JOIDES SITE SURVEY PANEL MINUTES
USGS MENLO PARK

APRIL 9 and 10, 1990

MEMBERS:	KIDD , Rob (Cardiff, UK) - Chairman
	DUENNEBIER, Fred (HIG, USA)
	KASTENS, Kim (LDGO, USA)
	LARSEN, Birger (Copenhagen, ESF)
	LEWIS, Stephen (USGS, Menlo Park, USA) - Host
	LOUDEN, Keith (BIO, Canada)
	PAUTOT, Guy (IFREMER, France)
	HIRATA, Aosh (Chiba, Japan)
	VON HERZEN, Richard (WHOI, USA)
LIAISONS:	BRENNER, Carl (DATA BANK, USA)
	d'OZOUVILLE, Laurent (JOIDES Office, HIG, USA)
	WATKINS, Joel (PCOM, TAMU, USA)
	BALL, Mahlon (PPSP, USGS, Denver, USA)
	MEYER, Audrey (ODP, TAMU, USA)
GUESTS:	KULM, Vern (Oregon, USA) + Moore, Casey (Santa Cruz, USA)
	DAVIS, Earl (PGC, Canada)
	WINTERER, Edward (Scripps, USA)
	SCHOLL, David (USGS, USA)

Apology was received from: Henrich Meyer (BGR, FGR)

SSP EXECUTIVE SUMMARY
MENLO PARK, CALIFORNIA, APRIL 1990

The aims of Site Survey Panel's Menlo Park Meeting were to assess as fully as possible the remaining CEPAC programs, that are presently either scheduled or tentatively scheduled, prior to PCOM's setting of a 4-year track for *JOIDES Resolution* at its Paris meeting. SSP plans to defer assignment of work on new proposals to its members until the 4-year plan is known. A further (July) meeting of SSP is to begin this assessment of survey data related to the new track.

SSP 'watchdogs' provided updates on scheduled legs 136, 137, and 138. For Leg 136, Engineering Leg III, there is a complete data package for 504B but SSP recommends that the near bottom seismic study planned for EPR be completed *before* guidebases are set there, so that the thickness of the rubble zone might be assessed beforehand. For Leg 137, Sedimented Ridges, all data requested by SSP are now in hand. SSP recommended collection of near bottom side-scan data in Escanaba Trough if at all possible. N.B. side-scan data will be collected at Middle Valley in May/June. For Leg 138, E. Pacific Neogene, SSP judges the data to be fully in hand although proponents are refining seismic data with further processing.

Data presentations were made to SSP for a number of remaining CEPAC programs by proponents attending as guests: Winterer, Kulm, Moore, Davis, Scholl. Data packages are now considered generally adequate for Chile Triple Junction, the Cascadia Margins, Atolls and Guyots, North Pacific Neogene and Bering Sea. However, in each case SSP has made specific recommendations to proponents as to desirable improvements in their data sets. Specific site locations when refined will require final SSP review when PCOM's 4-year program is in place.

SSP CONCENSUS:

1- The Equatorial Pacific Neogene sites were approved at the Hannover meeting. Proponent response on the quality of watergun data was to wording in the minutes that had been taken out of context.

2- The panel would track carefully sites proposed in thick sediment accumulations. Present SSP guidelines note that heat flow may be requested in some cases. It was noted that SSP guidelines *may* need to be updated anyway after PPSP's decisions on drilling through BSR's.

3- SSP confirms its view from the Hannover meeting that Chile Triple Junction data is regionally adequate and appreciates the work accomplished by proponents in data processing since that meeting. The panel looks forward to final review of the data when site locations are refined.

4- At its Hannover meeting, SSP had approved the EPR data package with the provision that video imagery became available for setting the guidebases. These data now emphasize the importance of imaging the extent and thickness of the "rubble zone", and SSP agrees with the EPRDPG's assessment of the importance of projected near bottom seismic surveys in selecting guidebase sites.

5- SSP looks forward to future recommendations for specific sites from the Cascadia Margins DPG at our next meeting. Based on the previously existing regional coverage and our preliminary look at new MCS data, we do not foresee the need of any additional requirements to satisfy SSP.

6- The critical data for the Winterer et al. component of the Atolls and Guyots program is in hand. Where basement is a target, SSP encourages proponents to make every effort to collect velocity data which will be critical in assessing depth to basement. Ships of opportunity should be considered for sonobuoy data and other possibilities are for sonobuoy and sample data to be acquired during Engineering III.

7- The critical data for the Schlanger/Duennebier component of the Atolls and Guyots program is in hand and further data collection on the projected 'Moana Wave' cruise is likely to complete the data set.

8- SSP concluded that the data package is probably sufficient for picking North Pacific Neogene sites. Crossed seismic lines are requested for the site near the crest of the ridge (DT-1) in order to avoid closed structures. All sites should be located on seismic lines, preferably with 3.5 kHz, in order to detect disturbances in the sequence. Heat flow data should be compiled.

MENLO PARK MEETING

ACTION ITEM LIST

Item No	Person	Action
1	d'Ozouville	To forward SSP survey data and evaluations to proponents.
2	Kidd	To provide PCOM chairman with a list of names and resumes for Duennebier's replacement and to clarify the status of J. Hedberg on SSP.
3	Brenner	To initiate site survey data assessments of programs selected at the April PCOM meeting.
4	d'Ozouville	To initiate information synthesis of programs selected at the April PCOM meeting.
5	Kidd	To recommend to PCOM chairman the following dates and place for the next SSP meeting: July 10-11, 1990 at Lamont, to be hosted by C. Brenner
6	Kidd	To propose to PCOM chairman a list of guests to attend the next SSP meeting

AGENDA FOR SSP MEETING

APRIL 9 AND 10, 1990, MENLO PARK, CALIFORNIA

FIRST DAY

1. PRELIMINARY MATTERS:
    1. Introductions (Kidd): aims of meeting
    2. Logisitics (Lewis)
    3. Report on WHOI Panel Chairman's meeting (Kidd)
    4. Changes in minutes of previous meeting and matters arising
    5. Updated ship schedules
    6. Other business for Agenda
2. REPORTS:
    1. PCOM (Watkins)
    2. JOIDES (d'Ozouville)
    3. TAMU (A. Meyer)
    4. PPSP (Ball)
    5. Data Bank (Brenner)
3. STATUS OF SCHEDULED LEGS
    1. Leg 136 Engineering III (504B and EPR) (A Meyer)
    2. Leg 137 Sedimented Ridges I (Louden)
    3. Leg 138 E. Pacific Neogene (Brenner)
4. PRESENTATIONS:
    1. Atolls and Guyots (Winterer and Duennebier)
    2. N. Pacific Neogene and Bering Sea (Scholl)

SECOND DAY

5. PRESENTATIONS (CONT'D)
    3. E. Pacific Rise (Davis)
    4. Oregon Margin (Kulm/Moore)
    5. Vancouver Margin (Davis)

6. STATUS OF CENTRAL AND EASTERN PACIFIC PROGRAMS - SSP SUMMARIES:

    1. Chile Triple Junction (Lewis)
    2. East Pacific Rise (Lewis)
    3. Cascadia: Oregon Margin (Louden)
       Vancouver Margin
    4. Atolls and Guyots (Duennebier)
    5. N. Pacific Neogene and Bering Sea (Larsen)

7. MEMBERSHIP

8. SSP SURVEY REQUIREMENTS FOR FRACTURE ZONE DRILLING (Von Herzen/Kastens)

9. PREPARATIONS FOR NEXT MEETING:

    1. Thematic panel rankings for 4-year program (d'Ozouville)
    2. Discussion of requirements from JOIDES Office and Site Survey Bank.
    3. Time and Place
    4. Guests

1. PRELIMINARY MATTERS

1. Introductions. The meeting began at 9:00 a.m. Chairman Rob Kidd welcomed new members Kim Kastens (LDGO), Dick Von Herzen (WHOI), and Aosh Hirata (Chiba Univ., Japan: replacement for Suyehiro)

2. Logistics. Steve Lewis as host outlined logistics for the meeting, noting when guests would arrive to make presentations on E. Pacific legs requiring review.

3. Aims of the Meeting. Kidd outlined the aims of the meeting that resulted largely from PCOM's November 1989 decision at its Woods Hole meeting to plan a 4-year ship track based on thematic panel ranking of programs. The track is to be decided in Paris at the end of this month. Site Survey Panel at its Hannover meeting had begun to adopt procedures for handling the large number of new proposals arriving at the JOIDES Office but it was clear that some such forward plan was necessary from PCOM if we were to efficiently assess and process site survey packages as had been done for the WPAC and CEPAC programs. Chairman made representations to PCOM at WHOI to provide for the necessary lead time and this was in concert with similar pleas from the PPSP, DMP, and TEDCOM chairmen. PCOM put in place a 1-year schedule for JOIDES Resolution for the Eastern Pacific along with a tentative further year of E. Pacific drilling which may or may not be part of the 4-year plan. It was recognized that watchdog assignments of new proposals could not be made until the 4-year track is known so Chairman agreed with Moberly, PCOM chair, that this spring meeting would complete as much as possible SSP's assessment of CEPAC programs. Another meeting will be scheduled in July when PCOM's 4-year track is known. At that meeting 'watchdog' assignments will be made and SSP will consider the overall survey status of programs around the track, as input for PCOM's August meeting at Scripps.

Kidd outlined further the results of his attendance at the Panel Chairman's meeting on November 26, 1989, a day preceding the Woods Hole PCOM meeting. His report as presented is included as Appendix I of these minutes, including a review of the two SSP meetings held in 1989; a forward look on CEPAC legs and SSP's concerns regarding review lead times for MCS data processing and detailed near-site surveys.

4. Changes to Hannover minutes and matters arising. No changes were noted for the Hannover SSP minutes. Chairman noted under "Matters Arising" that he had received a recent telephone call from Larry Meyer about the Eastern Equatorial Pacific Neogene proposal, expressing concern over SSP's assessment that at some sites, watergun data was 'useless' in determining sediment thickness and its other comments that better 3.5 kHz records were necessary. During

discussion it was pointed out that our minutes had: (1) approved all of the proposed sites; (2) noted that better 3.5 kHz should be collected, but that this might be done on slow site approaches to drilling; (3) noted that where sediments were thinned at one site (WEQ-2) a good 3.5 kHz profile was essential because the watergun records were indeed "essentially useless" because of ringing; (4) had asked for checks to be made of sediment thickness estimates which appeared incorrect at one site in particular (WEQ-4).

SSP CONSENSUS: The Equatorial Pacific Neogene sites were approved at the Hannover meeting. Proponent response on the quality of watergun data was to wording in the minutes that had been taken out of context.

Meyer has since noted that it is possible to process the 3.5 kHz records which were digitally collected and this will be done. He has also checked the sediment thicknesses.

Resulting from these discussions it was agreed that a better feedback mechanism was necessary between SSP and proponents (see JOIDES Report below).

5. Updated Ship Schedules. New ship schedules were received (Appendix II) for Japan, France, Canada, Australia, WHOI and LDGO. No change was reported for UK, nothing was available from ESF and the W. German member was absent.

6. Other Business for Agenda. David Scholl (USGS) was scheduled to present data packages for the NE Pacific sites in the group of guest presentations. It was also noted that he would include survey packages for the Bering Sea sites in his presentation.

2. REPORTS

2-1. PCOM reports (Watkins)

Joel Watkins made the following summary of SSP-relevant activities resulting from the November 1989 PCOM meeting:

PCOM noted that there were two competing proposals for Cascadia drilling; one off Oregon and one off Vancouver. A final decision on priority was deferred.

Sedimented Ridge 1, Chile Triple Junction, and Equatorial Pacific Neogene legs require no additional tool development. EPR barerock drilling requires DCS and high temperature slim hole tools to meet its objectives. 504B needs to be cleaned out before it can be drilled again.

PCOM approved for legs through 1991 drilling: Sedimented Ridge 1, Eastern Equatorial Pacific Neogene and 504B. If 504B cannot be cleaned out, East Pacific barerock drilling will be substituted.

PCOM tentatively scheduled for 1992 two Chile Triple Junction legs, an EPR barerock leg, Cascadia I and Sedimented Ridge II legs.

PCOM will develop a 4-year plan at its April 1990 PCOM meeting.

2-2. JOIDES Office (d'Ozouville)

d'Ozouville distributed a list of all the proposals received by the JOIDES office since the inception of ODP. Since October 1989, thirty proposals have been received, the new ones being related to the Atlantic Ocean and the revised ones to the Central and Eastern Pacific. The theme of these new proposals are mainly related to lower oceanic crust and upper mantle, deformation processes and fluid processes at convergent plates, and deformation processes at passive margins. (Appendix III) A list of abstracts of new proposals was also distributed.

In order to be sure that the proponents are informed of the comments of their site survey data by the panel, d'Ozouville proposed that the JOIDES Office forwards officially those comments to the proponents.

ACTION ITEM: JOIDES OFFICE TO SEND PROPONENTS COMMENTS OF THEIR LATEST SITE SURVEY ASSESSMENT FOLLOWING PANEL MEETINGS WITH A NOTE OF THE SSP 'WATCHDOG' OR CHAIRMAN AS CONTACT.

2-3 TAMU Report (Audrey Meyer)

1. Recent JOIDES Resolution activities:

Leg 130 ended on March 27, 1990 in Guam, recovering a record 4822 meters of core from the Ontong Java Plateau. Five sites (Sites 803-807) were occupied during the cruise, addressing both Neogene (and Paleogene) paleoceanographic objectives and basement objectives. The so-called "Neogene depth transect" consisted of Sites 803 (OJP-4), 804 (OJP-6, which the Co-Chief Scientists chose to drill instead of OJP-3), 805 (OJP-2), and 806 (OJP-1). Basement was recovered at Site 803 (~25 meters TD, of Albian or older tholeiitic basalts) and Site 807 (OJP-5; 1528.4 meters TD, including ~150 meters of slightly altered tholeiitic basalts interbedded with Albian-Aptian limestone).

Leg 131 left port on March 31, 1990. The ship is currently occupying Site 808 (proposed site NKT-2).

2. Ship schedule:

The current official ship operations schedule for the JOIDES Resolution is attached (Appendix IV), and includes cruises scheduled by PCOM through Leg 139. In this schedule, the third engineering test leg is Leg 136, consisting of two parts: Leg 136A will reoccupy Hole 504B and Leg 136B will conduct operations at the East Pacific Rise. (For more information, see status report of Leg 136 drilling plans that follows.)

An alternative ship schedule has been proposed by TAMU that separates the two parts of the third engineering test leg into separate legs about seven months apart. This has fiscal advantages for TAMU. More importantly, it also allows more time for making modifications to the diamond coring system that might be deemed necessary after upcoming tests on Leg 132. This schedule will be discussed by PCOM at their upcoming meeting in Paris.

3. Cruise scientific staffing:

742 scientists have sailed on the JOIDES Resolution through Leg 130 (see attached Appendix V).

New Co-Chiefs appointed include: Leg 137--Mike Mottl (University of Hawaii) and Earl Davis (Pacific Geoscience Centre); Leg 138--Nick Pisias (Oregon State University, and Larry Mayer (Dalhousie University, Canada).

Shipboard scientific parties through Leg 135 (Lau Basin) have been invited.

4. ODP personnel concerns:

Lou Garrison is retiring from ODP, and the search for a new Deputy Director is ongoing.

The recently advertised Staff Scientist position was filled by Amanda Palmer Julson, who decided not to leave ODP Science Operations. She will be sailing as Staff Scientist/Sedimentologist on Leg 133 (NE Australian margin).

5. ODP publications:

The Publication Department is making good progress towards reducing publication time for both the "Initial Reports" (Part A) and "Scientific Results" (Part B) volumes. The "Initial Reports" volume will soon be on a 12-month post-cruise publication schedule; the "Scientific Results" volumes are headed toward a 30-32-month publication schedule, though it will take a while to reach that goal. The Publications Department anticipates getting a total of 21 volumes published (or ready to be published) during FY90.

6. Underway lab improvements:

The following changes to the underway lab onboard JOIDES Resolution were made during the recent drydock: (a) A raised tile floor, similar to the floor in the computer user room, was installed. This flooring, complete with closed cableways, allows for easier future cable runs and cleaner signal paths. (b) Equipment racks and furniture were reinstalled in a more efficient configuration for scientists and technicians working together in the lab. This included adding a map case and large light table. (c) An air conditioner was installed in the SEDCO warehouse which vents cold air to the underway geophysics lab. This should provide enough cold air to solve the overheating conditions in the lab during tropical legs. (d) A 10-kw, 3.5kHz sonar transducer was put into the sonar dome, replacing the 2-kw, twelve-bottle array originally installed in the dome. This new system provided improved data on Leg 129--in 6000 m of water, chert layers could easily be seen beneath the sea floor. Efforts are underway to procure a CESP correlator for the 3.5-kHz system. (e) A 14-inch gate valve was reconditioned in preparation for the installation of a doppler speed log. Besides reconditioning, a 6-foot pipe spool extension was added to the gate valve. The doppler sonar transducer would have been installed, but the transducer stem was broken during shipment to the Singapore drydock. A surveyor transferred the centerline mark of the ship's hull to the gate valve hull opening, so that installation and alignment of the transducer will be possible at a later date.

