Approved Minutes
of the
JOIDES Planning Committee
Annual Meeting

held at the Ocean Drilling Program, Texas A&M University,
College Station, Texas, December 1994

PCOM ANNUAL MEETING 1994 PARTICIPANT LIST

Planning Committee - PCOM

R J Arculus	Australian National University, Canberra, Aus- Can Consortium
W H Berger	University of California, San Diego, Scripps Institution of Oceanography
H J B Dick	Woods Hole Oceanographic Institution
J P Fox	University of Rhode Island, Graduate School of Oceanography
R B Kidd	University of Wales, Cardiff, United Kingdom
H Kudrass	Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover, Germany
M G Langseth	Columbia University, Lamont-Doherty Earth Observatory
H-C Larsen	Geological Survey of Greenland, Copenhagen, ESF Consortium
B T R Lewis	School of Ocean Sciences, University of Washington
C Mével	Université Pierre et Marie Curie, Paris, France
A C Mix	Oregon State University, College of Oceanography
J H Natland	University of Miami, Rosenstiel School of Marine and Atmospheric Sciences
W W Sager	Texas A&M University, College of Geosciences
T H Shipley	University of Texas at Austin, Institute for Geophysics
K Suyehiro	Ocean Research Institute, Tokyo, Japan
B Taylor	University of Hawaii, School of Ocean and Earth Science and Technology

Liaisons

T J G Francis	Science Operator (ODP-TAMU)
D Goldberg	Wireline Logging Services (ODP-LDEO)
B Malfait	National Science Foundation
D Falvey	Joint Oceanographic Institutions, Inc.

Guests and Observers

J A Pearce	University of Durham, United Kingdom.
S D Scott	University of Toronto, Aus-Can Consortium.
T S Loutit	Australian Geological Survey, Canberra
P P E Weaver	Institute of Oceanographic Sciences Deacon Laboratory, United Kingdom, Co-Chief Leg 157.
D J Miller	ODP-TAMU, Staff Scientist Leg 158.
P K H Harvey	ODP-BRG, University of Leicester
J Knauss	PEC - IV Chair
M Sarnthein	PEC - IV
P Worthington	PEC - IV
J Allen	ODP-TAMU
J Baldauf	OD-TAMU

Panel Chairs

M M Ball	PPSP	Petroleum Geology Branch, USGS, Denver
S H Bloomer	LITHP	Department of Geology, Boston University
M L Delaney	OHP	Univ. of California, Santa Cruz
P Fryer	IHP	Univ. of Hawaii, Sch. of Ocean and Earth Science and Tech.
J M Gieskes	SMP	Univ. of California, Scripps Institution of Oceanography
W W Hay	SGPP	GEOMAR, Kiel
K. A. Kastens	SSP	Lamont-Dohert Earth Observatory, Columbia University
P Lysne	DMP	Sandia National Laboratories, Albuquerque
A H F Robertson	TECP	University of Edinburgh, Edinburgh
F E Shanks	TEDCOM	Mobil Exploration and Production Services Inc., Dallas

JOIDES Office

K K Ellins	Executive Assistant and US Liaison
C L Jacobs	Science Co-ordinator

SUMMARY OF MOTIONS AND CONSENSUS STATEMENTS

AGENDA

PCOM Motion 94-3-1

PCOM approves the agenda for the 1994 annual meeting with the above provisos.

Vote *16 For, 0 Against*

MINUTES

PCOM Motion 94-3-2

PCOM approves the revised draft minutes of the August 1994 PCOM, subject to the above corrections.

Vote *16 For, 0 Against*

GLOBAL SCIENCE PROGRAMMES

PCOM Recommendation 94-3-3

In view of Russia's unique capabilities and interest in the Arctic, PCOM recommends to EXCOM that high priority be given to identifying a process that will lead to Russia being re-associated with the ODP.

Vote *15 For, 1 Abstention*

PCOM Endorsement 94-3-4

PCOM endorses the PCOM Chair to invite Dr. Jean Boissonas, Director of the European Union Marine Science and Technology (MAST) programmes, to attend the next PCOM meeting to present the Geoscience aspects of the MAST programme in order to increase communication between European Union marine science programmes and ODP.

BUDGET ITEMS

PCOM Consensus 94-3-5

PCOM reaffirms continued support for the replacement of the computer-based data management system and continued development of the DCS if judged feasible (see motion 94-3-7).

PCOM Motion 94-3-6

PCOM offers the following prioritisation for BCOM with respect to budget cuts required by flat funding of $44.9M for FY96, 97 and 98 as identified by NSF.

1. Publications;
2. Technical Support: Reduce the technical staff on the ship by one per leg (2 FTE) or equivalent shore-based technical support;
3. Engineering Development;
4. To the extent possible, support certain experiments and certain special logs with non-commingled funds;
5. Reduce funds set aside for "Special Operating Expenses" from 4% to 3% of the annual budget.

In addition, new approaches to "project management" should be considered to identify special operating expenditures in advance and thus provide tighter control on costs.

Vote *14 For, 2 Abstain*

PCOM Consensus 94-3-7

If feasibility of the secondary heave compensation system is proven at the end of Phase II of the DCS development, then PCOM recommends that ODP-TAMU proceed to Phase III and Phase IV (land tests) at a pace consistent with budgetary constraints.

Vote *14 For, 2 Absent*

PCOM Recommendation 94-3-8

PCOM recommend to JOI Inc. that they reaffirm and/or refine the mandate of the Data Base Management Steering Committee and that JOI Inc. take steps to ensure that the Steering Committee is incorporated into the DBMS structure according to this mandate.

Vote *15 For, 1 Absent*

DATA INTEGRATION WORKING GROUP

PCOM Consensus 94-3-9

PCOM will establish a Data Integration Working Group to continue the work begun by CLICOM, by overseeing the development of a computer-based data integration capability. The membership should be constituted and the mandate drafted to assure that the working group works effectively with the JOI Steering Committee that is overseeing development of the ODP Data Management System Replacement Project.

FY96 DRILLING

PCOM Motion 94-3-10

There shall be only one Caribbean Leg scheduled in FY1996, as opposed to the two proposed.

Vote *8 For, 5 Against, 3 Abstentions*

PCOM Consensus 94-3-11

A Leg of further SE Greenland drilling should be inserted into the FY1995 schedule to precede the scheduled Gas Hydrates Leg.

PCOM Motion 94-3-12

That PCOM adopt the following schedule for Legs 163 to 170:

• Leg 163	East Greenland
• Leg 164	Gas Hydrates
• Leg 165	Bahamas
• Leg 166	Caribbean Ocean History
• Leg 167	California Margin
• Leg 168	Sedimented Ridges II
• Leg 169	Juan de Fuca
• Leg 170	Costa Rica

NOTE : Flexibility is retained for ODP-TAMU to interchange Caribbean and Bahamas drilling as Legs 165 and 166 to minimise potential current and weather problems in the Florida Strait.

Vote *12 For, 3 Abstentions, 1 Absent*

TECP WHITE PAPER

PCOM Consensus 94-3-13

PCOM Chair will poll PCOM members by e-mail that the TECP White Paper will be published in the next edition of the JOIDES Journal, subject to minor revisions sent to TECP Chair via the JOIDES Office.

RESPONSES TO PANEL RECOMMENDATIONS

PCOM Consensus 94-3-14

PCOM notes the recommendations and comments of the JOIDES panels made at their Fall 1994 meetings, and we have seriously considered them in our deliberations.

PCOM makes the following specific responses:

1. PCOM notes TECP's recommendations on technology development and has taken account of these in it's discussions of budget prioritisation. On shipboard structural measurements PCOM accepts the implementation plan presented by TECP, including the setting up of a User Working Group charged with preparing a "cookbook" for use aboard ship.

2. PCOM would like to have a clear statement of the goals of the computer upgrade from the Database Management Steering Committee, publicised in JOIDES Journal.

3. PCOM urge TAMU to make very effort to deploy the new Pressurised Core Sampler system on the upcoming Med I Leg.

4. PCOM notes IHP's concerns about development of the barrel-sheet ('Etch-a-Sketch') software as a part of the database upgrade and passes these concerns to the JOI Database Management Steering Committee.

5. PCOM endorses the IHP's recommendations relative to:

   1) approving the change of site for the Leg 154 post-cruise meeting,

   2) the publication of the ETH Neogene Chronologic Database,

   3) the addition of structural data on barrel sheets,

   4) the inclusion of structural data as primary data in the database,

   5) the continuation of work on FossiList, and

   6) the addition of Pat Driver to IHP.

6. PCOM endorses in principle IHP's wish to see the Boyce correction to GRAPE data on future CD-ROMs, but not knowing the budgetary implications, decided the following:
   if it is not already being done, the Boyce correction should be made to all future GRAPE data;
   if feasible, the correction should be applied to existing data before publication on future CD-ROMs;if not, 'READ ME' files or headers should be included to flag uncorrected data.

7. PCOM accepts the IHP's recommendation not to delay publication of IR volumes, in an attempt to save funds, and to reduce the size of Leg 155 IR volume, if practicable.

8. PCOM accepts the SMP recommendations concerning;

   1) upgrade of MST computer system.

   2) development of "manuals" for laboratories and urges ODP-TAMU to proceed expeditiously.

9. PCOM notes SMP's recommendation regarding utilisation of existing commercial software for data capture and passes this suggestion to the Database Management Steering Committee.

10. PCOM agrees with SMP's consensus over the acquisition of high quality XRF data and urges the utmost co-operation amongst technical staff and shipboard scientists.

11. PCOM recognises SMP's concern about input to the Database Management Steering Committee and recommends that JOI consider the addition of non-US participants to the committee and that the committee increase its e-mail communication with Panel Chairs and PCOM.

NOTE: PCOM also accepted all of SSP's recommendations and all those of PANCH '94 with minor modification to the PANCH "non-performers" recommendation.

PUBLICATIONS SUBCOMMITTEE

PCOM Motion 94-3-15

PCOM charges the PCOM Chair to appoint an ad-hoc Publications Sub-Committee consisting of 2 US and 2 non-US PCOM members and as ex-officio members the Manager of Science Services at ODP-TAMU and the IHP Chair. The committee is tasked to meet at ODP-TAMU as necessary and prepare different publication options with the goal to obtain an approximately 1/3 reduction of the annual publication budget by FY1998 while at the same time creatively restructuring ODP publications in order to expedite them and increase their scientific impact. These options and their costs will be reported to PCOM for consideration through the PCOM Chair and prioritised for presentation at the March BCOM meeting.

Vote *14 For, 2 Abstain*

SPECIALISED DATA CENTRES

PCOM Consensus 94-3-16

PCOM endorses, in principle, the concept of specialised data centres associated with core repositories and readily accessible micropalaeontological reference centres for the ODP community. PCOM notes that the GEO-Institute of the University of Bremen and GEOMAR at the University of Kiel stand ready to explore the possibility of developing and implementing a Database Centre in connection with the Bremen Core Repository. PCOM encourages both parties to pursue the matter with the aim of spearheading an international effort to develop an ODP Stratigraphic Database Centre in association with the Micropalaeontological Reference Centre, in co-operation with other European laboratories participating in ODP activities.

PCOM THANKS

PCOM Consensus 94-3-17

PCOM thanks Peggy Delaney for her many years of service to ODP as member and Chair of Ocean History Panel. Peggy has earned a reputation as a strong but fair leader and has set a high standard for those who will follow. PCOM especially notes Peggy's activist role in helping proponents craft drilling proposals, her heroic efforts that produced a superb Ocean History White Paper, and her consistently excellent presentations to PCOM that guide scheduling decisions. Peggy has earned a rest, but hopefully not for too long. We won't let her get away that easily. We expect to see Peggy continue to make major contributions to ODP in the future.

PCOM Consensus 94-3-18

PCOM wishes to thank Dick Arculus, the AUS-CAN Representative, for his outstanding service on PCOM for the last 3 years. His clearly reasoned and incisive contributions to PCOM's deliberations during his service on the panel are noted and greatly appreciated. Moreover, PCOM has taken great pleasure in his wry sense of humour that so often eased tensions and made our job easier.

PCOM Consensus 94-3-19

The Planning Committee thanks Charles Sparks for his many years of service to the Technology and Engineering Development Committee as Chairman. Under his leadership the TEDCOM became more effective at providing clear guidance and critical review of technology development projects at ODP. Under Sparks' leadership the TEDCOM provided a solid bridge between the scientific and engineering activities of JOIDES. We wish Charles Sparks success in his future endeavours.

PLANNING COMMITTEE DRAFT MINUTES

Wednesday 30th November 1994 *09:00 am*

A. Welcome and Introduction

1) Introduction of PCOM Members, Liaisons, and Guests

Kidd welcomed all to the annual meeting. He indicated that he considers this a pivotal PCOM for long-range planning issues and welcomed members of the PEC-IV committee with a number of other observers. He then asked for introductions around the table. Bob Duce, EXCOM representative for Texas A&M University welcomed all attendees. He expressed his happiness that this PCOM meeting was being held at ODP-TAMU. He informed those attending that Phil Rabinowitz is stepping down at ODP, he is moving into the University proper, becoming the Head of the new Geology and Geophysics Department at TAMU. He expressed his appreciation of Phil's work at ODP since the programme started there in the mid 1980's.

2) Logistics of the Meeting

Francis outlined the plan for coffee and lunch breaks and announced details of evening events through the week.

3) Approval of the Agenda

Kidd outlined the rationale of the agenda. He said it is a pivotal meeting, the key things being the projection of a level budget, the Long Range Plan (LRP), and recent developments in high budget items such as DCS and the computer upgrade. The structure of the meeting meant that the information on budgets and the LRP would be in-hand before taking decisions on scheduling. He said that questioning on the reports of day one will be limited to clarification, discussion can ensue on the following days. Kidd said that he will ask specific PCOM members to write motions during breaks so they are voted upon when they are fresh in people's minds, with a review at the end of the meeting. Kidd said that meeting at ODP-TAMU gives PCOM members the opportunity to question staff if needed.

Taylor said that with the science programme scheduled for Friday, and the budget scheduled for the day before, he thought they were the wrong way around. Kidd replied that the budget items under discussion were major items. Lewis said that the budget items and implications of a level budget needed to be discussed first, before the science program. Fox agreed and said that there may not be funds, for example, to use CORKs, until we know the implications of the budget issues. Taylor then suggested that when considering large line items such as LWD, these could be built in to this discussion. Kidd asked Francis to speak to this on Thursday.

PCOM Motion 94-3-1

PCOM approves the agenda for the 1994 annual meeting with the above provisos.

Vote *16 For, 0 Against*

4) Approval of the Minutes of the August 1994 PCOM Meeting, Reykjavik.

Taylor said that on p.51 the correct figure should be $44.9M,
Berger pointed out that he is not a LITHP liaison as indicated on p.59

PCOM Motion 94-3-2

PCOM approves the revised draft minutes of the August 1994 PCOM, subject to the above corrections.

Vote *16 For, 0 Against*

B. Reports of Liaisons

1) NSF

Malfait said that the recent political changes in Washington may well have an effect on NSF and through that ODP. The incoming Congress may be able to change the currently planned budget. The NSF did rather well last year, with an increase of almost 14%. In the areas of research infrastructure and research equipment NSF had increases of 138% and 641% respectively. Of the ocean science NSF programs, ODP received the largest increase this year (3.1%), but overall geosciences in general received the smallest increase (Appendix B1.1).

Malfait also reported that a new MOU was signed between NSF and AUS-CAN, on 22 September 1994, with a commitment through 2003. The MOU is for participation at 2/3 level in 1995, but does assume that the consortium will become a full member. He went on to say that the 1995 program plan has been approved at a level of $44.0M, but NSF expect JOI to ask for $44.9M. He passed on concerns that administration and management costs in the program may be increasing too fast and will be looked at. He further reported to PCOM the appointment of Dave Falvey as Program Director at JOI Inc. and USSAC, and Malfait said we should express our thanks to Jamie Austin for stepping in and doing such a fine job in helping the program whilst the search for a new Director was undertaken. He said that there are plan for an ODP Council (ODPC) review to be completed by 1996, prior to formal renewal in 1998 (Appendix B1.2).

Malfait outlined the NSF marine geological field programs (Appendix B1.3), and told PCOM that the 1996 programs will be reviewed in January 1995.

2) JOI

Falvey ran through the highlights of the FY 94, the status of the FY 95 budget and the FY 96 budget, and progress on recruitment of new partners (Appendix B 2.1.1). He said that Taiwan was a strong candidate, but it must be referred to as the Consortium of Taiwan Universities, as Taiwan is not recognised by other member countries. He said they may come in by mid 1995 as a 1/6 partner. He was unsure if they will join in US Fiscal Year '95 or FY '96. He reported that Jamie Austin began an initiative with Brazil which he will be following up, and that the Canadians are still having discussions with Mexico. A group from South Korea has been in contact with the Australian Secretariat concerning possible membership in their consortium, and these leads will be followed. Furthermore, Arculus will be making a promotional trip on ODP's behalf to Beijing after the PCOM Meeting. He then briefly outlined the other main activities that had been and are to take place with JOI involvement (Appendix B2.1.2).

Falvey will present an "internationalisation" strategy to EXCOM in January, but outlined it for PCOM. He said that as part of this new strategy he was going to emphasise the benefits to existing members of widening the membership base. He identified six major points as follows: 1) it would enhance ODP's "international" image, 2) it would increase access to regional databases and thereby increase "local knowledge", 3) the pool of talent available to the program would be expanded, 4) access to national exclusive economic zones would be improved, 5) new international educational and scientific links could be built, and 6) it would stabilise the program and improve the support base (Appendix B 2.2). He said that most agencies around the world were suffering level or reduced budgets so extra memberships were the only realistic way to increase the program funding

Falvey said that there were realistically a dozen possible candidates for membership, probably as parts of consortia (Appendix B2.3). By FY 97 Falvey said that he has set himself a target of having the equivalent of one new member in the program. He outlined a 6 point strategy for recruitment of new members (Appendix B2.4) that he considers would take a minimum of two years to implement.

He then outlined some ideas to PCOM of various options that may be considered to broaden the membership in ODP, bearing in mind that realistically not many countries could join as full members.. He said that there was a need to modify the current full member concept and put forward the current EXCOM Chairs' ideas for a partial, or candidate membership status. Basically this would be open to all countries who are not current full members and membership benefits would be linked to the level of subscriptions, in multiples of 1/6 the current full subscription. The full details are in Appendix B2.5 and target recruitment schedules and financial projections in Appendix B2.6.

He concluded with a brief outline of the Performance Evaluation Committee-IV schedule (Appendix B2.7), which has already begun with observation of the DRILLOPTS and PANCH meetings and is due to conclude with a report to JOI in April 1995 which will be forwarded to the subcontractors for comment and final onward transmission to EXCOM and ODPC (with responses) in June 1995.

Francis commented that the implications of more people on the ship must be carefully considered. Lewis said that NSF would like their contribution to drop to about 50%, and that additional funds from new partners may simply allow NSF to drop their contribution. Falvey said that allowing for the AUS-CAN membership, the NSF contribution is down to 60%, that with the addition of a further 1/2 member it will go to 58%, with a full member it will be 53%. Berger commented that he is happy to see the membership suggestion is being opened up to a less rigid form, but asked if any thought been given to existing members becoming more than single memberships, i.e. 1+1/6 members. In the current financial climate this was thought unrealistic. Sager asked where the internationalisation will begin and who can take part. Falvey said that so long as things are fed through the central JOI office, it is not a closed shop and he encourages all participants to seek potential new members. Kidd asked who was taking the initiative with South Africa, Falvey said that Malpas was taking the lead and Lewis had additional information.

3) ODP-TAMU

Francis reported that Leg 157 (VICAP-MAP) was in progress during the last PCOM (Appendix B3.1): 3090m of core had been recovered, recovery was 80 % overall. A pin failure led to 430m of pipe being lost with over 2000m of pipe being out. It was the same type of pipe that failed before and the pin has been sent for metallurgical tests. At the port call in Las Palmas, 5 containers went astray and the ship was delayed a couple of days until these were returned. He reported on a couple of personal mishaps before the Leg 158 cruise (crew member mugging and near-drowning).

He said Leg 158 (TAG) was a high-risk leg (Appendix B3.2), it was hoped to spend all the time at TAG2 and leave a deep cased re-entry hole. This didn't happen. The ground was very difficult and the holes were unstable. There were 17 shallow holes (Appendix B3.3). Hole 957E, the deepest, was drilled to 125m but the pipe got stuck and eventually the drill pipe was severed so that the Bottom Hole Assembly (BHA) was left in the hole. A Hard Rock Guide Base (HRGB) was not successful in B and C holes. This Leg turned out to be the most extensive used of Motor Driven Core Barrel (MDCB) (Appendix B3.4), which is a Diamond driven system pushing core barrel 4.5m ahead of the drill-bit. Total core recovery on the leg was 55m; half was recovered with RCB and XCB and half with MDCB. Francis concluded that large diameter roller cone drilling doesn't work in this type of environment, but diamond drilling does. The most successful hole was 957C which recovered 22 m (Appendices B3.5-3.7). Shanks and Miller said that this system actually gave a lower recovery than should be achievable with DCS.

Francis outlined the dry-dock schedule (Appendix B3.8). The JOIDES Resolution is scheduled to arrive in Dakar on 3 January '95 and it is hoped to sail the next day. If ship leaves Falmouth early, any spare days may be used to acquire core for PR purposes for museums and universities. Taylor asked why TAMU did not ask the JOIDES structure what to do with 3 days of drilling time. Francis said that the ship would not be equipped to take scientists. Mix said that TAMU should still have asked for advice as to where to take useful cores. Francis re-iterated that the 3 days are a contingency and may not materialise. PCOM decided that this item should be re-visited later in the meeting. Francis then outlined the currently scheduled areas of operation (Appendix B3.9).

He then outlined Leg 159 (Equatorial Atlantic Transform) and said that IG1 has a planned penetration of 1600m and will probably be a re-entry hole. All the sites are in Ghanaian waters (Appendix B3.10); TAMU has received clearance, with two observers to be taken on the Leg. ODP is paying for them to join and leave the ship.

Francis then reported that the operations schedule was changed to respond to a French request for a port call in France and so that the same SECDO/FOREX crew were not at sea over Christmas again (Appendix B3.11), a brief port call in Malaga has been scheduled which is very close to the Alboran Sea sites. Upon questioning, Francis reported that the French port call was discussed at the June '94 EXCOM, although there was not a formal motion passed. Mével said the reason was to advertise the ship in France. Falvey didn't recall that this was discussed openly, and expressed his concern at the way this happened. Sager commented that Francis was in charge of operations and questioned if he now had to ask for PCOM approval for scheduling port-calls. Shipley said he was concerned that a schedule had been changed to be less efficient, and it was unclear as to who should make that decision. Francis said that he was instructed to pursue this and that he understood it originated at EXCOM. He agreed that the changes had cost two days and the ship would be in Edinburgh two days later than originally scheduled. Kidd said that there is concern about the procedure, Dick asked that if needed, we discuss this further under New Business, looking at political/PR port calls.

Francis then reported that the pre-cruise meeting for Leg 160 (Appendix B3.12) was held at TAMU in October, clearance for sites in Greek and Italian waters had been given. Cyprus clearance is still awaited

He then outlined the key personnel on legs 159, 160, 161 (Appendix B3.13-3.14), and went on to say that the Leg 161 meeting was also to be at TAMU. There were 7 Alboran sites and 3 Mediterranean sites, with one re-entry site. Leg 162 had some leg sites approved at the last PPSP, the others will have to wait until next meeting. Gas Hydrates is scheduled as Leg 163, but there is engineering development ongoing on cutting shoes for the pressure core sampler (PCS).A Japanese visiting engineer will be joining TAMU in April to assist with PCS development and participate on the Gas Hydrates leg.

Francis then outlined members' share of Leg participants (Appendix B3.15) the size and staffing of the Leg 159-162 scientific parties (Appendix B3.16).

He then ran through the recent organisational changes in the operations and drilling department (Appendix B3.17) and presented an outline of the old organisational structure (Appendix 3.18), and reported that at end of 1993 D.Huey resigned from ODP, but TAMU can use his skills under subcontract. Also B.Harding resigned from ODP and Francis is acting as interim manager. A job advertisement for the post of Manager of Engineering and Drilling Operations (Appendix B3.19) has gone out, and TAMU hope to interview from about 20 applicants, and have a short list of two or three, by January 1995. Kidd asked about having a TEDCOM member on the selection panel, Falvey said he would suggest they have an engineer, but would not name one.

Francis then described the proposed new structure as recommended by the EDRC (Appendix B3.20) and the actual new structure (Appendix B3.21) that has been in place at TAMU since October 1994. He also said that Glen Foss will be retiring next October after a year without sea-going responsibilities. He announced that a new co-ordinator for public information, Aaron Woods has been appointed, and confirmed that Phil Rabinowitz is giving up the Directorship of ODP in 1995.

Coffee Break *10:55- 11:10*

4) ODP-LDEO

Goldberg briefly outlined logging operations on Legs 157 and 158 and proposed operations for Legs 159-161 (Appendix B4.1).

The logging winch will be changed from diesel to electric during the dry-dock to give an increase in capability. This has implications for stepping up the functionality of the heave compensator.

Future legs are staffed and equipped with standard logging tools. There have been recommendations for LWD, GHMT and BHTV. He outlined the current status of downhole systems development (Appendix B4.2) and announced that the third party shear-wave sonic logging tool is being upgraded, with land tests in Spring 1995, for evaluation and deployment on Leg 163. He also reported that the database is moving ahead smoothly, CD's for Legs 139-152 are in press and Leg 154 is targeted for January 1995. The usage and description of the downhole tools for inclusion in the ODP-LDEO guide have been extracted from the educational CD-ROM that was displayed at the Cardiff PCOM in April 1994. The same information has been extracted from the CD-ROM movie and used as a base for a MOSAIC page. An AGU special session is scheduled for Monday 5 December. Convenors Goldberg and Lysne have had 25 abstracts submitted, with about five on logging-related results in other areas of AGU.

Goldberg then briefly outlined some results from the FMS data obtained on Leg 152 (Appendix B4.3), and strike and dip data showing that there is an increase in dip in the more subsided layers of basalt and lava flows, but he questioned why is there a rotation in time of these features (Appendix B4.4).

Peter Harvey presented the results from Leg 157 (Appendix B4.5). The primary objective was to get as good a lithological distinction as possible. He outlined the cruise area of operations (Appendix B4.6) and showed site 950A natural gamma data (Appendix B4.7) which was obtained through a series of alternating sequences to about 230m, before an abrupt change in the nature of the logs. He then showed some geochemical logs (Appendix B4.8) through a sharply alternating sequence of turbidites and mud and at the bottom a volcaniclastic sequence. Core recovery was >90%. The physical property logs were also displayed (Appendix B4.9) representing alternating volcaniclastic and carbonate sediments. Harvey then showed the natural gamma logs from site 952A (Appendix B4.10) and showed how they could be used to correlate individual beds across the abyssal plain (Appendix B4.11).

Harvey then presented a site summary sheet of VICAP (Appendix B4.12) and showed the Quad combo results from Site 953 (Appendix B4.13). The change in the nature of the log at its base represents the base of the submarine part of the Canaries volcanism, with some distinct analogues to those recognised on land. He said that the sonic and resistivity logs had enabled the production of high quality synthetic seismograms providing good correlation in upper part of seismic sequence (Appendix B4.14). Site 956 had a high cyclicity signal, then at 560m was a zone of lower amplitude with a peak in Thorium (Appendix B4.15), and the physical properties were interesting as grading is seen, interpreted as large flow deposits (Appendix B4.16).

Goldberg then returned and talked about management and planning in terms of data processing and science support (Appendix 4.17). He outlined the status of the subcontracts in the UK and France and said that LDEO had recently added some quality assurance and efficiency for data processing.

He said that he was asked to look at the program in terms of functions by Dave Falvey. He considered functions in terms of personnel, and these split into 5 categories (Appendix B4.17). He also presented a chart of the LDEO-ODP organisational structure (Appendix B4.18).

Goldberg finished his report by presenting the FY96 logging prospectus (Appendix B4.19). This summarises the logs requested, dollar implications and non-standard logs. Also LWD requests are marked as are special tool requests, packers, CORKs etc.

Kidd asked if Goldberg could have some figures available for the scheduling discussion later in the meeting. Taylor asked if we had a cost for the GHMT tool, and what are the implications for the Schlumberger contract. Goldberg said he does not have a day rate but could estimate the costs, though we may get it for free for a limited time under a prototype status.

C. JOIDES Panel Reports

1) TECP

Robertson presented some highlights of four topics, firstly the TECP White Paper, modified after PCOM request. In fact it was substantially revised. The key elements are a clear focus on limited thematic objectives, stressing linkage with applied and societal relevance and linkage with other international programmes. TECP's main emphasis was on extensional, contractional, strike-slip and vertical kinematic settings (independent of plate location), then tectonic processes (stress and strain, rheology, fluid flow), and support for the necessary technology to achieve their long-term aims. Robertson said the White Paper was with his panel for comment and he would welcome comment from PCOM with the aim of publication in the next issue of JOIDES Journal (Appendix C1.1).

He then outlined the TECP drilling plans (Appendix C1.2) which involved four proposals, to be dealt with in detail later in the meeting. He then presented a third topic of more technical aspects, and said that TECP reiterate the need to collect, process and archive structural data, it is important for both short and long term objectives. This will be dealt with more fully under agenda item M.2. Tools particularly supported are LWD, CORKs, WSTP, VSP, and side-looking technology such as radar (Appendix C1.3).

Finally he outlined the achievements of tectonic drilling. Robertson said they have not been fully appreciated by PCOM or the wider community. Without DSDP and ODP there would not have been recent advances in the orogenic belts. Also tectonics workers have now moved forward from description to quantification of processes (Appendix C1.3).

Fox asked how Robertson could present these in terms of relevance to funding agencies and public who have no knowledge of earth sciences. Robertson said he could relate the TECP work to hazards, especially earthquakes.

2) SGPP

Hay went over the SGPP themes (Appendix C2.1) and how they will use these in the future planning. He said that SGPP had come to look at rock architecture that results from sea level change. They also look at fluid flow (geochemical fluxes) in overall mass balance and at carbon cycling, including microbial process during diagnoses and alteration.

He reported that their Spring #1 ranking was the New Jersey Transect and gave a progress report on site survey (Appendix C2.2). If a site survey is carried out the proposal would be ready for drilling in 1997. It would look at the effects of sea level on a margin dominated by clastic sedimentation. Hay said SGPP also want PCOM to press for testing of pressure core sampler. He then outlined their Proposals Ranking in FY96 Prospectus (Appendix C2.3) and commented that they did not rank proposals with marginal panel interest.

Hay said that there is a major controversy in the anoxia geochemistry world about what happens to sediments in enclosed basins and why it happens. One group believe that anoxia has nothing to do with preservation of organic matter, whereas another group believe that it has everything to do with it. Hay said that the microbial processes are completely different, one type leads to methane, the other leads to petroleum. Most of the work of academia is done with piston cores in young sediments, the petroleum scientists use deep cores in ancient rocks. The Cariaco Trench site in the Caribbean Ocean History Proposal has a sequence of anoxic sediments.

He then went through the fall rankings briefly and went on to discuss the ratings of other proposals not in the prospectus (Appendix C2.4 -C2.5). Hay said that SGPP want to see the result of the upcoming Gas Hydrate leg before they rank the other similar proposals in their system. He said that SGPP urges that LOI's rated A1 be developed into full proposals, and that they believed the LOI gave a useful insight as to what may be coming along in the future (Appendix C2.6).

Hay said that no PCOM representative was at the SGPP meeting when they wished to discuss Budget Prioritisation (Appendix C2.7), and he said that SGPP had also discussed publications (Appendix

C2.8). However, without input from PCOM they did not feel that they had enough information to make sound recommendations

3) OHP

Delaney outlined OHP 1994 activities (Appendix C3.1) and the OHP Spring Global Ranking (Appendix C3.2). Delaney then told PCOM of the upcoming changes in personnel on the panel (Appendix C3.3) and reviewed the 1994 membership.

Delaney said the previous OHP White Paper grew out of the themes outlined in Appendix C3.4. New themes included in this White Paper are orbital forcing and understanding the sensitivity of systems to this, rapid climatic change and internal feedback's in the oceanic system, long term changes and abrupt events such as the growth of the northern and southern hemisphere ice-caps, and global sea-level change.

The context for reviewing sea-level work (Appendix C3.5) was dependant upon the shallow water hazards guidelines. Planning and execution is a very time consuming process, and there are shipboard considerations that have yet to be addressed. Data interpretation and integration and multi-site transects will be required. The conclusion is that they are still on a steep learning curve, but there are very large potential payoffs.

Delaney then reaffirmed OHP endorsement of the Leg 162 drilling plan (Appendix C3.6) and showed a map of the locations of Leg 151 and Leg 163 sites in the Arctic (Appendix C3.7), and explained that the short-term time-scale changes that can happen and that have been documented in ice-cores need to be examined as they have implications for global warming and the formation of bottom waters in the Arctic. She further said that there is a good possibility of getting sedimentary records to decadal scales. However she pointed out that OHP suggest that if there is ice cover, then the high latitude alternative sites are not drilled, but the ship returns south to do the high priority sites there that will still give good results.

Delaney finished by outlining the OHP FY96 Prospectus Rankings (Appendix C3.8), and pointed out that the Global Ranking #1 and #2 are now the Fall Ranking #1 and #2 as they have matured and the site survey data is adequate.

Francis reminded PCOM that Delaney raised an important point about shallow water drilling. If the surveys go well in June or July, it implies around $200K expenditure in the FY97 budget to prepare for drilling.

Lunch Break *12:45 - 13:30*

4) LITHP

Bloomer outlined the LITHP objectives as detailed in (Appendix C4.1) and the LITHP Global Rankings and Prospectus rankings (Appendix C4.2). The prospectus rankings have all come from high global rankings, and had 735B been ranked it would have been in the top 3, LITHP had thought it would be drilled early in 1995, but re-scheduling meant it was back in the system; it is an important part of the LITHP offset drilling strategy.

He then talked about some LITHP issues of concern (Appendix C4.3), which included things like the panel knowing little about the computer upgrade, the idea of mini-legs and how to get around 56 day legs. Bloomer circulated copies of an idea for collecting cuttings from holes as well as taking core, he suggested it may be taken as a proposal to NSF for funding (Appendix 4.9*).

He then ran through the LITHP Offset section drilling summary (Appendix C4.4), saying that this was one of their highest scientific priorities, including material from HESS and MARK. Drilling at HESS had validated the concept of offset drilling. The panel recognised it was not what they set out in the proposal, but the results were very useful. They identified 3 general categories of window (Appendix C4.5). However, Bloomer reported that LITHP still do not know exactly why they were successful with previous legs, and that is why they did not rank VEMA. The important strategies are that better site survey may identify easier places to drill, and ODP should explore new techniques to improve the success of drilling (Appendix C4.4). It remains a mystery as to what the fundamentals are that make drilling easier in certain areas. At fast spreading ridges, some effort has to be put in to developing new techniques.

Bloomer then offered a brief comment on DCS (Appendix C4.6), most importantly that it is fundamental to many LITHP objectives and without it many will not be fulfilled. It will require phased engineering development and phased scientific priorities. Perhaps a Motorised core-barrel system should be used first with DCS coming on line in the next phase after 2003.

He then went on to present the rationale behind the LITHP White Paper, and said that the focus is by design: they believe that mid-ocean ridges are worth about 50% of their balance of interest. However, he conceded that what is missing is the broad theme (Appendix C4.7), but this is being developed along the lines contained in Appendix C4.8*. He said that here they have considered things that have short term and long term relevance, both scientifically and societally.

* This was numbered out of sequence as it forms a discrete package of several pages.

5) SSP

Kastens spoke first about the routine work looking at data (Appendix C5.1). SSP reviewed the top 7 proposals from each panel, they reviewed 20 in April 1994, which is a very high workload. She said that the amount of data that comes in is increasing dramatically and SSP has to look at most of the data as it nearly all relates to highly ranked proposals. Through time each leg is bringing in more data, and also the switch to thematic panels from regional system has had a large impact (pre 1992), now SSP are dealing with twice as much data. First the regional panel pre-digested the data and sent only pertinent packages, with the present system of data coming from proponents this filter is absent. The drop in the number proposals from 20 in April to 12 in July is due to programs being eliminated due to no data being in the system, and the PCOM decision to limit the area of operations for the next year. If the area of operations is not decided upon at the April PCOM, then the system is in danger of overload, so although the decision will be difficult, it must be taken. She also pleaded for more lead-time between the thematic panel meetings and SSP. Kidd said that this was discussed by PANCH and will be dealt with later in the meeting.

Kastens then reviewed the SSP recommendations to PCOM (Appendix C5.2) two of which relate to site naming, one regarding man-made sea floor hazards and the last regarding JOIDES Resolution seismic data. She then ran through the non-routine special projects that SSP had considered or been involved in (Appendix C5.3). She reported that SSP had contributed to the Offset Drilling Workshop on site survey aspects, a draft report forms Appendix A in the SSP Minutes. She summarised by saying that existing guidelines are OK for shallow holes, but deep holes need something more. In order to place a guide-base you need better sea-floor characterisation to find places flat enough and free of sediment and rubble, in terms of "digging the hole" there are no known techniques to find intact crustal blocks, but SSP are optimistic that such survey methods will be developed, possibly using techniques to measure porosity. Various sea-floor markers should be used to ensure that the navigation of the JOIDES Resolution is in the same reference frame as the Site Survey data.

Kastens elaborated on a SSP Issue for PCOM consideration, namely that of encouraging members to provide funding for ODP site survey work, especially the non-US members (Appendix C5.4). She asked that as individuals we could work towards this goal.

Francis responded on the man-made hazards, saying that it was not a simple issue, and not restricted to odd legs. He suggested that the responsibility to get things through PPSP rests with the proponents and not with ODP-TAMU. Ball also said that Chief scientists should provide this data. Francis said that SSDB staff were producing some of this information and that therefore it was available to proponents. Kastens said that may be so, but the system obviously wasn't working, and if TAMU could look at currents, why could they not also look at man made obstacles. Francis replied again that it is not that simple and the TAMU staff are already heavily loaded. Kidd commented that similar problems, even as basic as sites in shipping lanes, were encountered, and SSP should continue to flag these problems. Francis said that he would look at man-made problems but not before a leg is scheduled. Mix and Kidd said that was too late. Kidd asked that with as few as 12 proposals why could TAMU not find at least some preliminary information, but Francis countered again that the problem is larger than most perceived. Falvey said that perhaps Francis could flag a non-definitive pass at DRILLOPTS, with a full analysis when legs are scheduled.

Natland asked if Kastens thought that money should be set aside to support science in support of drilling. She replied that it would be a good idea, but that she should not dictate how this should be done. She said that she knew, for example that non-US members would not be allowed to do a submersible study just to find a guidebase site. Fox said that we may avoid some of these problems by using a series of nested investigations, each of which is succeeded by addressing a specific scientific case. Taylor said that if commingled funds are considered it may never get off the ground or if it does it may have dire consequences.

6) PPSP

Ball reported that PPSP also asks for more lead time. He said problems were arising because proponents do not always have secondary sites identified when primary sites are put forward. Also a recent chief scientist did not have safety check sheets for one PPSP meeting, luckily there is time to put this right. He asked if it would be possible to have legs identified as possible or stand-by legs so that they could warn the chief scientists of the work to be done. Ball then reviewed one page of the last PPSP minutes (Appendix C6.1) which was concerned with approval of three alternate Alboran Sea sites and re-endorsement of six previous and two new NAAG sites.

Kidd asked if Ball would flag the potential problem legs. Ball replied Clathrates and the Gateways leg. He said that he would rather have PCOM look at the legs and make science decisions before he is asked to make comments on potential safety problems. Delaney questioned the wisdom of identifying potential co-chiefs for legs that are a considerable way down the road. Ball said that he appreciates this but would still like a name to contact. Natland asked if we could identify a lead proponent for this aspect. Ball said that proponents and chief scientists are often different. He re-iterated that he wanted a chief scientist. Francis said the process of identifying a co-chief can take a long time. Falvey asked if the staff scientist could be selected, and that he/she could act. Baldauf said that staff scientists had too much to do, and Kastens said that many staff scientists are not that familiar with geophysical data.

Taylor asked about any ramifications from the "look-back" sections of PPSP meetings. Ball said that it was standard procedure for the panel and that they were happy with their "look-backs" to date.

7) IHP

Fryer said that their panel was asked to look at budget priorities in a philosophical manner, in terms of their idea of the general program objectives (Appendix C7.1). She said that the main concerns of IHP are the collection and curation of cores and data. She said that IHP was concerned that communications with the computer upgrade steering committee were not as clear as they could be and that perhaps the IHP members can communicate with the computer upgrade steering group via a listserver. They are very concerned that the database be one that people can use and that is a relational database so that any data can be input.

Publications caused IHP some concern, especially the slowdown in publication of IR's. IHP believed this would not reflect a saving, but a longer-term cost. It may also mean that eventually the IR would not be available to the scientific community ever again. On publications in general, the panel members had every opinion, from those who want to see everything in electronic form, to those who want to retain paper. They would like to see changes that mitigate costs, such as requests for core photographs and the different ways of producing core images and passing them to the community.

Fryer then ran through the panel recommendations to PCOM and ODP (Appendix C7.2).

Regarding the suggestion that the Lazarus publication become an ODP technical report, Kidd said that normally PCOM would recommend to JOI who then recommend to TAMU etc. Berger said that they (Lazarus et al) had done the work, and all they want was help in publishing so it was almost free.

Loutit said that it could be used as an opportunity to test out the database system. Kidd said that there is also a review question. Fryer said it has been reviewed and that it should be published. Delaney said that there is some of this database already in the peer reviewed literature.

Falvey asked how much it would cost to implement full-colour scanning of cores. Francis said that Russ Merrill could answer that but it would generate huge amounts of data. Sager commented that IHP has been down this path a number of times, and are have been told by many people that they are worried that CD-ROM's are not yet a standard and may disappear, whilst others are in favour.

8) SMP

Gieskes pointed out that the Multi-Sensor Track (MST) needs upgrading to a single computer control system. He also said that the X-ray laboratory is coming to the end of its life and it will break at some point. Arculus asked when the spare parts were stopped being manufactured as these may determine the life. Gieskes said that PCOM should be aware that funds will be needed at some time, but SMP are not asking for a new one now. He also said that the palaeomagnetic equipment was out of date, that new systems are up to 100 times more sensitive and could easily be used in palaeoceanographic work.

He said that CLICOM is finished and he would like to see DICOM should begin (Data Integration). To take core-core and core-log integration further, a new committee should really be seriously considered. He did say that he was glad to see that a number of the CLICOM recommendations had already been taken care of.

Kudrass asked if cores were to be colour scanned would that data be included with all the data. Gieskes said that yes in theory, and although it produces large amounts of data it is useful in core correlation.

He presented an overview of the SMP (and CLICOM) recommendations for 1994 as Appendix C8.

9) DMP

Lysne said that about half the DMP are from academia and half from industry, and he would like to record his appreciation of the hard work they have put in over the past year. Lysne reported that one of the potential DMP Panel replacements has recently retired from a commercial company which was a competitor of Schlumberger, but that PCOM have said in the past that this kind of appointment is at the discretion of the panel chair and suggested that he should proceed on that basis He then ran through the DMP membership and affiliations (Appendix C9.1) and the thrusts of DMP from 1993 through to 1995 (Appendix C9.2), which included a review of the DMP program in the light of budgetary constraints.

He then outlined the DMP recommendations to PCOM from their Spring 1994 meeting (Appendix C9.3). He made the following points; How are we to fund the Bore Hole Tele-Viewer (BHTV) ? The scientific support for BHTV should come from the thematic panels. There was also concern about the flexible funding and finding the $40K for bringing this Schlumberger tool onto the ship every time it is used. The memory tools issue was discussed by PCOM, they are cheap but becoming very specialised, DMP recommended to assign responsibility for them to the Borehole Research Group (BRG). The six month time requirement on new third party tools was to give DMP time to think about what to do with these tools in terms of their testing as they had only gone through an autoclave test; he said that there is a quality control problem here too. DMP estimated that extra engineering staff would be required at BRG to fulfil their recommendation. He then ran through the DMP Fall 1994 recommendations (Appendix C9.4) and commented that the panel was not clear on the instruction from PCOM regarding the budget.

He then presented the ideal DMP third-party tool test requirements before such tools became routinely used on the JOIDES Resolution (subject to funding and availability) (Appendix C9.5). He then moved on to the areas of DMP concern (Appendix C9.6). Firstly was that PCOM and DMP sister panel communication seems to be a problem, though this may be improving after PANCH 94. They (DMP) need guidelines for the budgetary exercise, but will continue to add dollar values to items where possible. Interactions with other programs for technology development are of concern and ODP should use these to help the programme.

Natland asked about DMP interest in a drilling leg with hole-hole experiments. Lysne said that there is interest, but a proposal is not in the pipeline at present. If there were a proponent, then they may back it but they are afraid of the costs. Goldberg asked if Lysne saw an avenue of approach to the national laboratories for logging while coring. Lysne said that there may be a chance, but this may mean that there may need to be a "clearing house" formed to put things together.

Taylor said he was concerned about the way DMP use the term "add-on" experiments to describe in-situ stress measurements. Lysne replied that they have wrestled this issue, and they have told the thematic panels that they have the capability of doing in situ stress measurements, and asked if there is enough interest in the community to bring this to a standard log suite. Taylor said that if it is an essential part of the science it needs to be identified now, and not be called an "add-on". Francis said this process already happens as the science and proposal evolve. Dick said that the science to be done and paid for by commingled funds should go through the review process and not come in by the back door. This question was addressed at the last meeting (see p.68 of PCOM minutes, August 1994). Kidd said that PCOM needs to be informed about these ongoing questions and that it is possible for PCOM to be polled by e-mail, communication lines need to be opened and used.

Coffee Break *15:55 - 16:15*

10) TEDCOM

Shanks reported that TEDCOM held its last meeting in November. He elaborated a little on the main topics discussed (Appendix C10.1) at the meeting and the principal events since the March meeting. He then made a few comments on DCS (Appendix C10.2). TEDCOM still considers DCS a prime candidate for core recovery of the rocks it was intended for. If a bumper-sub could be designed to fit in a riser it would solve a lot of problems and may do away with the secondary heave compensator. But this has a low probability of success as it is difficult to put into a small package and has been replaced in industry by the secondary heave system. He then ran through the recommendations to PCOM regarding DCS (Appendix C10.3). He reminded PCOM that the penetration rate depends upon water depth, and that the system is designed for 4500m in total, so the theoretical penetration depth is 4500m less water depth. TEDCOM recommend to sea-test in FY96 or risk losing another year if feasibility is determined.

He then reviewed TEDCOM opinion on 4000m Drilling Riser with BOP (Appendix C10.4). He commented that from the study a few years ago, the proposed slim-line riser was deemed the most appropriate. As a general comment on risers he said that any riser that can support its own weight in water is feasible, the question is what are the environments that you expect once you have to disconnect from the well, historically that is about 3,300m. The storms in an open ocean environment make a ship-shaped vessel very difficult with risers, semi-submersible vessels are far better in terms of motion characteristics, but the cost would be about $30M.

He told PCOM that if hydrocarbons are encountered you cannot simply disconnect if a storm approaches, in any water depth it takes 24-36 hours to disconnect. But disconnection is feasible depending upon the amount you wish to spend and the state you wish to leave the well in. It is the vertical motion that is the problem, finding a balance between the high accelerations on ship-shaped vessel movements and keeping the riser under tension. The mass of the riser is critical, to have enough hanging mass so that the riser is under tension yet doesn't buckle when the accelerations change. In summary, unconventional BOP will be required.

Lewis said that the JAMSTEC design is based on the assumption that drilling is in hydrocarbon areas so you do need appropriate BOP. His question was, if you drilled in the normal situations that we are in now, i.e. no hydrocarbons, what then would you do in terms of a riser to improve hole stability. Shanks said that you have to have some kind of BOP, because even if you just hit gas you will have serious problems, and that the system designed by Charles Sparks would be adequate. Lewis asked how we could maximise core recovery. Shanks replied that with horizon balancing you balance the bottom hole pressure and this will greatly increase the core recovery.

Taylor said he thought that this type of discussion would be appropriate between TEDCOM and JAMSTEC. Shanks said they did try, but JAMSTEC did not want to talk about details like this. He thought that TEDCOM should talk direct to JAMSTEC and that PCOM could not be the filter in this dialogue. Suyehiro said JAMSTEC does need to be informed about our (ODP) requirements. Shanks said that we need to start designing for 4000m or you may find that you cannot get to that depth if you start for 2000m and then try to go deeper. Taylor asked Lewis if he wanted to explore a parallel option to the JAMSTEC system, and Lewis said he did. Langseth commented that this would probably need a new platform.

Shanks then outlined TEDCOM consensus on hard rock drilling and a recommendation to PCOM on logging while coring (Appendix C10.5). He then asked that TAMU continue to update spreadsheets on operational tool development (Appendix C10.6), and Francis said he is happy with concept of updating equipment spreadsheets. Shanks also suggested that TAMU look at re-entry cone diameter with a view to determining the most efficient size.

He concluded by saying that TEDCOM recommend that low friction seals should be a high priority as it will help EVERY coring tool as well as DCS. Fox asked about costs, and Shanks said there would be a small cost with testing, but present seals last 4 years and if they approach that it would be worthwhile (the seals cannot be replaced out of port). They also recommend strongly that the diamond coring string be used to determine its efficiency.

Shanks ended by expressing thanks to Charles Sparks for his efforts as TEDCOM Chair over the years.

11) PANCH 94

Bloomer presented the results of the PANCH 94 meeting in terms of the nine points made as recommendations and comments (Appendix C11.1). Regarding the computer upgrade, PANCH was concerned largely because they did not know what was going on, it was proceeding faster than the time-scale that the JOIDES panels meet (twice per year). If three important things don't happen, namely archive data, incorporate derived data, and allow integration and manipulation of data (Appendix C11.2) then the system will not be what is required. They will examine ways of setting up a listserver to facilitate information flow. They also want to establish formal liaisons with IHP and SMP as the primary conduit of information between IHP (and hence the steering committee) and the thematic panels.

In terms of the budget, the panel Chairs thought they didn't have enough information to give PCOM good advice, therefore they tried to identify what the program was about and what is required to fulfil the program (Appendix C11.3). A list of components on how to solve the problems was drawn up. The most important measurements are those on the ship because they may go away with time, and you can use the interaction of the scientists on board ship. Another important aspect was curation, keeping data safe and accessible. These are also the key things that have to be disseminated. Also PANCH looked what they need to survive, and among the key things they listed were innovation and flexibility.

He then presented to PCOM a PANCH perspective of the LRP (Appendix C11.4). The panels think we have been doing a lot of very good basic science, and if we have not passed that to the public and earth science community, then it is a communications problem and not a problem with the programme. The panel system and planning process is in general working well and producing good results, though this does not preclude some kind of modification. Further it has been a model for international co-operation, and this must be maintained. Finally the thematic panels should look at the LRP before it is published.

D. Leg Reports

1. Leg 157 VICAP/MAP

Weaver reported first on the Madeira Abyssal Plain (MAP) section of the leg and then on the Canary Islands section (VICAP). He said there were 3 holes drilled in MAP and 4 in the VICAP area (Appendix D1.1).

He outlined the objectives of MAP drilling (Appendix D1.2) and then showed the different sources of sediment that filled the abyssal plain (Appendix D1.3). He said that a high resolution δO^{18} stratigraphy has been put together from over 1000 piston cores taken in the region (Appendix D1.4) and showed a map of the thickness of one turbidite unit that is 1-3.5m thick in its distal parts (Appendix D1.5). He said that the drilling had allowed correlation (preliminary using lithology) of turbidites across the basin (Appendix D1.6) and the accumulation rates (Appendix D1.7) using different techniques and the accumulation rates of the calcareous , volcanic, and organic-rich turbidites in site 950 (Appendix D1.8-1.10). He said that the turbidite sequence began at about 12Ma and continued to the present, although the volcanic turbidites do not begin until 6.5Ma. He said the organic turbidites were infrequent until about 5.5Ma, but they then increased in frequency rapidly, and that this may be due to the continental margin collapsing as a response to the mid-Miocene sea-level change, or alternatively, the onset of upwelling. He then showed a map of a debris flow which he said was the same age as turbidite b, but is four times the volume (Appendix D1.11). It is thought that many of the turbidites in the abyssal plain are associated with debris flows. He concluded this section by showing a more detailed map of interpreted side-scan records and the relationship of the avalanche headwall to the debris avalanche and debris flow (Appendix D1.12).

He then outlined the VICAP objectives (Appendix D1.13) and a map of the four sites (Appendix D1.14), though he said that not all of the objectives of this part of the leg were met. He showed a stylised section across the region with the aims of what they had hoped to drill (Appendix D1.15) and said that the southern sites showed evidence of considerable reworking but there was little information from Tenerife. He showed a schematic diagram of site 953 (Appendix D1.16) and reported that all the onshore formations were found in the drill-sites, but volcanic breccias prevented the deeper parts of the section being sampled. He then showed a preliminary accumulation rate curve (Appendix D1.17), which are extremely high, and sections of the site 953 bulk and grain density logs, which he said allowed ready identification of the volcanic formations (Appendix D1.18).

He concluded with a major results summary of Leg 157 (Appendix D1.19) and recommendations and future plans (Appendix D1.20).

Natland asked what new was accomplished by drilling offshore ? Weaver said that what was offshore was previously unknown, and that they tried for the deep sequence, they couldn't drill deep enough. Drilling allowed the determination of the volumes through time. Bloomer said that was the principle point of the proposal and try to determine the mass balance. Kidd asked about mass balance in the sediments. Weaver said that they can use the down-hole logging and get the volume for each individual packet of turbidite on the abyssal plain. Dick suggested that the next step for VICAP drilling would be better on land than offshore.

2. Leg 158 TAG

Miller (TAMU Staff Scientist on Leg 158) reported on behalf of the co-chief scientists. He summarised the scientific objectives (Appendix D2.1) saying that models of hydrothermal vents have all been derived from Cyprus-type exposures on land, and all samples to date have been from dredges or submersibles. He then outlined the shipboard operations in terms of what they were and were not prepared for (Appendix D2.2) and said that none of the expected adverse conditions affected the drilling, but what did was the massive anhydrite, breccias, cm-size pyrite and formational problems that prevented the hole from being kept clean. He showed the bathymetry and location of the five sites on the TAG mound (Appendix D2.3) and summarised the drilling location environments and operations plans (Appendix D2.4). He said that at TAG 2 after drilling for 20m there was fresh basalt, no stockwork and no evidence of elevated temperatures so they decided to concentrate on the known high temperature area.

He outlined the TAG 1 objective and specific highlights (Appendix D2.5) and then showed a schematic section of site 957 E, F and G (Appendix D2.6). He then moved on to the TAG2 specific objectives and highlights (Appendix D2.7), commenting that they only recovered about 5% by volume of anhydrite, and showed a schematic lithology of site 957 A, B and H (Appendix D2.8). He then moved on to the TAG4 specific objectives and schematic lithology (Appendix D2.9-2.10) commenting that it was thought that this would be an area of influx of cold sea-water, all the minerals appeared to be in-situ precipitates, there was no stockwork developed here, even though the site was only 10m away from the main stockwork area. He then finished the site summaries by looking at TAG3 and TAG5 (Appendix D2.11) saying these were very metal-rich areas.

He began his round-up by showing a section through the TAG mound and a schematic representation of the sites (Appendix D2.12). He said that in general the top of the section consists of massive pyrite breccias, then anhydrite rich units which constrains the up-flow zone to within 50-60m of the central part of the mound. Further down the section are quartz and pyrite rich breccias, and below 100m depth is a chloritised stockwork zone. He summarised the preliminary interpretations and overall highlights (Appendix D2.13-2.14) and said that drilling here is a good test of the models developed on land, and that the massive Cu-rich sulphides in Cyprus and elsewhere have a conglomeratic nature and that this may be due to removal of the anhydrite.

Natland said that it was thought that the basalts would be soft and primed for drilling, and asked how fresh were they ? Miller replied that they were altered by 10% with about 30% alteration rinds, they may have been a talus deposit.

Adjourn *18:05*

Thursday 1st December 1994 ***09:00 am***

E. PEC -IV

John Knauss said that this is the most continuously reviewed program in the NSF and the longest running, and that these two facts are closely linked. He said that it is a good program, but there are changes in Washington and there will likely be massive changes in the program at the turn of the century. He wanted PCOM to help in shaping those changes for the benefit of the program. He passed around a list of members of PEC-IV for PCOM members to contact (Appendix E1.1).

He said there are political problems and he has learned how to deal with them. A first point PCOM should consider is that almost without exception the members of congress are well educated and very bright. They are also very busy and rely heavily on their staff and all staff members are well educated and bright too. Those staff that deal with the members who have science interests usually have science backgrounds. He said that you don't have to convince them about the value of basic research, they do appreciate it, what they do need to know is how much basic research should be supported.

He said that his stance is that ODP has a strong position in volcanics, metallogenesis etc., but do not oversell the program; They have been lobbied long enough to see through things. Also don't underestimate the uniqueness of JOIDES, it is the only program, possibly in science, where the funds are managed from the bottom up. It is run by scientists and continues to attract the best scientists in the world with minimal government bureaucracy. The superstructure built over the last 25 years is one of it's strongest arguments for continuation. Governments and congressmen will be pleased that it is run by those who actually do the work.

F. Global Science Programme PCOM Liaisons

1. MESH

Mix reported that MESH exists as a program; the plan is published and the planning office is at Oregon State with Nick Psiais as Chair. The first proposal deadline is January 1st, and the first MESH workshop is in January. MESH will submit a letter for inclusion in the LRP in support of ODP, but they are concerned that the science we do is driven by individual proposals and not by MESH. They will not submit a large proposal for drilling transects, and are enthusiastic for circumnavigation but would not like to see this planned too far ahead, they want the areas to be determined by proposals. In general they are pleased with ODP and do not want the program to change too much. There is some concern that the MESH and JOIDES communities may go in opposite directions, but the individuals involved in both programs may ensure this doesn't happen.

Sager asked how he saw the role of ODP in MESH, it appears to him as a building block. Mix replied that it is an integral part, if ODP disappeared MESH would continue, but it is better with the existence of ODP. MESH is a US program, but an international program, IMAGES, takes pieces of MESH (CO_2 dynamics and climate change) as its focus. He is not sure how much money IMAGES has, it is mostly a planning and co-ordinating group, he also said that Psiais was involve in writing the IMAGES science plan. Mix said that there was about $1M in FY95 in MESH. Mével asked if drilling is an important part of the IMAGES plan. Mix replied that they do not mention drilling, but some of their targets will require drilling although at the moment they emphasise piston cores. Fox asked if there are any overseas programmes like MESH. Mix said that there may be one set up at Cambridge in the UK. Berger asked if the focus was the Quaternary ? Mix replied that the MESH the focus was mainly the Pliocene and Eocene warm periods but will include the Cretaceous warm periods.

Kidd said that there are a number of funded programmes in Europe, but these are mostly regional and smaller in scope than MESH or IMAGES. Kidd asked if Mix is a link with the smaller programmes through IMAGES, or just with MESH. Mix replied that at the moment just MESH. Pearce asked if the link should be more specific to international programmes rather than national programs. Lewis said that care should be taken who liaisons are made with, and Mix agreed, saying that internationalism should not be forced. Loutit commented that the more global programs there are, the more the international partners will become involved and create something larger.

2. NANSEN/ANTARCTIC

Lewis outlined the goals and organisation of NAD (Appendix F2.1-2.3). He reported a drilling focus on three areas, the Laptev sea on the continental shelf, and the Bering and Chukchi Sea. They also have interest in Arctic gateways Lewis pointed out that they have not been submitted proposals, but they wanted holes drilled in 1996.

Lewis said that there were a number of Russian companies involved (Appendix F2.4-2.5) with experience of drilling through ice in Lake Baikal. He also said that Canadian companies had been approached (Appendix F2.6-2.7) and had held discussions with NAD. Their drilling technique is to insert a base under the ice and into the sediment and the drill-ship is then laid upon this base that is now locked into the sediments so ship doesn't move around in the ice. NAD was getting bids from these companies to drill in depths of 500-600m. Lewis believed that the commercial companies seemed to think that NAD did not have the money to use their equipment.

Lewis reported on a recent NAD meeting in Russia (Appendix F2.8-2.9). He encouraged them to submit a proposal to drill in the Bering Sea and they also want to drill in the central Arctic Basin. These areas were in the last ODP LRP. Lewis said that ODP looked forward to when Russia would rejoin the ODP, and reported that the Russians would like to re-join but do not have the annual membership fee and would like other methods of payment to be considered. Lewis suggested that PCOM ask EXCOM to consider a special partnership with Russia to eventually get them back as full members.

Kidd asked if our liaison with NAD was close enough. Lewis said he gave them information that they were not aware of. Delaney said that there is an inactive Bering Sea proposal and that OHP are looking for someone to re-activate this proposal, but it needs to be re-submitted by 1 January. Natland asked how much it would cost for NAD to hire a drilling vessel. Shanks said these vessels only work a few months of the year and that they tend to try and recover a years' costs in 3 months so they are usually very expensive.

Falvey said he was not in favour of a special relationship with Russia as there are other countries such as Brazil and China that ODP would also like as members, but have fiscal problems. Dick said that they were involved for many years previously and they should be offered a special status due to their strong scientific track record. Larsen said that Russia could offer the program special things such as ice-breakers. Taylor said that they should not offer a special class of citizenship, but they could offer special programs. Falvey said he was happy to see Russia fit into the second category of membership as outlined in his report, but he did not want to see a third status of membership. Kidd said a motion taking account of the comments above was required, this matter needed to be flagged to EXCOM.

PCOM Recommendation 94-3-3

In view of Russia's unique capabilities and interest in the Arctic, PCOM recommends to EXCOM that high priority be given to identifying a process that will lead to Russia being re-associated with the ODP.

Vote *15 For, 1 Abstention*

3. ION

Suyehiro reported that he main aim of the International Ocean Network, was to expand the broad band seismic network into the ocean. ION is to have a workshop in France in January from which a plan will evolve. At the moment it has no money. The US Ocean Seismic Network does have money, they will run an experiment in a site off Oahu in 1996, to study how data compares between sea-floor and island observation. Starting in 1995, Japan will have about $2M every year for 5 years, but this will be focused to the west Pacific area. France is the third major component of ION, and they are trying to set up special observatories. Current activities have not changed since the report to the last PCOM. ION thinks that ODP is the only program that can provide a stable quiet environment for their observatories and it is important to link with ODP. The main objectives of ION are to image the deep interior of the earth, which are not targets of the thematic panels, but the sites will be globally scattered, so it is difficult to package in a single leg.

Fox said that one of the ambiguities that has plagued the discussion of putting instruments in holes as opposed to on the sea-floor had been an experiment whose initial results indicated that holes were not as quiet as first thought, but he has since heard that re-interpretation of the data indicates that a hole is actually a good environment. Suyehiro said that other experiments from a French group showed that the noise in a hole decreased with time and that over a period of years the environment would be quieter than on the sea-floor. This time-lag may be due to the system of anchoring. Langseth said that it could be that water is flowing down the holes continuously and this was probably a factor. Natland said that a requirement is to understand the causes of noise in holes and that different sorts of environments needed looking at, e.g. sediments vs. basement holes. Francis said that during Leg 156 casing bond logs were run and that these kinds of things should be done before the bore-holes are used for experiments of this type.

Kidd reminded PCOM that they agreed to take a special interest in this area of science, and that it should also be taken into account in the short-term plans. Robertson said that TECP takes an interest, but they feel that holes are under-utilised, and there is a lack of funds to support thing kind of work. Taylor said there is a mechanism to use existing facilities without using the drill-ship.

4. InterRidge

Mével said that a detailed presentation was made to PCOM at Cardiff. InterRidge has no money for science but it organises workshops to define experiments and discuss results. She reported the main thrust of two recent InterRidge workshops (Appendix F4.1). Firstly the SW Indian Ridge was chosen for global study, and to start to compile a digital bathymetric atlas of mid-ocean ridges. A workshop in Boston on 4D architecture of oceanic lithosphere agreed that drilling was an important tool. Secondly she said that slow spreading ridges was another main area of study, and what should be done at fast spreading ridges. Drilling was required to relate the geophysical crustal structure with the geology, and the best place to do this seems to be the HESS Deep. InterRidge endorsed 735B drilling and logging. A working group is to lead the preparation of LOI's and drilling proposals (Appendix F 4.2). Dick said that for Arctic ridge drilling he could not yet see a use for a drill-ship, Langseth agreed and said that more geophysical data was required first. Drilling targets were not discussed but it was implicit that some may emerge.

She then reported that the next workshop is to be held in Paris where they will be discussing TAG and Sed Ridges (Appendix F4.3). She said that InterRidge has responded to PCOM very positively for the LRP. InterRidge are looking at meso-scale studies, 4-D architecture, fluxes, crustal accretion in back arc basins, and general active processes. Mével said many targets will require DCS and we don't know when this will be available.

Natland asked how far off axis and how deep the targets will be. Mével said perhaps 10Ma crust. Natland said there is a disconnect between people working on zero-age crust and off-axis workers and he wishes to bring them together; if it cannot be monitored then at least you should be able to see what has happened. Robertson said that it looks as though processes in back-arcs and on Mid-Ocean Ridges are similar, but site survey data is limited and perhaps InterRidge could help in co-ordinating site survey data for areas of joint importance.

5. MARGINS

Taylor reported that it is a US-only program but has friends in other countries. The current Chair is Dale Sawyer, and he has submitted a proposal for a co-ordinating office to NSF along with a draft program plan. Lewis wrote to Sawyer about the LRP, and the response is positive as it is an essential part of the future of where MARGINS want to go. In their response they set out where MARGINS want to research in terms of active faults and décollement zones, and also talk about using holes for experiments and observatories.

Mix asked if MARGINS has money, Taylor said that not as yet but it will be like a Ridge Office and will need more than NSF support. It is hoped it will evolve into an InterRidge type office, as at present there is a huge community with not much focus. Mével said that there is an initiative in France to create such a programme, and Taylor said that many other countries are currently talking, but that is all. Natland said that these are behind MESH in terms of stating what they want from drilling, and asked Taylor how he saw things evolving. Taylor replied that as he saw things, they are ahead in drilling, e.g. Barbados and the New Jersey margin. Many proponents are involved in the MARGINS program, and Larsen commented that his program off SE Greenland is in fact a MARGINS program and is funded for 5 years, they just haven't published a program document yet.

Kidd said that there are a number of funded programmes about half way through their life in Europe, and asked Weaver to comment. Weaver said that Euro-funding works in 3 year cycles. They involve groups of 3 countries minimum, and at the moment there are Mediterranean sedimentation, North European Margin, and Mediterranean Ridge programs. They tend to be interdisciplinary, but a link with Europe and ODP would prove useful to give the time aspect to the European-funded study. As examples of funding levels, he said that MAST II had $50M and MAST III had about $100M. He said there is also a parallel Environment program with separate money sources. Mével suggested inviting Dr. Jean Boissonas (Director of the European Union Marine Science and Technology (MAST) programmes).

PCOM Endorsement 94-3-4

PCOM endorses the PCOM Chair to invite Dr. Jean Boissonas, Director of the European Union Marine Science and Technology (MAST) programmes, to attend the next PCOM meeting to present the Geoscience aspects of the MAST programme in order to increase communication between European Union marine science programmes and ODP.

6. DOLCUM

Dick reported that DOLCUM is a loosely connected group that evolved in 1989 from the success of Site 735B, and involves about 150 people. Planning activities consisted of the Offset Drilling Working Group, and goals include total penetration of the ocean crust and getting to Layer three. Site 504B represented progress on the other aspect of the DOLCUM report.

All the components of the DOLCUM report are there and they know what is achievable and they need another planning meeting. Mével suggested that it is really a part of InterRidge, and Dick said that he didn't think so but that it may eventual be subsumed. Taylor said that perhaps this should be removed from the list. Both Mével and Dick said that there are enough links with this program.

Coffee Break *10:35 - 10:55*

G. Long Range Planning

Kidd reminded PCOM that the LRP is a draft and that even what will be presented to EXCOM will be in draft form, and Lewis presented the latest draft written by the LRP subcommittee, looking mainly at 1994-98 Phase II, 99-2003 Phase III, and 2004-2008 Phase IV. He said that it was being written for the customers, those who are putting money into the program, but also it has to be acceptable to the broad science plan contained within it. He ran over the process for input to the LRP: thematic panels, partner countries, global programs etc. and the deadlines. He then suggested that ODP and JOIDES should think of the customers as government agencies. His perception of the message received is that the customer does not want more of the same, and ODP has to be innovative, but with good quality basic research. Dick said that he thinks his customers do want more of the same and he gets this opinion from the proposals that come in. Lewis said that opportunities include the possibility of a new riser drill ship platform, but this is not the only platform (Appendix G1).

He then reviewed the role of scientific ocean drilling (Appendix G2) along lines that he said arose from discussion at the last PCOM, this may be seen along the lines of a mission statement for ODP. He said that over the last few years many national and international geoscience research programs had been begun and that whereas in the past drilling was seen as the major goal, it has now become a component, but not the only component of these programs and areas of study. (e.g. TAG area, ION).

Lewis then ran over the contents of draft Vision and Mission statements put together by the LRP Subcommittee (Appendix G3).

In terms of the vision statement, Dick said that he would like to see a sentence emphasising "understanding earth dynamics through basic research and exploration". Loutit said that in trying to explain, then it is no longer a vision statement but a mission statement. Fox said that they thought they had stated this already. Larsen said that he thought the words "basic research" should be in the vision statement. Langseth recommended changing the time definition to "in the next 15 years", and that the second sentence should "say this understanding or knowledge". Sager said there is nothing about studying the ocean, and that this should appear somewhere. Kidd commented that the emphasis is that we have to study the oceans to get to the big current-interest issues. Kudrass said he thought it was not good to put basic research in the vision statement, that it should appear in the mission statement or there may be problems in attracting long term funding. Pearce said the UK was focused to societal relevance and said that the word "basic" could be left out but that Dicks' suggestion sounded OK to him. Natland commented that it may read that if the proposed work does not include climate research and resources, then ODP will not consider it. Kidd asked for a modified statement to be put together for approval later in the meeting.

Lewis summarised national priorities (Appendix G4). He said that USSAC was as much a user as PCOM and are not necessarily a representative customer. He referred to Malfait's previous comments on the emphasis on strategic research from NSF, and that perhaps we should re-phrase some of the things we are doing. Input from AUS-CAN was that up-front societal relevance was the name of the game but that good basic research would be treated fairly. Loutit pointed out that his (institutions') vision and mission had to reflect resources, mans' effect on the environment and hazards. He went on that you must write the vision in terms of the outside groups and not on your own interests, and further that you have to make sure internally that basic science isn't compromised, but you must show how this influences the user more and more. Lewis said this was the message he got from all the partners. Bloomer said that this was fine so long as we are careful to clearly state the balance in case we become trapped in several years time when agencies ask to see the results. Berger said that we do not want to represent ourselves as doing something we are not doing, we must look upon it from a different perspective. He said that peoples' mind-set toward the earth has changed since the program started, now people want to protect the earth and not necessarily exploit it. PCOM must try and see things from the external angle, and he then summarised the external research programs priorities (Appendix G5).

Lewis outlined the draft Long Range Plan, which had 2 themes (Appendix G6). He said we did not have any constituency looking at biological related projects that can arise from ODP work, and said that you can couch all the present topics into two new themes; Dynamics of Global Change and Dynamics of the Solid Earth. He said that these are in line with the thematic panel white papers. Dick asked how the Dynamics of Global Change differ from the objectives of OHP. Mix responded that it adds major parts of SGPP objectives also, such as biogeochemistry and the dynamics of ocean chemical change. Berger said that the dynamics of the solid earth actually has a large component that is in fact is to do with fluids, and that fluids are becoming more and more important. Bloomer suggested a possible third division, of Fluid Exchange. Fox said that fluids didn't appear in the heading, but it was a major subheading. One of the reasons for two divisions instead of four as we have now, is that the division can be artificial and can lead to problems of topics falling between panels. Natland said there seems to be one panel more -or-less continuing and a combination of three others and that this may mean that there will not be enough expertise on the panels to deal with the problems. Taylor said that looking at the former panels of DSDP, when combined became large and complex and caused a lot of trouble because of the diverse nature of the study areas. Mével said that perhaps the outside programs should be more proactive in preparing proposals. Sager said he too thought the Dynamics of Solid Earth would be too large and unwieldy, and suggested moving the fluids to the other panel. Hay said that SGPP was split from OHP as it was recognised that it's objectives didn't concern Ocean History. He didn't think evolution and biosphere should be a separate theme under ODP. Langseth said perhaps it should be palaeontology. Taylor said that taking earthquakes as an example, and the work of TECP and SGPP, there has been a synergism and interaction that has dovetailed well. He said that for the integration Lewis is requesting in terms of the way the science is going to evolve, then the people involved would simply be subsets; that this re-organisation may well take place outside the program, and that perhaps the question of societal relevance should not affect the panel structure. Kidd said he thought we should actually advance and put more effort and expertise into microbial environments and that they are as important for geologists as biologists. Dick supported this, with a preface that it has to do with opening new horizons. There was consensus that this project can do this and no-one else.

Lewis said that you can bring in as many panels as you like, but the idea behind the draft LRP was to focus and help those paying bills understand ODP. Natland said that the Dynamics of the Solid Earth is too unwieldy, that we will have to live with whatever is published and this is simply unworkable. Lewis said that panels formulate their own proposals as well as reviewing those from outside and that he considers this a conflict of interest. This was the rationale he took when drawing up the mission statement. Bloomer said that he didn't believe that any panel had written a proposal, though they had been proactive and helped proponents. Larsen said that the most valuable resource is the community. and the panels had both advisory and liaison roles. He said it is dangerous to have two panels, there should be three or more or they may become too competitive. Sager suggested that the consensus is that the four panel system is OK and although it may need renaming and slight reworking, they should be kept. Kidd questioned the argument for changing the present system. Fox said that InterRidge proposals would have to go for LITHP, TECP and SGPP, and he sees it as a disconnect between these initiatives that are coming on line and the present structure. Langseth said that it is a question of balance, there is a proposed 50/50 split, and that it is an uncomfortable split for many here. He believes it has something to do with the amount of drill-time, and that by having two panels you will be effectively allocating the drill-time of each to 50%. He suggested that you need both money and the interest of the scientist, and if that interest is lost it could be more dangerous than lack of money. Fox said the rationale for two panels was in recognition of what the program does best. There is still a misfit of the aims of TECP and LITHP and the technology that will allow us to begin to address their problems. He worries that people are so fearful of change that despite this success, unless changes occur the product (ODP) may disappear. Despite the importance of what is done, the links with the customers must be brought up to date.

Natland said that some of the misfits, for example between LITHP and TECP, may be solved by changing the thematic panel mandates. Mével said that, for example InterRidge will in reality be an Ocean Crust panel. Robertson said that panels can meet together, they have in the past and that these problems are not major and they can be overcome. Suyehiro said that the actual number of panels could be a separate issue, and asked if PCOM can agree on the themes as set out in the draft LRP. Kidd agreed with this sentiment, and said that for many of the goals, the technology will not be available until after 2003, but there is technology at present to do a lot of what is in the draft LRP. Dick agreed that the two themes are well stated and can drive the program, but he said that TECP and LITHP have had major successes and that the program should not be carried solely on the success of OHP.

Taylor said that PCOM has historically avoided making a judgement call between the panels and that is what we are now doing, and that we are now cloaking that discussion. A second fundamental issue is how will our future panel structures relate to the national and international programmes. He said that you could make these international programmes into panels if that was what was wanted. Kidd said that we are already making strides in receiving input from these other programs. Secondly there will not be significant technological development until later down the road. Taylor said that the draft LRP is asking PCOM to "bite the bullet" and make decisions now. Natland said that it may take 20 legs to solve the MESH problems, but if we are taking proposals from individuals why build MESH and other programs into the LRP? Mével said that we should not be too specific, as proposals may not be developed in time. Mix said that if proposals are not up to standard then they should not be programmed, proposals should only be scheduled if they stand on their own merit. Delaney said that the thematic panels that co-ordinate the proposals, are proposed to be restructured, but there is no mention of how PCOM will change, she also commented that the thematic panels give advice, it is PCOM who schedule the cruises.

Dick said that getting adequate proposals into the system in the relevant time line is impossible. Sager said he thinks that the panel system is OK, and that we must decide what time and effort we wish to allocate our support to. He asked if palaeoceanographers can produce enough proposals to run 3 cruses per year. Mix said yes, as these proposals get up and running, proposals could be forthcoming if the global programs came to pass, however, they should only proceed if the science is of sufficient quality. He said further, that the overall goal is to enlarge the program, and it was agreed that Ocean History would be a bow-wave that could lead us to a future multi-platform program, and that although Ocean History may grow a little faster than the others, but that the others would grow too.

Kidd said that we must move on and the next stage must be another draft, but asked if there is agreement for a consensus statement. Shipley said this is very important even if it means meeting Friday evening. Dick said that now there is a panel structure where each panel does all its work, why not use working groups to do the work and then have the panel meet only once to do the final "cut". Falvey said that with a reduction in the number of panels, he saw an increase in the number of DWG's. PCOM agreed to meet again on Friday evening to discuss this further.

Loutit said that the LRP subcommittee should look at the document again before Friday evening's meeting. Kidd said that PCOM is the driver behind this and that PCOM must think of this in terms of FY96 onward. Langseth said there is a lot to be discussed and should we ask EXCOM to accept a final version of the LRP document at a meeting after January. He did not believe it was ready for EXCOM in its present form, and he asked for time away from PCOM, using e-mail communication to ensure we get a thorough discussion, as that would not be achieved on Friday. Larsen said that it is to be both a renewal and Long Range Plan document and at the moment it is neither. Falvey said it is already on the EXCOM agenda and must be presented even in a draft form.

Arculus said many are unhappy about phrasing things in terms of societal relevance, and that we must listen to what the customers want to hear. That will allow us to continue to do what we want to. Kidd reiterated that it is on the agenda for EXCOM and that we need a statement. Kidd asked that we focus on the contentious issues on Friday night and flag them for EXCOM.

The following section was discussed on Friday 2nd December between approximately 18:15 - 19:30. It has been placed here in the minutes for continuity

G. (cont.) Re-visit LRP for input to subcommittee

PCOM had an open discussion where concerns were put to the subcommittee. It began by Lewis reminding PCOM that the present document was a rough draft and it was only meant as a guide as to the final content. He first asked for opinions from outside PCOM on whether we were going in the right direction, and then asked PCOM where they think the main problems are. We might finally get a sense of how the sub-committee might revise it.

Falvey gave a few comments for PCOM to think about. It is important to consider who the LRP is being written for. There are some very serious deadlines, publication must be in May/June 1995. This is especially important for France and the UK. Potential customers want to see things mission oriented, but without sacrificing basic research. Next year sees an ODPC review leading to renewal in 1998. He sensed that PCOM should seriously consider the idea of two themes. It could project the program in a much more understandable light externally. He had in mind a trade off ,with a reduced number of standing panels would be an increase number of DWG's. There is always the question of compromise on that, and on the question of time-scale.

Robertson made a brief scenario. From UK perspective we have to go for societal relevance. The two themes are broadly OK, but the SGPP panel may be lost in the new framework which may become unwieldy. Could not broader themes be considered, such as Ocean History and Sedimentary Environments with the other panel called Tectonic and Magmatic Crustal Dynamics.

Malfait commented about societal relevance. He said ODP must not try to be everything. From the NSF perspective it will sell on the quality of the science, but things can be re-phrased to suit the reader. Also there are two arguments that are getting mixed. Whether the program becomes more focused, and the second argument of how to set up the panel structure, and these must be kept separate. A further point is that you shouldn't underestimate the non-scientific aspects, education, international links, engineering development, these are major selling points in the higher political structure. Dick reminded PCOM that Knauss had said that the program is run from the bottom up, and asked how we could sell that. Malfait said that the international community aspect was the way to push that, along with no governmental interference.

Sager said that he was struck by the simplistic beginning of the draft, but then the jargon came thick and fast and perhaps this should be gone over by a science writer. Mével said the way to sell the document will be different in different countries and that perhaps each country should have their own preface. Francis said that people have expressed concern about the dominance of the Japanese ship in phase IV and that the JOIDES Resolution is not mentioned at all as the ship for phase III. Also he said that in the earliest draft there was talk of larger diameter cores but that has disappeared. Perhaps the top 100m or so should be sampled with a giant piston corer and then use the pipe for regular drilling.

Loutit said that if the vision and mission statements are worked on the rest will fall into place. He also said that you must use examples to show the relevance to society, and hammer the fact that this is the most successful geoscience program ever. Then go on to say what the new directions are, and will be in the future. Shipley said that it wasn't stated what we want from those who read the LRP. He asked if it was to get through the next phase ? and said we must clearly put what we want and how we are going to make it happen. We have to make some hard decisions about where we want to go, be realistic about the sums of money we want and what we can realistically expect to achieve.

Natland commended Robertson's idea with slight modification. His major concern about post 2003 science is that we have to say clearly what science we are interested in or what societal relevance it has, and not that we have a new ship and this is what it can do, but this is where we want to go and this is what we need to do with it. Larsen said that from an OECD view, we are a small program and that the cost of a combined land-ocean drilling program is only about 1-2% of the typical total government funding of Earth Sciences programs (universities, Surveys etc.). Dick compared ODP costs to those of the space program and suggested we look at the way we focus things to get attention and some of that money. Larsen said we should not look upon our science as expensive, because it really isn't.

Lewis said he wants to come back to scientists for examples to use. Also there are goals for the future. On the 2 theme system, the issue of how we organise ourselves is an internal matter and doesn't need publicising. Lewis asked PCOM to come up with statements of achievements quickly. Berger reminded Lewis that we have customers in the geoscience community and we must be very careful not to disenfranchise the community. Pearce said the UK is desperately in need of a PR document that emphasises the achievements and relevance to society. Hay pointed out that this system has already changed with the times several times, most other programs have not. He suggested removing the current "buzzwords" and possibly using our own.

Taylor said it is too easy to see the MESH document in the LRP, and it does not reflect the breadth and the focus of where we are and where we want to go. Loutit said we have the 4 white papers and we should go back over what we have achieved, the White Papers should be at the centre and the achievements should be put around this. Taylor also said that 3 themes were put into a B level category and one in a super-heading. He would like to see that settled tonight. Fox said that the 50/50 split is now gone. Taylor asked that in that case can we have four themes back ?

Langseth said the program should be presented as a balanced program. Although climate change is an area where we have a unique capability, and we should emphasise that, the document should still present ODP as a balanced program that can address many problems. Falvey reminded PCOM that the document will be re-written in 5 years despite having a strategy to 2008. Fox suggested that the "Climate Change" heading may be the problem and we could change that. Dick agreed and said that the theme should be broadened. He said two themes are good, more than that and we will have a selling problem.

Lewis summarised by saying Section 1 needed major re-writing, and we need to think again about the two major themes and what they are and what they are called. Dick said the vision statement was also a problem. Lewis would prepare another draft and get comments from PCOM before the January 1995 EXCOM meeting.

Lunch Break (Thursday 1st December 12:50 - 13:35

H. Budget Items

1. FY95 Re-instatement of AUS-CAN contribution

Falvey presented this section, outlining the FY95 Savings and proposed re-allocations (Appendix H1.1). This exercise left the option of an extra $100K for re-deployment. Falvey would like to allocate an additional $10K to the SSDB to increase capability in digital seismics. He said that the EXCOM Chair asked about possibility of glossy annual report. Francis said he thought TAMU would request $50K for a shallow water hazard survey. Falvey said that was a valid point and it was open for discussion. Berger asked about the day-rate saving, and said that was a "flexibility". Francis said that it was based on an inflation factor and they may make savings. In recent years he had put saving into items identified by SMP, in FY93 they spent $300K of this flexibility. Falvey said that they are removing the responsibility for these funds from TAMU and he was asking PCOM to put this into the budget as line item.

Falvey reminded PCOM that he wants PCOM advice before he writes to NSF requesting the funds. Dick said that the $50K for the hazard surveys forms an integral part of a high priority proposal that PCOM has backed for a while and if the survey is not done then the cruise will not be scheduled. Langseth asked about the timing of the DCS land test. Francis said that once the feasibility has been proven setting up the hardware and software can go forward in parallel. Langseth said that there were sufficient funds to carry through the feasibility tests. Francis agreed but said that did not include the land test.

Pearce said that the UK is in dire need of short term PR and supports the call for a glossy brochure. Sager also thought that this sort of PR has been poorly handled in the past and that this is a good investment. Shipley asked if the $50K estimated would be an annual cost. The details were not known.

Lewis supported the hazard survey as it impacts the FY97 program, and the CLIP development was also important as it was at the centre of the database upgrade. Goldberg commented upon the shear tool for Leg 160. He said it was a Schlumberger tool and it was an outside request. Dick and Taylor said it had not gone through the panel structure so that is out. The magnetic susceptibility tool is requested for use on Legs 160/161. PCOM consensus was that the hazard survey was more important, so that was added to the re-instatement list. Falvey's suggestions (Appendix H1.1) were accepted by PCOM consensus.

2. FY96 Budget Prioritisation

a) 1996-98 Budget

Lewis outlined the program elements for PHASE II 1996-98 (Appendix H2a.1). The budget is flat for this period, which actually requires a reduction of approx. $1M per year ($3M over 3 years), which cannot be taken from fixed cost items. He then referred to a recommendation from the LRP subcommittee (Appendix H2a.2), and suggested asking TAMU and BRG opinions on what we should do so that PCOM could consider what to advise.

Kidd said we have to look to the LRP because we have to address where we are going to make the savings, and he asked Bloomer to comment on PANCH priorities, which are now included in the PANCH 94 recommendations (Appendix H2a.3-H2a.6). The PANCH recommendations break things down under essential and ideal requirements; Kidd asked Francis to comment. Francis said he didn't think this was the way to pick specific cuts, that things should be prioritised as had been done by PANCH. Francis has not come prepared to offer cuts, but he has asked R. Merrill to talk about the cost of publications and the advantages and disadvantages of different publication formats. Kidd reminded PCOM that PANCH had asked for their list to be roughly costed so they may take that back to the panels. Arculus said that a publications presentation would be useful, and asked if the worry over 97-98 isn't premature. Lewis said it was very real and more serious than many realised. Malfait said that next years' budget will be flat at $44.9M and inflation will take a bite from that. Falvey said that even two new 1/6 partners would not see an increase in allocation, but with new membership over and above that an increase in funding was negotiable.

Kidd asked to look at publications. Merrill said he would put the publications budget into perspective, the formal report budget is 2.6% of the $44.9M, at just over $1M. He said that other agencies spend from 2-8% so TAMU are not out of line. He then outlined the attributes of ODP Publications, the aims of the ODP Initial Reports and Scientific Results Series, showed data from a Science Citation index of non-ODP publications and mentioned the number of Citations by volume (Appendix H2a.7-H2a.11). He commented that citation peaks seem to be Lithosphere and Palaeoceanography. He then ran through the ODP publishing schedule (Appendix H2a.12) commenting that Legs 142,3,4,5 are the first legs where the deadlines were firm, by Leg 147 the authors were submitting on time, the number of manuscripts seem to be increasing at about 4% and he outlined the proposed distribution dates (Appendix H2a.13). Merrill then showed a map of Proceedings distribution (Appendix H2a.14) and said that of the 1700 copies that are printed, 1450 have destinations. He then showed a table of the costs of publication (Appendix H2a.15) and Sager asked why those at the bottom are half the cost. The view was that those Journals have larger print runs and carry advertisements.

He then presented 6 methods of how to save money on the IR series (Appendix H2a.16). Berger questioned the savings identified, Merrill explained that the editing cost was about $130K, which included quality control, typesetting spell-checking etc. He then ran over 4 ways to save money on the SR series (Appendix H2a.17). Dick asked about the costs of camera ready copy. Merrill answered that it is possible and would reduce composition costs but there would be an increase in pages and therefore savings are difficult to identify. Dick asked the saving if only one volume was published, Merrill didn't have the figures to hand, it would depend upon the number of barrel sheets etc. published as opposed to manuscript pages. Merrill then reviewed the status of ODP Volumes at the end of 1994 (Appendix H2a.18).

Kidd asked if Lewis had any comments to pass on now in terms of the LRP. Lewis replied that by the time 1998-99 arrives we should be looking at electronic publication. Falvey said that perhaps we should look upon it differently, looking at a single leg as a project from initial planning until final publication. This option may identify savings not apparent from looking at the overview of all costs. Dick said that it seemed obvious that publications was an area for cuts and that such a decision must be made now, because of the lead time in savings, or we may have to break commitments in other areas further down the road. Berger suggested giving Merrill a target figure and asking him to work out the details. Lewis said that any cuts have to be presented to BCOM in March, and therefore must be identified now. Francis reminded PCOM that we have to recommend our advice to JOI and not decide upon details here.

Kidd asked TAMU and LDEO to fulfil the PANCH requests for approximate costings and reminded PCOM that PANCH do not want to lose shipboard measurements. But Mével said that we will have to look at all areas. Arculus asked if we can hear details of what is sacrosanct and what may be cut. Bloomer said that the PANCH list (Appendix H2a.6) was a core part of solving the scientific problems and ran through the list again, reminding PCOM that they did not have dollar values for items. Kidd said that the sense of the panel discussion gives information in terms of their priorities.

Kidd then asked PCOM if there were any disagreements. Dick strongly disagreed with some aspects and said that the scientific party is grossly under-utilised and that having trained technicians as watch-standers and not allowing the science crew to, for example cut rock is not realistic. Shipley said the data base upgrade needs two extra technicians. Allen said that the data quality is consistent and that cutting staff will result in loss of quality. Francis said that there was a vast amount of difference between hard and soft rock cruses and that TAMU has to man every leg as though they are all high recovery legs. Sager said that IHP would be against reducing technical staff due to the reasons outlined by Allen. Also he did not see evidence of under utilisation of science personnel. Larsen suggested the use of a core-group of technicians being augmented during high-recovery legs. Mével said that PCOM instituted a mechanism for getting graduate students on legs, and asked how that was working. Francis said that they had been taking about 2 student-technicians on the last several legs, but he was worried about diluting the quality of service. Baldauf also said that you had to marry the technicians with the equipment in terms of high, medium and low priority. Arculus asked what we could save by dispensing with XRD and core scanning. Allen said the savings would be quite small, although you would save on replacement costs and sensor upgrades.

b) Beyond 1998

Lewis said that the assumption was that JOI would be active in membership recruitment and that in terms of the budget we should be able to accomplish what was (is) identified in the draft LRP.

Goldberg commented that the flat budget is not new, and that a real dollar increase is really double that (in operation dollars) and he has lost out in the last two years. Schlumberger have had 5% increases that have flattened off as they have come to understand our predicament. It leaves BRG with a shortfall of 4-5% of their operating budget. He said that they are now looking at personnel reductions if they have to make any further savings, there is no flexibility left. He further said that there is not a lot of room regarding personnel, but he could reduce non-function personnel such as administration. The PANCH list does not significantly impact BRG, but the impact of the magnetic susceptibility tool is as yet unknown.

Kidd asked if there is a consensus on cutting personnel. Delaney said you need to define what science you want to do first. Mével, said that maybe other programs such as MESH could provide technical support. Bloomer said that special operations could impact his panel, but he would think seriously about losing special operations before losing the routine tools. Langseth said that in terms of geothermal programs many special tools are vital, and that without some of these tools the legs would be almost worthless. Larsen said we should prioritise the tools and techniques, and not talk about eliminating them. Taylor said that there are no class B tools, but there are "occasional use" tools.

Kidd asked for a consensus statement and motion to JOI on functions to be looked at for potential cuts.

PCOM Consensus 94-3-5

PCOM reaffirms continued support for the replacement of the computer-based data management system and continued development of the DCS if judged feasible (see motion 94-3-7).

PCOM Motion 94-3-6

PCOM offers the following prioritisation for BCOM with respect to budget cuts required by flat funding of $44.9M for FY96, 97 and 98 as identified by NSF.

1. Publications;
2. Technical Support: Reduce the technical staff on the ship by one per leg (2 FTE) or equivalent shore-based technical support;
3. Engineering Development;
4. To the extent possible, support certain experiments and certain special logs with non-commingled funds;
5. Reduce funds set aside for "Special Operating Expenses" from 4% to 3% of the annual budget.

In addition, new approaches to "project management" should be considered to identify special operating expenditures in advance and thus provide tighter control on costs.

Vote *14 For, 2 Abstain*

Coffee Break *15:55 - 16:10*

I. Diamond Coring System (DCS)

1. TAMU

Dan Reudelhuber presented on behalf of TAMU. He gave an outline of the TAMU view on the status of DCS (Appendix I1.1) and the new development plan that has been reviewed by TEDCOM (Appendix I1.2). He announced that Stress Engineering Services (SES) are the prime subcontractor, and that two individuals have been retained, one a mechanical engineer and the other a computer specialist. He then presented the Secondary Heave Compensator Development Plan (Appendix I1.3-1.4) emphasising that he has tried hard to implement an open communications structure so that all members in the group can talk to each other at any time. He then presented the development plan in terms of the timetable (Appendix I1.5), noting that feasibility and review would be mid 1995, and that is the earliest that TAMU will be able to make a recommendation to PCOM regarding feasibility.

He then summarised the current status of the new development plan in three parts (Appendix I1.6) and re-capped on the three main development phases. Phase I involves coming up with a plan in itself (see Appendix I1.1). At the end of Phase II they make the feasibility determination. Once feasibility is established then go to Phase III and land test this may be 30 September or thereabouts, but this date has no input from prime contractor so the timing is preliminary.

Natland asked where PARVUS are in the development. Reudelhuber said they have been selected by SES as their primary subcontractor. Natland also asked about the software developed by Paul Munroe. Reudelhuber said that TAMU have the software and are free to use it. Langseth asked about the fact that the dates for both a final plan and negotiations with contractors will be January 1st. Reudelhuber said the computer model to be used as the yardstick will be completed before the planning stages. Taylor also questioned the dates, saying that nothing scheduled for November has yet occurred and will not do so until January, Reudelhuber replied that until the contract has been negotiated with the bidders, the dates are not fixed. The size and complexity of the contract makes this stage difficult.

2. TEDCOM

Shanks presented the TEDCOM view on DCS. He said that the DCS subcommittee met during the year and presented both the TEDCOM DCS Subcommittee membership and DCS Subcommittee actions (Appendix I2.1). He commented that since the PARVUS meeting they had reviewed several documents of work and passed them to TAMU and it looks as though everything going to plan. Shanks ran over the main points of the Shatto Control Loop (Appendix I2.2) which will be the main control system in the secondary heave compensator.

Lewis asked in terms of the budgetary impact, what will be required in terms of the land test. Shanks said that until Reudelhuber can fully plan that work, with the modelling, TEDCOM will learn about several other components and how they contribute to the overall efficiency of the system. Reudelhuber said previous estimates for a land test are $270K with a 4-5 month duration. Francis said they have money carried over ($560K) as there wasn't a land test last year, but reiterated that they don't yet know what the costs of the prime contractor will be.

3. PCOM

Natland passed around sample of a diamond core to show that it can work and what can be expected when the system comes on line. The sample was almost zero age crust.

He then ran through areas where the DCS would have applications (Appendix I3.1) and compared it with recent experiences using other types of system such as the motor driven core barrel. He summarised that it was worth pursuing at least to the stage of a feasibility study and possible land test. He said that on Leg 132 they went to some very difficult places to core, and that ODP should develop a phased system of development and operation at sea, learning as you go. A big cost item will be putting the system on the ship, it will have to be coincident with a refit. If the tool is proved successful (around 1998) then it could either be built into a re-built JOIDES Resolution or a new platform.

Lewis reminded PCOM that the limitation of 4000m is for the DCS mini-rig. Shanks said you would have to re-design the secondary heave compensation system to use this. Lewis said that we may want to plan on a second generation system in terms of the LRP. Shanks suggested that total maximum capability would be 6,500m. Reudelhuber said that to go deeper you would have to reduce the core size. Natland commented that the 4000m capability would cover most of the East Pacific Rise.

Taylor asked the question that if the bird's nest is not in the derrick is it a fundamentally different design of heave compensation? Shanks said maybe not, TAMU looked at two types a few years ago, one of which was a liner tensioner. Shanks confirmed that the computer systems being developed could be used on a different heave compensation system.

Langseth said that TEDCOM has advised PCOM to approve this project to the feasibility stage and that hopefully we can follow this through to the land test. He asked that PCOM should consider that if all the DCS tests are successful we should not hold up development and a sea-test due to lack of a ship-schedule slot in FY96. Taylor said in that case the issue is the budget of FY96 which will have to go in the program plan now. Delaney said that this time next year we may not have the land test results. Lewis said that was true, but if necessary we would have to adjust the schedule.

Kidd called for a motion that was voted upon as follows.

PCOM Consensus 94-3-7

If feasibility of the secondary heave compensation system is proven at the end of Phase II of the DCS development, then PCOM recommends that ODP-TAMU proceed to Phase III and Phase IV (land tests) at a pace consistent with budgetary constraints.

Vote *14 For, 2 Absent*

J. Offset Drilling

Francis began the presentation by saying that he may introduce Glen Foss and Tom Pettigrew if their expertise is required. He reported that TAMU hosted an offset drilling workshop in September 1994. He continued, saying that the offset drilling legs are not achieving what the scientists set out to achieve, a cased hole that can be deepened on future legs. He said that it was because our technology was not up to the task and referred to a coring summary of Legs 153, 147, and 140 (Appendix J.1). He then described the current Hard Rock Guide Base (HRGB) and said that it is unstable on slopes of over 20°, and many areas have slopes steeper than this (Appendix J.2). He said that during drilling the drill string is frequently not vertical, becoming less so with depth, and that the drilling fluid washes out sediment and talus from beneath the base, making it unstable (Appendix J.3). He then gave the reasons why an engineering leg, with no science pressures to collect core is required (Appendix J.4).

Sager asked if these techniques are ready, and Francis replied that they are not. Pettigrew said they would be ready by FY96 and would need 30-35 days of operating time. He said they were still evaluating a number of ideas, and they are not sure what equipment they will need (in terms of sea-floor systems). They do know what the need is in terms of casings etc.

Mével asked what kind of budget they will need to develop this equipment. Pettigrew said he thought it would be of the order of $500K, there is not much off-the-shelf sea-floor hardware that fulfils ODP requirements. Kidd asked about hiring-in equipment that is available off-the shelf as opposed to purchasing. Pettigrew said this was in fact what he meant, but the $500k was a gross estimate. Francis said that a normal leg cost about $250K, but Legs such as 153 and 147 cost about $500K. At present the sea-floor equipment for DCS will be the existing HRGB, that is why this instability problem must be overcome, to realise the full potential of DCS.

Shipley asked if TAMU have the staff to develop this in time for a leg next year. Pettigrew said it would take a considerable amount of manpower, with re-arrangement of priorities, or design work done outside. Taylor said he would like to see a report of a working group, a proposal with full site survey information and the types of site to be addressed and for it to proceed through the panel system as any other leg. Shipley said that he is not sure about separating engineering legs from science legs. Allen said that running it through the JOIDES panel would be like mixing apples and oranges, also there may be problems in staffing and the prioritisation of goals. Natland recalled the original idea of engineering legs, which was that there were technological developments that needed to be addressed if the program was to proceed. The concept was difficult to put into the system, but once it was there most people were happy with it. He said evaluation and development of equipment was important and although scientists should advise, the engineering requirements should take priority when selecting sites.

Taylor said that using his scenario, experts from the areas of test would be on hand to advise on bottom expectations, that TEDCOM could review the proposal and that SSP could advise also. He did not mean pushing the proposal through the thematic system. Bloomer said that he did not feel LITHP could give PCOM advice on offset drilling proposals unless they got feedback from the type of project under discussion now. Falvey said that this was an example of what the EDRC wanted to see, engineering legs treated as projects, fully costed and run through the whole system. Kidd agreed with Falvey, and said that it should go to the service panels and that it is for PCOM to track this kind thing, they cannot be ranked as such. Dick asked who is going to put these type of proposals together and review them. Falvey said the LRP will have an engineering development strategy and TAMU will be responding to that.

Francis said he is happy for new proposals to be done in this way, but that many engineering developments are improvements upon existing systems and he did not think these appropriate for panel review. Falvey said that if you can develop equipment that fulfils a need then it can indeed be treated as a 'new' project. Pettigrew replied that it is starting on a curve and not a fresh project. Falvey persisted and asked if that prevented these things from being planned and costed properly. Lewis summarised that PCOM encourage TAMU to produce a workshop report and work closely with PIs. Pettigrew said that by returning to the same test area, you could compare much better how much things have improved. Also site surveys are required for engineering legs.

Adjourn *17:35*

Friday 2nd December 1994 ***08:35 am***

K. Data Base Management System (DBMS)

John Coyne presented the ODP-TAMU view on the status of the database, and this part of the meeting was also attended by R McPherson (TAMRF) and R Mithal (ODP-TAMU). Coyne said that much of the work is still ill defined and they want to view it as a joint project with TRACOR.

At the Steering Committee meeting in September, they decided that 3 phases were appropriate for the statement of work (Appendix K1). Analysis - TRACOR will look at current systems and get as much information as they can, it will be undertaken simultaneously with the specification phase and this should help define the requirements of the development implementation. The original proposal was to use an incremental build methodology. Some of the development work will therefore be done in the analysis stage and TRACOR will prototype various parts of the data system to do this. TRACOR need contact with staff at TAMU and staff on the ship so they will sail from Falmouth to Dakar, with a large technical contingent, but no scientific party. TRACOR staff will also go on Legs 160 and 161 to get science input and be exposed to a real working environment. At the same time they will be working to develop prototypes. They will not however be building production systems; these will be prototypes to show that progress is being made in the correct directions.

Phase 2 will determine the sizing and network requirements and should be quite straightforward. TAMU would like a test environment as soon as possible so that they can test the products TRACOR are working on. After the transit leg TAMU expect to get data flow and system architecture diagrams. The main deliverable will be the analysis report which will have the software development plans and test plans so that ODP-TAMU can move through phase 3 easily.

The requirements document will be to define the applications that they will build in phase 3, after proof of concept and prototypes. Phase 3 will be actual production and development of the system. ODP-TAMU hope to sail TRACOR people as often as possible to work with the development products to modify and re-evaluate them under working conditions. He then presented the time-line of the project, the project advisory structure and the ODP-TAMU Information Services structure (Appendix K2-K4). He said that TAMU are still in negotiations with TRACOR to nail the terms and conditions of the contract. In order to move the project forward and take the opportunity of the transit, TRACOR have begun to collect software code and documentation from ODP-TAMU so they have an idea what a preliminary model will look like. It is anticipated the preliminary phase will be ready 2 months after Leg 161 (end July 1995). ODP-TAMU anticipate that at least two applications will have preliminary prototypes. They have started looking at the shore system and are attempting to understand the requirements for that part of the model. They will then start working on the ship systems and the two will proceed simultaneously. TRACOR have begun to staff the project at least at senior level. An overview from ODP-TAMU's perspective is presented as Appendix K5.

Berger said that WOCE have similar problems with databases, and asked if ODP-TAMU could take their programs. Coyne said TAMU are looking at the numbers going into the computer, getting them from instruments and allowing the users to use the numbers. Berger said that is just what WOCE is doing, and that he perceives we are re-inventing the wheel in many respects, and that the marine geophysicists are usually on top of these things, more so than geologists and that perhaps ODP-TAMU should at least talk to these people. Coyne said they did speak to the WOCE people at Texas A&M but did not go into detail. He said they are also looking at industry systems. Lewis said that one member of the WOCE group at TAMU was in fact on the steering committee, was aware of the problems, and that they (WOCE) would in fact do it the ODP way if they had the chance to do it again.

Lewis presented the state of play as seen from the steering committee, using three headings (Appendix K6) and summarised the history of the ODP Database Management Project (Appendix K7) and the mandate of the DBMS Steering Committee and its membership (Appendix K8). Lewis reported that the steering committee has only met once (Appendix K9) and outlined their recommendations (Appendix K10-11). He told PCOM that the report is still in draft as the wording had not as yet been finalised, but there are some important recommendations and that PCOM should be aware of them. Francis said he thought PCOM should discuss the relationship of the Steering Committee, TRACOR and ODP-TAMU. He went on to say that all contracts should go through ODP-TAMU or they will have no control. Lewis said that the Steering Committee has an advisory capacity. Falvey said the Steering Committee provides the guidance, but only Coyne gives direction. McPherson said that Texas A&M Research Foundation (TAMRF) actually hold the liability and not ODP-TAMU.

Lewis said the statement of work was written by TRACOR along with ODP-TAMU and the DBMS Steering Committee joint input (Appendix K12) and he ran through the scope of work and timelines (Appendix K13), and the deliverables. The equipment would actually be purchased by TAMU as they could get a better price than TRACOR. There was an issue on whether writing programmes for both MAC and PC would be beneficial or whether buying all new (single operating system) computers would be cheaper. This is still unresolved as they don't yet have an agreement. He outlined the development and implementation phase (Appendix K14) and the different data categories (Appendix K15). Lewis then ran through ten assumptions (Appendix K16) and said that both TRACOR and ODP-TAMU understand the important statement that ODP-TAMU have final contract authority. Coyne is looking into putting old data into the proposed new system which will be a separate issue.

Lewis outlined the actions of the DBMS Steering Committee since September 14 (Appendix K17), and said that ODP-TAMU had now signed a contract. McPherson said they actually signed a purchase order and it was approved by JOI (cost was $181K). Larsen asked the reason for leaving out the core-core and core-log integration. Lewis replied that de Menocal at Lamont was already quite close to this and it would be left to the CLICOM group to deal with (Appendix K18). Larsen asked about why TRACOR were not doing the core-log integration and if they were capable, and Lewis said they are a large database company and are capable of doing it, but they are not marine geologists and that is why the core-log system is not being put out to them. Goldberg said there is a huge gap between what the community wants and what the CLICOM group will actually produce. Taylor said that core-log integration is a desirable product, but it is a scientifically produced beast and he has no problem with that being developed in parallel with the TRACOR system.

Mithal said that being able to integrate the large number of data tasks that are already in existence is a big enough problem before thinking of adding even more tasks. Langseth said it would seem logical to have the logging data included. Lewis said it was in the original RFP but it totally dropped out when it was presented to the Steering Committee. Lewis continued that it was obvious to him but not to the rest of the Steering Committee. Taylor asked for clarification on what is or is not in the offer. Lewis said logging data is in TRACORs' original proposal, but ODP-TAMU excluded it, however, since then Coyne has now put it back into the specification.

Dick said that the need to integrate the logging data with the cores was the original reason for the upgrade and that at this time of financial stringency perhaps it should not go ahead if that is not the prime reason for the upgrade. Mithal said there are two issues, one to provide the logging and core data side by side, the other is to put all the data into the same database. He said putting pointers to logging records in the database is not an issue, they will be there, but that the old logging data will not be in the database.

Kidd asked Falvey for comment. Falvey replied that he would have to back the Steering Committee mandates completely, though he can understand the situation that led to the purchase orders. He thinks the time has come to properly review the statement of work and to ensure that it fits the requirement of the user community and ODP-TAMU. Coyne said that that was in fact pretty much how things had gone, all they had done was to itemise and specify certain items. McPherson said that he met with the Steering Committee, that the Steering Committee was new, and to be blunt they didn't know what to provide the steering committee with. He continued, saying they obviously didn't provide enough information, and that the relationship will have to change to improve the information flow. He said that ODP-TAMU couldn't move forward if the purchase order was not placed. The reason the order was not placed on 1 Oct. was because the problem was much bigger than originally thought. He assured Lewis that the relationship between the committees would improve.

PCOM Recommendation 94-3-8

PCOM recommend to JOI Inc. that they reaffirm and/or refine the mandate of the Data Base Management Steering Committee and that JOI Inc. take steps to ensure that the Steering Committee is incorporated into the DBMS structure according to this mandate.

Vote *15 For, 1 Absent*

Mithal said that ODP-TAMU has 4 people on the Steering Committee, yet the recommendations from the Steering Committee do not always reflect the advice given by the ODP-TAMU staff, that somehow the advice of the ODP-TAMU staff on the Steering Committee is apparently being overlooked, and he said he was in agreement with an earlier comment of Lewis that at times one questioned whether the Steering Committee are there to advise or to be steered. Fox said we cannot afford another DCS, we must find a way to create a positive relationship. Larsen said that he is very uncomfortable with this situation, that we committing a lot of money for something that is not at all defined or properly understood yet. Suyehiro said that it is important that the Steering Committee functions properly and that the scientists who will be on board can have a proper amount of input. Kudrass said the Steering Committee is set up to bring in the wishes of the users and we should endorse them, despite the occasional friction. Mével said she too is uncomfortable that there is no definite area of where we are going.

Falvey referred to the line between ODP-TAMU and the Steering Committee of the Database Advisory Structure (Appendix K3), he said that the line should be solid and that the committee is advisory not directional. McPherson said that committee provides advice but they have no liability, that TAMU has to go to JOI. McPherson reassured PCOM that this problem will be solved. Loutit said that panels, individuals etc. should inundate the Steering Committee with information. Goldberg said he too was concerned at the lack of communications. Also with the development of CLIP now that a CLICOM committee no longer exists, it is falling into his lap without direction. He wants to see more direction from CLICOM or a re-incarnation with a two way communication flow.

Langseth said that PCOM should ensure that a Data Integration committee is set up and that it should not fall through the cracks. Kidd said that PCOM would take advice from SMP Chair on any changes he would like to see and then press forward.

Mével asked about the total cost of the Database upgrade and was told that the contract was still under discussion so there was no price as yet. Taylor asked how much flexibility there was, McPherson said that there was a huge amount of flexibility. Francis asked when the Steering Committee was next meeting, Lewis said he would like it to meet in the next couple of weeks.

Dick asked where the TAMU manager of Science Operations stood in this team, as he was a representative of the ship users, Francis replied that he was on the SC. Baldauf said that there were different expectations from the different panels. Dick continued that he was not at all happy and that from his experience previous attempts at standardising data collection for input can and did result in the degradation of the data .

A consensus that PCOM would like to have a clear statement of the goals of the computer upgrade from the Steering Committee. PCOM agreed that a regular article in JOIDES Journal would be a good idea, with a statement of the goals of the computer upgrade. Lewis said that Carla Moore has a Mosaic home page, that is worth looking at. Lewis also suggested setting up an e-mail drop-box for information and suggestions.

The question arose of the role of the Steering Committee and whether or not they could provide advice direct to TRACOR. McPherson said he was still unhappy because of the liability question. Falvey said that he saw no problem so long as it was clear to all that direction only came from Coyne. PCOM then voted on the above recommendation, and ended the session by endorsing the following consensus statement.

PCOM Consensus 94-3-9

PCOM will establish a Data Integration Working Group to continue the work begun by CLICOM, by overseeing the development of a computer-based data integration capability. The membership should be constituted and the mandate drafted to assure that the working group works effectively with the JOI Steering Committee that is overseeing development of the ODP Data Management System Replacement Project.

Coffee Break *10:15 - 10:35*

L. FY96 Science Programme

1) Thematic Panel Chair Presentations of Prospectus Rankings

1.1 Caribbean Basalt

Bloomer presented this. The proposal grew out of a working group in February 1994 in Puerto Rico. LITHP has interest in the Caribbean province as a LIP. The Caribbean (Appendix L1.1.1) is a good place to start making an understanding of what LIPs really are. He summarised the Caribbean LIP (Appendix L1.1.2) as a large LIP, it seems to fit a simple model, there is good age data in a narrow time span 88-89 Ma, and a good degree of partial melting. Some aspects can be constrained in a single drilling transect. Not too big so it lacks the complications of larger LIPS. Deeper levels may be accessed by drilling. Bloomer then described the goals of drilling (Appendix L1.1.3) and reported on the site locations (Appendix L1.1.4) and rationale behind them; C1 to complement the eastern end, the oldest part. It is a thin edge with depth to MOHO of 7-8km. B1 is in central thickest part to look at petrologic diversity, there are some previous samples. At A1 it may be possible to drill to the lower level of the plateau, the B' reflector may be faulted out to give access.

He said that these objectives can be accommodated in a two-leg programme (Appendix L1.1.5), although Site S3 or S7 may need moving. Taylor said site times are different from the book. Bloomer said the times he used were provided by ODP-TAMU. Delaney said proponents often estimate longer times than ODP. Bloomer assured Taylor that he has checked the sites. Natland asked which are re-entry, Bloomer said A1 and S6 are re-entry.

1.2 Caribbean Ocean History

Delaney presented the "big picture" and the proposal history. It is a synthesis of 5 proponent groups and 1 leg of OHP objectives. It has been highly ranked since spring 1992, and grew from 2 proposals, one from a K-T boundary proposal, the other a Neogene Caribbean History, also a site proposal for the Cariaco Basin (SGPP). Delaney then ran through the objectives (Appendix L1.2.1). She said that one of the major objectives in MESH and OHP white paper looks at Cretaceous warm intervals. There are no tropical models as yet. In the Neogene sites there is a link to global ocean circulation questions, and the opening and closing of Caribbean gateways, which affects heat transport from southern to northern oceans. These sites will help to understand how tectonic changes affect the cryosphere.

Cariaco Basin - even at present there is no good definition for climatic stability of the Quaternary, and this site serves to look at sedimentation in modern anoxic basin. Proponents have been responsive to SSP recommendations and SSP are very happy. There are 7 primary sites and 1 leg's worth of time (Appendix L1.2.2).

Bloomer said LITHP prefers B1 to S3 or S7, this can be resolved with final site survey data. All the high priority sites of OHP and LITHP can be covered in a 2 leg scenario, with only one site that has some dispute.

Mix asked about the K-T site, when combining with LITHP objectives and losing a site or two, can you guarantee to get the K-T ? Delaney said that the early Palaeogene looks good generally but perhaps not at B1. The ejecta are another matter, C1 (Appendix L1.1.4) will probably add information on ejecta distribution. S6 gives LITHP the edge of the lip and is also useful in distribution of K-T ejecta.

Hay commented on Cariaco Trench which he said is a classic site for anoxic sedimentation. Although drilled on Leg 15, some sediments recovered but not a continuous section, and the area is ripe for a re-visit. In terms of plate reconstructions, no matter which sites you use, you will get a lot of pertinent information.

Taylor asked if in a one-leg scenario would you get basement anywhere else apart from S3, Delaney said S3 and S7.

1.3 Bahamas Transect

Hay began the presentation by showing the SGPP themes and the FY96 Prospectus rankings of SGPP (Appendix L1.3.1-1.3.2). He said that 10 years ago the Bahamas were thought to be understood, but seismics from oil industry have changed this view, and he showed a track chart of the available seismic lines (Appendix L1.3.3), and an interpreted section (Appendix L1.3.4) that showed the margins are steep and sharp. He commented that it was previously assumed that the carbonate banks were like this in geologic history, however, it is now believed that the present shape is young, and something drastic happened during the Neogene. Samples have been taken using a jack-up rigs and Diamond Coring systems in shallow water (Appendix L1.3.5). The idea is to extend those offshore, identify the ages of the different reflectors, and to find out the nature of the slope materials (Appendix L1.3.6-1.3.7).

He said that it is hoped to drill through the Neogene to the mid-Cretaceous (Appendix L1.3.8) to try and define the cause of the cessation of growth in the whole region. If the boundary is not sharp, it has implications for the flow of the Gulf Stream, and it will document why the shape has changed.

Hay acknowledged that potential problems may be currents (as encountered on Leg 126). However, these present sites are out of the main Gulf Stream and current meters are in place to define the current strength. Recovery may be questionable, in the slope and rise sediments, but he didn't think it would invalidate the results.

He then described the fluid flow sites. He said the Bahama platform should be drawing in water at depth and it should be warm and rising, but some studies show this is not the case, although the results are somewhat ambiguous. Other studies suggest fluid flow from the top downward. The location of the sites is to see if the platform is sealed on the sides and to understand how you can have diagenesis if the flow is from above.

Taylor asked what moving along strike will do. Hay said they want to scatter sites to test where the flow is taking place. There have been instances where fluids have modified material, but the amount and direction of flow is unknown. Larsen asked what is in the drilling that can explain the transformation. Hay said the facies development would help. Larsen asked if this would also explain the mechanism. Hay said the productivity is 900% above that needed to maintain the shape and size but they don't know where the excess material goes.

Delaney said this proposal was ranked 5th by OHP. It is a test of the response to sea-level change on a carbonate margin and OHP interest is focused on BT3 and 4 (15 days) as these can determine the time issue as how this margin is responding to sea level change.

Mix asked about the controversy regarding the stratigraphy. Hay said that the proposal was first drawn up before the stratigraphy was established. Since then the biostratigraphy, magnetostratigraphy and strontium stratigraphy are now in good shape. It has been very thoroughly studied and is probably as good as you can get. Delaney said that regardless it is a good test of the response to sea level change and that the stratigraphy is not necessarily so critical.

1.4 Costa Rica

Robertson outlined to PCOM the main objectives of drilling (Appendix L1.4.1) and presented a site location map (Appendix L1.4.2). He reported that the key element is to define the chemical and physical mass balance. It is believed that the subduction/accretion history of this margin has been more or less constant for a considerable time. He then displayed a map showing that all the proposed sites were very well documented along a closely-spaced seismic grid (L1.4.3), and showed a graph of accretion vs. time (Appendix L1.4.4) saying that the present best estimate is 40-50% accretion, and a graph of Ba enrichment in basalts vs. Ba flux in subducted sediments (Appendix L1.4.5). Using Ba flux in sediments as a reference will fulfil the aims of determining frontal accretion relative to subduction. A section over the margin shows no infill by trench sediments (Appendix L1.4.6) just a superficial apron over the accretionary wedge with the underplated component attached beneath the wedge; then further below the subducted component.

He then described the sites from deep to shallow starting with a reference hole to characterise the incoming sediments and the nature of the basement (Appendix L1.4.7), and finished by summarising the operational points of the proposal (Appendix L1.4.8). Excluding alternate sites it is about a leg in length, but proponents expressed an interest in CORK and LWD. TECP does not want to lose sites at the expense of CORK, but would give up some conventional logging in favour of LWD. The most important thing is to drill, log and date the sites.

Hay said SGPP were interested in fluid balance. It should be possible to get an idea of the fluid flow from taking samples of the pore waters. The first thing is to get the transect done and take as many measurements as possible.

Fox said these systems are heterogeneous and this can give a 2-D perspective. He asked if TECP have a commitment to a specific margin to build on spatial sampling and commit to developing a 3-D perspective. Robertson said this area looks the best in terms of a steady state and there is other data available from nearby sections so that there will be 3 transects to build upon.

In answer to Natland, Robertson said that the reference site has 300m of basement penetration and has high priority. Sager said logging is difficult in these areas without LWD. Goldberg responded that two of the highest priority sites are 2.5 times the depth of the Barbados sites and this has a cost implication. He thought that operationally there will be 100% log recovery, but not with all logs, just the basic suite. Without using LWD the chance of getting logs may be analogous to Barbados. Taylor said that it is different because of the slope apron and the proposal will stand alone without LWD. Bloomer added that LITHP has a strong interest because of the mass balance. Pearce asked about societal relevance and earthquake studies and Robertson said that is not a main priority.

1.5 Sedimented Ridges II

Bloomer presented for LITHP. He said these hydrothermal deposits are much larger than TAG, and more analogous to the on-land deposits. He showed a location map (Appendix L1.5.1) and said the sites are located at Middle Valley (metals from basalt) and in the Escanaba Trough (metals from sediments). Bloomer then explained the goals as of the drilling (Appendix L1.5.2). To run a transit across sites 855 and 858 to look at areas with thin sediment cover and penetrating the alteration zones to look at fracturing. Escanaba is much younger than Bent Hill. The Dead Dog is site to look at permeability. The fourth part of the proposed work is a CORK experiment arising from the SCORE workshop. It is proposed to replace the thermistor string and re-CORK Site 858. First go to Site 858 pull CORK, replace thermistor string and replace the CORK, then go to Site 857 pull CORK, re-drill and deepen, re-log and then re-CORK using Site 858 to measure the pressure pulse.

He presented seismic sections across sites 855, 858, 856 and 851 (Appendix L1.5.3) and a more detailed summary of the aims at Bent Hill, Escanaba Trough, Dead Dog vent and the CORK work (Appendix L1.5.4). He then described the CORK sites in more detail with a seismic section showing detail of Bent Hill, site 856 (Appendix L1.5.5). At the moment there is more than a leg of drilling, but there is a priority list (Appendix L1.5.6). Larsen asked if there could be TAG-type deposits at Escanaba Trough. Bloomer said there may be problems for the sites on the vent. Proponents were not aware of the TAG problems at the time of this proposal. Natland asked about previous legs' recovery rates, Bloomer said he thought that at Bent Hill there was 95m of penetration with 30% recovery by RCB.

Hay pointed out that SGPP ranked this 3rd, and would like to see the microbial content of the fluids studied, it may be high risk but is very important.

1.6 California Margin

Delaney presented a summary of what the leg would examine (Appendix L1.6.1). It represents the synthesis of 2 proponent groups and has been in top 7 or so since 1991 and worked its way up as it has matured. It is focusing on orbital forcing and boundary up-welling regions. Some sites will allow looking at very rapid sedimentation and high resolution laminations. In the context of global climate - atmosphere evolution. Some sites will show deep and intermediate Pacific circulation. Secondary objectives meant that the other panels all had an interest (see panel rankings). The sites are 3 East-West transects and 1 North-South transect.

Existing drilling gives the story of shifting patterns of biogenic silica. Site 893 is expected to yield high return and high visibility science and also very high resolution stratigraphy. This site seemed to be seeing changes in global ocean operation with no time lag (from Arctic signals). The North-South transect ties the other transects together. There are 20 sites proposed (Appendix L1.6.2), although 14 are a leg's length in time. It is a well studied region in terms of modern oceanography and it will allow the results to be put in the right context. It is a mature well thought out plan, responsive to SSP. Two things may be higher cost logging items, BHTV to look at the site to basement in terms of stress and strain, and the magnetic susceptibility tool. The scientific objectives can be achieved without these. Robertson said TECP have interest in the Gorda Plate. Hay said there will be organic rich sediments and therefore SGPP have an interest too.

Taylor said that SSP only list 7 sites ready to drill. Delaney said there is a scheduled Site Survey cruise and the other sites will be ready by summer 1995 SSP meeting. Sager asked, given the Santa Barbara Basin site, will there be a problem with PPSP, and he also commented that the cores that came back from this region before are disturbed. Delaney said PPSP didn't think there would be a problem but they hadn't looked at the proposal in detail yet. There may be some gas damage but there should still be good results, the problems of gas expansion will have to be overcome. Shipley said he thought there were concerns at drilling in these areas, and that he wasn't clear on the seismic data that needs to be collected. Francis said the PPSP probably would accept another site in the Santa Barbara Basin. Taylor reminded PCOM that PPSP had pleaded for more lead time.

1.7 S E Greenland

Robertson presented for TECP beginning with the site locations (Appendix L1.7.1). He continued with a summary of the 'SE Greenland 2' objectives (Appendix L1.7.2), saying that it was a world type example of rifted volcanic margin. There is a large international community interested in these margins and it gives an opportunity for land-sea integration. The nature of the seaward dipping reflectors was solved on the previous leg. The questions to be addressed here are; 1 what is the nature of the crustal rifting, 2 what is the role of plumes

He then described the proposed sites in terms of the Ocean-Continent transition (Appendix L1.7.3) and said that complimentary drilling is very likely onshore in the next few years. He showed various plume models that could be involved in this region (Appendix L1.7.4); it is their nature and geometry that the drilling hopes to detail. He then showed a seismic grid map of the E Greenland margin

(Appendix L1.7.5), and explained the objectives of the two transects (Appendix L1.7.6). The southern transect is to drill the feather edge of the seaward dipping reflectors, to look at the earliest magmatism and crustal structure, and to deepen Site 915 to look at volcanic evolution. The northern transect is to determine the role and nature of the Iceland plume in rift volcanism, to look at rift crustal structure, early oceanic seaward dipping reflectors and earliest oceanic basement, and to compare the rift history of the margin with that seen on land.

He summarised the southern transect by showing an interpreted section a seismic line with existing and proposed site (Appendix L1.7.7-1.7.8) and said that EG63 is the key as this one will go through the feather edge of the volcanics and into the rifted basement. These data could be integrated with existing data. The northern sites, to see if a plume component comes into the area, must be done away from continental contamination, and he presented a schematic section with proposed sites (Appendix L1.7.9).

LITHP has ranked this 4th. It is important from the geochemical and petrological points of view, looking at the spatial and temporal distributions of the Iceland Plume.

1.8 Juan de Fuca

Bloomer said this proposal looks at heat ageing and alteration of oceanic lithosphere at a fast spreading ridge. In terms of volume of heat loss the rise flank is more important than ridge crest. He then showed the location of sites along a seismic line just ESE-WNW from the Juan de Fuca Ridge (Appendix L1.8.1), he said that because of high sedimentary input the area has been sealed and buried very early in the crustal history. In terms of the objectives of E Juan de Fuca drilling, he said all the types of circulation can be examined within a very small area (Appendix L1.8.2).

There are 3 experiments. First the effect of sealing the basement HT1, 2, and 3 (Appendix L1.8.3). Second to try and understand cellular convection in a porous medium. East of Juan de Fuca the basement topography is very flat, the heat-flow has highs and lows suggesting this kind of convection. There are 4 sites (Appendix L1.8.4), 2 to basement to take temperature measurements and take pore-water samples. These would be drilled and back-filled and another pair would be drilled and then CORKed. This is to measure pressure and temperature differentials. A survey is underway to see if these are independent from basement topography or structure. Third to look at effects of flow driven by basement. 3 sites on buried penetrators (Appendix L1.8.5), offset then to determine gradients.

The only way to get the data required is to use 5 CORKs. A priority list has been drawn up (Appendix L1.8.6) and, at the moment, there is more than a leg. The main thrust of the proposal is to look at processes. Mével asked how applicable this would be to normal ocean crust. Bloomer said that the processes would be applicable to normal crust, but here they are easier to see because of the steep gradients.

SGPP ranked this 4 and Hay said it has a hydrogeologic perspective. The proponents are aware of the constraints in using 5 CORKs.

Fox asked if seismic velocities are known for 2A/2B boundary (Appendix L1.8.7). Langseth said they range from 3.5 to 5kms^{-1}. Kidd asked when the 3-D survey is planned. The answer was in June -July. Dick asked about the readiness of the sites and the number of CORKs. Kastens for SSP said all required and some recommended data was in the Databank, but for the bare-rock site some visual data would be required.

Lunch Break *12:40 - 13:35*

1.9 Iberia II

Robertson presented for TECP, and showed a location map of the principal sites (Appendix L1.9.1), he said the area of Leg 149 was a transect across margin, it was a partial success, though the area is too complicated for a single leg to answer all the questions. He then outlined an overall drilling plan for Iberia (Appendix L1.9.2) and the more detailed objectives of Iberia 2 drilling (Appendix L1.9.3). A key theme is the role of simple shear mechanisms in rifting, this is important to the oil industry as well as basic science. PCOM had asked the proponents to produce models and further survey, and they have done all that has been asked of them, with an additional cruise to come next year for more site survey data. He showed a schematic section from Leg 149 (Appendix L1.9.4) and said that, at the time, the highs were drilled without understanding their importance. Now they can go forward and show that they are not just odd highs, the modelling suggests that they are dealing with a simple shear process at least at high levels in the crust Each high started low in the crust before being exhumed by faulting and therefore drilling on highs should therefore give important information (Appendix L1.9.5).

He said that a new model has been inferred of magmatic intrusion at depth with a propagating fracture system as the ocean opens (appendix L1.9.6), and that there is a 150km wide continent-ocean transition zone (Appendix L1.9.7). Although the area of interest is 100km wide, there is only one new site in this area. He then described, with the aid of a section across the margin, the sites proposed and the aims of each; to deepen Site 901 and go into basement to test simple shear. A site close to Site 900 to look at the detachment fault, IAP 7 into a block to look at simple shear, and another site on oldest ocean crust (Appendix L1.9.8). He then showed two seismic sections with site locations which he thought were amongst the best ever presented as site survey data (Appendix L1.9.9-1.9.10). He said the final site is GAL1, to look at the major "S" reflector, believed to be a detachment fault. S' is thought to be the same, offset by a fault. If drilled into upper plate above S' this site could give details of the nature of the crust in that area. He showed a seismic section across Galicia Bank with the site location (Appendix L1.9.11). He concluded by saying that the proponents have done what the panels and PCOM had asked, and refined their targets with reasonable chance of success.

Sager asked why the ranking is down below the others. Robertson said that the PCOM signal from last year was not positive. PCOM had not appreciated how far advanced this proposal was, but even if successful TECP felt it would not provide a complete solution: a deep hole will still be needed.

1.10 Western N Atlantic Drifts

Delaney presented for OHP. She reported that OHP felt that the drilling strategy here is only partially mature and considered that the proposal, would be back with higher priority next year. Delaney outlined an overview of the proposal, which is to look at the Blake Bahama Outer Ridge and Bermuda Rise (Appendix L1.10.1) and to look at changes in N Atlantic deep water production, to test the "sea salt" oscillator model and to look at changing sedimentary fluxes. The Blake Nose and Blake Plateau objectives are to look at low vs. high latitude sources of water, low latitude SST's, palaeoceanographic transitions and at chronostratigraphy (Appendix L1.10.2). Just the depth transect on the BBOR or the Bermuda Rise is about 1/2 programme. There is a reasonably mature depth transect on Blake Nose. She reported that the proponents are close to satisfying SSP and presented a map of site locations (Appendix L1.10.3).

1.11 VEMA FZ

This "Non-Prospectus" Proposal was ranked by TECP on a majority vote. He outlined the objectives (Appendix L1.11.1) and showed a bathymetry of area and the site locations (Appendix L1.11.2). He then showed a seismic profile of the limestone cap with site VE3 (Appendix L1.11.3), the objectives of which were to date and work out the timing and rate of subsidence of the transverse ridge. Robertson then showed the locations of dredge and dive sites (Appendix L1.11.4-1.11.5) and a stylised section of the rock sequence based on the submersible studies (Appendix L1.11.6) He finished by saying that although this was only about 1/2 leg worth of drilling, TECP do not want VEMA to be forgotten.

Dick commented that the origin of transverse ridges is a major problem and the subject of lively debate. This offers a remarkable opportunity to address this question: to say if there has been uplift after emplacement.

Taylor commented said this site was on the schedule for a DCS test, and what energised TECP to bring it back was that they thought they already had it scheduled. He emphasised that they are very interested in the vertical tectonics question, but they recognised that it was not a whole leg. Robertson told Kudrass that the only samples to date were dredged and would not answer the age questions.

2) Comments by PCOM Watchdogs

2.1 Caribbean Basalt

Mével spoke to this. Proponents know they won't solve the LIP problem with this drilling, but it is a well designed proposal and everything is ready. Kidd asked if there are any basic science problems, Mével said no. Natland said there is no evidence to identify what kind of sea-floor the LIP was formed on, it is only inferred from the Galapagos and Costa Rica, and encircled by complex tectonic structures. He said that we don't know anything about the age progression of the sea-floor. Mével said that was precisely why they wanted to drill. Natland said that they could be drilling along a flow line and so ages may not be uniquely constrained. Larsen said they seem to have overlooked the some structures within the basement, and that local age-progressions in the seismic section may give some clue. Taylor said that given the age problems, the majority of the test relates to site S6. It seems that for 80% of the proposal relating the age progression, the OHP leg is going to get that by drilling to basement.

2.2 Caribbean Ocean History

Mix said that there were several objectives. The Cariaco Basin is very focused and should be excellent for SGPP objectives. As for the K-T boundary ejecta, there is some inherent risk in going after the boundary and he is concerned whether they have enough sites to cover it. It is high profile, has been wanted for a long time, and is refined and mature.

The Palaeogene and Cretaceous warm climates. There is a good chance of getting some under-sampled sections, and feeding the results into climate models. It is exploratory and a good experiment. The Neogene is focused more on the Nicaragua Rise and uses tried methods to look at intermediate water chemistry, it has a high probability of success. The subsidence of the Nicaragua Rise is not so clear and this is the weakest part of the proposal. Site Surveys are underway at present and will be well defined.

Kidd said there were concerns at DRILLOPTS about the site survey data (S6, S2a and S3a, and C1, S7 and S3 in February). There was a comment that PPSP may need to look at the trench site, but based on comments from SSP Chair that was the only potential problem. Operationally there are two re-entry sites and we must avoid the hurricane season. Bloomer said a one-leg OHP scenario will not fully test the LIP objectives.

2.3 Bahamas Transect

Berger said it was well prepared. They have two holes drilled already. This platform is the "grandmother" of all carbonate platforms and all the carbonate workers follow the work on this platform. The carbonate story is related to the change in CO_2 in the atmosphere, due to the carbonate response to sea-level change. The study of such platforms is very important in the context of climatic change and this will have a lot of influence on people's thinking. The fluid flow is of major interest to petroleum geologists who will be very interested in the results, and may be used in the development of reservoir models.

Taylor asked about currents. Francis said the time window for currents was the same as the hurricane window, Feb-May was a safe time. Kidd said the biggest concern was the shallow sites, but the proposal should still be OK. Kidd mentioned that core recovery had been discussed at DRILLOPTS, and it may be addressed by using the MDCB if recovery is bad. Hay presented a spreadsheet of recovery for different techniques. He suggested that 30-50% recovery should be achieved (Appendix L2.3.1-2.3.3).

Mix asked about the CO_2 story and the role of carbonate platforms, but this was not in the proposal. Berger replied that the shapes and steepness of the slopes reflected this. Mix asked if this was relevant to where the sites were placed. Delaney did not consider it would address the problem.

2.4 Costa Rica

Larsen reported that the CORKing and LWD would realistically not take place, but that drilling without them would still allow the mass balance objectives to be realised. The only deficiency would be the depth of penetration at the reference site. They have not allowed for re-entry so they may only get 25-100m into basement.

Natland said it is a mass balance using isotopic studies. If the reference site turns out to be material from the Pacific high productivity region and therefore carbonate, there will not be much fluid flow or diagenesis. If this is so there may be problems with drilling characteristics and time must be taken when drilling the reference hole. Perhaps an exploratory hole should be drilled before considering going deep into the crust. Kidd said this may mean additional work at a site when the leg is already tight for time. Taylor said LWD takes longer than standard logging, logistically the sites have to be drilled and cored first, LWD would have to come at the end of the leg, and he would like to defer LWD until after this leg and the drilling characteristics are known. LWD is also expensive. Larsen fully agreed with this. Goldberg said that a rough estimate of LWD for two sites would be around $300K. Kidd said that DRILLOPTS discussed mostly CORKs and LWD, there were no other serious operational considerations. Langseth said the mass balance may not be that simple as most of the trench fills from the south, and a ridge is being subducted to the south and that may be damming the sediment supply. Taylor said that problem had been addressed by the proponents.

2.5 Sedimented Ridges II

Langseth said the drilling that bottomed at 95m in Bent Hill was due to poor hole cleaning and this is likely to happen again. There is a question whether they can reach the stockwork. Apart from that they should have success with the transect. They should be able to document when it built up from looking at the detritus. This builds on a successful leg and is highly regarded scientifically. He was uncertain about the re-CORKing, it was damaged in a previous attempt to retrieve the CORK The objective of drilling a further 200m is also good, although the expected results are not clear. The Escanaba Trough is "virgin territory" and it is not known if they will be like TAG or Middle Valley. The priorities are right. Kidd commented from DRILLOPTS that the site survey position is very good. DMP flagged that there could be high in-hole temperatures. The major discussion was weather window, which must be northern summer. Mével asked what kind of recovery is required and do they have contingencies if they do not make that target (Escanaba Trough). Langseth said that the logs could give a lot of information, but Mével said that you may not get deep enough to log. Natland sad that it had to be removed from the prospectus four years ago due to lack of DCS, but PCOM did pass a motion that said it will be re-scheduled in the future. Goldberg reminded PCOM of costs implication of high temperature sites.

Coffee Break *15:55 - 16:10*

2.6 California Margin

Berger said this leg runs over a large range of latitude and has 3 major transects. Most of the up-welling is close inshore with eddies and filaments moving offshore. DSDP showed large latitudinal changes in the distribution of the temperature proxies of the order of 10°C. Much of this is upwind of North America so it may be the most important area in the world to look at climate change linked to the continents. The Aleutian low dominates the area and the evolution of this will be seen. He thought SGPP should have ranked this higher for the organic matter story, i.e. in determining the role of the deposition of organic carbon during climate change. It is an exciting proposal and has a large interest group. There is also the opportunity to look for short-term changes in the high resolution stratigraphy. There is a problem that the site surveys have not been completed, SSP. said that the data package acquisition plans are fixed, remaining data are scheduled to be collected in May 1995. There should be no PPSP problems as sites are only 200-400m penetrations, the deepest is well offshore and there are lots of high priority sites. Kidd reported on DRILLOPTS, and said any leg had to be scheduled late, and it may be possible to get PPSP to see data. The sensitivity of local media to offshore drilling was flagged to the Operator.

Goldberg said that the Gorda Plate site may show an inconsistency. The BHTV is not funded, an estimate is about $40K per leg. OHP has requested that third party tool costs be passed down to proponents. BHTV may be deployed for a shorter period of time as the site is close to shore and this may reduce costs. Natland asked why the stress tests were in the proposal. Taylor said they are involved in a big group and the proponents built it in as they were thinking in a regional way in terms of the science. Kidd asked if PCOM are happy to pay for the BHTV for this leg. Fox said we could approach other programs to support this, such as the USGS. Larsen said it has been a long term priority of TECP to get the stress work done. Taylor said we should explore other options to cover the cost, but it is a key element of the leg. It is high priority, societally relevant etc. Goldberg said he would dial it in to his costs as an SOE with a note to approach USGS. Goldberg will follow this up.

2.7 S E Greenland Margin
Natland presented on behalf of Arculus. It is a LIP, one of the classic areas on the world. It is also an area where ODP and DSDP have invested large blocks of time. The discovery of seaward dipping reflectors are a first order discovery. The two transects here are to add to a lot of information gathered on leg 152. The southern transect is further from the heart of the plume, and is to get at the geometry, setting , age and influence of the plume both geometrically and through time using comprehensive chemical stratigraphy. The sites are in reasonably shallow water and a lot of basement penetration is planned in a 44 day period of time. He quoted the TECP and LITHP reviews to highlight the importance of this proposal. Kidd commented that DRILLOPTS discussed site survey data and said SSP are happy with the data lodged at the Databank. They discussed whether any sites may need a HRGB, SSP's main concern was to get proponents to submit their 3.5kHz data. On EG66-1 SSP would not accept that there was sediment cover. Apart from that the concern was timing, if scheduled, the suggestion is to insert this as a leg before Gas Hydrates. Goldberg said there is the same in-situ stress aspect here. Robertson said it was very important and Goldberg said there were BHTV studies on the conjugate margin on the Voring Plateau. Kidd asked if the Danish Geological Survey could pay. Larsen said he would investigate.

2.8 Juan de Fuca
Langseth said this was a nice experiment to try and find what happens in these transition zones. All the hydrothermal effects are enhanced so the chances of observation are larger. The first experiment is to drill 3 sites and look at temperature. LITHP asked for one of these to be deep. There is to be little drilling and a lot of experimentation according to the proponents. He wrote to the proponent about the CORK problem, and had 5 reduced to 4, but there still is a cost and time implication. They will prioritise depending upon a survey yet to be carried out. The CORKs are to measure pressure after 25m penetration into basement and equilibration, to find the pressure gradients driving the circulation. If massive flows are encountered these will not be permeable and no results will be obtained. Also any cold water allowed into the system may reverse the hydrothermal circulation Langseth thought they may have overestimated the time to drill the holes: they may not get to the lower priority sites. Taylor asked if the CORK sites are presently cased. The answer was yes. Taylor asked the minimum number of CORKs the proponent would sail with, Langseth said two. Without CORKs there are ways to measure, but they are less accurate; for the experiments planned properly CORKs are needed; packers would compromise the results. Bloomer said you would still get pore fluids, temperature, chemistry and physical properties measurements. Langseth mentioned the CORK II that could be emplaced quicker than the present system, the proponent offered to find outside funds to develop this. Francis said that he has had a number of meetings, but Pettigrew concluded that it wouldn't be possible to develop CORK II in time. Kidd reported on DRILLOPTS. SSP are happy in general, but for PP6 where a HRGB is to be used visual data is required. SSP still suggest that the site should be marked with a passive marker. Kidd asked what would happen if the leg was cut to two experiments. Langseth said one option was to offset slightly from the protruding basement peak to ensure the BHA could be emplaced. The weather window was northern summer.

2.9 Iberia II
Taylor reported that there is much more mature thinking in this proposal about detachment tectonics than during the previous leg. His concern relates to the fact that it is based on a one-line transect so there will only be a 2-D mode. DRILLOPTS came up with no major contrary items.

2.10 Western N Atlantic Sediment Drifts
Kudrass reported that the drifts are deposited at very high rates and offer a very high resolution stratigraphic record. The proposal has been with ODP since 1991 and has been unchanged since then, despite request for more site survey data. SSP said that fundamental data is still missing and this is not ready for drilling. He suggested waiting until after NAAG II before reconsidering this proposal around the Bermuda rise. The second part of the proposal around the Blake Plateau was not reviewed by SGPP and OHP ranked it as 4th. The proposal has a possibility that without a large overburden Eocene and Cretaceous sediments will be reached with much diagenetic change. Kidd gave the

DRILLOPTS report. SSP had a good response from the second part of the proposal, but disappointment from the first. It was not felt to be scientifically mature. Mix agreed that it will require another year to mature.

2.11 VEMA FZ
Taylor referred to his previous comments above (see section L1.11).

3. DRILLOPTS Report and FY 96 Final Discussion

Kidd presented the top ranked proposals. He pointed out that what appeared at the top of the global rankings were still there in the Prospectus. The SE Greenland ranking was because it is a new proposal (Appendix L3.1).

Kidd said there was discussion at DRILLOPTS of where we would be at the end of 1995, and there was a lot of discussion of weather windows. Also there was discussion about ending up in Costa Rica as a jump-off point for FY 97. This would give the option of using cased holes for engineering legs in the Pacific or Atlantic. Kidd then presented the scheduling options arising from the DRILLOPTS meeting (Appendix L3.2) and Natland said that options 3 and 4 should be out and Iberia is not good enough, so it should be down to options 1 or 2. Taylor suggested an option 6 but this was rejected and PCOM then proceeded to discuss the individual merits of several proposals and to build a schedule.

Taylor said that California Margin does not have sufficient site survey data and it shouldn't appear on the schedule. Mével said LITHP had the Caribbean LIP as top priority and that it should go ahead. Fox supported Taylor on a top priority Caribbean leg, but said that the science in the Caribbean Ocean History proposal is much better constrained than in the Caribbean LIP leg. Dick said he is neutral to the Caribbean LIP leg or slightly negative. Natland said that he is sensitive to the panel rankings, but said that giant LIPS is on the horizon, possibly with 2-leg efforts and asked if we should we spend time on this proposal at all at this stage. Kudrass said that with the ages tied on land and the tectonic and crustal problems here, then perhaps we should not drill. Kidd said he was uncomfortable with throwing out a top LITHP proposal but said that PCOM is here to make decisions like that. Langseth said that he was not against the proposal, he thought there is a strong argument for doing it as an exploratory leg. Suyehiro said in order to understand this we must have knowledge of the deep mantle and with the land surrounding the area then seismological studies could image the deep structure or root. Sager said the LIP is too old to have an active mantle plume root. Bloomer said that LITHP globally ranked generic LIPS and received proposals for both giant LIPS and the Caribbean. What they realised about giant LIPS is going to require two legs, they know it is complicated tectonically, but they also realise that it is possible to use this area to test the tectonic models of LIPS. The operational component is fine here and is different to the tectonics case. Taylor wanted PCOM to relate what is on the horizon for LIPS. There are 4 LIPS proposals and we have to think how much time to give them before 1999. Dick asked if there is a vote for just one leg in the Caribbean, could PCOM instruct OHP to increase the LITHP component. Mix replied that would be unacceptable. Dick said just to ensure that basement penetration would occur in one site to help LITHP. Mix said so long as OHP got their distribution of sites. Mével said that one of the sites is a re-occupation so perhaps their could be some negotiation here. PCOM then voted on the following motion:

> PCOM Motion 94-3-10
>
> There shall be only one Caribbean Leg scheduled in FY1996, as opposed to the two proposed.

Vote *8 For, 5 Against, 3 Abstentions*

There is a PCOM consensus that ;

> PCOM Consensus 94-3-11
>
> A Leg of further SE Greenland drilling should be inserted into the FY1995 schedule to precede the scheduled Gas Hydrates Leg.

Francis said TAMU would like to run that as a 7 week leg, but there would still be 42 days on site, and Gas Hydrates would be a 50 day leg, with 42 days on site (due to ice and Christmas and New Year concerns). There was also discussion about the merits of scheduling the California Margin leg when the site survey data was not yet collected.

PCOM then again debated the merits of proposals and decided to adopt the schedule outlined in the motion below, with the caveat that: the Bahamas and Caribbean leg may be swapped for operational reasons.

PCOM Motion 94-3-12

That PCOM adopt the following schedule for Legs 163 to 170:

Leg 163	East Greenland
Leg 164	Gas Hydrates
Leg 165	Bahamas
Leg 166	Caribbean Ocean History
Leg 167	California Margin
Leg 168	Sedimented Ridges II
Leg 169	Juan de Fuca
Leg 170	Costa Rica

NOTE : Flexibility is retained for ODP-TAMU to interchange Caribbean and Bahamas drilling as Legs 165 and 166 to minimise potential current and weather problems in the Florida Strait.

Vote *12 For, 3 Abstentions, 1 Absent*

Adjourn *19:30*

aturday 3rd December 1994 ***08:45 am***

M. Endorsement of TECP White Paper

Kidd asked that, with minor revisions to be sent to Robertson via the JOIDES Office, PCOM approve publication of the revised TECP White Paper (Appendix M) in JOIDES Journal. PCOM has a consensus that an e-mail poll will be taken by Kidd within a week.

PCOM Consensus 94-3-13

PCOM Chair will poll PCOM members by e-mail that the TECP White Paper will be published in the next edition of the JOIDES Journal, subject to minor revisions sent to TECP Chair via the JOIDES Office.

N. Panel Recommendations, Consensus's, Comments and Responses

Kidd asked PCOM to endorse the Panel recommendations as a block but to comment where there should be modification or where there is contention.

PCOM Consensus 94-3-14

PCOM notes the recommendations and comments of the JOIDES panels made at their Fall 1994 meetings, and we have seriously considered them in our deliberations.

PCOM makes the following specific responses:

1. PCOM notes TECP's recommendations on technology development and has taken account of these in it's discussions of budget prioritisation. On shipboard structural measurements PCOM accepts the implementation plan presented by TECP, including the setting up of a User Working Group charged with preparing a "cookbook" for use aboard ship.
2. PCOM would like to have a clear statement of the goals of the computer upgrade from the Database Management Steering Committee, publicised in JOIDES Journal.
3. PCOM urge TAMU to make very effort to deploy the new Pressurised Core Sampler system on the upcoming Med I Leg.
4. PCOM notes IHP's concerns about development of the barrel-sheet ('Etch-a-Sketch') software as a part of the database upgrade and passes these concerns to the JOI Database Management Steering Committee.
5. PCOM endorses the IHP's recommendations relative to:
    1) approving the change of site for the Leg 154 post-cruise meeting,
    2) the publication of the ETH Neogene Chronologic Database,
    3) the addition of structural data on barrel sheets,
    4) the inclusion of structural data as primary data in the database,
    5) the continuation of work on FossiList, and
    6) the addition of Pat Driver to IHP.
6. PCOM endorses in principle IHP's wish to see the Boyce correction to GRAPE data on future CD-ROMs, but not knowing the budgetary implications, decided the following:
    if it is not already being done, the Boyce correction should be made to all future GRAPE data;
    if feasible, the correction should be applied to existing data before publication on future CD-ROMs;if not, 'READ ME' files or headers should be included to flag uncorrected data.
7. PCOM accepts the IHP's recommendation not to delay publication of IR volumes, in an attempt to save funds, and to reduce the size of Leg 155 IR volume, if practicable.
8. PCOM accepts the SMP recommendations concerning;
    1) upgrade of MST computer system.

2) development of "manuals" for laboratories and urges ODP-TAMU to proceed expeditiously.

9. PCOM notes SMP's recommendation regarding utilisation of existing commercial software for data capture and passes this suggestion to the Database Management Steering Committee.

10. PCOM agrees with SMP's consensus over the acquisition of high quality XRF data and urges the utmost co-operation amongst technical staff and shipboard scientists.

11. PCOM recognises SMP's concern about input to the Database Management Steering Committee and recommends that JOI consider the addition of non-US participants to the committee and that the committee increase its e-mail communication with Panel Chairs and PCOM.

NOTE: PCOM also accepted all of SSP's recommendations and all those of PANCH '94 with minor modification to the PANCH "non-performers" recommendation.

NOTE: All Panel Recommendations are contained in Appendix N1.1.

1. TECP

PCOM have already endorsed the notion of structural data being added to the inventory of data already being collected aboard ship. Robertson passed around a zero-cost implementation plan (Appendix N1.2). Kidd said that it already has PCOM support in principle, but that a new working group will have a cost implication and this must be carefully considered. Robertson said that the recommendations were not intended to have cost implications. Though there is a request for funding support in the implementation plan (page three first paragraph), and the personnel should be changed to 2 US and 2 non-US. Taylor said that items C. and D. may need re-wording. Berger asked if this subcommittee was necessary, will the data be useful. Taylor said that the subcommittee will write a cookbook so that structural data can be recorded in a systematic manner. Shipley said that this is primary data and should be included as a routine operation, that it is ephemeral and must be collected. Robertson said it will not be imposed on the whole system, it will be mostly applicable to TECP legs. Lewis reminded PCOM that SMP and IHP have been pressing for this for some time.

2. LITHP

For item G, Kudrass suggested that TAMU assess the feasibility of a chip-catching tool as outlined in correspondence between Hartley Hoskins (WHOI) and engineers at ODP-TAMU, Francis agreed to give a definitive view on it , but it is not a part of their development program. Mével suggested it should also go onto the TEDCOM agenda.

Natland asked that PCOM look at the Recommendation E item on leg length again. Francis replied that usually it is only unusual circumstances that can lead to a change. Taylor said that 56 days is not cast in stone, and that the TAMU advice for 56 days has been taken so far. Fox reminded PCOM that flexibility does exist. Berger said that moving to out-of-the-way places is not a strong concept. If a proponent could propose a single hole, that could open up a new source of proposals. Kidd reminded Berger that was what happened with the Cariaco Trench site. Berger said that for re-occupation it would cut out a lot of SSP requirements. Larsen said we are covering old ground, and that PCOM have in the past, and continue to, consider scheduling short legs.

3. OHP

On item C, SSP felt that they could not provide a liaison to any thematic panel. Mix said he understood the OHP Chair withdrew that request but still wanted to improve communication channels. Dick said that this problem may have been due to a temporary breakdown in communications, and that generally SSP communications were very good. Ellins reported that SSP asked that the thematic panel Chairs liaise with SSP and send their minutes as soon as possible to ensure that SSP are aware of the thematic priorities.

4. SGPP

Francis spoke to the item on the Pressure Core Sampler. He asked if a couple of sea tests could be called a "fair test", but he conceded there is more time to make modifications now that Gas Hydrates is back to Leg 164. He said it is geometrical constraints within a small diameter core that is causing the problem. It will only be resolved by testing. Taylor asked the schedule. Francis said a land test was due in February, and it could be sea-tested before Leg 163, but would not commit on the time that any more modifications that may be required may take. Langseth said this was discussed at TEDCOM, it has worked in the past but with a poor performance. It is the performance that needs improving, so he didn't think a sea-test would be worth the expense, just of the new cutting edge. He suggested that ODP should only sea test if there is an opportunity. Taylor said that it will be the routine use that will prove the test, and this will be Mediterranean I. Given that there is a February land test, can it be used on Mediterranean I, as this will be wanted by the shipboard party and it can have a "real" test. Francis said the time-scale is too close for the modified version, but they may be able to send new cutting shoes if that is all that is required. Larsen said PCOM should urge TAMU to make very effort to deploy the new system on Mediterranean I.

5. IHP

Sager said there are a number of specific items and read a draft motion. He pointed out that the Boyce correction to be added to the GRAPE data could be a problem in that there could be users of future CD ROMs who are unaware of whether or not the corrections have been applied. Mix said that it may cost, but is a significant embarrassment and should be corrected. Francis suggested asking the database people what is involved in checking and or correcting the problem. Taylor said we need a minimum of a flag and preferably a fix to the problem. Sager asked if PCOM want to charge IHP with looking at the publications budget reductions. Kidd reminded Sager that PCOM is setting up a sub committee to meet (probably in January) to make recommendations to present to BCOM.

Dick read a draft motion on the Publications Subcommittee. Sager said we must bring any decisions forward and an implementation plan must be made and publicised as soon as possible to maximise the savings. Dick suggested that current legs should be left as they are. Falvey reminded PCOM that this will have to go before BCOM and EXCOM.

PCOM Motion 94-3-15

PCOM charges the PCOM Chair to appoint an ad-hoc Publications Sub-Committee consisting of 2 US and 2 non-US PCOM members and as ex-officio members the Manager of Science Services at ODP-TAMU and the IHP Chair. The committee is tasked to meet at ODP-TAMU as necessary and prepare different publication options with the goal to obtain an approximately 1/3 reduction of the annual publication budget by FY1998 while at the same time creatively restructuring ODP publications in order to expedite them and increase their scientific impact. These options and their costs will be reported to PCOM for consideration through the PCOM Chair and prioritised for presentation at the March BCOM meeting.

Vote *14 For, 2 Abstain*

Mével said there have been discussions in France for a while to change the publications system. Kudrass said he could not comment on the feelings of the German community. Kidd said the UK community would be keen on some change. Suyehiro is in favour of the change as it may improve science visibility. Lewis reminded Kidd that a background paper will be required for presentation to EXCOM, and Kidd said that the subcommittee report will be required for this.

Kidd proposed that Dick chair the Subcommittee, and that Sager be the other US member. Non-US members will be Kudrass and Pearce could be a member as Kidd's alternate. This composition would balance both international and disciplinary interest ("hard rock" versus "soft rock"). Francis commented that this is a constructive way to approach budget reductions.

Following brief discussion of IHP Recommendation "D", PCOM reached the following consensus.

PCOM Consensus 94-3-16

PCOM endorses, in principle, the concept of specialised data centres associated with core repositories and readily accessible micropalaeontological reference centres for the ODP community. PCOM notes that the GEO-Institute of the University of Bremen and GEOMAR at the University of Kiel stand ready to explore the possibility of developing and implementing a Database Centre in connection with the Bremen Core Repository. PCOM encourages both parties to pursue the matter with the aim of spearheading an international effort to develop an ODP Stratigraphic Database Centre in association with the Micropalaeontological Reference Centre, in co-operation with other European laboratories participating in ODP activities.

Coffee Break *10:15 - 10:30*

6. DMP

Suyehiro said DMP's view of flexible funding was in fact rather inflexible. They did not react quickly enough to have things ready. PCOM cannot accept recommendations A or F. Goldberg said that the budget items are really for BCOM consideration, he can provide information though as requested. PCOM cannot accept item D, and Leg 160 does now require LWD. PCOM cannot accept G on the basis of cost.

7. SMP

In discussion on item E, Mével said France could not send an extra member, but maybe there could be a corresponding member. Lewis said it seemed OK to him, but it will have to go to JOI. Kudrass couldn't see the point of an additional member, nor could Pearce. Suyehiro would like more information though. Larsen said it is advisable to have a non-US member, but he asked for the option to be kept open. Kidd suggested that in view of budget considerations PCOM should ask that JOI consider having another non-US member. "F" noted and acted upon under consensus for IHP. On recommendation. "C", Larsen said they had a hard time getting the XRF running on leg 152. Dick said that in his experience, in most cases, from one leg to the next the policy seems to change as to what can and cannot be done, depending upon the preference of the staff scientist and technical staff. He suggested changing the wording to "joint responsibility". Francis said that if the co-chiefs identify this at the pre-cruise meeting there should be no problem. Berger suggested this may have been a particular problem and that TAMU look into it. This was "noted" by PCOM.

8. SSP

Dick suggested that any changes in sites after SSP but before sailing have to go through the deputy director of ODP for approval. Kidd said that SSP at least want to comment on the new or moved sites (for example at the time of the pre-cruise meeting). PCOM will accept .

PCOM accepted their recommendations.

9. PANCH 94

1 should be formally passed
2 already have a PCOM motion
#3
#4
#5

on "non-performers" : Dick asked to remove the threat of informing the funding agencies. Kidd replied that it is at the stage of the IHP letter that the funding agencies will be informed. Pearce and Mével supported removing the letter to funding agencies. The motion was modified as follows;

PANCH Recommendation #5

PANCH recommends to PCOM the following procedures for identifying and dealing with non-performers (in terms of manuscript submission and sample analysis):

1. The Head of Sciences Operations at ODP-TAMU would write to the individuals concerned, giving a deadline for response. The letter should make it clear that an unsatisfactory or nil response would result in the matter being dealt with through the JOIDES structure with the individual's funding agency being informed and that ultimately the individual may be barred from further participation in the program (a copy of the letter should be sent to the JOIDES office, which will forward a copy to the relevant PCOM member with a request to investigate further).
2. An unsatisfactory or nil response should result in IHP taking up the matter. IHP will decide whether the Chair of IHP should send out a second warning letter. If sent, this letter should spell out again the risks of being barred from further program participation. A copy should be sent to the JOIDES Office which will contact the relevant funding organisation and will file copies of all correspondence.

#6
#7
#8
#9
on the composition of TEDCOM: Lewis commented that we have a new TEDCOM Chair, and that perhaps PCOM should wait until the LRP is fleshed out before doing anything precipitous, so that we can see where we are going before filling all the positions on TEDCOM.

O. New Business

1. Co-Chief Scientist Nominations EXECUTIVE SESSION

After discussions of panel nominations and others from within PCOM, ODP-TAMU (Francis) was provided with a list of nominations for co-chief for the FY96 schedule.

2. Panel Membership Recommendations EXECUTIVE SESSION

After discussion of panel nominees, PCOM endorsed the following:

SSP The nomination of S Srivastava (Bedford Institute of Oceanography) as the new SSP Chair.

OHP	T Crowley, (Texas A&M) C Ravelo, (Univ. California , Santa Cruz) B Popp, (Univ. Hawaii)
SGPP	B Bekins, (USGS, Menlo Park) M Kastner, (Scripps Inst. Oceanography)
LITHP	Panel Chair asked for 2 members to stay on for one extra year. Approved by PCOM
DMP	D Arnold, (Halliburton Logging Serv., Retd) D Herrick, (Mobil Exploration, Dallas) R Wendlandt, (Colorado School of Mines)

3. PCOM Correspondence

Kidd suggested passing correspondence received regarding re-activation of the Southern Ocean Panel to OHP for their consideration. PCOM agreed to this.

4. Future Meetings

Date	Venue
25 - 28 April 1995	Makuhari, Japan

(Makuhari is between the airport and Tokyo) Field trip on 24th April to Boso peninsular, collision zone. 4th day is half day, reserved room from 8am to 10pm. Suyehiro suggested that all participants arrive on 23rd April.

Francis asked that the April meeting include a review of non-DCS Engineering Development.

August 1995 Oregon, USA. Hosted by A Mix

After 15th August. Provisional dates are 16, 17, 18, 19, Field trip on 20th.

* December 1995 San Diego. Hosted by W Berger

* Note : Dates for AGU in 1995 are 11 - 15 December

5. PCOM Membership and Liaisons

PCOM will ask Bob Carter (new PCOM member for AUS-CAN) to be PCOM's SSP liaison.

Langseth will be leaving PCOM. Shipley will replace Taylor on TECP after Spring '95.

Judy McKenzie will replace Larsen on PCOM and be asked to be SGPP liaison.

Greg Moore will be asked to liaise for PCOM on TEDCOM.

PCOM Liaisons to Panels:

	EXCOM	LITHP	OHP	SGPP	TECP	DMP	IHP	PPSP	SMP	SSP	TEDCOM
AUS-CAN										?	
Berger				X							
Dick										X	
Fox									X		
Kidd	X							X			
Kudrass			X								
LDEO											
Larsen					X						
Lewis						X					
Mével		X									
Mix			X								
Natland		X									
Sager							X				
Shipley					X						
Suyehiro						X					
SOEST											?

PCOM Liaisons to other Global Community Programs:

	Berger	Dick	Fox	Lewis	Mével	Mix	Natland	Sager	Suyehiro	Taylor
Apti Core - Albi Core			X							
IAVCEI										
SUBCON		X								
InterRidge			X		X					
MARGINS										X
ION									X	
MESH						X				
IMAGES						X				
NANSEN				X						
LIPS								X		
USSAC							X			
Continental Drilling										
ANTOSTRAT	X									
IDEAL								X ?		
DOLCUM		X			X					

6. PCOM Thanks

PCOM Consensus 94-3-17

PCOM thanks Peggy Delaney for her many years of service to ODP as member and Chair of Ocean History Panel. Peggy has earned a reputation as a strong but fair leader and has set a high standard for those who will follow. PCOM especially notes Peggy's activist role in helping proponents craft drilling proposals, her heroic efforts that produced a superb Ocean History White Paper, and her consistently excellent presentations to PCOM that guide scheduling decisions. Peggy has earned a rest, but hopefully not for too long. We won't let her get away that easily. We expect to see Peggy continue to make major contributions to ODP in the future.

PCOM Consensus 94-3-18

PCOM wishes to thank Dick Arculus, the AUS-CAN Representative, for his outstanding service on PCOM for the last 3 years. His clearly reasoned and incisive contributions to PCOM's deliberations during his service on the panel are noted and greatly appreciated. Moreover, PCOM has taken great pleasure in his wry sense of humour that so often eased tensions and made our job easier.

PCOM Consensus 94-3-19

The Planning Committee thanks Charles Sparks for his many years of service to the Technology and Engineering Development Committee as Chairman. Under his leadership the TEDCOM became more effective at providing clear guidance and critical review of technology development projects at ODP. Under Sparks' leadership the TEDCOM provided a solid bridge between the scientific and engineering activities of JOIDES. We wish Charles Sparks success in his future endeavours.

Meeting Adjourn *13: 30*

Appendices

Appendix B1.1

1995 NSF BUDGET

	1994	REQ.	1995	% INC.
RESEARCH AND RELATED	2,163	2,348	2,280	5.4%
EDUCATION/HUMAN RES.	569	586	605	6.4%
RESEARCH INFRASTR.	105	55	250	138.1%
RESEARCH EQUIPMENT	17	70	126	641.1%
OTHER	127	140	132	4.0%
TOTAL NSF	2,982	3,200	3,395	13.8%

RESEARCH AND RELATED INCREASES

BIOLOGICAL SCIENCES	4.6 %
COMPUTER AND INFORMATION SCIENCES	7.4 %
ENGINEERING	9.4 %
GEOSCIENCES	3.9 %
ATMOSPHERIC SCIENCES	7.0 %
EARTH SCIENCES	2.2 %
OCEAN SCIENCES	2.2 %
OCEAN SCIENCES RESEARCH	2.9 %
OCEAN SCIENCES FAC.	0.6 %
OCEAN DRILLING	3.1 %
MATH. AND PHYSICAL SCIENCES	4.2 %
SOCIAL AND BEHAV. SCI.	15.8 %
POLAR SCIENCES	.4 %

App B 1.2

MANAGEMENT ITEMS

I. NEW MOU SIGNED BETWEEN N.S.F. AND AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION.

- * SIGNED ON 22 SEPTEMBER
- * COMMITMENT IN PRINCIPLE THROUGH 2003
- * PARTICIPATION AT 2/3 LEVEL IN 1995
- * ASSUMES CONSORTIUM WILL BECOME A FULL MEMBER

II. 1995 PROGRAM PLAN APPROVED AT $ 44.0 MILLION LEVEL

- * EXPECT REQUEST TO INCREASE TO $ 44.9 m
- * CONCERN WITH ADMIN/MANAG COST INCREASES

III DAVE FALVEY APPROVED AS PROGRAM DIRECTOR FOR ODP AND USSAC

- * THANK JAMIE AUSTIN FOR HIS EFFORTS

IV. PLANS FOR ODP COUNCIL REVIEW OF ODP ARE PROGRESSING.

- * EXPECT REVIEW TO BE COMPLETED IN EARLY 1996

1995 NSF/ODP FIELD PROGRAMS

1) CALIFORNIA CURRENT - SEISMICS AND CORING
   M. LYLE , L. STOTT
   <u>EWING</u> - MAY

2) MIDDLE VALLEY HEATFLOW AND SEDIMENT CHEMISTRY
   A. FISHER, P. BAKER, M. LANGSETH
   <u>EWING</u> - JUNE

3) TAIWAN COLLISION ZONE - MCS AND REFRACTION
   D. REED, G. MOORE, N. LUNDBERG, K. MCINTOSH
   <u>EWING</u> - AUG./SEPT

4) ANTARCTIC DISCORDANCE - PETROLOGY AND GEOPHYSICS
   J.C. SEMPERE, D. CHRISTIE, D. PYLE
   <u>MELVILLE</u> - DEC./JAN.

5) ALVIN PROGRAM AT TAG - INSTRUMENT/DATA RECOVERY
   K. BECKER, R. VON HERZEN
   <u>AII/ALVIN</u> - FEB./MARCH

6) NAUTILLE PROGRAM AT BARBADOS - FLUIDS/CORKS
   K. BECKER, B. CARSON, A. FISHER, M. KASTNER
   <u>NAUTILLE</u> - LATE SUMMER

1996 NSF/ODP FIELD PROGRAMS

REVIEW PANELS IN JANUARY AND MAY FOR 1996 FIELD WORK

Appendix B2.1.1

PCOM: B.2
DAVE FALVEY

App B2.1.1

JOI LIAISON REPORT

1. HIGHLIGHTS OF FY 94

- BUDGET OF $44.9M
  - NSF "RETURNED" $600K TO ODP BUDGET FOR THE DATA BASE MANAGEMENT SYSTEM DEVELOPMENT
  - BREMEN CORE REPOSITORY ESTABLISHED
  - LOGGING WHILE DRILLING FUNDED FOR LEG 156
  - ENGINEERING DEVELOPMENT REVIEW COMPLETE

2. STATUS OF FY 95 BUDGET

- APPROVED BY NSF AT $44.0 M BASED ON FIVE PARTNERS

- WITH AUS-CAN SIGNING AND FUNDING FOR 2/3 FULL MEMBERSHIP, NSF IS WILLING TO CONSIDER INCREASING PROGRAM BUDGET BY $900 K

- REALLOCATION OF PREVIOUS FUNDING CUTS
  - *FOR DISCUSSION, THURSDAY PM*

3. FY 96 BUDGET

- WITH SIX NON-US PARTNERS IN FY96, THE BUDGET TARGET EXPECTATION IS $44.9M

- BCOM WILL MEETS EARLY MARCH TO CONSIDER BUDGET
  - *FOR DISCUSSION, THURSDAY PM*

4. PROGRESS ON RECRUITMENT OF NEW INTERNATIONAL PARTNERS

- CONSEQUENCES OF NSF SIGNING MOU WITH "AUSCAN" CONSORTIUM

- NEW RECRUITMENT OPTIONS

- OUTLINE NEW "INTERNATIONALISATION" STRATEGY

5. LONG RANGE PLANNING (1995 - 2008)

- COMMITTEE MET IN WASHINGTON 17 - 19 NOV
  - *FOR DISCUSSION, THURSDAY AM*

6. STATUS OF THE PERFORMANCE EVALUATION COMMITTEE (PEC-IV)

- MET AT JOI IN NOVEMBER AUSTIN & KAPPEL ATTENDED
- COMMITTEE MEMBERSHIP:
  - DR. JOHN KNAUSS, CHAIR
  - MR. JACQUES DELACOUR (MEMBER OF THE ENGINEERING DEVELOPMENT REVIEW COMMITTEE)
  - DR. ROBERT GINSBURG (RSMAS)
  - DR. ROY HYNDMAN (PGC, CANADA)
  - DR. JANET MORTON (USGS)
  - DR. MICHAEL SARNTHEIN (GERMANY)
  - DR. PAUL WORTHINGTON (UK, FORMER DMP CHAIR)

7. ENGINEERING DEVELOPMENT REVIEW STATUS

- IMPLEMENTATION OF RECOMMENDATIONS UNDERWAY
  - CLEAR DEFINITION OF SCIENTIFIC NEED
  - AUTONOMY OF OPERATIONS & DEVELOPMENT
  - "PROJECT" DEFINITION, ASSESSMENT, BUDGET, STAFFING AND RESPONSIBILITY
  - REVIEW OF SUB-CONTRACT POLICIES IN ODP/TAMU
- IMPLEMENTATION REPORT BY JOI & ODP/TAMU

8. DATABASE MANAGEMENT SYSTEM

- FINALISING STATEMENT OF WORK
  - *FOR DISCUSSION, FRIDAY AM*

9. PERSONNEL CHANGES AT JOI

- MARY REAGAN TO LDEO
  - CANDIDATES FOR REPLACEMENT

App B2.2

INCREASING INTERNATIONAL PARTICIPATION IN ODP - A DRAFT STRATEGIC PLAN

THE BENEFITS TO *EXISTING* ODP MEMBERS OF EXPANDING THE MEMBERSHIP BASE

- ENHANCING ODP'S "INTERNATIONAL PROGRAM" IMAGE
- INCREASING PROGRAM ACCESS TO WIDER REGIONAL SCIENTIFIC DATABASES ("LOCAL KNOWLEDGE")
- EXPANDING THE POOL OF SCIENTIFIC, ENGINEERING AND TECHNICAL TALENT AVAILABLE TO THE PROGRAM
- IMPROVING ACCESS TO NATIONAL EXCLUSIVE ECONOMIC ZONES
- BUILDING OPPORTUNITIES FOR NEW EDUCATIONAL LINKAGES, SCIENTIFIC CO-OPERATION
- IMPROVING PROGRAM STABILITY AND SUPPORT BASE.

KEY FINANCIAL OBJECTIVES:

- ELIMINATE THE NEED, IN THE SHORT TERM, FOR INCREASED MEMBERSHIP CONTRIBUTIONS FROM *ALL* CURRENT PARTNERS
- INCREASED OPERATIONAL FLEXIBILITY
- ADVANCED ENGINEERING DEVELOPMENT
- IMPROVED DATABASE DEVELOPMENT, PARTICULARLY THE RECAPTURE OF ANALYSES OF EARLIER DRILLING DATA
- EXPANDED EDUCATIONAL PROGRAMS
- LONGER TERM, PROVISION OF ALTERNATE DRILLING PLATFORMS

SCOPE FOR POTENTIAL NEW PARTNERS IN ODP

RUSSIA	MEXICO
CHINA (± HONG KONG)	TAIWAN (SCIENTIFIC INSTITUTIONS)
BRAZIL	ARGENTINA
POLAND	SOUTH AFRICA
INDIA	INDONESIA
SOUTH KOREA	(NEW ZEALAND)

PROJECT OBJECTIVES

1. TO ATTRACT ONE OR TWO NEW PARTIAL MEMBERS, IN ORDER TO COMPLETE THE AUSTRALIA/CANADA CONSORTIUM BY THE START OF FY 96 AND RE-ESTABLISH THE BASE OF "SIX NON-US PARTNERS"

2. TO ATTRACT SEVERAL OTHER NEW PARTIAL MEMBERS TO COMPLETE THE EQUIVALENT OF A UNIT MEMBERSHIP, OR A COMPLETE CONSORTIUM BY THE START OF FY 97.

App B 2.4

PROJECT IMPLEMENTATION STRATEGY

1. STUDY NATIONAL SCIENCE FUNDING SITUATION FOR BASIC AND APPLIED SCIENCE

2. ESTABLISH/RE-ESTABLISH CONTACTS WITH KEY SCIENTISTS

   - EXPLORATORY VISIT.

3. CO-ORDINATE APPROACH WITH ONE OR MORE CURRENT ODP MEMBERS
   - IDENTIFY RELEVANT POLITICAL DIMENSION.

4. ARRANGE INITIAL SERIES OF VISITS, CONTACTING BOTH THE SCIENTIFIC SUPPORT BASE GROUP AND THE SCIENTIFIC/POLITICAL LEADERSHIP

   - USE PORT VISITS OF THE DRILLSHIP WHERE POSSIBLE
   - ESTABLISH STANDING LIAISONS

5. FOLLOWUP VISITS TO ASSIST IN THE DRAFTING OF SUBMISSIONS TO GOVERNMENT/FUNDING AGENCY

   - RETURN VISITS AT ALL LEVELS TO EXCOM, PCOM

6. DRAFT AND NEGOTIATE APPROPRIATE MOU FOR FULL, OR PARTIAL MEMBERSHIP IN THE PROGRAM

TIMESCALE FOR ALL SIX STEPS (FROM FIRST CONSIDERATION TO FINAL SIGNATURE), BASED ON THE MORE RECENT AUSTRALIAN AND TAIWAN UNIVERSITIES RECRUITMENT, IS *A MINIMUM OF TWO YEARS.*

OPTIONS FOR MEMBERSHIP OF ODP

NEED TO MODIFY THE CURRENT "FULL MEMBER" CONCEPT TO ENCOURAGE *NEW* INTERNATIONAL PARTICIPATION IN ODP

- A GENERAL MODEL FOR *PARTIAL* MEMBERSHIP

BRIDEN CONCEPT OF "CANDIDATE MEMBERSHIP"

- INTRODUCTORY MEMBERSHIP - ONE YEAR ONLY; OBSERVER STATUS AT PCOM AND ON THEMATIC PANELS; ONE SCIENTIST ON ONE LEG; NO FEE.
- CANDIDATE MEMBERSHIP - UP TO 3 YEARS; OBSERVER STATUS AT PCOM AND ON THEMATIC PANELS; TWO SCIENTIST BERTHS PER YEAR; ONE-SIXTH FULL ANNUAL MEMBERSHIP FEE ($492K/YR).

PROPOSED EXTENSION OF THIS CONCEPT:

- ELIGIBILITY - CANDIDATE MEMBERSHIP OPEN *ONLY* TO COUNTRIES/INSTITUTIONS WHO ARE *NOT* CURRENT FULL MEMBERS, OR PARTICIPANTS IN CURRENT CONSORTIA.
- MEMBERSHIP DURATION - 3 YEAR CANDIDATE MEMBERSHIP TERM MAY BE EXTENDED BY ODP COUNCIL IF NO COMPATIBLE CONSORTIUM
- SUBSCRIPTION - CANDIDATE MEMBERSHIP PAYABLE IN MULTIPLES OF ONE-SIXTH OF THE FULL MEMBERSHIP SUBSCRIPTION, UP TO FIVE-SIXTHS.
- BENEFITS - CANDIDATE MEMBERS RECEIVE BENEFITS *IN PROPORTION* TO SUBSCRIPTION LEVEL. FOR EACH ONE-SIXTH OF A FULL MEMBER SUBSCRIPTION PAID, THE CANDIDATE RECEIVES:
  - TWO BERTHS PER YEAR, PLUS
  - TWO PANEL MEMBERSHIPS, IN DEFINED INCREMENTS

TARGET RECRUITMENT SCHEDULE AND FINANCIAL PROJECTIONS.

	FY95 | FY96 | FY97
Russia	--1-----2/3------4-----------------------5----------------------6-----|
China	--2/3-----4-----------------------5---------------------6----|
Brasil	--4---------------5---------------------6----|
Poland	-----1--------2/3--------4-----------------------5---------------------6--------->
India	-----1--------2/3--------4-----------------------5---------------------6--------->
South Korea	--3------4------------------5----------------6---------|
Mexico	---------------5-------------------6----|
Taiwan	--5-------6--|
Argentina	-----1--------2/3--------4-----------------------5---------------------6--------->
South Africa	---2/3-----4-----------------------5---------------------6---------|
Indonesia	---2/3--------4-------------------------5--------------------6---------|

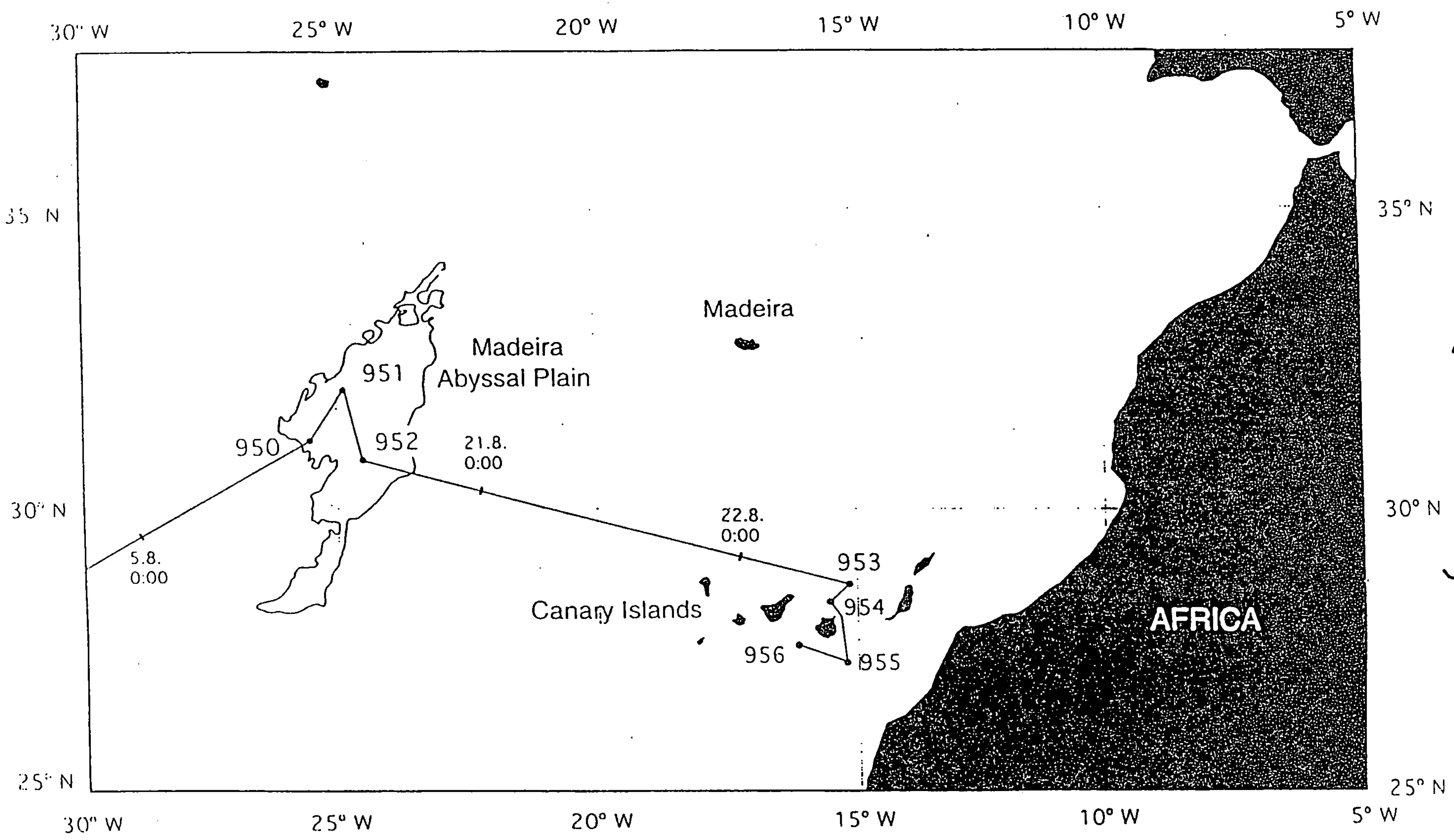
	FY95	FY96	FY97
Increase in Program Funding	$492K	$983K *to* $2 458K	$3 933K *to* $8 833K

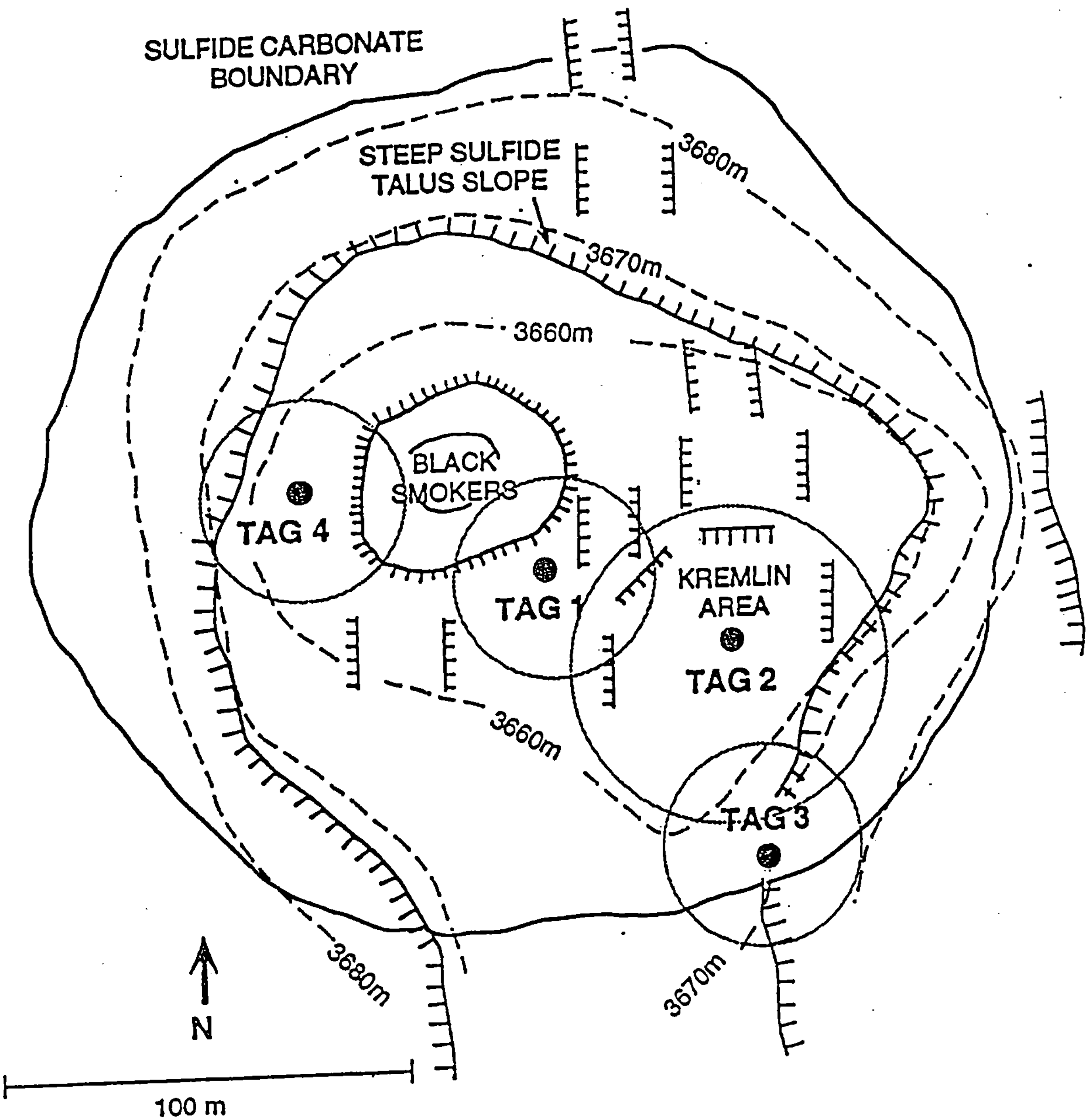
App B2.6

PEC - IV SCHEDULE

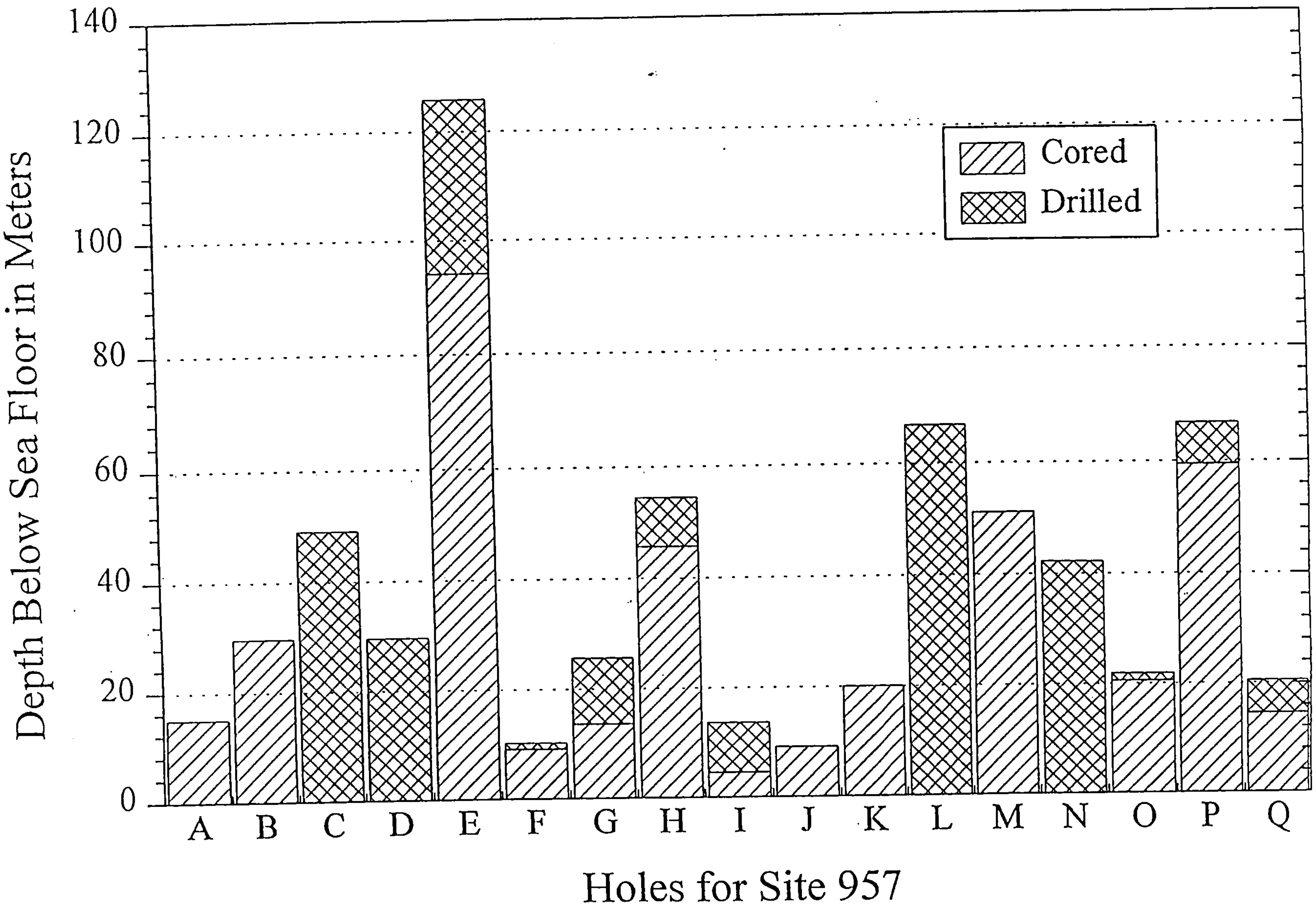
NOV 29 TO DEC 3	JOIDES MEETINGS COLLEGE STATION	KNAUSS & SARNTHEIN
DEC 5 TO 9	AGU SAN FRANCISCO (Co-Chief Interviews)	KNAUSS, SARNTHEIN & HYNDMAN
JAN 23	L-DEO	*ALL*
JAN 24	COMMITTEE MEETING	*ALL*
MARCH 8 TO 11	*JOIDES RESOLUTION* PORT CALL	DELACOUR, HYNDMAN & SARNTHEIN
Dates To Be Advised	L-DEO - BRG	SARNTHEIN
Before MAR 27	UNIV of LEISESTER	WORTH'GTON
MAR 27 T0 31	ODP/TAMU	*ALL*
APRIL	PEC - IV REPORT TO JOI; JOI TO FOWARD TO SUBCONTRACTORS FOR RESPONSE	
JUNE	REPOT & RESPONSES TO EXCOM & ODPC	

PCOM: B.3. ODP-TAMU REPORT (TIM FRANCIS)

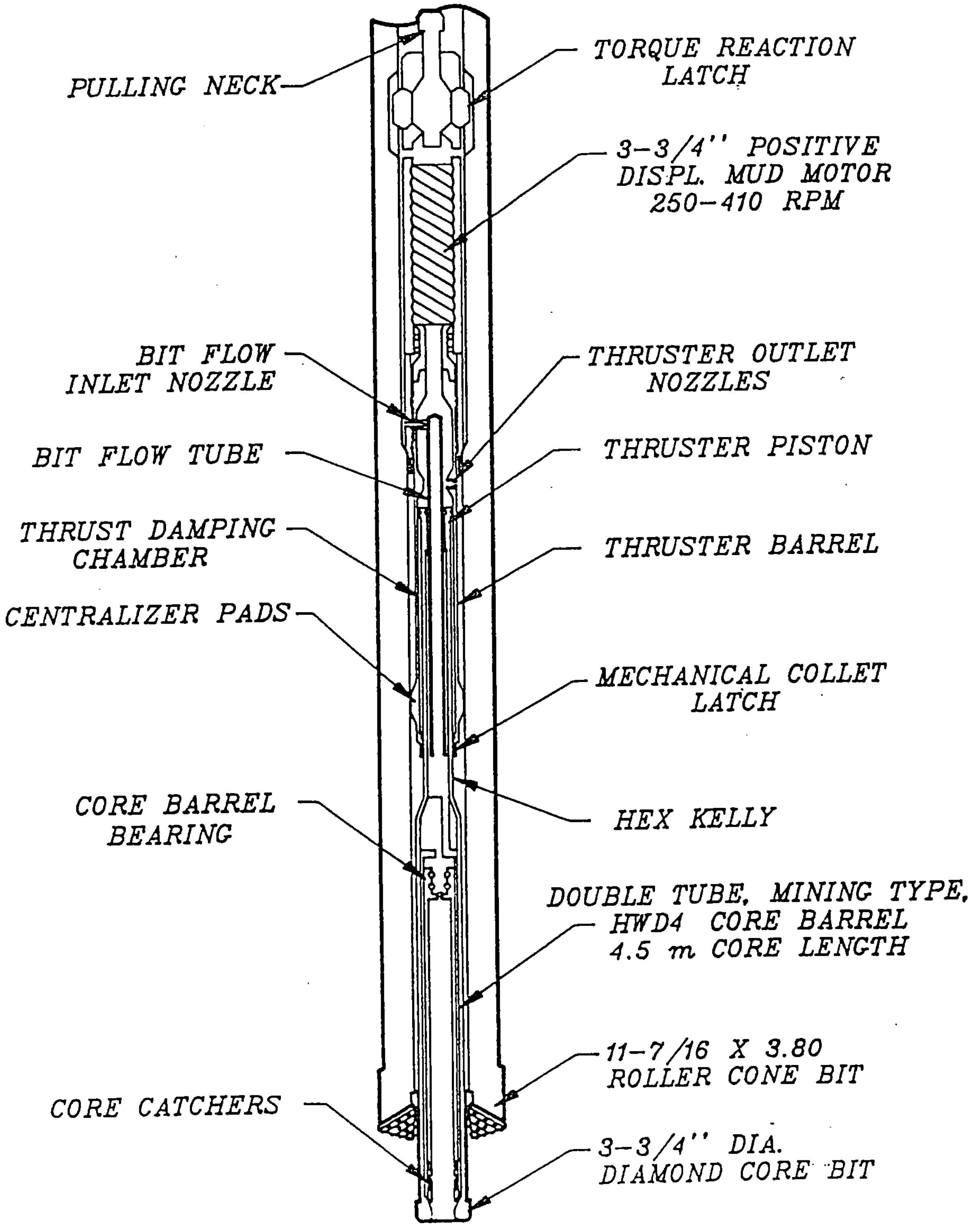



SULFIDE CARBONATE BOUNDARY
STEEP SULFIDE TALUS SLOPE
3680m
3670m
3660m
BLACK SMOKERS
TAG 4
TAG 1
KREMLIN AREA
TAG 2
TAG 3
3660m
3680m
3670m
N
100 m

Leg 158 - Site 957
Penetrations



MOTOR DRIVEN CORE BARREL
(MDCB)
OCEAN DRILLING PROGRAM



11/22/94

Appendix B3.5

Summary of MDCB Runs : Pre-Leg 158

Run	Leg	Core	Bit	Bit Flow (gpm)	WOB (lbs)	Penetration (meters)	Recovery (meters)	%Recv'y (%)
1	141	863B8N	SS, Piloted	30	6000	2.5	2.51	100
2	141	863B9N	SS, Piloted	30	6000	4.5	1.37	30
3	144	873B8N	Geoset	20	3000	4.5	2.17	48
4	144	873B9N	Geoset	20	3000	4.5	1.05	23
5	144	873B10N	Geoset	20	3000	4.5	1.08	24
6	146	889D4N	Geoset	20	3000	4.5	2.40	53
7	146	891B12N	Geoset	20	3000	4.5	0.00	0
8	146	891B21N	Geoset	20	3000	4.5	0.57	13
					Totals	**34.0**	**11.15**	**33**

B3.5

11/21/94

Summary of MDCB Runs : Leg 158

Run	Leg	Core	Bit	Bit Flow (gpm)	WOB (lbs)	Penetration (meters)	Recovery (meters)	%Recy'y (%)
1	158	957C3N	Impreg	25	5000	4.5	0.00	0
2	158	957C5N	Impreg, pilot, med	15	3600	4.5	0.50	11
3	158	957C7N	Impreg, pilot, hard	20	3600	3.6	3.60	100
4	158	957C10N	Impreg, pilot, hard	20	3600	2.0	0.15	8
5	158	957C11N	Impreg, pilot, hard	20	3600	4.5	4.07	90
6	158	957C12N	Impreg, pilot, hard	20	3600	2.0	1.70	85
7	158	957C13N	Impreg, pilot, hard	20	3600	3.0	1.70	57
8	158	957C14N	SS, pilot, hard	20	3600	2.0	1.55	78
9	158	957C15N	Geoset	20	3600	4.0	4.27	107
10	158	957C16N	Geoset	20	3600	3.0	2.60	87
11	158	957F1N	Geoset	20	3600	1.0	0.80	80
12	158	957F2N	Geoset	20	3600	4.5	0.15	3
13	158	957G1N	SS, pilot, hard	20	3600	4.5	0.23	5
14	158	957G2N	Impreg	25	5000	4.5	0.09	2
15	158	957G3N	Impreg, pilot, hard	25	3600	4.5	0.09	2

Appendix B3.6

11/21/94

Summary of MDCB Runs : Leg 158

Run	Leg	Core	Bit	Bit Flow (gpm)	WOB (lbs)	Penetration (meters)	Recovery (meters)	%Recv'y (%)
16	158	957H1N	Impreg, med	25	3600	4.5	0.61	14
17	158	957H2N	Geoset	25	3600	4.5	0.23	5
18	158	957H3N	Geoset	25	3600	4.5	0.81	18
19	158	957H4N	Impreg, med	20	3600	4.5	0.00	0
20	158	957H5N	Impreg, med	25	3600	4.5	1.59	35
21	158	957H6N	Impreg, med	20	3600	4.5	0.39	9
22	158	957H7N	Impreg, med	20	3600	4.5	0.10	2
23	158	957H8N	Impreg, med	25	4400	4.5	1.14	25
24	158	957I1N	Tungsten Carbide	20	3600	4.5	0.77	17
25	158	957K1N	Tungsten Carbide	20	3600	4.5	0.40	9
					Totals	**97.1**	**27.54**	**28**

DRYDOCK SCHEDULE

28 NOVEMBER	ARRIVE FALMOUTH, ENGLAND OFFLOAD
3 DECEMBER	INTO DRYDOCK
17 DECEMBER	LEAVE DRYDOCK (EARLIEST) LOAD
21 DECEMBER	DEPART FALMOUTH (EARLIEST)
24 DECEMBER	DEPART FALMOUTH (LATEST)

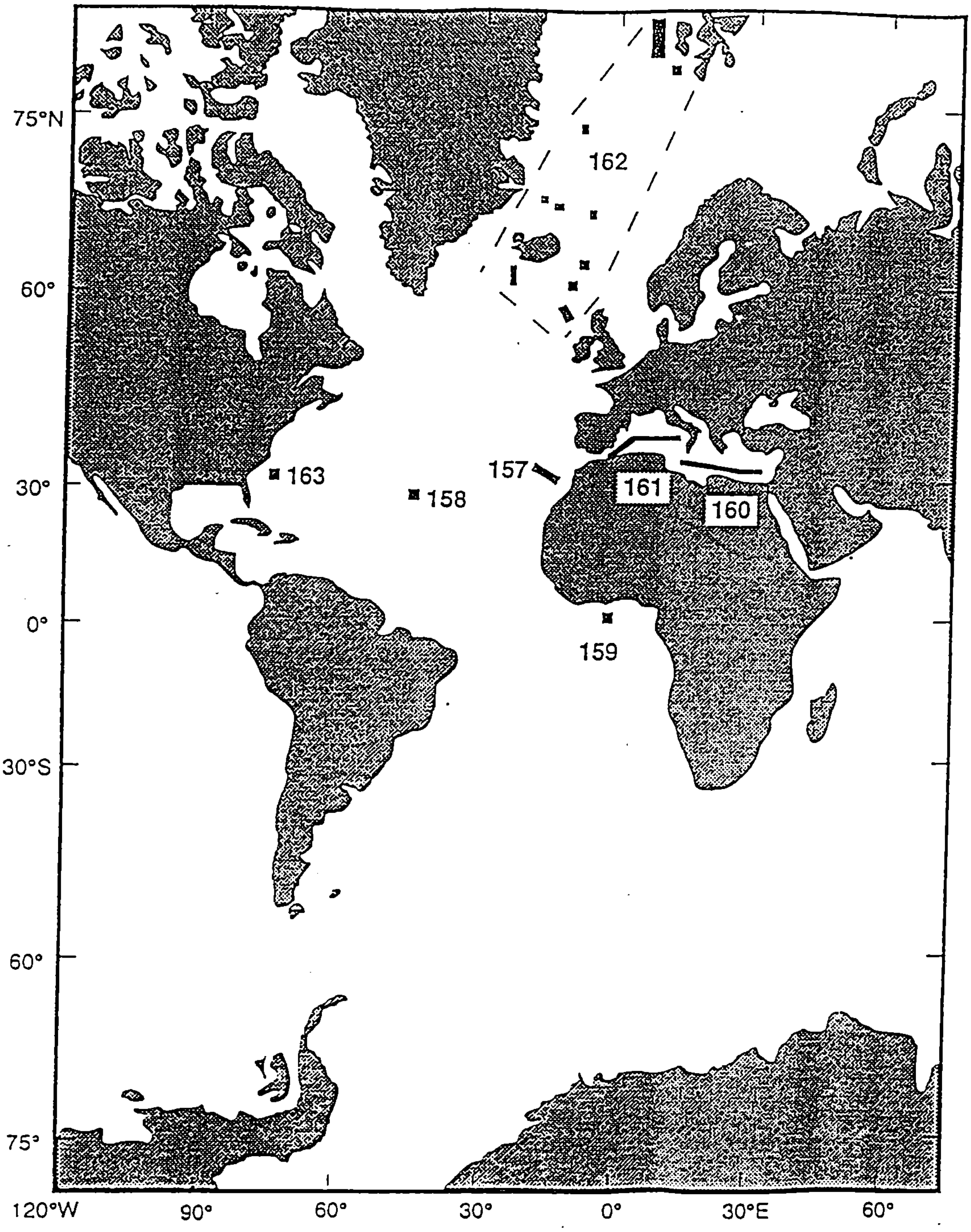
MAJOR JOBS

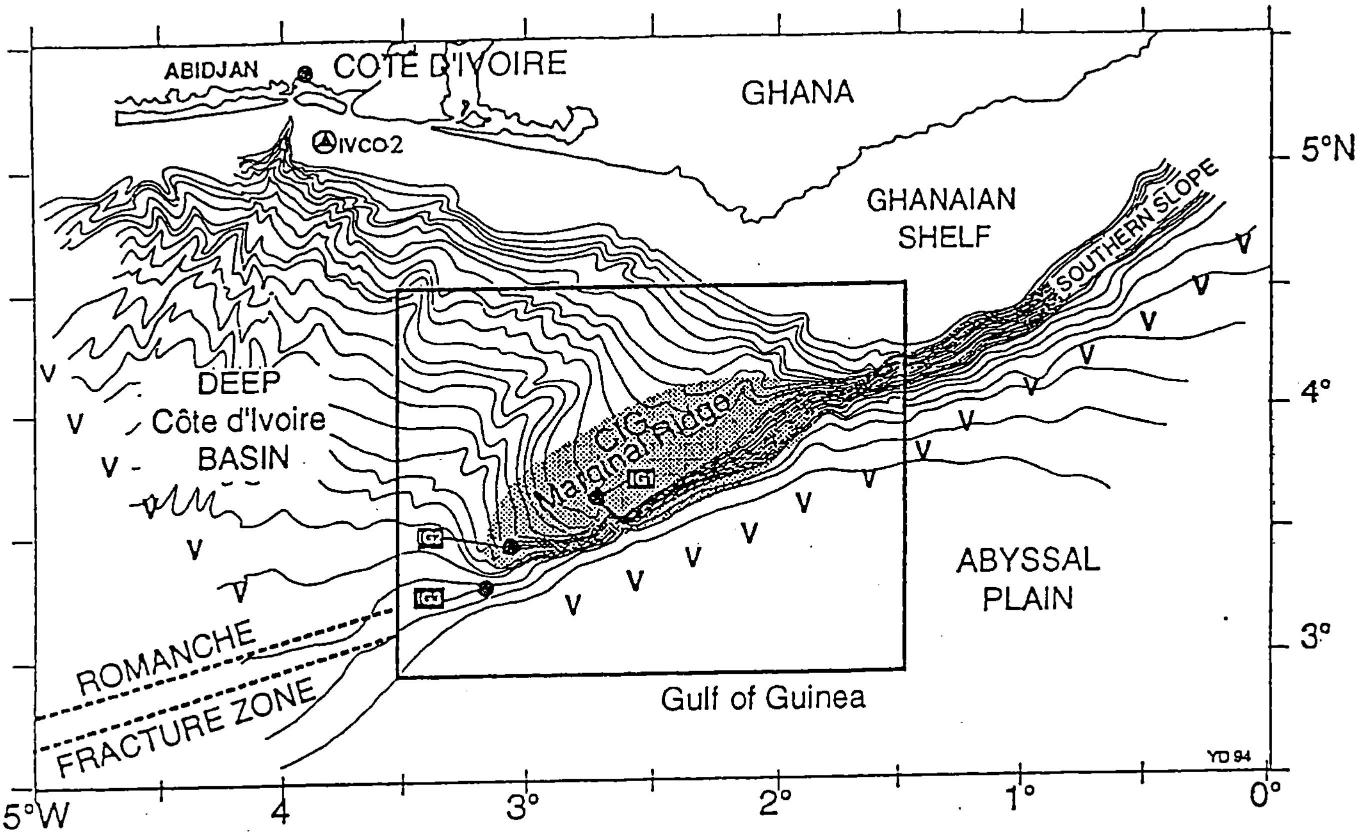
HULL CLEANING AND PAINTING

PULLING SHAFTS AND CHANGING SEALS ON MAIN PROPULSION

THRUSTER MAINTENANCE

REMOVING ASBESTOS PANELS IN LIVING QUARTERS


75°N
60°
30°
0°
30°S
60°
75°
120°W
90°
60°
30°
0°
30°E
60°
162
163
158
157
161
160
159


ABIDJAN
COTE D'IVOIRE
GHANA
IVCO2
GHANAIAN SHELF
SOUTHERN SLOPE
DEEP Côte d'Ivoire BASIN
CIG Marginal Ridge
IG1
IG2
IG3
ABYSSAL PLAIN
ROMANCHE
FRACTURE ZONE
Gulf of Guinea
YD 94
5°N
4°
3°
5°W
4
3°
2°
1°
0°

ODP OPERATIONS SCHEDULE

Leg		Port of Origin†	Cruise Dates	Days at Sea	Estimated Days Transit/On Site
158	TAG	Las Palmas 23-28 September	29 September - 23 November 1994	55	13/42
	Transit to drydock	Las Palmas 23 November	24 November - 30 November 1994	6	
	Drydock at Falmouth, England				
	Transit to Dakar	Falmouth	24 December - 3 January 1995	10	
159	Eq. Atlantic Transform	Dakar 3-4 January 1995	5 January - 2 March 1995	56	13/43
	Transit	Las Palmas 2 March*	2 - 8 March 1995	6	
160	Mediterranean I	Marseilles 8-11 March*	12 March - 3 May 1995	52	11/41
161A	Mediterranean II	Napoli 3-7 May‡	8 May - 25 May 1995	17	11/46
161B		Malaga 25 May‡	25 May - 4 July 1995	40	
162	Atlantic Arctic Gateways II	Leith 4-8 July‡	9 July - 3 September 1995	56	15/41
163	Gas Hydrates	Reykjavik 3-7 September	8 September - 3 November 1995	56	13/43
		Miami 3-7 November			

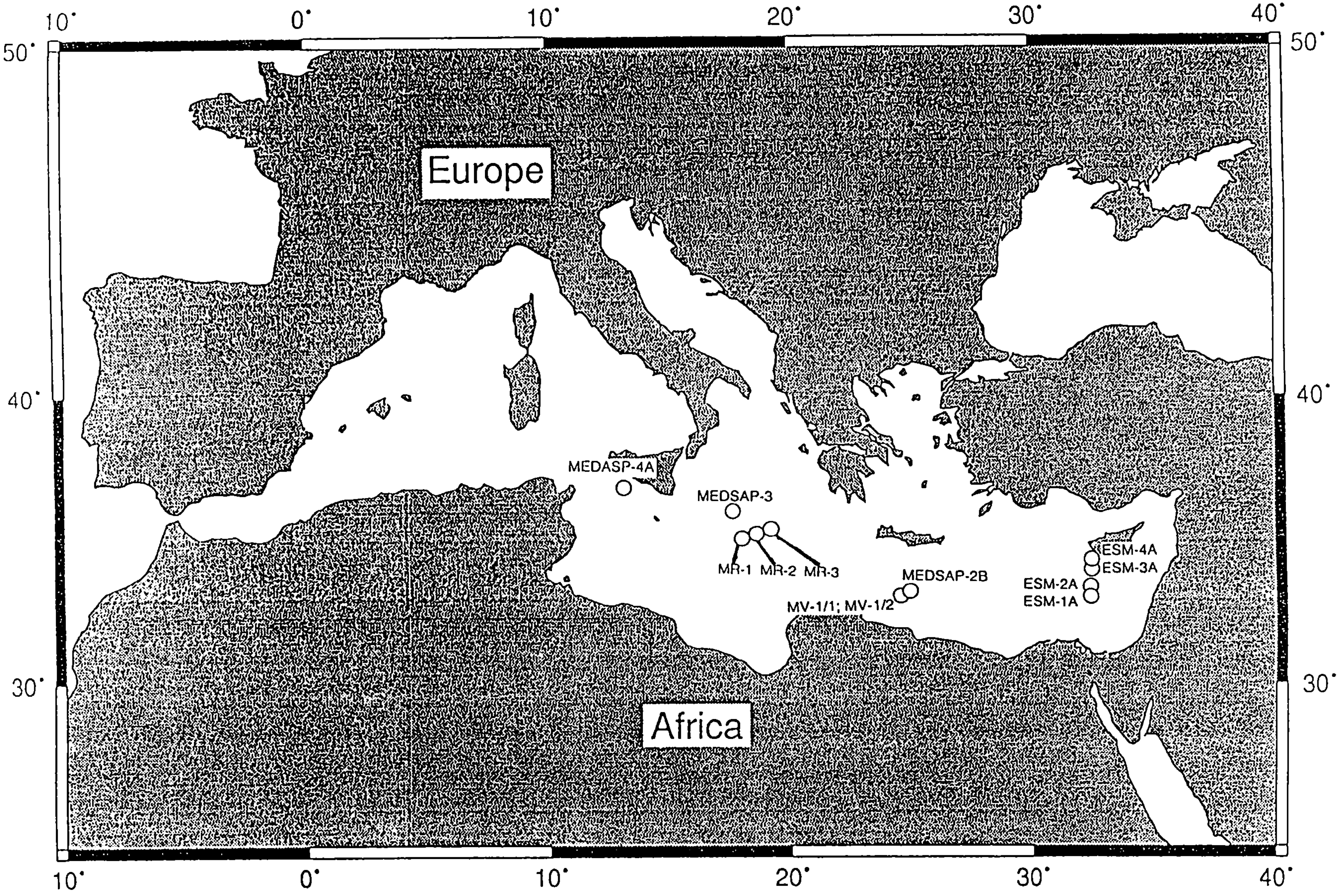
† Although 5 day port calls are generally scheduled, the ship sails when ready.

* Sedco-Forex crew rotates on 2 March; Leg 160 scientific participants join in Marseilles.

‡ Sedco-Forex crew rotates on 3 May, 25 May, 4 July.

TJG

3 October 1994



Appendix B3.12

LEG 159

CO-CHIEF SCIENTISTS: PAT LOHMANN (WHOI)
JEAN MASCLE (FRANCE)

EQUATORIAL ATLANTIC TRANSFORM

ODP STAFF SCIENTIST: PETER CLIFT
ODP OPERATIONS MGR: MIKE STORMS
ODP LAB OFFICER: BURNEY HAMLIN

LEG 160

CO-CHIEF SCIENTISTS: KAY-CHRISTIAN EMEIS (GERMANY)
ALASTAIR ROBERTSON (UK)

MEDITERRANEAN I

ODP STAFF SCIENTIST: CARL RICHTER
ODP OPERATIONS MGR: GENE POLLARD
ODP LAB OFFICER: BILL MILLS

LEG 161

CO-CHIEF SCIENTISTS: MENCHU COMAS (SPAIN/ESF)
RAINER ZAHN (GERMANY)

MEDITERRANEAN II

ODP STAFF SCIENTIST: ADAM KLAUS
ODP OPERATIONS MGR: LEON HOLLOWAY
ODP LAB OFFICER: BRAD JULSON

LEG 162

ATLANTIC ARCTIC
GATEWAYS II

CO-CHIEF SCIENTISTS: EY[illegible]EIN JANSEN (NOR
MAUREEN RAYMO (MIT)

ODP STAFF SCIENTIST: PETER BLUM
ODP OPERATIONS MGR: MIKE STORMS
ODP LAB OFFICER: BURNEY HAMLIN

LEG 163

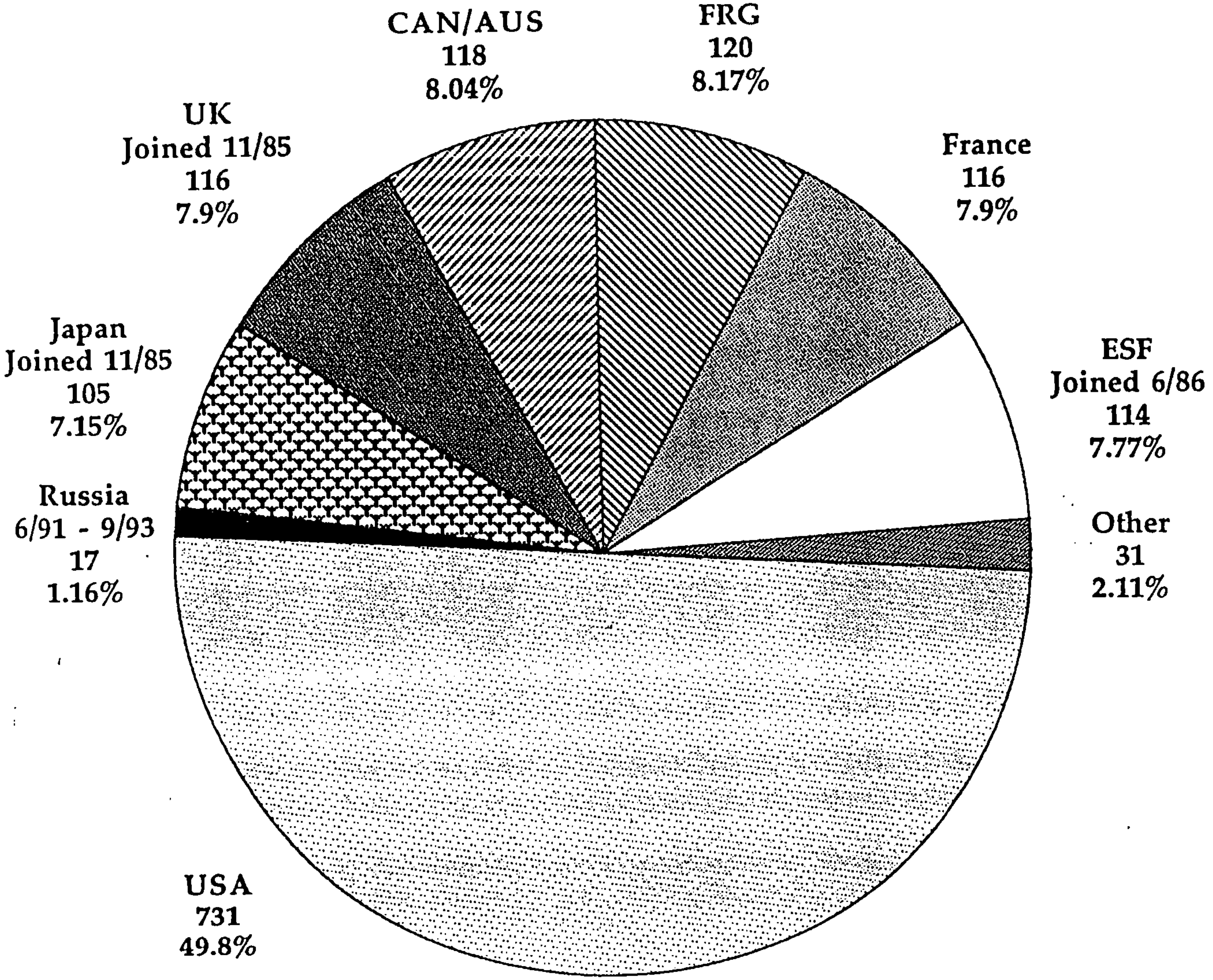
GAS HYDRATES

CO-CHIEF SCIENTISTS: RYO MATSUMOTO (JAPAN)
CHARLES PAULL (UNIV. NORTH CAROLINA)

ODP STAFF SCIENTIST: NEW HIRE
ODP OPERATIONS MGR: GENE POLLARD
ODP LAB OFFICER: BILL MILLS

SHIPBOARD PARTICIPANT TALLY

LEG 101 - LEG 158



TOTAL = 1468 Participants including Staff Scientists and LDGO/LDEO Logging Scientists

Leg Staffing

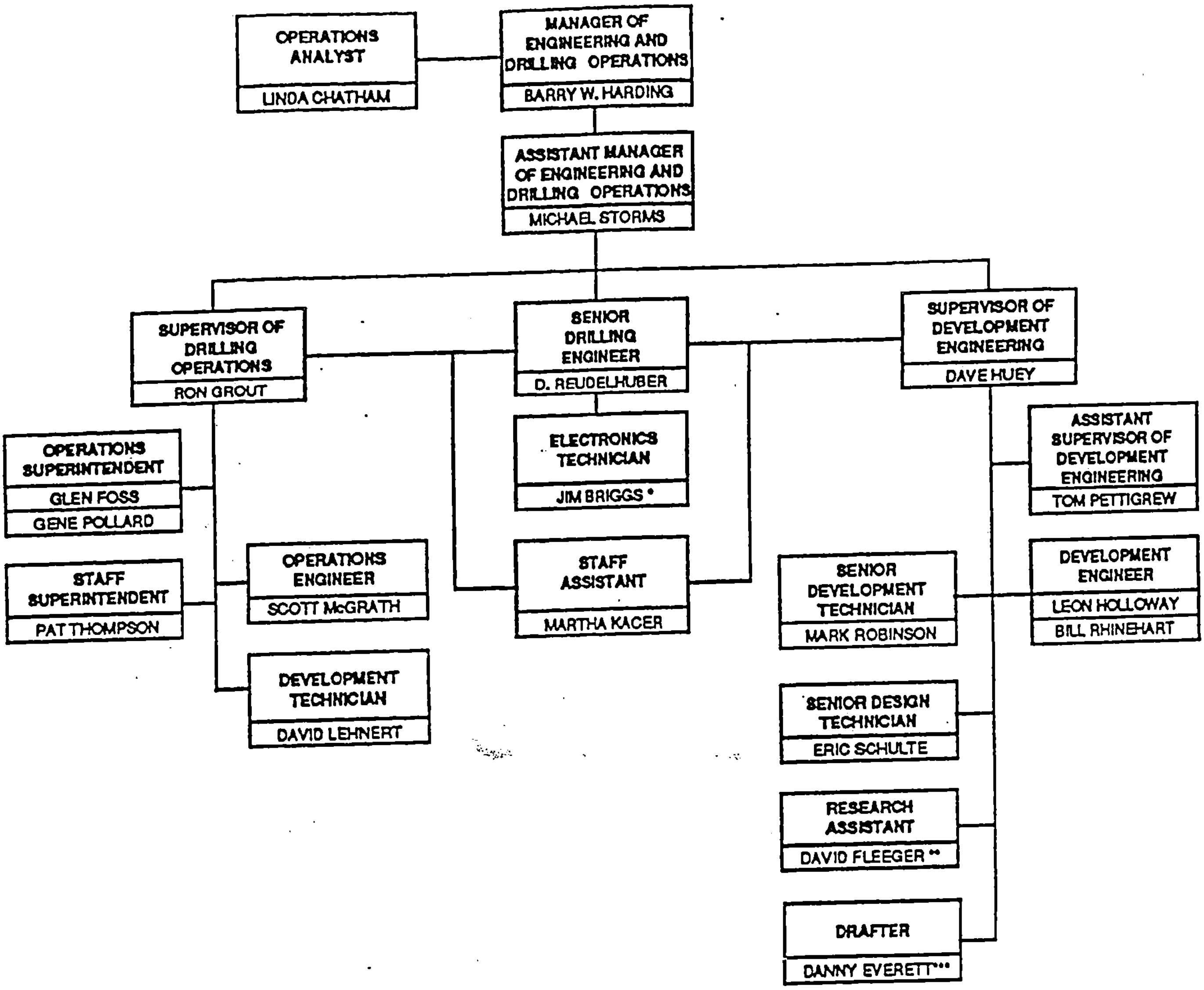
	159T	159	160	161A	161B	162
Scientific Party		48	47	47	47	50
Observer(s)	-	2	2	1+1?	1	-
Tracor	6	-	1	-	2	-
New York Times	-	-	-	1	-	-
French Television	-	-	-	-	3 ?	-

Appendix B3.17

B3.17

ORGANIZATIONAL CHANGES
IN
ENGINEERING AND DRILLING OPERATIONS
DEPARTMENT

Appendix B3.18



Task: 1803 Engineering and Drilling Operations
Subtasks: Engineering development, drilling operations
Functions: Liaison and coordination of development engineering activities and drilling operations; operations liaison to drilling subcontract

* SOE
** 50%
*** 75%

March 1993

MANAGER OF ENGINEERING & DRILLING OPERATIONS

Ocean Drilling Program
Texas A&M University

The Ocean Drilling Program at Texas A&M University invites applications for the position of Manager of Engineering and Drilling Operations. Applicants should have minimum qualifications of a bachelor' s degree or equivalent in a relevant engineering discipline, several years experience of engineering development work and experience of drilling operations from floating platforms offshore. The successful candidate will have been responsible for the technical oversight and budgetary monitoring of numerous engineering development projects and subcontracts. In addition to distinguished engineering accomplishments, candidates should possess exceptional qualities of leadership and interpersonal skills and have the stature to lead a team of highly skilled professionals.

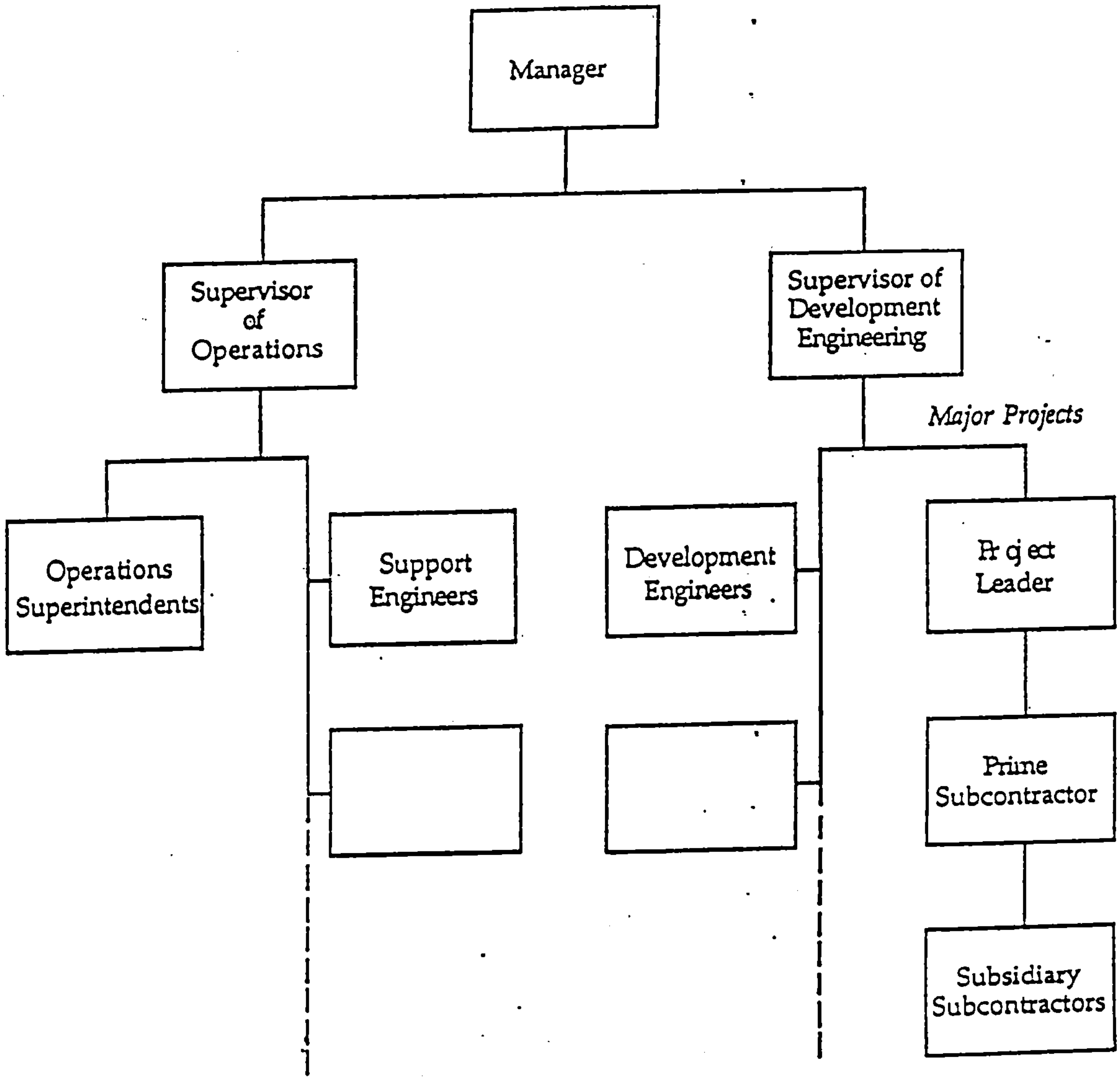
The position requires interaction with senior level engineers from industry and academia, and the ability to communicate engineering technicalities to scientists from the world's principal earth and ocean science institutions and government agencies.

Letter of application should include a resume with three references and be forwarded to:

Personnel Supervisor
Ocean Drilling Program
Texas A&M University
1000 Discovery Drive
College Station, TX 77845

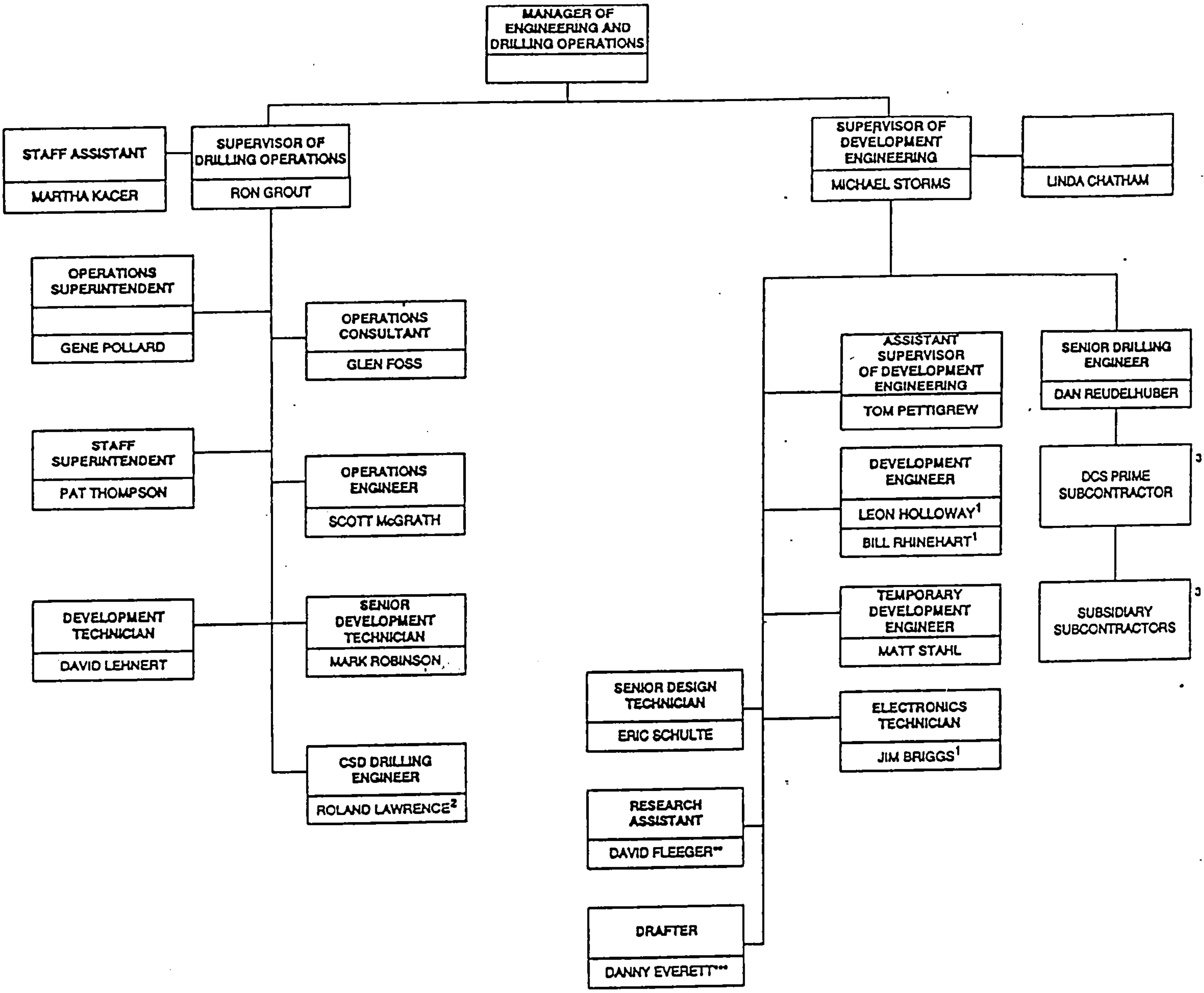
AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER
COMMITTED TO DIVERSITY

Figure 1
ODP-TAMU Engineering/Operations Department
Organizational Chart
EDRC Report



Appendix B3.21

B.3.21



1. Working 15% on the DCS project.
2. Works with Drilling Operations when Continental Scientific Drilling (CSD) activities allow.
3. Not yet in place.

** 50%
*** 75%

7 October 1994

PCOM: 8 · 4 · 1 ODP - LDEO
(DAVE GOLDBERG)

Appendix B4.1

Recent Logging Operations

Leg 157: VICAP/MAP -- evolution of volcanoclastic facies

- Quad tool in 5 holes *(No CSES)*
- FMS in 3 holes
- Geochem tool in 3 holes

- 'Geoframe' FMS processing software on board

Leg 158: TAG -- Hydrogeology of mid-Atlantic geothermal vents

- 'high-T' and std tools available
- No logging attempted in unstable holes

Near-future Logging Operations

Leg 159: EAT -- Evolution of W. African transform margin

- standard tools available

Leg 160: E. Med -- Processes of tectonic deformation and sapropel formation

- standard tools available
- LWD recommended
- GHMT recommended

Leg 161: W. Med -- Processes of back-arc basin tectonics and sapropel formation

- standard tools available
- GHMT recommended

B4.2

Downhole systems development

Magnetic Susceptibility / Total field (GHMT - Schlumberger)

- ▨ tool size modifications needed
- ▨ mods and leasing quotes - to be determined
- ▨ deployment for E. Med - FY96 legs possible

Shear-wave sonic tool (LDEO)

- ▨ data acquisition and electronics upgrade in progress
- ▨ land tests in Spring 1995
- ▨ evaluation and deployment for 163 - Gas Hydrates

Database initiatives

- ▨ Legs 139-152 CD-ROMs published or in press for IR
- ▨ Legs 154 CD-ROM completed in January

Education/Scientific results

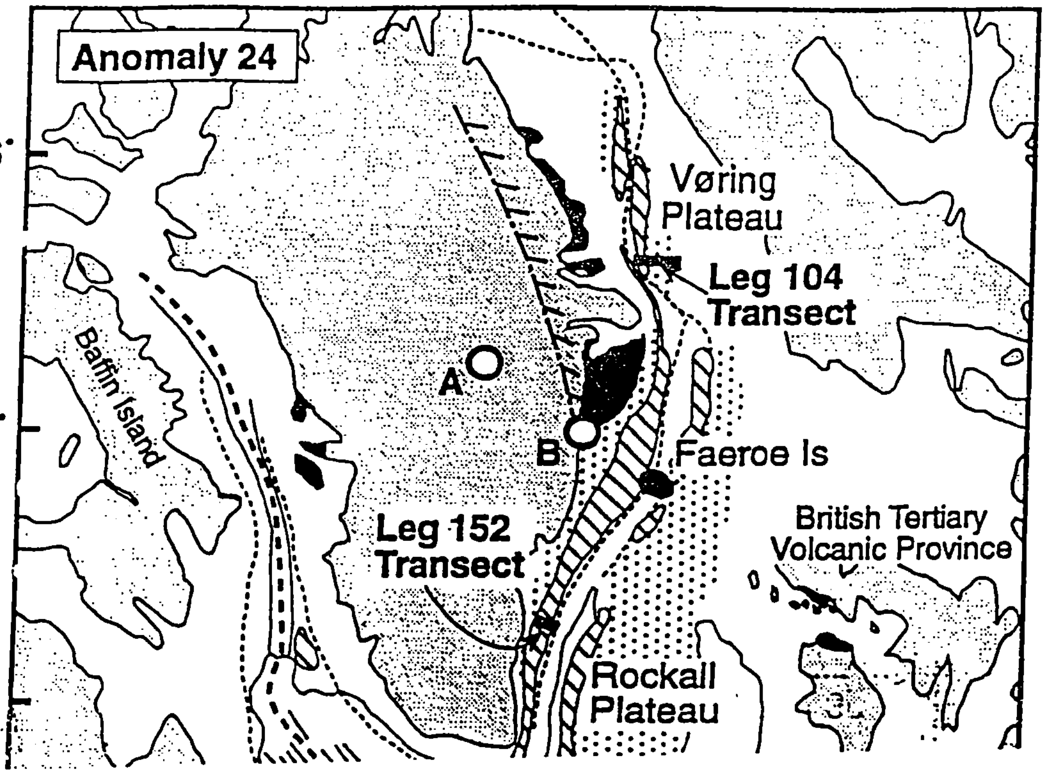
- ▨ "Downhole Tools Guide" print publication available from BRG

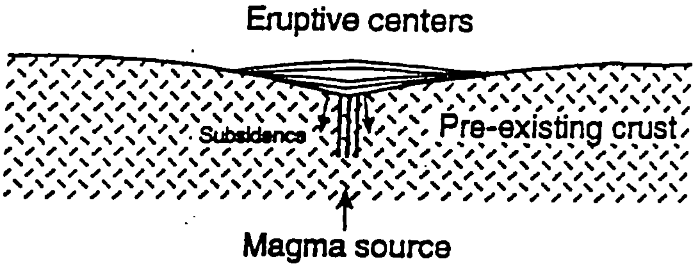
- ▨ Fall 1994 AGU Special Session (O, T)

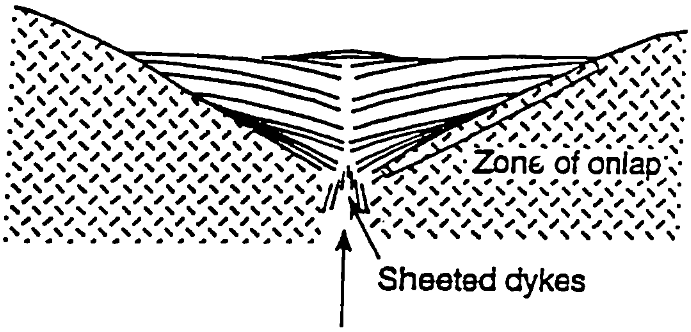
  MON, Dec 5 AM & PM

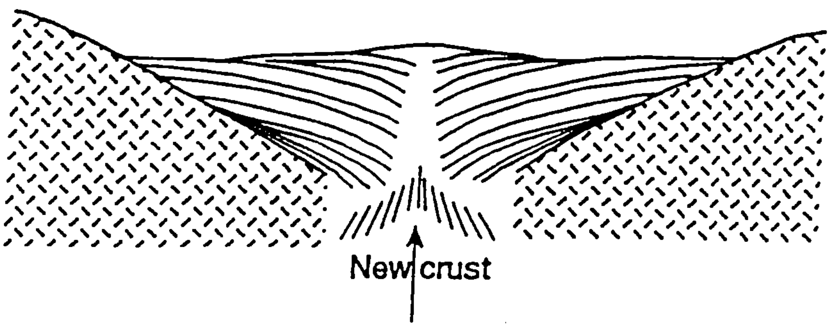
  "Integration of Downhole, Core and Seismic Data"
  Convenors: D. Goldberg, BRG; P. Lysne, DMP

  25 abstracts submitted (>5 in other sessions)

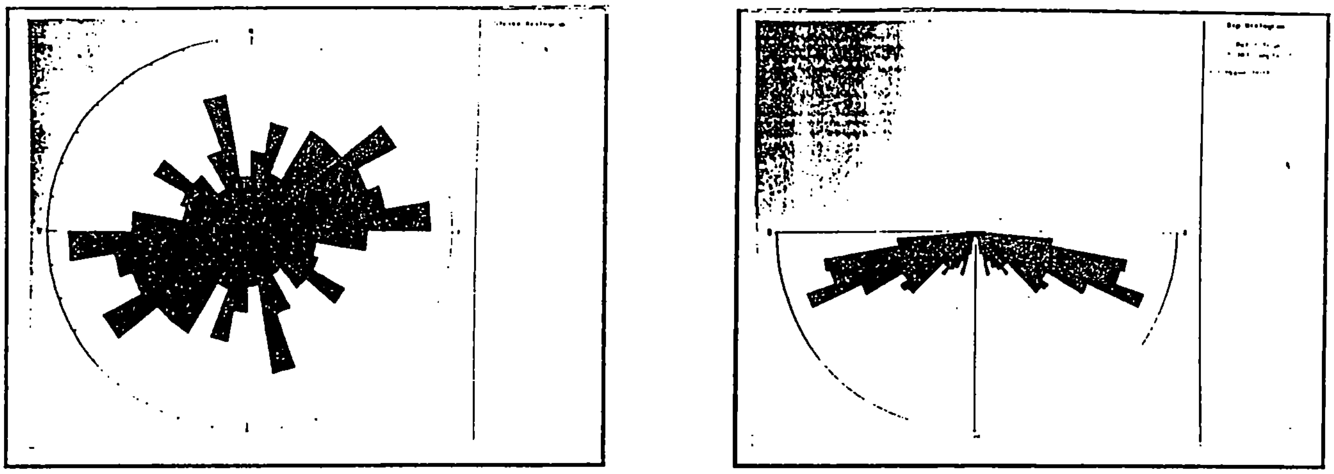

Anomaly 24
76°
68°
60°
Baffin Island
A
B
Vøring Plateau
Leg 104 Transect
Faeroe Is
British Tertiary Volcanic Province
Leg 152 Transect
Rockall Plateau
3


Eruptive centers
Subsidence
Pre-existing crust
Magma source

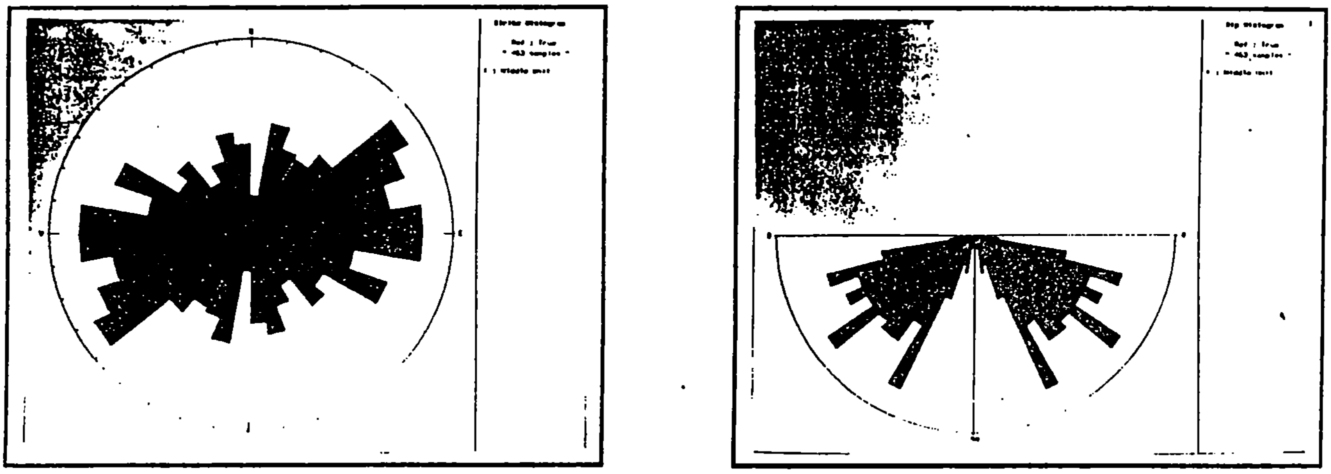

Zone of onlap
Sheeted dykes


New crust

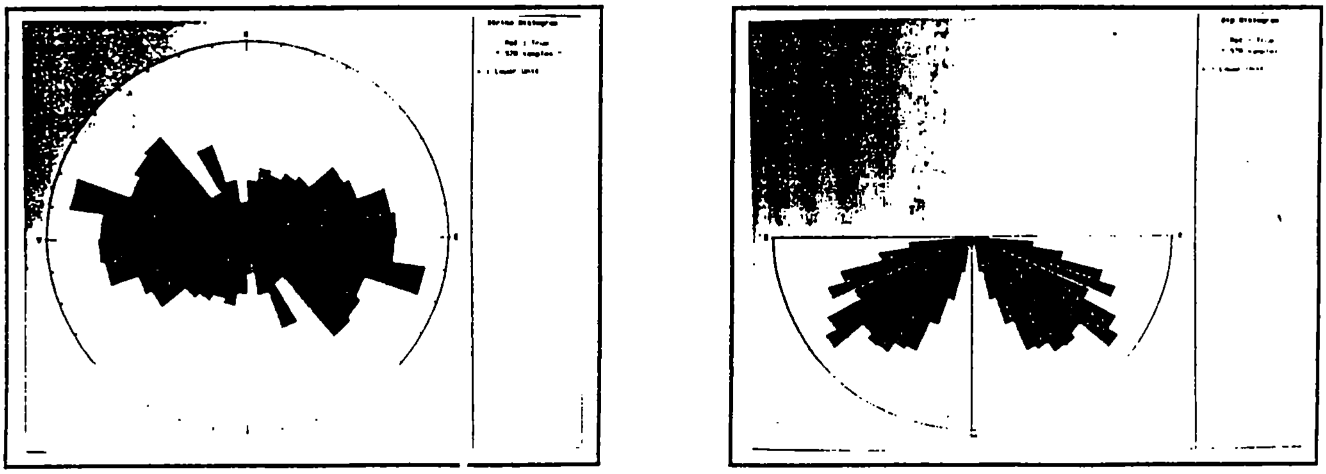
Strike **Dip**



Upper Unit



Middle Unit



Lower Unit

4.5
PCOM: · 4 · 25 ODP - LDEO - LEI
(PETER HARVEY)

MAP

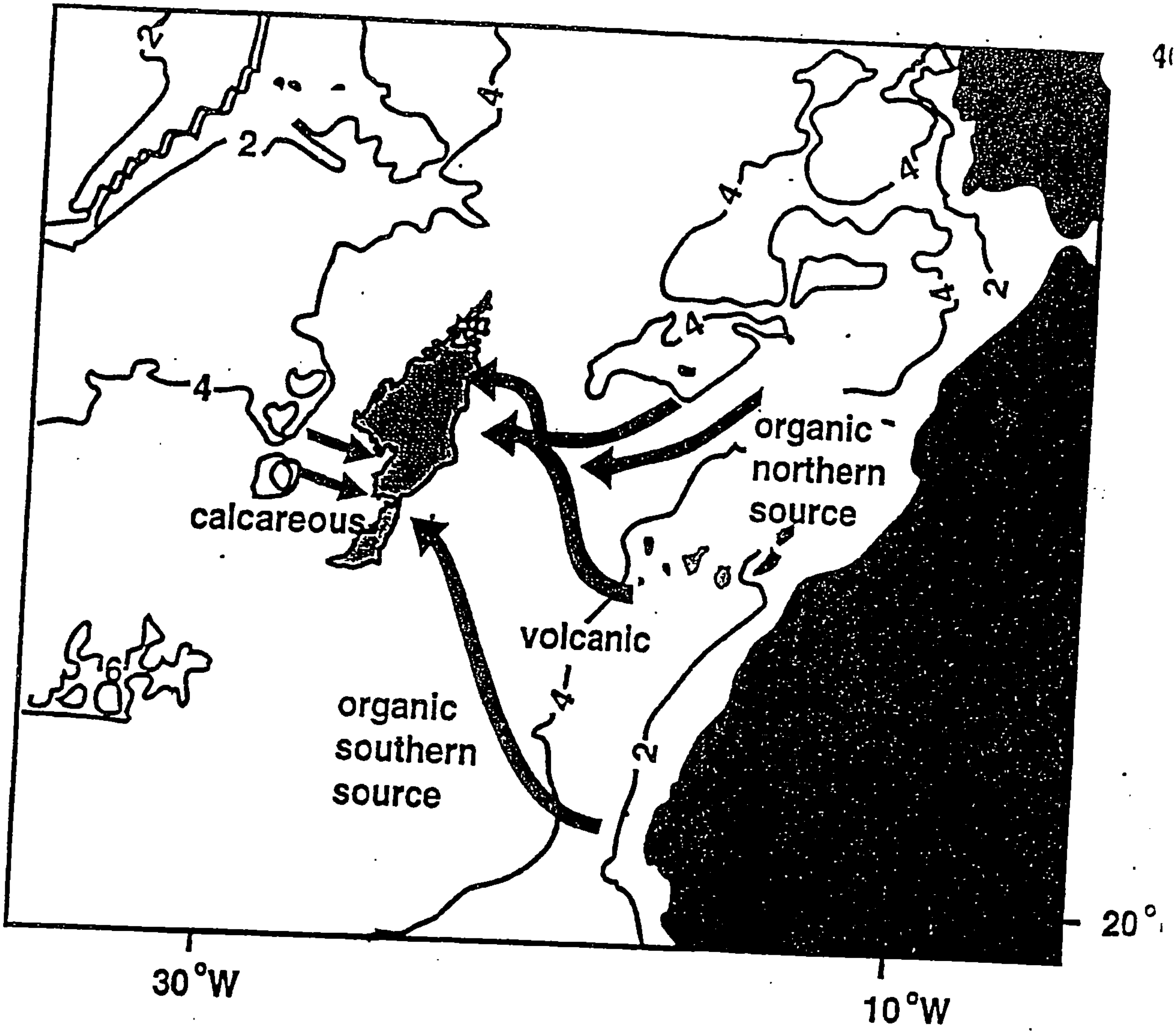
Site	Hole	Penet.	Recovery	Logs run
950	950A	381.3	88	a. Lithoporosity b. Geochemical c. Seismic stratigraphy b. Formation Microscanner
951		No logs run		
952	952A	425.9	97	Quad combo (Lithoporosity + Seismic stratigraphy)

Lithoporosity: HLDT, CNT, NGT
Geochemical: AACT, SGT, NGT
Seismic stratigraphy: LSS, DIT, NGT
Formation Microscanner: FMS, NGT

(Madeira Abyssal Plain)

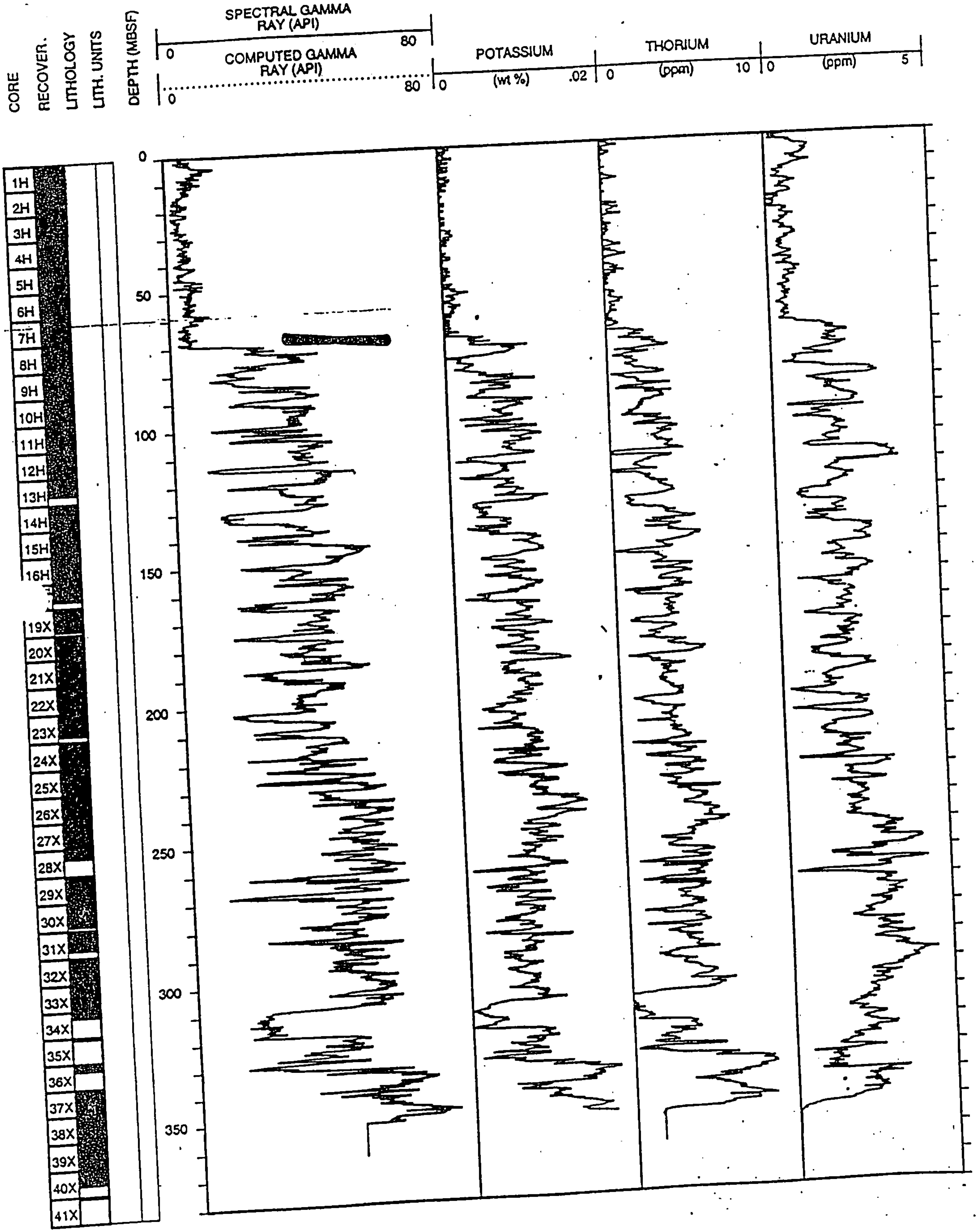
B 4.6

000079



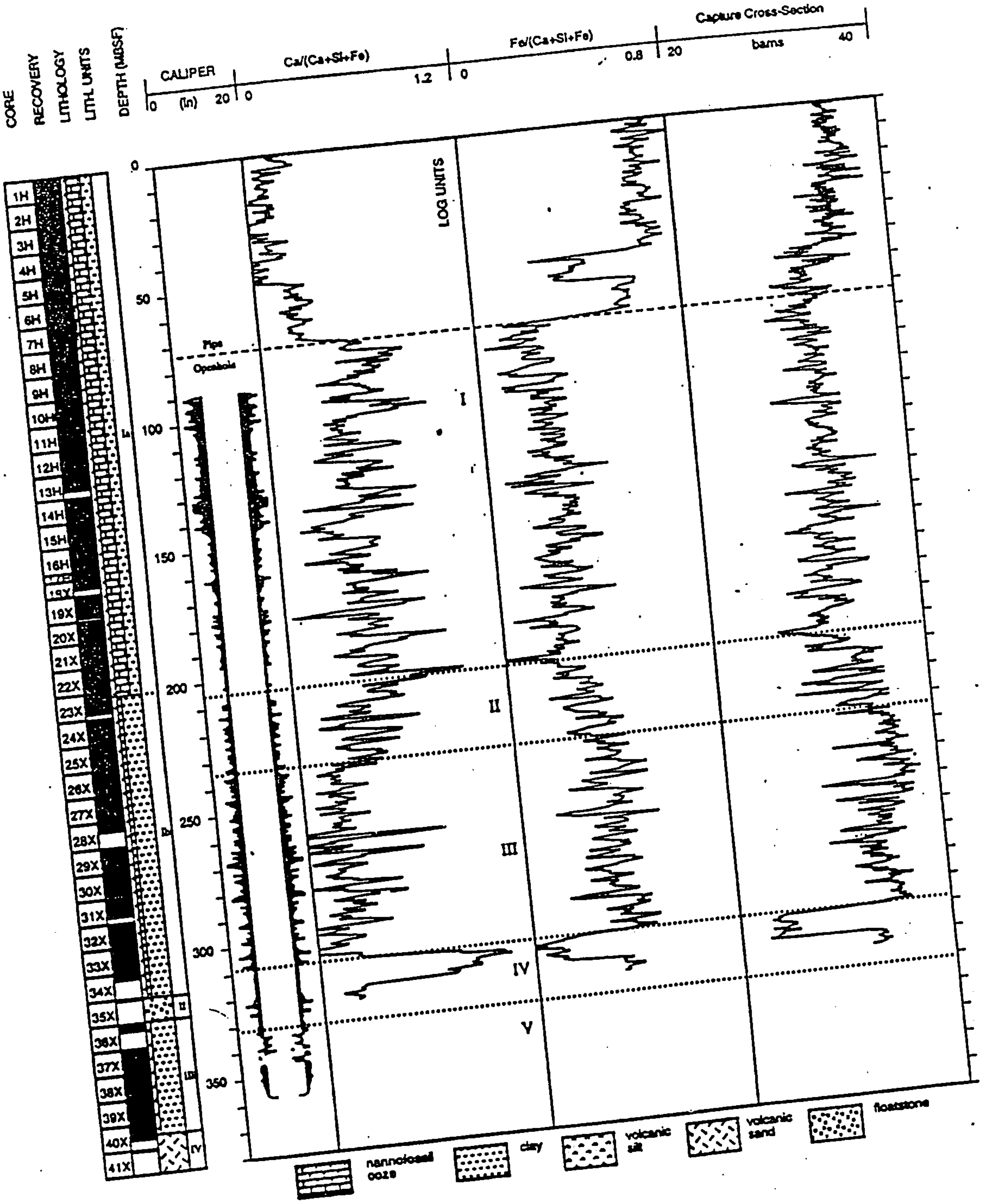
INTRO (MAP) Figure 1

Hole 950A: Natural Gamma Ray

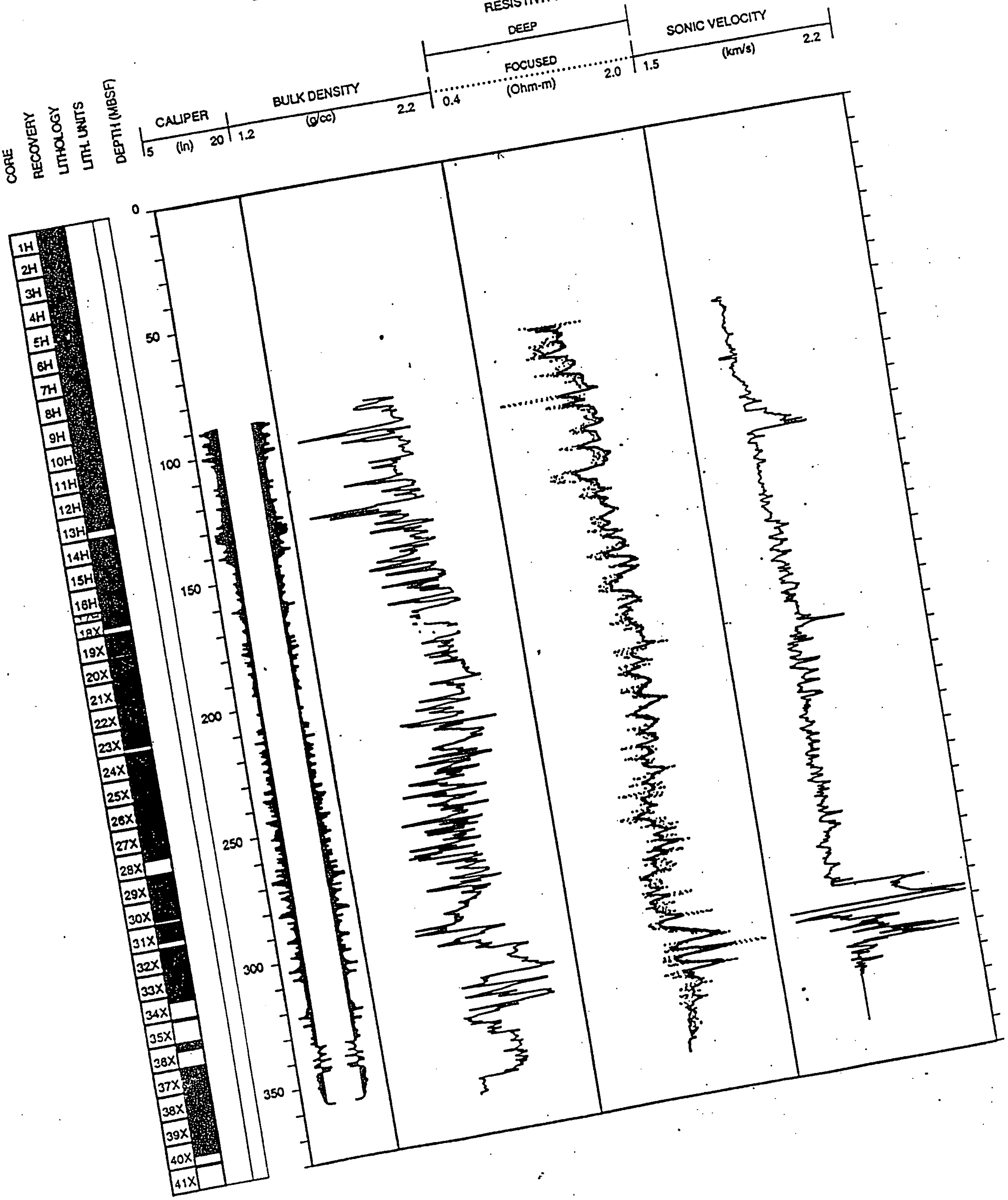


ix B4.8

Hole 950A: Geochemical logs



Hole 950A: Physical Logs Summary

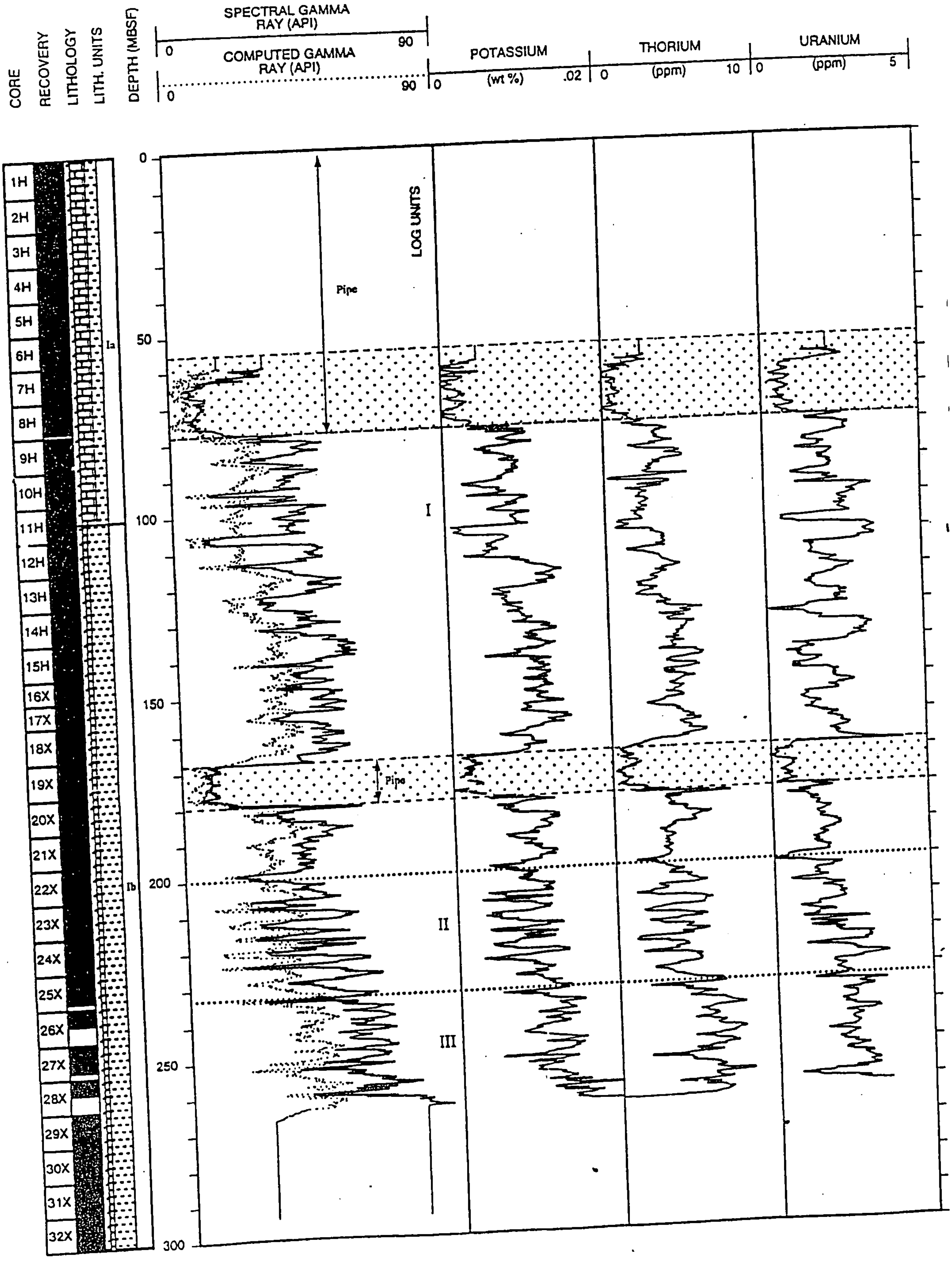


B4.10

Figure 952-L-1

000725

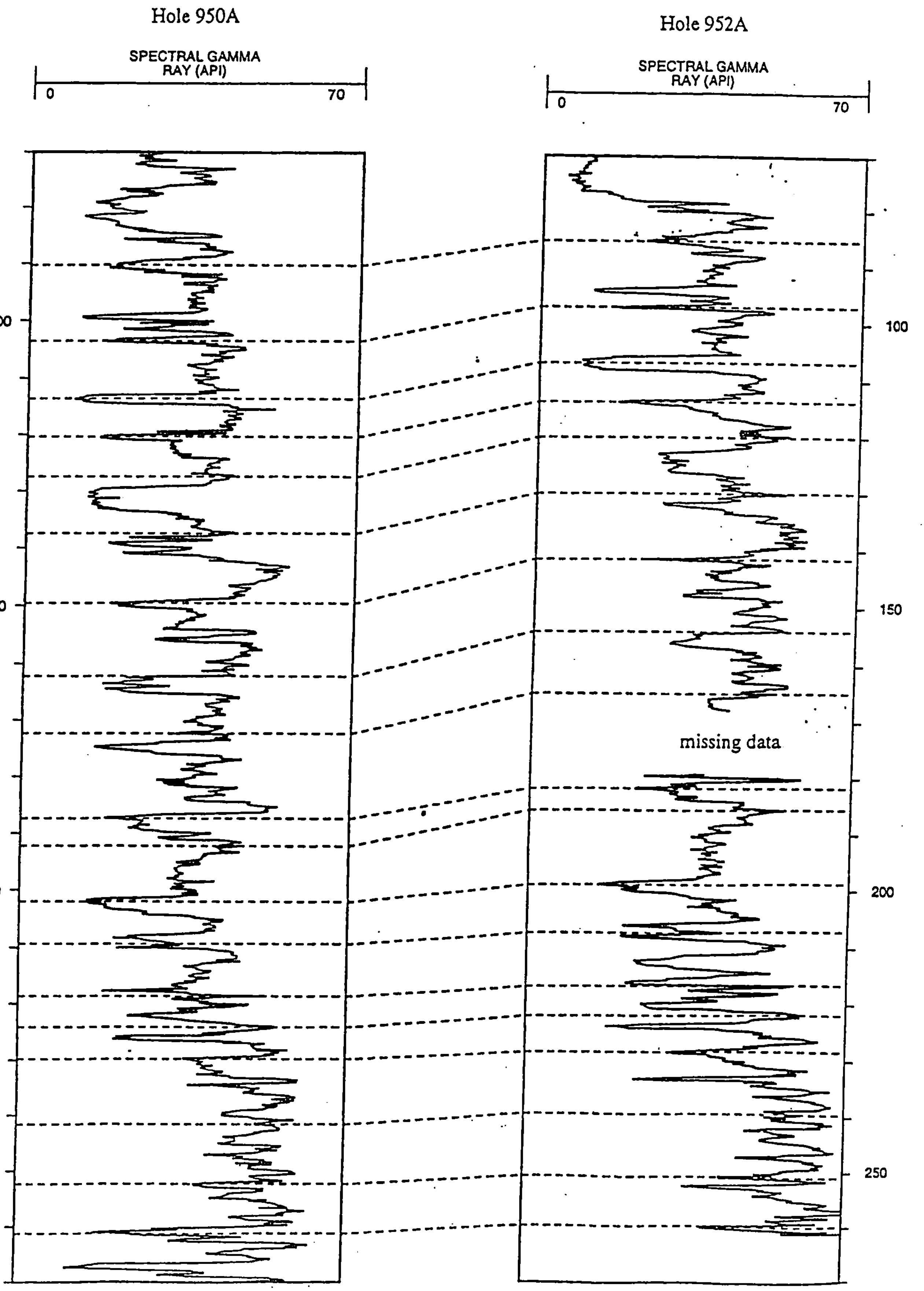
Hole 952A: Natural Gamma Ray



B4.11

000728

Comparison of gamma-ray log from Holes 950A and 952A.



Appendix B4.12

VICAP

Site	Hole	Penet.	Recovery	Logs run
953	953C	1158.7	48	Quad combo
954		No logs run		
955	955A	599.4	89	a. Quad combo b. Geochemical c. Formation Microscanner
956	956B	703.5	54	a. Quad combo b. Geochemical c. Formation Microscanner

Quad combo: HLDT, CNT, LSS, DIT, NGT

Geochemical: AACT, SGT, NGT

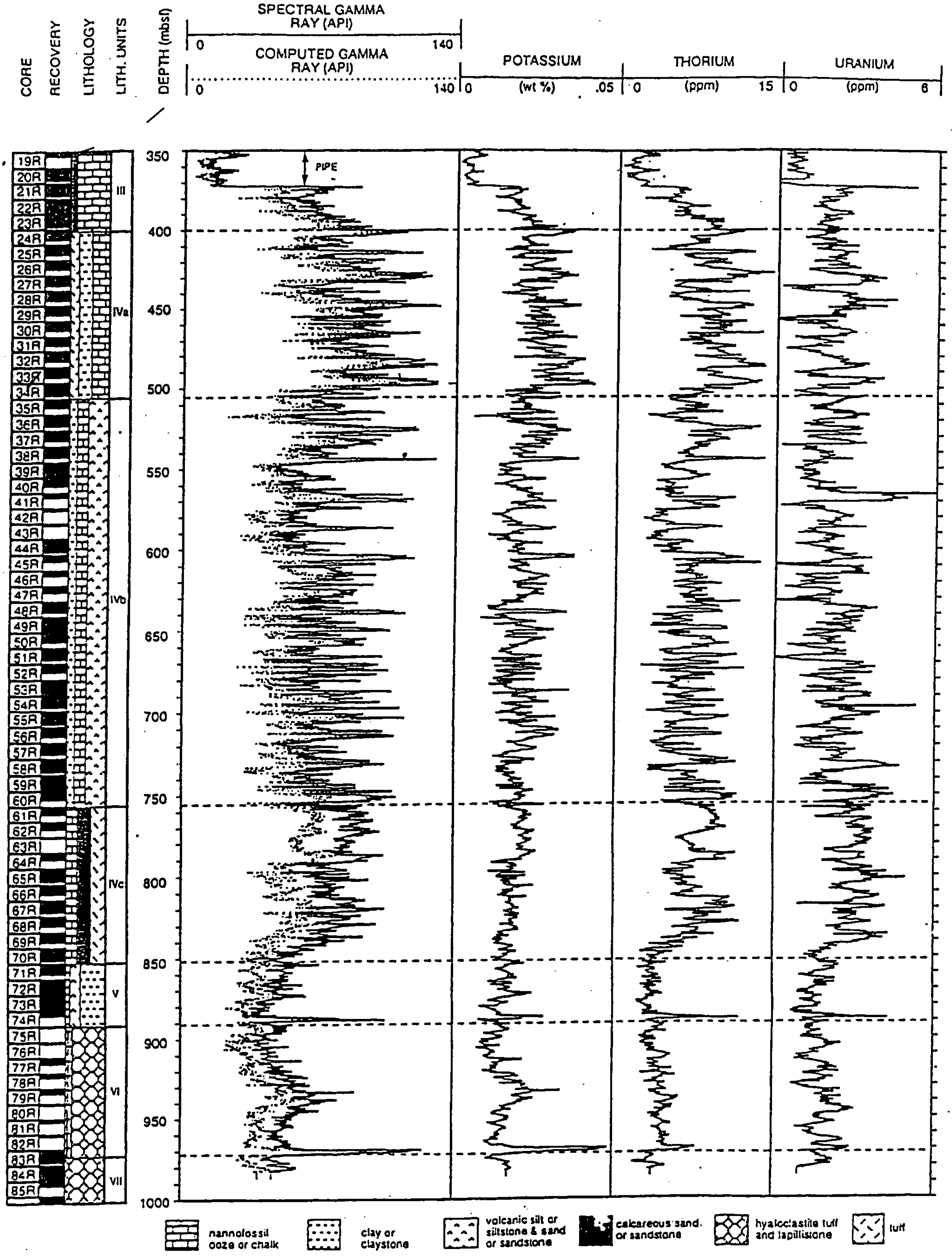
Formation Microscanner: FMS, NGT

(Volcanic Islands Clastic Apron Project)

Figure 953-L-1

001045

Hole 953C: Natural Gamma Ray



001052

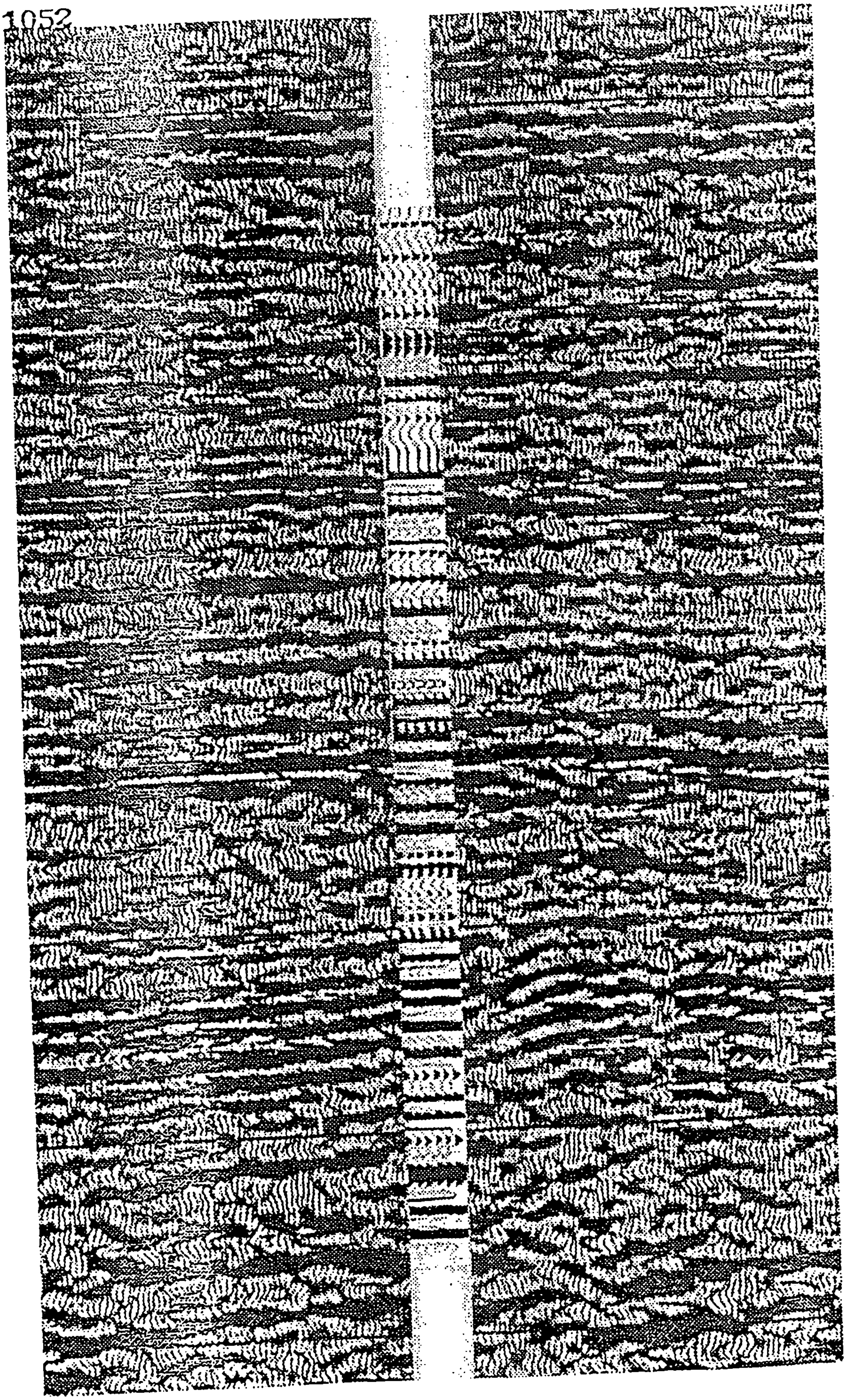
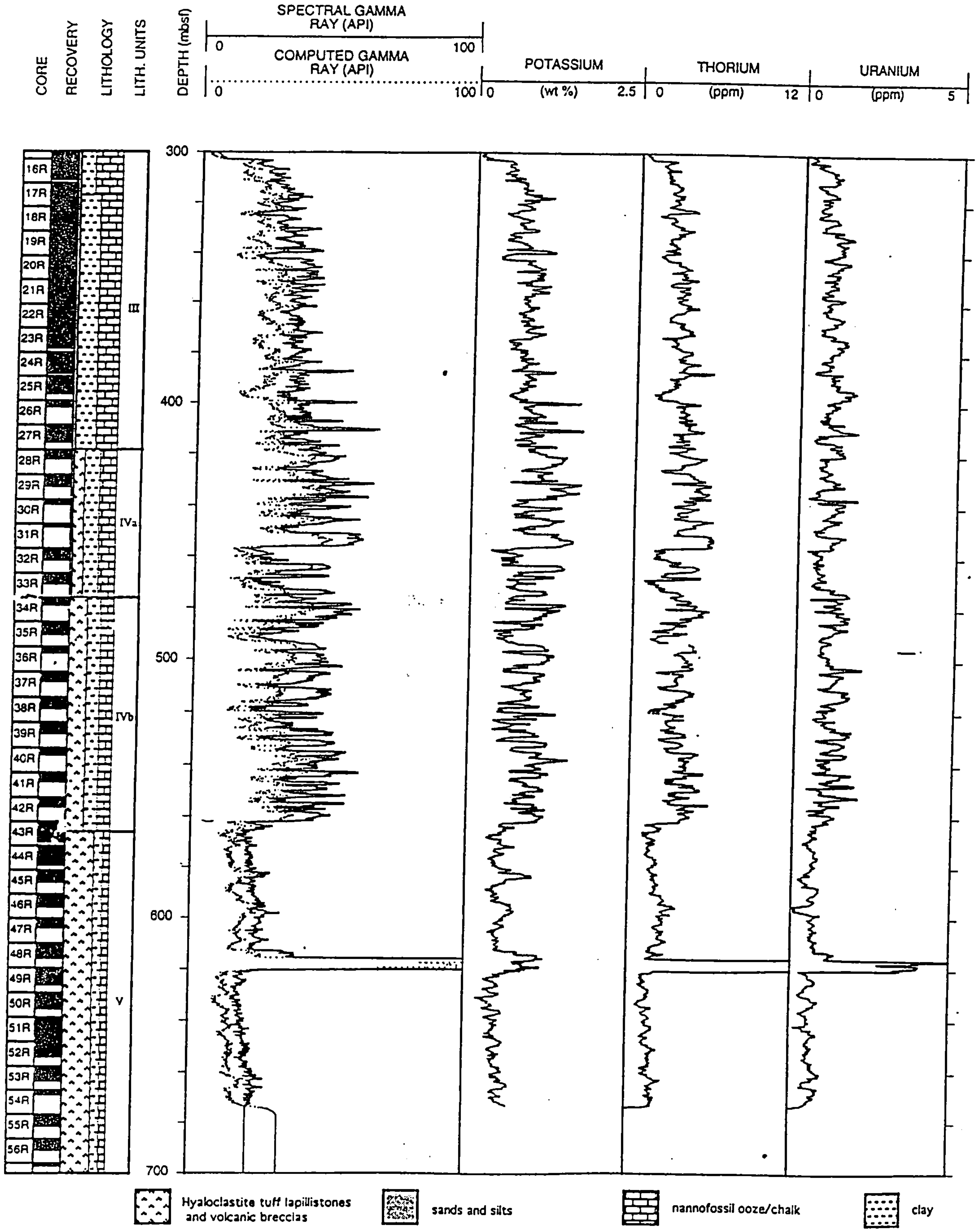


Figure 953-L-8

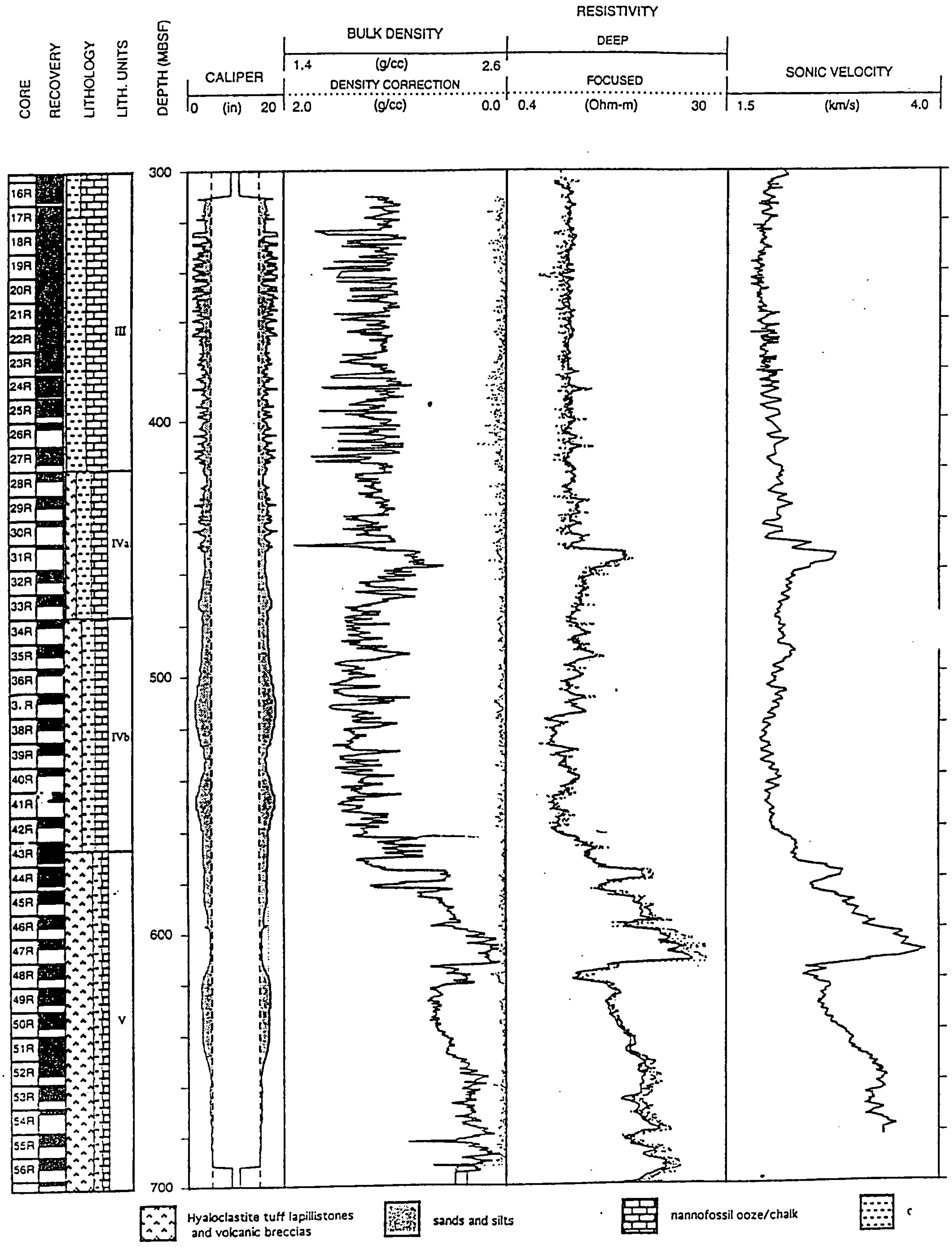
Hole 956B: Natural Gamma Ray



Appendix B4.16

b4.16

Hole 956B: Physical Logs Summary



Subcontracts in UK and France: Status Report

Data Processing

Initiated Nov 1992
(Leg 144)

10 Legs completed
- 6 LDEO/remote login
- 4 foreign systems

QA/efficiency procedures
implemented Q4-94

Science Support

Initiated July 1993
(Leg 151)

8 shipboard loggers
- thru Leg 159

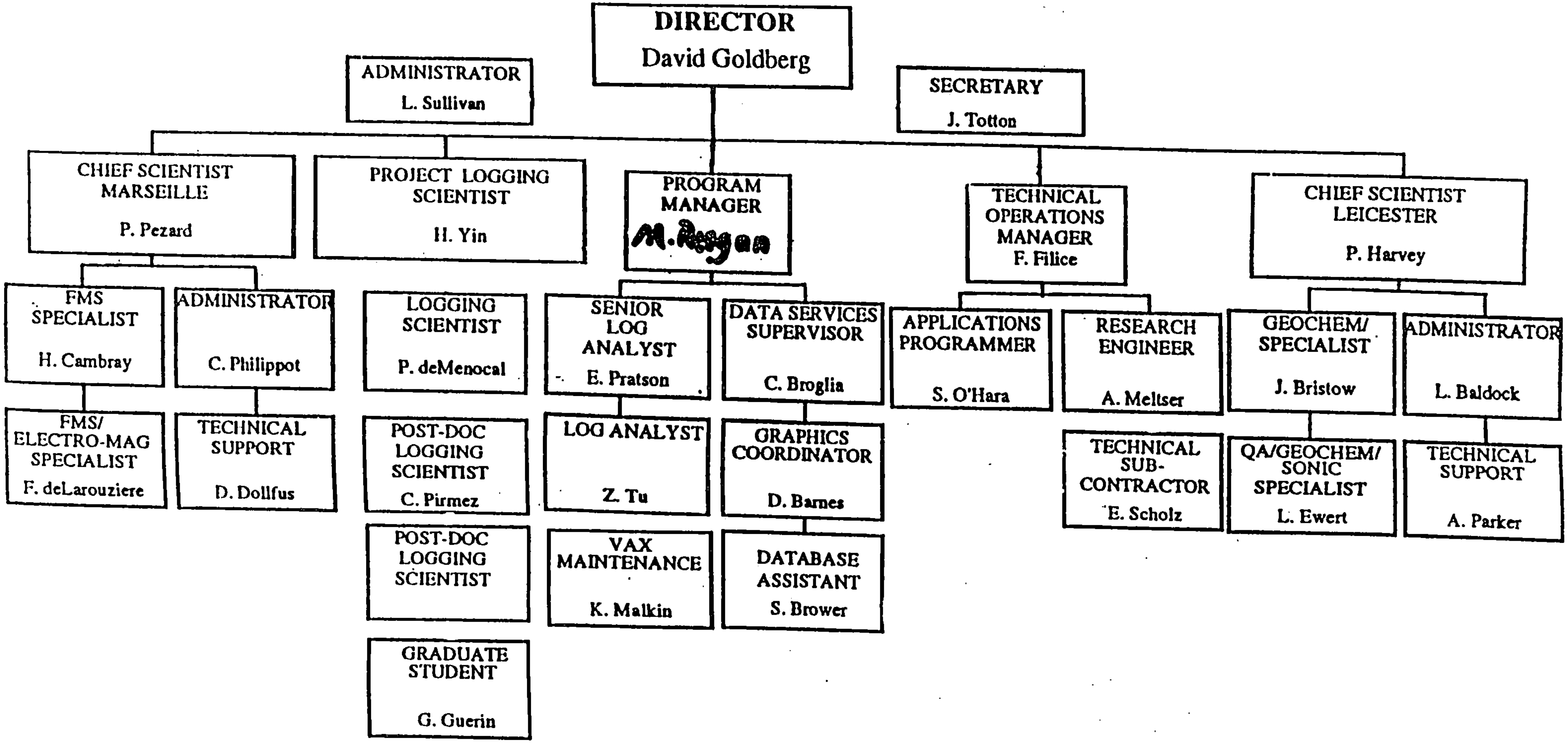
5 Them Panel attended
- 2 liaisons

2 Logging Prospectus
- completed

FY95 ODP Wireline Logging Services
Personnel Summary by Function

	Admin	Tech	Sci	Proc	DB	Total
LDEO	3.3	2.8	3.2	1.2	2.5	13.0
UK	1.6			2.0	--	3.6
FR	0.6			1.7	--	2.3
Total (FTE)						18.9

Borehole Research Group Organizational Structure



Organizational structure of WLS

1996 Logging Prospectus-Summary

	TOOL	Bahamas Trasnsect	Carib. Basalt Prov.	Caribbean Ocean History	Costa Rica Accret. Wedge	E. Juan de Fuca	California Margin	Return to Iberia	SE Greenland Volc. Rift	Western Atl. Sed. Drifts	Sedimented Ridges II	Alboran Sea	Return t 735B
		Eberli et al.	Donnelly et al.	Sigurdsson et al.	Silver et al.	Davis et al.	Lyle et al.	Narm N-V II	Larsen et al.	Keigwin et al.	Franklin et al.	Comas et al.	Dick et a
	Standard												
1	sonic	x	x	x	LWD, x	x	x	x	x	x	x	x	x
2	resistivity	x	x	x	LWD, x	x	x	x	x	x	x	x	x
3	density	x	x	x	LWD, x	x	x	x	x	x	x	x	x
4	neutron	x	x	x	LWD, x	x	x	x	x	x	x	x	x
5	geochemical	x	x	x	x	x	x	x	x	x	x	x	x
6	gamma ray	x	x	x	LWD, x	x	x	x		x		x	x
7	caliper	x	x	x	LWD, x	x	x	x	x	x	x	x	x
8	FMS	x	x	x	x	x	x	x	x	x	x	x	x
9	temperature tool	x	x	x	x	x	x	x	x	x	x	x	x
	Special												
10	televiewer						$	$	$			$	$
11	VSP				$							$	$
12	MAG/SUSP-GHMT	$	$	$			$			$		$	
13	drillstring packer/CORK				$	$					$		x
14	fluid sampling	x			x	x	x				x		
	Third-Party												
15	Hi-T MAG-BGR		x										x
16	Hi-T Resistivity												
17	Hi-T BHTV												
18	Hi-T Temperature										x		

LWD=Logging While Drilling ($)
$=Extra Expense

C1.1

TECP REPORT

1. LONG-TERM PLANNING-NEW WHITEPAPER

-CLEAR FOCUS ON THEMATIC OBJECTIVES
-STRESS ON SOCIETAL RELEVANCE AND LINKAGE WITH OTHER PROGRAMS

MAIN EMPHASIS ON
-EXTENSIONAL, CONTRACTIONAL, STRIKE-SLIP AND VERTICAL KINEMATIC S SETTINGS (independent of plate location)

-TECTONIC PROCESSES (E.G. STRESS, STRAIN, RHEOLOGY, FLUID FLOW ETC).

-NECESSARY TECHNOLOGY TO ACHIEVE LONG- TERM AIMS; SUPPORT FOR LWD, CORKS, FLUID SAMPLING ETC
-STILL STRESS ON RECENT SYSTEMS AND QUANTIFICATION

Appendix C1.2

2. DRILLING PLANS

-FIT IN WITH TECP REVISED OBJECTIVES,
COSTA RICA: CONTRACTIONAL SETTING, TO PRODUCE QUANTITATIVE PHYSICAL AND CHEMICAL MASS BALANCE

SE GREENLAND
[redacted]: EXTENSIONAL SETTING TO CONSTRAIN RIFT PROCESSES (AND THERMAL EFFECTS)

IBERIA: EXTENSIONAL SETTINGS TO INVESTIGATE DETACHMENT FAULTING

VEMA; ROLE OF STRIKE SLIP AND VERTICAL PROCESSES

3. TECHNICAL ASPECTS

-NEED TO COLLECT, PROCESS AND ARCHIVE STRUCTURAL DATA (SAME AS OTHER PRIMARY DATA); IMPORTANT FOR LONG-TERM OBJECTIVES

-COMPUTING; ESSENTIAL TO INCLUDE STRUCTURAL DATA ALONG WITH OTHER PRIMARY DATA

-TOOLS; SUPPORT FOR LWD, CORKS, WSTP,
VSP,SIDE-LOOKING TECHNOLOGY E.G.
RADAR

4. ACHIEVEMENTS OF TECTONIC DRILLING

REAL ACHIEVEMENTS SO FAR NOT
PROPERLY APPRECIATED

E.G.-HAS GREATLY ADVANCED
UNDERSTANDING OF OROGENIC BELTS
ON LAND AS WELL AS AT SEA

-CONTRACTIONAL PROCESSES (E.G. ACTIVE
MARGINS, AN OUTSTANDING SUCCESS,
WHERE PROCEEDED FROM DESCRIPTION
TO QUANTIFICATION OF PROCESSES;

-EXTENSIONAL PROCESSES; PROGRESS ON
DOCUMENTATION OF RANGE OF
FEATURES

-SW PACIFIC MARGINAL BASINS AND
FOREARCS
VERY IMPORTANT TO UNDERSTAND
LAND SETTINGS AS WELL

DON'T UNDERSELL THE ACHIEVEMENTS
ESPECIALLY AS TECTONICS IS A KEY
COMPONENT OF LONG RANGE PLAN

PCOM: C.2 SGPP
(Bill Hay)

SGPP THEMES

SEA LEVEL AND FACIS ARCHITECTURE

FLUID FLOW AND GEOCHEMICAL FLUXES

CARBON CYCLING FROM THE SEA FLOOR TO THE BASE OF THE BIOSPHERE

4.11 Site Surveying on New Jersey Margin:

McKenzie reported on discussions she had with J. Austin in Davos. Hay had also received a letter from Austin regarding the surveys. Austin reported that funding was received from the Navy to carry out surveys because they are interested in better understanding continental margins. The survey will be run next summer, so that a drilling leg could be placed in the prospectus for 1997.

Baker moved and Underwood seconded the following motion:

MOTION - SGPP strongly supports the effort to obtain the additional funding required to complete and evaluate site survey data necessary to allow safe drilling in shallow water depths > 40m toward the inshore end of the NJ transect. Our great interest in this transect was emphasized by our ranking it as our first priority during the spring 1994 meeting.

The motion passed unanimously.

Summary of Ratings of Proposals included in the FY96 status

OPOSAL NO.	AREA	RATINGS					
3-REV3	SED. RIDGES II	A1	B1.1;B2.1	C1	D1		F1
00-REV2	COSTA RICA	A1	B1.1;B2.1	C1	D1		F1
12-ADD3	BAHAMAS	A1	B1.1;B2.1	C1	D1		F1
40-ADD	E J. DE FUCA	A1	B1.1;B2.1	C1	D3		F1
415-REV2	CARIB. HIST.	A3	B1.1;B2.1	C1	D1		F4
		(A1 for Cariaco Trench)					
386/422	CALIFORNIA	A3	B1.2;B2.1	C0	D1	E8	F2
404-ADD	W. N. ATL.	A3	B1.2;B2.1	C2	D1		F3
411-REV	CARIB. BSLT	A5					F4
460	SE GRNLAND	A5					F4
461	IBERIA	A5					F4

c2-4

6. Ranking of Programs in the FY96 Prospectus

SGPP voted only on Bahamas 412, California 422, Caribbean KT 415, Costa Rica 400, Juan de Fuca 440, and Sedimented Ridges II SR-REV3

Rank	Proposal	Area	#votes	Total	Avg.	Std. Dev.
1	412	Bahamas	10	47	4.70	1.83
2	400	Costa Rica	10	42	4.15	1.00
3	SR II	Sed. Ridges	10	41	4.05	1.64
4	440	Juan de Fuc	10	36	3.55	1.21
5	386	Calif. Marg	10	24	2.35	1.25
6	415	Caribbean	10	22	2.20	1.87

5.4 Summary of Ratings of Other Proposals: The following table presents a summary of the ratings of other proposals, sorted by category of thematic interest level to SGPP. The order within each category is by proposal number and is not a ranking.

PROP. NO.	AREA	RATINGS					
355-REV4	PERU	A1	B1.1;B2.1	C2	D3	E8	F3
435-ADD	NICARAGUA	A1	B1.1;B2.1	C2	D3	E3;E5;E8	F2
452-ADD	ANTARCTIC	A1	B1.1;B2.1	C2	D5		F2
354-R2-A3	BENGUELA	A3	B1.2;B2.1	C1	D1		F3
454	EAST AUSTRALIA	A3	B1.2;B2.1	C2	D1	E8	F4
455	NORWEST ATL.	A3	B1.2;B2.1	C3	D1	E2;E8	F3
458	SOUTHERN OCN	A3	B1.1;B2.1	C2	D1		F4
459	FAROE-SHTLND	A3	B1.2;B2.1	C2	D1	E3;E6	F4
333-ADD2	CAYMAN TR.	A5					F4
376-REV3	VEMA FZ	A5					F4
448-REV	ONTONG-JAVA	A5					F4
451-REV	TONGA FOREARC	A5					F4
456	TJORNES FZ.	A5					F4
457	KERG.-BROKEN R.	A5					F4

C2.6

7.2 Summary of Ratings of LOIs:

LOI #	AREA	RATING
24	CASCADIA MARGIN II	A1
27	RHONE AND VAR	A1
34	PACIFIC SEAMOUNTS	A1
35	SAANICH INLET	A1
37	SUBSEA BIOSPHERE	A1
16	SOUTH AUSTRALIA	A3
17	MANUS & WOODLARK	A3
30	PERU MARGIN	A3
36	NANKAI TROUGH	A3
38	SCOTIA-FALKLAND	A3
18	SOUTHEAST PACIFIC	A4
19	RED SEA	A4
15	ADRIATIC	A5
20	SW PACIFIC	A5
21	W PACIFIC	A5
25	SHATSKY RISE	A5
26	GULF OF MEXICO	A5
28	JAPAN TRENCH	A5
29	HAWAIIAN-EMPEROR	A5
31	AUSTRALIAN BIGHT	A5
33	GULF OF ADEN	A5
39	KYUSHU-PALAU RIDGE	A5

SGPP strongly urges that LOIs rated A1 be developed into full proposals. SGPP would be interested in seeing proposals developed from LOIs rated A3 if they are of interest to another thematic panel.

8. Discussion of Budget Prioritization

8.3 L-DEO: Logging should be reviewed to determine cost/benefit ratios.

A major part of the L-DEO budget concerns the maintenance and validation of 3rd party tools, and costs in this area should be justified.

8.4 ODP/TAMU:

Engineering Development:

The item of greatest importance to SGPP is the PCS.

The corking program should be examined to determine its fiscal impact and cost/benefit ratio for science information gained.

While recognizing the ultimate value of a working DCS system, given the budgetary constraints, this panel reiterates that it does not feel that DCS is critical to its program for the next few years.

C2.8

Publications:

The time might be ripe to make the transition to electronic publishing?

Many institutions do not recognize ODP reports as refereed publications for purposes of evaluating faculty.

Could Part A be published in simpler form as soon as the Leg is over, and part B farmed out to a publisher.

Being able to find the interdisciplinary literature on a Leg in a single place is a great advantage, and dispersal through many journals would make it difficult for workers at institutions with smaller libraries to keep abreast.

Science Operations:

Science operations are funded minimally, and with recent personnel cuts could fall below a viable level.

Pcom: C.3. OHP REPORT
(Peggy Delaney).

OHP 1994 ACTIVITIES

MEETINGS

Spring 1994 Amherst, MA
Fall 1994 Townsville, Australia

WHITE PAPER

CARIBBEAN WORKSHOP

OTHER COMMUNICATIONS WITH PROPONENTS

SEA LEVEL

Report on status of sea level
Joint OHP/SGPP working session--Spring 1995

NAAG II EVALUATION

OHP S94 GLOBAL RANKING

	FRACTION OF POINTS
1. Caribbean Workshop OHP leg	0.83
2. California Margin	0.82
3/4. NJ MAT II	0.75
3/4. Sub-SAT (Southern Ocean)	0.75
5. Southwest Pacific Gateway (OHP leg)	0.69
6. Benguela Current, Angola/Namibia	0.67
7. Western N. Atlantic sediment drifts	0.60

Appendix C3.3

OCEAN HISTORY PANEL
1994 Membership

SPRING	FALL
Jan Backman (ESF)	
Gregg Blake	
Robert Carter (Can-Aus)	
Bradford Clement	
Peggy Delaney (chair)	**
Rainer Gersonde (G)	
Timothy Herbert	**
David Hodell	
Anne Marie Karpoff (F)	
Mark Leckie	
Theodore Moore	
Warren Prell	
Maureen Raymo	Delia Oppo
Kozo Takahashi (J)	
Philip Weaver (UK)	Alan Kemp (Dick Kroon) (UK)
James Zachos	**
	Chair (1995-) Tom Loutit

C3.4

OHP GLOBAL THEMES

PREVIOUS WHITE PAPER

High resolution oceanographic/climatological studies
Investigations in ancient oceans
Upwelling
Sea level
Multi-objective

[High latitude, Ultra/high resolution, Gateways]

1994 WHITE PAPER

Evolution and sensitivity of global environments:
forcing and response experiments

Orbital forcing
Rapid climatic change and internal feedbacks
Long-term changes and abrupt events
Global sea-level change

OHP REPORT --- SEA LEVEL

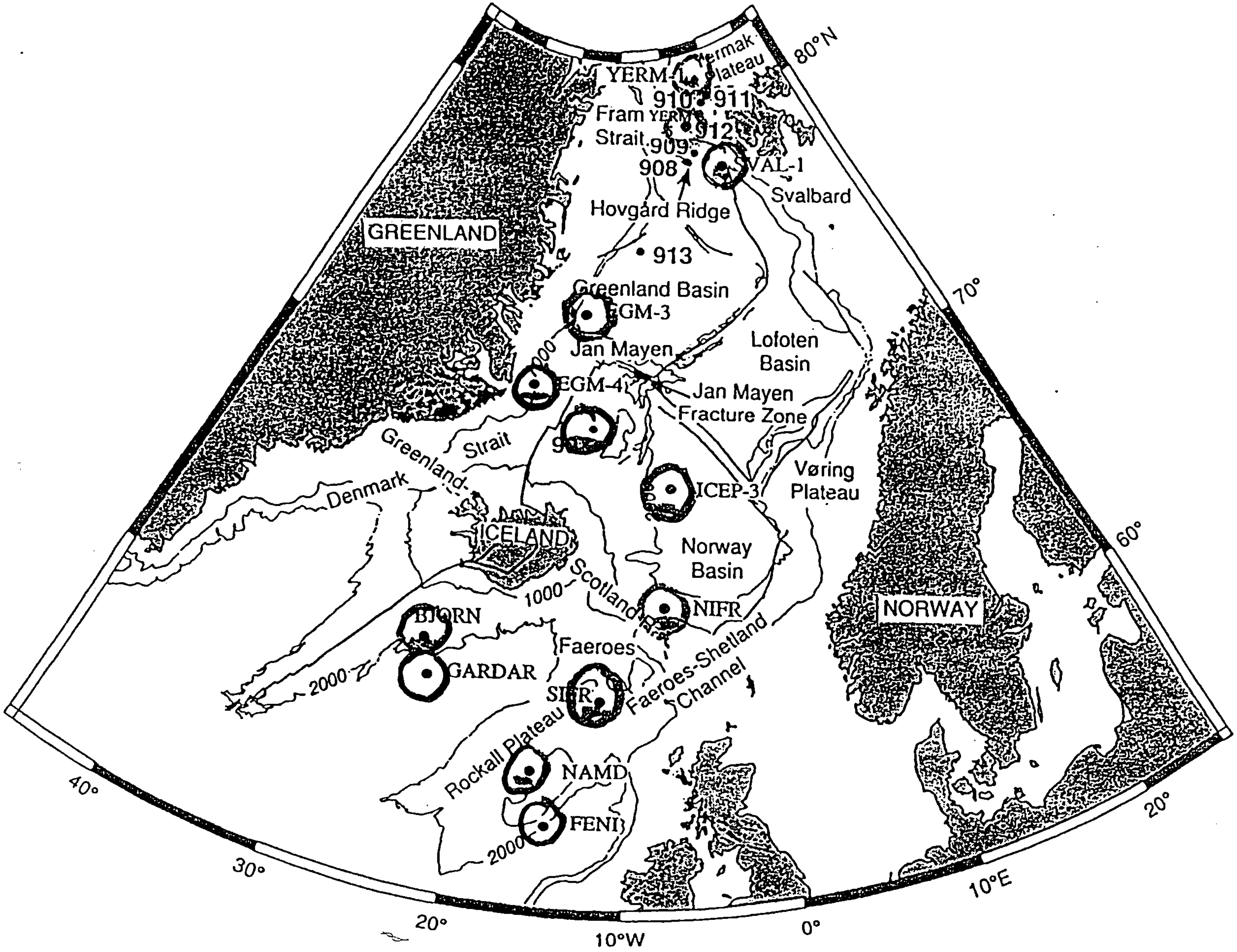
- Planning and execution of sea level programs
    - Guidelines for shallow water hazards surveys
- Integration and interpretation of data
    - Combination of techniques
- Multi-site transects

Steep learning curve, large potential payoffs

C3.6

OHP RESPONSE -- *NAAG II PRIORITIES*

After thorough review of the plans for the North Atlantic and Arctic Gateways Leg II, Leg 162, OHP reaffirms our endorsement of the drilling plan, including the selection of sites and their assigned priorities, resulting from the Fall 1993 OHP-sponsored planning session. In addition, we state our strong confidence and enthusiasm for the scientific and logistical judgement and skills of the assigned co-chief scientists for this leg.



O PRIORITY 1.

Figure 2. Location of Leg 151 sites and Leg 163 proposed sites.

Ocean History Panel -- FY96 PROSPECTUS RANKING

Rank Order	Program (Documents)	Fraction Available Points Awarded	1994 OHP Spring Global Ranking
1	Caribbean Ocean History (415-Rev 2)	0.89	1
2	California Margin (386-Rev2/Add/Add2/Add3, 422-Rev)	0.83	2
3	Western North Atlantic Sediment Drifts (404)	0.51	7
4	Blake Plateau and Blake Nose, Paleogene and Cretaceous (404-Add)	0.38	not yet submitted
5	Bahamas Transect--two deeper sites (412/Add/Add2/Add3)	0.23	12
6	Caribbean Basalt Province	0.16	-

Appendix C4.1

Lithosphere Objectives: 1993-1998

	Done	*Potential*
• Convergent margins		
Mass balance at subduction zones	*Costa Rica*	
Confirm the supra-subduction zone ophiolite hypothesis		
• Ocean ridge processes and crustal evolution		
Long lengths of lower crustal and upper mantle rocks by offset drilling	**MARK, Hess Deep, 735B**	
Aging and alteration of the oceanic lithosphere	**504B**	*E. Juan de Fuca*
• Hydrothermal circulation and metallogenesis		
Hydrothermal drilling at sediment and volcanic hosted deposits	**Sed. Ridges 1, TAG** *Sed. Ridges II*	
• Intraplate processes		
Timing and eruption of large igneous provinces	*Caribbean LIP*	
Evolution and dynamics of a mantle plume	**VICAP/MAP**	
Continental rifting and mantle plumes	**NARM Volcanic 1** SE Greenland NARM drilling	

- Assess carefully:

advantages of borehole seismometers
the need and technical requirements for natural laboratories
the technical and fiscal needs for a diamond coring system,
the technical and fiscal requirements for deep drilling

Appendix C4.2

PCOM:C-4. LITHP (Sherm Bloomer)

Lithosphere Panel Rankings 1994

	Spring 1994	Fall 1994
7 3	**Caribbean LIP**	Carib. LIP
5 B	Giant LIP	Sed Ridges II
	Sed Ridges II.	Juan de Fuca
	Juan de Fuca hydro	SE Greenland
	Antarctic Discord.	Costa Rica
	Costa Rica mass	Carib. OHP
	NARM Volc. II	
	Tonga arc/forearc	
	Evol. ocean crust	
	Mar-Izu mass balance	

Lithosphere Panel Issues of Concern

1. Offset drilling strategy
2. Diamond coring system development
3. Chip-catcher tool development
4. Computer upgrade status and progress
5. Mini-legs--how to accommodate non-56 day work
6. White paper completion and priorities

Offset Section Drilling Summary

Important progress:

- Long section of gabbroic rock at 735B
- Stratigraphically controlled sections at Hess Deep and validation of offset-section idea (mid-crust to upper mantle)
- Mantle section and lateral variation in crust at MARK

Have tried all major types of tectonic windows

Questions about important variables in drilling success

Strategies to pursue:

- Better site surveys and easier places--may work for slow-spread crust
- Techniques that improve drilling results--apparently a must for fast-spread crust, give the available tectonic windows

Type of Window	Location	Advantages of this type of expos	typ
Rifted Crust	Hess Deep	Principal type of plutonic exposures at fast-spread crust	Usually associated with prop ting rifts, which may overprint the original crustal structures
	Pito Deep	Cut non-transform crust, may be more representative than transforms	
	Kings Trough	Provide windows into crust of different ages; can examine temporal variation	
Transform Ridges	Atlantis II FZ (735B)	Windows provide access to extensive exposures; can examine stratigraphy of crust and mantle	transform tectonics is superimposed on sections and creates stratigraphic ambiguities
	Vema Fracture Zone	Transverse ridges allow sampling of cells along both flow lines and ridge parallel directions	transforms are terminations of magmatic cells; may not be representative
	Oceanographer FZ	Transform-generated crust may be "typical" of slow-spread crust	the origin of transverse ridges is not well understood
Rift Valley Walls	MARK area	More representative--outside transform tectonics	Difficult to examine temporal variations
	15°20'N MAR	Can access along axis variations	Relief on rift valley walls is limited ; stratigraphic exposures more limited
		Can test models for rift valley formation and detachment faulting	

C4.6

DCS Summary

- A fundamental innovation in drilling
- Some environments will demand it--zero age crust, fault zones
- Many lithified sections give low recovery- <50%
- Consider a phased scientific as well as engineering approach?

  By 1998 a tool sutiable for occasional deployment for short cores in difficult lithologies

  By 2003 a tool that can be routinely deployed for drilling long holes in difficult lithologies

White Paper Time Division

1. Focus--more balanced between environments

1993-1998	4 goals at mid-ocean ridges 2 goals at convergent margins 3 goals in intraplate or rift settings
1998-2003	4 goals at ridges 1 goal at convergent margins 2 goals in intraplate or rift settings 1 goal for large ore deposits

2. Timeline--what we think is a realistic set of goals and a reasonable schedule for attacking them

What is the theme underlying LITHP's mandate:

Mass + energy flux from the solid earth

I. Flux from interior to crust
   Volcanism, plutonism,
   and consequences

II. Flux from solid earth to
   hydrosphere and atmosphere
   hydrothermal deposits
   heat pulses
   chemical buffering
   climate / extinction effects?

PCOM: C.4

WOODS HOLE OCEANOGRAPHIC INSTITUTION
1930

31 May 1994

JUN 1994
RECEIVED
Department of
Geology

Prof. Sherman H. Bloomer
Chair, ODP Lithophere Panel
Department of Geology
Boston University
675 Commonwealth Avenue
Boston, MA 02215

Dear Sherman:

Do you perhaps remember me from leg 118, Site 735B? Steve Swift and I did the vertical seismic profile.

I was on Leg 148, the return to Site 504B, last year and spent some time going through the rock pieces and chips in the junk basket. Given the low core recovery, I became interested whether a mechanism to systematically collect the chips would be scientifically useful. The ensuing discussion with various ODP staff is covered in the enclosed correspondence.

I would like to offer the idea to the Lithosphere Panel as a possible developmental project. Kathy Gillis suggested that I forward the enclosed material to you for your preliminary consideration.

If I can provide any further explanation, please let me know.

Sincerely yours,

Hartley Hoskins

Hartley Hoskins

Woods Hole, Massachusetts 02543—Phone 508-548-1400—Telex 951679

Appendix C4.9

WOODS HOLE OCEANOGRAPHIC INSTITUTION
1930

23 November 1993

Michael Storms
Ocean Drilling Program
Texas A&M University Research Park
1000 Discovery Drive
College Station, TX 77845-9547

Subj: Musings on Leg 148, Hole 504B

Dear Mike:

You have doubtless received a plethora of comments on leg 148. I offered some to Barry Harding who suggested that I jot them down and send them to you or Gene Pollard.

In the course of the cruise, I spent some time looking at the chips from the junk basket. Not being "official" samples, most weren't taken into the regular curatorial routine. Some were as long as 6 cm, and showed the relative orientation of the fracture planes in the rock. A few showed the curved borehole surface, allowing orientation of the fracture planes in respect to the vertical. Many were foliated fragments ranging from 1/2 to 3/4" long; this seems commensurate with the spacing of the teeth on the roller cones. Qualitatively, I did not feel that there was much apparent mixing of material falling down the hole.

The ratio of the volume of the core sample to the amount of material which the drill bit has to grind to fine-enough particles to flush out of the hole is about 1:9. Lacking a closed-cycle mud circulating system, the only way you can flush, by floating the chips, is through periodic pumping of mud. As the hole deepens the density of the rock is increasing. As the hole deepens the diameter of the upper part of the hole tends to increase some, lowering the velocity of the upward-moving circulating fluid and therefore its ability to carry the chips out of the hole.

Given the increasing difficulty of getting chips out of the hole with depth, I wonder if it might not be possible to adapt the corer on the sand line for this purpose. Shorten the core and put a "chip basket" on top of it. This would involve taking core more frequently but could remove a significant portion of the cuttings. Attached are some rough sketches of what I have in mind. When the chip basket on top of the corer is full, the back pressure on the circulating pump would increase some, signaling the driller to retrieve the combination corer/chip basket.

Woods Hole, Massachusetts 02543—Phone 508·548·1400—Telex 951679

Putting slots to collect the chips in the bottom hole assembly would, of course, significantly weaken it. On the other hand, facilitating the removal of the chips may reduce the torque load some. An indexing key on the landing point is needed to align the slots in the sub with those in the chip basket. The chip basket would be keyed to rotate with the bottom hole assembly, while the corer would not. The space between the corer/chip basket OD and the collar ID is prone to collecting chips which could wedge when it is retrieved. When the corer/chip basket are retrieved, the collecting chutes will have to "shear" some of the chips. The tension required to do this might be significant. An alternative to reduce the shearing force needed might be for the sub's slots to be horizontal and the chip catcher's slots sloping inward instead of both sloping inward.

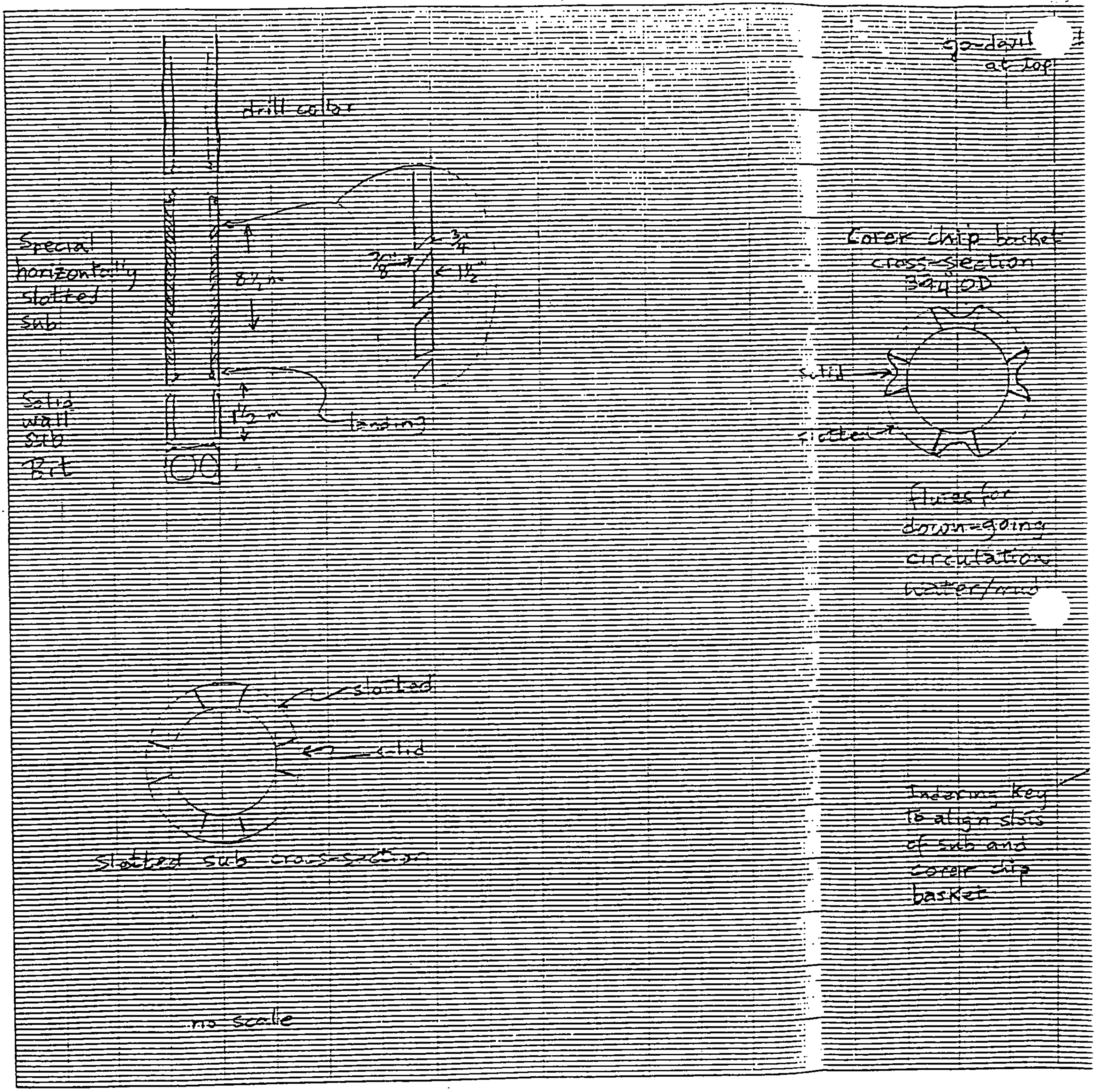
From the petro-fabrics of the rocks, it is entirely reasonable that the core recovery in some rocks will be quite low. Frequent recovery the chips with a corer/chip basket would provide useful samples in this case since contamination of material falling down the hole is probably modest. The chips in the bottom of the basket would tend to correspond to the top of the core and the top to the bottom of the core.

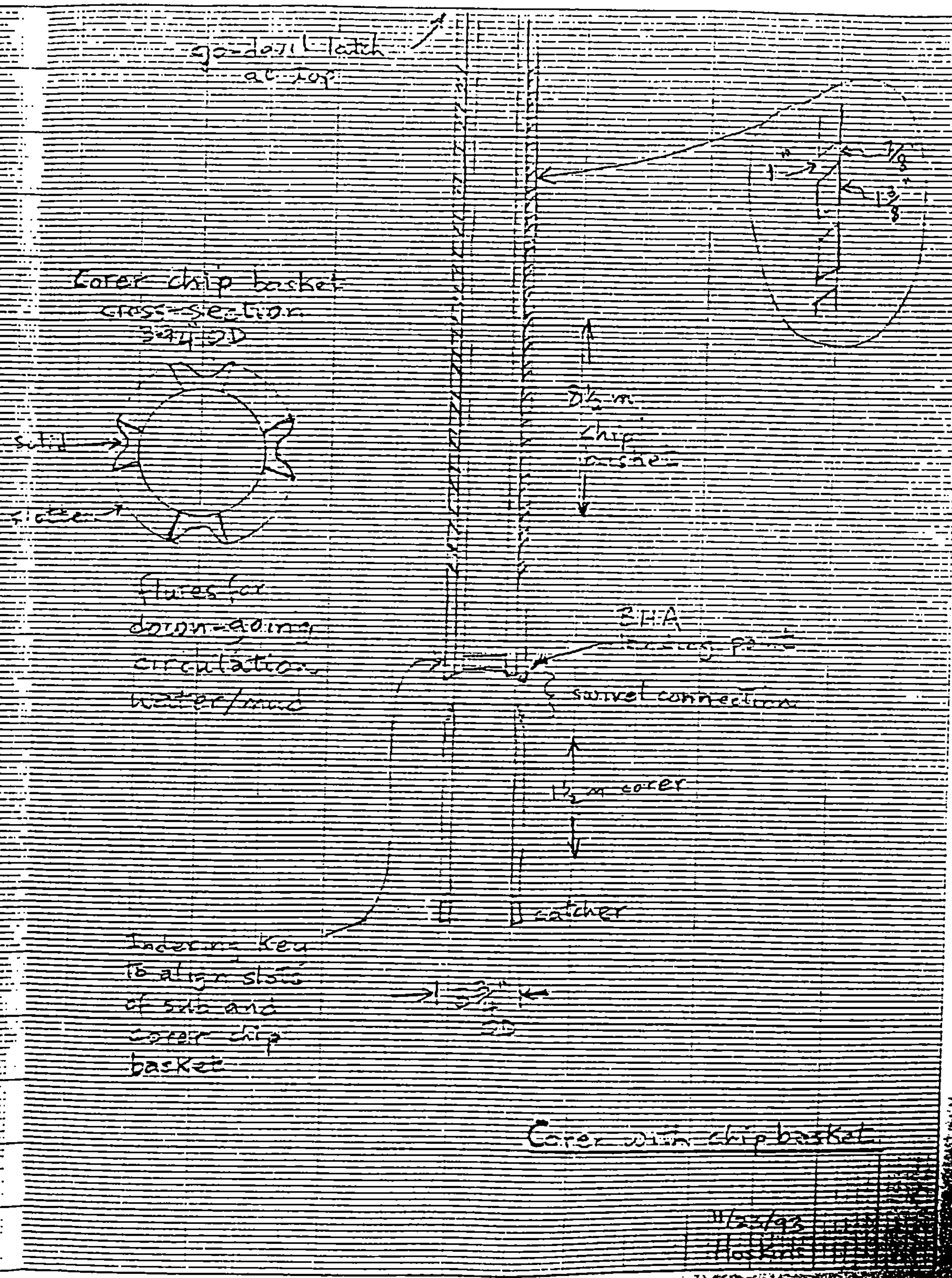
Do you think such a strategy would be feasible and enhance your ability to drill crustal rocks better?

Sincerely yours,

Hartley Hoskins

Appendix C4.9




go-down latch
at top
Corer chip basket
cross-section
3¼" OD
solid
slotted
flutes for
down-going
circulation
water/mud
1"
1/8"
1 3/8"
8½ m
chip
basket
BHA
landing pt
swivel connection
1½ m corer
catcher
Indexing key
to align slots
of sub and
corer chip
basket
OD
Corer with chip basket
11/23/93
Hoskins

Appendix C4.9

December 1, 1993
MAS/M12/143

Dr. Hartley Hoskins
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

Dear Hartley,

Thanks for your letter and sketches regarding the "hybrid" hard rock core barrel/junk basket or as you called it a "chip basket". The idea of incorporating a chip basket capability with a wireline core barrel is indeed novel. Your calculations on volume ratio of cored rock versus destroyed rock (1:9 ratio) for our nominal RCB hole size is right on the mark! While mulling over your idea I couldn't help wondering why this idea never occurred to us here at ODP! That is not to say that the project is quite as easy as it may appear but it certainly deserves further scrutiny and discussion. In the end it still may not prove feasible but on the other hand sometimes great things come of ideas such as yours!

While I still need to discuss the concept with others in the department here are my initial thoughts. The system would likely be limited to RCB coring since this is our only true hard rock core barrel and the required BHA modifications would not affect multiple tool designs as they would with the APC, XCB, MDCB, VPC, PCS, PPCS, etc. all deployed in the APC/XCB bottom hole assembly. The Diamond Core Barrel (DCB) with it's nominal 7-1/2" diamond core bit and standard RCB wireline barrel is another possibility but unlikely since to be effective the system would have to be deployed in situations where core recovery is extremely low. The DCB should get significantly better recovery than the standard RCB roller cone system and the cuttings generated from a diamond bit are more like rock flour then chips anyway.

It is likely that, for the most part, the concept would only require the use or modification of proven hardware designs and/or techniques. This is a plus. The RCB barrel would have to be redesigned and a means found to get the coring circulation fluid past the junk sub on top without exiting the BHA junk slots. Seals would have to be employed to minimize the amount of detritus that could find it's way into the annulus between the wireline barrel OD and the drill collar ID. Stuck core barrel problems could be significant and a means to eliminate or minimize this situation would have to be investigated thoroughly. Keep in mind that we do have limited wireline jarring capability to help if a barrel does become stuck. It is also

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AX Number (409) 845-2308

Appendix C4.9

WOODS HOLE OCEANOGRAPHIC INSTITUTION
1930

7 January 1994

Michael A. Storms
Ocean Drilling Program
Texas A&M University Research Park
1000 Discovery Drive
College Station, TX 77845-9547

Subj: Musings on Leg 148, Hole 504B

Dear Mike:

Thank you for your December 1st letter. I hope that the "chip basket" suggestion can be some help to a difficult drilling and sampling situation.

Also I hope that it will encourage consideration of the use of chips as samples to "fill in" and extrapolate where cores are not continuous. The mechanical competence of rocks vary considerably; many are foliated making them prone to fracturing while being drilled. Chips may be the only means to recover some types.

If the "chip basket" notion appears to have possibilities to you, I would be happy to get an informal reaction from a couple of friends on the Lithosphere Panel. Also I will be attending the Leg 148 post-cruise meeting in Kano, Hawaii January 29-February 2; perhaps it might be useful to try the idea out on that group. Please let me know.

Happy New Year!

Sincerely yours,

Hartley Hoskins

Hartley Hoskins

Woods Hole, Massachusetts 02543—Phone 508-548-1400—Telex 951679

likely that a double float valve arrangement would have to be employed with the second valve placed above the BHA junk slots. Otherwise drill cuttings are likely to be swabbed into the outer core barrel (8-1/4 DC) when retrieving the wireline barrel. A mule shoe or other orientation trick could probably be designed to satisfy proper slot alignment/orientation.

In addition to the science advantages this tool could have some significant operational virtues. Monitoring well bore cuttings on a core by core basis might yield important information on bit condition, for instance. Should carbide or steel particles be found in with the cuttings it would certainly aid the ODP operations superintendent in determining or verifying a suspected downhole problem before it becomes catastrophic.

Lastly, as with all projects, whether they are internally generated by TAMU engineers, or externally by the scientific community/panel structure, the effort must be prioritized by PCOM and funds/manpower identified within TAMU before a significant effort can be undertaken. Of course, TAMU engineers certainly would commit some time to an assessment of an idea's merits and feasibility. It is also possible that a project such as this could be promoted by a scientist/principal investigator with independent 3rd party development funding.

We will kick your idea around some more internally and I'll let you know if anything of significance arises. In the meantime take care and thanks again for the input.

Regards,

Michael A. Storms

Michael A. Storms
Assistant Manager,
Engineering and Drilling Operations

Appendix C4.9

STRESS ENGINEERING SERVICES, INC.

Dr.
41-1101

Dr.. Ste. 200
45246

ax

CIPALS:
Ph.D.. P.E.

sident
bill. P.E.

ung. Ph.D.. P.E.

S:
bert. P.E.
ailey. Ph.D.. P.E.
oswell. P.E.
cceil. P.E.
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ASS ATE:
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CONSULTANTS:
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s L. Marriott. Ph.D.

METALLURGIST:
Kovach. P.E.

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ling Hsu. P.E.
reas Katsounas
an Lane. P.E.
ristopher Matice. Ph.D.. P.E.
annon Read
enmod M. Samman. Ph.D.
vid A. Tekamp. P.E.
enneth R. Waecer

NALYSTS:
Christopher R. Alexander
Connie W. Curington
Douglas Drahem
eping Zhang

CORPORATE
ECRETARY/TREASURER:
en Shackelford

February 14, 1994

Dr. Hartley Hoskins
Woods Hole Oceanographic Institution
Woods Hole, MA 02543

Dear Hartley:

I don't think I have seen you since some half forgotten port call of the JOIDES Resolution in the western Pacific about four or five years ago. I know you are still active in the ODP sphere of influence, however. Consequently, I am writing with some news that I think may interest you. As you might possibly have heard I have recently left my position as Chief Engineer for ODP and moved on to "the private sector", as they say. What it means in my case is that I finally decided to see if I could make a living in the real world after 13 years of academia with both DSDP and all of ODP.

Before I left ODP Mike Storms gave me a copy of your letter in which you propose a novel new combination chip basket/core barrel for hard rock core recovery improvements. I agree with Mike that the concept has legitimate merit and would be good to pursue for the benefit of ODP, at least as far as a feasibility analysis and some layout design work.

Unfortunately, when I left ODP I was not replaced. The result is that the remaining engineering staff is now even thinner than it already was. Hence, the chances are that your idea won't get pursued simply because it won't get into the ODP engineering priority list. I am suggesting an alternative plan. With your permission I would like to send an unsolicited proposal to ODP to do the engineering work necessary to advance your idea. ODP can opt to accept this plan if they have only the money for the job, not necessarily the manpower. This may be an attractive option for them. This would not constitute a third party tool development because ODP would be footing the bill. You could

Design of Structures and Mechanical & Electrical Equipment
Stress. Thermal. Fluid Mechanics. Dynamic Analysis & Testing Failure Analysis & Metallurgy

act as advisor or simply an interested bystander and observer. Another approach would be to treat it as a true third party development, but that would require that some P.I. find the funds outside of ODP to finance the engineering and prototype fabrication and then follow through on the development effort prior to the tool's introduction on the ship in ODP operations. I am not going to hold my breath waiting for that eventuality, although it isn't completely out of the realm of possibility.

Before I go on any further let me bring you up to date on some of my pertinent recent background. I am now working for Stress Engineering Services, Inc (SES) in Houston. SES is a top-of-the-line engineering consulting firm which supports the oil and gas industry and quite a list of other industries in many parts of the country. This new position was offered to me based on my experience as a mechanical engineer and machine designer. I expanded the conditions of employment by emphasizing to the management here at SES that, in my opinion, there was a significant body of this type of work that could be done for geoscience.

The management here is very enthusiastic that I proceed to establish a client base and healthy, ongoing business providing engineering support to the geoscience international community. They are giving me all of the time and tools necessary to demonstrate that this science-support business is achievable.

The management at ODP has also been supportive in this effort. They feel that I can be of value as an independent engineer to help with 3rd party tool development and take some of the burden off the ODP engineering and operations group when they are besieged by outside groups who want to tap into the established ODP drilling, coring and sampling technology.

I am enclosing the standard SES brochure which does a pretty good job of highlighting the company experience and strengths. What it doesn't tell you is how good SES really is. I learned this from the client perspective when I was at ODP. We used SES on about a dozen projects over the years. We also used a number of other engineering consultants, both individual and company. SES was always the Cadillac (Lexus?) of the group in comparison with the others which were hit or miss; often just fine but sometimes missing badly and expensively. With SES the cost is generally higher than some but it pays for a large group of high caliber engineers (32 at last count), a savvy; experienced management (all engineers, no-bureaucrats) and a financially healthy (booming) firm that can stand behind its commitments even if things don't go exactly as planned on a given project.

The result is that I feel quite comfortable in casting my lot with SES and offering our services to my old ODP colleagues. Over the years I have often thought that

rtley Hoskins
ary [illegible], 1994

vorld geoscience community could use this kind of engineering support. For time I considered attempting to become an independent consultant to do of that kind of business. My current arrangement at SES, however, is much er. Being securely employed and salaried I can be much more cautious about ng only the right jobs, rather than the ones that might offer too much risk to er me or the client. My potential clients are better off because the strength of a verful engineering company will support, and add to, my personal experience l expertise. It can be a win-win situation for all, I believe.

nat might SES and I do to help you in geoscience research? There are several tegories that I think are naturals that I am suggesting to many of my old ODP cientific contacts and shipmates:

» Design and development of geoscience special tools, e.g., downhole samplers, temperature monitoring instruments, core barrels, packers, flow meters, third party tools for ODP, environmental monitoring instruments, etc
  - This could include: function conceptualization, mechanical design, materials selection, packaging, and complete electronic design

» General engineering analysis for existing tools or devices, or for possible new equipment, e.g. finite element stress analysis (FEA), hydraulic modeling, computational fluid dynamics modeling (the fluid analog to FEA), systems analysis

» Feasibility studies or state-of-the-art reviews

» Lab testing of tools or instruments

» Assistance in operational planning of field projects, e.g., instrument emplacement or sampling strategies, equipment specifications, tool customizations, manpower/time estimates, cost estimates

» Operational assistance in the field

» Oversight, assistance or middleman in fabrication projects for instruments or downhole tools.

» Data logging and data reduction/analysis

» Failure/metallurgical analysis of equipment with past problems

SES provides potential clients with estimates or competitive bids for most projects.

Please let me know if you'd like to discuss your chip basket/core barrel concept or any other upcoming project. Make a point of stopping by the SES offices and lab if you are in Houston. Also, considering your position as one who eventually gets in contact with lots of people in this business, please feel free to pass the word to others in the geoscience community that I am available for this kind of work. I have high hopes that this plan will work out well for us all.

Sincerely,

David P. Huey, P.E.

cc: Mike Storms, Ocean Drilling Program (w/o enclosures)

Enclosure: SES Company brochure

WOODS HOLE OCEANOGRAPHIC INSTITUTION
1930

28 March 1994

David P. Huey
Stress Engineering Services, Inc.
13800 Westfair East Drive
Houston, TX 77041-1101

Dear Dave,

Thank you for your letter and information packet of February 14th. Sorry not to get back to you sooner, but travel absences have backed up my correspondence and other writing.

Your offer to advance the concept of a chip basket/core barrel is much appreciated. My first objective is to review it with the concerned ODP panels. I plan to first send the proposal to the Lithosphere Panel and to Technology & Engineering Development Committee. Downhole Measurements Panel may also be interested.

Working with "chips" is a significant change in the type of sample with which the ODP/DSDP science community has worked and I think it would take some re-orientation by the community to work with different samples, even though chips are commonly used elsewhere.

I give you every encouragement to pursue your offer and would be happy to help in any way. Now that you have prodded me, I will make a submittal to the appropriate panels to get the ball rolling.

Thanks for your encouragement, I hope that the idea can come to fruition.

Sincerely yours,

Hartley Hoskins

cc: M. Storms

Woods Hole, Massachusetts 02543—Phone 508-548-1400—Telex 951679

Appendix C4.9

WOODS HOLE OCEANOGRAPHIC INSTITUTION
1930

phone: 508-457-2011
May 25, 1994

Dr. Jamie Allan
Dr. Jay Miller
Dr. Laura Stokking
Ocean Drilling Program
Texas A&M University Research Park
1000 Discovery Drive
College Station, TX 77845-9547

Subj: Corer with chip basket

Dear folks,

Per Laura Stokking's suggestion, I am enclosing some correspondence proposing development of a corer with a chip basket for drilling fractured hard rock. While on Leg 148, I spent some time looking through the chips from the junk basket. Qualitatively, it did not appear that there was significant contamination of material falling down the hole. This seems reasonable given the pumping rate. In drilling certain types of hard rocks, particularly those with low recovery via coring, it seems that a lot of useful information can be obtained from the chips. Chips derived largely from the fracturing of the rock, as opposed to chips derived from the grinding of the roller cones, appear to represent a significant impediment (and risk) to the drilling operation.

Attached is a diagrammatic sketch of the proposed combination corer/chip basket. Its length would be the same as the present corer. Because the corer section is shorter, and the volume of the chips is nine times the volume of the corer per unit length, the corer would be pulled more frequently. Collecting the chips in the upper portion of the core pipe would require a special "louvered" lower-most section of the bottom hole assembly. Initial correspondence with Mike Storms and Dave Huey indicated that this would be an achievable design. Dave Huey, now with Stress Engineering Services, is interested in engineering development proposal.

What I am writing you about is the question as to the scientific usefulness of chips. Working with well cuttings is a long-standing practice in drilling, but it has not been (to my knowledge) utilized much in DSDP or ODP. I would be grateful to get your thoughts as to suitability of such a sampling arrangement for the circumstance of drilling fractured hard rock. If you feel it has possibilities, I would like to submit the idea to the appropriate ODP panels (Lithosphere Panel, and Technology & Engineering Development Committee) for their consideration. I have discussed this suggestion with Kathryn Gillis and she has asked me to share it with Sherman Bloomer, Lithophere Panel chair.

Woods Hole, Massachusetts 02543—Phone 508-548-1400—Telex 951679

If I can provide any more particulars as may be helpful to your consideration, please let me know.

Sincerely yours,

Hartley Hoskins

Hartley Hoskins

Encl.

C.5 SSP (KIM KASTENS).

Site Survey Panel 1994
Program Reviews

Jan / Proposal deadline

Thematic Panels

PCOM

July / data deadline

PCOM

Thematic Panels

November / data deadline

PCOM

	April (Brest)	July (L-DEO)	November (L-DEO)
ite survey implications f recently drilled legs	3	1	2
Site survey status of scheduled legs	9	6	4
Site survey status of highly-ranked prospective legs	$\boxed{20 \rightarrow 12}$		12
Total	32	19	18

SSP November 1994
Recommendations to PCOM

Designations of proposed drill sites:

SSP recommends that PCOM direct the JOIDES Office to develop, promulgate, and insist upon the use of, a consistent system of designating proposed drill sites, such that each location on the seafloor proposed for drilling is identified by a unique and unchanging site designator.

New sites for scheduled legs:

SSP recommends that PCOM direct the JOIDES Office to develop and enforce the use of a formal procedure for the addition of new sites to the program for scheduled legs.

Early identification of man-made seafloor hazards:

SSP recommends that PCOM request JOI to direct ODP/TAMU to investigate the occurrence of man-made seafloor hazards in the vicinity of proposed drillsites as part of their preparation for the DRILLOPTS meeting.

Format of JOIDES Resolution seismic data:

SSP recommends that PCOM request JOI to direct ODP/TAMU to make every reasonable effort to deposit processed copies of underway SCS data collected during surveys aboard the JOIDES Resolution into the ODP Data Bank.

Site Survey Panel 1994
Special Projects

Revision of Site Survey data guidelines

- clearer
- science-driven
- consistent across target types
- cognizant of evolving survey technology

Contribution of site survey section to Offset Drilling workshop

- existing guidelines and data packages are OK for shallow holes
- deep holes require better seafloor characterization to find places that are flat enough and free of sediment & rubble
- deep holes may benefit from pre-drilling subseafloor characterization to find more-nearly intact rock bodies
- pinpoint navigation and marking of sites

C5.4

SSP Issue for PCOM consideration:

The site-specific survey data required to support certain kinds of challenging, high-priority, drilling targets will probably not be produced as a by-product of independent science-driven survey cruises. SSP thinks that the funding structures of ODP member nations should include mechanisms to support site-specific surveys whose main contribution is to prepare the ground for drilling, rather than to directly reveal primary truths about earth processes.

PCOM·~~[illegible]~~C.6: PPSP

· Mahlon Ball

Menchu Comas reviewed the scientific goals and regional geologic and geophysical characteristics of the Western Mediterranean, Leg 161. Comas then led a site-by-site discussion of proposed alternate sites to previously approved drilling locations.

Alb-2B:	Approved to a sub-bottom penetration at 1000m and moved 4 km NW of 36°17'44.4" N and 4°13'24" W on line Alb-45 to avoid a structural crest with amplitude anomalies suggesting possible gas and to avoid penetration of Messinian M-unconformity and underlying Tortonian sediments. The water depth at this site is approximately 750m.
Alb-3A	Approved to a sub-bottom penetration of 600 m and moved to the intersection of lines BRM-3 and Ray 36 about 3 km S. of 35°45' and 16.8" N and 3°12'09.6" W to avoid pinchout configuration. The water depth of this site is approximately 1000m.
Alb-4A	Approved to a sub-bottom depth of 1200m and moved 2 km N., on line 823, from 36°01'36"N and 1°56'54"W to put the site over a structural low. Water depth at this site is approximately 1950m.

Eystein Jansen and Anders Solheim discussed the scientific goals and regional geologic and geophysical setting of the North Atlantic Arctic Gateways with assistance from Paul Grogan.

Jansen then led a site-by-site discussion of proposed drill sites. The Safety Panel had requested that previously approved undrilled sites be reconsidered in light of drilling experience on Leg 151. In this connection, sites: Yerm 1, 2A, 5, ICEP 3, EGM 3 and 4 were re-endorsed.

ICEP-1:	Approved to a sub-bottom penetration of 300m at 69°15.0' N and 12°42.0' W in a water depth of 1950m. This site is an offset hole to previously approved and drilled hole 907A.
NAMD-1:	Approved to a sub-bottom depth of 820m and moved to SP 4530 on line MH 90/2 in a water depth of 1150m.

Additional sites up for approval lacked complete safety check sheets and it was decided that these would be reviewed at the March 1995 meeting of the Safety Panel.

Charles Paull described the scientific goals and regional geologic and geophysical character of the Blake Ridge and Carolina Rise Gas Hydrate drilling, Leg 163. Paull then led a site-by-site discussion of proposed drill sites.

PCOM: C-7. IHP (Patty Fryer).

IHP Priorities

General Program Objectives

1. Address Scientific Problems
   - Collect Cores + Data
   - Curate Cores + Data
2. Disseminate Information
   - Data base
   - Publications

RECOMMENDATIONS FROM THE IHP MEETING
BREMEN, AUGUST 24-27, 1994

I. RECOMMENDATIONS TO PCOM:

A. FIRST PRIORITY RECOMMENDATION TO PCOM:

Because, in addition to the cores themselves, data and publications are the most tangible product of this large and long-standing research program, and because this action is likely to incur more costs in the long run, **IHP strongly recommends to PCOM that it recind its directive to ODP Publications to delay publication of the IR volumes.**

B. SECOND PRIORITY RECOMMENDATIONS

RECOMMENDATION TO PCOM: IHP recommends that structural data be included in the database as primary data.

RECOMMENDATION TO PCOM: IHP recommends that Pat Diver, a representative of the oil industry, joins the panel as a regular member.

NO COST ITEMS:

RECOMMENDATION TO PCOM: The IHP recommends that PCOM endorse the concept of specialized data centers associated with core repositories and readily accessible micropaleontological reference centers. Such an endorsement would be useful for prospective Database Center organizers in their efforts to secure funding. The IHP further recommends that north German institutions be encouraged to spearhead an international effort to develop an ODP Stratigraphic Database Center associated with the core repository at Bremen University, in cooperation with other European laboratories participating in ODP activities. From presentations made to us during our meeting it appears that GEOMAR in Kiel is a likely location for a nearby Micropaleontological Reference Center.

RECOMMENDATION TO PCOM: IHP recommends permitting Leg 154 Scientific Shipboard Party to hold its second post cruise meeting Oct 10-14, 1995, but shortening the publication deadline to 4 months after the post cruise meeting.

II. Recommendations to ODP:

Recommendation to ODP: IHP recommends that ODP continues work on FossiList so as not to lose momentum.

Recommendation to ODP: IHP cannot endorse further work on Etch-a-sketch until it is known whether reworking of this program is to be included as part of the computer and database upgrade project (JANUS).

Recommendation to ODP: Based on the review of the ETH Neogene Chronologic Database by Bill Riedel, John Saunders and Brian Huber, IHP recommends publication of the Lazarus et al. database as a Technical Report. Bill Riedel will follow up to ensure that this will get done.

Recommendation to ODP: Any followup CD-ROM in future should include the Boyce correction to all ODP data.

Recommendation to ODP: The IHP appreciates the Leg 155 Scientific Shipboard Party's desire to be thorough, but feels a 100% increase in volume size is excessive and that if the expansion of the volume is because of interpretation of the data that this be severely curtailed or another aspect of the volume be cut back in order for the volume to fall close to the accepted size.

Recommendation to ODP: Another column should be added to the VCD barrel sheet to accomodate stuctural geology information if PCOM agrees to include structural data as prime data.

PCOM · C-8 : SMP

Overview of SMP Recommendations 1994

Joris M. Gieskes Chair SMP

In this report I present the recommendations by the SMP to PCOM and/or ODP/TAMU.

SMP wishes to stress its general satisfaction with the good relationship between SMP and ODP/TAMU. This, of course, is the quid pro quo for a good shipboard measurements program. SMP wishes to stress the importance of the shipboard measurements program for the following reasons:

1. The availability of first rate equipment makes it possible to attract the best scientific staff as participants in any ODP Drilling Leg.

2. It is the greatest importance to the Ocean Drilling Program as such to produce the best possible data, using excellent equipment, especially to justify the expense of the drilling program.

3. Modernization of techniques of shipboard measurements will make the program continuously innovative, a requirement absolutely necessary for progress in the future.

March Meeting 1994

SMP made several recommendations during this meeting, many of which have been acted on by PCOM or ODP/TAMU.

1. During discussions of the paleontology laboratory SMP felt that the following recommendations were in order:

Recommendation 94-1:

1. SMP strongly recommends that ODP rewrites the job description of shipboard paleontologist, so that shipboard data are required to be collected in computerized spreadsheet format, instead of on paper forms.

2. SMP recommends that ODP continue efforts to finish the paleo data acquisition module (FossiList) as soon as possible, and to that effect to sail a 4D programmer with the alpha version of the program.

3. SMP recommends that ODP provides software for the shipboard preparation of age-depth plots, so that a consistent format will be used from leg to leg.

4. SMP recommends that the ODP-shipboard technician who writes the report on the paleo-lab at the end of the cruise check the laboratory inventory.

SMP can report progress on these items, although FOSSILIST is still in need of further development. This topic will be discussed further below.

2. The Pressure Core System is a recurrent item, especially for SGPP. SMP supports that attention be given to this item by ODP/TAMU, especially because of the potential importance of the PCS during gashydrate legs. This item, of course, depends on the present funding climate, and it is understood that an outside interest is necessary for the development of equipment to use the pressurized core for scientific purposes.

Recommendation 94-2:

SMP recommends to PCOM that ODP/TAMU be encouraged to use available funds for the further upgrading of the PCS system for future use on the gashydrate leg.

3. The SMP has discussed the following item before, but emphasizes the need that any one involved in the development of software should be available on ship for the testing of this software. This should also be the case for any software developed by TRACOR.

Recommendation 94-3:

SMP recommends that whenever new software is placed on the ship the principal programmer will go out to sea with this software, so that problems arising can be solved by direct interaction with the shipboard scientific party.

4. With the advent of the new Japanese SMP member Satoru Nakashima the measurement of color was reconsidered:

Recommendation 94-4:

The SMP restates that the color scanner spectrophotometer is now the routine tool for the measurement of core color and that this manner of color measurement should completely replace visual comparison using Munsell color charts. In addition the color measurements should be made as soon as possible after splitting of the core so as to minimize deterioration of color.

5. Core-log integration was already briefly discussed during this meeting, but this topic will be discussed in more detail below.

Recommendation 94-5:

The SMP suggests that, especially on legs dedicated to core-log integration efforts (e.g., paleo-legs), that the shipboard party include a Core-Log Integration Specialist, who is well versed in the MST device.

6. SMP discussed the shipboard technical staffing and proposed the following recommendation. SMP likes to stress, however, that this recommendation is already acted upon through the re-instatement of this personnel.

Recommendation 94-6:

SMP has previously expressed its dismay with cuts in technical staff (e.g., minutes of the 10th SMP meeting). In the meantime SMP has learned that further cuts in shipboard technical personnel are planned. SMP is strongly concerned that this further diminishment in staff will lead to problems with the maintenance and operation of valuable shipboard equipment. Any potential cuts in the important array of shipboard measurements will lead to a deterioration of the productivity as well as of the quality of shipboard science operations. SMP fears that as a result of this situation scientific objectives may be compromised. For these reasons SMP strongly recommends that PCOM consider this critical situation and urges PCOM/BCOM to seek alternate ways of funding in order to remedy this critical situation.

7. Multi Sensor Track (MST) Devise

SMP discussed the importance of the MST device in the core-log integration (data integration) efforts, as started by various groups in the scientific community.:

Recommendation 94-7

SMP recommends that ODP/TAMU be encouraged to go ahead as soon as possible with the envisaged upgrade of the MST. Funds have been allocated for this purpose and SMP recommends strongly that special attention be given to a more centralized work station capable of replacing the manifold of computers presently associated with the MST.

Fall Meeting 1994

1. The SMP meeting in Las Palmas offered the opportunity to inspect the ship's laboratories. Below some of the results are summarized in terms of specific recommendations. Among the primary aims should be the writing of simple cook books for the various shipboard laboratories. These cook books should be simp[le and need to be reviewed periodically by the SMP as well as by knowledgeable ship board scientists.

Recommendation 94-8

SMP notes from visits to the ship's laboratories that "cook books" of laboratory procedures are important items that are often missing in the various laboratories. SMP recommends that such "cook books" be developed through co-operation between laboratory users of the appropriate expertise and designated ODP technical staff. SMP suggests that future staffing by ODP may bear this aim in mind, sothat procedure cook books can be developed in the near future.

2. A further item of discussion was the use of the XRF and XRD laboratory. It is the opinion of the SMP that the laboratory is an extremely important asset to the ship's laboratories. The equipment is capable of obtaining first rate data on major and minor constutuents of sediments and basalts. The X-Ray diffraction apparatus also is invaluable for the achievement of first rate shipboard scientific data.

Recommendation 94-9

SMP wishes to stress that the X-Ray Fluorescence apparatus on board ship should be utilized to its fullest extent to include a full set of major and trace element determinations. The SMP strongly endorses the proper use of the XRF by the technical staff, with the aim of continuing the collection of high quality major and minor element data, comparable with most competent shore-based laboratories. If experienced XRF scientists sail, then these scientists should assume responsibility for the operation of the XRF, get thoroughly involved in the analyses, and provide guidance and training for the technicians.

It is the desire of SMP that PCOM endorses this position.

3. Software Development and Data Management

SMP is aware that much of the efforts of the ODP/TAMU computer group wil be directed towards the interactions with the new data base management system to be installed by TRACOR. For these reasons SMP considered the development of software, including the software highly recommended during the Spring meeting (i.e., before the TRACOR constract existed). From this discussion resulted the following recommendations:

Recommendation 94-10

SMP urges that the further development of Etch-a-Sketch and similar programs be put on hold. SMP considers it of importance that for the capture of data on VCD, Etch-a-Sketch, Rocky, or Structure Data, the capability be explored by TAMU of commercially available CAD programs.

Recommendation 94-11

SMP urges PCOM/JOI to consider the appointment of one extra member of one of the other member countries to the Data Base Steering Committee, having obtained the assurance of active participation in this effort.

SMP is aware, however, for the need for a continued development of the FossiList program.

Recent testing by shorebased scientists as well as shipboard scientists on Leg 156 revealed many problems. Ellen Thomas, Dave Lazarus, Annika Sanfilippo, and Bill Riedel have tested Fossilist, but not extensively and much more testing needs to be done in the future. Dave, Annika, and Bill had severe problems with speed; Ellen tested the program on a Quadra and had less problems. Overall, testers agree that the program requires excessive amounts of memory for such a program, and is very slow when run on smaller computers (onboard, the program is run through a server, but users also complained about the speed - i.e., the lack of it). The software holds much promise to become very useful, but it needs a considerable amount of work to become fully operational. It can, in its present state, not be considered fully operational, especially because of several problematic features, such as the loss of data.

Recommendation 94-12

SMP recommends that the development of the FossiList software continues in the near future. SMP urges that, in order for Fossilist to become operational, due attention be given to inclusion of the prime data fields as defined by IHP/SMP. IHP urges that ODP give first priority to the continued development of Fossilist, sothat the impetus will not be lost and the program will become fully functional in the near future.

5. CLICOM report

SMP discussed the report by CLICOM (Core-Log Integration Committee). Below a summariy of CLICOM's recommendations is given:

Summary and Recommendations

CLICOM recommends:

1. The CLIP program, developed by Peter deMenocal in collaboration with Terri King Hagelberg, after extension of this program in the future, will be an important feature of data integration efforts. CLICOM realizes that the CLIP program is still in a development stage and can be made available to shipboard scientists, especially for core-core data integration However, CLICOM is satisfied about the future prospects of the CLIP platform and, therefore, CLICOM recommends that CLIP be recognized as an important component of the future data base update and that the future contractor remain in full contact with BRG-LDEO with regards the future implementation of this program;

2. CLICOM agrees and recommends that a very careful record be kept of depth changes achieved during the manipulations necessary to reach the common depth scale of cores and logs and that each Initial Report of ODP contain a separate chapter on core-log integration or any other Shipboard Data Integration (SDI) effort;

3. CLICOM recommends the maintenance on board ship of three work stations available for dedicated data integration, especially during drilling legs in which core-log integration plays a major role:

   1. In the core laboratory;
   2. In the scief scientists office;
   3. In the library.

4. With the Multiple Sensor Track (MST) being one of the most important components of SDI CLICOM recommends that attention be given to:

   1. Dedicated technical support through a well trained ODP MST specialist;
   2. Dedicated future support for continued further software and hardware development

(MST track improvements).

5. Though staffing of a cruise, during which core-log integration is envisaged to be of importance, is usually done in collaboration with the co-chief scientists of that cruise, CLICOM recommends special attention to the following aspects of this staffing:

Shipboard data integration requires the co-ordination by a dedicated Shipboard Data Integration Specialist, who will have the sole responsibility to carry out the shipboard program of data integration, in collaboration with scientists operating the MST, the physical property experts, as well as shipboard biostratigraphers, paleomagnetists, chemists, and, of course, the logging specialists. The Shipboard Data Integration Specialist will end up defining the depth scales - working together with all other shipboard scientists to confirm/validate and even constrain depth scales.

CLICOM realizes that this report is mainly directed towards consideration of the state of development of the CLIP platform, conform with the directives of the PCOM Chair. However, this report should also serve as a potential basis for future more extensive discussion on data integration. This should be discussed in greater detail by the SMP and IHP panels.

Major SMP related concerns are:

1. The recommendation of CLICOM that, especially on legs in which data integration is expected to play a major role, a careful selection of staff is made, including the appointment of a scientific staff member responsible only for data integration, in close collaboration with other specialists working in this area (e.g., MST, PP, Color scanner, paleontology);

2. Dissemination of information with regards the importance of core-core/core-log or, simply, data integration in other legs with sediment and/or hard rock recoveries.

Data Integration is presently most feasible and constitutes a major advance in a subject long advocated, but presently achievable. SMP strongly endorses the further development of the Data Integration Platform (formerly CLIP).

6. Equipment needs

SMP wishes to emphasize that, notwithstanding a mandate for frugality with regards spending, consideration must be given to upgrades of shipboard equipment. In particular SMP calls attention to:

1. The upgrade of the MST device. ODP/TAMU is making strong efforts in this direction and SMP endorses these efforts. A well functioning MST is one of the quid pro quo's of a successful data integration program.

2. The potential necessity of a renewal of the shipboard XRF system. Although at present this system is still highly functional, all sophisticated equipment has a limited life-time. Because of the very high value of the XRF/XRD laboratory, not only for hard rock legs but also for soft sediment legs, SMP suggests that PCOM should be aware of the potential need of replacement of this equipment.

3. The potential replacement of the shipboard equipment for magnetic measurements. Again, the available equipment, though acceptable for many purposes, is aging and not up to date. At present more sophisticated and far more snsitive equipment exists, which will magnetic mesurements in biogenic sediments a feasibility. This, of course, is of great importance for paleoceanographic drilling legs.

SMP wishes to stress these items. These issues will be revisited during the spring 1995 SMP meeting, but it is necessary for PCOM to be aware of these items. Shipboard science is still one of the most important aspects of the drilling program.

7. Panel Membership

SMP is aware of the desirability of periodic renewal of the panel membership.

The present and future membership (names suggested below) will be:

Geochemist	Joris Gieskes (US), Chair
Geochemist, Color expert	Saturo Nakashima (J)
Data Integration Specialist	Terri Hagelberg
Geophysicist (DMP experience)	Heinrich Villinger (G)
Paleomagnetist	Janet Pariso (US)
Petrology/XRF	Suggested:
	Joel Sparks (presently on Leg 158)
	Mike Perfit (US)
Paleontology	Suggested:
	Lucy Edwards (US)
	Dave Harwood (US)
Sedimentologist	Massimo Sarti (ESF)
Physical Properties	Kate Moran*
	Ron Chaney (US)
	Robin Brereton (UK)
Structural Geology	To be named (F)

* Need input from CANAUS

This panel membership should cover the various areas of expertise to advise JOIDES PCOM on Shipboard Measurements related matters.

Liaison with DMP was discussed. It was decided that such liaison would be beneficial to the panel, but that two potential liaisons would be a proper idea, if anything to reduce travel time of these liaisons. Heinrich Villinger (D) was persuaded to be the first liaison to DMP, especially because he has extensive experience with that panel. Ron Chaney (US) will act as the other liaison.

c9.1

PCOM. C:9 DMP. (Peter Lysne)

DOWNHOLE MEASUREMENTS PANEL

[illegible]	*Louisiana State University*
Gilles Dubuisson	*Ecole Normale Superieure*
Gerard Fryer	*University of Hawaii*
Andrew Green	*Camborne School of Mines Assoc.*
Steven Hickman	*USGS/Menlo Park*
[illegible]	*Baker-Hughes Inteq*
Richard Jarrard	*University of Utah*
Peter Lysne	*Sandia National Laboratories*
Philip Nelson	*USGS/Denver*
Laust Pedersen	*University of Uppsala*
Henry Salisch	*University of New South Wales*
Karen Von Damm	*University of New Hampshire*
Michael Williams	*Mobil Research*
Juergen Wohlenberg	*University of Aachen*
Makoto Yamano	*University of Tokyo*

[illegible] of the panel as of December, 1994

Appendix C9.1

C9.2

Appendix C9.2

DMP THRUSTS, 1993-1995

1993

Emphasized Barbados and TAG due to downhole measurement challenges

1994

Emphasized Third-Party Tools in support of TAG

Initiated review of the Downhole Measurements Program in view of present budgetary constraints

1995

Continue programmatic review

DMP RECOMMENDATIONS, SPRING, 1994

94-1 *Concerning In-Situ Stress Measurements*

94-2 *Concerning Flexible Funding for In-Situ Measurements*

94-3 *Concerning Responsibility for Memory Tools*

94-4 [illegible] 10 *Concerning Specific Third Party Tools*

94-11 *Concerning Additional Engineering Staff at the BRG*

DMP RECOMMENDATIONS, FALL, 1994

94-12 Concerning BRG Budget Scenarios

94-13 Concerning LWD for Mediterranean Operations, Leg 160

94-14 Concerning Distribution of Logging Brochures

94-15 Concerning a Uniform Review of Add-On Science

94-16 Concerning a Study of Logging While Coring

DMP THIRD-PARTY TOOL REQUIREMENTS

The DMP philosophy is to be pragmatic and flexible at the same time as upholding the Third-Party-Tool Guidelines. Watchdogs will aid Principal Investigators and the contractors.

- *Pressure Housing Test*
- *Electronics Test*
- *Vibration Test*
- *Wireline Test*
- *System Test*
- *Calibration consistent with goals*

Appendix C9.5

DMP AREAS OF CONCERN

Communications with PCOM and DMP-sister panels

Guidelines for budgetary exercises

Interactions with other programs for technology development

Appendix C10.1

PCOM → C.10. TEDCOM (Earl Shanks)

SIXTEENTH TEDCOM

College Station, November 7-8, 1994

****

Main Topics Of The Meeting:

Discuss progress on the DCS.

Discuss riser drilling.

Obtain an update from TAMU on operational tools development.

Elect a new chairman.

Principal events since March TEDCOM:

TAMU cancellation of the Paul Monroe contract.

Engineering Development Review Comm report.

Meetings between JAMSTEC/ODP about riser drilling.

Meetings of DCS Sub-Comm with TAMU and others.

Instructions to elect new chair and discuss 4 year member rotation

DCS REVIEW

The TEDCOM considers the high speed diamond coring technology to still be a prime candidate to obtain good core recovery for the rocks it was originally intended.

TAMU have proposed a new plan to determine feasibility for the DCS secondary heave compensator:

Phase I -Create a design/development plan
Phase II -Develop controller concepts and test on modified analytical model and scale model
Phase III-Implement controllers in software and install on DCS hardware
Phase IV-Land test complete system

TEDCOM proposes the DCS Sub-Comm remain active.

TEDCOM advises TAMU to continue to examine possible use of a bumper sub to replace the secondary heave compensator.

EDCOM RECOMMENDATIONS TO PCOM FOR DCS

he TEDCOM endorses diamond drilling for core recovery. Penetration is ot limited to 500 meters. Provisionally include diamond drilling in the LRP from 1998.

Accept and implement the proposed Plans I and II to determine feasibility for an estimated $240,000.

If feasibility is demonstrated, implement Phase III for an estimated $80,000.

Plan a DCS Sea Test in late 1996.

If feasibility is not demonstrated, TEDCOM will assess and make recommendations.

The DCS Sub-Comm be expanded to include Summerour. And, the Sub-Comm be allowed to assist in:

- Meetings with TAMU and SES (or other sub-cons)
- Mechanical simulator tests

4000 METER DRILLING RISER WITH BOP

A TEDCOM working group (including reps from TAMU, PCOM, LITHP, TECP) proposed a riser for this depth in 1992. The purpose was to determine feasibility to drill holes specified by LITHP/TECP.

The advantage of a riser is to return drilling mud in order to maintain hole stability which will allow longer intervals between casing strings and allow the well to be drilled deeper.

The riser which was deemed to be practical from a design and cost perspective was the proposed slim line riser.

TEDCOM received a presentation from JAMSTEC during this meeting where they presented an example of their 16" design for 2600 meters of water depth. The riser utilized conventional well control equipment.

> Any riser which can support its own weigh can be feasible in this water depth depending on what ocean environments it is expected to survive when hung-off during a storm disconnect.

Conventional well control can be a problem in this WD. Un-conventional means of well control should be considered in order to reduce the equivalent circulating densities (ECD) due to fluid frictions at the bottom of the hole.

TEDCOM requests clarification as to the purpose of the riser in order to determine feasibility.

TEDCOM RECOMMENDATION TO PCOM ON DEEPWATER DRILLING RISERS

Clarify the objectives with respect to deep drilling requiring the use of a riser to return drilling mud to the surface for hole stability.

TEDCOM is ready to organize a workshop to include key members of TEDCOM/TAMU/PCOM/OTHER PANELS to determine optimal methods to reach the objectives.

HARD ROCK DRILLING

DCOM received a presentation from the Iceland TEDCOM resentative on drive in casing systems.

EDCOM recommends TAMU investigate the feasibility of adapting a iven-in casing system for bare rock drilling in such areas as Hess Deep, ARK, TAG.

TEDCOM RECOMMENDATIONS TO PCOM ON LOGGING WHILE CORING (LWC)

LWC is considered feasible. If the tool development can be justified by DMP needs, TEDCOM would recommend integrating WOB and torque measurement into the tool.

C10.6

OPERATIONAL TOOLS AND OTHER DEVELOPMENTS

TEDCOM requests that TAMU continue to update spread sheets on Operational tools developments to enable TEDCOM to better advise PCOM on prioritization of such developments.

In connection with their studies of a Seafloor Template, TEDCOM suggests TAMU to establish the "time to re-entry" as a function of cone diameter and water depth, from experience with 12' and 8' cones.

TEDCOM RECOMMENDATIONS TO PCOM ON OPERATIONAL TOOLS AND OTHER DEVELOPMENTS

The present seals on the main heave compensator be replaced by low friction seals once the seals are proven efficient and operationally acceptable. This should be a high priority item since such seals could lead to improved performance of several tools and not just DCS.

DCB is promising technology for improving core recovery in crystalline rock, particularly if the main heave compensator is improved by the introduction of new low friction seals. A site should be found as soon as possible to test this existing equipment.

Appendix C11.1

Pcom : C:11 —PANCH (Sherm Bloomer)

1994 PANCH Meeting

November 29, 1994

Recommendations and Comments for PCOM

1. Database project/upgrade
2. Issues related to the database project
3. Equipment needs and flags
4. Operational priorities 1995-98
5. Procedures for non-performers
6. Thematic panel meeting schedules
7. Costs of panel operations
8. Liaisons to national and international groups
9. Long range planning issues

PANCH Recommendations 1 and 2

Any upgrade must:

- archive original data from cores and boreholes
- incorporate derived data
- allow integration and manipulation of these various data

Two user-contributed components in achieving these objectives are:

- define software goals and methodology up-front
- test and refine the prototype software

PANCH recommends

- **establish a LISTSERVER for communication**
- **establish formal liaisons to both IHP and SMP, as the primary conduit of information between IHP (and hence the SC) and the thematic panels.**
- **the user groups established by ODP-TAMU also provide up-front advice--CLICOM is an example**
- **give the panels the list of data modules and data types and ask for advice**
- **confirm support for SC as expressed by IHP and OK direct communication between SC and panels**
- **Endorse ODP-TAMU's suggestion for holding a meeting to address the depth problem**

#4 BUDGET

What is the Ocean Drilling Program about?

1. Identifying, evaluating, and prioritizing scientific problems and strategies

2. Helping to solve those scientific problems through drilling, sampling and logging

What do we need to accomplish #2 for a given leg of work?

make boreholes and recover core
shipboard measurements and scientist interaction
these are also the key things to disseminate
basic curation and access to core and data

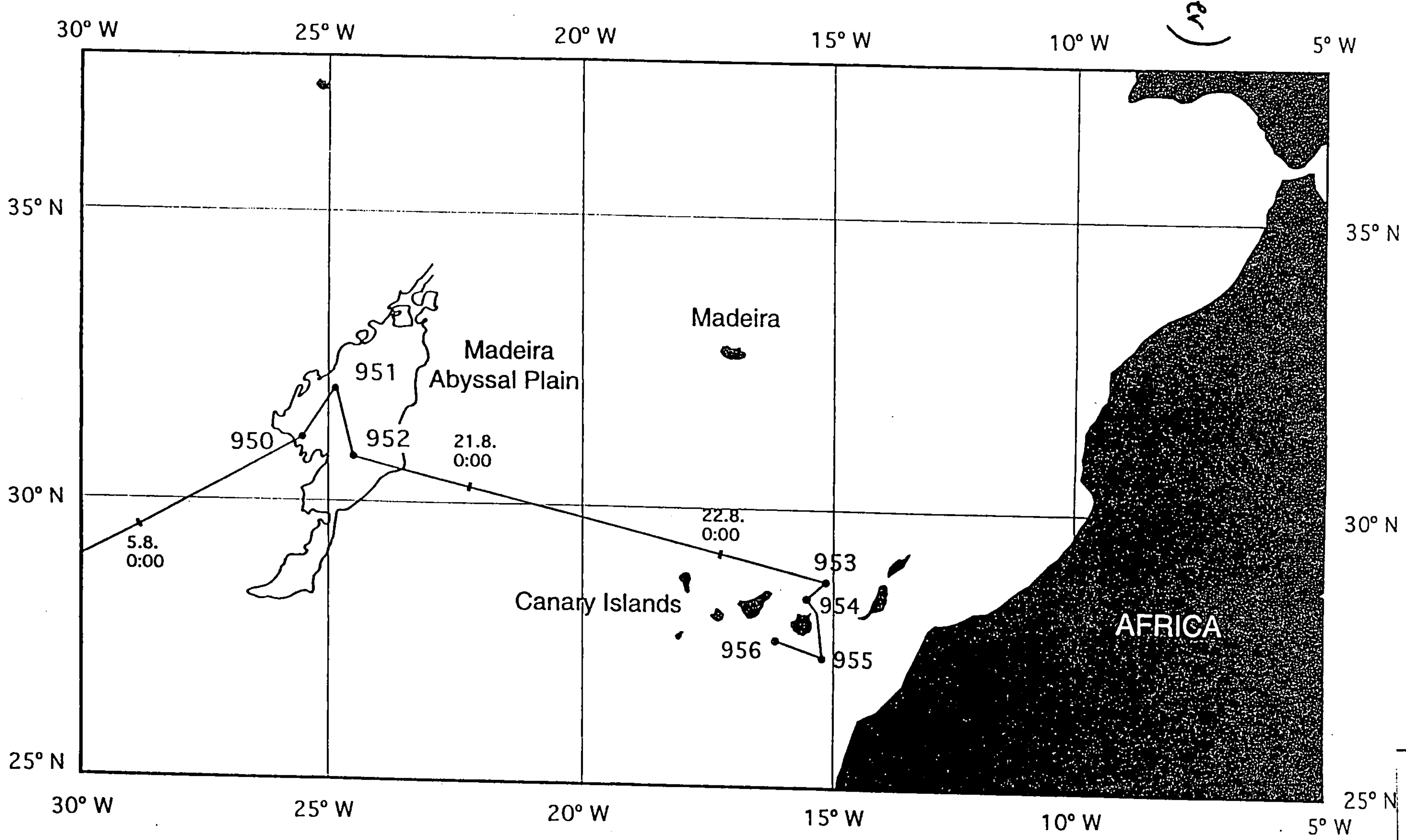
What do we need to survive?

innovation and advance--drilling, logging, data
flexibility in targets and geography

LRP: A PANCH Perspective

- Outside perspectives of ODP need to be improved
- LRP is a key document to help change perspectives
- The LRP must be science driven
- Thematic panel process is mature and working well
- The planning process does not need major surgery
- Themes may change in response to community needs
- System needs to incorporate wider group of customers
- The reporting mechanisms need a major overhaul

COM: D1
Leg 157
(P il Weaver)



Appendix D1.1

MAP OBJECTIVES

1) Determination of the frequency of mass wasting in the Canary basin and the volume of individual sediment flows so as to be able to calculate sediment budgets.

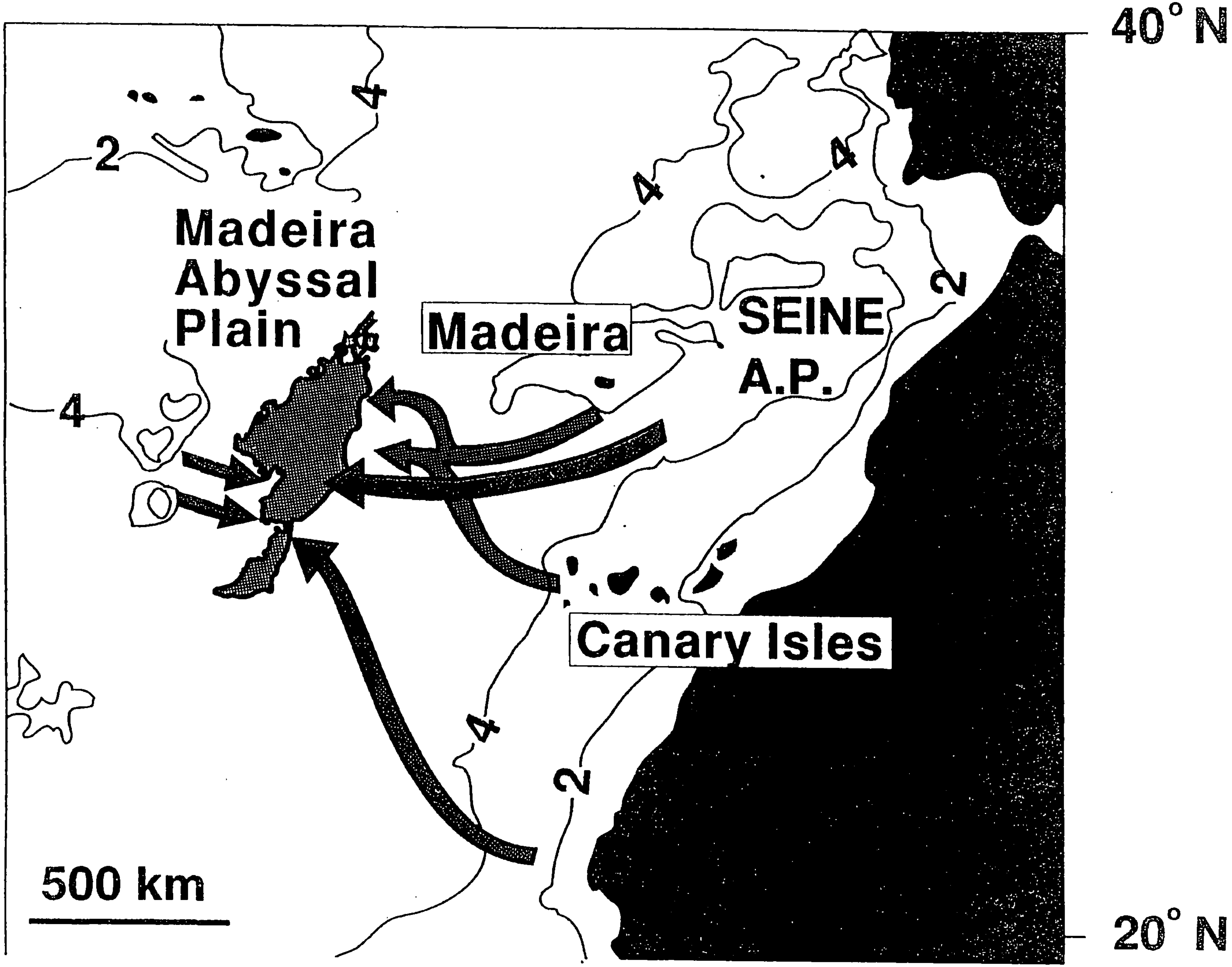
2) Dating the inception of the Madeira Abyssal Plain.

3) Geochemical analysis and studies of diagenesis in mixed organic-rich and organic-poor sediments.

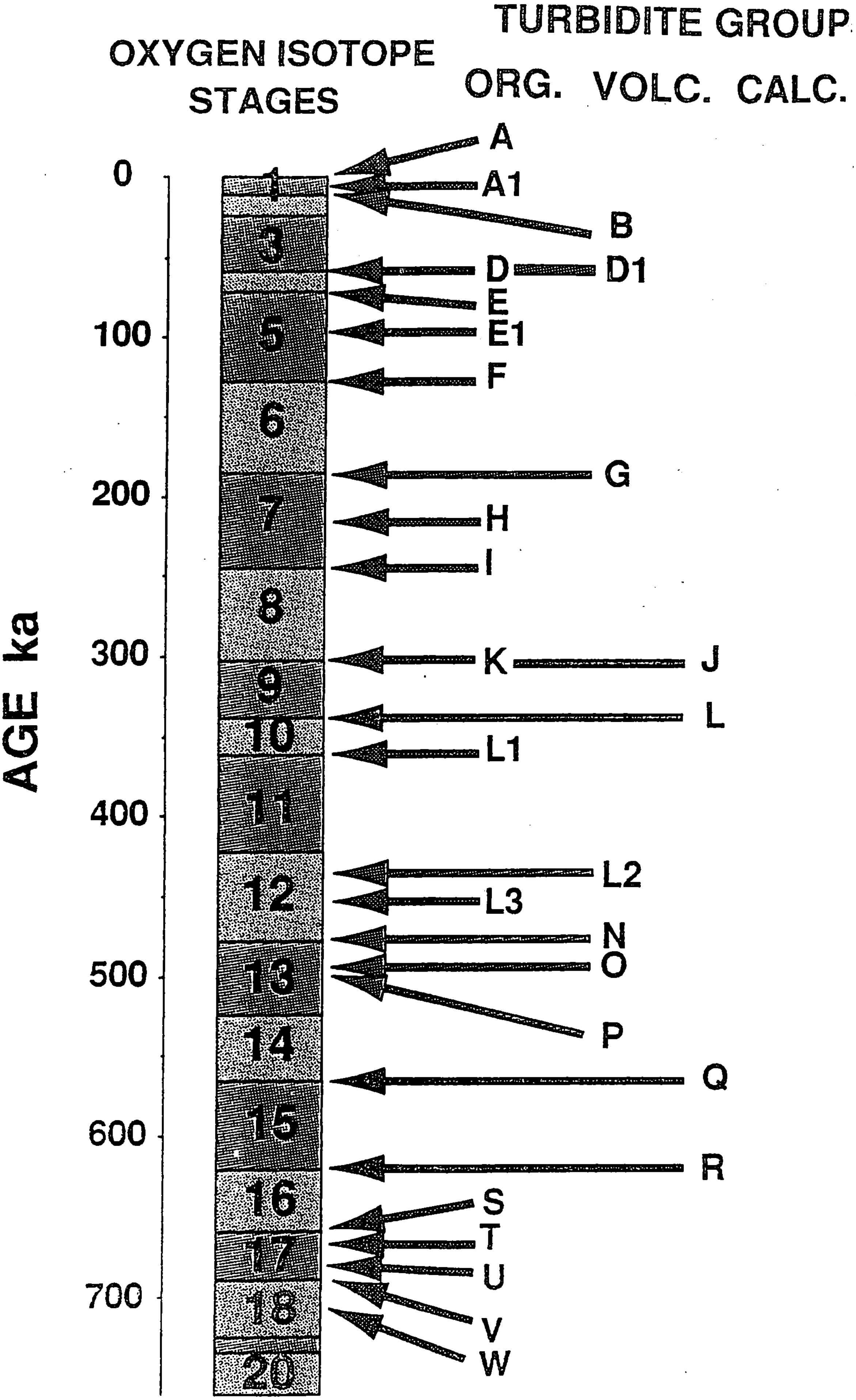
4) Determination of the pre-turbidite sediment sequence.

5) Studies of changes in the CCD in one of the deepest North Atlantic basins.

[redacted]



Appendix D1.3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TURBIDITE GROUP
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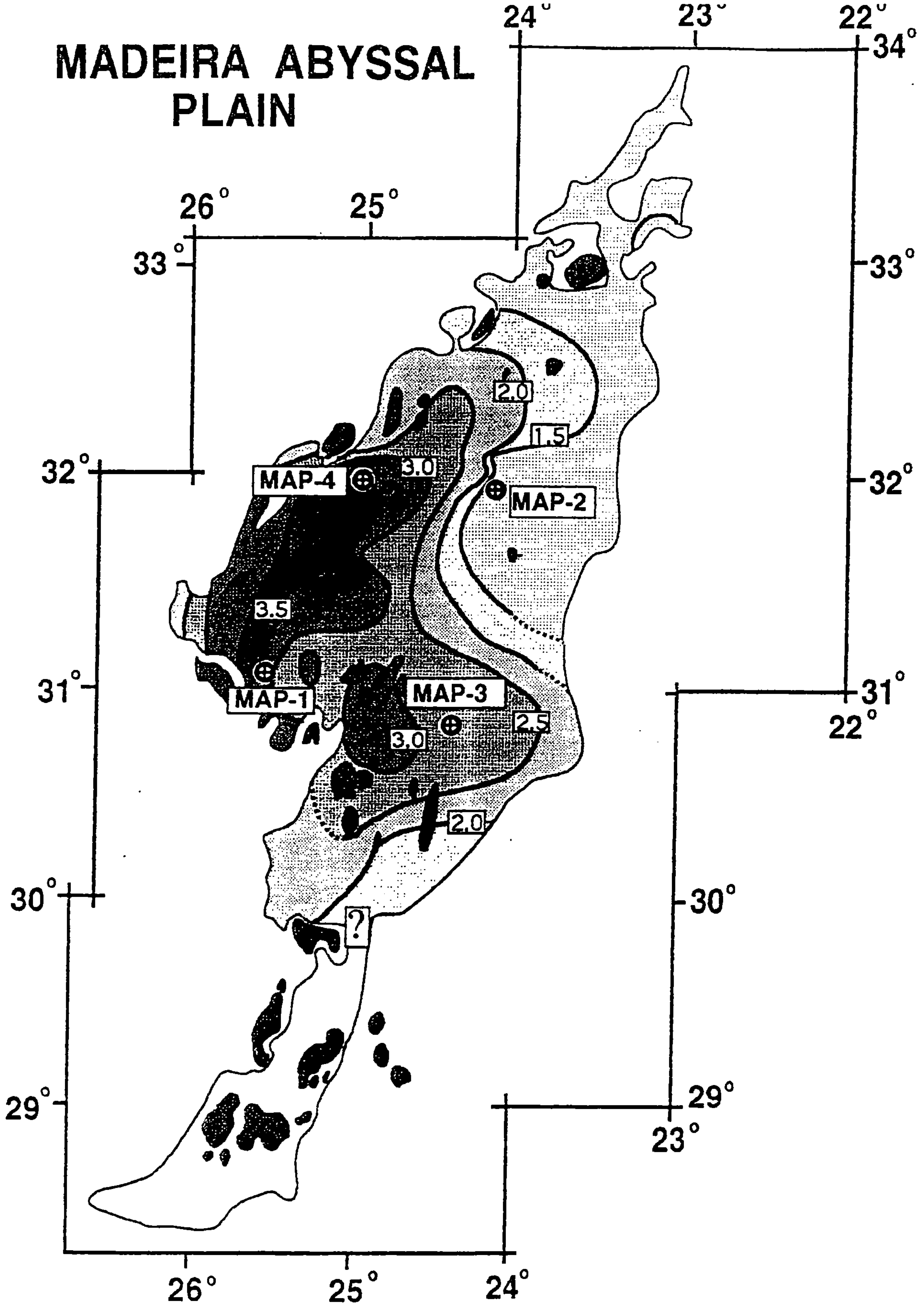
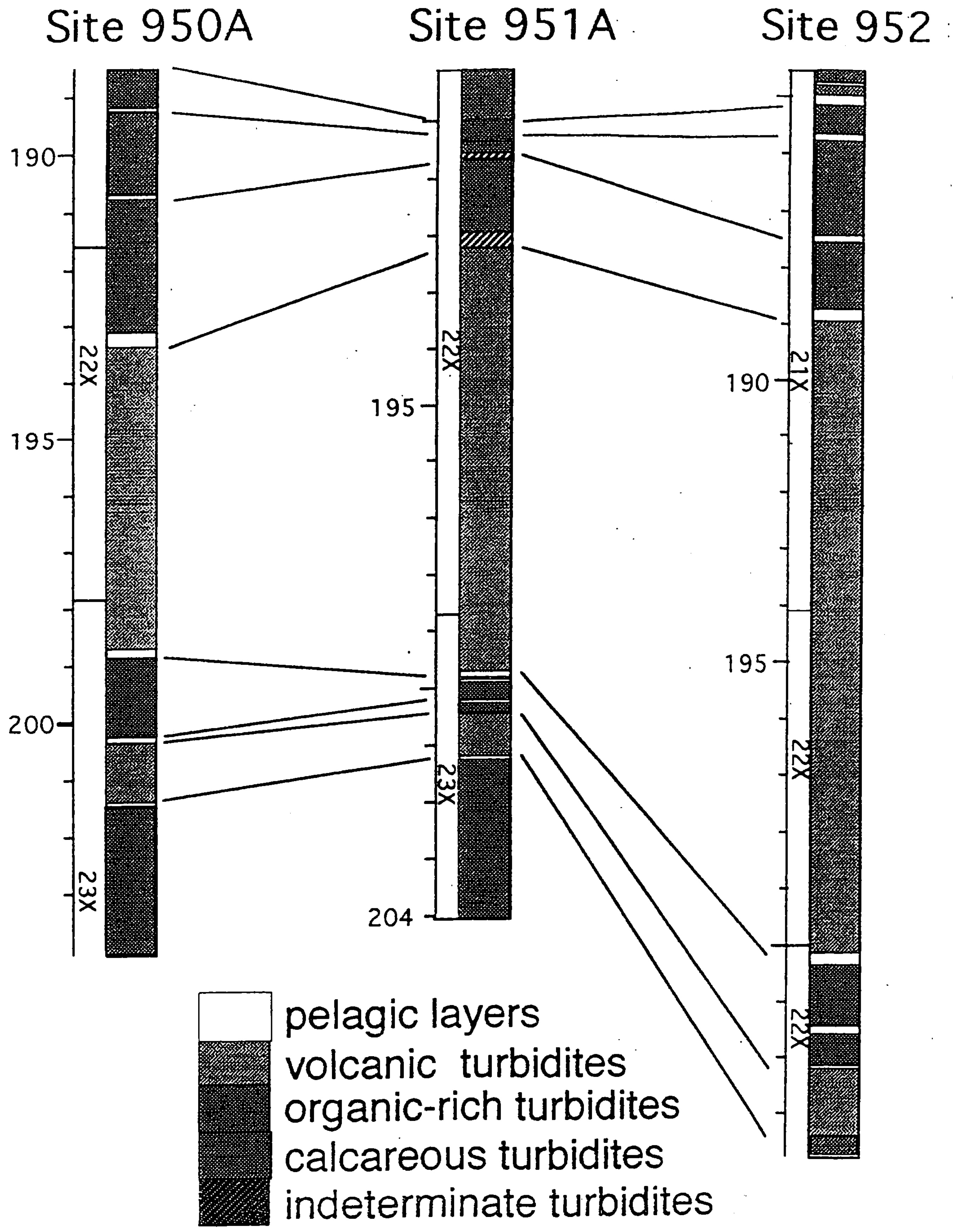


MADEIRA ABYSSAL PLAIN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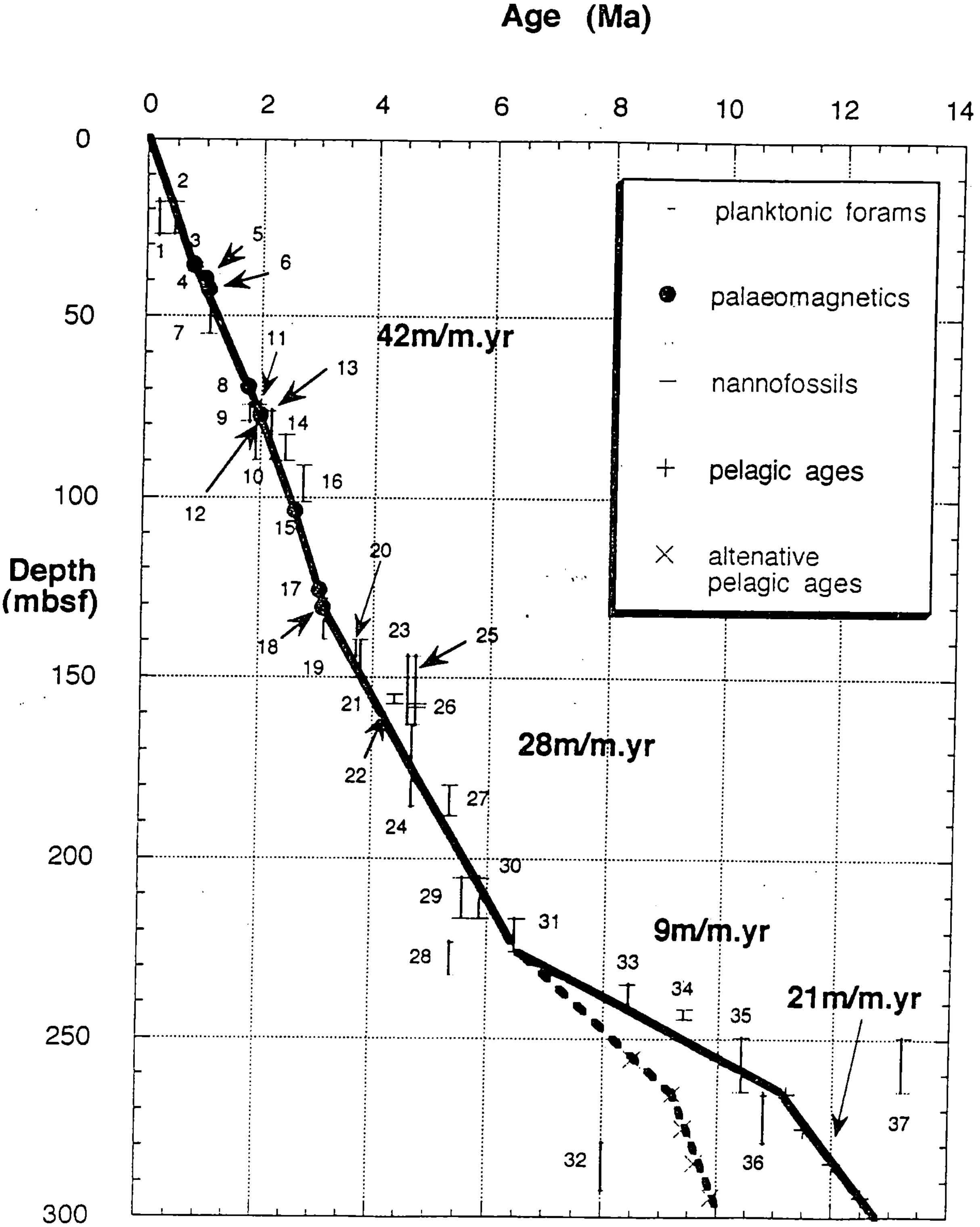
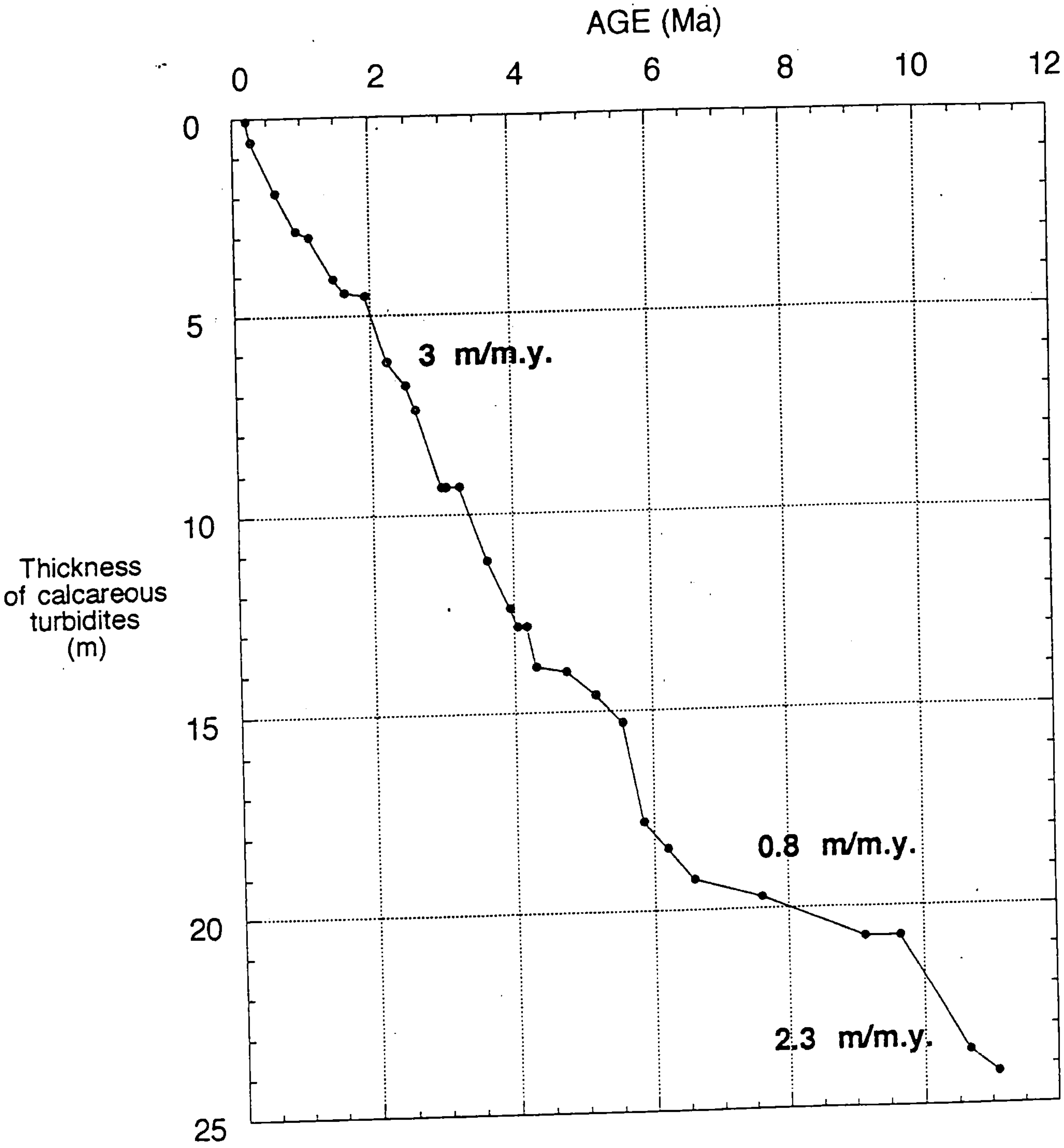
pelagic layers
volcanic turbidites
organic-rich turbidites
calcareous turbidites
indeterminate turbidites

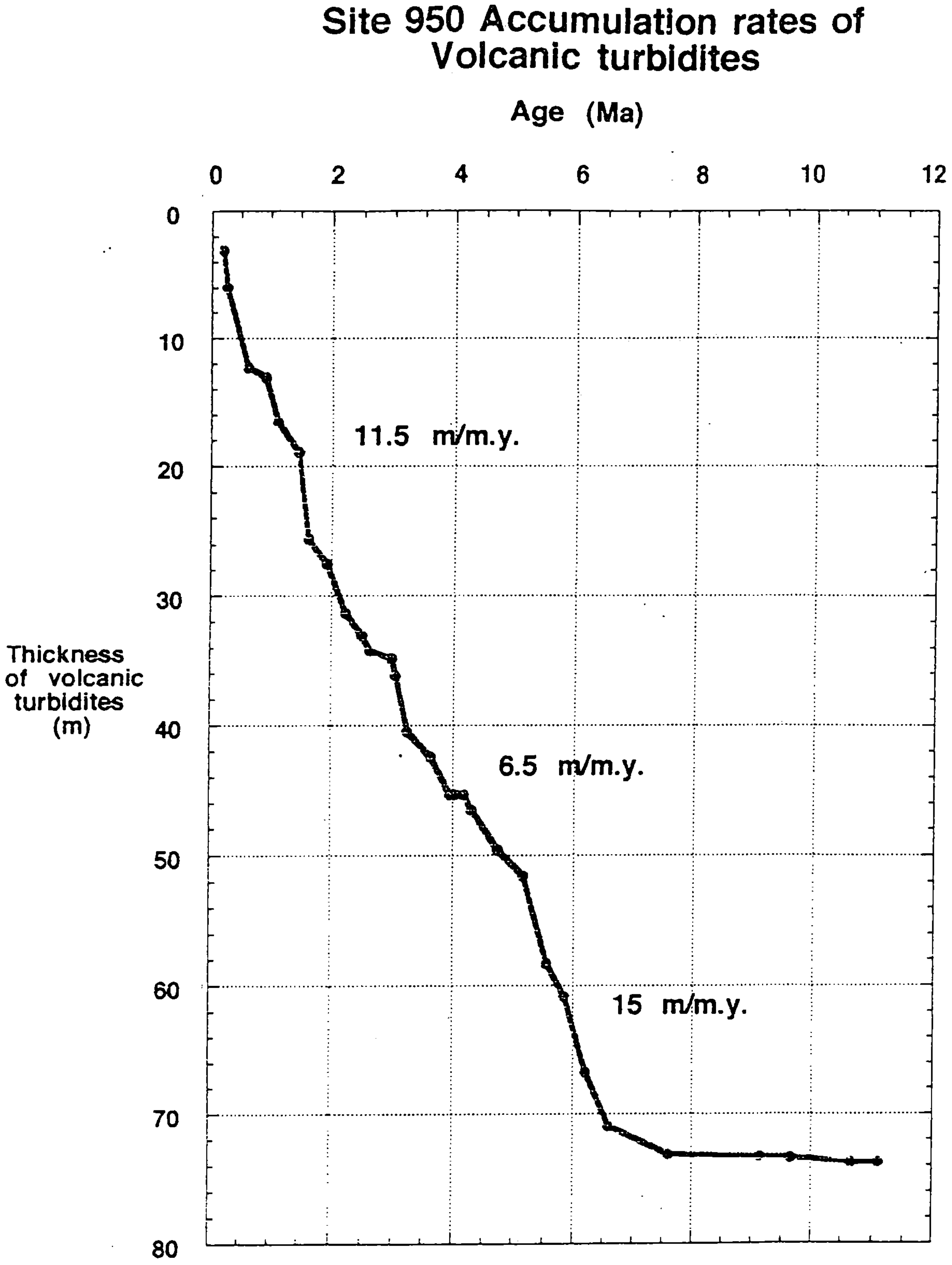
Site 950 accumulation rates



D1.8

Site 950 Accumulation Rate of Calcareous Turbidites

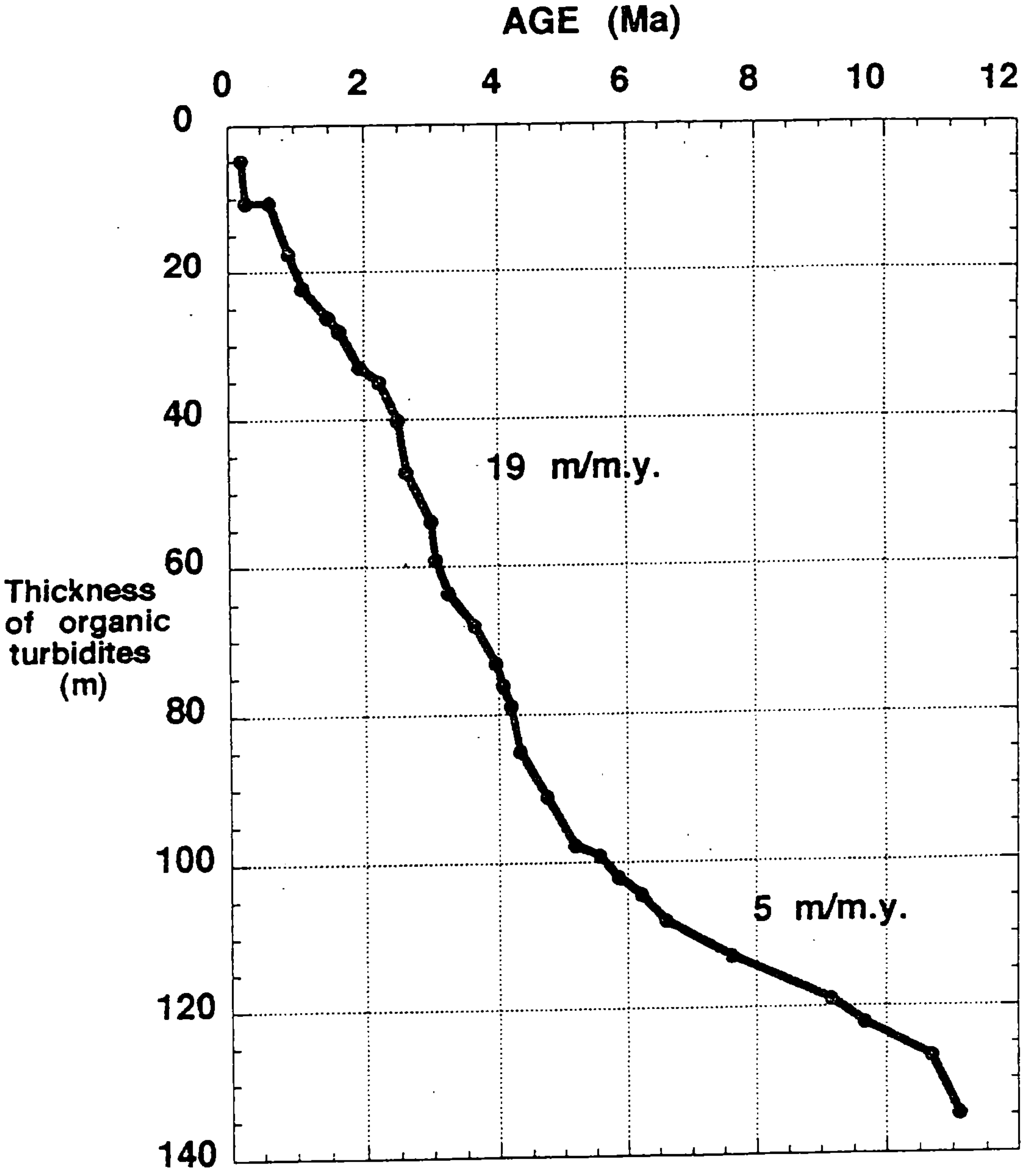



Site 950 Accumulation rates of
Volcanic turbidites
Age (Ma)
0
2
4
6
8
10
12
Thickness of volcanic turbidites (m)
0
10
20
30
40
50
60
70
80
11.5 m/m.y.
6.5 m/m.y.
15 m/m.y.

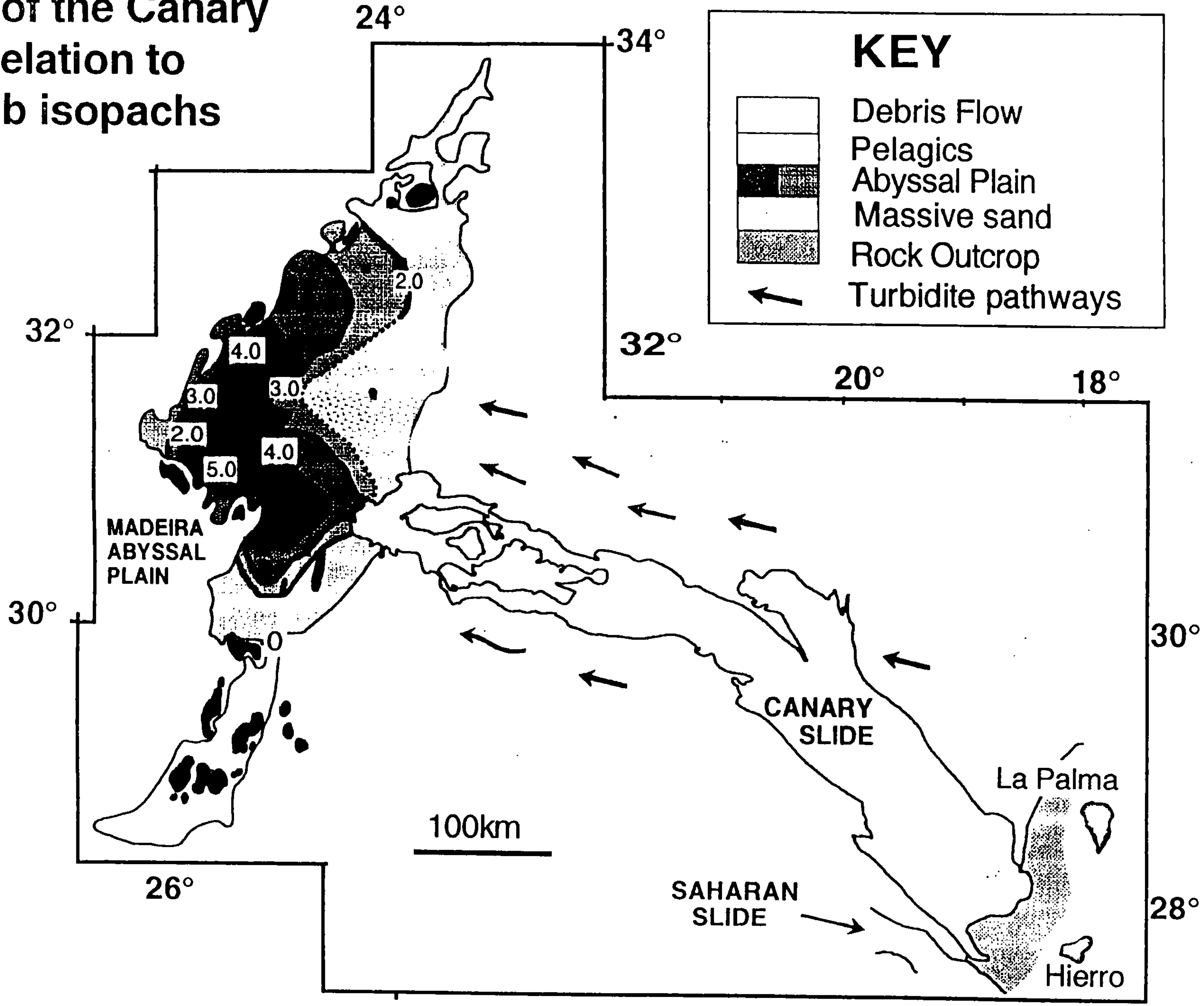
Appendix D1.10

D1.10

Site 950 Accumulation Rate of Organic-rich Turbidites



osition of the Canary
lide in relation to
urbidite b isopachs



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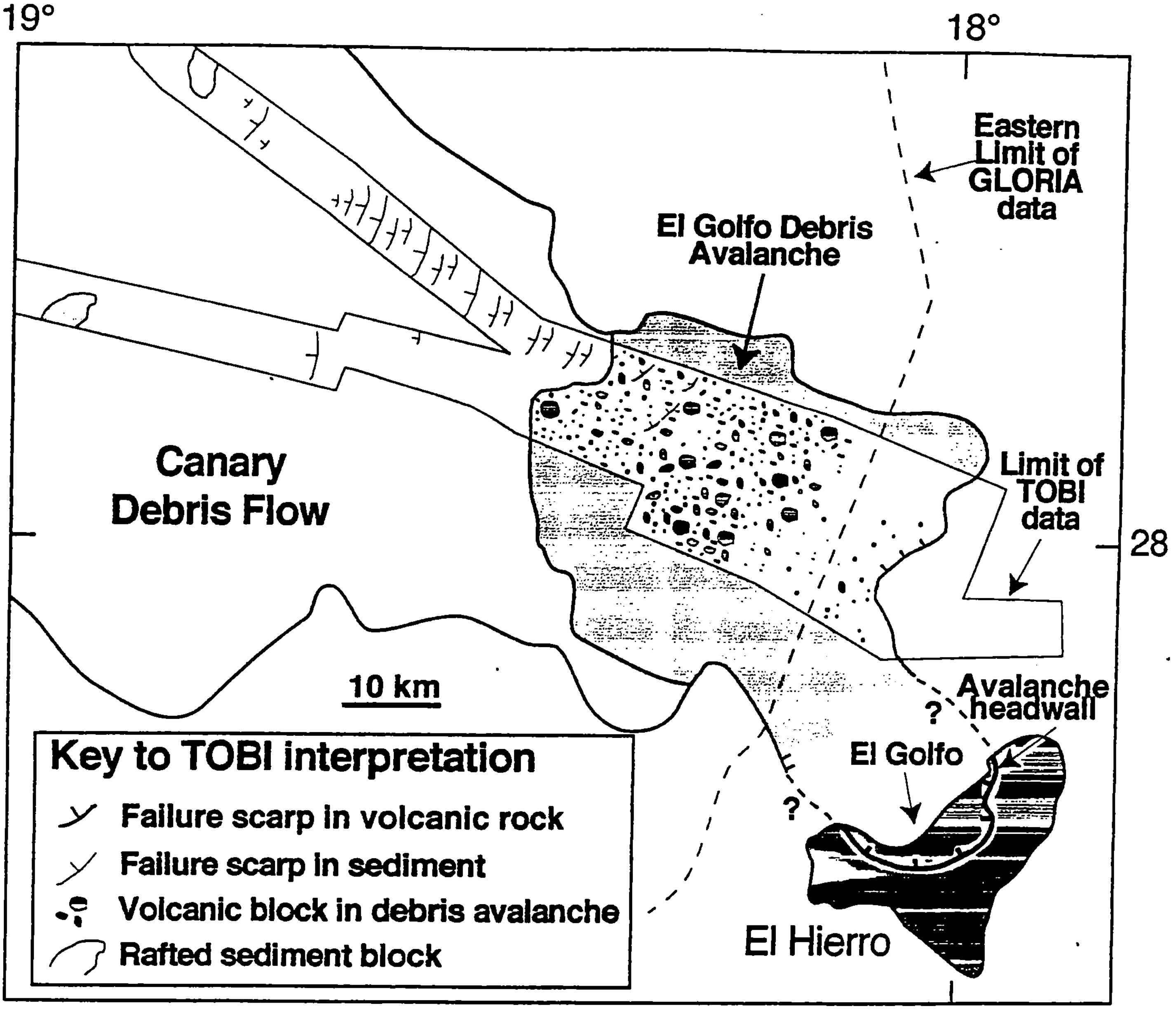
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Eastern Limit of GLORIA data
El Golfo Debris Avalanche
Canary Debris Flow
Limit of TOBI data
10 km
Avalanche headwall
?
El Golfo
?
El Hierro
Key to TOBI interpretation
Failure scarp in volcanic rock
Failure scarp in sediment
Volcanic block in debris avalanche
Rafted sediment block

OBJECTIVES

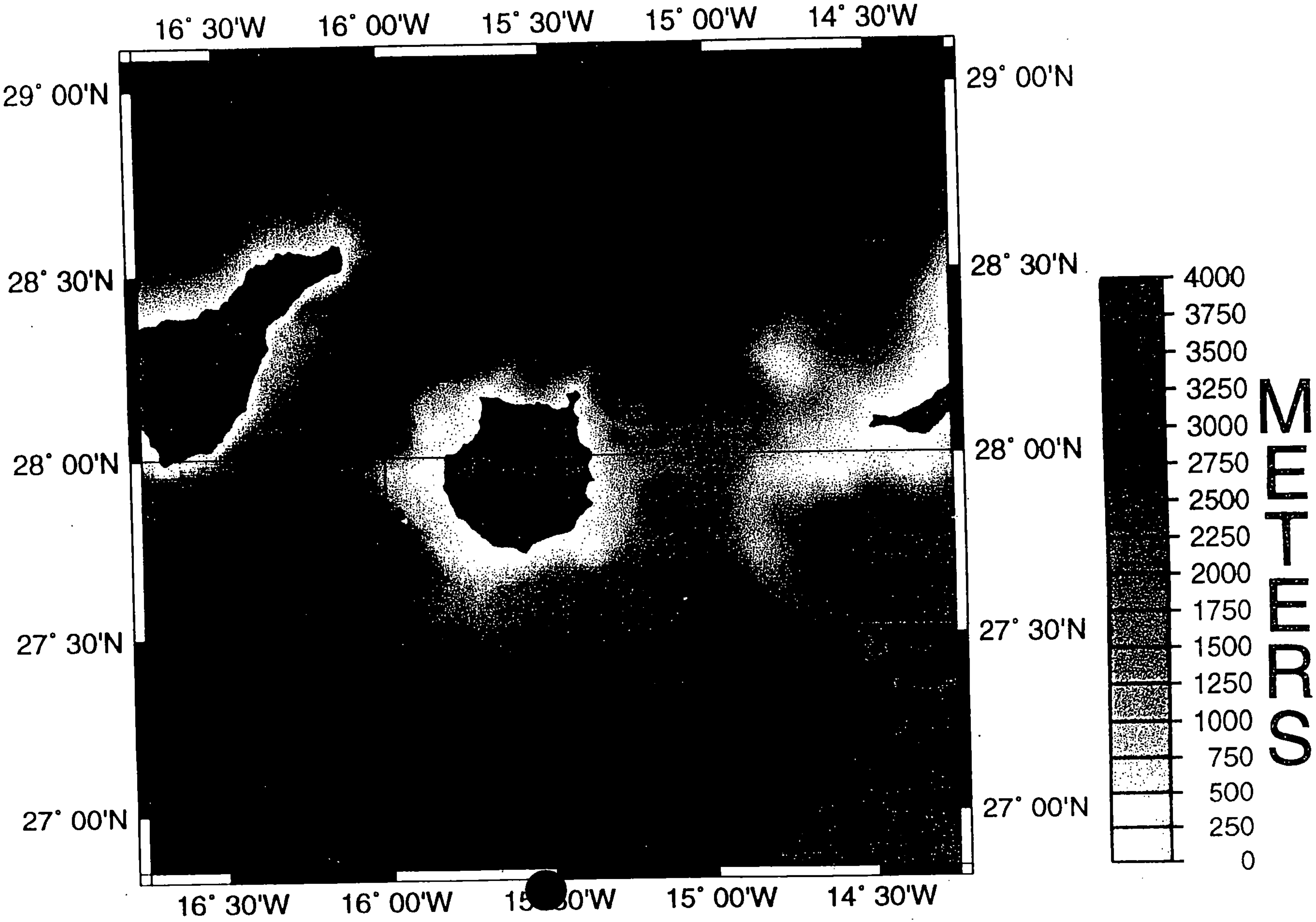
High resolution compositional, temporal uctural and sedimentological evolution of intraplate volcanic island.

2) Correlation of subaerial and submarine volcanic events.

3) Dating the inception of Gran Canaria by drilling the feather-edge of the volcanic apron.

4) Calculation of sediment budgets for the rowth of the volcanic aprons of Gran Canaria and Tenerife.

5) Response of the lithosphere to loading and heating during magmatic activity.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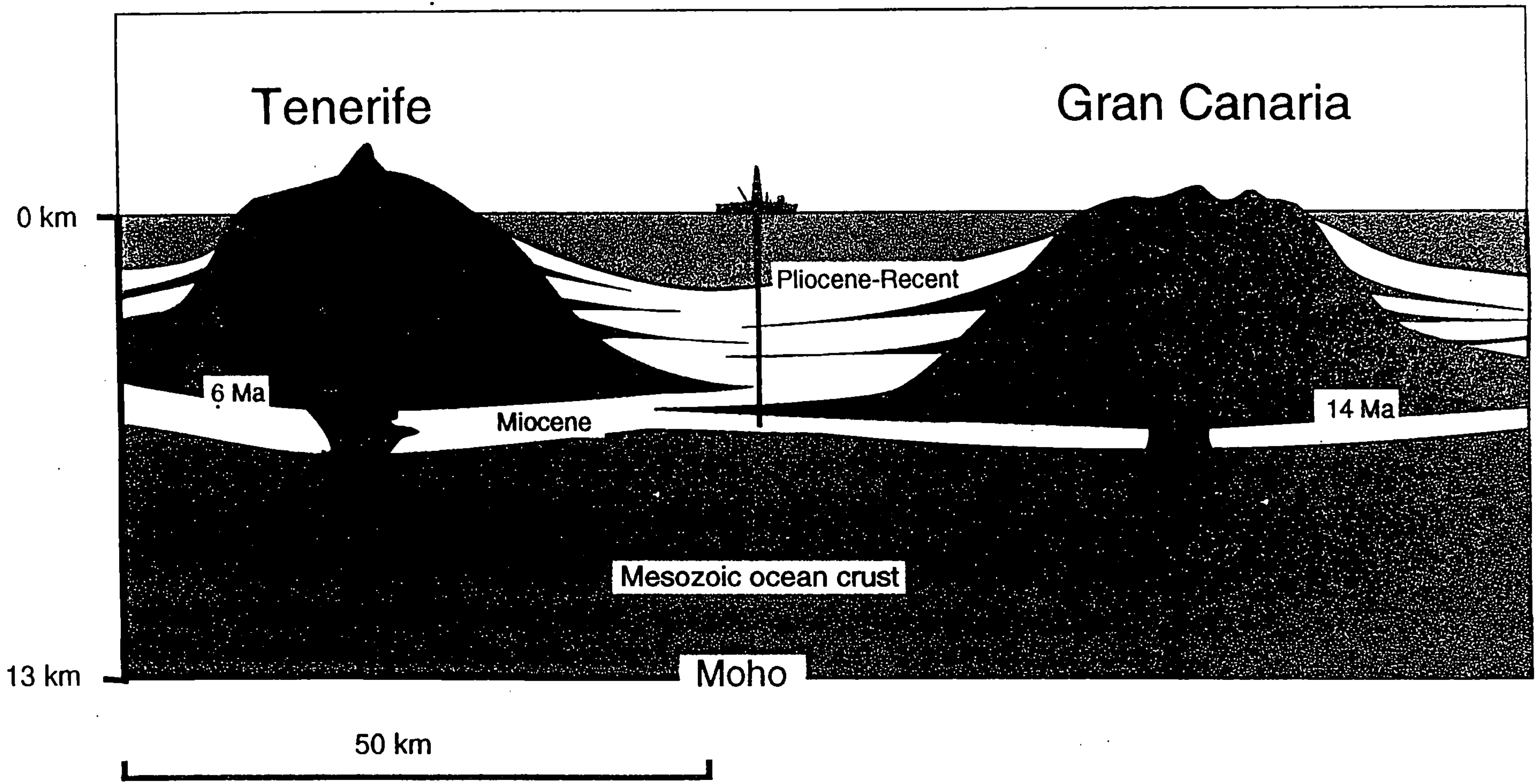
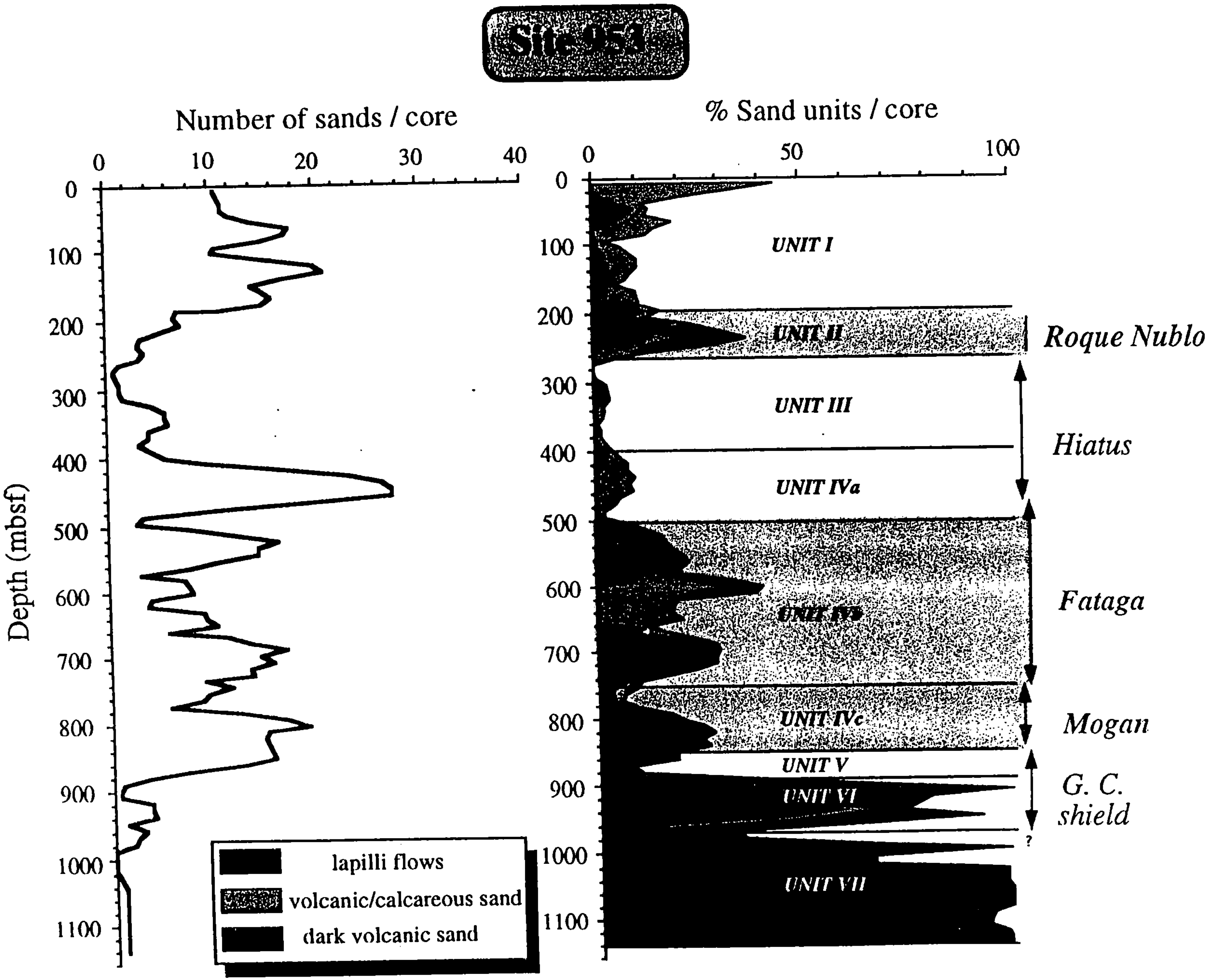
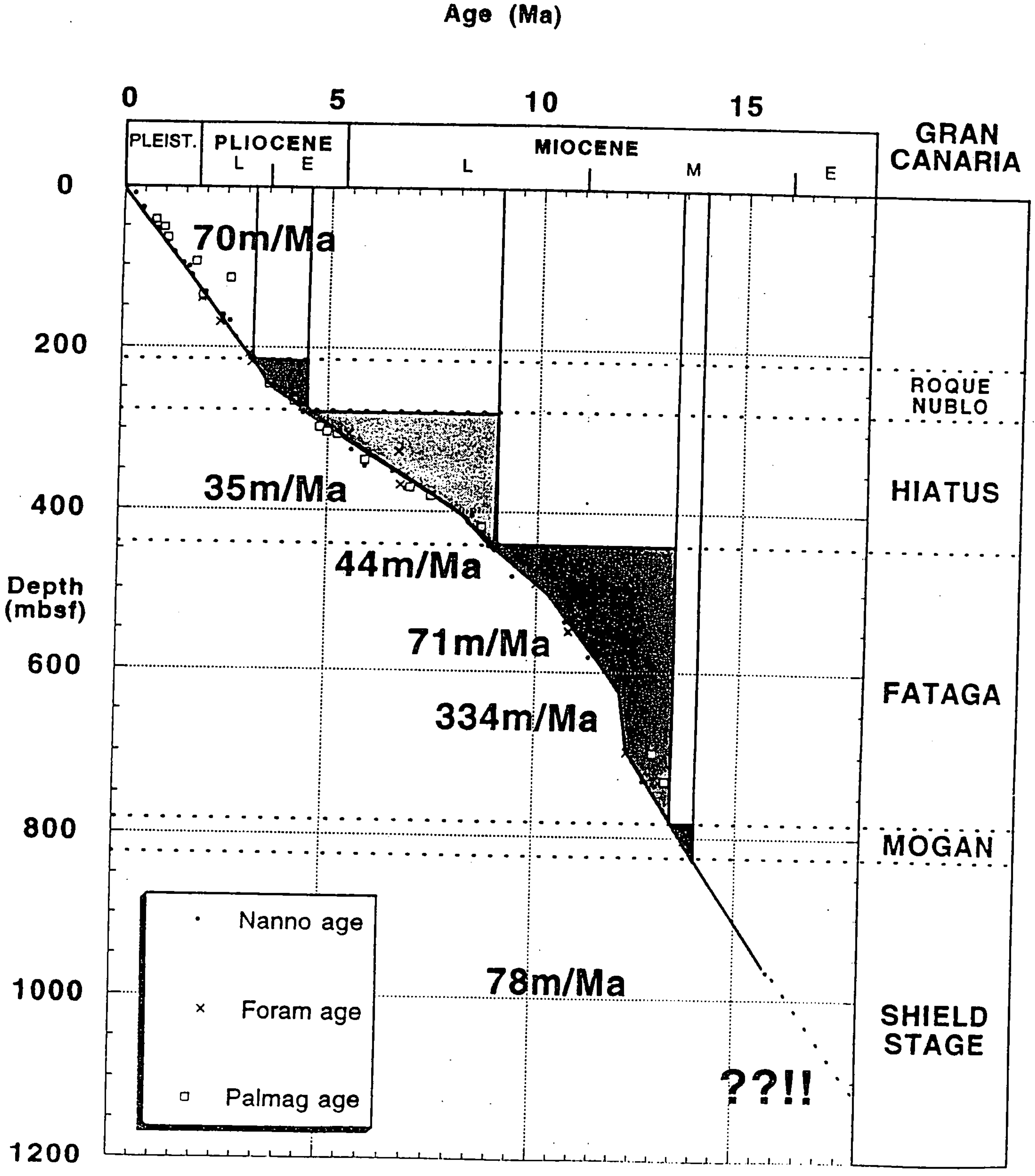
0
METERS


Tenerife
Gran Canaria
0 km
Pliocene-Recent
6 Ma
Miocene
14 Ma
Mesozoic ocean crust
13 km
Moho
50 km


Site 953
Number of sands / core
0
10
20
30
40
Depth (mbsf)
0
100
200
300
400
500
600
700
800
900
1000
1100
% Sand units / core
0
50
100
UNIT I
UNIT II
UNIT III
UNIT IVa
UNIT IVb
UNIT IVc
UNIT V
UNIT VI
UNIT VII
Roque Nublo
Hiatus
Fataga
Mogan
G. C.
shield
?
lapilli flows
volcanic/calcareous sand
dark volcanic sand

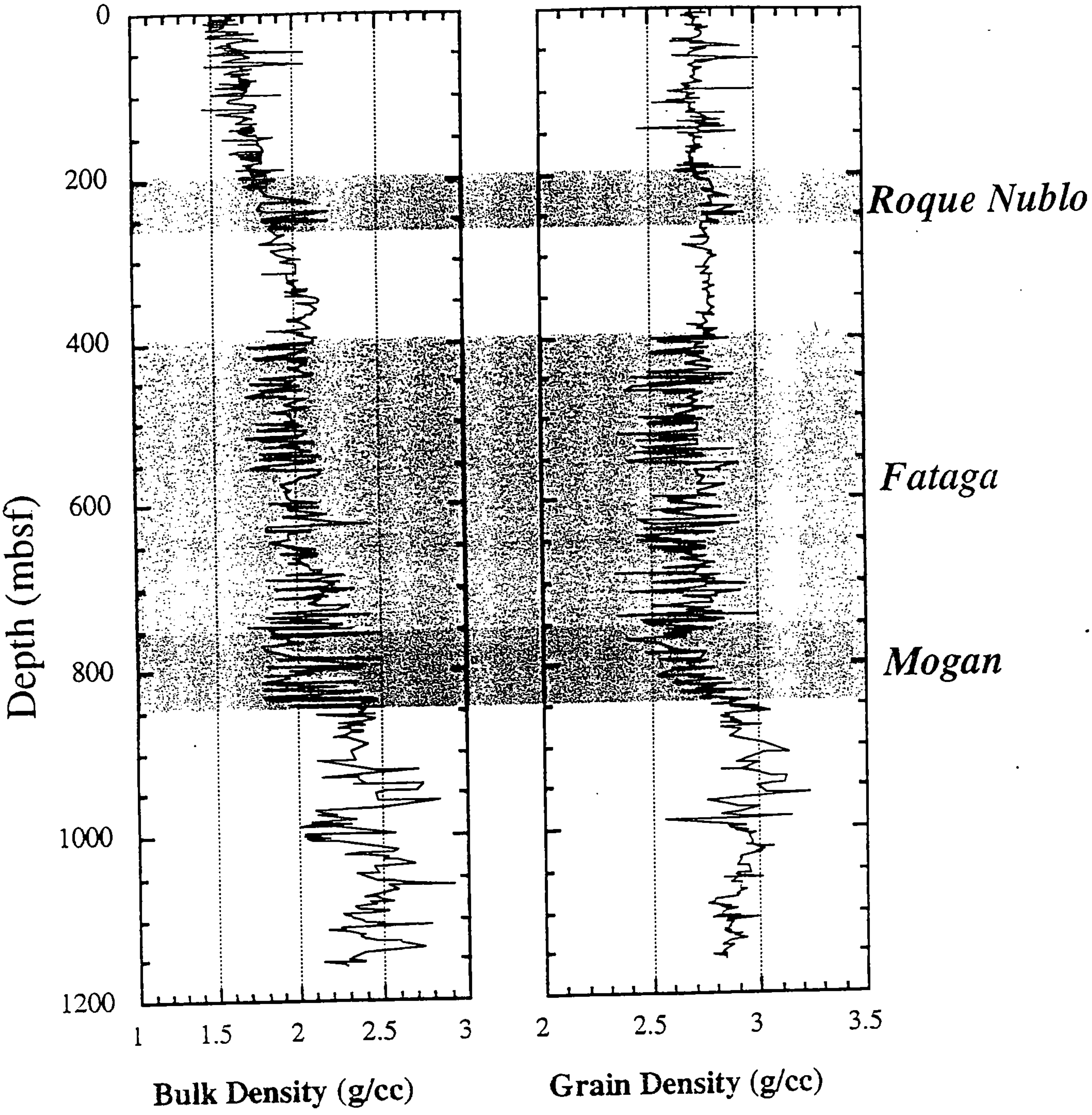
D1.16

953A/B/C PRELIMINARY SED. RATE CURVE



Appendix D1.18

Site 953 Physical Properties



Major Results Leg 157

Excellent correlation of land evolution with submarine volcaniclastic deposits

Temporal correlation suggests synchroneity

Volcaniclastic sediments correlate with periods of major explosive volcanism

Nonvolcanic hiati are characterized by distinct physical properties reflecting thorough fragmentation and mixing

Thick hyaloclastite debris flows characterize the largely submarine shield stage, coarse heterogeneous breccias the emergent early shield stage

Individual ash flows can be correlated over 180 km; their submarine equivalents are deposited synchronously

Glassy lumps in ash turbidites correlative to ignimbrites may reflect passage of hot ash flows into the sea

Pore solutions reflect ash chemistry and proximity to volcanically active areas

D-120

RECOMMENDATIONS

1) Recovery in sandy formations was poor. There is a need to develop the vibrocorer.

2) Develop the capability to switch from XCB to RCB and back without a pipetrip?

FUTURE PLANS

1) Build abyssal plain studies into sealevel proposals where they involve continental margin drilling.

2) VICAP Drill a single deep hole through the shield stage of an oceanic island.

Appendix D2.1

PCOM D: 2. LEG 158 -Jay Miller

RESULTS OF ODP LEG 158 TAG HYDROTHERMAL MOUND

SCIENTIFIC OBJECTIVES

Drill at least three locations on a mature, active hydrothermal mound at the slow-spreading Mid-Atlantic Ridge to address:

- the permeability and temperature structure within the upflow zone beneath an active hydrothermal system
- the nature of the chemical reactions between water and rock in an active hydrothermal system
- the mechanisms of sulfide precipitation and subsequent modification below the seafloor
- structural controls on the plumbing system within both the upflow and reaction zones
- the evolution of major black smoker systems
- the existence, extent and persistence of a subsurface biosphere.

OPERATIONS

WHAT WE PREPARED FOR

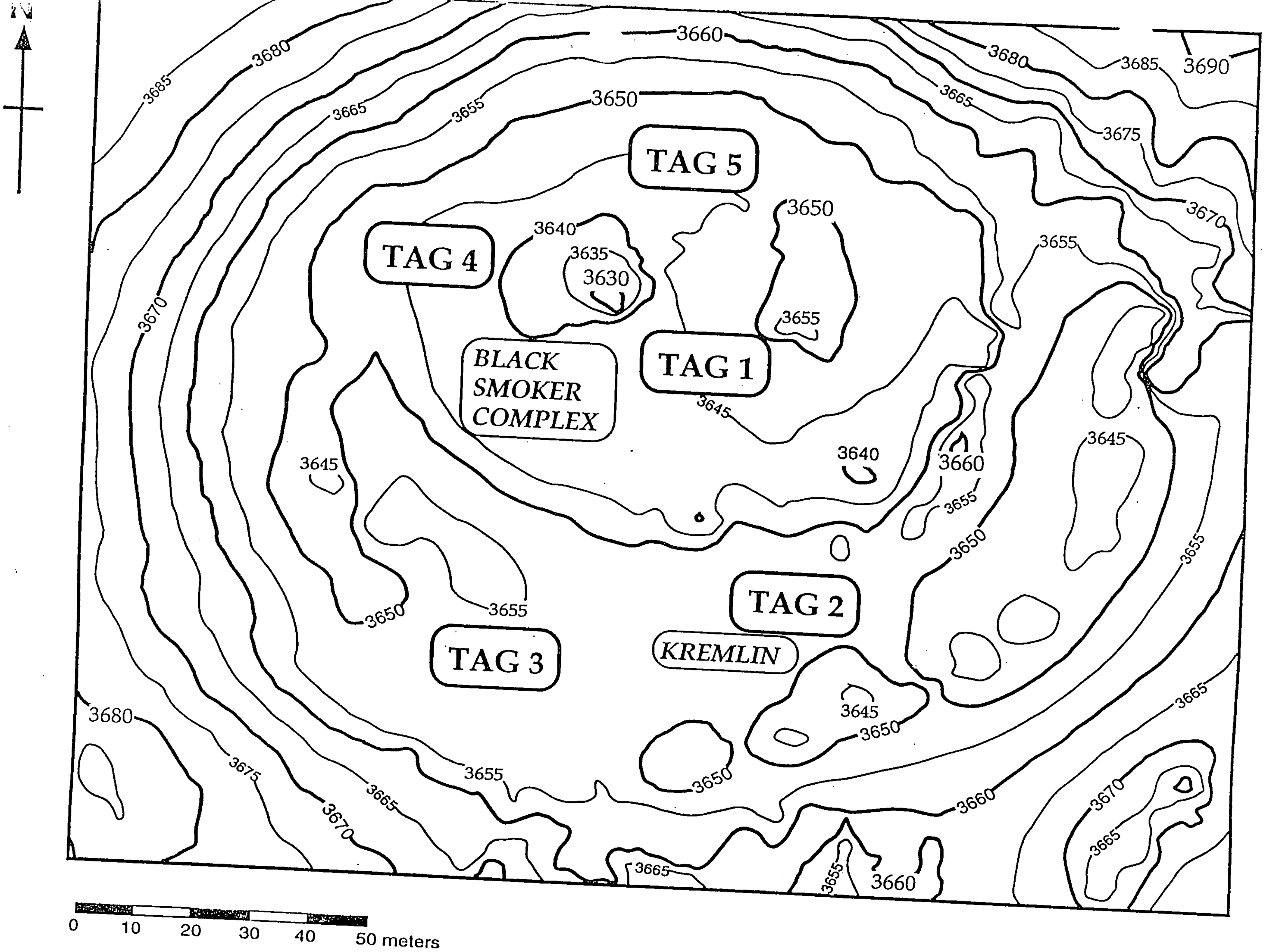
high temperature- exhalent fluids at least 360° C
H_2S
reactive (pH <3) fluids

NONE OF THESE ADVERSELY IMPACTED DRILLING OPERATIONS

WHAT WE DID NOT EXPECT

abundant massive anhydrite
dominantly brecciated sulfides
highly permeable formation

ALL OF THESE CONTRIBUTED TO LIMITING DEPTH OF PENETRATION



Contour Interval = 5 meters

Appendix D2.

D2·4

SCIENTIFIC RESULTS

DRILLED THREE DIFFERENT MAJOR ENVIRONMENTS IN FIVE LOCATIONS ON THE ACTIVE MOUND

TAG 1 (east side of the Black Smoker Complex)

TAG 2 (Kremlin area-white smoker complex)

TAG 3 (south of the Black Smoker Complex)

TAG 4 (west side of the Black Smoker Complex)

TAG 5 (north of the Black Smoker Complex)

OPERATIONS PLAN :

DRILL AS DEEP INTO STOCKWORK AS POSSIBLE AT TAG 2,

THEN DETERMINE NEXT LOCATION

AFTER ENCOUNTERING BASALT AT 20 mbsf

MAIN OPERATIONS AREA BECAME TAG 1

TAG 1 Specific objective:

recover a section of the hydrothermal deposits and underlying stockwork beneath the most active part of the mound

TAG 1 highlights:

- Successful use of the Motor Driven Core Barrel recovery of >60% once parameters optimized

- MDCB coring recovered the critical interval that represented transition from the mound to the underlying stockwork

- Cored 35 m+ thick, anhydrite-rich interval, representing the heart of the main upflow zone

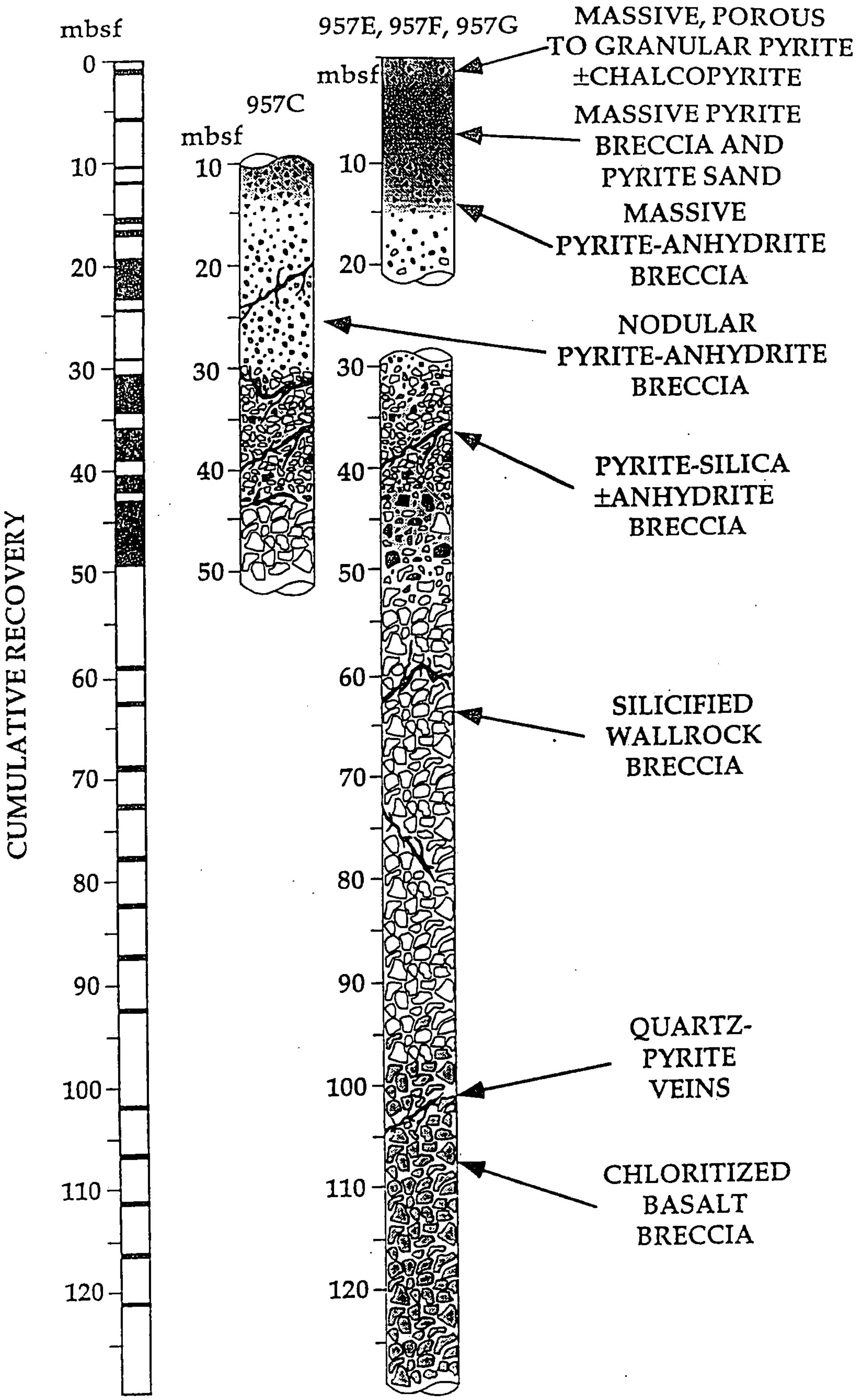
- Recovered pyrite-anhydrite-quartz breccias, which grade downward into intensely silicified basaltic breccia, underlain by less silicified, chloritized basalt breccia

- Established depth to stockwork of about 45 m

Appendix D2.6

D2.6

TAG 1 AREA



TAG 2 Specific objective:

sample a section of the mound where discharging fluids have chemistries distinct from those of the black smokers, and have undergone conductive cooling and mixing within the mound.

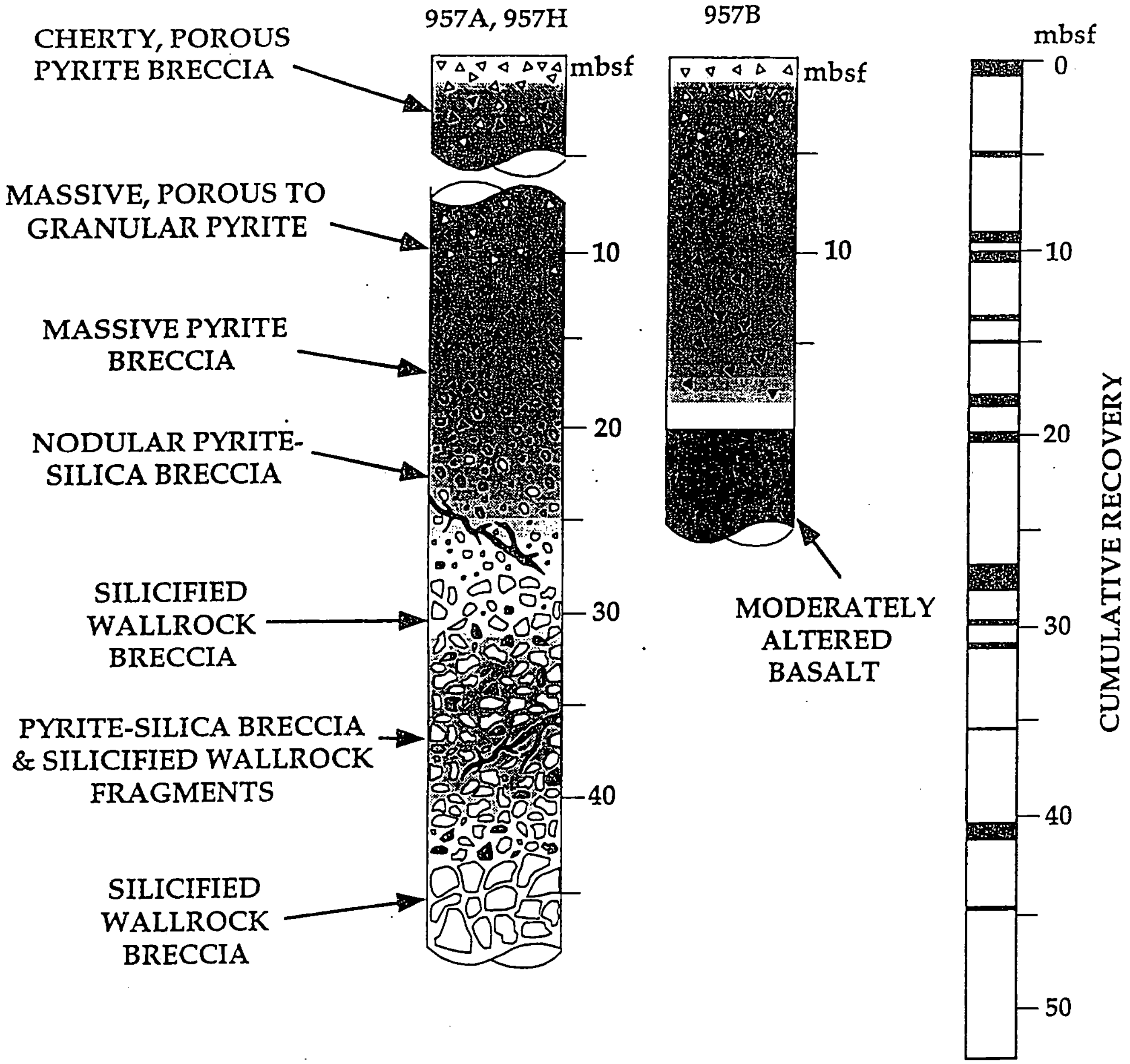
TAG 2 highlights:

- Constrain outer boundary of the stockwork zone
- Constrain outer boundary of the main upflow zone (by anhydrite distribution)
- Chert-rich "hard layer" at depth of 2 to ±5 mbsf
- Recovered compressed section into silicified wallrock breccia

Appendix D2.8

D 2. 8

TAG 2 AREA



ecific objective:

through the sulfides and into the stockwork zone in an area of low
ctive heat flow and to determine the extent of the sulfides and the
vork on the western side of the deposit

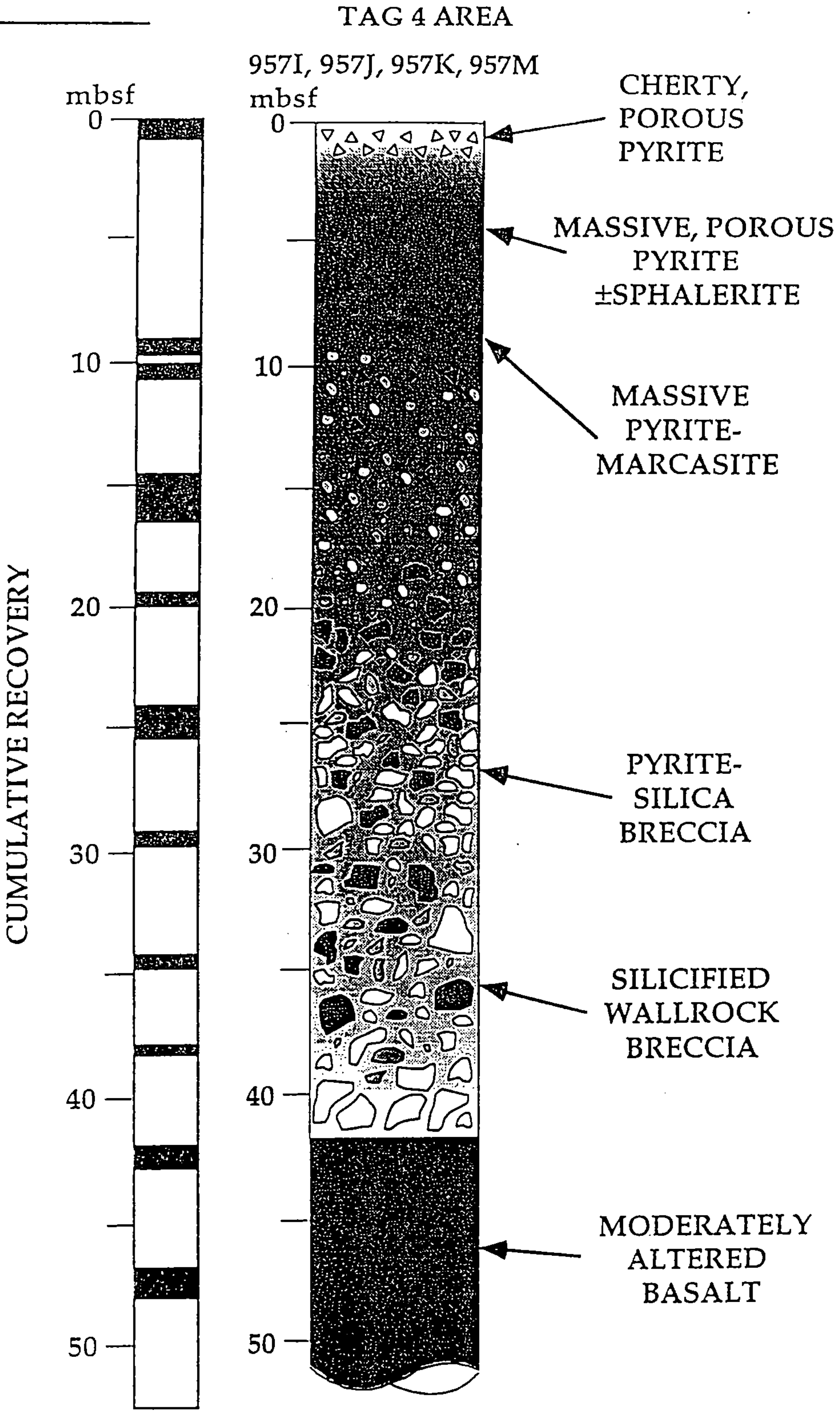
G 4 highlights:

Constrain lateral extent of stockwork

Constrain western boundary of upflow zone

- Predominantly near-source massive to porous pyrite breccia
- Abundant primary precipitates (chalcopyrite-sphalerite) indicating, despite proximity to main upflow zone, these have been isolated since formation.

D2.10

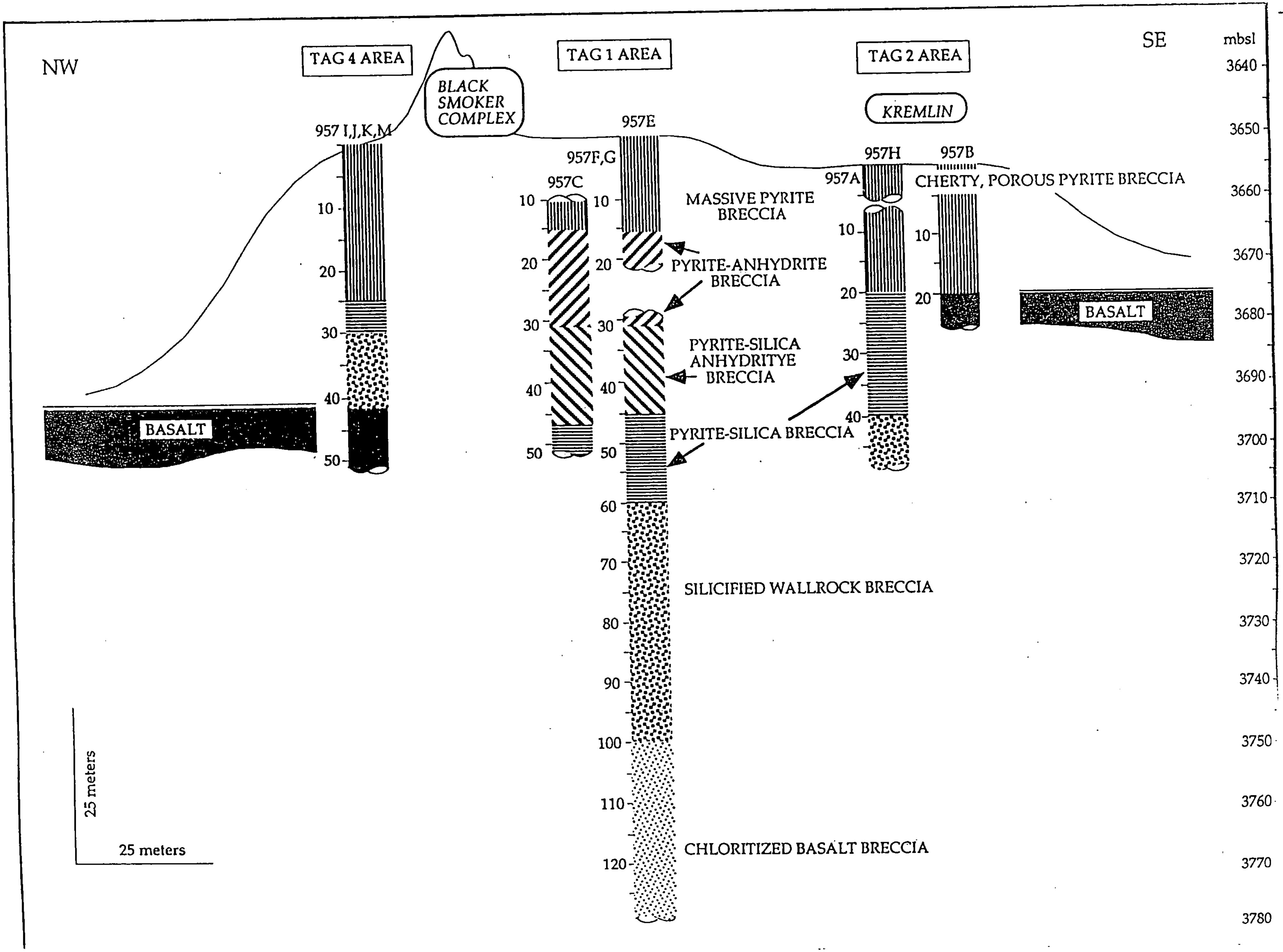

TAG 4 AREA
957I, 957J, 957K, 957M
mbsf
mbsf
0
10
20
30
40
50
0
10
20
30
40
50
CUMULATIVE RECOVERY
CHERTY, POROUS PYRITE
MASSIVE, POROUS PYRITE ±SPHALERITE
MASSIVE PYRITE-MARCASITE
PYRITE-SILICA BRECCIA
SILICIFIED WALLROCK BRECCIA
MODERATELY ALTERED BASALT

TAG 3 and TAG 5 Specific objective:

assess lateral heterogeneity of the mound and underlying stockwork

TAG 3 and TAG 5 highlights:

- Upper section of southern part of mound is Cu-rich
- Abundant Fe-oxides/oxyhydroxides
- Chert-rich hard layer persists well away from main upflow zone
- Stockwork present beneath northern part of mound


NW
TAG 4 AREA
BLACK SMOKER COMPLEX
TAG 1 AREA
TAG 2 AREA
KREMLIN
SE
mbsl
957 I,J,K,M
957E
957F,G
957C
957H
957B
957A
CHERTY, POROUS PYRITE BRECCIA
MASSIVE PYRITE BRECCIA
PYRITE-ANHYDRITE BRECCIA
PYRITE-SILICA ANHYDRITYE BRECCIA
PYRITE-SILICA BRECCIA
SILICIFIED WALLROCK BRECCIA
CHLORITIZED BASALT BRECCIA
BASALT
BASALT
BASALT
10
20
30
40
50
60
70
80
90
100
110
120
3640
3650
3660
3670
3680
3690
3700
3710
3720
3730
3740
3750
3760
3770
3780
25 meters
25 meters

D2.

PRELIMINARY INTERPRETATIONS

Chert-rich upper layer is likely analogous to the silica caps overlying many volcanogenic massive sulfides deposits on land.

The abundance of anhydrite within the mound indicates that either ambient fluid temperatures are above the solubility limit of anhydrite, or the anhydrite is isolated from continued exposure to circulating fluids of less than 150°C.

2.7 million tonnes of massive sulfides exist above the seafloor and approximately 1.2 million tonnes of sulfides comprise the subseafloor stockwork zone. This amounts to a total of about 4 millon tonnes, similar in volume to ophiolite-hosted massive sulfide deposits worldwide.

Metals are being concentrated in the of the mound by leaching from brecciated deposits deep in the mound, and precipitation near-surface ("zone refining").

Massive cupriferous sulfides in Cyprus are characterized by the occurrence of "conglomerate ore" which has been interpreted to be a product of seafloor weathering and alteration. The presence of abundant anhydrite in the subsurface of the TAG mound indicates that the conglomerate ore could have been deposited as a pyrite-anhydrite breccia and now represents the clasts of this material remaining after the dissolution of the anhydrite cement.

Appendix D2.14

OVERALL HIGHLIGHTS

- Pyrite breccias dominate the lithology
- Different types distinguished on the basis of the relative abundances of pyrite, anhydrite, and silica
- These types reflect different degrees of brecciation, cementation, hydrothermal reworking, and replacement of pre-existing sulfides.
- Four major zones can be distinguished, all with gradational boundaries
    - ∞ massive pyrite and pyrite breccia with chert-rich cap
    - ∞ anhydrite-rich unit constraining main upflow zone to the TAG 1 area (possibility exists that anhydrite was preferentially not recovered)
    - ∞ quartz-pyrite mineralization and quartz veining increases with depth and represents the top of a quartz-sulfide stockwork zone marked by pyrite-silica breccia overlying silicified wallrock breccia
    - ∞ quartz-chlorite stockwork zone was sampled at depths greater than 100 mbsf

PCOM: DEC1/1994 — JOHN KNAUSS.

Appendix E1.1

Ocean Drilling Program Performance Evaluation Committee - IV (PEC-IV)

List of Committee Members

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Appendix F2.1

F2.1

Pcom

E.2 MAD

Nansen
Arctic
Drilling

LS

Program Objectives

ary Objective:	Application:
plete paleoenvironmental ord	*Prediction of climates/ faunal adaption*
eoceanography	*Past and future climate*
ructure of major Arctic atures and margins	*Hydrocarbon potential*
ature and age of Arctic Ocean asement	*Paleogeography*
Former productivity levels	*Biosphere/climate interaction, hydrocarbon potential*
Former extent and composition of sea ice	*Atmosphere/ice feedbacks*
Paleo-wind flux	*Atmosphere feedback*

ioritized Objectives

e primary goals of NAD are to understand:

) the climatic and paleoceanographic evolution of the Arctic region and its effects on global climate, the biosphere and the dynamics of the world ocean and atmosphere;

B) the nature and evolution of the major structural features of the Arctic Ocean Basin and circum-Arctic continental margins.

Final Product

NAD will make a major contribution to global physical models that will now have realistic inputs from the Arctic for predicting ocean-atmosphere-cryosphere systems. It will be possible, for the first time, to develop models of the structural fabric and geologic evolution of the northern latitude regions.

F2.3

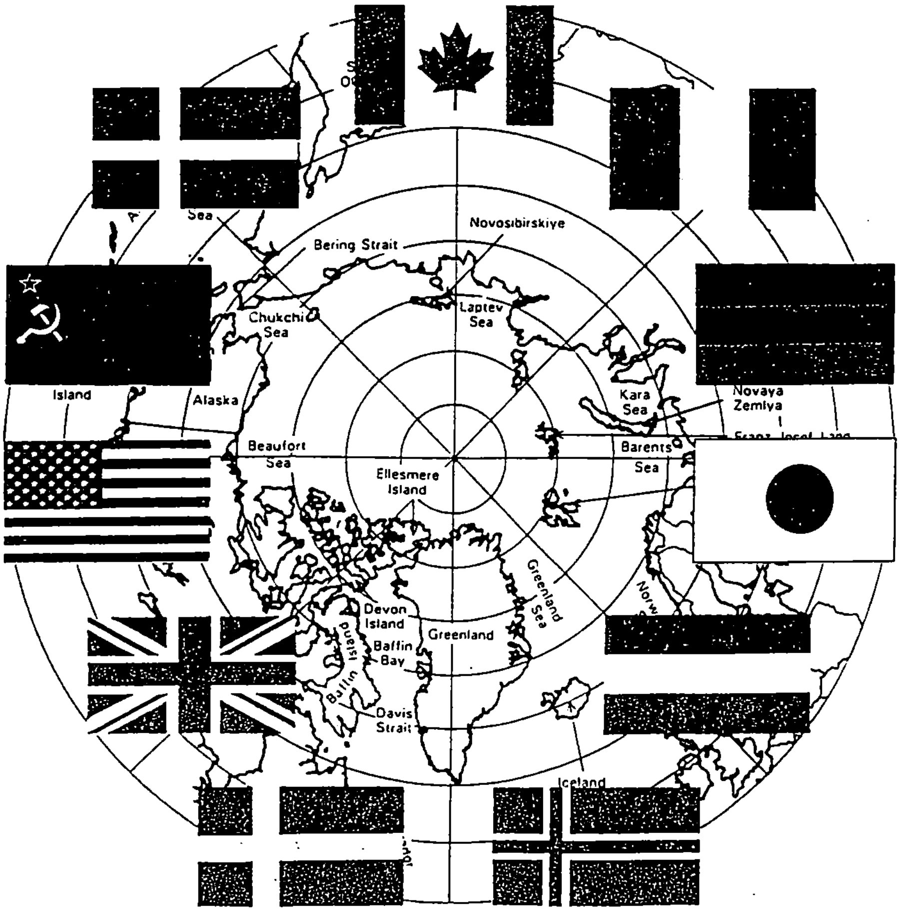
ORGANIZATION

NAD will be led by an Executive Committee, composed of senior scientists from institutions actively involved in the Arctic. Working with the Executive Committee will be a Science Committee of senior level scientists and a Technical Committee of scientific engineers with Arctic expertise. These committees were inaugurated during the summer of 1989 and NAD now includes representatives from Canada, France, Germany, Japan, The Netherlands, Norway, Sweden, U.K., U.S.A., and the U.S.S.R. Denmark has participated as an observer.

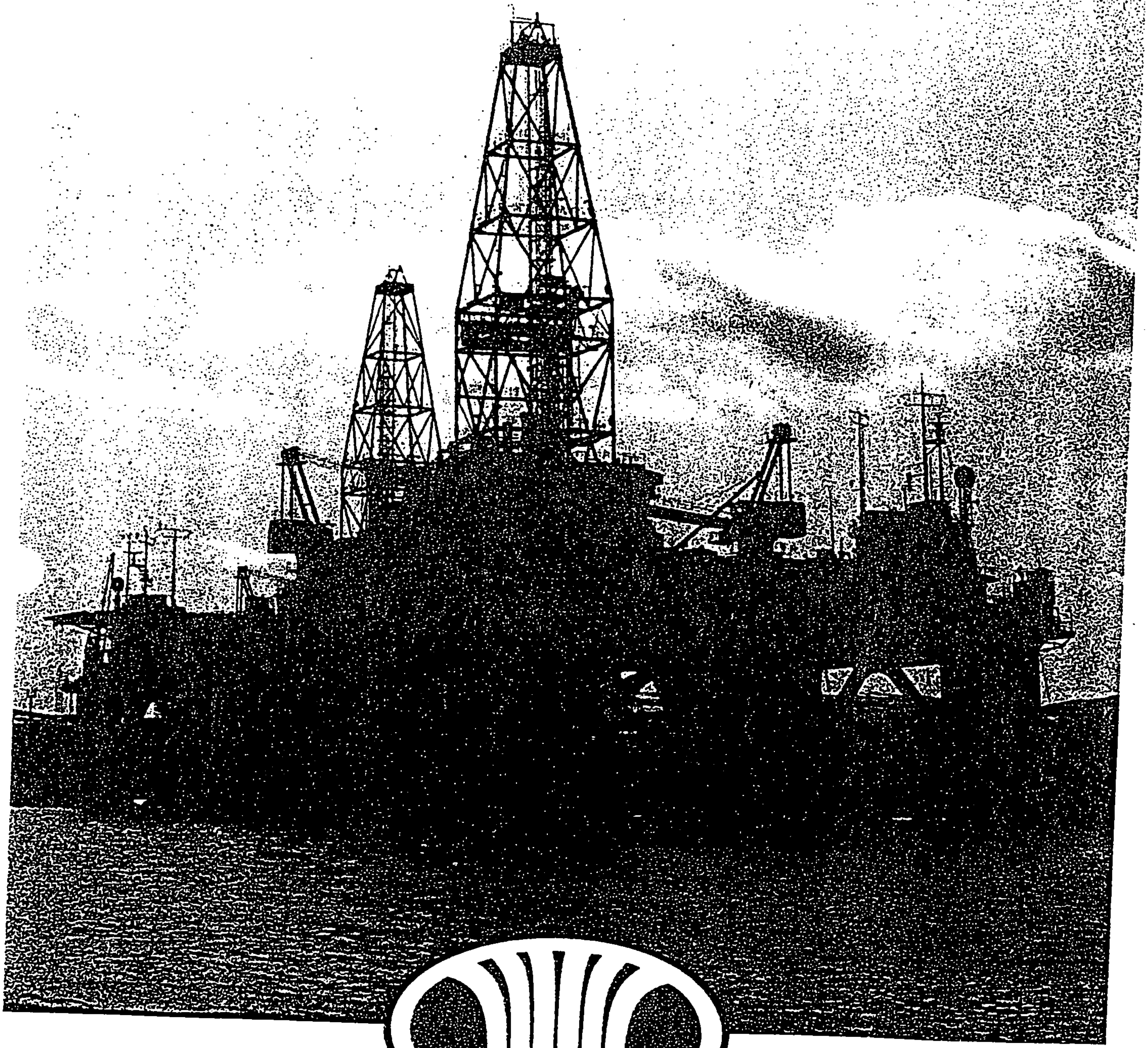
Linkages to other programs:

- Close liaison will be maintained with the Ocean Drilling Program.
- A joint U.S. Geological Survey and Canadian Geological Survey program has been proposed to examine the terrestrial record in the suspected Neogene basins of Yukon Flats Alaska and Old Crow Basin, N.W.T. These data would be linked to the marine record by drill sites on the continental margin and adjacent oceanic basin. The latter would be coordinated with NAD.
- Important paleoclimatic data are emerging from the work of U.S.S.R. scientists on the Eurasian shelf and Arctic islands. Data from these programs and NAD will be complementary.
- The European Science Foundation Polar Network programs will produce paleoenvironmental data from the Greenland Ice Sheet and the northern Norwegian-Greenland Sea continental margins.

The Nansen Arctic Drilling Program includes representatives from Canada, France, Germany, Japan, The Netherlands, Norway, Sweden, United Kingdom, United States of America, and the Union of Soviet Socialist Republics. Denmark has participated as an observer. (map courtesy of NASA)



Appendix F2.4



ARKTIKMOR NEFTEGAZ RAZVEDKA

Russia's state company for the prospecting, exploring and development of oil and gas fields on the shelf.

Appendix F2.5

F2.5

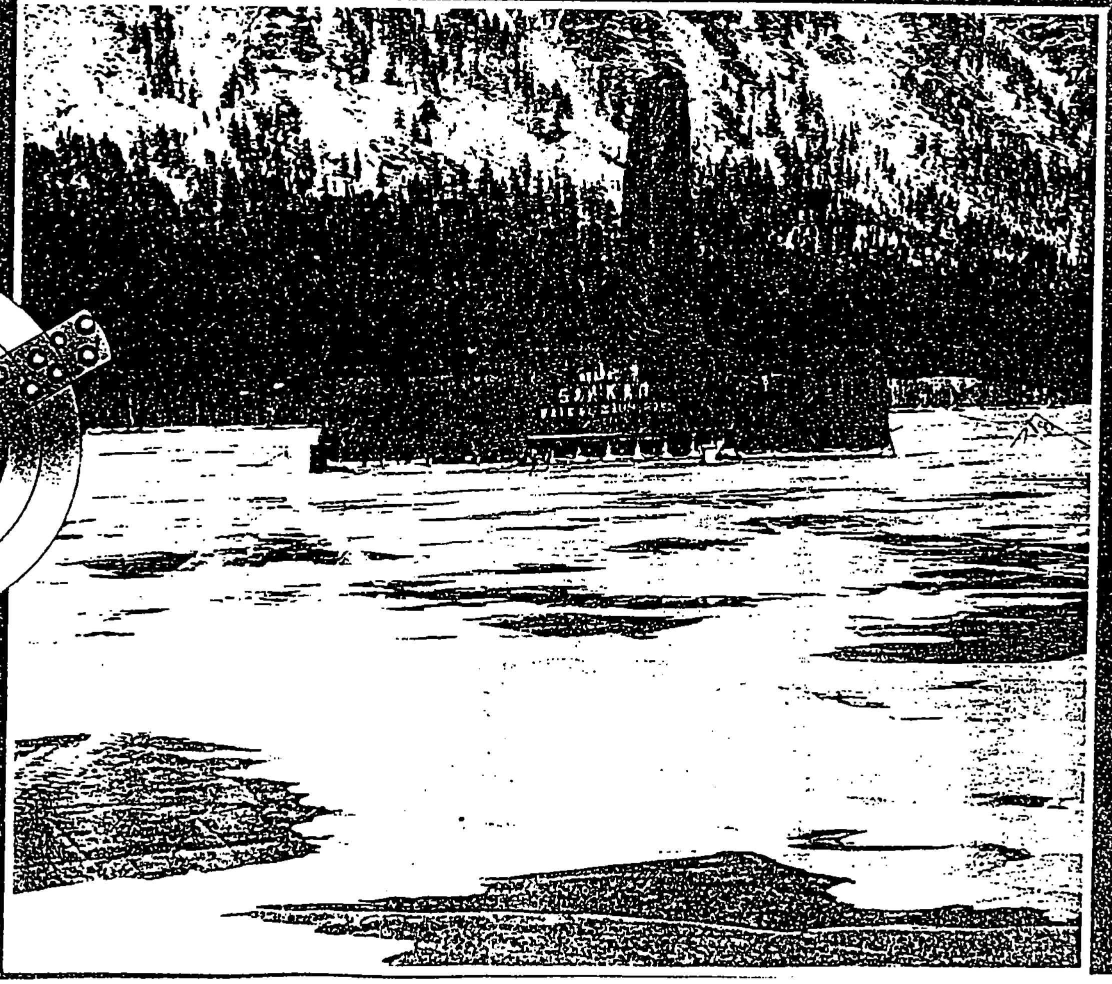
FLOOR SEDIMENTS DRILLING BY GNP NEDRA.

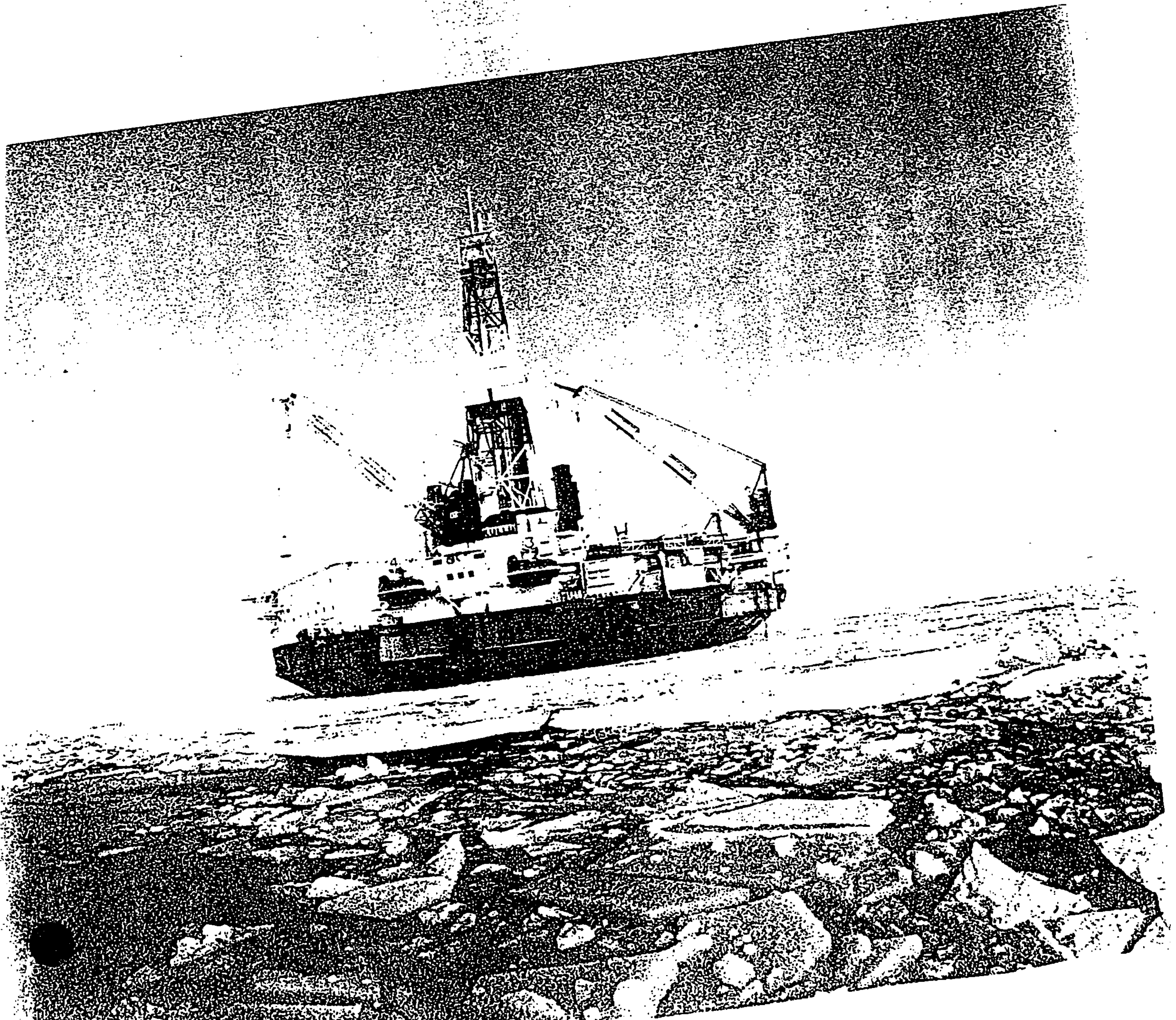
To solve many scientific and practical problems, it is necessary to drill deep water holes for recovery of continuous high quality core from floor sediments of intracontinental lakes and shelves of seas and oceans.

Difficulty of realisation of these tasks is in the fact that drilling of structural deep water wells from vessels in lakes and shelves with application of on-shore and off-shore technologies is, as a rule, cost-ineffective.

Offered is the "Baikal" drilling module and a cost effective technology for drilling deep water wells in the frozen ice of lakes and marine shelves in winter.

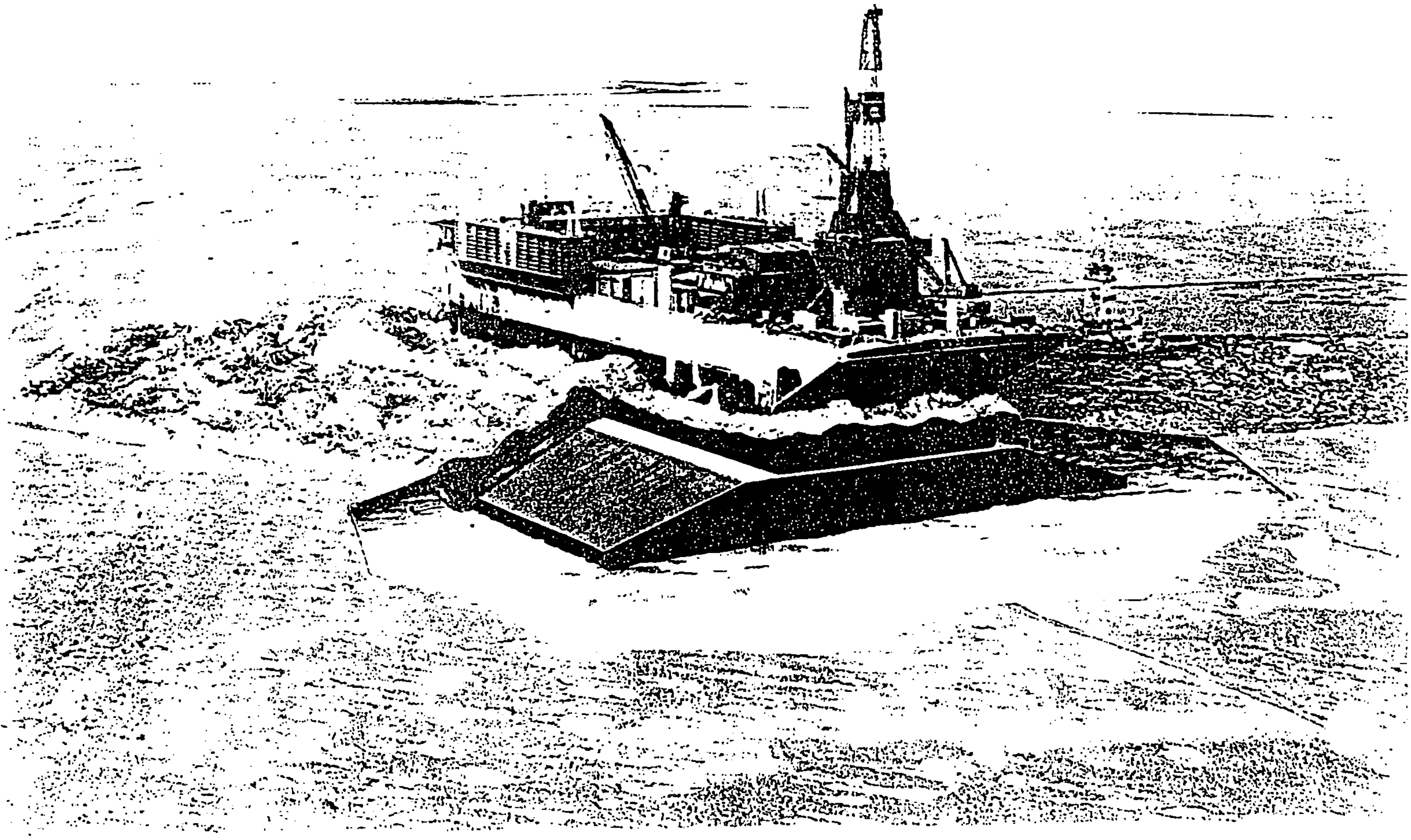
In 1993 the new technology allowed successfull drilling of a number of deep water wells in the Baikal lake which continuously provided core material with an intact texture in sealed plastic coatings. While working on the International program Investigations of Global Change of the Environment in Central Asia, based on scientific drilling in the Baikal lake and Baikal-type depressions.





Appendix F2.7

F2·7



NAD LIAISON REPORT

B.Lewis, ODP Liaison to NAD

A meeting of the Nansen Arctic Drilling Program (NAD) was held on Nov. 25,26 in St. Petersburg, Russia. NAD goals are primarily related to the role of the Arctic in Climate Change and are defined in several of their publications. At this meeting the following NAD issues were of importance to ODP:

- **1.** In the near term (several years) NAD focus will be in two areas;

  a) The Laptev Sea, a zone of continental shelf off the Russian Arctic coast adjacent to the Gakkel Ridge. A drilling program is being proposed here which could use conventional methods to drill. NAD wishes to use the JOIDES site survey and safety panels to review and comment on their sites, which are in water depths less than 100 m. The possibility is also being considered of drill sites on the Laptev Sea slope (intersection of the Gakkel Ridge and the continental margin) with site surveys by Russian colleagues pending

  b) NAAG II (ODP leg 162), the second leg of the gateways program.

- **2.** In the longer term NAD has two objectives which relate to ODP.

  a) They wish to drill sites in the Bering (and Chukchi) Sea that relate to the Arctic and I encouraged them to submit a NAD proposal for these objectives.

  b) They wish to drill sites in the central Arctic basin that will require ice breaking ships and ice capable drilling platforms. NAD urges ODP to incorporate the use of these facilities (and associated budget) in it's revision of the long range plan.

- **3.** In my presentation to NAD I pointed out that the Former Soviet Union had been a member of ODP and that ODP looked forward to a time when Russian scientists could again participate in the program. This elicited comments from Russian lab directors that Russian scientists are indeed very interested in participating in the program but do not have the annual membership fee. It was suggested that an interim solution, such as one involving partial payment and or payment in kind, be considered which will

F2.9

eventually lead to full membership. Such an arrangement is also of great interest to NAD and the US Arctic Research Commission.

I recommend to PCOM that they ask EXCOM to consider at their January 1995 meeting options for a special partnership arrangement with Russia that will eventually lead to full renewal of their membership in ODP.

InterRidge

Steering Committee met in Tokyo, September

- SW Indian Ridge → global studies
- Digital bathymetric atlas of mid-ocean Ridges

Workshop "4D architecrure of the oceanic lithosphere" Boston, September

Develop experiments to characterize the crustal structure at a fast and and slow spreading ridge

Integrate drilling to groundtruth geophysical models

F4.2

- