 failed because of the mechanical malfunction of the re-entry cones. Geophysical data and results from previous drilling suggest that the lowermost sediments are Oxfordian to possibly Bathonian.

[1]Certain drilling priorities are not final and may be changed.

Drilling at ENA-1 will address the following questions.

1) What is the age and lithofacies of the sediments formed during the earliest opening of the North Atlantic Ocean?

2) What were the mechanisms of deposition which formed the thick Miocene debris-flow deposits (previously cored during Leg 44)?

3) What is the origin and source rock potential of highly carbonaceous Cretaceous black shales?

4) What is the age of basement? Was the spreading rate for the Middle Jurassic much higher, lower, or similar to that of the Late Jurassic and Early Cretaceous?

5) What is the nature of the rock magnetism in the basement of the magnetic quiet zone?

The upper part of ENA-1 will be cored with the hydraulic piston corer, and the remainder of the hole will be continuously cored with the rotary drill. A complete logging program will be run to measure the *in situ* physical properties for comparison with available remote sensing data such as that obtained by seismic reflection profiling.

Blake-Bahama Outer Ridge

Gas Hydrates

Gas hydrates that produce bottom-simulating reflectors (BSR) were first detected on the Blake-Bahama Outer Ridge during Leg 11 (Holes 102, 103, 104). The BSR on the crest of the ridge is the impedance contrast between an ice-water mixture in the sediment above, and a gas-water mixture below. This interpretation agrees with available acoustic data and geochemical theory. The theory, however, has not been tested as gas hydrates have never been drilled with the proper testing equipment. In addition, some recent seismic data from the Blake-Bahama Outer Ridge suggests that the gas hydrate acts as a seal when in a structural closure — possibly trapping free gas below.

The Leg 76 team will attempt to recover gas hydrate samples using a pressure core barrel which has been designed to maintain the core (and gas hydrate) under pressure for analysis.

The structure will be continuously cored to 400 meters sub-bottom. Ordinary core samples will also be contained in special pressure devices designed for detailed geochemical studies, and the hole will be completely logged to gain information about the *in situ* properties of the hydrate.)

Erosional Unconformity

An erosional surface underlies the upper part of the sediment sequence northwest of the Blake-Bahama Outer Ridge. The extensive erosional scalloping on the upper continental rise was caused by major down-slope canyon cutting during the Tertiary. This major unconformity correlates seaward with the A^u unconformity, and probably correlates with a very large upper Oligocene unconformity reported in the area. Drilling on this structure will contribute to a better understanding of the erosional and depositional processes along the continental slope of the eastern North American margin — including the precise age and cause of the erosion surface and the nature of such phenomena as turbidity currents and grain flows.

The Leg 76 team will spot core above the unconformity, and continuously core across and just below it.

Leg 77
Florida Straits

Ft. Lauderdale to San Juan 30 November 1980—23 January 1981. Co-Chief Scientists: Richard T. Buffler, Wolfgang Schlager

Objectives

The objectives of Leg 77 are to sample a complete sedimentary record — probably into the Jurassic — in an area believed to have been the seat of early connection between the opening North Atlantic Basin and the Gulf of Mexico, and to learn about the age and origin of the Yucatan Basin.

Florida Straits

Recent geophysical investigations have shown that the central part of the Gulf of Mexico is probably underlain by a relatively narrow zone of oceanic crust extending from the vicinity of the Florida Straits in the east, to the Campeche Gulf in the southwest. The zone is bordered to the north and south by thick middle to upper Jurassic evaporites. The sediments in the Gulf itself are too thick to penetrate, but in the Florida Straits, north of the western end of Cuba, they appear much thinner and older layers could be reached by *Challenger*' drilling string.

Drilling in the Florida Straits will provides a unique opportunity to study both the early connection between the Atlantic and the Gulf of Mexico and the older stratigraphy of deep-sea deposits in the Gulf itself. The drilling results should allow interpretation of the extensive seismic data collcted over all the Gulf, the Florida Straits, and the southwestern lower slopes of the Florida peninsula.

The drilling plans presently call for at least two holes (vicinity of ENA-12) to penetrate into old sediments. The oldest sediments will be sampled where most of the post lower-Cretaceous sediment has been removed by erosion; the area is only covered by a relatively thin layer of Pliocene-Quaternary deposits. A second hole will be drilled where the Mesozoic section appears complete but where penetration must be limited to avoid potential safety hazards associated with the very thick sediment accumulation. Basement is probably out of reach at both holes but Lower Cretaceous to Upper Jurassic open marine deposits and, possibly rift deposits — contemporaneous with the middle to Upper Jurassic evaporites, may be sampled.

Possibly sites ENA-14A, -B, -C on and around the Catochie knoll near the Florida Straits will be drilled. Here acoustic basement is covered by only a thin cover of sediment.

At ENA-13, a few kilometers to the east, the *Challenger* may drill through the younger part of the section. The Tertiary record would be studied to understand the evolution of oceanic circulation between the Gulf of Mexico and the Atlantic, particularly the early evolution of the Gulf Stream. Taken together, this series of relatively short holes should produce a very complete record of the entire stratigraphc column of the region.

Yucatan Basin

Understanding the origin of the Yucatan Basin is fundamental to reconstructing the tectonic history of the Western Caribbean and the relationship between the North American and Caribbean plates. Very limited data, however, have been collected to support any of the various theories advanced to explain the age and evolution of the Caribbean. Drilling at CAR-7 would test the validity of the several models suggested to date. These hypotheses basically require either (1) sphenochasmic opening of the Gulf of Honduras, (2) transcurrent faulting along the Motagua-Polochic fault zones with large left lateral displacement, or (3) a combination of (1) and (2) with or without the northward migration of Cuba. Dating the sedimentary section and crust in the Yucatan Basin would allow us to date the sequence of events leading to its formation and place constraints on plate reconstruction models for the area.

ENGINEERING DEVELOPMENTS

Hydraulic Piston Corer

The effectiveness of the hydraulic piston corer (HPC) recover has been well documented during recent *Challenger* operations (e.g. see Legs 72 and 73 Cruise Summaries). The tool can recover virtually undisturbed samples to a depth of about 200 meters.

The HPC can now also be deployed without pulling the drill pipe. In this operation the drill string is raised to just above the seafloor, the bit is dropped, then coring with the HPC proceeds. This eliminates the long delay caused by round-tripping the drill string.

The Project is currently developing a **variable-length HPC** to more effectively sample sediments of varying firmness. Operators will be able to adjust the tool to between 3.0 and 9.5 meters (in 1.5-meter increments) without round tripping the drill pipe.

In conjunction with the hydraulic piston corer, DSDP is developing (1) a new system to scribe orientation on each core to provide references for magnetic studies, (2) cutting shoes to permit deeper HPC penetration, and (3) a system to include heat-flow probes.

Project engineers are also studying the possibility of incorporating an atmospheric chamber in the HPC system to trap and utilize energy from the static head of the water column.

Pressure Core Barrel

DSDP has developed the pressure core barrel (PCB) to recover and maintain sediments at *in* *situ* pressures (< 5000 psi) for gas hydrate (clathrate) and other geochemical studies. The PCB, deployed by wireline, recovers a 2-¼ inch core. It will be tested during the upcoming Leg 76 during which recovery (and study) of clathrates at ENA-7A is a major objective.

Extended Core Barrel

DSDP Project engineers are currently designing an extended-core-barrel system (XCB) to recover undisturbed samples in the upper 200 to 300 meters of sediment. The spring-loaded core barrel extends beyond the bit face and will "punche core" in soft sediments; it continues to extend beyond the bit, but will be rotated in firmer sediments. Very firm or hard sediments (or rock) will push the XCB back onto the core barrel so that standard rotary drilling will continue. The spring-loaded core barrel will extend once again, should drilling encounter softer sediments. The entire sequence proceeds without the need to pull the drill string.

The XCB is designed to complement the hydraulic piston corer. It will be used primarily at levels below HPC competency and in sequences of alternating soft and firm sediments.

Development of the XCB is progressing rapidly. DSDP hopes to test the system in April 1981.

Drill String Stress and Strain

DSDP continues to study stress and strain on the drill pipe caused by drill string motion. The project is measuring (1) ship's roll, pitch, and heave (2) heave at the lower end of the drill string, and (3) strain in an instrumental section of pipe at the top of the drill string. These data are being subjected to computer analyses. The ultimately objective is to develope drill-string stress curves (to ensure that structural limits are not exceeded in very long drill strings) and to estimate the metal-fatigue limits (to preclude loss of string owing to fatigue).

Wireline Re-entry

The Project plans to initiate development of a wireline re-entry system during FY 1981. The system will incorporate sonar, television (?), and positioning pingers to guide various instrument packages through re-entry cones into previously drilled holes.

This system will be designed so that it may be deployed from any ship. It will allow scientists to collect additional data from previously drilled holes, and to deploy instruments too large to pass through *Challenger*'s drill pipe.

INFORMATION HANDLING GROUP

Introduction

The dissemination of geologic data gathered by deep-sea drilling is a primary function of the Deep Sea Drilling Project (DSDP). The *Initial Reports of the Deep Sea Drilling Project*, a series of volumes published by the U.S. Government Printing Office, is the primary publication of DSDP. Space limitations, however, prevent the Initial Reports from including all of the observational data, thus DSDP has developed other methods of making these data available to the scientific community. The Information Handling Group (IHG-DSDP) has taken the responsibility of developing a coordinated, automated Master Data file with associated computer software to process, store, and retrieve DSDP data. A series of informal specific memoranda entitled *Data Data* contain more detailed descriptions of the procedures and capabilities of the Information Handling Group.

The DSDP/NSF Sample Distribution Policy restricts the release of most scientific data gathered aboard *Glomar Challenger* to members of the respective shipboard scientific party until two months after publication of the Initial Core Descriptions. The preliminary report on underway data, containing only track charts and data indexes, however, are immediately available to any interested scientist. (A reimbursement charge will be assessed for handling and reproduction if costs exceed $50.00.)

New Data Bases

The IHG has recently added three data bases to its data files: paleontology, hard rock major-element chemical analyses, and site summary.

The **paleontologic data base** contains 24 genera comprising 8520 species. These species are all represented by a unique 9-character alphanumeric code. The data sources are range charts and/or text descriptions from contributions to the Initial Reports.

Table 6. DSDP DATA BASE STATUS

GENERIC DATA FILE	COMPLETE THROUGH LEG	STORAGE MEDIUM	COMMENTS
SITE SUMMARY DATA Summary of coring and operational data.	73	T	
VISUAL CORE DESCRIPTIONS (Shipboard observations)	44	FT	
SMEAR SLIDE DESCRIPTION (Shipboard observations)	44	FT	
CARBON CARBONATE (DSDP shore lab.)	65	FT	No carbonate data for Leg 46. Carbonate samples for Legs 60 and 62 are being reburned.
CHEMISTRY Water content (Shipboard lab.)	72	FT	No chemistry for Leg 41.
Hard rock major element analyses (Shipboard and shore lab. data)	65	FT	No hard rock data for Legs 1-12,20-21,31,40,43,44, 47-48,50,56-57. Legs 62-64 not completed.
DEPTHS (From underway recordings)	73	FT	
GRAIN SIZE %Sand-silt-clay (DSDP shore lab.)	68	FT	No grain-size data for Leg 16. Legs 64-65 grain-size data are not yet processed.
GRAPE (Gamma Ray Attenuation Porosity Evaluator points taken onboard. Data processed and edited onshore.)	58	FT	GRAPE data were not collected on Leg 46. Leg 45 GRAPE is not complete. Leg 53-57 are not yet completed.
PALEONTOLOGY (Onshore lab. studies)	44	T	Not completed: 12, 15-17 20-28, 38-40, 42

Table 6. Continued.

GENERIC DATA FILE	COMPLETE THROUGH LEG	STORAGE MEDIUM	COMMENTS
SCREEN (output from JOIDESSCREEN) Computer-generated lithological classifications. Includes basic composition data, average density, and geologic age of layer.	44	T	
SONIC VELOCITY (Shipboard Hamilton Frame)	73	FT	No sonic data for Legs 1-2. Leg 71 data not yet processed.

UNDERWAY DATA: Recorded onboard between drilling sites. The underway data is processed jointly by DSDP and the SIO Geologic Data Center.

Bathymetry	Legs 07-09, 13-56,61-72	FT
Magnetics	Legs 7-9 12-72	FT
Navigation	Legs 3-72	FT
Seismic	Leg 73	F

T = magnetic tape F = microfilm

The records include sample data (sample designator, sub-bottom depth, analyst, and volume number and publication date of Initial Report from which information extracted) and fossil data (fossil group code, abundance, preservation, and age, if known). Scientists may obtain output in the form of data lists or range charts.

The **hard rock major-element chemical analyses** file includes analyses of igneous and metamorphic rocks and a few sedimentary rocks composed of volcanic material. Both shipboard and shore laboratory data (enclosed from the Initial Reports) are included. Minor and trace element analyses are stored in a separate file.

The **site summary data base** is a composite file containing a record for every DSDP hole. The data are taken from the DSDP Hole Summaries, Initial Core Descriptions, and the Initial Reports.

Recorded data include operational data (site positions, per cent recovery, sub-bottom depths, time on site), and stratigraphic data (sediment and rock lithology, age, description of basement and description of oldest sediment overlying basement).

Table 6 (Data Base Status) gives details of data currently available from these data bases.

Aids to Research

The DSDP Information Handling Group, has developed tools to assist researchers in finding and/or displaying materials relevant to their studies.

Guide to DSDP Cores

The *Guide to DSDP Cores* summarizes the data that are published in the Initial Reports. The IHG has established 30 categories of data from which to select relevant information. The Guides are available in text, on microfiche, or on magnetic tape. The Information Handling Group welcomes requests for a list of cores per specific criteria.

The IHG has developed a computer-generated Keyword Index to retrieve information relating to research on core material published outside the DSDP Initial Reports. The Index helps investigators to plan future studies by knowing what studies are currently in progress. The data base is constructed from the DSDP sample request and bibliography files, and is updated once a year. The data base can be searched to find the ocurrences of selected keywords linked to selected site numbers.

Programs

MUDPAK is an extremely flexible program which graphically compares and displays sets of coordinated data against a common depth axis. MUDPAK can make a composite plot of curves both from individual data files and from the superimposition of like information measured by different methods.

DATAWINDOW is the most versatile program for the retrieval and display of data. It transfers data between tape and disk, updates tapes, corrects records, and monitors tape status within a tape series. It is accessed through independent, easily modifiable data dictionaries: and is understood, queried and manipulated using natural descriptive terms. Output from DATAWINDOW is availble on magnetic tape, disk file, or hard copy. The IHG can provide documentation describing the syntax used in DATAWINDOW.

DSDP Core Photographs

The DSDP west and east coast core repositories each maintain a complete collection of black and white and color photographs of all cores retrieved by *Glomar Challenger*. Legs 1 through 44 are archived as prints; Legs 45 onwards are archived on 35 mm slides. They may be viewed at any time at the repositories.

Address your requests for data to the:

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

INITIAL REPORTS AND INITIAL CORE DESCRIPTIONS — STATUS

Initial Reports

The Initial Reports of the Deep Sea Drilling Project, Volumes 1-53, 55, and 58 are published. You may buy them from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

The Government Printing Office is presently printing Volumes 54, 55, 56/57 (a two-part volume), and 59. They expect to publish them as follows:

Volume 54 — December 1980

Volume 56/57 — November 1980

Volume 59 — Undetermined

DSDP is currently preparing Volumes 60-69; it plans to ship camera-ready copy for Volumes 60 and 62 to the Government Printing in December and January, respectively.

Initial Core Description

The Initial Core Descriptions (ICD's) contain graphic descriptions of DSDP cores plus summarized site data (latitude, longitude, coring summary, and brief scientific summary). DSDP has published the ICD's for Legs 27-67 and 70 and is currently preparing them for Legs 68, 69, 71-74.

In the past, DSDP has limited the distribution of the ICD's to appropriate shipboard participants and to key libraries and institutions for general reference. Beginning with the Leg 67 ICD, DSDP will produce them on microfiche for distribution to the general scientific community. (Write to Information Handling Group, DSDP, address above.)

PERSONNEL BRIEFS

Yves Lancelot became DSDP **Chief Scientist** 1 April 1980. He replaces David G. Moore who, although formally retired, is still actively working on Leg 64 (Gulf of California) results.

DSDP appointed **Matthew Salisbury Associate Chief Scientist** for **Science Operations**, effective 1 June 1980. He replaces Stanton White who has joined Robertson Research, Inc. in Houston.

Valdemar (Swede) Larson became **Head of Engineering and Development** 1 June 1980, replacing Stan Serocki who has joined an industrial firm.

Barry Robson, previously a DSDP Cruise Operations Manager, replaces Swede Larson as **Head of Operations**, also effective 1 June 1980.

William Coulbourn joined the **DSDP Scientific Staff** 1 April 1980. A marine geologist specializing in micropaleontology, he was the DSDP staff representative during Leg 67 (Middle America Trench) and Leg 72 (Brazil Basin and Rio Grande Rise).

IPOD SITE SURVEY MANAGEMENT DATA BANK

The IPOD Site Survey Data Bank at Lamont-Doherty Geological Observatory has received the following data (April 1980-August 1980):

- **Angola Basin and Walvis Ridge** — Sepia film copies of *Fred H. Moore* multichannel seismic profiler records, lines AM-07 through AM-20, AM-32 and AM-07. Multichannel seismic records of Sites I-1 to I-5. From J. Austin, Univ. of Texas Marine Science Institute.

- *Meteor* 53 cruise report. From K. Hinz, Bundesanstalt für Geowissenschaften, FRG.

- Safety Package data for Leg 76. From R. Sheridan, Univ. of Delaware.

- **West Rockall Plateau** — Shotpoint map, IPOD site survey and RH survey; multichannel seismic profiles lines IPOD 76-7, 76-2, and 76-4; regional seismic profiles IPOD 76-1 and RH 116; contoured bathymetry. From D. Roberts, Inst. of Oceanographic Science, U.K.

- Microfilm of bathymetry and magnetic data for *Challenger* Legs 66 through 70; reflection air gun records, for *Challenger* Legs 67, 69, and 70. From B. Long, DSDP.

- Leg 78 **Caribbean** data — Seismic lines and figures for CAR-1, -2, and -3. Pollution Prevention and Safety Panel check sheets. From B. Biju-Duval, I.F.P., France.

- GEBCO map of Sea of Okhotsk to Aleutian Basin. From Hydrographic Chart Office, Ottawa, Canada.

- **Blake-Bahama Basin** — *Conrad* 21 multichannel seismic profiles. From R. Markl, Lamont-Doherty Geological Observatory.

- **Blake-Bahama Basin** — Additional processed multichannel seismic lines from *Conrad* 21 to supplement Leg 76 chief scientists' data packages.

JOINT OCEANOGRAPHIC INSTITUTIONS, INC.

PERSONNEL BRIEFS

William W. Hay, formerly Dean of the Rosenstiel School of Marine and Atmospheric Science, became **president** of **Joint Oceanographic Institutions, Inc.** 1 June 1980.

Thomas A. Davies, Professor of Geology at Middleburg College, Vermont, joined JOI, Inc. 1 September 1980 as **Chief Scientist**.

OCEAN MARGIN DRILLING – STATUS

NSF is close to reaching an agreement with eight U.S. oil companies to participate in the Ocean Margin Drilling (OMD) program. The companies are Exxon, Atlantic Richfield, Mobil, Chevron, Union, Sunmark, Phillips, and Continental Oil.

The Congress is presently reviewing the request for FY 81 OMD funds. NSF expects Congress to act by October 1980.

Scientific Planning

Scientific Planning of the OMD program is progressing, but going more slowly than anticipated.

During its Houston meeting (3-6 March 1980) an *ad hoc* committee addressing the future of ocean drilling (utilizing *Glomar Explorer*) recognized four areas of emphasis: active margins, passive margins, ocean crust, and paleoenvironments. The committee developed a two-phased model scientific program as follows.

1) One year of riserless drilling in three areas:

a) **Costa Rica Rift** to penetrate layer 3 at DSDP Site 504.

b) **Middle America Trench** to explore accretionary prism and subducted ocean sediments.

c) **Weddell Sea** (6 holes) to study Mesozoic and Cenozoic environmental and climatic changes.

2) Subsequent years of drilling in seven areas with well-control equipment (riser and blowout preventer systems):

a) **Upper rise off New Jersey** to calibrate geophysical record and gain experience in riser drilling.

b) **Moroccan Margin** to reach basement and evaluate subsidence tectonics in area with a thin sediment cover.

c) **Mid-Atlantic Ridge** to penetrate into layer 3.

d) **South Central Gulf of Mexico** to study stratigraphy and transport of components in pore waters with controlled conditions.

e) **Barbados Ridge** to determine mechanism of overthrust by drilling through sedimentary prism into subduction slab.

f) **Middle Rise off New Jersey** to further calibrate reflectors, and sample early Atlantic sediments and penetrate basement.

g) **Southeastern Gulf of Mexico** to calibrate seismic stratigraphy, penetrate pre-rift/early rift sediments, and resolve differences between oil company interpretations of profiler records.

The model program, given to NSF and Santa Fe Engineering, served as a basis in estimating costs to design a suitable drilling vessel and well-control equipment.

JOI formed the Scientific Advisory Committee (SAC) comprising one representative from each of the participating oil companies and JOI institutions, and three members from other agencies and institutions, to continue the scientific planning. During its 23-24 April meeting (Houston), the SAC addressed organizational matters and procedures for translating the *ad hoc* panel's recommendations into a program plan.

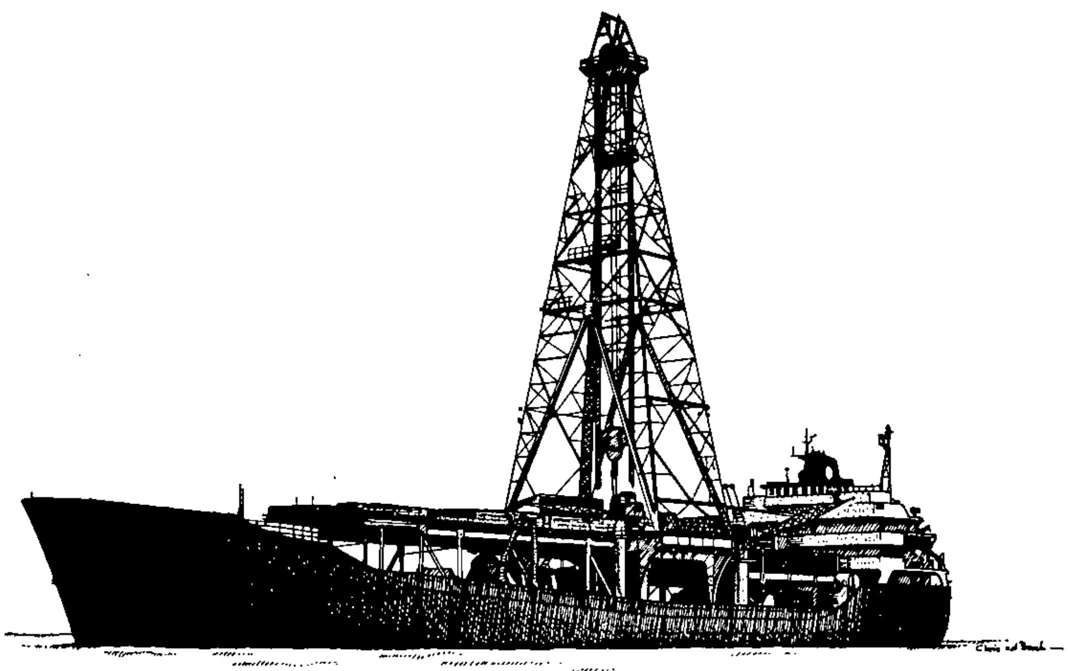
During its Boulder (29-30 May) meeting the SAC approved preparation of requests for proposals (RFP's) for geological and geophysical syntheses in the eleven candidate drilling areas. The Planning Advisory Committees (PAC), appointed by the SAC, reviewed the proposals 15-16 September 1980 at Woods Hole Oceanographic Institution, and SAC approved their recommendations for awards of contracts to do the work. JOI is now negotiating the details of the contracts. The syntheses should be completed within one year and results will be published as soon as possible thereafter.

The Science Advisory Committee will devote next year to developing the Scientific plan for the Ocean Margin Drilling program.

Technologic Planning

Consulting engineers have overcome many forminable technical problems, but problems in shipboard procedures, e.g. the fracture/gradient problem (protecting the upper part of a hole in deep water), still require engineering solutions.

Santa Fe Engineering Co. has developed a conceptual baseline design using the *Glomar Explorer* as the drilling platform. Engineers will next prepare a preliminary design as a basis for conversion of *Explorer* for Ocean Margin Drilling. RFP's should be ready for bids by potential systems-integration contractors by Spring 1981.



APPROVED JOIDES PANEL MEETINGS

	COMMITTEE / PANEL	July 1980	Aug 1980	Sept 1980	Oct 1980	Nov 1980	Dec 1980	Jan 1981	Feb 1981	Mar 1981	Apr 1981	May 1981	June 1981
	Executive Committee (EXCOM)	17-19 Bordeaux				17-19 Atlanta							
	Planning Committee (PCOM)	2-4 Paris			15-16 URI				24-27 SIO				
SUBJECT / AREA	Ocean Crust Panel (OCP)				8-10 U.of Wash								
SUBJECT / AREA	Ocean Margin (Active) Panel (AMP)	4-5 Brest											
SUBJECT / AREA	Ocean Margin (Passive) Panel (PMP)			9-11 Barbados				17-19 Galveston					
SUBJECT / AREA	Ocean Paleoenvironment Panel (OPP)	7-8 Paris											
DISCIPLINE	Inorganic Geochemistry Panel (IGP)		4-5 SIO										
DISCIPLINE	Organic Geochemistry Panel (OGP)		22-24 Durham										
DISCIPLINE	Sedimentary Petrology & Physical Properties Panel (SP[4])				3-4 Denver								
DISCIPLINE	Stratigraphic Correlations Panel (SCP)												
OPERATIONS	Downhole Measurements Panel (DMP)												
OPERATIONS	Industrial Liaison Panel (ILP)												
OPERATIONS	Information Handling Panel (IHP)							15-16 SIO					
OPERATIONS	Pollution Prevention & Safety Panel (PPSP)		28-29 SIO			5-6 SIO							
OPERATIONS	Site Surveying Panel (SSP)												
	Ad hoc Panel				23 Toronto	(EXCOM)							
	Working Group				2 Denver	SP[4] (Long-Range Planning)							

JOIDES COMMITTEE AND PANEL REPORTS

We have extracted the following items from **draft** minutes of recent JOIDES committee and panel reports. We omitted items reported elsewhere in the JOIDES Journal (e.g. NSF and DSDP reports, and status of ocean margin drilling), and/or those items of limited interest. *Ed.*

EXECUTIVE COMMITTEE
William A. Nierenberg, Chairman

The Executive Committee met 18 July 1980 in Bordeaux, France. The following includes items from the **draft** minutes which are not reported elsewhere in the JOIDES Journal.

The Executive Committee thanked Arthur Maxwell for services rendered over the past two years as Chairman of the committee.

Potential New JOIDES Members

Report on Potential Member Countries

W. Hay and E. Winterer reported on contacts with scientists from IPOD countries attending the International Geological Congress in Paris, 7 to 17 July.

The Australian scientific community seems very interested in the IPOD program. Crook (Australian National University) has asked E. Winterer to outline the JOIDES plans for 1981-83 at a meeting in Australia later this year.

W. Hay has discussed participation with scientists from the Netherlands, Italy, Switzerland and Norway. The Netherlands and Norway seemed especially interested; the Dutch expressed interest in both 1981-83 and Ocean Margin Drilling programs, and may meet during the fall 1980 to further coordinate participation. The Executive Committee will further explore possibilities of Norwegian and Dutch memberships to JOIDES.

The Italians are interested in formal participation, but might not be able to raise full membership fees.

Individual Swiss scientists are interested (and have already contributed significantly to the program) but would need to submit a well defined suitable program to their governments.

H. Durbaum reported that the Bundesanstalt für Geowissenschaften had forwarded information about IPOD plans to Academy of Science of the People's Republic of China.

The Canadians have expressed strong interest in the program; the EXCOM selected Toronto as the site for the September meeting of its subcommittee for increased international support (see below, "Meeting of International-Support Subcommittee").

Planning, 1981-83 Program

The EXCOM discussed what role new members could have in shaping the 1981-83 drilling program and the bearing this would have on acquiring new members.

Bogdanov (USSR) will ask his government for money to support the 1981-83 program on the basis of plans in the current proposal, thus, he felt the EXCOM should not allow major changes in the scientific emphasis or geographic region of drilling.

Other members [Debyser (France), Winterer (PCOM)] noted that although the overall strategy had been agreed upon, flexibility remains in choosing individual sites; the Planning Committee remains open to new proposals, and must necessarily adjust *Challenger* priorities to prevailing circumstances.

Nasu (Japan) suggested that although participation in planning the 1981-83 program is reduced, new members who joined now would have a larger role in planning post-1983 drilling.

Classes of Membership, Definition and Discussion

During the discussion of potential new members the EXCOM addressed three basic classes of membership: full, joint and affiliate.

1) **Full membership**: Full members are entitled to full participation in all phases of planning, shipboard science, and access to new data. (All present members have full membership).

2) **Consortia, as full members**: (=Joint membership) The EXCOM discussed the possibility of countries forming consortia to join as full members with full privileges.

Each consortium would resolve internally how to divide privileges and responsibilities among its members.

3) **Affiliate membership**: Affiliate membership would provide for formal participation at reduced cost. Affiliate membership could be handled in a variety of ways which would variously influence present JOIDES structure and planning.

Discussion - Problems associated with affiliate membership

At the New Orleans EXCOM meeting (25-26 March 1980), the EXCOM accepted the idea of new members, but barred admission of affiliate members with full privilege at lower dues.

At the present meeting, J. Debyser introduced the possibility of affiliate members participating formally in shipboard and shore-based science, but not formally in planning (e.g. as PCOM members). He also pointed out a subtle but very important aspect to JOIDES membership: the benefits of belonging to a large scientific community involved in planning and executing a global program. The process has resulted in a significant ongoing symposium of drilling results and the participation and contribution by young scientists has been particularly beneficial.

C. Helsley noted three basic aspects of JOIDES participation: planning, at-sea participation, and ready access to samples and new data.

P. Kent endorsed Debyser's approach and summarized *points of discussion* on affiliate membership as follows:

a. affiliate members could submit proposals;

b. affiliate members could go to sea on *Challenger* (as negotiated);

c. affiliate members could participate on advisory panels, but not on the Planning Committee.

The EXCOM also discussed possible classes of membership with increased privilege matched by increased dollar contribution, but no ready formula emerged.

Wilkniss suggested that another possible approach would be to encourage participation by additional self-supporting programs (e.g. the DARPA program, see below.)

EXCOM Consensus

The EXCOM agreed unanimously that it should encourage new countries to join JOIDES and that JOIDES should admit consortia as full members.

A light majority agreed that JOIDES should pursue the question of a restricted, affiliate, membership but noted that the question was too complex to address with a simple "yes or no."

Meeting of International-Support Subcommittee

During its March 1980 meeting the EXCOM established a subcommittee encourage "increased international support" of the drilling programs. The subcommittee comprises W. Nierenberg, Chairman, J. Debyser, H. Durbaum, P. Kent, A. Maxwell, P. Wilkiniss (NSF), and W. Hay (now with JOI).

During the present meeting, the EXCOM asked the subcommittee to meet in Toronto, Canada, 11-12 September, 1980, to explore further the complex of problems surrounding recruitment of new members. The subcommittee will review possibilities for adding new members and examine the questions surrounding classes of membership during the first day of meetings. Canadian scientists would be invited to discuss possible membership during the second day, provided W. Nierenberg's previous discussions with Canadian contacts gave reason to believe such discussions might be fruitful.

DSDP Slide Sets

M. Peterson reported that DSDP has prepared slides for use in presenting the IPOD scientific program to interested groups. One set is for use in addressing interested laymen; the other set contains more detailed scientific information for discussions with scientists.

Site Survey Plans

E. Winterer reviewed the site survey plans as prepared by the Site Survey Pannel and endorsed by the Planning Committee during its recent Paris meeting. The Site Survey Plan is now part of the 1981-83 *Challenger* proposal which will be reviewed by NSF in early August 1980.

During discussion, Winterer noted that the Planning and Executive committees need a mechanism to dispose of this and similar business between meetings. He asked that the EXCOM allow him to experiment with an *ad hoc* committee to match opportunities to survey sites with the evolving drilling plan. The French, for example, will have R/V *Jean Charcot* in the North Atlantic during 1980 and have offered to survey some crustal sites proposed in the 1981-83 drilling plan. JOIDES, however, must respond before the Planning Committee, Ocean Crust or Site Survey panels meet again.

In response to this problem, the Executive Committee encouraged the Planning Committee chairman to develop, on an experimental basis, a PCOM subcommittee to make quick decisions. The EXCOM will evaluate the effectiveness and suitability of the subcommittee at its next meeting.

Planning Committee Report

1981-82 Drilling Plans

Because the availability of funds beyond the currently funded program is uncertain, Winterer has asked subject panels to review their priorities. Should the 1981-83 program be reduced the proportion of time per subject would remain about the same. (See also PCOM minutes.)

North Atlantic Drilling Plans

Leg 76

(See priorities recommended by PCOM in PCOM report.)

J. Knauss asked what options were available if the pressure core barrel (PCB) were not ready for Leg 76. M. Peterson is optimistic that the PCB will be operational by that time, but DSDP is also studying ways to adapt a commercial PCB to the *Challenger* drill string (see also PCOM minutes, 2-4 July, Item 307-IV).

ENA-1 Coring

The EXCOM endorsed the PCOM recommendation that ENA-1 be cored with the hydraulic piston corer in the upper part and continuously cored to termination as suggested in R. Sheridan's letter (of 16 April 1980 to J. Ewing, App. I, EXCOM Minutes).

The EXCOM had no objections to the Leg 76 plan.

Legs 77 and 78

During his report and discussion, Winterer drew the EXCOM's attention to the PCOM

1) alternate plan, should drilling in the Florida Straits be forstalled.

2) recommendation to designate 2 days of *Challenger* time to a downhole experiment (Duennebier-Hussong, Principal Investigators) during Leg 78 with the understanding that other expenses would be met by the principal investigators (PCOM Item 305-III-B).

3) recommendation to support the use of the DSDP LYNES single-element packer for hydrogeological experiments, and to allocate 2 days of *Challenger* time during Leg 78A to the experiment. Other costs would be the responsibility of the experimenters.

Discussion. Some EXCOM members expressed concern that the PCOM, by designating time to Leg 78A for technical experiments including the DARPA experiment (discussed below), had assigned Site CAR-3 (Venezuelan Basin) a low priority by default. No specific recommendations, however, were made. The EXCOM accepted the PCOM's recommendations pertaining to Legs 77 and 78 drilling without formal objection.

Defense Advanced Research Agency (DARPA) Proposal

Winterer described the proposed DARPA program and directed EXCOM's attention to the PCOM recommendation that, subject to approval of the DSDP engineering staff, 6 days be allowed for the testing phase of the experiment during Leg 78A. All costs, including *Challenger* time, would be paid by DARPA; DSDP would be compensated by adding 6 days to its present NSF contract.)

The EXCOM accepted the PCOM recommendation with regard to the DARPA proposal.

Sedimentary Petrology Technical Manual

The Planning Committee recommended that DSDP issue a hard-cover Sedimentary Petrology Technical Manual as soon as possible as a supplement to Vol. 44, but that its production not interfere with publication of the Initial Reports. (See also PCOM minutes, below.)

The EXCOM agreed that the technical manual be printed and recommended that DSDP and NSF work out details of budgeting costs of publication schedule.

Special Geotechnical Studies (Leg 75)

The EXCOM agreed to the Planning Committee's recommended sequence of drilling at SA-1 developed to provide a set of hydraulic piston cores for special geotechnical studies. (see PCOM Item 307-III).

During discussion of the PCOM motion, C. Helsley questioned whether designating an entire cored sequence to a special study constituted a breach of curatorial policy (i.e. consumption of the archive in addition to the working half of the core). Winterer responded that the core is effectively paired because the interval will be cored for the general scientific community first; only duplicate materials are available for geotechnical studies, and although certain vane-shear tests may require the full diameter of the core, much of the archive half of the special geotechnical cores would remain. Also provision for special sampling has existed within the general policy since Leg 2 (e.g. organic geochemistry sampling). The concern, however, was well placed; the PCOM and EXCOM should continue to consider very carefully any special proposal requiring destructive sampling procedures.

SP^4 Recommendations

The EXCOM endorsed the PCOM's position that time constraints aboard ship preclude effecting all SP^4 recommendations within DSDP's financial and staffing constraints. (See also PCOM minutes, below.)

Consensus

Winterer submitted the draft Planning Committee Meeting minutes (of 2-4 July 1980) containing recommendations in the form of motions to the Executive Committee. The EXCOM found no objections; the recommendations of Planning Committee are thus approved.

Rock-Eval Users

The Institut Français du Pétrole has recently prepared a list of Rock-Eval users. J. Debyser will send the list to the chairman of the Executive Committee, shortly.

Future Meetings

The next meeting of the Executive Committee will be 17-19 November in Atlanta, Georgia.

The Executive Committee will meet at Scripps Institution of Oceanography in mid-March 1981. W. Nierenberg will write EXCOM members, suggesting specific dates.

H. Durbaum (FRG) has invited the EXCOM to conduct their summer meetings in Hannover.

Postscript: The summer 1981 Executive Committee Meeting will be held at the BFG 12-14 August 1981.

PLANNING COMMITTEE
Edward L. Winterer, Chairman

The Planning Committee met 2-4 July 1981 in Paris, France. J. Ewing and E. Winterer chaired the meeting. E. Winterer assumed chairmanship of the committee 1 July 1981. The following includes items from the **draft** minutes of the Planning Committee not reported elsewhere in the JOIDES Journal.

North Atlantic *Challenger* Plans

The Planning Committee discussed the plans for Legs 76 through 79 as one complex of problems. The division into Legs shown below is an attempt to order the results of the discussions.

Leg 76

The Safety Panel has approved drilling for gas hydrates on Leg 76 (Blake-Bahama Outer Ridge). The PCOM discussed how to ensure that both hydrate and oldest-Atlantic sediments (ENA-1) objectives are met.

R. Sheridan (Leg 76 Co-Chief) agreed in personal comments to J. Ewing one hydrate hole should be drilled before drilling ENA-1. Sheridan also urged that we core continuously with HPC as deeply as possible at ENA-1.

The Planning Committee recommended drilling priorities during Leg 76 as follows:

1) **ENA-7A (Sample gas hydrates with pressure core barrel)**

2) **ENA-1 (Core to basement to recover oldest Atlantic sediments)**

3) **ENA-5 (Core unconformity if time remaining) and/or**

4) **DSDP-102 (attempt further hydrate drilling).**

The PCOM further recommended that if drilling at ENA-1 has not reached basement by the end of Leg 76, and if continued drilling is technically possible, drilling of ENA-1 be completed by Leg 77 as their **first** priiority.

Leg 77

Alternatives to Florida Straits Drilling

1) **Problem** The PCOM proposed to establish an alternate drilling program in the event that international political considerations preclude drilling at the chosen sites.

2) **Background** Although DSDP belives that *Challenger* probably will be able to drill in the Straits, they need an alternate plan in case the political climate changes. The U.S. Department of State now advises DSDP not to operate in the Florida Straits, but would not block the drilling if DSDP insisted. The situation could change in either direction.

3) **Drydock Schedule and Port** The loss of time in steaming to Mobile for drydocking was discussed and DSDP was asked to restudy the possibility of moving the drydocking to a more convenient port and/or delaying this work to a later time, e.g., at the end of Leg 78A in Las Palmas.

4) **Discussion and Comments**

- The possibility of reorganizing the schedule of Legs is limited by the fact that Leg 80 drilling (Bay of Biscay and Goban Spur) cannot be started before May 1981 because of unfavorable weather..
- The possibility of drilling certain North Atlantic ocean crustal sites was discussed, but the want of appropriate site surveys and the difficulties of staffing mixed-objective legs ruled this out for the present.

5) **Recommendations** Following extensive discussion, the PCOM recommended the following priorities for Leg 77:

a. Finish ENA-1 if not completed on Leg 76 and if technically possible.

b. Florida Straits

(2) ENA-12
(oldest Gulf Sediments)

(3) ENA-13 (hiatuses re
origins of Florida
Current)

(4) CAR-7 (Yucatan Basin)
or CAR-3 (Venezuelan Basin)
as time permits

OR

Caribbean Sea

(2) CAR-7
(3) CAR-3
Spot core top of section
if required to save time
to reach basement

Leg 78

Drilling at CAR-1

PCOM recommends that the main focus of Leg 78 should be CAR-1, on the toe of the Barbados slope. The possibility of moving the site to a position where the oceanic basement is at a more "normal" depth was discussed, but rejected.

Seismic Experiments at CAR-1

The Planning Committee accepted a proposal to designate 2 days of *Glomar Challenger* time to the downhole seismometer experiment (Duennebier-Hussong principal investigators) during Leg 78 with the understanding that other expenses, including transport to and from *Challenger*, are the responsibility of Principal Investigator.

PCOM recommended that the planned DSDP engineering tests be conducted at the oceanic reference site to be drilled at the end of Leg 78, outside the trench.

Leg 78A

The PCOM designated the transit between Legs 78 and 79 as Leg 78A.

Submarine Hydrology Proposal

Background M. Langseth outlined a proposal, jointly submitted by L-DGO, URI and PGC hydrologists, to measure *in situ* temperature and thermal properties, resistivity, hydraulic and geochemical properties of pore waters.

The team proposed to make experiments during Leg 78A when *Challenger* returns to Hole 395A. They estimated that experiments could be completed within two days ship's time. They specifically requested PCOM approval for,

1) two days ship's time at Hole 395A be devoted to hydrology experiments (packer, temperature, geochemistry and resistivity)

2) refurbishment of the single-element Lynes packer presently owned by DSDP

3) a PCOM recommendation that DSDP improve the operational aspects of the Large-Scale Resistivity Experiment.

The PCOM supported the use of the DSDP Lynes single-element packer for hydrogeological experiments at Hole 395A, and it approve allocation of 2 days of *Glomar Challenger* time, with the understanding that all other costs, including refurbishing the packer, are the responsibility of the experimenters.

Allocation of Time:

During transit from San Juan to Las Palmas, the PCOM recommended 10 days of work at Site 395A, as follows:

1) 2 days for logging

2) 2 days for submarine hydrology experiments (see above)

3) 6 days for DARPA test of their marine seismic system (see below).

Leg 79

E. Winterer and H. Beiersdorf reviewed FRG seismic data recently processed by K. Hinz showing possible salt diapirism at the foot of the Mazagan Escarpment.

Defense Advanced Research Agency (DARPA) Proposal

R. Alewine (DARPA) and J. Dean (Consultant to DARPA) presented a proposal to test DARPA's marine seismic system at Site 395 and to use *Glomer Challenger* for 30 days in the NW Pacific to deploy the system in oceanic basalt.

DARPA has 13 seismic research observatories on the continents in a worldwide network. The system measures broadband seismic, crustal tilt, hydroacoustic signals and long-term temperature changes. A system in the northwest Pacific would provide data on tectonic processes at subduction zones, stress at plate margins, sound propagation along pure oceanic paths, and details of crustal structure. Placement of a system beneath the ocean floor would allow a direct couple to basement rocks and reduction in ambient noise.

DARPA proposes to test emplacement of the instrument package with *Glomar Challenger* package in a previously drilled hole (395, 395B) during 1981 (engineering leg 78A), and have proposed four sites in the NW Pacific between Kamchatka and the Emperor Seamounts for deployment of a system in 1982.

Data collected from the system would be available to the seismic community at large.

The PCOM addressed the following questions:

Who pays for the drill string if it is lost during the experiment? DARPA has not yet addressed this question, so they seek only endorsement of the experiment in principle at this time. PCOM wants some specific understanding on this point before tests begin.

Will DARPA remove the instrument from the test hole? DARPA promises to leave a clean hole. The PCOM is concerned that technical failure could result in wire and gear obstructing the hole. The PCOM views open drill holes as valuable scientific entities.

In what order should experiments be conducted at 395A? The PCOM wants the hole to be logged before the DARPA test. The Downhole Measurements Panel should be involved in all phases of planning for the DARPA work, especially in the near future at Site 395A.

What is the relation of the DARPA proposal to the 1981-83 *Challenger* Program? In addition to the obvious benefits of availability of seismic data, support from DARPA would help bring required 1981-83 funds to "critical mass."

Who will cover the cost of DARPA work at Site 395A? DARPA will pay for 6 days of ship's time, and NSF would extend by 6 days the termination of the present program. Time and funds would not come from the present DSDP budget.

How will site selection in nothwest Pacific be conducted? JOIDES will work with DARPA to find mutually beneficial sites, in keeping with the JOIDES objectives in the NW Pacific as well as the requirements of DARPA.

The Planning Committee adopted the following position:

The Planning Committee has high regard for the scientific merits of the DARPA Marine Seismic System proposal and considers favorably the proposed deployment in the northwest Pacific, subject to approval of the operational aspects by DSDP engineering staff. This experiment should be part of the *Glomar Challenger* scientific program and its results should be published in the Initial Report series. The Downhole Measurements Panel should be involed in the planning and should propose scientists to take part in the experiment. The PCOM proposes that 6 days be allowed for the testing phase of the experiment during transit between Legs 78 and 79. Legs from 79 to 82 will accordingly be shifted by 6 days.

Hydraulic Piston Corer (HPC) Working Group

The HPC Working Group met 8-9 May in Washington, DC. Four main points emerged:

1) The hydraulic piston corer provides many opportunities to solve important problems in paleoceanography, evolution, paleomagnetism, organic and inorganic geochemistry of marine sediments, acoustic reflectivity and marine geotechnology. Significant science can be done in the world's oceans with minor amounts of advanced engineering using *Challenger*-type vessels and HP coring procedures.

2) New archiving and curatorial techniques are needed for hydraulic piston cores. The HPC Working Group proposed that hydraulic piston cores be opened, described and sampled at the core repositories. (Samples for onboard paleontologic determinations could be taken from ends of cores.) The recommendation is made to ensure coordinated sampling programs and most efficient use of the highly valuable and limited HPC materials.

3) Using ships of opportunity to launch the HPC is not an economically desirable alernative to continued use of the *Glomar Challenger* because of high mobilization costs.

   a) The hydraulic piston corer does not fit a standard drill string

   b) A special sand line and high-speed drum are required to retrieve cores.

   c) The acoustic referencing systems of many ships are not suited to deep-water operations.

4) The HPC Working Group suggested that in future planning *first the scientific problems be defined*, then technological improvements be made to solve them, rather than attempting to work from a given technology to define scientific goals.

Following discussion **the PCOM recommended that,**

1) **except in special circumstances, the hydraulic piston cores be split on board *Challenger*.**

2) **Moberly send the Working Group's core-handling recommendations to other panels for comments to be submitted in time for the October PCOM meeting.**

3) **Lancelot (DSDP) submit a report on use of the HPC on board *Challenger*** to date.

4) **The HPC Working Group continue to function, and that Mike Storms (co-designer) of the HPC and either a repository member or staff scientist represent DSDP on the group.**

The PCOM noted that although V. Larson's figures regarding ships of opportunity are useful, it encourages the Working Group to consult more widely outside DSDP for advice on this matter.

Site Survey Panel (SSP), 1981-83 Proposal

The Site Survey Panel met 14-15 May 1980 in Hamburg to discuss and prepare a Site Survey proposal to accompany the 1981-1983 *Challenger* proposal. H. Beiersdorf presented the main points of the Panel's discussions, and reviewed the main elements of the draft proposal being submitted by JOI to NSF.

During the discussions, some members of the PCOM questioned the cost effectiveness of the high-resolution profiling system for *Challenger* asked for in the proposal. Most of the Planning Committee, however, felt the system was not only useful, but necessary.

The Planning Committee accepted the 1981-83 Site Survey Proposal as presented by H. Beiersdorf.

LePichon reminded PCOM that R/V *J. Charcot* will be operating in the North Atlantic during parts of calender 1981, and that multi-beam surveys could be conducted in certain sites, e.g., OCP sites, during transit. Incremental costs for the work would have to be paid by JOI.

The chairman of the Planning Committee will write Jacques Debyser about the possibility of diverting *Charcot* during 1981 to obtain Seabeam data from the North Atlantic.

Special Action Items

SP[4] Recommendations

The Sedimentary Petrology and Physical Properties Panel (SP[4]) has drawn up a comprehensive list of recommendations to improve shipboard sampling and testing of physical properties.

The PCOM recognizes the importance of the items, but notes that time constraints aboard ship preclude effecting all recommendations. **The PCOM suggests that DSDP should use the list as a guide and should implement the Panel recommendations within DSDP's financial and staffing constraints.**

DSDP has already incorporated some items into shipboard operations. Others that are being investigated include an onboard continuous-strip system for photographing cores, and the sonic probe.

Sedimentary Petrology Technical Manual

The Planning Committee first expressed interest in publication of a Sedimentary Petrology Technical Manual in September 1975. Compilation of the manual awaited publication of the now completed Initial Report Volumes 1-44 (phases I-III of the Deep Sea Drilling Project). The technical manual is conceived as containing techniques and methods used in obtaining and treating data — both at sea and on shore — published in the Initial Reports, and cross-references to IR papers. The manual would be a guide to interpreting and evaluating the quality of the Initial Report data.

Eight contributions comprising 240 pages of manuscript, equalling about 1/3 of anticipated contributions, have been received at DSDP. No funds have been budgeted for publication of the manual.

DSDP asked the PCOM to comment on (a) form of publication (hardbound versus soft-bound) and priority of publication.

The PCOM recommended that, because the manual was a comprehensive guide to the Initial Reports, it be produced in hard cover to assure durability and shelving alongside the Initial Reports. Publication of the volume, however, should not take precedence over publication of the Initial Reports in the current year's budget.

Hydraulic Piston Corer — Special Geothchnical Studies

The SP[4] requested that a hydraulic piston core be taken from SA-1 (Angolan Basin) specifically for geotechnical, acoustical, and geochemical studies. Cores would not be split or sampled on board ship, but removed intact at Miami and shipped to Lamont. Representatives of six institutions would participate.

Current plans are to core the site twice: one set to be split for the general scientific community, one core for the special geotechnical studies.

Following discussion of priorities, The Planning Committee recommended that the order of events at SA-1 be,

1) **drill a single-bit hole to bit destruction. Spot core the hole in the upper 200 meters and check cores for shear strength, continuously core the hole below the level where sediment shear strength prevents use of the HPC.**

2) **take a set of hydraulic piston cores for the general scientific community.**

3) **take another set of hydraulic piston cores for the special geotechnical studies.**

4) **drill a hole to reach basement, using re-entry if required.**

If intervals missed by the first, general-community core are recovered in the second, sedimentary petrology core, the general community has first claim on the unique samples.

COMMENT: All special sedimentary petrology studies must be funded by non-DSDP sources.

Commercial Pressure Core Barrel

A commercial pressure core barrel (PCB) is available from Exxon which could be used during Leg 76. The Exxon PCB works very well but is not easily adapted to the *Glomar Challenger* drill string. A redesigned system could not be ready for several months.

The existing Exxon PCB could possibly be used but an extra round trip would be required. Moreover, the Exxon PCB has not been used in soft sediment.

The PCOM discussed the merits of putting the commercial PCB on *Challenger* during Leg 76 as a back-up to the DSDP pressure core barrel. Lancelot assured the PCOM that interest in the commercial PCB would not divert interest from development of DSDP PCB.

The PCOM recommended that DSDP should limit the time and money spent on a back-up PCB for Leg 76. The decision on whether to use it would be made by Lancelot (in consultation with Winterer) as more specific information is received.

Microfossil Slide Repositories

Slide Collection

During its February 1980 meeting the PCOM asked JOI Inc. to submit a proposal to NSF requesting funds to prepare a microfossil slide collection for the Smithsonian Institution. W. Riedel has prepared a proposal *for* JOI Inc. requesting funds for about 2-man-years of effort to prepare calcareous microfossil and radiolarian slide collection. Riedel would not be principal investigator; he is writing the proposal for JOI Inc.

Additional Repository

Riedel has not found an institution in Australia willing to serve as a microfossil slide repository. He did inspect the New Zealand Geological Survey and found it both suitable and its staff willing to assume the responsibility. He suggests it be considered for the SW Pacific repository.

The Planning Committee asked Riedel to proceed with negotiations with the New Zealand Geological Survey for a microfossil slide repository in Lower Hutt, and that he pursue the possibility of its assuming responsibility for preparation of nannofossil slides.

Submarine Hydrology Working Group

M. Langseth proposed the formation of a Submarine Hydrology Working Group to promote the study of seafloor water circulation and its consequences. The working group would develop a continuous program of thermal measurements and pore water sampling (to be carried out on nearly all DSDP legs) and develop specialized experimental programs for certain legs, e.g., Leg 78A.

The Planning Committee recommended formation of a Submarine Hydrology Working Group

Winterer will draw the attention of the Downhole Measurements Panel and Ocean Crust Panel chairmen to a memo outlining the need for and function of the group and ask the panel chairmen to make nominations for the group.

Site Proposal Forms

The site proposal forms (JOIDES Journal, Special Issue Volume III, No. 3) have been printed and distributed as a supplemental volume of the JOIDES Journal.

Drilling Proposals

Two drilling proposals were submitted recently to the PCOM for consideration during the 1981-83 drilling.

1. Proposal outline for Deep Sea Drilling on the Ontong Java Plateau: Zvi Ben-Avraham.

2. Evolution of Greenland-Iceland-Foeroe-Scotland Ridge, a key area in marine geoscience: Jorn Thiede.

The PCOM takes consideration of drilling proposals seriously and is receptive to new ideas and approaches. **The appropriate routing for proposals of this nature is to the panel or panels involved. The PCOM will act upon the appropriate panel recommendation.** The Ben-Avraham proposal will be submitted to the Ocean Crust Panel and the Thiede proposal to the Paleoenvironment Panel.

Future Meetings

The Planning Committee meeting schedule is as follows:

15-17 October 1980
University of Rhode Island
Alton Jones Campus
T. Moore - Coordinator

24-27 February 1981
Scripps Inst. Oceanography
E. Winterer - Coordinator

Postscript: The Planning Committee will meet 8-10 July at the Bundesanstalt für Geowissenschaften und Rohstoffe. H. Beirsdorf will host.

The Planning Committee gave John Ewing a special vote of thanks for so ably serving as chairman of the Committee at a crucial time.

OCEAN CRUST PANEL
Paul J. Fox, Chairman

The Ocean Crust Panel (OCP) met 22-23 Fe[illegible] 1980 in the Republic of Djibouti. New me[illegible] attending were J. Honnorez and R. Stephan.

Rock Catalogue

During the first 44 legs of the *Glomar Challenger* the oceanic basement was sampled ma[illegible] times. During these early legs the empha[illegible] was often on the sediments lying above base-ment; the crustal rocks, in general, were nev[illegible] rigorously described or analyzed. Furthermore new analytical methods with greater precision have been developed in the intervening years, making it possible to quantitatively measure the concentration of a large number of trace elements (e.g. Ta, Nb, Y, Mf, Th etc.). Those elements are very important to understanding the petrogenesis of basalts. The OCP believes that it is time that this important reservoir of data be carefully analyzed. Before such an endeavor can begin a document must be prepared that catalogues the pertinent information relevant to the basement sample. When completed, this document could be sent to all the petrologists/geochemists who have worked on DSDP rocks in the past. We are sure that such a compilation would prompt investigators to return to the early collection and carry out new analyses. We suggest that the task of compiling a rock catalogue for the first 44 legs be carried out by the DSDP staff under the supervision of a DSDP scientist. A DSDP technician with a background in petrology could compile the existing petrologic data for each hole that reached basement. The OCP realizes that what we request is not a trivial task but we believe that the effort expended during the creation of a basement catalogue will be an excellent investment because such a compilation will serve as a catalyst initiating a new round of synoptic petrologic investigations.

***Explorer* Drilling**

Since the last meeting of the OCP in September, a great deal had transpired in terms of the organization of the *Glomar Challenger* program. Three OCP members (Fox, Larson and Stephen) participated in one or more *Explorer* meetings and these members communicated the results of the meetings to the Panel. During a lengthy discussion the Ocean Crust Panel focused interest on several issues (i.e., the effect of political pressur[illegible] objectiv[illegible] geological questions answered; the bias of the program towards a few deep holes on a passive margin; the effect of such a costly program on the overall funding of geological research).

Following the discussion the OCP adopted the following position: It is the opinion of the OCP that drilling to deep crustal depths (seismic layer 3 and beyond) with *Explorer*-type capabilities is crucial to our understanding of the deep structure of the oceanic crust. OCP maintains, however, that *Challenger*-type drilling to shallower objectives at a much larger number of sites should be continued in conjunction with an *Explorer*-type program. The scientific value of a larger number of shallow holes into oceanic crust is fundamental to our yet imperfect understanding of the properties of the oceanic crust and how these properties vary in time and space. Our goal to understand the processes governing the formation and evaluation of oceanic crust should be pursued with these independent but complementary drilling techniques that attack different problems at different levels in the oceanic crust.

As presently defined, there will be at most two deep (into seismic layer 3 and beyond) oceanic crustal holes drilled during the *Explorer* program. One of these holes will be in the North Atlantic and the other hole will be in the Pacific. The objectives of these two holes will be the same: to establish the structure, composition, physical properties and alteration history of the oceanic crust at depth. A hole in both the Atlantic and Pacific would be ideal because these two holes would allow for a comparison between crust created at a slowly accreting plate boundary (Atlantic) and an accretionary boundary where the rates are much higher (Pacific). The panel addressed the question of where in the Atlantic and Pacific these two holes should be located. Although the *Explorer* engineering capabilities are still not clearly defined, we assumed that the following constraints apply: a limit of a 13,000 ft. water depth (riser capability without blow-out prevention); sediment thickness of approximately 100 meters.

North Atlantic Ocean

Existing geological and geophysical information indicates that the oceanic crust in the North Atlantic (slow-spread-crust) is very ieterogeneous. These data, however, are not vell enough constrained to allow us to define ow crustal heterogeneities vary in space. The ecific selection of a locality, therefore, can t be chosen until the requisite regional Seabeam survey and geophysical experiments (seismic refraction, seismic reflection and magnetics) are carried out. These experiments will define the morphotectonic fabric of the crust and will establish the crustal structure allowing us to select a drilling site that has properties typical of slow-spread crust. These surveys will also enable us to link the vertical perspective gained by drilling a single core laterally to gain a more regional perspective.

On the basis of what we already know about the North Atlantic, the site should be away from anomalously high terrain — and the geochemical anomalies associated with the high terrain of volcanic platforms (Iceland and Azores). Furthermore, the tectonized crust associated with transform faults and their aseismic extensions (fracture zones) should be avoided. With these constraints in mind, the OCP recommends that a swath of terrain between 28°N to 33°N and bounding 10 million year-old crust (13,000 ft. depth) be chosen initially as the area for intense geological and geophysical surveying. This swath is at a scale that includes all the major crustal components of slow-spread crust (normal ridge segments approximately 50-60 km wide bounded by large or small offset fracture zones) and when properly surveyed, will provide the perspective needed for the selection of a deep hole.

Pacific Ocean

Ideally, before a deep hole in the Pacific is selected, an intensive regional surveying program — like the program envisioned for the Atlantic — would be carried out. The need for such a survey in the Pacific, however, is not so compelling because fast-spread crust is not as structurally heterogeneous as slow-spread crust.

On the basis of our present knowledge, several attractive sites for deep crustal penetration can be identified; the OCP makes the following recommendations. **If a 1981-83 *Challenger* extension is not funded, or if the *Challenger* does not return to Site 504 during an extension, the OCP recommends that Site 504 be chosen in deep-crustal penetration during the *Explorer* phase.** We stress, however, that a potential problem be addressed before a final decision to drill at this site is made. The high temperature at the bottom of the existing hole (125°C) suggests that its thermal environment is probably deleterious to downhole measurements. A deep-crustal hole without downhole instrumentation is unacc-
able. Also, the magnet

very low and a deep hole at this locality would therefore sacrifice important magnetic property measurements.

If *Challenger* does return to Site 504 during the extension, the OCP recommends that another site be found for deep-crustal penetration.

The constraint of thick sediments makes it difficult to specifically identify sites but we deem the following areas tentatively acceptable, although each site is flawed by a problem: east flank of the Juan de Fuca Ridge (problem: poor weather); equatorial carbonate belt — Galapagos spreading center in an area of low heat flow (problem: low magnetic latitude); East Pacific Rise in the area of the ROSE study (problem: lack of sediment cover and poor magnetic latitude).

1980-83 Recommendations

The OCP recommends the following drilling program to enhance our understanding of the behavior of geochemical provinces through time. If there is no 1981-83 extension and only time in the current program to drill a few single bit holes, the first two holes should be drilled at AT-3 and -4 to establish the continuity of a mantle geochemical domain in time. The next two holes should be drilled North and South of the western extension of the Hayes fracture zone geochemical boundary at anomaly 13 (38 my). This boundary has been shown to be sharp and coincides with the Hayes transform from dredging zero age crust. If the 1981-83 extension is funded, the OCP favors one leg comprising 8 single-bit holes, drilled in conjunction with onboard capability for geochemical study. The first two holes would be at AT-3 and -4 and the remaining 6 holes would be north and south of the Hayes fracture zone boundary. We emphasize that site surveys in the Hayes fracture zone area should be designed to ensure maximum flexibility so that drill sites could be selected on the basis of shipboard drilling results. Only in this way can the location of the boundary and therefore the behavior of the mantle source discontinuity in time be established. These surveys should be a N-S swath parallel to isochrons and controlled by Seabeam and seismic reflection surveys.

Next Meeting

The next meeting of the Ocean Crust Panel will be 8-10 October 1980 at the Friday Harbor Laboratory, University of Washington.

OCEAN MARGIN (ACTIVE) PANEL

Roland von Huene, Chairman

The Active Margin Panel (AMP) met 4-6 July 1980 in Brest, France. The following summarizes the preliminary minutes of the meeting.

New Members

Three new members attended the meeting: P. Barker (replaces M. Audley-Charles), K. Nakamura (replaces K. Kobayashi) and J. P. Cadet (replaces R. Blanchet).

East Pacific Results

Downhole Experiment, Leg 67

The Hawaii Institute of Geophysics (HIG) downhole experiment on Leg 67 was only partially successful. Real-time monitoring from the ships provided good refraction and earthquake results, but the seismometer signals were partially obscured by electronic noise in the final recording mode. HIG is redesigning the instrument to improve the response of the seismometers, increase the sensitivity of tilt and temperature measurements, and provide digital data for real-time monitoring up to 40 Hz. The improved instrument will be deployed during Leg 78.

Middle America Trench

Seabeam surveys of the Middle America Trench off Guatemala and Guerrero have provided critical new information concerning the transects drilled on Legs 66 and 67. The surveys revealed horst and graben structures on the trench's seaward slope which enter the trench obliquely to the trend of its axis. These structures parallel magnetic anomalies and probably originated from tectonic movement along the fabric inherited from crustal generation at the East Pacific Rise.

Analysis of igneous rock from Legs 66 and 67 give compositions intermediate between usual oceanic and island arc magmatic products.

Proposed Caribbean Drilling

The objectives of drilling sites along the front of the Barbados Ridge are to (1) sample the complete subduction complex to document the tectonic history of the any accretionary prism, (2) measure physical properties in the lab, and by downhole logging to look for anomalous water contents and/or high pore pressures, and (3) study the slope and trench sediments to evaluate their involvement in the tectonic processes and to determine possible rates of consumption at the Lesser Antilles active margin.

The AMP reviewed the latest geophysical and sedimentological data for the proposed area of drilling off Barbados. The data indicate that as the sediments thin northward, the water depth also increases; a transverse structure present to the north (shown by *Gloria*) would not be a suitable place to drill; the sedimentary sequence thickens north of the transverse structure. Earlier data show that the sediments also thicken to the south of the structure.

The AMP **thus favors drilling at CAR-1A over the thinnest sedimentary sequence and reasonably far from the transverse structure, (water depth 4875 m, basement depth 5975 m, total sediment thickness 1100 to 1200 m, deformed upper sediment thickness 700 m). CAR-1B is its second choice; CAR-1 and/or CAR-1C are suitable alternatives. CAR-1D is a second alternative seaward reference site (water depth 5600 m, sediment 500-600 m, the first being on Line A-1D, SP 140).**

The Panel strongly recommended that a Seabeam survey be conducted in the area of the Barbados sites. The relationship of the transverse structure to the Barbados sites is important to understanding the history of the area. The Panel will explore the possibilities of obtaining a limited survey by the R/V *Jean Charcot* when it passes that way.

The Panel hoped that the *Gloria* data would be made available to the Leg 78 shipboard party prior to drilling.

Selection of additional auxiliary sites above the CCD and at the foot of the slope is left to the discretion of the Leg 78 Co-Chief Scientists.

Hellenic Trench

Recent work with Seabeam and a submersible in the Hellenic Trench revealed a direct correspondence of strain observed at several different scales — from earthquake first-motion data, through Seabeam bathymetry, to the megascopic observational scale. These data form a compatible set showing thrust and strike-slip motion. The rock was not sampled however, and the AMP suggests that this area be studied with a hydraulic-piston-corer traverse.

1981-83 Program Priorities

The Planning Committee asked the Active Margin Panel to set priorities on its 1981-83 targets in the event that NSF can fund only a shortened program.

Offshore Japan

Two mechanisms may be active off the coast of Japan. Some Japanese studies show that the Nankai Trough is an accretionary margin; others suggest that slumping has occurred. Both mechanisms may co-exist, as is the case off Middle America. Not all members of the Active Margin Panel have seen the Japanese multichannel records of the Nankai Trough, but the two who did considered them to be excellent.

The Japanese IPOD Committee recommended that in addition to sites along the Japan Trench transect and Nankai Trough two sites be drilled near Daiichi Kashima Seamount where the lower slope of the inner trench has been uplifted to within reach of the *Challenger* drill string. Sampling an otherwise inaccessible part of the slope would thus be possible.

Middle America Trench

Only the surface of the accretionary complex of Guerrero was sampled during Leg 66. Deeper penetration is needed to date the sequence, recognize thrust faults, and measure diagenetic changes. The results of Leg 66 drilling clearly showed that landward-dipping reflections are caused by uplifted sand bodies from the trench axis or lower slope basins associated with a submarine canyon in that area. Deeper penetration may be possible farther from the canyon where interpretation of seismic records suggests less sand is present.

The Active Margin Panel views drilling another site in the upper-slope oceanic-continental transition zone important as it may reveal the history of plate reorganization and the jump of the spreading ridge from the Mathematician Seamounts to the East Pacific Rise.

The Leg 67 results showed that upper plate at Site 494 — which does not have gas hydrates — may be penetrated. Penetration through the main fault and into the downgoing plate would provide information on the dynamics of faulting could constrain interpretations of the origin of the Cretaceous section along the trench's lower slope, and also perhaps information about the processes whereby oceanic sediment is subducted.

Peru-Chile Trench

The results of recent studies on the neotectonics of northern South America show that compressional features are not common in the Pacific coastal area.

The Active Margin Panel stressed the need to begin site surveys in that region soon; otherwise geophysical work can not be completed in time for the proposed 81-83 drilling.

Consensus

The Panel was very reluctant to establish priorities in the event of a shortened 81-83 program. The Peru margin cannot be surveyed in this short a period so it is eliminated. The Panel did agree to the following statement:

The Active Margin Panel considers that drilling the Japan Trench and Middle America transects is important for understanding tectonic processes in modern fore-arc areas, and finds it difficult to endorse drilling one transect and not the other. However, if only one leg is available, the Panel favors the Japan transect.

Oman Working Group

The informal Oman Working Group reported that the accretionary complex along the Macran coast contains Pliocene sediments. Drilling sites in the younger sediments of the offshore extension would give a good opportunity to measure rates of vertical uplift and accretion.

The AMP greatly appreciates the work of this informal working group. Drilling in this area, however, was proposed for the Ocean Margin Drilling program and as JOI has formed its own OMD scientific advisory committee for that program, the AMP is no longer directly involved in its planning. Despite the attractiveness of drilling the Oman area, unless the *Glomar Challenger* program is extended far longer than presently envisioned, the Panel does not expect it to be drilled.

IPOD Active-Margins Synthesis

The Panel reaffirmed its position that a synthesis dealing with active margins be more than a recapitulation of the Initial Reports which emphasizes topical problems. It envisions topical contributions, results of re-examination of cores, as well as some geophysical data. The effort should retain the international character of IPOD. About 20 scientists have expressed an interest in joining this effort. The Panel would like a senior sedimentologist who is keenly interested in the project to organize it.

No funding presently exists to support the scientific work. The chairman will try to find a suitable synthesis coordinator and solutions to funding problems before the next meeting. The synthesis must be completed in about 2 years to have maximum value.

Future Meetings

The AMP tentatively plans to meet next in Menlo Park, California on or near 7 April 1981.

OCEAN MARGIN (PASSIVE) PANEL

Robert E. Sheridan, Chairman

The Passive Margin Panel (PMP) met at Bellairs Research Institute, St. James, Barbados, on 8-10 September 1980. The JOIDES Office has not yet received the minutes but the following notes key important items from that meeting.

Plans for 1980-81 Drilling

Leg 76

ENA-7 (gas hydrates, Blake-Bahama Outer Ridge) will be drilled first; ENA-1 (deep penetration in the Blake-Bahama Basin) second, and if time allows, ENA-5 (Continental Rise of Blake Outer Ridge).

The Passive Margin Panel asks DSDP and Planning Committee to approve the following sequence of operations: (a) set re-entry cone and casing without drilling a pilot hole since Site 391 is near, (b) continuously core the lower part of the hole, below 500 meters, (c) continuously core the upper 500 meters, (d) log. This scheme can save about one week's time.

Leg 77

The PMP discussed ENA-14A, B, C, (approved by JOIDES Safety Panel), located on small structural blocks close to the Yucatan side of the Gulf close to Florida Straits. Acoustic basement is covered here by only a thin cover of sediments.

Buffler and Schlager (Leg 77 Co-Chief Scientists) were instructed to find a new site (to be labelled ENA-12E) to substitute for ENA-12A, to bracket the "middle Cretaceous" seismic discontinuity, and to submit this to the Safety Panel for review at its early November meeting.

After thorough discussion of scientific priorities, the PMP recommended the following sequence for drilling sites: (a) ENA-12E, (b) ENA-12B, (c) ENA-14C, (d) ENA-14B, (western Florida Straits), (e) CAR-7E (Yucatan Basin). If too little time remains to reach the deep objectives at CAR-7E, then drill ENA-13. If too little time remains to reach lower Cenozoic strata at ENA-13, then drill ENA-14A.

At CAR-7E, the PMP asks the Planning Committee for permission to conduct the following sequence of operations: (a) spot core the upper half of the sediment column, (b) continuously core into basement, (c) continuously core the by-passed upper section. This will increase the chances for accomplishing the primary objectives within the time available.

Leg 78

The PMP recommends to the Planning Committee that CAR-2B (Granada Basin) be the first alternate site for Leg 78, rather than CAR-3 (Venezuela Basin). The fundamental problem addressed at CAR-2B is the nature of dipping sub-basement reflectors. The PMP instructed the Caribbean Working Group to compare the scientific merits of CAR-2B with the site proposed upslope from CAR-1 by the Co-Chief Scientists — the main site on the toe of the Barbados slope. Montadert will provide the PCOM with a full explanation of the scientific merit of CAR-2B.

Leg 79 (Mazagan)

K. Hinz showed the PMP the most recently processed multichannel seismic data for the Mazagan area. After a lengthy discussion of priorities, opportunities and risks, the panel recommended the following sequence of drilling:

a) MAZ-3, on a small structural high seaward of the Mazagan Escarpment, where a thin (~200 m) cover of oldest sediments rests on acoustic basement;

b) If no drilling hazards (e.g., salt) are detected at MAZ-3, then drill MAZ-2 (on same block, with thicker Jurassic(?) section overlying basement). Core, if possible, through the contact between the deep and shallow facies;

c) MAZ-4, which, to minimize drilling time in hard strata, should consist of a series of short holes stepping down the Mazagan Escarpment, rather than a single deep hole.

d) If MAZ-3 and MAZ-2 cannot be drilled, then drill the MAZ-4 sequence plus MAZ-8, at the top of the Escarpment, through the prominent seismic discontinuity (Mid-Cretaceous?)

Leg 79 - Galicia (Alternate to Mazagan)

Following L. Montadert's review of the most recent seismic and dredge data, the PMP recommended drilling GAL-1 (on the most seaward "continental" block, where serpentinite has been dredged); GAL 1A (on nearby oceanic crust); GAL 2 (pre- and syn-rift sediments); and GAL 3 (post-rift sediments).

The PMP recommends a combined series of short holes at both GAL-2 and -3.

Leg 81 (Rockall Bank)

L. Montadert and D. Roberts reviewed the most recent seismic data. The PMP will establish priorities on these legs at its next meeting.

Leg 82 (Western North Atlantic)

J. Grow reviewed the USGS data off New Jersey near COST B-3. ENA-3 and -4 were surveyed recently by WHOI. Grow will document a series of alternate single-bit sites for Leg 82 before the next PMP meeting.

Alternate Sites

W. Ruddiman wrote the Passive Margin Panel asking that a number of sites for paleoenvironmental studies (mainly those in the North Atlantic transect in the 1981-83 Proposal) be treated as alternative sites during Legs 77-82. The PMP suggests that W. Ruddiman and R. Douglas (OPP Chairman) consider similar sites that are even closer to the drilling areas for Legs 80 and 81.

Priorities for 1981-83 Drilling

The Passive Margin Panel reviewed priorities for drilling 1981-83. The internal anatomy of fans still ranks very high, along with study of seismic discontinuities on the slope, and their possible relations to global sea-level changes.

FUSOD-II

The Panel discussed the desirability of a new FUSOD conference, to review advances since FUSOD-I and to assess the problems that can be addressed by ocean drilling and to recommend a long-range program (independently of the capabilities of particular vessels on techniques). The Panel unanimously agreed on the need for such a new assessment and report. The chairman will ask the PCOM to recommend a FUSOD-II conference to the Executive Committee.

Next Meeting

The Passive Margin Panel tentatively scheduled its next meeting in Galveston, Texas, sometime during the week of 12 January 1981.

OCEAN PALEOENVIRONMENT PANEL

Robert G. Douglas, Chairman

The Ocean Paleoenvironment Panel (OPP) met 7-8 July 1980 in Paris, France. The following summarizes items from the preliminary minutes not reported elsewhere in the JOIDES Journal.

Contingency Plan, 1981-83 Program

In view of the possible reduced funding for the 1981-83 drilling program, the Planning Committee asked the OPP to establish priorities on its sites and/or programs contained in the 1981-83 proposal. The OPP discussed the need to set priorities, how such priorities should be established and when they should communicate (i.e. before or after NSF established the level at which it intended to fund the 1981-83 program). The OPP noted that its 81-83 program is composed of four parts or experiments: the North Atlantic, the Central Pacific, the southwest Pacific and the North Pacific. Each part represents a strong scientific program in itself. The Panel generally agreed that it would be best to complete fewer experiments rather than partially complete all four. It will forward its priorities to the Planning Committee following NSF's decision on funding for the 1981-83 program.

Request for Site Survey Input

The Planning Committee requests guidance on site surveys for the 1981-83 program. A site surveying proposal has been submitted by JOI, Inc. to NSF, but the Site Survey Panel needs more data on many of the OPP sites in the 1981-83 program, specifically:

EQ-4 and -5, OC-1, NP-1 and -2; Leg 94 — all sites; Leg 86, NW-5-7.

The OPP designated specific members to locate existing survey data and coordinate efforts for future site survey in the (a) North Atlantic, open ocean (not including Caribbean), (b) circum-Saharan-equatorial-Atlantic sites; AIII-4 to -7, (c) southwestern Pacific and equatorial Western Pacific, (d) Western Pacific, (e) and Central and North Pacific.

Mesozoic Working Group

S. Schlanger will chair the Mesozoic Working Group. H. Thierstein (former Chairman) and Y. Lancelot (now with DSDP) are no longer Ocean Paleoenvironment Panel members. H. Thierstein, however, will continue to participate as a working group member. The working group now includes H. Jenkyns, W. Sliter, R. Larson, R. Douglas, and H. Thierstein.

Alternative North Atlantic Sites

W. Ruddiman, J. Hays, and J. Kennett, submitted a report suggesting alternative sites to be cored during the late phases of the North Atlantic program. The nine proposed sites lie near the proposed *Challenger* track and could be cored in one to two days of ship's time.

The Stratigraphic Correlation Panel is also preparing a report on alternate sites which they will relay to the OPP, when ready.

Arctic Sampling Program — Status

According to J. Thiede, the Scandinavians have neither proposed nor contemplated a drilling program in the Arctic, contrary to reports received by Panel members at the Ocean Margin Drilling meeting in Houston. They do plan to use a Swedish icebreaker for three months to take long piston cores in the basin and margin north of Spitzbergen and North Greenland.

Thiede also reported that the Canadians are planning a 1982 ice-station program, but have decided against drilling in the region.

Hydraulic Piston Cores — Sampling Policy

DSDP is presently seeking recommendations concerning sampling of the hydraulic piston cores (HPC). The current HPC policy is to consume no more than 1/3 of the working half on board ship, and no more than 1/3 of the working half in post-cruise sampling by ship and contributing shore-based scientists. Scientists should collect only enough sample to provide data for their contribution to the Initial Report. DSDP also apparently has an inadequate repository staff to handle the numerous sample requests, created by recovery of the hydraulic piston cores.

Complaints have been directed to the OPP regarding "over enthusiastic" sampling by shipboard scientists, and concern expressed regarding the loss of the high-resolution potential of cores for future scientific studies. The OPP addressed the question of whether the current sampling policy was too generous, and made the following recommendation to the Planning Committee:

The Ocean Paleoenvironment Panel recommends that (1) except under extraordinary circumstance, shipboard sampling be limited to 3 samples per 150 cm section per scientist or program; (2) all undestroyed HPC samples (e.g. paleomagnetic) be returned to DSDP at the end of the post-cruise investigation; and (3) DSDP maintain or increase its curatorial staff so that returned HPC samples may be properly curated.

The Panel recommended that "extraordinary circumstances", should they occur, be resolved by the appropriate co-chief scientists.

Next Meeting

The Ocean Paleoenvironment Panel proposes to hold its next meeting 23-24 April 1981, in St. Croix, Virgin Islands, followed by a two-day unofficial field trip. An alternative site would be at the Bermuda Marine Station.

INORGANIC GEOCHEMISTRY PANEL
Joris M. Gieskes, Chairman

The Inorganic Geochemistry Panel met 4-5 August 1980 at Scripps Institution of Oceanography. We will include items from minutes of that meeting in the February 1981 JOIDES Journal.

ORGANIC GEOCHEMISTRY PANEL
Bernd R. Simoneit, Acting Chairman

The Organic Geochemistry Panel met 22-24 August at Durham, New Hampshire. The Panel tentatively plans to meet again the week of 26 January in Boca Raton, Florida. We will include items from the August meeting in the February 1981 JOIDES Journal.

SEDIMENTARY PETROLOGY AND PHYSICAL PROPERTIES PANEL
Adrian Richards, Chairman

The Sedimentary Petrology and Physical Properties Panel met 3-4 October in Denver, Colorado. We will include items from minutes of that meeting in the February 1981 JOIDES Journal.

STRATIGRAPHIC CORRELATIONS PANEL
Richard Poore, Chairman

The Stratigraphic Correlations Panel (SCP) met 7-9 May 1980 in La Jolla, California. The following is a brief abstract of that meeting's minutes.

Challenger **Procedures**

The SCP noted that shipboard scientists are still not quantifying fossil abundance data. Some form of tabular abundance quantification (e.g. Rare = <3%, Few = 3%-15%, and so forth) is essential to allow later analyses of data. Any reasonable quantification categories are acceptable so long as they are defined.

At its Paris meeting, the PCOM asked DSDP to revise instructions to shipboard scientists accordingly.

The SCP expressed concern that ammonite aptychi and certain other megafossils are being destroyed by customary core splitting onboard *Challenger.* Megafossils are best preserved by splitting cores along bedding planes. The Panel suggested that cores not be split vertically until after megafossils have been removed.

At its Paris meeting, the PCOM asked DSDP to alert the shipboard curatorial representatives to possible occurrence of megafossils so that they could ensure their preservation.

DSDP distributed a list of references presently on board the *Challenger* to SCP members. SCP has given DSDP an additional list of suggested foraminifer references. DSDP has also agreed to place additional copies of appropriate Initial Reports on board *Challenger* when the ship is drilling in areas explored during earlier Legs.

Initial Reports

The SCP expressed continuing concern about the quality of graphics in the Initial Reports, particularly in the presentation of plates and tables in the paleontologic papers. Members agreed to monitor illustrations on an irregular basis and work more closely with the DSDP production staff to resolve problems.

DSDP has updated its list of references for paleontologic papers on basis of SCP recommendations.

Uncored Stratigraphic Sequences and Boundaries in the North Atlantic

The SCP noted that drilling in the North Atlantic on DSDP-IPOD legs has yielded vital information on some Mesozoic-Cenozoic sequences and boundaries, *but* that a number of others have not been cored.

The Panel recommended that in order to fill gaps in Mesozoic-Cenozoic sequences, certain intervals be continuously cored during Legs 76-82. These cored stratigraphic sequences would yield essential paleontologic and paleoenvironmental data.

(*Details of recommended coring are too long for inclusion in* JOIDES Journal.)

SCP members will contact the co-chief scientists of Legs 76-82 regarding special interests and alert them to critical boundaries so that they can make a special effort to identify and preserve them.

Cenozoic Oscillations of the Gulf Stream Working Group

The Stratigraphic Correlations Panel formed a small working group, Cenozoic Oscillations of the Gulf Stream (COGS), to refine ideas about Gulf Stream oscillations (J. Saunders, coordinator). The group's objectives are to document the northern limit of the Gulf Stream from late Eocene to Recent by hydraulic piston coring a 3-hole transect in the Labrador Sea and Newfoundland Basin. Oscillations of this northern interface would allow correlations between high and low latitude biotic assemblages (especially forams) to better refine the oxygen isotope stratigraphy.

The COGS group will produce a short report by the end of October for distribution to appropriate Panel Chairmen.

Paleontology Reference Centers

1) Eight splits of samples will be made to accommodate all expected needs. About one third of the samples already processed will not split 8 ways, thus the original cores need to be resampled.

2) The Smithsonian Institution (SI) will become a reference center and accept a prepared set of samples; but SI staff will not prepare material. The SI does not need NSF funding for the center.

3) **The SCP recommends that the New Zealand Geological Survey in Lower Hutt, N.Z. become the reference Center for the Austral-Asian region.** (Attempts to generate interest in Australia for a reference center had been unfruitful.)

4) The director of SIO confirmed the permanent status of a reference center there.

5) The reference center in Basel now has material prepared from the first 9 DSDP legs.

Data Handling

The DSDP Information Handling Group demonstrated search capabilities within the Tertiary Paleo data base. This data base should be loaded by September 1980. The SCP continues to be impressed with the competence of the data handling group and by the excellent and vital job they are doing.

P. Cepek has completed loading the Cretaceous paleo data base at the BFG in Hannover. The base includes data on nannofossils, radiolarians, and diatoms (Sites 1-418); the foraminifer data are partially loaded (Sites 1-100, 135, 136, 382-402), loading should be completed by the end of 1980.

The Panel suggested that Jurassic data be added to the BFG data base. This would be relatively simple as very little Jurassic material has been collected.

Membership

The Panel unanimously thanked Richard Benson for the excellent contribution he has made to the Panel during his 3 years as chairman. Richard Poore, although unable to attend the meeting (he was aboard *Glomar Challenger*, Leg 73), became the Panel Chairman at the conclusion of the meeting.

The SPC recommended that Lloyd Burckle (L-DGO) be asked to join the Panel (replcing R. Benson).

Burckle subsequently accepted the Executive Committee's invitation to join the Stratigraphic Correlations Panel.

Next Meeting

The Stratigraphic Correlations Panel tentatively plans to meet next on 6-8 May 1981 at Scripps Institution of Oceanography in La Jolla.

DOWNHOLE MEASUREMENTS PANEL
Roy D. Hyndman, Chairman

The Downhole Measurements Panel met 20-21 May 1980 in Palisades, New York.

DSDP Logging

The Downhole Measurements Panel is very concerned about the limited number of holes drilled in which good quality logs have been obtained. In addition to poor hole conditions, which are largely unavoidable, a high rate of logging equipment failure has contributed to the high failure rate. **The Panel recommended that DSDP monitor the contracted logging carefully to ensure that the rate of equipment failure is reasonable.**

Table 7 summarizes the DSDP downhole logging experiments to date.

The Panel was particularly concerned about the very small number of successful sonic logs. These logs are essential in correlating the seismic reflection and refraction profiles, and the velocities of the core samples measured in the laboratory with the drilled section (e.g. acoustic stratigraphy). **The Panel recommended that DSDP investigate obtaining a better sonic tool through the contractor or by some other means.** It suggested that a long-spacing sonic tool, which has the potential to obtain more accurate velocities be considered.

The Panel recommended very strongly that the DSDP hire a staff log analyst or at least a logging engineer and also suggested that it should consider doing its own logging through additional personnel and the lease or purchase of tools. If experienced logging engineers cannot be found, electronics engineers should undergo an appropriate training program (e.g. a course plus field training). Staff logging engineers presumably could undertake other electronics or technical jobs on board the ship when not required for logging. For holes or legs where logging is critically important (e.g. ENA-1) the Project should also contract a shipboard log analyst.

The Panel felt that in general the choice of downhole logging tools now being used was appropriate.

Soviet Downhole Magnetometer and Logging Tools

The Soviets have obtained excellent results with their downhole magnetometer in several deep crustal holes. Although no deep crustal holes are planned for the present phase of drilling **the Panel recommended that the downhole magnetometer be used, if available, whenever there is significant crustal penetration.**

Soviet logging tools might also be available for use on *Glomar Challenger*. **The Panel recommended that if they become available, they be tested, but that DSDP continue to make other arrangements for logging tools.**

Logging Hole 395, Mid-Atlantic Ridge

The Panel strongly supported logging the previously drilled crustal hole, Hole 395A, in the transit between legs 78 and 79.

Wireline Re-entry

A technique to re-enter holes drilled in the deep sea without drill pipe would permit (1) logging the hole after the drill ship had left the site, (2) logging with large diameter tools that will not pass through the drill pipe (e.g. borehole gravimeter), and (3) the emplacement (and subsequent repair and replacement) of instruments left in holes by the the drill ship (e.g. seismometers, strainmeters, etc.). The Office of Naval Research and Hawaii Institute of Geophysics are investigating a wireline re-entry technique; they are presently developing a computer simulation of the wire behavior. DARPA is also interested, and the DSDP engineering staff have been examining the problem as well. **The Panel recommended that a test be made of wireline re-entry from the *Glomar Challenger* as soon as the ONR computer simulation is completed.** The *Challenger* has the required equipment, maneuverability and re-entry experience. The time required for a test should be very short.

Report on Downhole Experiments

Certain recent downhole logging experiments have been extremely successful; for example, they have produced some very signficant data during Legs 68, 69 and 70, during which the shipboard parties made special efforts to ensure the downhole logging worked.

Table 8 summarizes these and other special downhole experiments conducted by DSDP.

Roger Anderson (L-DGO) outlined the borehole-televiewer and downhole packer permeability results; both have yielded significant data. Several large formation-water samples were also taken. Televiewers were loaned by AMOCO Production Research and the U.S. Geological Survey. **The Panel recommended that DSDP repair or replace the packer — damaged the last time it was used — as soon as possible or that a new packer be bought by outside investigators. It also suggested that DSDP investigate purchasing a straddle packer (spaced pair of packers) and the availability of a televiewer.**

Leg 76 Logging and Experiments

The Office of Naval Research is providing support for logging; it particularly wants to obtain high quality logs in a deep hole off the eastern U.S. (ENA-1). An important complement to the sonic logging would be downhole "check shots": surface shots and downhole recording. This was attempted unsuccessfully on Leg 45 with an airgun and downhole hydrophone. A downhole clamped geophone and a larger airgun may be needed. A downhole recording seismograph will not be ready in time to use at ENA-1, but the Panel hopes that a seismograph can be implaced there subsequently from another ship.

DARPA Proposal

The Defense Advance Research Project Agency (DARPA) wants to implant a downhole seismometer for scientific purposes as part of the proposed two year *Challenger* extension. **The Downhole Measurements Panel supports the DARPA proposal, provided that there is no departure from the normal JOIDES control of the operation. Data from the instrument must be made freely available to the scientific community.**

DARPA is also interested in testing a downhole seismometer in the present phase and in developing wireline re-entry capability.

Hawaii Institute of Geophysics (HIG) Downhole Siesmometer

HIG is funded to construct two downhole seismographs. The first will not be ready in time for drilling at ENA-1 (western North Atlantic), but HIG might attempt wireline re-entry from another oceanographic ship. The Panel suggests they also consider holes drilled off Nova Scotia (proposed for Leg 82, about September 1982) or a hole off Hawaii which would facilitate servicing and recovery.

Downhole Temperatures and Heat Flow

M. Langseth outlined new developments in obtaining equilibrium downhole temperatures from the HRT temperature log. He has modelled the drilling system as a heat exchanger and found that the drilling disturbance and its decay with time can be calibrated quite accurately if precise records of the drilling history and rates of drilling fluid are kept. The magnitude of the disturbance can also be reduced by minimizing the drilling circulation rates. He also pointed out the HRT temperature log needs much better calibration. Application of this technique may allow participants to obtain accurate and detailed equilibrium temperature profiles on a semi-routine basis.

67	494A		x				x	x	x		x
	495		x				x	x	x		x
	497		x				x		x		x
68/69	501	x (poor)	x	x	x	x	x	x	x		x
69	504A (adjacent 501)		x				x	x	x(1)	x	x
	504B	x (shorted out)	x	x		x	x	x	x(2)	x	x
	505B	(not attempted, poor bore-hole)	x	x		x	x	x	x(2)	x	x
70	504B (same as 69)	x (spectrum)	x	x		x	x	x	x(2)	x	x
71	511					x^3 (with collar locator)		x^3		x	x
None on 72											

CSVL = Sonic Log-Borehole Compensated)occasionally with VDL = Variable Density Log and Amplitude Log)
CDL = Density Log-Borehole Compensated
GL = Guard Log (Laterolog 3)
IL = Induction Log - 16-Inch Normal
NL = Neutron (epithermal-noncompensated, qualitative)
CL = Caliper Log (usually with Density or Sonic Log)
GR = Gamma Ray (usually with Sonic, Density, Electric Logs, and Neutron)
TL/DTL = Temperature Log - absolute and differential

[1]Material in hole is stated on analog records with its resistivity characteristics.

[2]These Gearhart-Owen Computer tapes are for each logging run, e.g. CSVL, GR, CL on one tape (there is no equivalent to Schulumberger's standard library tape).

[3]Taken through pipe, etc.

Table 8. Special Downhole Experiments Summary

COMPLETED	LEG	HOLE	AREA	TOOL DEPTH SUB-BASEMENT/ SUB-BOTTOM (m)	RESULTS
Downhole geophone/surface airgun	45	395A	Mid-Atlantic Ridge	570/680	None (insufficient signal).
Oblique seismic experiment	46	396B	Mid-Atlantic Ridge		None (site abandoned for ship repairs).
Oblique seismic experiment	51	417D	Bermuda Rise	228/571	First *in situ* determination of seismic velocities and gradients in the oceanic crust; comparison with logging and physical properties data permitted indirect determination of porosity and permeability of old crust.
Large-scale resistivity	60	454A	Philippine Sea	39/106	None (insufficient penetration).
	60	459B	Phillipine Sea	0/440	Operational verification of technique; no basement penetration but results in sediments consistent with logging data.
H.I.G. downhole seismometer	65	482C	Gulf of California	50/180	None (tool malfunction).
Oblique seismic experiment	65	485A	Gulf of California	70/220	Determination of seismic velocity structure in young, fast-spreading crust.
H.I.G. downhole seismometer	67	494A	Guatemala Margin	0/244	Operational success in sediments (no basement penetration attempted).
Large-scale resistivity	68	501	Costa Rica Rift	68/333	Operational success; results still being analyzed.
Russian downhole magnetometer	68	501	Costa Rica Rift	68/333	First *in situ* determination of polarity reversals and intensity of magnetization in oceanic crust.

Hydrofracture/permeability/ borehole televiewer experiment	68	501	Costa Rica Rift	40/305	Operational tests of equipment to be used in hydrofracture experiment on Leg 69; first direct measurement of basement permeability; chert layers, massive and pillow basalts clearly distinguishable in first use of televiewer at sea.
In situ temperature and interstitial water sample	69	504A (adjacent 501)	Costa Rica Rift	97	Barnes-Uyeda Temperature Probe: leakage of sea water was a problem.
				157	Probe jammed in bit.
In situ temperature and interstitial water sample	69	504C	Costa Rica Rift	53.5, 101, 162.5, 200	Barnes-Uyeda Temperature Probe: successful. Temperature measurements, but the lower interstitial water samples appear t leaked.
Hydraulic fracture permeability tests	69	504B	Costa Rica Rift	194	Successful: indicated permeable basalt in the lower 120 m of hole.
Russian magnetometer	69	504B	Costa Rica Rift	375-475	Run 4 times, using new and old tools.
Borehole teleview experiment[1]	69	504B	Costa Rica Rift	375-589	Data noisy at top of run but improved with depth: identified pillow flows.
Large water sample from basement using packer	69	504B	Costa Rica Rift	489	15 gallon sample obtained.
Downhole magnetometer	69	505B	Costa Rica Rift	100-178	Run 4 times: indicated uniform, reverse, magnetization.

Table 8 (continued)

In situ temperature and interstitial water sample	69	505	Costa Rica Rift	86, 142, 183, 210	Barnes-Uyeda Temperature Probe: 4 successful runs.
Large-scale electrical resistivity	70 (re-entry)	504B	Costa Rica Rift	687	Successful.
Oblique seismic experiment	70	504B	Costa Rica Rift	687	Required 2 tries: second try satisfactory only in one component.
In situ temperature and interstitial water sample	70[2]		504B	687	Barnes-Uyeda Temperature Probe: water sample successful, but temperature no good. Indicate hydrothermal circulation in the basalt section.

[1]Borehole televiewer not successful at Site 505B.

[2]Other holes (506-510) ran the Barnes-Uyeda Temperature Probe successfully.

Development Funds for Downhole Measurements

The Panel addressed the question of how development funds for downhole measurements could best be used. It concurred with the conclusion of *ad hoc* group (convened for JOI, Inc. in Seattle, February 1980) which discussed Downhole Measurements for the Ocean Margin Drilling Program and concluded that a detailed review of logging tools is critical. Information about the development of logging tools by various companies and organizations is particularly important. The Panel also supports the need for a workshop on downhole logging and borehole instrumentation (see below). Finally, it recommended the development of a number of specific tools and instruments, e.g. the borehole televiewer and downhole gravimeter.

Clathrates

Clathrates, or gas hydrates, provide a potentially serious hazard to drilling. The Panel was asked to study downhole tools that could be used to detect them. Gas hydrates are not readily distinguished and would need to be logged while drilling progressed (i.e. while logging tools were in the drill string). Industry has developed the capability to do this, but the system is very expensive. Logging can add little about the recovered clathrate, particularly if it is recovered in a pressure core barrel.

Workshop and Course on Downhole Logging and Downhole Instrumentation

The Downhole Measurements Panel proposes to include a course to review the state-of-the-art in downhole logging, and a workshop on downhole instrumentation in conjunction with its next meeting. The meeting is tentatively scheduled for March of 1981 in Hawaii.

INDUSTRIAL LIAISON PANEL
W. A. Roberts, Chairman

The Industrial Liaison Panel has not met within the past year.

INFORMATION HANDLING PANEL
Daniel W. Appleman, Acting Chairman

The Information Handling Panel has not met within the last nine months. The next meeting will be 15-16 January 1981 at Scripps Institution of Oceanography, La Jolla, California.

POLLUTION PREVENTION AND SAFETY PANEL
Louis E. Garrison, Chairman

The Pollution Prevention and Safety Panel (PPSP) met 19 June and 28 August 1980 at Scripps Institution of Oceanography to review sites proposed for Legs 76, 77, and 78.

Safety Review, Leg 76

ENA-1: Approved as proposed.

ENA-5: Approved as proposed to 800 meters, but should be continuously cored below 300 meters with extra precaution, and terminated if hydrocarbon showings above normal background level are encountered.

ENA-7A, -B and -C: The principal reason for proposing these sites was to learn more about the occurrence of gas hydrates in the marine environment. R. Sheridan and W. Dillon explained the geology of the region and the bottom-simulating reflector interpreted to be the interface between gas hydrate and free gas. J. Ewing discussed previous drilling at nearby DSDP sites, and the possibility that a sharp decrease in drilling rate at 620 meters at Site 102 may have been the bottom-simulating reflector. Kvenvolden explained the proposed Leg 76 program for an intensive shipboard and laboratory study of hydrates from the proposed sites.The Safety Panel discussed at length the potential hazards of drilling in gas hydrates without well control, and recommended an extremely cautious approach to the problem. Some reassurance was gained from the fact that Leg 11 had drilled similar sites nearby to depths greater than 600 meters whereas the present DSDP proposals are only to 400-meter depths.

Recommendations:

ENA-7A: Approved as proposed to a depth no greater than 400 meters.

ENA-7B and -7C: Disapproved. At these sites the increased amplitude of the bottom simulating reflector in an area of structural closure suggests that free gas, if present, may be accumulated in considerable quantities here. If such is the case, any attempt to approach the upper boundary of this "bright spot" based on velocity-derived drilling depths is subject to too many uncertainties to be judged an acceptable risk.

ENA-15: Approved for hydraulic piston coring to refusal depth.

ENA-16: Approved as proposed.

ENA-17: Approved to 800 meters.

In addition, the PPSP approved drilling at DSDP Site 102 to a depth of 400 meters at the discretion of the co-chief scientists.

Safety Review, Leg 77

ENA-12A: The location should be moved about 2 km to the northeast along Line SF-4 toward the axial portion of the apparent synclinal structure; otherwise approved as proposed.

ENA-12B: The location should be moved to the intersection of Lines SF-15 and GT3-65 off the crest of the apparent structure below unconformity two; otherwise approved as proposed.

ENA-12C and -12D: Both approved as proposed.

ENA-13: The mid-Cretaceous unconformity (MCU) at the location proposed appears to arch broadly in a NW-SE direction along Line SF-12 to form an anticlinal structure more than 25 km across. On the basis of information available to the Panel, we could not determine whether the structure was closed up dip or drainage was open to the outcrop to the northeast. The Panel asked Dick Buffler to prepare and circulate to Panel members a structure map on the MCU. The Chaiman will contact the Panel by telephone or mail after it has examined these data and report its recommendation on this site.

ENA-14A: Approved as proposed.

ENA-14B: Approved, but recommended that site be moved to a location where acoustic basement is covered by no more than 100 meters of sediment.

ENA-14C: Approved as proposed.

ENA-14D: Disapproved. Penetration of the angular unconformities presents too great a risk.

CAR-7, -7A, -7B, -7C, -7D, -7E, -7F: All approved as proposed.

Safety Review, Leg 78

CAR-1, -1A, -1B, -1C, -1D, -1E: All approved as proposed.

CAR-2 and -2A: Both approved as proposed.

CAR-2B: The location should be moved to a position at 2130 on CEPM Line 220A near the axis of the apparent synclinal structure below the unconformity. An intersecting seismic line should be made through the 2130 site by *Challenger* to examine the north-south structural configuration. Drilling is approved only if the older beds do not pinch out against the unconformity.

CAR-3: Approved as proposed. Re-entry is not a safety requirement at this site, but safety approval was given on the basis of continuous coring to total depth.

Other Business

The PPSP, with concurrence of the SIO Safety Panel, approved a new *Safety Review Check Sheet* to be used for all future reviews. They also reviewed the new *Drillsite Data Sheet* filled out by the shipboard scientists for the first time on Leg 73. The Panel will send it out again, with some revision, on Leg 75. The PPSP appreciates the cooperation of Leg 73 Co-Chief Scientists, K. Hsü and J. LaBreque, in providing the information.

SITE SURVEYING PANEL

E. J. W. Jones, Chairman

The Site Surveying Panel met 14-15 May 1980 in Hamburg, F.R.G. The JOIDES Office did not receive minutes of the meeting by publication date (October JOIDES Journal), but see the Planning Committee report for key items from that meeting.

HYDRAULIC PISTON CORER WORKING GROUP

Ted Moore, Chairman

The Hydraulic Piston Corer Working Group met 8-9 May 1980 in Washington, D.C. See the Planning Committee report for a summary of key points from the meeting and PCOM responses.

DIRECTORY OF JOIDES COMMITTEES, PANELS AND WORKING GROUPS

Executive Committee (EXCOM)

Dr. William A. Nierenberg, Chairman
Scripps Institution of Oceanography, A-010
University of California, San Diego
La Jolla, CA 92093
Tel: (714) 452-2826

Dr. D. James Baker, Jr.
(Alternate: Dr. Joe S. Creager)
Department of Oceanography, WB-10
University of Washington
Seattle, WA 98195
Tel: (206) 543-7160
(543-5060)

Prof. Dr. F. Bender
(Alternate: Prof.Dr. H.-J. Durbaum)
Bundesanstalt für Geowissenschaften und Rohstoffe
3 Hannover 51, Postfach 510153
FEDERAL REPUBLIC OF GERMANY
Tel: 0511-64681

Dr. Warren Wisby
(Alternate: Dr. Christopher G.A. Harrison)
Rosenstiel School of Marine and Atmospheric Science
4600 Rickenbacker Causeway
Miami, Florida 33149
Tel: (305) 350-7519
(350-7400)

Dr. G. Ross Heath
(Alternate: Dr. George Keller)
Oregon State University
School of Oceanography
Corvallis, OR 97331
Tel: (503) 754-3504
(754-4763)

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

Sir Peter Kent, F.R.S.
(Alternate: Dr. Anthony E. S. Mayer)
Natural Environment Research Council
Polaris House
North Star Avenue
Wilts SN2 1EU
Swindon, ENGLAND
Tel: (0793) 40101, Ext. 314

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

Dr. Melvin N.A. Peterson (DSDP Rep.)
(Alternate: Dr. Yves Lancelot)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3500
(452-3521)

Dr. Gerard Piketty
(Alternate: Dr. Jacques Debyser)
C.N.E.X.O.
B.P. 107, Paris 16
FRANCE
Tel: 723 5528, Ext. 420

Dr. Noriyuki Nasu
(Alternate: Dr. Kazuo Kobayashi)
Ocean Research Institute
University of Tokyo
Nakano, Tokyo 164
JAPAN

Dr. John Steele
(Alternate: Dr. Arthur Maxwell)
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
Tel: (617) 548-1400, Ext. 2500

Prof. T. K. Treadwell, Jr.
(Alternate: Dr. Stefan Gartner)
Department of Oceanography
Texas A&M University
College Station, TX 77843
Tel: (713) 845-7211
(845-2153)

Address and/or phone number in parentheses is that of alternate.

22
In

Executive Committee (EXCOM)

U

Mr. Alexander V. Sidorenko
T (Alternate: Dr. Nikita A. Bogdanov, or
Dr. Peter P. Timofeev)
22, Staro Monetny Pereylok
Institute of the Lithosphere
U.S.S.R. Academy of Sciences
Moscow, U.S.S.R.
Tel: 233-06-20

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

Planning Committee (PCOM)

Dr. Edward L. Winterer, Chairman
(Alternate: Dr. William R. Riedel)
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-2360
(452-4386)

Dr. Helmut Beiersdorf
(Alternate: Dr. U. von Rad)
Bundesanstalt für Geowissenschaften
und Rohstoffe
3 Hannover 51, Postfach 510153
FEDERAL REPUBLIC OF GERMANY
Tel: 0-511-6468-788

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

Dr. Joe R. Cann
(Alternate: Mr. D.G. Roberts)
Department of Geology
The University
Newcastle-Upon-Tyne
NE1 7RU
ENGLAND
Tel: 0632-28511, Ext. 3090/3098
(Inst.Oceanographic Sciences
Brook Road, Wormley, Godalming
Surrey GU8 5UB, ENGLAND
Tel: 042-879-4141)

Dr. Joe S. Creager
(Alternate: Dr. Dean A. McManus)
Department of Oceanography, WB-10
University of Washington
Seattle, WA 98195
Tel: (206) 543-5099 AM, 543-9944 PM
(543-5099)

Dr. Jack Dymond
(Alternate: Dr. Jack Corliss)
Oregon State University
School of Oceanography
Corvallis, OR 97331
Tel: (503) 754-2296

Mr. John Ewing
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
Tel: (617) 548-1400

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

Dr. Kazuo Kobayashi
Ocean Research Institute
University of Tokyo
1-15-1 Minamidai
Nakano, Tokyo 164
JAPAN

Dr. Yves Lancelot (DSDP Rep)
(Alternate: Dr. Matthew Salisbury)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3521
(452-3503)

Dr. Xavier LePichon
Laboratoire de Geodynamique
Tour 15 - 1a et.
Universite Pierre et Marie Curie
4 Place Jussieu
Paris 75005
FRANCE
Tel: 329-1221, Ext. 4592

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

-- number in parentheses is that of alternate.

Planning Committee (PCOM)

Dr. Ted Moore
Graduate School of Oceanography
University of Rhode Island
Kingston, RI 02881
Tel: (401) 792-6178

Dr. Lev Nikitin
Institute of Earth's Physics
of U.S.S.R. Academy of Sciences
10 B. Gruzinskaya
Moscow
U.S.S.R.

Dr. Wolfgang Schlager
(Alternate: Dr. Wayne D. Bock)
Fisher Island Station
Miami Beach, FL 33139
Tel: (305) 672-1840
(Rosenstiel School of Marine
and Atmospheric Science
University of Miami
4600 Rickenbacker Causeway
Miami, FL 33149)

Dr. Henri Bougault
Centre Oceanologique de Bretagne
B.P,. 337
29273 Brest Cedex
FRANCE

Dr. Robert G. Coleman
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
Tel: (415) 323-8111, Ext. 2334

Dr. Jack Dymond (Ex-officio)
School of Oceanography
Oregon State University
Corvallis, OR 97331
Tel: (503) 754-2296

JOIDES ADVISORY PANELS

Ocean Crust Panel (OCP)

Dr. Paul J. Fox, Chairman
Centre Oceanologique de Bretagne
B.P. 337, 29.273
Brest, Cedex
FRANCE
Tel: 98 458 055

Dr. Nikita A. Bogdanov
(Alternate: Dr. A. A. Tsvetkov)
22, Staromonetny Pereylok
Institute of the Lithosphere
U.S.S.R. Academy of Sciences
Moscow
U.S.S.R.
Tel: 233:06-20
(Institute of Geology of Ore
Deposits, Petrology,
Mineralogy & Geochemistry
of the U.S.S.R. Academy of Sciences
Staromonetny 33
Moscow, 109017, U.S.S.R.)

Prof. Dr. Rolf Emmermann
Institute für Petrographie und
Geochemie der Universitat Karlsruhe
Kaiserstrasse 12
D-7500 Karlsruhe
FEDERAL REPUBLIC OF GERMANY
Tel: (0721) 608 3323

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

Dr. Jose Honnorez
Rosenstiel School of Marine and
Atmospheric Sciences
University of Miami
4600 Rickenbacker Causeway
Miami, FL 33149
Tel: (305) 350-7508

Dr. Paul Johnson
Department of Oceanography
University of Washington
Seattle, WA 98195
Tel: (206) 543-5060

Dr. Roger Larson
Graduate School of Oceanography
University of Rhode Island
Kingston, RI 02881
Tel: (401) 792-6165

---mber in parentheses is that of alternate.

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

Dr. Jim Natland (DSDP Rep.)
(Alternate: Matthew Salisbury)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3538
(452-3503)

Dr. Minoru Ozima
(Alternate: Dr. Ikuo Kushiro)
Geophysical Institute
Faculty of Science
University of Tokyo
Bunkyo-ku, Tokyo 113
JAPAN

Dr. Ralph Stephen
Woods Hole Oceanographic Institution
Department of Geology and Geophysics
Woods Hole, MA 02543
Tel: (617) 548-1400, Ext. 2583

Dr. John Tarney
Department of Geological Sciences
The University
P.O. Box 363
Birmingham, BI5 2TT
ENGLAND
Tel: 021-472-1301

Ocean Margin (Active) Panel (AMP)

Dr. Roland von Huene, Chairman
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
Tel: (415) 856-7105

Dr. Peter F. Barker
Department of Geological Sciences
The University
P.O. Box 363
Birmingham BI5 2TS
ENGLAND
Tel: 021 472 1301, Ext. 2081

Dr. Jean-Paul Cadet
Laboratoire de Geologie
Universite d'Orleans
Domaine Universitaire de la Source
45045 Orleans CEDEX
FRANCE
Tel: (38) 66-07-25

Dr. William Coulbourn (DSDP Rep.)
(Alternate: Dr. Jim Natland)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-4884

Dr. Joe S. Creager (Ex-officio)
Department of Oceanography, WB-10
University of Washington
Seattle, WA 98195
Tel: (206) 543-5099 a.m.
543-9944 p.m.

Dr. William R. Dickinson
Department of Geosciences
University of Arizona
Tucson, AZ 85721
Tel: (602) 626-2178

Dr. Yury I. Dmitriev
Institute of Geology of Ore Deposits
Petrology, Mineralogy, & Geochemistry
of the U.S.S.R. Academy of Sciences
Staromonetny 35
Moscow, 109017
U.S.S.R.

Dr. Donald M. Hussong
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, HI 96822
Tel: (808) 948-8711

Dr. Daniel Karig
Department of Geological Sciences
Cornell University
Ithaca, NY 14853
Tel: (607) 256-3679

Dr. Keith Kvenvolden (OGP Rep.)
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
Tel: (415) 856-7150

Address and/or phone number in parentheses is that of alternate.

Dr. Xavier LePichon (Ex-officio)
Laboratoire de Geodynamique
Tour 15 - la et.
Universite Pierre et Marie Curie
4 Place Jussieu
Paris 75005
FRANCE
Tel: 329-1221, Ext. 4592

Dr. Kazuaki Nakamura
Earthquake Research
University Institute of Tokyo
Bunkyo-ku, Tokyo 113
JAPAN

Dr. Hansjust Walter
Bundesanstalt für Geowissenschaften
und Rohstoffe
Stillewag 2, D-3000 Hannover
FEDERAL REPUBLIC OF GERMANY
Tel: 0511-64681

Dr. Joel Watkins
Exploration & Production Division
Gulf Science & Technology Company
P.O. Box 2038
Pittsburgh, PA 15230

Ocean Margin (Passive) Panel (PMP)

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

Dr. Helmut Beiersdorf (Ex-officio)
Bundesanstalt für Geowissenschaften
und Rohstoffe
3 Hannover 51, Postfach 510153
FEDERAL REPUBLIC OF GERMANY
Tel: 0511-6468-788

Dr. Arnold H. Bouma
Office of Marine Geology
U.S. Geological Survey
P.O. Box 6732
Corpus Christi, TX 78411
Tel: (512) 888-3294

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

Dr. John A. Grow
U.S. Geological Survey
Woods Hole, MA 02543
Tel: (617) 548-8700

Dr. Karl Hinz
Bundesanstalt für Geowissenschaften
und Rohstoffe, Abt.Geophysik
3 Hannover 51, Postfach 510153
FEDERAL REPUBLIC OF GERMANY
Tel: 0511-6468-330

Dr. John M. Hunt (OGP Rep.)
Department of Chemistry
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
Tel: (617) 548-1400, Ext.2562

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

Dr. Yves Lancelot (DSDP Rep.)
(Alternate: Dr. Ken Pisciotto)
Deep Sea Drilling Project
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3521
(452-3521)

Dr. Lucien Montadert
(Alternate: Dr. Bernard Biju-Duval)
Division Geologie
Institute Francais du Petrole
1 et 4, Avenue de Bois-Preau
B.P. 18, 92 Rueil-Malmaison
FRANCE
Tel: 749-02-14

... in parentheses is that of alternate.

Prof. V. Nalivkin
(Alternate: Dr. M.E. Artemiev)
Liteynyi Prospect
Leningrad
U.S.S.R.
(Institute of Earth's Physics
U.S.S.R. Academy of Sciences
10 B., Gruzinskaya
Moscow, U.S.S.R.)

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

Dr. Sigmund Snelson
Shell Oil Company
P.O. Box 481
Houston, TX 77001

Dr. Jorn Thiede
Institute for Geologi
Universitetet I Oslo
Postboks 1047
Blindern, Oslo 3
NORWAY
Tel: 46-6800, Ext.9692

Dr. Peter R. Vail
EXXON Production Company
P.O. Box 2189
Houston, TX 77001

Dr. Jan E. van Hinte
Vrije Universiteit
Aardwetenschappen
P.O. Box 7161
Amsterdam 1011
THE NETHERLANDS

Ocean Paleoenvironment Panel (OPP)

Dr. Robert G. Douglas, Chairman
Dept. of Geological Sciences
University of Southern California
University Park
Los Angeles, CA 90007
Tel: (213) 743-7676

Dr. Charles Adelseck (DSDP Rep.)
(Alternate: Dr. William Coulbourn)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-4172
(452-4884)

Dr. Wolfgang H. Berger
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-2750

Dr. Herve Chamley
Sedimentologie et Geochimie
Universite des Sciences et
Techniques de Lille
U.E.R. des Sciences de la Terre
B.P. 36
59650 Villeneuve D'Ascq
FRANCE

Dr. Geoffrey Eglinton (OGP Rep.)
School of Chemistry
University of Bristol
Bristol BS8 1TS
ENGLAND

Dr. Dieter Futterer
Geol.-Paleontol.Inst.der Univ.Kiel
23 Kiel,Olshausenstrasse 40/60
FEDERAL REPUBLIC OF GERMANY

Dr. James D. Hays
Lamont-Doherty Geological Observatory
Palisades, NY 10964
Tel: (914) 359-2900, Ext,403,404

Dr. Hugh C. Jenkyns
Dept. Geology and Mineralogy
University of Oxford
Parks Road
Oxford OX1 3PR
ENGLAND
Tel: (0865) 54511

Address and/or phone number in parentheses is that of alternate.

Dr. James P. Kennett
Graduate School of Oceanography
University of Rhode Island
Narragansett Bay Campus
Kingston, RI 02881
Tel: (401) 792-6216

Dr. Ted C. Moore (Ex-officio)
Graduate School of Oceanography
University of Rhode Island
Kingston, RI 02881
Tel: (401) 792-6178

Dr. William Ruddiman
Lamont-Doherty Geological Observatory
Palisades, NY 10964
Tel: (914) 359-2900, Ext. 528,529

Dr. Seymour O. Schlanger
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, HI 96822

Dr. William V. Sliter
Branch of Paleontology and
Stratigraphy, MS 970
U.S. Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092

Dr. Yoichi Takayanagi
(Alternate: Dr. Hakuyu Okada)
Geol. and Paleont. Inst.
Tohoku University
Sendai
JAPAN
Tel: 0542-37-1111
(Geoscience Inst., Shizuoka Univ.
Shizuoka 422
JAPAN)

Dr. Peter P. Timofeev
(Alternate: Dr. Ivar Murdmaa)
Institute of Geology
U.S.S.R. Academy of Sciences
7 Pyzhevsky per
Moscow ZH-17
U.S.S.R.
(Institute of Oceanology
U.S.S.R. Academy of Sciences
22 Krasikoua Street
Moscow, 109387
U.S.S.R.)

...d/or phone number in parentheses is

Dr. Edward L. Winterer (Ex-officio)
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-2360

Inorganic Geochemistry Panel (IGP)

Dr. Joris M. Gieskes, Chairman
Scripps Institution of Oceanography
University of California, San Diego
La Jolla, CA 92093
Tel: (714) 452-4257

Dr. Jack Dymond (Ex-officio)
School of Oceanography
Oregon State University
Corvallis, OR 97331
Tel: (503) 754-2296

Dr. Henry Elderfield
Dept. of Earth Sciences
The University
Leeds LS2 9JT
ENGLAND

Dr. Margaret Leinen
University of Rhode Island
Graduate School of Oceanography
Kingston, RI 02881
Tel: (401) 792-6268

Dr. Frank Manheim
U.S. Geological Survey
Woods Hole, MA 02543
Tel: (617) 548-8700

Dr. Ken Pisciotto (DSDP Rep.)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3521

Dr. Igor D. Ryabchikou
(Alternate: Dr. Aatoly Sharaskin)
Institute of Geology of Ore
Deposits, Petrology, Mineralogy,
& Geochemitry of the U.S.S.R.
Academy of Sciences
Staromenetny 33
Moscow, 109017
U.S.S.R.
(Institute of Geochemistry
U.S.S.R. Academy of Sciences
47, a, Vorobiovskoe Shosse
Moscow, U.S.S.R.)

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

Dr. Yves Tardy
Laboratoire de Pedologie et Geochimie
38, rue des Trente:six Ponts
31078 Toulouse
FRANCE

Dr. Karl-Heinz Wedepohl
34 Gottingen
Geochemisches Institut der Universitat
Goldschmidstrasse 1
FEDERAL REPUBLIC OF GERMANY

Organic Geochemistry Panel (OGP)

Dr. Keith Kvenvolden, Chairman
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
Tel: (415) 856-7150

Dr. Earl W. Baker
Dean of Science
Florida Atlantic University
Boca Raton, FL 33431
Tel: (305) 395-5100, Ext.2701

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

Dr. Gordon Erdman
Phillips Petroleum Company
Bartlesville, OK
Tel: (918) 336-6600

Dr. Eric Galimov
(Alternate: Dr. E. Romankevich)
Institute of Geochemistry
U.S.S.R. Academy of Sciences
47 a, Vorobiovskoe Shosse
Moscow
U.S.S.R.
(U.S.S.R. Academy of Sciences
Inst. of Oceanology
22 Krasikoua Street
Moscow, 109387, U.S.S.R.)

Dr. John M. Hunt
Woods Hole Oceanographic Institution
Department of Chemistry
Woods Hole, MA 02543
Tel: (617) 548-1400, Ext.2562

Dr. Philip A. Meyers
Department of Atmospheric & Oceanic Science
University of Michigan
Ann Arbor, MI 48109
Tel: (313) 764-0597

Dr. Ken Pischiotto (DSDP Rep.)
(Alternate: Dr. Jim Natland)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3521
(452-3538)

Dr. Bernard R. Simoneit
Institute of Geophysics and Planetary Physics
University of California
Los Angeles, CA 90024
Tel: (213) 825-3331

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

Dr. Dietrich Welte
(Alternate: Dr. E. Degens)
Lehrstuhl für Geologie, Geochemie, und Lagerstatten des Erdolsun der Kohle
Rhein-West. Techn. Hochschule
51 Aachen
FEDERAL REPUBLIS OF GERMANY
(Dept. Geologie,Univ.of Hamburg
Hamburg, GERMANY)

Dr. Edward L. Winterer (Ex-officio)
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-2360

Address and/or phone number in parentheses is that of alternate.

Sedimentary Petrology and Physical Properties Panel (SP[4])

Dr. Adrian Richards, Chairman
Marine Geotechnical Laboratory
Lehigh University, Building 17
Bethlehem, PA 18015
Tel: (215) 861-3649

Dr. Michael A. Arthur
Branch of Oil and Gas Resources
U.S. Geological Survey
Box 25046, MS-940
Denver, CO 80225
Tel: (303) 234-4026
Denver Federal Center
Denver, CO 80225

Dr. Richard Bennett
NOAA/AOML
15 Rickenbacker Causeway
Miami, FL 33149
Tel: (305) 361-3361, Ext.318/319/320

Dr. John Conolly
Era North America Inc.
200 Railroad Avenue
Greenwich, CT 06830
Tel: (203) 622-9130

Dr. John W. Handin
Center for Tectonophysics
Texas A&M University
College Station, TX 77843
Tel: (713) 845-3251

Dr. George deVries Klein
Department of Geology
University of Illinois
Urbana, IL 61801
Tel: (217) 333-3540 (message)
333-2076 (office)

Dr. I. N. McCave
School of Environmental Sciences
University of East Anglia
Norwich NR4 7TJ
ENGLAND
Tel: (0603) 56161

Dr. Frederic Melieres
Laboratoire de Geologie Dynamique
Universite Pierre et Marie Curie
75230 Paris Cedex 05
FRANCE
Tel: 336-2525, Ext.5157

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

Dr. Orrin H. Pilkey
Department of Geology
Duke University
Durham, NC 27708
Tel: (919) 684-2206

Dr. Peter Rothe
Geographisches Institut der
Universitat Manheim
Abteilung für Geologie
6800 Manheim 1
Schloss, Postfach 2428
FEDERAL REPUBLIC OF GERMANY
Tel: 0621-292-5458

Dr. Matthew Salisbury
(Alternate: Dr. Eugene Boyce)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3503

Prof. Peter P. Timofeev
Geological Inst. Acad. of Sc. of U.S.S.R.
Deputy Director
7, Pyshevsky per,
Moscow ZH-17 109017
U.S.S.R.
Tel: 231-9418

Address and/or phone number in parentheses is that of alternate.

Stratigraphic Correlations Panel (SCP)

Dr. Richard Poore, Chairman
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
Tel: (415) 323-8111, Ext.2768

Dr. V. Basov
22, Staromonetny Pereylok
Institute of the Lithosphere
U.S.S.R. Academy of Sciences
Moscow
U.S.S.R.
Tel: 233-0620

Dr. Lloyd Burckle
Lamont-Doherty Geological Observatory
Palisades, NY 10964
Tel: (914) 359-2900, Ext. 406.

Dr. Pavel Cepek
Bundesanstalt für Geowissenschaften
und Rohstoffe
3 Hannover 51, Postfach 510153
FEDERAL REPUBLIC OF GERMANY
Tel: 0511-646 8783

Dr. Joe S. Creager (Ex-officio)
Department of Oceanography, WB-10
University of Washington
Seattle, WA 98195
Tel: (206) 543-5099 a.m.
543-9944 p.m.

Dr. D. Graham Jenkins
Department of Earth Science
The Open University
Milton Keynes, MK7 6AA
ENGLAND
Tel: (0908) 63116

Dr. Catherine Nigrini
510 Papyrus Drive
La Habra Heights, CA 90631
Tel: (213) 697-8842

Dr. John B. Saunders
Naturhistorisches Museum Basel
CH-4051, Basel, Augustinergasse 2
SWITZERLAND
Tel: 061-258282

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

Downhole Measurements Panel (DMP)

Dr. Roy Hyndman, Chairman
Pacific Geoscience Centre
Dept.Energy,Mines and Resources
9860 West Saanich Road
P.O. Box 6000
Sidney, B.C. V8L 4B2
CANADA
Tel: (604) 656-8269

Dr. Heinz Beckmann
Geologisches Institut
Technische Universitat Claustahl
3392 Claustahl-Zellerfeld 1
Leibnizstrasse 10
FEDERAL REPUBLIC OF GERMANY
Tel: 052323/722-2235

Mr. Eugene Boyce (DSDP Rep.)
(Alternate: Dr. Matthew Salisbury)
Deep Sea Drilling Project
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-2779
(452-3503)

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

Dr. Nikolas I. Christensen
Dept.Geological Sciences, AK-20
University of Washington
Seattle, WA 98195
Tel: (206) 543-7143

Mr. A. H. Jageler
Amoco Production Research Company
P.O. Box 591
Tulsa, OK 74102

Dr. Hajimu Kinoshita
Dept. Earth Science
Chiba University
Chiba, JAPAN

Dr. Drummond H. Matthews
Dept. of Geology and Geophysics
Cambridge University
Madingley Rise, Madingley Road
Cambridge CB3 0EZ
ENGLAND

Address and/or phone number in parentheses is that of alternate.

Dr. Yury Neprochnov
(Alternate: Dr. A. Pokryshkin)
P.P. Shirshov Institute of Oceanology
U.S.S.R. Academy of Sciences
22 Krasikova Street
Moscow, 109387
U.S.S.R.

Dr. Vincent Renard
Centre Oceanologique de Bretagne
B.P. 337
29273 Brest Cedex
FRANCE
Tel: 80-46-50

Dr. Adrian F. Richards (Ex-officio)
Marine Geotechnical Laboratory
Lehigh University, Building 17
Bethlehem, PA 10815
Tel: (215) 861-3649

Mr. J. R. Severns
McCulloh Oil Corporation
10880 Wilshire Blvd.
Los Angeles, CA 90024

Industrial Liaison Panel (ILP)

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

Mr. R. L. Adams
Executive Vice President
Conoco Inc.
P.O. Box 2197
Houston, TX 77001
Tel: (203) 359-3500

Prof. N. P. Budnikov
Ministry of Geology of U.S.S.R.
4/6 Bolshaya, Gruzinskaya
Moscow 123812
U.S.S.R.

Mr. Melvin J. Hill
President
Gulf Oil Exploration and
Production Company
P. O. Box 2100
Houston, Texas 77001

Dr. Ing. Guenter Peterson
Deutzche Schachtbau-und
Tiefborhrgesellschaft mbH
Postfach 1360
D-4450 Lingen (Ems)
FEDERAL REPUBLIC OF GERMANY

Dr. Gilbert Rutman
Societe Nationale des Petroles
D'Aquitaine
Tour D'Aquitaine—Cedex No. 4
92080 Paris La Defense
FRANCE

Mr. G. Williams
UK Offshore Operations Association,Ltd.
192 Sloane Street
London SW1 9OX
ENGLAND
Tel: 01-235-0762

Information Handling Panel (IHP)

Dr. Daniel W. Appleman, Acting Chairman
Department of Mineral Sciences
Natural History Building
Smithsonian Institution
Washington, DC 20560
Tel: (202) 381-6331

Dr. H. Glashoff
Documentation Service
Bundesanstalt für Geowissenschaften
und Rohstoffe
3 Hannover 51, Postfach 51053
FEDERAL REPUBLIC OF GERMANY

Dr. John C. Hathaway
U.S. Geological Survey
Bldg. B. Quissett Campus
Woods Hole, MA 02543
Tel: (617) 548-8700
FTS: 837-4155 or 4134

Dr. A. Loeblich, Jr.
Department of Geology
University of California
Los Angeles, CA 90024
Tel: (213) 825-1475

Address and/or phone number in parentheses is that of alternate.

Dr. Michael S. Loughridge
Marine Geology and Geophysics Branch
National Geophysical and Solar
Terrestrial Data Center
Code D621, NOAA
Environmental Data Center
Boulder, CO 80302
Tel: (303) 499-1000, Ext. 6487

Dr. Marthe Melguen
B.N.D.O.
Centre Oceanologique de Bretagne
B.P. 337 29273 Brest
FRANCE

Dr. Ted Moore (Ex-officio)
Graduate School of Oceanography
University of Rhode Island
Kingston, RI 02881
Tel: (401) 792-6178

Mr. Peter Woodbury (DSDP Rep.)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
Tel: (714) 452-3526

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

Dr. George Claypool
(Alternate: Dr. Keith Kvenvolden)
Branch of Oil and Gas Resources
U.S. Geological Survey
Denver Federal Center
Denver, CO 80225
Tel: (303) 234-3561
(U.S. Geological Survey
Menlo Park, CA 94025
Tel: (415) 856-7150)

Mr. Brian E. Davies
Sohio Petroleum Company
100 Pine Street
San Francisco, CA 94111
Tel: (415) 445-9400

Dr. Robert Douglas (Ex-officio,
OPP sites only)
Dept. of Geological Sciences
University of Southern California
University Park
Los Angeles, CA 90007
Tel: (213) 743-7676

Mr. John Ewing (Ex-officio)
Department of Geology and Geophysics
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
Tel: (617) 548-1400

Dr. Paul J. Fox (Ex-officio, OCP sites only)
Centre Oceanologique de Bretagne
B.P. 337, 29.273
Brest, Cedex
FRANCE
Tel: 98 458 055

Pollution Prevention and Safety Panel (PPSP)

Dr. Louis E. Garrison, Chairman
U.S. Geological Survey
P.O. Box 6732
Corpus Christi, TX 79411
Tel: (512) 888-3295
888-3294

Dr. N. J. Beliy
(Alternate: Dr. O. O. Scheremet)
Ministry of Gas Industry
8UL Strolitelei
117939 Moscow
U.S.S.R.
Tel: 133 0130

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

Dr. Arthur E. Green
EXXON Production Research Laboratory
P.O. Box 2189
Houston, TX 77001
Tel: (713) 965-4172

Prof. A. J. Horn
34 Lloyden Drive
Atherton, CA 94025
Tel: (415) 323-7126

Address and/or phone number in parentheses is that of alternate.

Dr. Ernst Hotz
c/o Deminex
Dorotheenstrasse 1
4300 Essen
FEDERAL REPUBLIC OF GERMANY
Tel: 0201-726350

Mr. J. Laherrere
(Alternate: Mr. Christian Bois)
Director, Dept. of Assistance Research
Total CFP—39 Quai A. Citroen
75739 Paris Cedex 15
FRANCE

Dr. Yves Lancelot
(Alternate: Dr. Matthew Salisbury)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3521
(452-3503)

Dr. David B. MacKenzie
Marathon Oil Company
P.O. Box 269
Littleton, CO 80160
Tel: (303) 794-2601 (Ext.410)

Dr. Arthur E. Maxwell (Ex-officio)
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
Tel: (617) 548-1400, Ext.2550

Dr. Robert Sheridan, (Ex-officio
PMP sites only)
Department of Geology
University of Delaware
Newark, DE 19711
Tel: (302) 738-2569

Mr. G. D. Taylor
British Petroleum Company Ltd.
Britannic House/Moore Lane
London, EC2Y 9BU
ENGLAND

Dr. Roland von Huene (Ex-officio,
AMP sites only)
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
Tel: (415) 323-8111

Address and/or phone number in parentheses is that of alternate.

Site Surveying Panel (SSP)

Dr. E.J.W. Jones, Chairman
Department of Geology
University College London
Gower Street
London WC1E 6BT
ENGLAND
Tel: 01-387-7050

Dr. Robert G. Douglas, (Ex-officio,OPP)
Dept. of Geological Sciences
University of Southern California
University Park
Los Angeles, CA 90007
Tel: (213) 743-7676

Dr. Paul J. Fox (Ex-officio, OCP)
B.P. 337, 29.273
Brest, Cedex
FRANCE
Tel: 98-458 055

Dr. Dennis Hayes (Ex-officio, PCOM)
Lamont-Doherty Geological Observatory
Columbia University
Palisades, NY 10964
Tel: (914) 359-2900

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

Dr. Shozaburo Nagumo
(Alternate: Dr. Nadamori Murauchi)
Earthquake Research Institute
University of Tokyo
Bunkyo-ku, Tokyo 113
JAPAN
(Department of Earth Sciences
Chiba University
Yayoi-cho, Chiba
JAPAN 280)

Dr. Philip Rabinowitz (Ex-officio,
Data Bank)
Lamont-Doherty Geological Observatory
Columbia University
Palisades, NY 10964
Tel: (914) 359-2900, Ext.501

Dr. Roland Schlich
Institute de Physique du Globe
Observatoire Geophysique du Park
St.-Maur, 4 Avenue de Neptune
94 St.-Maur-Des-Fosses
FRANCE

Dr. Wolfgang Schlager
(Ex-officio, PCOM)
Fisher Island Station
Miami Beach, FL 33149
Tel: (307) 672-1840

Dr. A. A. Schreider
(Alternate: Dr. I. Kosminskaya)
Shirshov Institute of Oceanology
22, Krasikova Street
Moscow, 109387
U.S.S.R.
(Institute of Earth's Physics
U.S.S.R. Academy of Sciences
10, B. Gruzinskaya
Moscow, U.S.S.R.)

Dr. Robert Sheridan
(Ex-officio, PMP)
University of Delaware
Department of Geology
Newark, DE 19711
Tel: (302) 738-2569

Dr. Thomas Shipley (DSDP Rep.)
(Alternate: Dr. Mattew Salisbury)
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanoraphy
La Jolla, CA 92093
Tel: (714) 452-4193
(452-3503)

Dr. Roland von Huene
(Ex-officio, AMP)
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
Tel: (415) 856-7105

Dr. Wilfried Weigel
Institute für Geophysik der
Universitat Hamburg
Bundeskasse 55
D-2000 Hamburg 13
FEDERAL REPUBLIC OF GERMANY

Address and/or phone number in parentheses is that of alternate.

JOIDES WORKING GROUPS

Hydraulic Piston Core Working Group

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

Dr. Michael Bender
Graduate School of Oceanography
University of Rhode Island
Kingston, RI 02881

Dr. E. Hailwood
Department of Oceanography
University of Southampton
Southampton
SO9 5NH
U.K.

Dr. James Hays
Lamont-Doherty Geological Observatory
Palisades, NY 10964

Dr. Alain Huc
Institut de Recherche
Lab. de Geochem. Mineral Geol. Appl.
Universite d'Orleans
45045 Orleans Cedex
FRANCE

Mr. Valdimar F. Larson
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, California 92093

Dr. Ralph Moberly
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, HI 96822

Dr. Adrian Richards
Marine Geotechnical Laboratory
Lehigh University, Bldg. 17
Bethlehem, PA 18015

Dr. Peter Rothe
Geographisches Institut der
Universitat Manheim
Abteilung fur Geologie
6800 Manheim 1
Schlass, Postfach 2428
FEDERAL REPUBLIC OF GERMANY

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

Mediterranean/Caribbean Sea Working Group

Dr. Lucien Montadert, Chairman
Institut Francais du Petrole
Division Geologie
1 et 4, Avenue de Bois-Preau
B.O. 18
92 Rueil-Malmaison
FRANCE
Tel: 967-11-10 967-17-66

Dr. Mahlon M. Ball
U.S. Geological Survey
Woods Hole, MA 02543
Tel: (617) 548-8700

Dr. A. W. Bally
Shell Oil Company
P. O. Box 2099
Houston, TX 77001

Dr. V. Chehovich
Inst. of Geology
U.S.S.R. Academy of Sciences
7, Pyzhevsky per ZH-17
Moscow
U.S.S.R.

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

Dr. William Ludwig
Lamont-Doherty Geological Observatory
Palisades, NY 10964
Tel: (914) 359-2900

Dr. Isabella Premoli-Silva
Instituto di Paleontologie
Paizzale Gorini 15
20133 Milano
ITALY
Tel: (02) 29 28 13

Dr. W. Schreyer
Institut für Mineralogie
Rugh-Universitat Bochum
D 463, Bochum-Querenburg
Universitatstrasse 150
Postfach 2148
FEDERAL REPUBLIC OF GERMANY

Dr. Joel Watkins
Exploration & Production Division
Gulf Science & Technology Company
P.O. Box 2038
Pittsburgh, PA 15230

Middle America Working Group

Dr. Joel Watkins, Chairman
Exploration & Production Division
Gulf Science & Technology Company
P.O. Box 2038
Pittsburgh, PA 15230

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

Dr. J. Casey Moore
Department of Earth Sciences
University of California
Santa Cruz, CA 95060
Tel: (408) 429-2504

Dr. D. Sealy
EXXON Production Research Company
P.O. Box 2189
Houston, TX 77001
Tel: (713) 965-4222

Dr. Lynn Sykes
Lamont-Doherty Geological Observatory
Palisades, NY 10964
Tel: (914) 359-2900

Dr. Roland von Huene
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
Tel: (415) 856-7105

North Atlantic (Eastern) Working Group

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

Mr. David G. Roberts, Co-Chairman
Institute of Oceanographic Sciences
Brook Road, Wormley, Godalming
Surrey GU8 5UB
ENGLAND
Tel: 042-879-4141

Dr. Karl Hinz
Bundesanstalt für Geowissenschaften
und Rohstoffe, Abt. Geophysik
3 Hannover 51, Postfach 510153
FEDERAL REPUBLIC OF GERMANY
Tel: 0511-6468-330

Prof. Dr. Eugene Seibold
Geologisch-Palaontologisches Institut
Universitat Kiel
Olshausenstrasse 40/60
D-23, Kiel
FEDERAL REPUBLIC OF GERMANY

Dr. Jorn Thiede
Institute for Geologi
Universitet et I Oslo
Postboks 1047
Blindern, Oslo 3
NORWAY
Tel: 46-6800, Ext.9692

North Atlantic (Western) Working Group

Dr. Robert Sheridan, Chairman
Department of Geology
University of Delaware
Newark, DE 19711
Tel: (302) 738-1271

Mr. John Ewing
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
Tel: (617) 548-1400

Dr. John A. Grow
U.S. Geological Survey
Woods Hole, MA 02543
Tel: (617) 548-8700

Dr. James P. Kennett
University of Rhode Island
Graduate School of Oceanography
Narragansett Bay Campus
Kingston, RI 02881
Tel: (401) 792-6216

Southeast Atlantic Working Group

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

Dr. Karl Hinz
Bundesanstalt für Geowissenschaften
und Rohstoffe, Abt.Geophysik
3 Hannover 51; Postfach 510153
FEDERAL REPUBLIC OF GERMANY
Tel: 0511-6468-330

Dr. Hugh C. Jenkyns
Dept. Geology and Mineralogy
University of Oxford
Parks Road
Oxford OX1 3PR
ENGLAND
Tel: (0865) 54511

Dr. Yves Lancelot
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3521

Dr. David Needham
Centre Oceanologique de Bretagne
29273 Brest, CEDEX
FRANCE

Dr. Katerina Perch-Nielson
Technische Hochschule E.T.H.
Sonneggstrasse 5
Zurich 6
SWITZERLAND

Dr. Phil Rabinowitz
Lamont-Doherty Geological Observatory
Palisades, NY 10964
Tel: (914) 359-2900, Ext.501

Dr. Nicholas J. Shackleton
University of Cambridge
Sub-Dept. of Quaternary Research
The Godwin Laboratory
Free School Lane
Cambridge
ENGLAND
Tel: 0223-58381

Dr. Bernard Tissot
Institute Francais du Petrole
Division Geologie
1 et 4 Ave de Bois-Preau
B.P. 18
92502 Rueil Malmaison
FRANCE

Southwest Atlantic and Southern Ocean Working Group

Dr. James P. Kennett, Chairman
University of Rhode Island
Graduate School of Oceanography
Narragansett Bay Campus
Kingston, RI 02881
Tel: (401) 792-6216

ENGeter F. Barker
Telirtment of Geological Sciences
D University
G. Box 363
C mingham B15 2TS
NGLAND
el: 021 472 1301, Ext. 2081

Dr. R. Dingle
Geology Department
Cape Town University
Rondebosch, Cape Town
SOUTH AFRICA

Dr. Dennis E. Hayes
Lamont-Doherty Geological Observatory
Palisades, NY 10964
Tel: (914) 359-2900

Dr. David A. Johnson
Submarine Geology and Geophysics
National Science Foundation
1800 G Street, NW
Washington, DC 20550
Tel: (202) 632-4215

Dr. J. LaBrecque
Lamont-Doherty Geological Observatory
Palisades, NY 10964
Tel: (914) 359-2900

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

Dr. John Sclater
Department of Earth and
Planetary Sciences
Massachusetts Insitute of Technology
Cambridge, MA 02139
Tel: (617) 253-1980

Dr. Tjeerd J. van Andel
Department of Geology
Stanford University
Stanford, CA 94305
Tel: (415) 497-0765

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

Mesozoic Working Group

Dr. Seymour O. Schlanger, Chairman
Hawaii Institute of Geophysics
University of Hawaii
[illegible] Correa Road
[illegible] 96822

Dr. Robert G. Douglas
Dept. of Geological Sciences
University of Southern California
University Park
Los Angeles, CA 90007
Tel: (213) 743-7676

Dr. Hugh C. Jenkyns
Dept. Geology and Mineralogy
University of Oxford
Parks Road
Oxford OX1 3PR
ENGLAND
Tel: (0865) 54511

Dr. Yves Lancelot
Deep Sea Drilling Project, A-031
Scripps Institution of Oceanography
La Jolla, CA 92093
Tel: (714) 452-3521

Dr. Roger Larson
Graduate School of Oceanography
University of Rhode Island
Kingston, RI 02881

Dr. William V. Sliter
U.S. Geological Survey
Branch of Paleontology and
Stratigraphy, MS 970
12201 Sunrise Valley Drive
Reston, VA 22092

Dr. Hans Thierstein
Scripps Institution of Oceanography, A-015
La Jolla, CA 92093
Tel: (714) 452-4646

Cenozoic Working Group

Dr. James Ingle, Chairman
Department of Geology
Stanford University
Stanford, CA 94305
Tel: (415) 497-2531

Dr. Wolfgang H. Berger
Scripps Institution of Oceanography, A-015
La Jolla, CA 92093
Tel: (714) 452-2750

Dr. Jere H. Lipps
296 Geology-Physics Building
University of California
Davis, CA 95616

Dr. Hans Schrader
School of Oceanography
Oregon State University

ALPHABETIC TELEPHONE DIRECTORY

NAME	PANEL AFFILIATION	TELEPHONE	NON-U.S. COUNTRY
Adams, R.L.	ILP	(203) 359-3500	
Adelseck, C.	OPP	(714) 452-4172	
Appleman, D.	IHP	(202) 381-6331	
Artemiev, M.	PMP		USSR
Arthur, M.	SP4	(303) 234-4026	
Baker, D.J.	EXCOM	(206) 543-7160	
Baker, E.	OGP	(305) 395-5100 (Ext 2701)	
Ball, M.	Med/Carib WG	(617) 548-8700	
Bally, A.	Med/Carib WG	(713) 220-5975	
Barker, P.	SW Atl/S Ocn WG	021 472 1301 (Ext 2081)	
Basov, V.	SCP	233-0620	USSR
Beckmann, H.	DMP	05323/722-2235	FRG
Beiersdorf, H.	PCOM,PMP	0511-6468-788	FRG
Beliy, N.J.	PPSP	1330130	USSR
Bender, F.	EXCOM	0511-64681	FRG
Bennett, R.	SP4	(305) 361-3361 (Ext 381,319)	
Berger, W.	OPP	(714) 452-2750	
Biju-Duval, B.	PMP	967-11-10	France
Bock, W.	PCOM		
Bogdanov, N.	EXCOM,OCP	233-06-20	USSR
Bois, C.	PPSP		France
Bougault, H.	OCP		France
Bouma, A.	PMP	(512) 888-3294	
Boyce, E.	DMP,SP4	(714) 452-2779	
Brett, R.	(NSF)	(202) 632-4274	
Bryant, W.	PCOM,PMP,DMP	(713) 845-2153	
Budnikov	ILP		USSR
Burckle, L.	SCP	(914) 359-2900 (Ext 406)	
Cadet, J-P	AMP	38 66-07-25	France
Cann, J.	PCOM	0632-28511 (Ext 3090)	U.K.
Cepek, P.	SCP	0511-646 8783	FRG
Chamley, H.	OPP	(20) 91-92-22 (Ext 2130)	France
Chehovich, V.	Med/Carib WG		USSR
Christensen, N.	DMP	(206) 543-7143	
Claypool, G.	PPSP	(303) 234-3561	
Clotworthy, J.	(JOI Inc.)	(202) 338-8276	
Coleman, R.	OCP	(415) 323-8111 (Ext 2334)	
Conolly, J.	SP4	(203) 622-9130	
Corliss, J.	PCOM	(503) 754-2296	
Coulbourn, W.	AMP, OPP	(714) 452-4884	
Couch, R.	Mid Am WG		
Creager, J.	PCOM,AMP,SCP	(206) 543-5099, (206) 543-9944	

NAME	PANEL AFFILIATION	TELEPHONE	NON-U.S. COUNTRY
Data Handling Group	(DSDP)	(714) 452-3530	
Davies, B.	PPSP	(415) 445-9400	
Davies, T.	(JOI Inc.)	(202) 338-8276	
Debyser, J.	EXCOM	723-5528 (Ext 420)	France
Degens, E.	OGP		FRG
Dickinson, W.	AMP	(602) 626-2178	
Dingle, R.	SW Atl/So Ocn WG		So.Africa
Dmitriev, Y.	AMP		USSR
Douglas, R.	OPP, Mesoz WG	(213) 743-7676	
Durbaum, H.	EXCOM	0511-64681	FRG
Dymond, J.	PCOM,IGP,OCP	(503) 754-2296	
Eglinton, G.	OGP, OPP	(918) 336-6600	U.K.
Elderfield, H.	IGP		U.K.
Emmerman, R.	OCP	(0721) 608 3323	FRG
Erdman, G.	OGP	(918) 336-6600	
Ewing, J.	PCOM,PPSP W No Atl WG	(617) 548-1400 (Ext 2265)	
Fox, P.	OCP, SSP, PPSP	(598) 45-80-55	France
Francheteau,J.	OCP	98 45-80-55	France
Futterer, D.	OPP		FRG
Galimov, E.	OGP		USSR
Garrison, L.	PPSP	(512) 888-3295	
Gartner, S.	PCOM	(713) 845-2154	
Gieskes, J.	IGP	(714) 452-4257	
Glashoff, H.	IHP		FRG
Goodell, H.G.	PPSP	(804) 924-7761 (Ext 219)	
Green, A.	PPSP	(713) 965-4172	
Grow, J.	PMP,W No Atl WG	(617) 548-8700	
Handin, J.	SP^4	(713) 845-3251	
Haq, B.	NSF	(202) 632-5849	
Harrison, C.	EXCOM	(305) 350-7400	
Hathaway, J.	IHP	(617) 548-8700	
Hay, W.	(JOI,Inc.)	(202) 333-8276	
Hayes, D.	PCOM,SSP So Atl/So Ocn WG	(914) 359-2900	
Hays, J.	OPP	(914) 359-2900 (Ext 403,404)	
Heath, R.	EXCOM	(503) 754-3504	
Helsley, C.	EXCOM,PCOM	(808) 948-8760	
Hill, M.	ILP		

NAME	PANEL AFFILIATION	TELEPHONE	NON-U.S. COUNTRY
Hinz, K.	PMP,SE Atl & E. No Atl WG	0511-646 8330	FRG
Honnorez, J.	OCP	(305) 350-7508	
Horn, A.	PPSP	(415) 323-7126	
Hotz, E.	PPSP	0201-726350	FRG
Hsu, K.	OPP,SE Atl & Med/Carib WG	(01) 32-62-11	Switz
Hunt, J.	PMP,OGP	(617) 548-1400 (Ext 2562)	
Hussong, D.	AMP	(808) 948-8711	
Hyndman, R.	DMP	(604) 656-8269	Canada
Ingle, J.	Cenozoic WG	(415) 497-2531	
IPOD Data Bank		(914) 359-2900 (Ext 502)	
Jageler, A.	DMP		
Jenkins, G.	SCP	(0908) 63116	U.K.
Jenkyns, H.	OPP,Mesoz & SE Atl WG	(0865) 54511	U.K.
Johnson, D.	SW Atl/SoOcn WG	(202) 632-4215	
Johnson, P.	OCP	(206) 543-5060	
JOI Inc.		(202) 333-8276	
JOIDES Office		(714) 452-2360	
Jones, E.	SSP	01-387-7050	U.K.
Kagami, H.	PMP	03-376-1251	Japan
Karig, D.	AMP	(607) 256-3679	
Keller, G.	EXCOM	(503) 754-4763	
Kennett, J.	OPP,SW Atl/So Ocn&W No Atl WG	(401) 792-6216	
Kent, P.	EXCOM	0793 40101 (Ext 314)	U.K.
Kinoshita, H.	DMP		Japan
Klein, G.	SP4	(217) 333-2076	
Knauss, J.	EXCOM	(401) 792-6222	
Kobayashi, K.	PCOM,EXCOM	03-376-1251	Japan
Kosminskaya, I.	SSP		USSR
Kushiro, I.	OCP		Japan
Kvenvolden, K.	OGP,AMP	(415) 856-7150	
Labrecque, J.	SW Atl/So Ocn WG	(914) 359-2900	
Laherrere, J.	PPSP		France
Lancelot, Y.	EXCOM,PCOM,PPM, PPSP,SE Atl & Mesoz WG	(714) 452-3521	
Langseth, M.	PCOM	(914) 359-2900	
Larson, R.	OCP, Mesoz WG	(401) 792-6165	

NAME	PANEL AFFILIATION	TELEPHONE	NON-U.S. COUNTRY
Leinen, M.	IGP	(401) 792-6268	
LePichon, X.	PCOM,AMP	329 1221 (Ext 4592)	France
Lewis, B.	SSP	(206) 543-6043	
Lipps, J.	Cenozoic WG		
Loeblich, A.,Jr.	IHP	(213) 825-1475	
Loughridge, M.	IHP	(303) 499-1000 (Ext 6487)	
Ludwig, W.	Med/Carib WG	(914) 359-2900	
Mackenzie, D.	PPSP	(303) 794-2601 (Ext 410)	
Manheim, F.	IGP	(617) 548-8700	
Matthews, D.	DMP		U.K.
Maxwell, A.	EXCOM,PPSP	(617) 548-1400	
Mayer, A.	EXCOM		U.K.
McCave, I.	SP4	(0603) 56161	U.K.
McManus, D.	PCOM	(206) 543-5099	
Melguen, M.	IHP		
Melieres, F.	SP4	336-2525 (Ext 5157)	France
Meyers, P.	OGP	(313) 764-0597	
Moberly, R.	EXCOM,PCOM,OCP, SP4	(808) 948-8765	
Montadert, L.	PMP,E No Atl & Med/Carib WG	967-11-10	France
Moore, J.	Mid Am WG	(408) 429-2504	
Moore, T.	PCOM,OPP,IHP	(401) 792-6178	
Murauchi, N.	SSP		Japan
Murdmaa, I.	OPP		USSR
Nagumo, S.	SSP		Japan
Nakamura, K.	AMP		Japan
Nalivkin, V.	PMP		USSR
Nasu, N.	EXCOM		Japan
Natland, J.	OCP,AMP,OGP	(714) 452-3538	
Needham, D.	SE Atl WG		France
Neprochnov	DMP		USSR
Nierenberg, W.	EXCOM	(714) 452-2826	
Nigrini, C.	SCP	(213) 697-8842	
Nikitin, L.	PCOM		USSR
Okada, H.	OPP		Japan
Ozima, M.	OCP		Japan
Perch-Nielson, K.	SE Atl WG		Switz
Peterson, G.	ILP		FRG

NAME	PANEL AFFILIATION	TELEPHONE	NON-U.S. COUNTRY
Peterson, M.	EXCOM	(714) 452-3500	
Piketty, G.	EXCOM	723-5528 (Ext 420)	France
Pilkey, O	SP4	(919) 684-2206	
Pisciotto, K.	IGP,OGP,PMP	(714) 452-3521	
Pokryshkin, A.	DMP		USSR
Poore, R.	SCP	(415) 323-8111 (Ext 2768)	
Premoli-Silva, I.	Med/Carib WG	(02) 29 28 13	Italy
Rabinowitz, P.	SSP,SE Atl WG	(914) 359-2900 (Ext 501)	
Renard, V.	DMP,SSP	80-46-50	France
Richards, A.	SP4, DMP	(215) 861-3649	
Riedel, W.	PCOM	(714) 452-4386	
Roberts, D.	PCOM,PMP,E No Atl WG	042-879-4141	U.K.
Roberts, W.	ILP	(918) 661-3833	
Romankevich, E.	OGP		USSR
Rothe, P.	SP4	0621-292-5458	FRG
Ruddiman, W.	OPP	(914) 359-2900 (Ext 528,529)	
Rutman, G.	ILP		France
Ryabchikov, I.	IGP		USSR
Salisbury, M.	PCOM,DMP,SP4, OCP,PPSP	(714) 452-3503	
Sarnthein, M.	OPP		FRG
Saunders, J.	SCP	061-25-82-82	Switz
Savin, S.	IGP	(216) 368-3690	
Scherbakov, V.S.	IHP		USSR
Schermet, O.O.	PPSP	133-01-30	USSR
Schilling, J-G	EXCOM	(401) 792-6102	
Schlager, W.	PCOM,SSP	(305) 672-1840	
Schlanger, S.O.	OPP	(808) 948-7826	
Schlich, R.	SW Atl/ So Ocn WG		France
Schrader, H.	Cenozoic WG		
Schreider, A.	SSP		USSR
Schreyer, W.	Med/Carib WG		FRG
Sclater, J.	SW Atl/ So Ocn WG	(617) 253-1980	
Sealy, D.	Mid Amer WG	(713) 965-4222	
Severns, J.	DMP		
Shackleton, N.	OPP,SE Atl WG	0223-58381	U.K.
Sharaskin, A.	IGP	137-00-11 (Ext 83)	USSR
Sheridan, R.	PMP,SSP,PPSP W No Atl WG	(302) 738-1272	
Shipley, T.	SSP	(714) 452-4193	

NAME	PANEL AFFILIATION	TELEPHONE	NON-U.S. COUNTRY
Sidorenko, A.	EXCOM	233-06-20	USSR
Simoneit, B.	OGP	(213) 825-3331	
Sliter, W.	OPP,Mesoz WG	(202) 343-3206	
Snelson, S.	PMP		
Steele, J.	EXCOM	(617) 548-1400	
Stephen, R.	OCP	(617) 548-1400 (Ext 2583)	
Sykes, L.	Mid Amer WG	(914) 359-2900	
Takayanagi, Y.	OPP	0542-37-1111	Japan
Talwani, M.	EXCOM	(914) 359-2900	
Tardy, Y.	IGP		France
Tarney, J.	OCP	021-472-1301	U.K.
Taylor, G.	PPSP		U.K.
Thiede, J.	PMP, E No Atl WG	46-6800 (Ext 969)	Norway
Thierstein, H.	Mesoz WG	(714) 452-4646	
Timofeev, P.	OPP,EXCOM,SP[4]	233-06-20	USSR
Tissot, B.	OGP,SE Atl WG		France
Treadwell, T.	EXCOM	(713) 845-7211	
Tsvetkov, A.	OCP		USSR
Usher, J.	IHP,SCP	(714) 452-3529	
Vail, P.	PMP	(713) 965-4884	
Van Andel, T.	SW Atl/So Ocn WG	(415) 497-0765	
Van Hinte, J.E.	PMP		Netherlands
Von Huene, R.	AMP,SSP,PPSP Mid Amer WG	(415) 323-8111	
Von Rad, U.	PCOM	0-511-6468-788	FRG
Walter, H.	AMP	0511-64681	FRG
Watkins, J.	AMP,Mid Amer & Med/Carib WG		
Wedpohl, K.	IGP		FRG
Weigel, W.	SSP		FRG
Welte, D.	OGP		FRG
Wilkniss, P.	NSF	(202) 632-4134	
Williams, G.	ILP	01-235-0762	U.K.
Winterer, E.	PCOM,OPP,OGP	(714) 452-2360	
Wisby, W.	EXCOM	(305) 350-7519	
Wise, S.	SW Atl/So Ocn WG		
Woodbury, P.	IHP	(714) 452-3526	
Zdorovenin, V.	IHP		USSR

PUBLICATION STATEMENT

The **JOIDES Journal** is printed and distributed by the JOIDES Office at Scripps Institution of Oceanography for the International Phase of Ocean Drilling (IPOD) under a contract provided by the National Science Foundation and administered through the Joint Oceanographic Institutions Inc., 2600 Virginia Avenue, N.W., Washington, D.C. 20037. The material is based upon research supported by the National Science Foundation under Contract No. NSF EAR 78-08082.

The **JOIDES Journal** serves 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. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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

Direct comments and suggestions concerning the content of this issue of **JOIDES Journal** to: JOIDES Office (A-012), Scripps Institution of Oceanography, La Jolla, California 92093, Attention: Science Coordinator.

Request additional copies of this issue and available back issues from: Joint Oceanographic Institutions Inc., 2600 Virginia Avenue, N.W., Suite 512, Washington, D.C. 20037.

JOIDES JOURNAL
PUBLICATION HISTORY

Volume I

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

Volume II

No. 4 1976/1 – March 1976
No. 5 1976/2 – April 1976
No. 6 – September 1976
Special Issue: Manual on Pollution Prevention and Safety

Volume III

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

Volume IV

No. 1 – February 1978
No. 2 – June 1978
No. 3 – October 1978

Volume V

No. 1 – February 1979
No. 2 – June 1979
No. 3 – October 1979

Volume VI

No. 1 – Febeuary 1980
No. 2 – June 1980
No. 3 – October 1980
Special Issue: Initial Site Prospectus: Supplement Number Two (Distributed June 1980)