Based on advice of the Shipboard Measurements Panel (SMP), a new RFP for a real-time navigation system will be written by TAMU. This RFP will hopefully produce responses that are within the financial resources of ODP, and result in a real-time navigation system onboard the JOIDES Resolution in the relatively near future.

ODP tested the French high-speed streamer loaned by LDGO during Leg 128 and the transit cruises on either side of the drydock. Results of the tests did not show significant improvement in the seismic records over ODP's existing streamer, so we do not intend to pursue purchasing such a streamer at this time. However, we continue to be interested in working towards acquiring better seismic records at greater than ~8 knots, and would appreciate continued input and advice from SSP and SMP on this matter.

7. Co-Chief Review of Site Survey packages, etc:

At Rob Kidd's request, the issue of how Co-Chiefs view the site survey packages they eventually received from the Data Bank was raised at the most recent Co-Chief Scientists' review workshop (held March 12-14, 1990, involving the Leg 125-129 Co-Chiefs). Though this issue generated little discussion, there seemed to be general agreement that the services and materials provided by the Data Bank were excellent. Chairman commented that this meant that SSP's, and in particular the Data Bank's activities were reaching their objectives and Carl Brenner was to be congratulated.

2-4 PPSP Report (Ball)

PPSP met in Menlo Park, California on February 27 and 28, 1990. The meeting opened with a discussion of the gas shows encountered during Sea of Japan drilling (legs 128 and 129) led by Marta von Breymann (ODP hydrocarbon chemist). It was concluded that judging from the Sea of Japan experience, an addendum to PPSP guidelines for hydrocarbon monitoring at sea is required. George Claypool led a discussion of gas hydrates. Claypool pointed out that although a BSR is evidence for free gas below a clathrate base, pressure of this gas should not exceed hydrostatic as long as water is present in a liquid phase to combine with the gas to form more clathrate. Ball appointed Claypool (Mobil), Katz (Texaco), and Kvenvolden (USGS) to develop expanded guidelines for gas monitoring and to update policy regarding gas hydrates.

PPSP conducted safety reviews of legs 132-134, an engineering leg, the Northeast Australian Margin, and Vanuatu. Three engineering sites (six locations) were approved to penetration depths of less than 300 m in the Bonin Back-arc Basin and on Shatsky Rise. The purposes of this leg are: (1) to further evaluate the diamond coring system (DCS) drilling crystalline rocks, interbedded chalk and cherts, and shallow water carbonates of atolls and guyots; (2) to deploy the mini hard-rock guide base; and (3) deploy and test a modified re-entry cone compatible with the DCS. No safety problems are anticipated in connection with these sites. Fourteen sites were approved on the Northeast Australian Margin. Only two of these sites were approved to penetration depths exceeding 500 m; one to 700 m and one to 1100 m. All the Australian sites are located off structure. PPSP emphasized that the Northeast Australian Margin is essentially an unknown area and that extreme caution must be exercised in monitoring for hydrocarbons during the drilling operations. A hydrocarbon chemist is a member of the scientific party on this leg. Six sites were approved for the Vanuatu leg. Four of these sites are on the d'Entrecasteaux ridge where it collides with the central New Hebrides Arc and don't appear to present potential safety problems. Two sites are on the flanks of the North Aoba Basin. Sediment thicknesses in this basin appear to be 5 to 6 km. It follows that if source rocks are present in this section, they may be mature and could provide hydrocarbons to migration routes that might reach the basin's flanks. Care must be taken in monitoring samples for hydrocarbons in drilling the Aoba Basin holes.

Ball commented that PPSP would like to recommend that all sites with > 2km of sediment thickness should have heat flow data available for safety review, in order to calculate temperature gradients.

SSP CONSENSUS: **The panel would track carefully sites proposed in thick sediment accumulations. Present SSP guidelines note that heat flow may be requested in some cases. It was noted that SSP guidelines _may_ need to be updated anyway after PPSP's decisions on drilling through BSR's.**

2-5 Data bank report (Brenner)

The Data Bank's FY91 budget was trimmed slightly during BCOM review. The final figure is just under $228,000, an increase of about 4.5% over FY90, and about $1,000 less than requested. No hardship is anticipated from this minor reduction.

Brenner described how USSAC had funded Data Bank to convert the EPR synthesis tapes to a single ASCII format. (The SeaMARC tapes were produced at LDGO and had been written in UNIX; the SeaBeam tapes had been prepared by URI and were written in VMS). A general discussion ensued concerning the difficulty of archiving and reproducing some of the more advanced types of survey data (side-scan, swath mapping, video images, etc.).

For now the Data Bank should try to keep things simple and continue to work with "analog" versions of swath data (e.g., photographic negatives for side-scan, drafted maps for bathymetric swath mapping) when preparing data packages for JOIDES panels and scientists.

If in the future a standardized digital format for these data types evolves, the Data Bank will explore the possibility of archiving the data digitally and running off images on an "as needed" basis. Some high quality image processing hardware already exists at LDGO, so the Data Bank will probably be able to provide these services to the JOIDES community without a major budget adjustment.

3. STATUS OF SCHEDULED LEGS

3-1 Leg 136 Status Report (Audrey Meyer)

Leg 136 is scheduled as the third engineering test leg, consisting of two parts (see Appendix IV). Leg 136A will reoccupy Hole 504B and attempt to mill up/fish junk left in the bottom of the hole during Leg 111. Prior to milling, several days of logging experiments (temperature, fluid sampling, and permeability) will be conducted. If the milling and fishing are successful, LITHP has recommended that Hole 504B be deepened as much as possible during the remainder of Leg 136A; if the milling and fishing are not successful, LITHP recommends that a full-logging program be carried out for the remainder of the leg. This recommended full-logging program would include FMS, wireline packer, flow meter, geochemical logging, and sidewall coring (see LITHP minutes from their March 5-7, 1990 meeting for more details). A small scientific party of petrologists, geochemists, and downhole loggers will be invited to participate on this part of Leg 136. There are no remaining survey requirements for 504B drilling.

Leg 136B will establish one or two holes on the East Pacific Rise, using mini hard-rock guidebases and drill-in BHA/back-off sub bare rock spudding systems. Site survey status relating to selection of these sites is discussed in 6-2 below. Additional testing of the diamond coring system (DCS) will be conducted, as necessary to verify that the sites established are viable for further scientific drilling on a later leg. A small scientific party will be invited to participate on this part of Leg 136, to handle any rocks recovered and to make scientific decisions during the leg regarding such critical things as placement of the guidebases. Both LITHP and the EPRDPG feel that Leg 136B should occur as soon as possible, consistent with engineering needs for possible additional development after Leg 132. The EPRDPG has recommended 9°30' N as the preferred region to set the guidebases (see LITHP minutes from the March 5-7, 1990 meeting and EPRDPG minutes from their April 5-7, 1990 meeting for more details).

3-2 Leg 137, Sedimented Ridge Crests

Davis and Franklin were contacted regarding the SSP request for core summary information from Middle Valley (Juan de Fuca). Franklin will supply these to Data Bank. Detailed heat flow data to be merged with pore fluid chemistry. Davis will supply heat flow and single-channel seismics on Escanaba Trough and multichannel seismic lines on Middle Valley. No new information as to possibilities for high resolution seismics for Escanaba Trough. We recommend collection of deep-tow side-scan sonar if possible.

New programs planned for Middle Valley are:

a. 120 kHz side-scan survey (May/June).
b. Alvin program for vent fluid sampling (5-7 dives in August).

No changes in sites from those presented at October 1989 meeting. SSP Site Summary Sheets given in Appendix VI. PCOM has allocated a two leg program:

- First is scheduled for summer 1991 on Middle Valley
- Second tentatively scheduled for summer 1992 on Escanaba Trough.

Technical limitations for logging in high temperature regimes on active sites remain.

3-3 Leg 138 Eastern Equatorial Pacific Neogene (Brenner)

Because Larry Mayer has been at sea on the Ontong-Java leg for the past 2 months, not much progress has been made on the seismic processing for this program. Mayer and Pisias are aware of the SSP's critique of the data set presented in October (see discussion in matters arising above). No major problems are now anticipated. It is hoped that the SSP will get a final look at these data at the July meeting.

4. PRESENTATIONS

At the end of the morning session SSP preceded the presentations by guest proponents, scheduled for day one PM and day 2 A.M., with a review of watchdog concerns for each program.

Following lunch, Chairman welcomed Jerry Winterer (Scripps) and Dave Scholl (USGS, Menlo Park) and presentations of data and discussions ensued on:

1) Atolls and Guyots (Winterer and Duennebier)
2) N. Pacific Neogene and Bering Sea (Scholl).

Day one proceedings ended at 5:30 p.m.

5. PRESENTATIONS CONTINUED

Day two began at 8:30 a.m. with Chairman welcoming guests Vern Kulm (Oregon State), Casey Moore (Santa Cruz), and Earl Davis (PGC, Canada) and presentations of data and discussion ensued on:

3) East Pacific Rise (Davis)
4) Oregon Margin (Kulm and Moore)
5) Vancouver Margin (Davis)

6. STATUS OF CENTRAL AND EASTERN PACIFIC PROGRAMS - SITE SURVEY SUMMARIES

In the afternoon, SSP reconvened to consider the presentation data and discussions in the light of earlier concerns for each of the East Pacific Programs. The following summaries and panel consensus resulted from these discussions:

6-1 Chile Margin Triple Junction (Lewis)

A progress report for Chile Margin Triple Junction data processing and analysis was presented in Menlo Park. Work accomplished or undertaken since the Hannover SSP meeting includes:

1) Merging of SEABEAM bathymetric data with GLORIA side-scan sonar imagery in the triple junction region. These results were presented at the Fall 1989 AGU Meeting.

2) Further processing of the CDP data has begun at GEOMAR and will continue at the HARC supercomputer facility in Houston. Preliminary pre-stack migrations of Line 734 were compared to an earlier post-stack migration. Some structures were better imaged by the pre-stack migration, but it was noted that the BSR reflector was not as apparent as on the earlier profile.

SSP notes that if the processing sequence that best images the structure and stratigraphy of the Chile Margin Triple Junction does not adequately image the BSR reflector, then it will be necessary to provide profiles to SSP and to PPSP that are optimized for imaging the BSR.

SSP CONSENSUS: SSP confirms its view from the Hannover meeting that Chile Triple Junction data is regionally adequate and appreciates the work accomplished by proponents in data processing

since that meeting. The panel looks forward to final review of the data when site locations are refined.

6-2 East Pacific Rise (Lewis)

The EPRDPG met in Sidney, B.C. immediately before the SSP met in Menlo Park. In Sidney, the EPRDPG chose to concentrate initially on a drilling program at 9° 30' N. Drilling will be focussed along MCS Line 561, that displays the best-developed axial reflection event, presumably related to the magma chamber beneath the axis of the East Pacific Rise. New data and results presented in Sidney and reported to the SSP for the 9° 30' N site included:

1) New ARGO side-scan sonar, 35 mm still camera images, and digital electronic video camera images from the EPR axis (Fornari cruise, fall 1989).

2) New 3-D acoustic tomography results from a 16 km square region centered on MCS Line 561 that images a linear sausage-shaped low velocity volume nearly centered under the rise crest and a high-velocity zone at the surface along the rise axis (Purdy cruise, 1989).

SSP CONSENSUS: At its Hannover meeting, SSP had approved the EPR data package with the provision that video imagery became available for setting the guidebases. These data now emphasize the importance of imaging the extent and thickness of the "rubble zone", and SSP agrees with the EPRDPG's assessment of the importance of projected near bottom seismic surveys in selecting guidebase sites.

SSP evaluated the site survey recommendations enumerated by the EPRDPG, and recommends that the following data and/or analyses be conducted prior to final site selection and drilling:

1) MIGRATION OF MCS LINE 561 TO BETTER IMAGE THE LATERAL EXTENT OF THE AXIAL REFLECTION.

2) INTEGRATION OF THE NEW 3-D TOMOGRAPHY RESULTS WITH THE MCS DATA.

3) ANALYSIS OF THE SINGLE-CHANNEL SEISMIC REFLECTION DATA ACQUIRED DURING THE TOMOGRAPHY EXPERIMENT.

In addition, SSP urges that Mike Purdy's NSF-funded near-bottom refraction experiment be scheduled far enough in advance of the Engineering 3B leg so that his preliminary results will be available to select drill sites at which to get guide bases.

6-3 Cascadia Margins: Oregon and Vancouver (Louden)

The Site Survey Panel was presented a selection of recently processed multichannel seismic profiles (144 channel Digicon) which were taken last fall across both the Oregon and Vancouver margins. These data are of high quality and clearly image the structure of faults which were not well demonstrated by the older MCS data. (Site Survey Data Sheets compiled prior to this meeting are in Appendix VI.)

The fault locations can be coherently traced across neighboring profiles with typical spacings of 2 km. This largely answers our previous concerns regarding the lack of near site 3-D imaging. We also note the presence of BSRs in the upper Section of the Oregon margin (sites 6 and 7), similar to those already mentioned on Vancouver.

We had also discussed the lack of good quality 3.5 kHz data for imaging the near surface structure close to prospective drill sites. It now seems that a merging of near-bottom side-scan data with the near MCS profiles is the best approach in correlating surface features with deeply penetrating seismic features. Good quality side-scan images already exist on Oregon and are planned for Vancouver in May-June. However, SSP recommends that deep tow 3.5 kHz data be collected on the Vancouver margin during a projected side-scan survey. On the Oregon margin, Vern Kulm mentioned that new Alvin dives will be made with a view to PPSP's projected decision-making on drilling the BSR's in September 1990, with the possibility of making additional heat flow measurements. SSP encourages the proponents to collect further heat flow data on the September cruise, particularly in the region of prominent BSRs with variable depths on the upper margin. We also encourage the collection of surface 3.5 kHz data to extend the present coverage, if at all possible.

SSP CONSENSUS: SSP looks forward to future recommendations for specific sites from the Cascadia Margins DPG at our next meeting. Based on the previously existing regional coverage and our preliminary look at new MCS data, we do not foresee the need of any additional requirements to satisfy SSP

6-4 Atolls and Guyots (Duennebier)

a. Cretaceous Guyots in the NW Pacific

Proposed sites include drilling on several carbonate capped guyots in the NW Pacific with the intent of studying Cretaceous carbonate platform and history. Data available are from several cruises, but the most recent and valuable presented at this meeting were collected on SIO Cruise Roundabout 10, 1988. Early assessment indicates that critical data are in hand, but much "desirable data" in the SSP guidelines are not available (deep penetration seismic, MCS, seismic refraction, side scan sonar, heat flow, photography, and current data). The desirability of many of these data sets in the context of this drilling may be questionable, and SSP considers their lack should not be considered at this stage detrimental to the possible scientific return afforded by drilling.

Presently the seismic data is weak for some of the Cretaceous guyots and some 3.5 kHz data is missing because of equipment problems on the Roundabout cruise. Basement is a target at some sites where it is poorly imaged by the seismics.

SSP CONSENSUS: The critical data for the Winterer et al. component of the Atolls and Guyots program is in hand. Where basement is a target, SSP encourages proponents to make every effort to collect velocity data which will be critical in assessing depth to basement. Ships of opportunity should be considered for sonobuoy data and other possibilities are sonobuoy and sample data to required during Engineering III.

b. Drowned Atolls of the Marshall Islands

Eight sites are proposed on and near three guyots in the Marshall Islands region. Proposed drilling addresses problems of chronology of reef growth and drowning related to sea level fluctuations, paleolatitude variations, and vertical tectonics. Survey data are from several cruises, mainly from HIG (MW8805, KK810626-02) and the USGS (Hein, 1989). The site survey matrix (Appendix VII) shows all necessary data available, again with some lack of "desirable" deep penetration seismic reflection, MCS, heat flow, photography, and current meter data. SSP again considers the lack of these data should not be considered detrimental the possible scientific return afforded by drilling.

A site augmentation proposal (Duennebier) will be funded by the USSAC for 5 to 7 days of additional data collection in June 1990, on the ***RV Moana Wave***.

- Data is available from USGS for apron site near Majaro (Jim Hein).

More data to be taken June-July 1990 on Moana Wave (dredge, 3.5kHz, 6-channel seismic with watergun). (USSAC grant for site augmentation, Duennebier). Basement is poorly imaged in some cases, but dredges of volcanic breccias on high slopes indicate basement near bottom of pelagic cap in some places. Sonobuoy velocity data still need to be analysed to find depth to basement.

SSP CONSENSUS: The critical data for the Schlanger/Duennebier component of the Atolls and Guyots program is in hand and further data collection on the projected 'Moana Wave' cruise is likely to complete the data set.

6-5 North Pacific Neogene and Bering Sea (Larsen)

The main objective of the two programs is the Neogene high latitude paleoceanographic development of the northern Pacific and the sampling of possible Cretaceous sediments on seamounts of an Old Pacific plate trapped behind the Aleutian Ridge.

SSP had noted at its last meeting a number of inconsistencies of the updated proposals for the North Pacific Neogene and the Bering Sea programs in the third CEPAC prospectus. Most of these have been clarified in correspondence with C. Sancetta and L.D. Keigwin and by the presentation of D. Scholl at this meeting. It should be noted that the site numbering in CEPAC III prospectus of April 1990 is still not revised. The proponents are urged to do so.

a. North Pacific Neogene

PM-1. Patton Seamount was approved by SSP at the Hannover meeting.

NW-1, NW-3, NW-4. The positions of all of these sites have been relocated in CEPAC Prospectus III, so they need to be assigned a new number (NW-1A, NW-3A, NW-4A). SSP noted that according to Sancetta there are no specific basement objectives here but one double HPC/XCB to 200m or to bit destruction (into basement) has been projected. The seismic data for all three sites are of low quality but is regarded sufficient for this type of drilling, provided better data are collected by JOIDES Resolution prior to drilling. SSP RECOMMENDS THAT OTHER OPPORTUNITIES TO COLLECT BETTER DATA CONTINUE TO BE LOOKED FOR. The ponding of sediments at site NW-4 may suggest that reworking of pelagic sediments from the surrounding hills may have taken place. Copies of the relevant seismic lines have been received at the data bank.

Detroit Seamount. (DT-1A, DT-2A, and DT-3A). A paleoceanographic transect is the main objective but basement samples may provide important information of the stability of the Hawaii hotspot near the K/T boundary. R/V Thomas Washington data was presented in Hilo along with R/V Farnella - USGS data was presented at the meeting and are passed on to the data bank. Lloyd Keigwin proposed (letter April 4, 1990) three positions (DT-1A, DT-2A, DT-3A) which are discussed in Dave Scholl's Memo, April 10, 1990. (Appendix VIII)

SSP CONSENSUS: SSP concluded that the data package is probably sufficient for picking North Pacific Neogene sites. Crossed seismic lines are requested for the site near the crest of the ridge (DT-1) in order to avoid closed structures. All sites should be located on seismic lines, preferably with 3.5 kHz, in order to detect disturbances in the sequence. Heat flow data should be compiled.

b. Bering Sea

Data was presented by Dave Scholl and is referred to in Appendix VIII.

Umnak Plateau (UM-1). The site UM-1 was approved by SSP.

Sounder Ridge (SR-1). Sounder Ridge is a nearly completely buried seamount on a possible basement diapir. Questions with respect to achieving the scientific objectives and to safety considerations were discussed. SSP recommends that structural contour maps be produced for Sounder Ridge in order to investigate possible closures.

Shirshov Ridge. Further SSP assessment awaits the arrival of Soviet seismic profiling data (and this in turn awaits Soviet involvement in the ODP program).

7. MEMBERSHIP

Chairman informed the Panel that Fred Duennebier had formally resigned from SSP and had agreed to attend at Menlo Park as his last meeting. SSP must now recommend to PCOM a suitable US replacement, preferably with similar expertise to Duennebier since the Panel had already diversified its expertise with its latest new members. After discussion it was agreed to recommend AS POSSIBLE REPLACEMENTS :

Greg Moore (HIG)
Tom Shipley (UTIG)
Ann Trehu (Oregon State)

Chairman will also ask the PCOM chairman to clarify the status of Jim Hedberg as an SSP member.

Chairman formally thanked Fred Duennebier on behalf of SSP and JOIDES for his sterling service on the Panel. His expertise and humor will be greatly missed.

8. SSP SURVEY REQUIREMENTS FOR FRACTURE ZONE DRILLING (Von Herzen and Kastens)

The requirements for drilling in FZ's are similar in many ways to those of ridge crests, in the sense that drill sites in such environments frequently have igneous rock or rubble at the surface. This means that surveys must provide geological as well as engineering information for ideal siting of drilling locations. The survey data must extend down to the smallest scales (i.e., cm to m) to optimize the critical task of starting the hole in such environments.

On the other hand, FZ's have some general unique characteristics that distinguish them from other environments or survey objectives. FZ's are formed by major tectonic displacements, horizontal as well as vertical, which expose rock of many different types. Indeed, this characteristic is what may allow the strategy of offset drilling to sample sections of the crust and upper mantle. The crustal thickness also may be attenuated or absent in parts of some FZ's, requiring detailed surveys to place any rocks recovered by drilling in a structural and tectonic framework.

Drilling in FZ's to date (1990) has had somewhat mixed results. The most recent extensive campaign on Leg 118 achieved a reasonably deep hole (500m) in Atlantis II gabbro rocks of the FZ of SW Indian Ridge over the last half of the leg only after extensive and somewhat frustrating surveys made by the drill ship itself (Appendix IX). The original surveys of the FZ were not sufficiently detailed, and lacked some techniques which now seem technologically possible and affordable.

In particular, two detailed survey techniques may need upgrading for FZ surveys. To provide information on near-surface (tens to hundreds of meters) structured near-bottom seismic experiments would be useful. Small-scale expanding-spread experiments are capable of providing the velocity vs. depth structure for shallow depths at selected sites, which may indicate the priority and extent of fracturing in the near sub-surface. The ability to start a hole in FZ environments may depend on the amount of fracturing and rubble in the near-surface rock.

Another detailed survey requirement that became obvious during surveys on Leg 118 is sampling of in-situ rocks under TV control. Particularly in vertical sections in FZ's rock types are important to determine location in crustal stratigraphic sections. It was not possible to sample during the Leg 118 surveys, but some recent technological advances suggest that in-situ rock samplers under TV control may soon be available.

9. PREPARATION FOR NEXT MEETING

1. Thematic panel rankings

d'Ozouville presented to the panel the list and the locations of the programs ranked by the thematic panels at their last meeting. Fifty-one programs have been selected amongst which PCOM will establish a 4-year drilling program starting FY92 at its next meeting in April.

2. Requirements from JOIDES Office and the Data Bank for the next SSP meeting

After the selection made by PCOM, the JOIDES Office will forward a list of the chosen programs with the proposal references to the SSP chairman and to the Data Bank for the preparation of the next SSP meeting in July. Carl Brenner will initiate the assessment of the site survey data and Laurent d'Ozouville will begin to synthesize information contained in these proposals for use by SSP members.

ACTION ITEM 3: BRENNER TO INITIATE THE ASSESSMENT OF THE STATUS OF SITE SURVEY DATA FOR THE PROGRAMS RANKED BY PCOM IN ITS 4-YEAR PLAN.

ACTION ITEM 4: D'OZOUVILLE TO INITIATE THE SYNTHESIS OF INFORMATION (ABSTRACT, THEMES, LOCATIONS OF PROPOSED SITES, THEMATIC REVIEWS OF THE PROGRAMS RANKED BY PCOM).

3. Time and place

After discussion at the last Panel Chairman Meeting between SSP chairman and PCOM chairman, it was recommended that SSP should meet as soon as possible after PCOM decision on the 4-year drilling program to start to assign watchdogs to the selected programs.

SSP members agreed that the next panel meeting should be July 10-11 would take place at Lamont, and would be hosted by Carl Brenner.

ACTION ITEM 5. KIDD TO CONFIRM (WITH PCOM CHAIRMAN) TIME AND PLACE OF THE NEXT SSP MEETING (PROPOSED JULY 10-11TH JULY AT LDGO)

4. Guests

Von Herzen suggested that Dan Fornari and/or Rachel Heyman might be invited to make a presentation at Lamont of the new video imagery - East Pacific Rise.

Chairman will also propose that P. Blum, who will replace L. D'Ozouville at the JOIDES Office, be invited to the next meeting. The next SSP meeting will be the last one before the JOIDES Office relocates from Hawaii to Texas.

It was further suggested that it might be appropriate to invite Louden's Australian alternate, Phil Symonds, to take part in the next meeting as it would afford a full view of SSP's work schedule over the next few years.

ACTION ITEM 6. KIDD TO WRITE TO PCOM CHAIRMAN SUGGESTING GUESTS FOR THE JULY MEETING

The meeting closed at 4.30 p.m. Steve Lewis was warmly thanked for arranging a most successful meeting and field trip.

SITE SURVEY PANEL MEETING
MENLO PARK
APRIL 9-10, 1990

APPENDICES

LIST OF APPENDICES

JOIDES SITE SURVEY PANEL - CHAIRMAN'S REPORT 1989

BACKGROUND:

Site Survey Panel provides advice to PCOM on the adequacy of site survey data accompanying mature drilling proposals: in terms of each proposal's stated drilling objectives.

The Panel provides guidelines for proponents and advises where additional data must be collected or may be available elsewhere.

SSP oversees the activities of the JOIDES Site Survey Data Bank in assembling site specific packages, both for PPSP scrutiny and for eventual use on scheduled ODP Legs. Thus, the SSP comprises:

- members, who each maintain a *watchdog* role for specific proposals;
- the manager of the Data Bank;
- liaisons from TAMU and the JOIDES Office;
- liasons from PPSP, PCOM, and SMP.

YEAR REVIEW:

SSP began the year with 8 members and Dr. Greg Mountain as Chairman. During the year, Mountain resigned to move to NSF and R. Kidd took the Chair; members for Canada/Australia and France were changed (Louden for Pierce and Pautot for Mauffret, respectively) and PCOM assigned three new members (Kastens, von Herzen, and Hedberg and one liason (Moran, SMP). This expands the full membership to 11, broadens the technical expertise available and increases the U.S. membership from 2 to 5.

Two SSP meetings have been held:

10 - 12 April in Hawaii (including a joint session with CEPAC);
16 - 19 October in Hannover.

In Hilo, Hawaii, the Panel concentrated primarily on reviewing the status of survey data for the CEPAC program. Updated packages on scheduled and remaining WPAC were discussed as well as the effects on site survey progress of likely changes in order of drilling being contemplated by PCOM. In the event, Old Pacific drilling became scheduled when the key site survey data was still to be collected and SSP requested a special presentation of the data at its Hanover meeting by proponent Lancelot. Good progress was reported on all other WPAC packages. On CEPAC programs, SSP provided advice to proponents on survey data to be collected on cruises in support of Oregon, Vancouver and Sedimented Ridges Proposals and voiced concern at the quality of N. Pacific Neogene data urging the preparation of alternate site packages. As usual, many action items referred SSP *watchdogs* to *chase up* proponents to deposit their data in the Data Bank for compilation and review.

In Hannover, SSP made made its final reviews of Legs now scheduled through February, 1991. Only Lau,Basin requires further review. SSP included an assessment of new data for the Old Pacific Leg which was presented by Lancelot. The panel noted that processing of the MCS and sonobuoy data is still to be done. The panel also commented on the late inclusion of new NANKAI sites and one extra ONTONG - JAVA (basement) site in the drilling program, in the latter case on old seismic data that had not been presented to SSP. Chairman was asked to recommend to PCOM that proponents be asked to submit many alternate sites for review at an initial stage. SSP review of the CEPAC proposals in Hannover resulted in the forward look as outlined below:

FORWARD LOOK:

SSP has effectively already approved survey packages for the following potential *early* CEPAC Legs:

Sedimented Ridges
504B Lower Crust
Eastern Equatorial Pacific

Because new survey data is being collected or because available data still has to be presented in a collated form, SSP has requested that proponents present data for the following Legs at its next meeting in April '90 (Menlo Park):

Cascadia - Oregon and Vancouver
Atolls and Guyots
N. Pacific Neogene
Hawaii Flexure

If PCOM schedules CHILE TRIPLE JUNCTION and EAST PACIFIC RISE , these two data packages must go through final review in April.

CAUSES FOR CONCERN:

(1) PROPOSAL REVIEW PROCEDURES: SSP has, during 1989, put in place its own procedures for dealing with proposals to take account of the JOIDES thematic structure and PCOM's arrangements for review of proposals. SSP will now consider only those new proposals that are passed on as *favoured* by PCOM. The Panel is concerned, however, that proposals returned by thematic panels for modification, or *resurrected* old proposals, may come to SSP unable to satisfy current survey standards. In both cases, the leadtimes may be too short for SSP to remedy shortfalls in data packages.

(2) MCS DATA PROCESSING: Sufficient leadtime is frequently not being allowed for newly acquired MCS data to be processed. PCOM is being required to schedule a leg before the processed MCS data has been assessed.

(3) DETAILED NEAR-SITE SURVEYS FOR TECP PROGRAMS: Both TECP and SSP recognize the need for tightly constrained seismic surveys and analysis of the 3-D structure of faulting where drilling objectives are to trace fluid flow. SSP is concerned that, whereas proponents can prepare impressive regional data sets, they do not yet appreciate that their needs approximate more the near-site survey requirements of HRGB drilling. Again, the necessary leadtime for surveys and data compilation must be recognized. SSP also recommends that shipboard real-time navigation be provided on the drill ship in the form of a laboratory plot monitor.

(4) TAMU LIASON to SSP meetings: Problems encountered at its Hannover meeting brought SSP to recognize the absolutely essential role of its SSB, JOIDES Office and TAMU liaisons. Suggestions have been made that TAMU may need to be selective as to which service panel meetings it sends representatives to. SSP wishes to record that TAMU representation is considered essential to this particular service panel.

Robert B. Kidd
24, November, 1989

Appendix II

Updated Ship Schedules:
1990 - 1991

Japan
France
Canada
Australia
WHOI
LGDO
UK

Current Ship Schedules for Japan

(Ocean Research Inst., Tokyo Univ.)

1. R/V Hakuho-maru

   June 25- Aug 1 — Japan Trench +
   Izu-Bonin Trench

   (KH-90-1)

2. R/V Tansei-maru — Nankai Trough
   to Support Leg 131

   May 10-21

   (KT-90-6)

3. R/V Tansei-Maru

   June23 - May 2 — Off Óokkaido

   (KT-90-110

4. R/V Tansei-maru

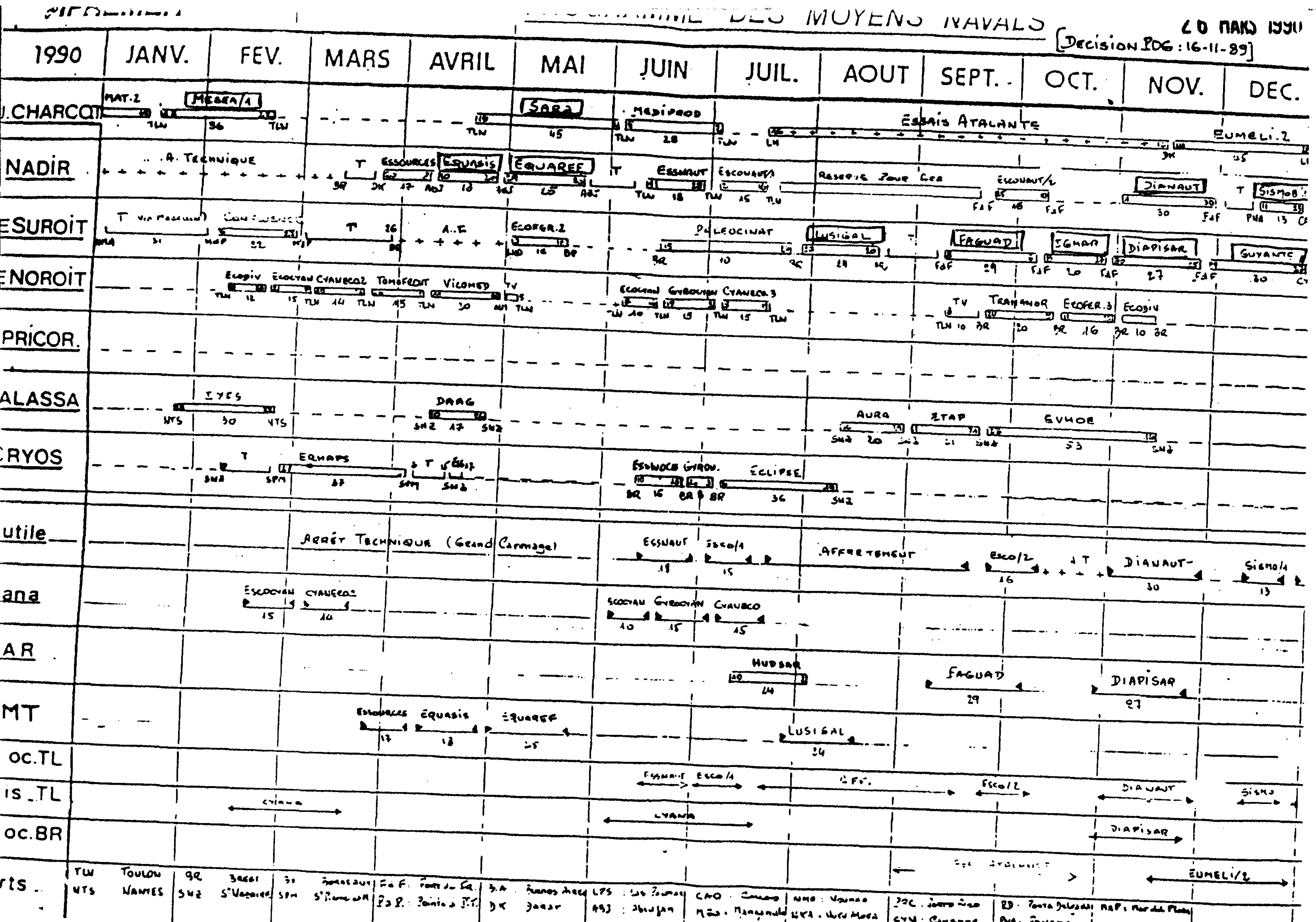
   Sept. 11 ~28 — Japan Sea

   (KT-90-14)

5. R/V Tansei-maru — Izu

   Nov 16-24

   (KT-90-16)


PROGRAMME DES MOYENS NAVALS
20 MARS 1990
[Decision POG : 16-11-89]
1990
JANV.
FEV.
MARS
AVRIL
MAI
JUIN
JUIL.
AOUT
SEPT.
OCT.
NOV.
DEC.
J.CHARCOT
MAT.2
MESEA/4
TLN
36
TLN
TLN
SARA
45
MEDIPROD
TLN 28 TLN
LH
ESSAIS ATALANTE
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DK 45 LH
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A. TECHNIQUE
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ESSOURCES
DK 17 ABJ
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ESSNAUT
TLN 18 TLN
ESCONAUT/1
15 TLN
RESERVE POUR GEI
FdF
ESCONAUT/2
16 FdF
DIANAUT
30 FdF
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SISMOB
PNA 13
LE SUROIT
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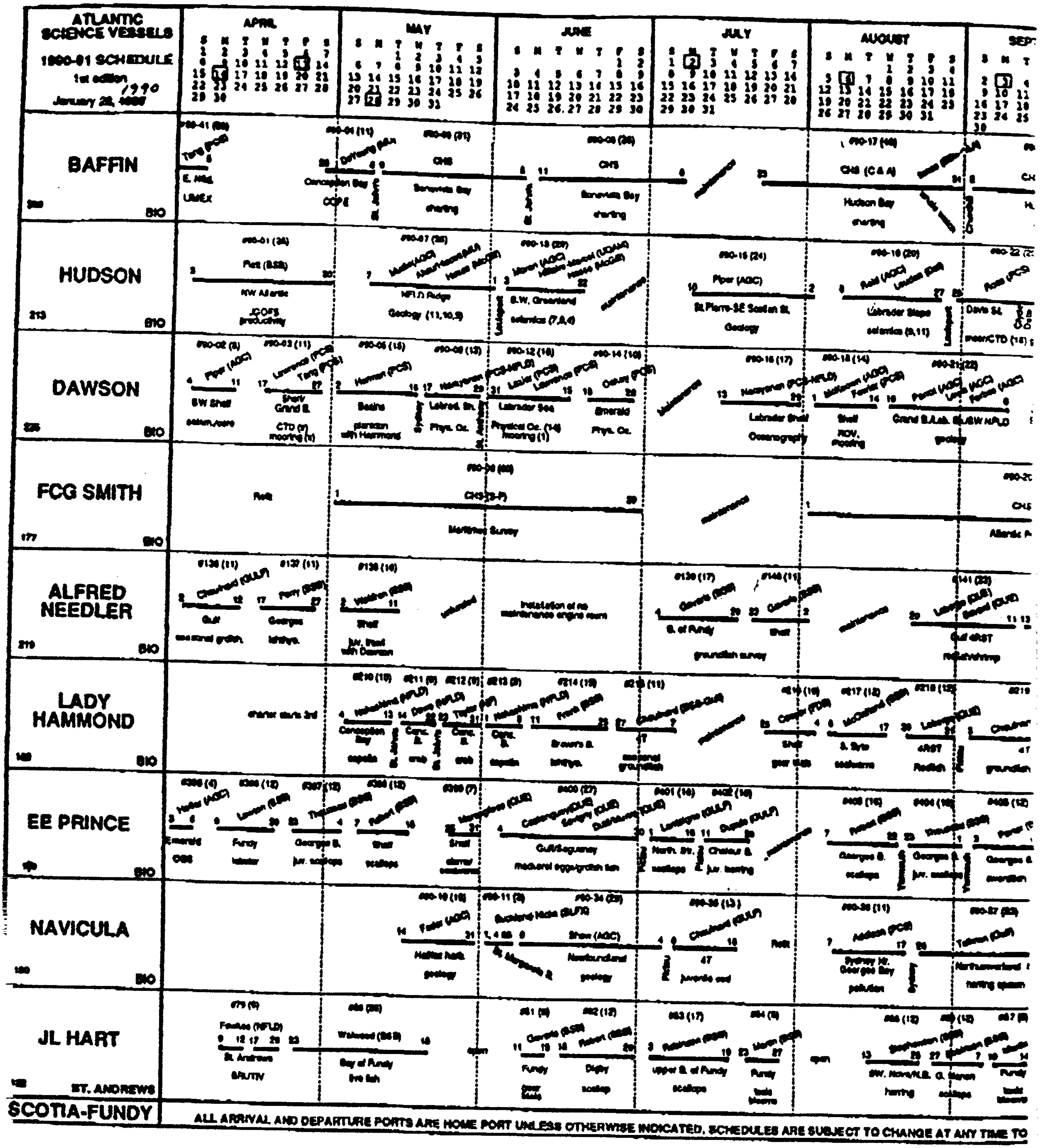
31
CONFLUSION
22
MDP
T 26
BR
A.T.
ECOFER.2
16 BR
PALEOCINAT
BR 10 BR
LUSIGAL
24 BR
T
FAGUAD
FdF 29 FdF
IGHAR
20 FdF
DIAPISAR
27 FdF
GUYANTE
30
LE NOROIT
ECODIV
ECOCYAN
CYANECO2
TOMOFRONT
VICOMED
TV
TLN 12
15 TLN 14 TLN 15 TLN 20 TLN
ECOCYAN GYROCYAN CYANECO3
TLN 10 TLN 15 TLN 15 TLN
TV
TRANANOR
ECOFER.3
ECODIV
TLN 10 BR 20 BR 16 BR 10 BR
CAPRICOR.
THALASSA
ZYES
NTS 30 NTS
DRAG
SNZ 17 SNZ
AURA
SNZ 20 SNZ
ETAP
21 SNZ
GVHOE
53 SNZ
CRYOS
T
SNZ
SPM
EQNAPS
37
SPM
T
ESSAIS
SNZ
ESSWOCE GYROV.
BR 16 BR BR
ECLIPSE
36 SNZ
Nautile
ARRÊT TECHNIQUE (Grand Carénage)
ESSNAUT
18
ESCO/1
15
AFFRETEMENT
ESCO/2
16
T
DIANAUT
30
SISMO/1
13
Cyana
ESCOCYAN CYANECO2
15 14
ECOCYAN GYROCYAN CYANECO
10 15 15
SAR
HUDSAR
24
FAGUAD
29
DIAPISAR
27
EMT
ESSOURCES EQUASIS EQUAREF
17 13 25
LUSIGAL
24
Equip.oc.TL
Equip.is.TL
CYANA
ESSNAUT ESCO/1
AFF.
ESCO/2
DIANAUT
SISMO
Cyana
CYANA
Equip.oc.BR
DIAPISAR
Ports
ESSAIS ATALANTE
EUMELI/2
TLN TOULON
NTS NANTES
BR BREST
SNZ St Nazaire
BX BORDEAUX
SPM St Pierre et M.
FdF Fort de Fr.
PàP Pointe à Pitre
BA Buenos Aires
DK Dakar
LPS Las Palmas
ABJ Abidjan
CAO Callao
MZO Manzanillo
NMO Noumea
NKA Nuku Alofa
JPC Joao Pesso
CYN Cayenne
PD Ponta Delgada
MdP Mar del Plata
PNA Panama



ATLANTIC SCIENCE VESSELS

1990-91 SCHEDULE

1st edition

January 28, 1990

APRIL · MAY · JUNE · JULY · AUGUST · SEP

Vessel		
BAFFIN	300	BIO
HUDSON	213	BIO
DAWSON	225	BIO
FCG SMITH	177	BIO
ALFRED NEEDLER	210	BIO
LADY HAMMOND	140	BIO
EE PRINCE		BIO
NAVICULA	180	BIO
JL HART	100	ST. ANDREWS

SCOTIA-FUNDY

ALL ARRIVAL AND DEPARTURE PORTS ARE HOME PORT UNLESS OTHERWISE INDICATED. SCHEDULES ARE SUBJECT TO CHANGE AT ANY TIME TO

OCTOBER

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

NOVEMBER

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25	26	27	28	29	30	

DECEMBER

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30	31					

JANUARY

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27	28	29	30	31		

FEBRUARY

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24	25	26	27	28		

MARCH

S	M	T	W	T	F	S
					1	2
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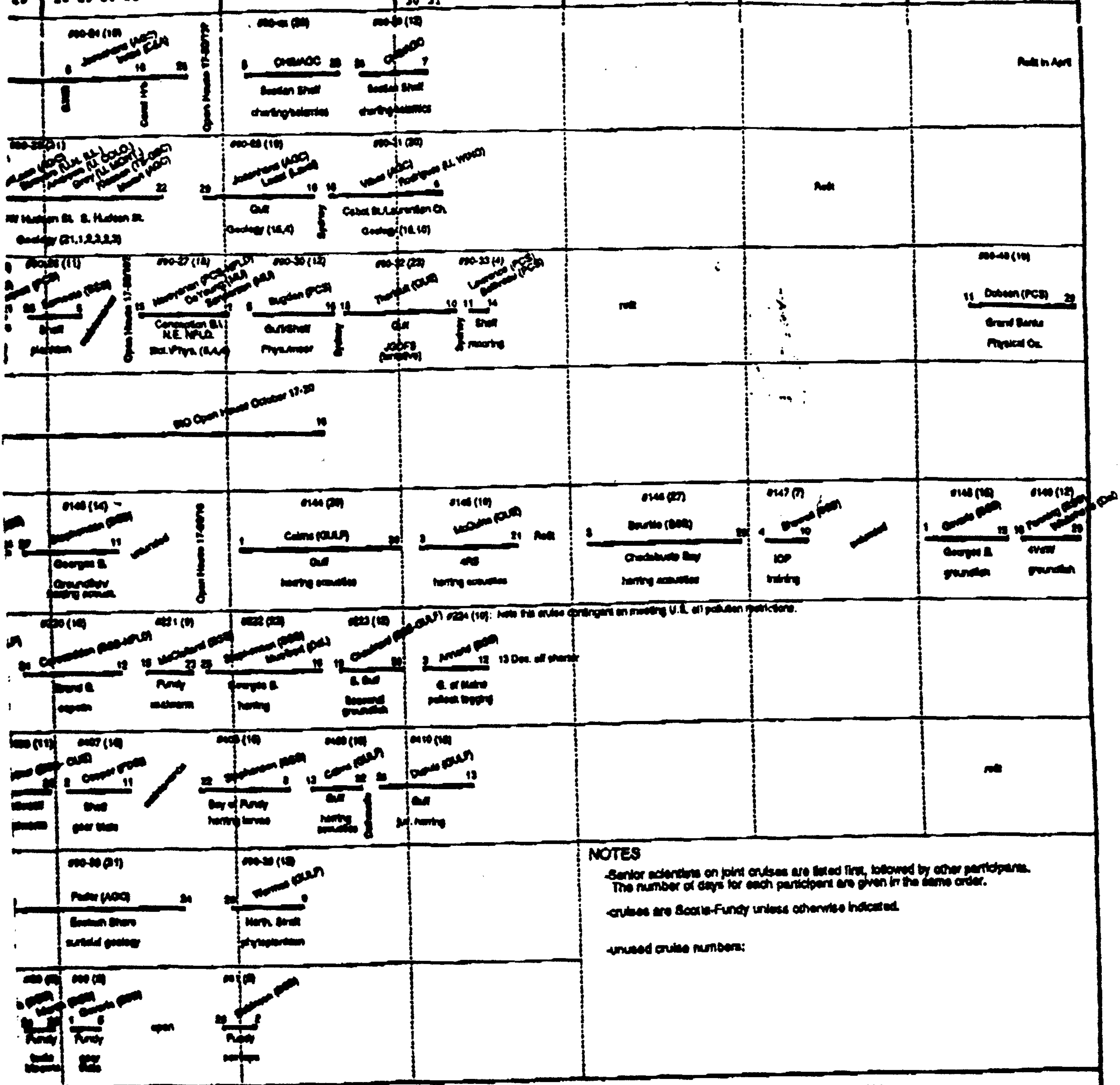
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						



NOTES

-Senior scientists on joint cruises are listed first, followed by other participants. The number of days for each participant are given in the same order.

-cruises are Scotia-Fundy unless otherwise indicated.

-unused cruise numbers:

PROGRAM OR VESSEL REQUIREMENTS. FOR MORE INFORMATION ON SCOTIA-FUNDY BASED VESSELS CONTACT A. ADAMS (902) 426-7292

CANADA – SHIP SCHEDULES

THESE CONTAIN ODP-RELATED OBJECTIVES

PACIFIC GEOSCIENCE CENTRE

Jan. 29,90

1. Proposed Cruise Schedule for fiscal year 1990-91:

Cruise #	Chief Scientist	Ship	Dates
PGC90003	BARRIE	ENDEAVOUR	MAY 22 - JUNE 8
PGC90004	CURRIE	TULLY	MAY 28 - JUNE 22
PGC90005	DAVIS	TULLY	JUNE 25 - JULY 13
PGC90006 +	FRANKLIN Barrie	ENDEAVOUR	JULY 30 - AUG. 3
PGC90008	BORNHOLD	VECTOR	SEPT.10 - SEPT.14
PGC90009	LAW	VECTOR	SEPT.17 - SEPT.28

2. Cruise Objectives and Areas of Operation:

Cruise 03: To complete a regional mapping program for Dixon Entrance, including geophysical surveys (side-scan), bottom sampling, and bottom photography.

Cruise 04: To obtain high resolution acoustic imagery and swath bathymetry to support Canadian proposals for O.D.P. drilling in Canadian waters,(Northern Juan de Fuca Ridge, Explorer Ridge, Tuzo Wilson Knolls, Vancouver Island Margin).

Cruise 05: To determine the scale and pattern of hydrothermal circulation on young mid-ocean ridge flanks, (Juan de Fuca Ridge), and provide constraints on the rates of advective heat and geochemical flux through the seafloor. This survey will include detailed seismic reflection profiling,seafloor heat flow measurements, and sediment pore fluid geochemical and pressure measurements.

Cruise 06: To provide support for the ALVIN submersible program in Middle Valley, (Juan de Fuca Ridge Area) by transferring scientists to the ATLANTIS and some coring and camera work if there is available time

Cruise 07: To determine the climatic and anthropogenic influences on sedimentation in deep basins on the Vancouver Island shelf. The survey will include high resolution seismic profiling and sidescan sonar, and coring.

AUSTRALIA : SHIP SCHEDULES

TENTATIVE PROGRAM FOR RV *RIG SEISMIC* :- 1990 - 1991

Bureau of Mineral Resources, Australia
Division of Marine Geosciences and Petroleum Geology

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* - add on program externally funded.
@ - Theme: Northwest Shelf evolution - passive margin to foreland.
\# - Theme: Tectonic development of Australia's southern margin.

1990 PROGRAM:

1@.	Eastern Arafura Sea -framework and HC pot. (Deep seismic + geochem. direct hydrocarbon detection, DHD)	Feb./March From Darwin
2.	Triassic Reefs - a new Northwest Shelf play (High res. seismic + sampling)	April/May From Darwin
	Installation of new seismic system + shake down (New 4800 m cable and 32 sleeve gun array; microvax acquisition computer etc.)	June In Freemantle
3@.	Bonaparte Basin region - deep structure and basin development (Deep seismic on long regional lines)	July From Freemantle
4@.	Vulcan Sub-basin - structural reactivation and trapping mechanisms (High res. seismic + sidescan sonar)	September From Darwin
5@.	Bonaparte Basin region - geochem. (DHD) (Regional 'sniffing'/seabed sampling, to include Vulcan S-b & margins Londonderry High) [NB. This project may be swapped with 1991/1]	Nov/December From Darwin

1991 PROGRAM:

1@.	Southern Northwest Shelf - deep structure (Deep seismic on long regional lines)	Jan./early Feb From Darwin
2*.	Philippines study - AIDAB funded	Feb/end March
3.	Barrow/Dampier Sub-basin - geochem. DHD ('Sniffing'/seabed sampling + high res. seismic)	May From Darwin
4@.	Northwest continental margin sampling (Dredging of Wallaby, Exmouth, & Scott Pl. to solve range of tectonic problems; e.g. nature of volcanic/non-volcanic passive margins)	July From Darwin
5@.	Northern margin crustal transects (Extend BIRPS transect across collisional system onto Aust. shelf; passive margin transect - Browse/Scott Pl./Sunda Trench)	September From Darwin
6#.	Bremer Basin framework and HC potential (Seismic, dredging; ?geochem. DHD)	November From Freemantle

1990 *RV Franklin* 1990

Research Schedule

Cruise	From	To	Chief Scientist	Project Title and Institute
1	Hobart Wed 10 Jan	Hobart Tues 30 Jan	Griffiths	*Subtropical Convergence* CSIRO Divisions of Fisheries (Harris), Oceanograpy (Mackey) and Atmospheric Research (Pearman)
2	Hobart Mon 26 Feb	Brisbane Mon 19 Mar	Church	*Ocean Transport —Tasman Sea* CSIRO Division of Oceanography
3	Brisbane Tues 20 Mar	Sydney Sun 7 Apr	Meyers	*Ocean Transport —Tasman Sea* CSIRO Division of Oceanography
4	Sydney Thurs 10 May	Townsville Thurs 24 May	Middleton	*Shelf Circulation* University of New South Wales
5	Townsville Fri 25 May	Townsville Tues 5 Jun	Carter	*Deep Sea Sediments* James Cook University & NZ Oceanographic Institute
6	Townsville Wed 11 Jul	Cairns Tues 7 Aug	Burrage	*Coral Sea Circulation Closure* AIMS
7	Cairns Fri 7 Sep	Rabaul Mon 1 Oct	Lindstrom	*BASICS* (Bismark Sea)* CSIRO Divisions of Oceanography & Environmental Mechanics (Bradley)
8	Rabaul Tues 2 Oct	Townsville Wed 17 Oct	Mackey	*Carbon Cycles* CSIRO Division of Oceanography
9	Townsville Fri 16 Nov	Sydney Mon 26 Nov	Middleton	*Shelf Circulation* University of New South Wales ERS*-1 Calibration CSIRO Division of Atmospheric Research (Barton)
10	Sydney Tues 27 Nov	Hobart Fri 14 Dec	McDougall	*Mixing & Subduction (Bunyip)* CSIRO Division of Oceanography ERS—Calibration CSIRO Division of Atmospheric Research (Barton)

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*Bismark Air-Sea Interaction and Circulation Study

*Earth Resources Satellite

1991 1991

RVFranklin

Research Schedule

Cruise	From	To	Chief Scientist	Project Title and Institute
1	Hobart Sat 5 Jan	Adelaide Mon 14 Jan	Nichols	*Bass Strait Study* CSIRO Oceanography
2	Adelaide Tues 15 Jan	Hobart Wed 30 Jan	v d Borch	*South Australian Margin Geology* Flinders University
3	Hobart Wed 6 Mar	Hobart Wed 27 Mar	McDougall	*Turbulence in ACC* CSIRO Oceanography
4	Hobart Thurs 25 Apr	Sydney Wed 15 May	Nichols	*Bass Strait Study* CSIRO Oceanography
5	Sydney Thurs 16 May	Sydney Tues 21 May	Jenkins	*Continental Margin Geology* University of Sydney
6	Sydney Wed 22 May	Townsville Wed 5 Jun	Nilsson	*Mapping of East Australian Current* CSIRO Oceanography *ERS-1* Scanning Radiometer ;* CSIRO Atmospheric Research (Barton)
7	Townsville Fri 12 Jul	Townsville Thurs 1 Aug	Lindstrom	*New Guinea Undercurrent* CSIRO Oceanography *ERS-1 Scanning Radiometer* CSIRO Atmospheric Research (Barton)
8	Townsville Sat 7 Sep	Cairns Mon 30 Sep	Burrage	*Boundary Flows —Coral Sea* Australian Institute of Marine Science *ERS– Scanning Radiometer* CSIRO Atmospheric Research (Barton)
9	Cairns Tues 1 Oct	Townsville Mon 21 Oct	Binns/Scott	*PACLARK** CSIRO Geoscience, University of Toronto
10	Townsville Tues 12 Nov	Sydney Thurs 12 Dec	Church	*Ocean Transport (WOCE*)* CSIRO Oceanography *ERS-1 Scanning Radiometer* CSIRO Atmospheric Research (Barton)

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*Papua New Guinea, Australia and Canada Woodlark Basin Study
*Earth Resources Satellite
*World Ocean Circulation Experiment

APPENDIX I

NERC RESEARCH SHIPS PROGRAMMES 1990/91

Apr

Mo	Tu	We	Th	Fr	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

May

Mo	Tu	We	Th	Fr	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Jun

Mo	Tu	We	Th	Fr	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

Jul

Mo	Tu	We	Th	Fr	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

Aug

Mo	Tu	We	Th	Fr	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Sep

Mo	Tu	We	Th	Fr	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Oct

Mo	Tu	We	Th	Fr	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Nov

Mo	Tu	We	Th	Fr	Sa	Su
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Dec

Mo	Tu	We	Th	Fr	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Jan

Mo	Tu	We	Th	Fr	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Feb

Mo	Tu	We	Th	Fr	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28			

Mar

Mo	Tu	We	Th	Fr	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

RRS Charles Darwin RRS Charles Darwin RRS Charles Darwin RRS Charles Darwin RRS Charles Darwin RRS Charles Darwin RRS Charles Darwin

02 ——— 24
BARRY
45
RVS
Eq.Trials
Atlantic

27 ——— 22
BARRY
46
Savidge
Queens
BOFS
NE Atlantic

25 ——— 19
BARRY
47
Burkill
PML
BOFS
NE Atlantic

21 - 26
BARRY LONDON
48
Edwards
BGS
Geophys

28
29 ——— 22
LONDON
50
Saunders
IOSDL
Physics
NE Atlantic

25 ——— 21
TROON
51
Pollard
IOSDL
Physics
Iceland/
Faeroes

25 ——— 13
TROON
52
Masson
IOSDL
Geophysics
Rockall
Plateau

18 ——— 24
BARRY
53
Shimmield
Edinburgh
BOFS
NE Atlantic

27 ——— 21
LISBON LISBON
54
Wilson
IOSDL
Geochem
NE Atlantic

21 - - - - 15
Re-cert'n

15 ——— 18
LISBON
55
Whitmarsh
IOSDL
Geophysics
Offshr Ghana

22 ——— 24
FREETOWN
56
Kidd
Cardiff
Geophysics
NW Africa

27 ——— 30
TENERIFE TE
57
Searle
Durham
Geophysics
Mid Atlantic

RRS Discovery RRS Discovery RRS Discovery RRS Discovery RRS Discovery RRS Discovery RRS Discovery RRS Discovery

08
14 ——— 8
BARRY
190
Watson
PML
BOFS
NE Atlantic

11 ——— 07
BARRY
191
Angel
IOSDL
BOFS
NE Atlantic

10 ——— 27
BARRY
192
Turner
PML
BOFS
NE
Atlantic

30 ——— 01
BARRY
193
Pingree
PML
Physics
NE Atlantic

04 ——— 02
BARRY
194
Herring/Priede
IOSDL / Abdn
Biology
NE Atlantic

05 ——— 05
TENERIFE
195
Herring
IOSDL
Biology
NE Atlantic

05
UK PORT
Commence Vessel Conversion

RRS Challenger RRS Challenger RRS Challenger RRS Challenger RRS Challenger RRS Challenger RRS Challenger RRS Challenger

03 ——— 03
TROON
64
Owens
PML
Biochem
N Sea

06 ——— 17
GY
65
Morris
PML
Chem
N Sea

20 ——— 18
GY
66
Prandle
POL
Physics
N Sea

21 ——— 05
GY
67
Ellett
DML
Physics
NW
Scotland

08 ——— 23
TROON
68
Hill
UCNW
Physics
Irsh Sea

26 ——— 07
BARRY
69
Morris
PML
Chem
N Sea

10 ——— 27
GY
70
Dando
PML
Biochm
N Sea

30 ——— 17
TROON
71
Ellett
DML
Physics
NW
Scotland

20 ——— 19
GY
72
Prandle
POL
Physics
N Sea

19 - - - - 14
GY
Re-cert'n

14 ——— 03
TROON
73
Simpson
UCNW
Physics
W
Scotland

06 ——— 19
TROON BARRY
74
Ellett
DML
Physics
NW
Scotland

19 - - - - 14
Available for
charter or
laid-up

14 ——— 03
BARRY
75
Ellett
DML
Physics
NW
Scotland

06 ——— 02
TROON BA
76
Van den
Berg
Liverpool
Biogeochem
NE Atlantic

Charter Ships Charter Ships Charter Ships Charter Ships Charter Ships Charter Ships Charter Ships Charter Ships Charter Ships Charter Ships

(26)+6
UK Port UK Port
Kenyon
IOSDL
Geophysics
Rhone Fan. Med.

(15)+4
UK Port UK Port
Fannin
BGS
Geol/Bio
NE Atlantic

(23)+2
US Port US Port
Masson
IOSDL
Geophysics
Mont.Fan Offshr.Calif.

(28)+6
UK Port UK Port
Parson
IOSDL
Geo-phys/chem
N Atlantic

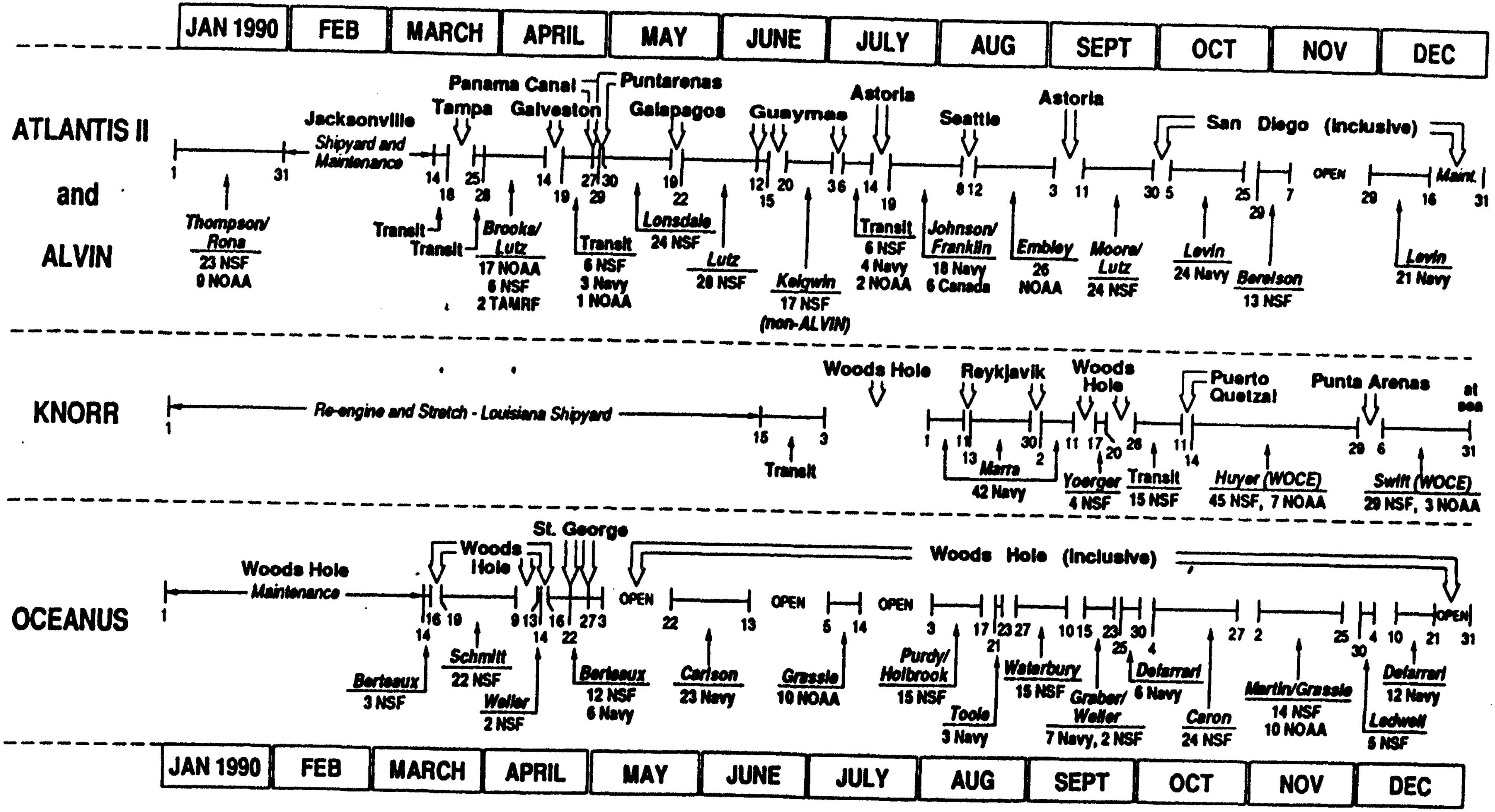
(25)+8
? ?
Parson
IOSDL
Swath Bathymetry
Area to be determined

Final Version (20 Sept 1989)

Charter ship allocations shown are for information only. Actual cruise dates and charter vessels are to be determined.

RVH.

Woods Hole Oceanographic Institution
Ships' Schedule – 1990



Totals:	NSF	Navy	NOAA	Other	Total
Atlantis II	147	70	55	8	280
Knorr	93	42	10		145
Oceanus	114	57	20		191

7 MARCH 1990

Donald A. Moller

George Grice
Approved: George D. Grice
Associate Director

BERNIER Operating Schedule 1990 Date: 06-Apr-90

POC: M.RAUSON.LDGO
Lamont-Doherty Geological Observatory
Palisades, N.Y. 10964
Tel: (914) 359-2900 SWING

SCHMAY01
Telex: 926090 LDGO Z
Fax: (914) 359-6817

M/V ~~BERNIER~~ OPERATING SCHEDULE: 1990
ATLANTIC/PACIFIC SCHEDULE

	DATE	PORT	PROGRAM	P.I.	CRUISE	DAYS		
						AT SEA	PORT	MAINT
YARD	01-Jan-90	SHIPYARD	MODIFICATIONS/INSTALLATIONS					91
PORT	02-Apr-90	NEW ORLEANS	LAY-UP					29
DEP	01-May-90	NEW ORLEANS	MB	SHAKE-	B90-01	10		
ARR	11-May-90	MIAMI	MCS, SCS	DOWN			1	
PORT	12-May-90	MIAMI	NSF (F)				0	
PORT	12-May-90	MIAMI		SHAKE-	B90-02		0	
DEP	12-May-90			DOWN		5		
ARR	17-May-90	MIAMI	MB, MCS,	SCS			1	
PORT	18-May-90		NSF (F)				1	
PORT	19-May-90	MIAMI		RYAN	B90-03		0	
DEP	19-May-90					4		
ARR	23-May-90	AT SEA	DMSS TEST				0	
PORT	23-May-90		NAVY (F)				0	
PORT	23-May-90	AT SEA		MILLER	B90-04		0	
DEP	23-May-90		MCS,SCS		(21+2)	23		
ARR	15-Jun-90	N. JERSEY	NSF (F)				1	
PORT	16-Jun-90						1	
PORT	17-Jun-90	N. JERSEY		SHERIDAN	B90-05		0	
DEP	17-Jun-90		MCS			8		
ARR	25-Jun-90	NEW YORK					1	
PORT	26-Jun-90			NSF (E.D.G.E)			0	
PORT	26-Jun-90	NEW YORK		TRANSIT	B90-06		1	
DEP	27-Jun-90					1		
ARR	28-Jun-90	WOODS HOLE					1	
PORT	29-Jun-90						1	
PORT	30-Jun-90	WOODS HOLE	TRANSIT-	NAVY	B90-07		2	
DEP	02-Jul-90		SM-II & MB TEST:	SHOR- JOI		11		
ARR	13-Jul-90	REYKJAVIK					1	
PORT	14-Jul-90						0	
PORT	14-Jul-90	REYKJAVIK		VOGT/SHOR	B90-08		1	
DEP	15-Jul-90			SM-II,MB		30		
ARR	14-Aug-90	BERGEN					1	
PORT	15-Aug-90			NAVY (P)			1	
PORT	16-Aug-90	BERGEN		VOGT/SHOR	B90-09		2	
DEP	18-Aug-90			SM-II,MB		30		
ARR	17-Sep-90	BERGEN		(REM: HIG SM)			1	
PORT	18-Sep-90			NAVY (P)			1	

BERNIER Operating Schedule 1990 Date: 06-Apr-90

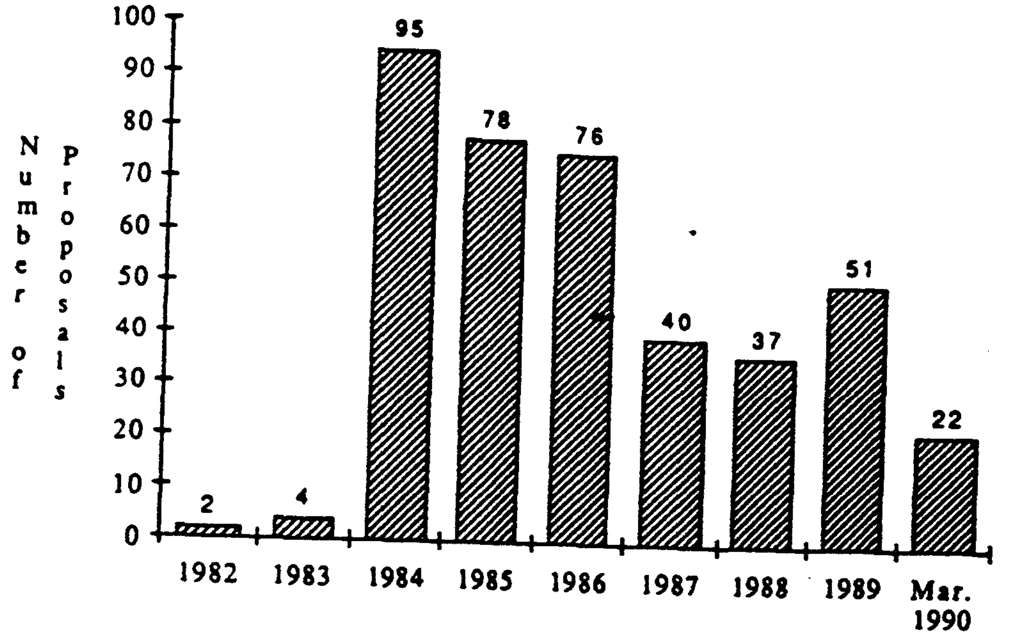
PORT	19-Sep-90	BERGEN	PARSON	B90-10		2	
DEP	21-Sep-90		MGG, MB		29		
ARR	20-Oct-90	AZORES				1	
PORT	21-Oct-90		NSF/UK			1	
PORT	22-Oct-90	AZORES	TRANSIT	B90-11		1	
DEP	23-Oct-90				10		
ARR	02-Nov-90	RECIFE	NAVY/NSF			1	
PORT	03-Nov-90					0	
PORT	03-Nov-90	RECIFE	CHERKIS	B90-12		1	
DEP	04-Nov-90		SCS, MB, DR		27		
ARR	01-Dec-90	RIO	NAVY (P)			1	
PORT	02-Dec-90					1	
PORT	03-Dec-90	RIO	FOX	B90-13		2	
DEP	05-Dec-90		MB,MGG		26		
AT SEA	31-Dec-90	AT SEA	NSF: FUNDED				
DEP	01-Jan-91		FOX	B90-13	12		
ARR	13-Jan-91	PUNTA ARENAS	MB,MGG			1	
PORT	14-Jan-91		NSF: FUNDED			1	
PORT	15-Jan-91	PUNTA ARENAS	DALZIEL	B91-01		2	
DEP	17-Jan-91		MCS		45		
ARR	03-Mar-91					1	
PORT	04-Mar-91	PUNTA ARENAS	DPP (F)			1	
PORT	05-Mar-91	PUNTA ARENAS	LARSON	B91-02		2	
DEP	07-Mar-91		GLORIA	(45+3)	48		
ARR	24-Apr-91		NSF: FUNDED			1	
PORT	25-Apr-91	VALPARAISO				1	
PORT	26-Apr-91	VALPARAISO	COCHRAN	B91-03		2	
DEP	28-Apr-91		MB, MGG		45		
ARR	12-Jun-91		NSF: FUNDED			1	
PORT	13-Jun-91	EASTER I. (?)				1	
		TOTAL DAYS			364	44	120

OPERATING DAYS BREAKDOWN: CALENDAR YEAR 1990

	TOTAL	NAVY	NSF	DPP	INDSTRY
SCIENCE	219	87	87	45	
S/DOWN	15		15		
TRANSIT	27	16	7	4	
PORT	46	19	23	4	
OP DAYS	307	122	132	53	0
YARD	91		91		
LAYUP	29		29		
TOTAL	427	122	252	53	0

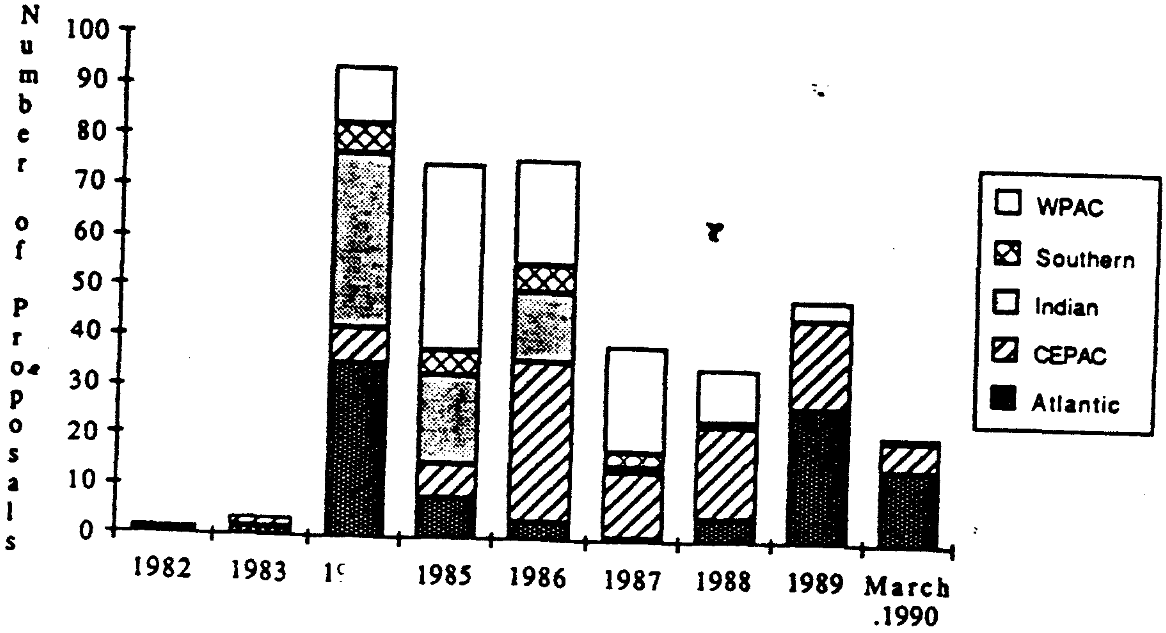
APPENDIX III

Proposals Received by the JOIDES Office,
1982 - April 1990



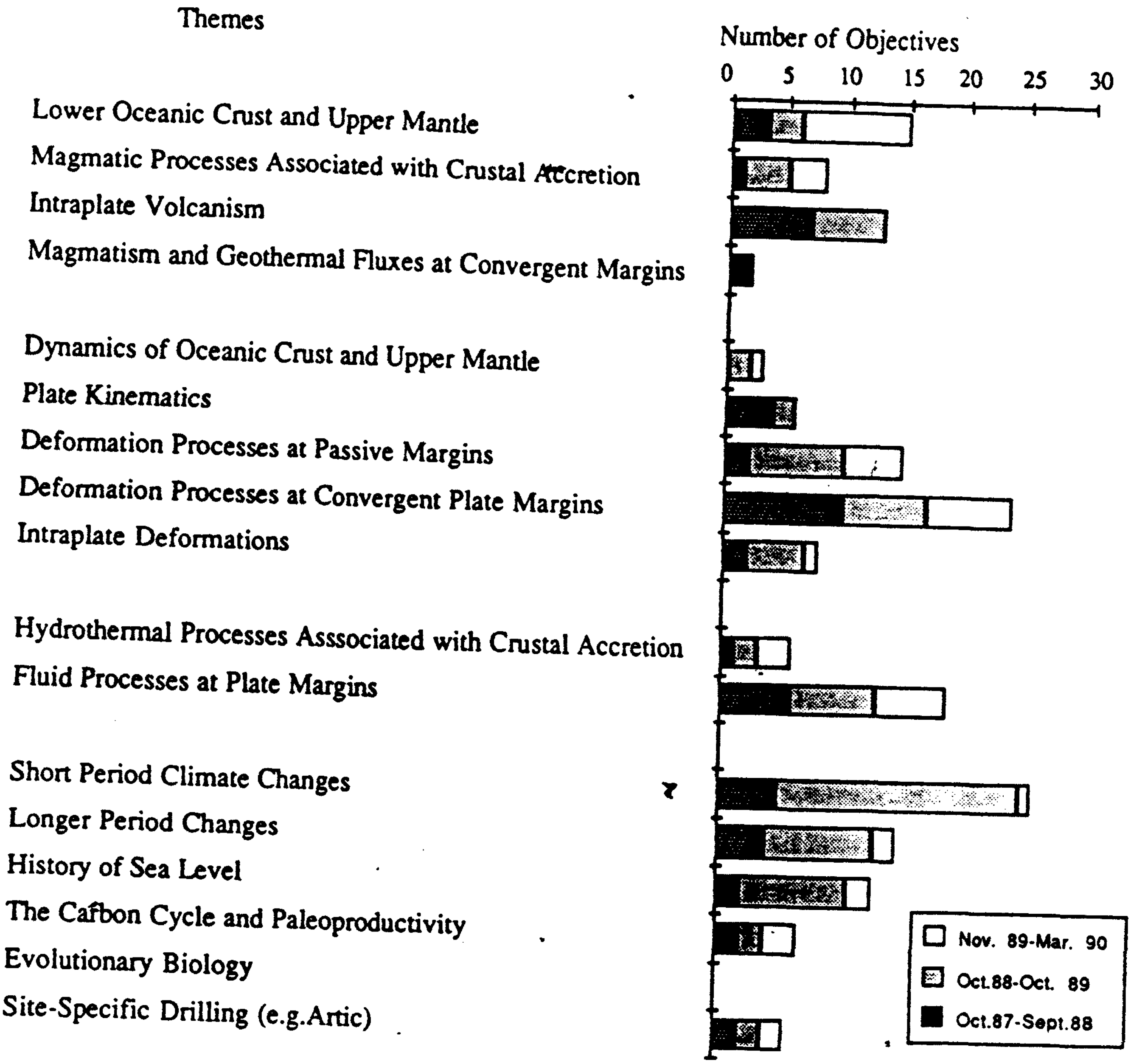
4 April 1990

Proposals vs Years and Oceans
1982 - March 1990



4 April 1990

OBJECTIVES OF RECENT PROPOSALS
(October 1987 to March 1990)
IN RELATION TO THEMES IN THE LONG RANGE PLAN



- 116 proposals have been received by the JOIDES Office from 1st October 1987 to 1st April 1990.

- A proposal can address more than one objective.

4 April 1990

APPENDIX [redacted] IV

Appendix IV

ODP OPERATIONS SCHEDULE

Leg	Port Dates	Sailing Date	Days at Sea	Terminates
129 - Old Pacific	Guam, 11/22-23(89)	11/24	56	Guam, 1/19(90)
130 - Ontong Java	Guam, 1/19-23	1/24	62	Guam, 3/27
131 - Nankai	Guam, 3/27-31	4/1	62	Pusan, 6/2
132 - Engineering II	Pusan, 6/2-6	6/7	59	Guam, 8/5
133 - NE Australia	Guam, 8/5-9	8/10	62	Brisbane, 10/11
134 - Vanuatu	Brisbane, 10/11-15	10/16	56	Suva, 12/11
135 - Lau Basin	Suva, 12/11-15	12/16	62	Papeete, 2/16(91)
136 - Engineering 3A*	Papeete, 2/16-20	2/21	37	Panama, 3/30
Engineering 3B*	Panama, 3/30-4/3	4/4	42	San Diego, 5/16
137 - Sed. Ridges 1	San Diego, 5/16-20	5/21	62	Victoria B.C., 7/22
138 - E. Equat. Pac.	Victoria, 7/22-26	7/27	60	Panama, 9/25
139 504B or EPR-1	Panama, 9/25-29	9/30	60	Panama, 11/29

DATES AND PORTS AFTER LEG 132 ARE TENTATIVE

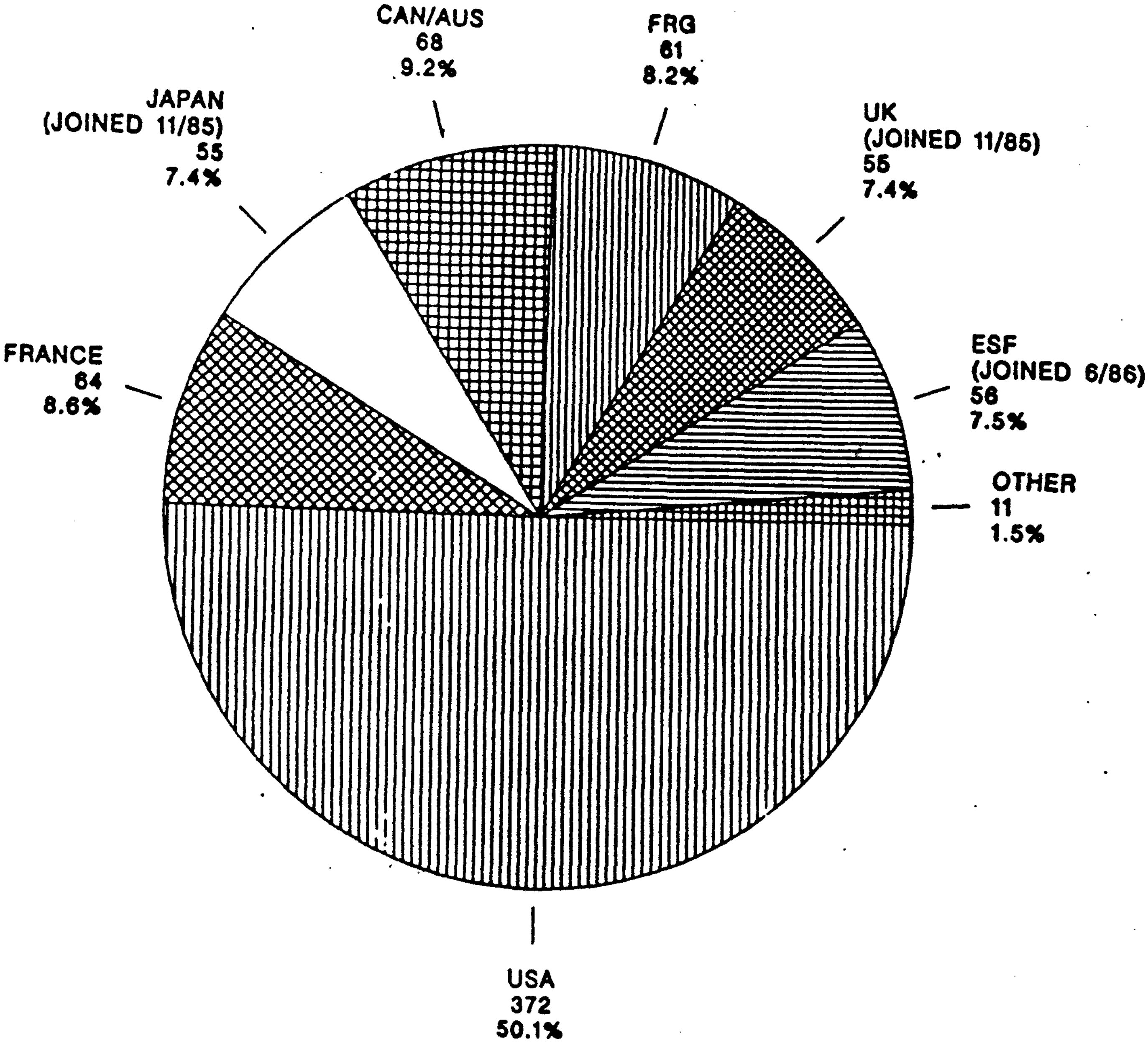
*3A - Hole 504B
*3B - East Pacific Rise

Revised 12/12/89

ndix IV

SHIPBOARD PARTICIPANT TALLY
LEGS 101 - 130

(January 1984 - March 1990)



TOTAL 742 PARTICIPANTS
(Does not include scientists on Leg 124E)

URVEY DATA SUMMARY : AREA:

TARGET SITE:	MV-7	ET-1	ET-2
latitude:	48°26.61N	41°00.0N	41°00.5N
longitude:	128°38.55W	127°29.5W	127°31.0W
region:	Juan de Fuca Ridge	Escanaba trough	Escanaba trough
Environment:	Ridge Crest	Ridge Crest	Ridge Crest
water depth:	2470	3270	3240
sed. thickness:	120	400-500	500-600
penetration:	120-170	100-500	100-500
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution	Yes	Yes	
(b) deep penetration	Yes	Yes	
3. MCS, including velocities	Lines 89-12 to 14 (144-ch)	24 channel	
4. Crossing Seismic Lines or Survey Grid	Yes, SCS only	Yes, MCS only	
5. Seismic Refraction	Yes	Yes	
6. 3.5 kHz	?	Yes	
7. Multi-beam Bathymetry	Yes	Yes	E
8. Side Scan Sonar a. Shallow Source	Sea Marc II	No	M
b. Deep Towed Source	Sea Marc I	No	A
9. Heat Flow	Yes	Yes but could use more	S
10. Magnetics and Gravity	Yes	Yes	
11. Coring	Yes	Yes	
12. Dredging	?	Yes	
13. Photography	?	Yes	
14. Current Meter (for bottom shear)	No	No	
Other	June 1990 Alvin	Alvin	Alvin

UPDATE:
Oct 1989

SITE SURVEY DATA SUMMARY : AREA:

TARGET SITE:	MV-4	MV-5	MV-6
latitude:	48°27.45N	48°27.15N	48°27.00N
longitude:	128°46.28W	128°41.58W	128°40.43W
region:	Juan de Fuca Ridge	Juan de Fuca Ridge	Juan de Fuca Ridge
Environment:	Ridge Crest/HT	Ridge Crest	Ridge Crest
water depth:	2480	2460	2470
sed. thickness:	520	250	200
penetration:	520-570	250-300	200-250
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution	Yes		
(b) deep penetration	Yes		
3. MCS, including velocities	89-12,13,14 lines (144 ch)		
4. Crossing Seismic Lines or Survey Grid	Yes SCS only		
5. Seismic Refraction	Yes		
6. 3.5 kHz	Yes		
7. Multi-beam Bathymetry	Yes	SAME	SAME
8. Side Scan Sonar a. Shallow Source	Sea Marc II		
b. Deep Towed Source	Sea Marc I		
9. Heat Flow	Yes		
10. Magnetics and Gravity	Yes		
11. Coring	No	No	No
12. Dredging	No	No	No
13. Photography	No	No	No
14. Current Meter (for bottom shear)	No	No	No

Other June 1990.
Alvin dive

UPDATE:
Oct 1989

SITE SURVEY DATA SUMMARY : AREA:

TARGET SITE:	MV-1	MV-2	MV-3
latitude:	48°27.33N	48°25.82N	48°26.63N
longitude:	128°42.51W	128°40.90W	128°42.65W
region:	Juan de Fuca Ridge	Juan de Fuca Ridge	Juan de Fuca Ridge
Environment:	Ridge Crest/HT	Ridge Crest/HT	Ridge Crest/HT
water depth:	2440	2480	2450
sed. thickness:	120	120	400
penetration:	50-170	75-170	400-500
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution	Yes		
(b) deep penetration	Yes		
3. MCS, including velocities	89-12,13,14 (144-ch)		
4. Crossing Seismic Lines or Survey Grid	Yes, SCS only		
5. Seismic Refraction	Yes		
6. 3.5 kHz	Yes		
7. Multi-beam Bathymetry	Yes	E	E
8. Side Scan Sonar a. Shallow Source	Sea Marc II	M	M
b. Deep Towed Source	Sea Marc I	A	A
9. Heat Flow	Yes	S	S
10. Magnetics and Gravity	Yes		
11. Coring	Yes	Yes	No
12. Dredging	No	No	No
13. Photography	Yes	Yes	No
14. Current Meter (for bottom shear)	No	No	No

Other

June 1990.
Alvin dive

UPDATE:
Oct 1989

SITE SURVEY DATA SUMMARY : AREA:

TARGET SITE:	VI-1	VI-2c	VI-2d
latitude:	49°09'N	48°13'N	48°16'N
longitude:	126°37'N	126°30'W	126°24'W
region:	Vancouver Margin	Vancouver Margin	Vancouver Margin
Environment:	Cascadia Basin	Frontal Fold .	Landward of Frontal Fold
water depth:	2500	2000	2100
sed. thickness:	2600	3000	3500
penetration:	1000	1500	1000
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution			
(b) deep penetration	digital SCS		
3. MCS, including velocities	1989-(144-ch) 85-01		
4. Crossing Seismic Lines or Survey Grid	Yes		
5. Seismic Refraction	Yes		
6. 3.5 kHz	?		
7. Multi-beam Bathymetry	Yes	SAME	SAME
8. Side Scan Sonar a. Shallow Source	Sea Marc II		
b. Deep Towed Source			
9. Heat Flow	Yes		
10. Magnetics and Gravity	Yes		
11. Coring	Yes		
12. Dredging			
13. Photography			
14. Current Meter (for bottom shear)			

Other

ROV or PISCES 1990
Electrical sounding MOSES

UPDATE:

SITE SURVEY DATA SUMMARY : AREA:

TARGET SITE:	VI-3	VI-4	
latitude:	48°19'N	48°23'N	
longitude:	126°17'W	126°10'W	
region:	Vancouver Margin	Vancouver Margin	
Environment:	Mid-slope plateau	Mid-slope plateau	
water depth:	1350	500	
sed. thickness:	˜6000	˜8000	
penetration:	1000	1000	
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution			
(b) deep penetration			
3. MCS, including velocities			
4. Crossing Seismic Lines or Survey Grid			
5. Seismic Refraction			
6. 3.5 kHz			
7. Multi-beam Bathymetry			
8. Side Scan Sonar a. Shallow Source	E	E	
b. Deep Towed Source	M	M	
9. Heat Flow	A	A	
10. Magnetics and Gravity	S	S	
11. Coring			
12. Dredging			
13. Photography			
14. Current Meter (for bottom shear)			

UPDATE:

SITE SURVEY DATA SUMMARY : AREA:

TARGET SITE:	OR-1	OR-2	OR-3
latitude:	44°40'N	44°36.6'N	44°38.63'N
longitude:	125°34.85'W	125°23.0'W	125°19.72'W
region:	Central Oregon Margin	Central Oregon Margin	Central Oregon Margin
Environment:	Astoria Fan	Astoria Fan	Marginal Ridge
water depth:	2850M	2830	2610
sed. thickness:	3400M	3800	~2000
penetration:	1000	500	500
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution			
(b) deep penetration	Yes		
3. MCS, including velocities	1989 (144-ch)		
4. Crossing Seismic Lines or Survey Grid	Yes		
5. Seismic Refraction	Yes (Trehn, 1989)		
6. 3.5 kHz	Yes but limited to Sea Marc Ia lines		
7. Multi-beam Bathymetry	Yes	SAME	SAME
8. Side Scan Sonar a. Shallow Source	USGS GLORIA		
b. Deep Towed Source	Sea Marc IA		
9. Heat Flow	Yes		
10. Magnetics and Gravity	Yes		
11. Coring	Yes		
12. Dredging			
13. Photography			
14. Current Meter (for bottom shear)			
Other	Alvin dives 1984,87,88		

UPDATE:
Oct 1989

SITE SURVEY DATA SUMMARY : AREA:

TARGET SITE:	OR-3A	OR-4	OR-4A
latitude:	44°41.50'N	44°40.45'N	44°40.65'N
longitude:	125°19.25'W	125°17.45'W	125°16.08'W
region:	Central Oregon Margin	Central Oregon Margin	Central Oregon Margin
Environment:	Marginal Ridge	Marginal Ridge	Slope Basin
water depth:	2720	2075	2275
sed. thickness:	~2000	~2000	~2000
penetration:	500	500	500
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution	deep-tow air and watergun (B.Lewis)		
(b) deep penetration	Yes		
3. MCS, including velocities	1989-144ch WO76-4 (24ch)		
4. Crossing Seismic Lines or Survey Grid	Yes		
5. Seismic Refraction	Yes (Trehn, 1989)		
6. 3.5 kHz	Yes but limited to Sea Marc Ia lines		
7. Multi-beam Bathymetry	Yes	SAME	SAME
8. Side Scan Sonar a. Shallow Source	USGS Gloria		
b. Deep Towed Source	Sea Marc Ia		
9. Heat Flow	Yes		
10. Magnetics and Gravity	Yes		
11. Coring	Yes		
12. Dredging			
13. Photography			
14. Current Meter (for bottom shear)			

Other — Alvin 1984,1987 dives 1988

UPDATE:
Oct 1989

SITE SURVEY DATA SUMMARY : AREA:

TARGET SITE	OR-5	OR-6	OR-7
latitude:	44°38.63'N	44°35.05'N	44°40.50'N
longitude:	125°10.30'N	125°10.30'W	125°02.70'W
region:	Cen. Oregon Margin	Cen. Oregon Margin	Cen. Oregon Margin
Environment:	Second Ridge	Middle Slope Prism	Middle Slope Prism
water depth:	2055	1060	1050
sed. thickness:	~2000	~2500	~1500
penetration:	600	700	500
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution			unihoom SCS
(b) deep penetration	Yes		Yes
3. MCS, including velocities	1989-(144-ch)		1989-(144-ch) WO76-4 (24-ch)
4. Crossing Seismic Lines or Survey Grid	Yes		
5. Seismic Refraction	Yes (Trehn, 1989)		
6. 3.5 kHz	Yes but limited to Sea Marc Ia		
7. Multi-beam Bathymetry	Yes	E	
8. Side Scan Sonar a. Shallow Source	Gloria USGS	M	
b. Deep Towed Source	Sea Marc Ia	A	E
9. Heat Flow	Yes	S	M
10. Magnetics and Gravity	Yes		A
11. Coring	Yes		S
12. Dredging			
13. Photography			
14. Current Meter (for bottom shear)			
Other	Alvin dives 1984,87,88	None	None

UPDATE:
Oct 1989

DATA SUMMARY : AREA:

TARGET SITE:	OR-8	OR-9	OR-10
latitude:	45°04.83'N	45°03.0'N	45°11.9'N
longitude:	125°24.94'W	125°29.65'W	125°32.2'W
region:	Cen. Oregon Margin	Cen. Oregon Margin	Cen. Oregon Margin
Environment:	Thrust Ramp	Thrust Ramp	Mud Volcano
water depth:	2240	2720	2510
sed. thickness:	3600	3800	3000
penetration:	500	600	400
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution	Deep towed seismics		
(b) deep penetration	Yes		
3. MCS, including velocities	1989-(144-ch)		
4. Crossing Seismic Lines or Survey Grid	Yes		
5. Seismic Refraction			
6. 3.5 kHz	Yes but limited to Sea Marc Ia profiles		
7. Multi-beam Bathymetry	Yes	SAME	SAME
8. Side Scan Sonar a. Shallow Source	Gloria USGS		
b. Deep Towed Source	Sea Marc Ia		
9. Heat Flow	Yes 1983-84		
10. Magnetics and Gravity	Yes		
11. Coring	Yes		
12. Dredging			
13. Photography			
14. Current Meter (for bottom shear)			
Other	Alvin dives 1984	Alvin 1984	Alvin 1988

UPDATE:

Oct 1989

SITE SURVEY DATA SUMMARY : AREA:

TARGET SITE:	OR-10A		
latitude:	45°11.9'N		
longitude:	125°32.2'W		
region:	Cen. Oregon Margin		
Environment:	Abyssal Plain		
water depth:	2645		
sed. thickness:	3800		
penetration:	500		
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution	deep-tow seismics		
(b) deep penetration	Yes		
3. MCS, including velocities	1989-(144-ch)		
4. Crossing Seismic Lines or Survey Grid	Yes		
5. Seismic Refraction			
6. 3.5 kHz	Yes but limited to SeaMarc Ia profiles		
7. Multi-beam Bathymetry	Yes		
8. Side Scan Sonar a. Shallow Source	Gloria USGS		
b. Deep Towed Source	Sea Marc Ia		
9. Heat Flow	Yes		
10. Magnetics and Gravity	Yes		
11. Coring			
12. Dredging			
13. Photography			
14. Current Meter (for bottom shear)			

UPDATE:

SITE SURVEY DATA SUMMARY : AREA: Mid Pac Guyots page 1/2

Proposal 203 Rev - Winterer

TARGET SITE:	Allison A	"HUEVO" A	"HUEVO" B
latitude: longitude: region:	18 27 N 179 32 W S. Mid Pacs	21 19N 174 18 E W. Mid Pacs	21 22N 174 18 E W. Mid Pacs
Environment: water depth, m: sed. thickness, m: penetration, m:	G 1440 >750 750	G 1365 800 1000	G 1370 >300 250-300
TECHNIQUE:			
1. Single-Channel Seismic (a) high resolution	SIO,LEG 10'88 1971, SIO Aries V	Roundabout SIO,LEG 10'88 DSDP S.463	Roundabout SIO,LEG 10'88 DSDP S.463
(b) deep penetration	DESIRABLE	DESIRABLE	DESIRABLE
3. MCS, including velocities	DESIRABLE	DESIRABLE	DESIRABLE
4. Crossing Seismic Lines or Survey Grid	SIO,LEG 10'88	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88
5. Seismic Refraction	DESIRABLE	DESIRABLE	DESIRABLE
6. 3.5 kHz	SIO,LEG 10'88	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88
7. Multi-beam Bathymetry	SEABEAM SIO,LEG 10'88	SEABEAM Roundabout SIO,LEG 10'88	SEABEAM Roundabout SIO,LEG 10'88
8. Side Scan Sonar a. Shallow Source	DESIRABLE	DESIRABLE	DESIRABLE
b. Deep Towed Source	-	-	-
9. Heat Flow	DESIRABLE	DESIRABLE	DESIRABLE
10. Magnetics and Gravity	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88
11. Coring	-	-	-
12. Dredging	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88
13. Photography	DESIRABLE	DESIRABLE	DESIRABLE
14. Current Meter (for bottom shear)	DESIRABLE	DESIRABLE	DESIRABLE

UPDATE: 4/5/90 FKD

SITE SURVEY DATA SUMMARY : AREA: Mid Pac Guyots page 2/2

Proposal 203 Rev - Winterer

TARGET SITE:	"M.I.T." 1	"CAPRINA" A	"CAPRINA" B	"CHAS JOHNSON" A
latitude:	27.2 N	20 02.5 N	20 02.5 N	32 01 N
longitude:	152.8 E	173 32 E	178 30.5 E	148 16 E
region:	W. CPAC	W. Mid Pacs	W. Mid Pacs	Japanese Group
Environment:	G	G	G	G
water depth, m:	1330	1610	1600	1800
sed. thickness, m:	>900	>150	>300	150
penetration, m:	300	150	300	250
TECHNIQUE:				
1. Single-Channel Seismic (a) high resolution	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88 Aries Leg 5
(b) deep penetration	DESIRABLE	DESIRABLE	DESIRABLE	DESIRABLE
3. MCS, including velocities	DESIRABLE	DESIRABLE	DESIRABLE	DESIRABLE
4. Crossing Seismic Lines or Survey Grid	SIO,LEG 10'88	SIO,LEG 10'88	SIO,LEG 10'88	SIO,LEG 10'88
5. Seismic Refraction	DESIRABLE	DESIRABLE	DESIRABLE	DESIRABLE
6. 3.5 kHz	SIO,LEG 10'88	SIO,LEG 10'88	SIO,LEG 10'88	SIO,LEG 10'88
7. Multi-beam Bathymetry	SEABEAM Roundabout SIO,LEG 10'88	SEABEAM Roundabout SIO,LEG 10'88	SEABEAM Roundabout SIO,LEG 10'88	SEABEAM SIO,LEG 10'88 SASS
8. Side Scan Sonar a. Shallow Source	DESIRABLE	DESIRABLE	DESIRABLE	DESIRABLE
b. Deep Towed Source	-	-	-	-
9. Heat Flow	DESIRABLE	DESIRABLE	DESIRABLE	DESIRABLE
10. Magnetics and Gravity	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88
11. Coring	-	-	-	-
12. Dredging	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88	Roundabout SIO,LEG 10'88
13. Photography	DESIRABLE	DESIRABLE	DESIRABLE	DESIRABLE
14. Current Meter (for bottom shear)	DESIRABLE	DESIRABLE	DESIRABLE	DESIRABLE

UPDATE: 4/5/90 FKD

UNITED STATES GEOLOGICAL SURVEY

MEMORANDUM

April 10, 1990

TO: Site Survey Panel

FROM: Dave Scholl

SUBJECT: Comments concerning proposed NW Pacific and Bering Sea Drilling Sites

DETROIT SEAMOUNT AREA

Three drilling sites, DT-1A, DT-2A, and DT-3A have been recommend for the Detroit Seamount region (see 3rd CEPAC prospectus). One site is to be positions on the broad and relatively flat crest of the seamount, the other two at increasing depths along the edifice's northern flank. Paleoceanographic information is sought at all sites, but, if basement rock is reached and penetrated to some depth, the crestal site, DT-1A, can provide important tectonic information concerning the geographic stability of the Hawaiian hotspot

Proposed site DT-3A has been position (52 27N/168 22E at 3855 m) along seismic line 43 collected in 1987 by the *R/V Farnella* (F287AA/USGS). But, as far as I can tell, proposed sites DT-2A and DT-1A, are based on piston core stations occupied by the *R/V T. Washington* in 1988, rather than seismic profile data.

Fortuitously, the coordinates for DT-1A (41 17.8N/167 39.9E at 2364 m) and DT-2A (51 04.6N/ 167 59.1E at 3160 m) selected by Lloyd Keigwin fall relatively close to *Farnella* seismic lines 41 and 43. Based on these lines, neither one of these sites would optimize the collection of the paleoceanographic or tectonic information desired, in particular at the proposed crestal DT-1A site.

Suggested alternate locations for these two sites are indicated on the *Farnella* seismic lines that have been submitted to SSP via Carl Brenner . However, for the purpose of optimally locating each of the three Detroit sites, the best procedure to follow is to bring together for joint inspection the separate *Washington* and *Farnella* seismic data sets.

SHIRSHOV RIDGE

Paleoceanographic and basement objectives are sought at a proposed Shirshov Ridge site(s), Bering Sea (see 3 rd CEPAC prospectus. The general site location is along the ridge's crestal region in relative shallow water (1100-700 m), where, it is thought (based on surface cores) that calcareous material will be preserved along with an abundant siliceous taxa. Relatively thick sequences (500-1,000 m) of diatomaceous debris has accumulate over the crest of the ridge, and in particular within a longitudinal half-graben. This structure is thought to have formed in early Neogene time as a consequence of rifting and the formation of the modern Komandorsky Basin west of Shirshov Ridge. Basin formation seems to have been rapid and accompanied by sediment infilling, which has since largely buried the basement relief of the ridge's crestal-region. The higher parts of the ridge crest exhibit planation surfaces, presumably documenting by wave-base erosion, as deeply submerged as 1,500-2,000 m. It therefore seems likely that the basin fill along the crest of Shirshov Ridge accumulated in relatively shallow water, possibly shallower but not significantly deeper than the present sea floor.

A provisionally located site (SH-1, 57 28N/170 32E at 1050 m) has been selected along a single-channel reflection line collected in 1970 from the *R/V Bartlett* (USGS). But a great deal more data to guide site selection is available from Soviet sources, including multichannel reflection profiles. Two sites have been recommended by Yuri Neprochnov, but accompanying seismic data, which have been promised, have yet to be received (see attached Telex). The two sites, SSH-1 (58 06N/170 30E at 700 m) and SSH-2 (58 18N/170 16E at 500 m), plot close to some of the *Bartlett* lines (see submitted navigation plot for Shirshov region). Based on these profiles, these sites would appear to be adequate for basement targets but less than ideal for the recovery of Neogene paleoceanographic information.

It is recommended that we await the arrival of the Soviet profiles before locating the proposed Shirshov site(s).

SOUNDER RIDGE

At the Hilo and Menlo Park SSP meetings, questions with respect to achieving scientific objectives and safe drilling conditions arose concerning the Sounder ridge drilling site. Sounder ridge is a nearly completely buried seamount, or basement structural high, located beneath the deep-sea floor of the Aleutian Basin, Bering Sea *(Site SR-1 at 58° 28.8'N, 178° 50.9'E; water depth 3,745 m; sediment column to penetrate to basement 800-1,000 m; see submitted data)*.

Drilling at Site SR-1 has been proposed to gather high-latitude paleoceanographic data from Neogene and Paleogene deposits, and potentially from older beds of Cretaceous age. Desired information bearing on the paleoclimatology of this region, including the Cenozoic history of the northern part of the Subarctic Gyre, which flows through the Aleutian Basin, can be gathered by sampling a 800-1,000-m-thick blanket of terrigenous and pelagic deposits overlying the basement summit of Sounder ridge. This same information, in particular if basement is reached and sampled, has the potential of testing the notion that the Aleutian Basin, which occupies a backarc setting relative to the Aleutian Arc, was formed as the consequence of the early Eocene capture of an oceanic fragment of the former Kula (?) plate. Concepts concerning the evolution of the northern rim of the Pacific basin are linked to this test, including processes by which regional deformation of continental crust is effected and terranes of crustal rock added to, and transported along, convergent ocean margins.

Sounder ridge is a 2-3-km high basement high that is nearly completely buried by basin floor deposits. As much as 4 km of dominantly terrigenous deposits bury the flanks of the ridge, but its crestal region is covered by a slightly undulating sequence of what is presumed to be more richly pelagic and hemipelagic beds only 800-1,000 m thick. The undulations are thought to be depositional synforms and antiforms reflecting the draping and post-depositional differential compaction of pelagic and hemipelagic beds over an uneven ridge summit. The likelihood that some deformation of the core occurred as sediment accumulated above it cannot be entirely ruled out, but the lack of evidence within the overlying sedimentary section of crestal and flank unconformities and faulted, disrupted, and shouldered-aside masses imply that the core is not a diapiric body but fundamentally a depositionally buried basement mass. Bathymetric relief in the past is suggested by the occurrence of deeply buried "moots", arguable signifying current concentration around the then (early Neogene?) bathymetric base of the ridge

Sounder's basement core rises above a regional framework of igneous oceanic crustal rocks. The core is associated with a magnetic anomaly but also a slight gravity low; the core is thus possibly a serpentinite mass. Sounder ridge trends east-west and appears to lie along a "fracture zone" that disrupts a north-trending pattern of magnetic anomalies. The age of this spreading pattern, although under study, remains unknown. Based on the oldest age of basin-filling sediment that can be correlated to sampled sections exposed along the margins of the basin, the anomalies are older than about middle Eocene. They are therefore either of early Cretaceous M-series age, or late Cretaceous to early Tertiary in age. The Sounder edifices is possibly roughly age-equivalent to the anomaly pattern. But Sounder may be part of a northeast-trending track of slightly elevated basement relief that is possibly linked to an early Eocene episode of backarc spreading. If the basement core of Sounder ridge is older than about 50-55 Ma (age of the Aleutian Ridge), then the buried seamount formed south of the Bering Sea region. Magnetic studies underway may help determine if this scenario is the correct one.

Regardless of the exact age of Sounder ridge, existing information supports the notion that sedimentary deposits of at least Eocene and younger age should overlies it formed basement core. The upper part of the burial sequence should be a mixture of pelagic and fine-grained terrigenous (turbidites are likely) units. With subsurface depth the section should become increasingly dominated by pelagic units.

Information exists--for example the widespread occurrence of VAMPs (velocity-amplitude anomalies, which are deep-water bright spots) that gas has locally pooled within the sedimentary sequence of the Aleutian Basin. Organic source beds are thought to occur at depth. Deposition of source beds may have in particular taken place in early and middle Miocene time when the basin was possibly more poorly ventilated then now.

Potential source beds would be relatively thin over the broad crest of the Sounder ridge. But, conceivably, petroleum fluids generated in the surrounding off-ridge section could migrate up-dip to reach the summit of the ridge. Although it seems likely that the thin section cresting the ridge is vented, the occurrence of sealing units cannot be dismissed. On seismic records, seals related to gas hydrates or diagenetic facies of siliceous beds are not exhibited. But reflection evidence suggest that a siliceous BSR (quartzose-facies ?) abutting the deeper flanks of the ridge may have been sealed paths of upward migrating fluid.

To minimize the likelihood that pressured hydrocarbons will be encountered within the relatively thin burial section, Site SR-1 (and an alternate site, SR-1A) has been situated over a synformal structure occupying a basement swale. This location also provides an opportunity to drill through the most complete section capping the ridge. Efforts are presently underway to complete a series of structural contour maps to help insure that the selected drilling sites are not associated with a closure. Prudent drilling practices should adequately allow for the safe drilling and recovery of subsurface rock samples at Sounder ridge.

UMNAK PLATEAU

ODP drilling at Umnak Plateau is intended to provide Neogene paleoceanographic information. The summit of the plateau, approximately 1950 m, is underlain by a nearly flatlying sequence of richly diatomaceous sediment. At a depth near 600, possibly as deep as 800 m, a BSR related to the diagenesis of opaline silica occurs. The age of the sediment at the boundary will probably be somewhat below the top of the Miocene. ODP site UM-1 was selected at the crossing point of two multichannel profiles (L680BS lines 2 and 5). At the intersection point the BSR appears to be relatively deep. Based on a depth-converted 24-fold profile (using interval velocities extracted from RMS values), the BSR could be as deep as 1,000 m.

Judging from DSDP drilling on Leg 19, diatomaceous units below the BSR will be much less abundant than above this horizon. But limestone units containing a well-preserved taxa may well be encountered, and additional paleoceanographic data acquired of middle and perhaps lower Miocene age.

APPENDIX IX

August 1988

Survey Requirements for Drill Sites in Fracture Zones (and possibly other Bare Rock Environments): ODP Leg 118 Experience

by R. P. Von Herzen

Fracture zones (FZ's, including transforms) are regions where many objectives of ocean crustal drilling may be more readily achieved than in any other tectonic environments. By their very nature, as now understood, FZ's include large vertical displacements (several km) of juxtaposed crust. Furthermore, the crustal thickness near FZ's may be attenuated compared to normal ocean crust, or even non-existent. As a result of these tectonic and structural characteristics, practically the entire section of ocean crustal and upper mantle rocks may be accessible in FZ's near the sea floor, and indeed, such a wide range of rock types have been dredged from many FZ's. Therefore, if the structural relationships of rock types in FZ's are properly deciphered, they offer the opportunity of drilling and sampling a complete section of crustal and upper mantle rocks at relatively shallow depths beneath the sea floor.

On the other hand, drilling in FZ's presents several difficulties and challenges. First, as mentioned above, any section recovered by drilling needs to be placed in a pre-tectonic structural framework, i.e., one in which the rock sequences were originally emplaced, before subsequent displacements. This may require rather complete geological and geophysical surveying in and around particular FZ's of interest. Second, as a result of their structure complexity, FZ's presents formidable technical obstacles to drilling. One major difficulty is the high amplitude topography, with associated steep slopes, created by large vertical offsets of juxtaposed crustal blocks, frequently accompanied by ubiquitous rubble as a result of mass wasting and "weathering" of such slopes. In particular the steep slopes may prevent deployment of a guide base required to start a bare rock hole, and unconsolidated rubble is difficult to drill even in ideal conditions since it tends to collapse around and jam the drill pipe.

All of these drilling opportunities and problems are particularly emphasized in the prominent FZ's of the Southwestern Indian Ridge (SWIR) where Leg 118 took place. The site survey included nearly continuous coverage of the 210 km long offset Atlantis-II transform with SeaBeam depth sounding, including the high amplitude (6 km) transform walls, and about 40 dredge hauls with a wide variety of basic and, especially, ultrabasic rocks. Although these data and samples were essential to establish a basic tectonic framework of the transform, unfortunately the survey was not sufficiently detailed to enable drill sites to be selected in advance of arrival of the drill ship. Therefore most of the detailed surveying for suitable drill sites were accomplished with the drill ship itself, primarily utilizing, first, a TV camera, then test spud-ins with a special turbine rotary drill motor (PDCM) or the standard rotary drill pipe.

On Leg 118, approximately 23 days of drill ship time, almost half the total leg time, was used in such surveys (25 Oct.-17 Nov. 1987) before a suitable site was found (735B) for deployment of the bare rock guide base. These include 4 extensive TV surveys at 4 sites (732-735, inclusive), and 18 test holes to test drilling conditions and to sample the near-surface rock. Although the TV surveys showed a number of regions with massive, apparently in-place, rock outcrop, the exposures were frequently on steep slopes (i.e., cliffs, or canyon walls) where test spud-ins could not be conducted, and in any case would have to be started at least in some softer material to protect the integrity of the drill string. The scenario usually followed was to attempt spud-ins in sediments or rubble up-slope from promising rock outcrops observed with the TV surveys, in hopes of eventually penetrating down to the solid material appearing in outcrop to establish a deep hole in mafic or ultramafic rock.

Unfortunately, this strategy was frustrated by either or both of two factors: (1) the rubble could not be penetrated by the test spud-in, and (2) samples of clearly in-situ rock were difficult to obtain with the tools used. On very steep slopes (greater than 40°), the drill bit tended to "walk" downslope before a spud-in could be established. Frequently the rubble caused jamming of the drill pipe after penetrating 10-20 m or less, and caused collapse and filling of the hole drilled during pauses in drilling, such as attempts to recover cores. In some locations, house-size boulders were part of the rubble, making it impossible to determine if any solid material being drilled was really in-place. Although the PDCM is an excellent tool for starting a hole with an unsupported drill string, its capability to recover samples appears to need improvement. Apparently part of the flow to drive the motor is diverted to the region where the core is being cut, causing all but the most competent material to be washed away. On Leg 118 this tool recovered only solid gabbro where it was drilled; softer in-situ material, perhaps even (serpentinized) peridotite (as deduced from rubble and dredge hauls recovered nearby), was never retrieved. A hole in ultrabasic rock was one of our major objectives, and it seems possible that such a hole could have been established at several of the sites attempted with use of the guide base. But without recovery of clearly in-situ rock on either the site survey cruise or with test spud-ins, we felt that we could not risk the large commitment associated with deployment of the guide base.

The TV survey tool, although somewhat awkward and very costly to use as a survey tool with the drill ship, provides extremely useful visual information for drill site selection in FZ's. Bare rock is certainly distinguishable from rubble, and in many (not all) instances it is possible to determine if the bare rock is in place (from consistency in orientation of bedding, foliation, and/or other lineations). The primary deficiency in the TV data for purposes of selecting drill sites is knowledge of rock type. For example, the petrologists aboard for Leg 118 had considerable discussion, without agreement, about the type of rock appearing in the outcrops during the TV surveys for site 735, before it was decided to deploy the guidebase. Some were convinced it was peridotite, others thought it appeared more like gabbro (which it was).

Therefore a sampling capability which can be coordinated precisely with TV surveys seems essential for selection of FZ drill sites. Dredges are useful to determine general petrology for km-sized regions, especially up-slope rock types, but it is unlikely that a significant fraction of dredged material is ever recovered from solid outcrops. Ideally, a tool could be developed to break off or drill rock samples under control of a TV visualization system, so that rock types could be correlated with the high quality TV images. I understand that the ARGO/JASON system under development may have such a capability, although it may also be possible to develop less complex and costly systems for the particular survey requirements of drilling in FZ's. An edited video tape of the Leg 118 surveys was/is being assembled at ODP (A. Adamson) which may be representative of terrain to be found in other slow spreading rate transforms.

In addition to a coordinated visualization survey and sampling capability, a small-scale (0.1 to 1 km) seismic survey capability would also be very useful to determine seismic velocities and structure to modest drilling depths. Such surveys could perhaps provide information on rock types and drilling conditions over these depths. It is my understanding that a key element in such surveys which has been lacking until recently is a deep seismic source, but that recent progress has been made. Although such surveys may not be routine, at least for the next few years, their deployment at promising sites should be considered seriously among the survey requirements in fracture zones.

30 March 1990

FRACTURE ZONE SURVEYS -- POSSIBLE TECHNIQUES

BATHYMETRY.

Multi-, narrow beam, with profiles parallel to grain.

SIDE-SCAN SONAR.

Surface (e.g., SeaMARC II). Medium-scale tectonics, rock outcrop distribution.

Near-bottom (e.g., SeaMARC I). Small-scale " "

SEISMICS.

Reflection profiling. Diffractions from steep topography.

SCS. Sediment/basement configuration.

MCS. Basement structure, velocity.

Refraction, wide-angle reflection (sonobuoys, OBS, 2-ship). Deep structure and velocity, limited by topographically-induced "noise".

*Near-bottom source, receivers. Shallow (10's to 100's m) structure.

Passive listening (OBS) for earthquakes.

GRAVITY.

Mass anomalies, inferred rock types.

MAGNETICS.

Surface. Magnetic anomaly sequence.

Near-bottom. Magnetization, inferred rock types.

HEAT FLOW.

Severely affected by rock outcrops, hydrothermal circulation.

ROCK SAMPLING.

Dredging. General rock type (rubble, erratics sampled, not outcrops).

Drilling (small). Horizontal outcrop sampling.

*Percussion or chip samplers (with TV control).

PHOTOGRAPHY.

Near-bottom: Detailed visualization.

*50 to 100 m height: Acre (hectare) visualization.

TV.

Real-time detailed visualization.

SUBMERSIBLE.

Special small-scale sampling and experiments in topographically awkward situations.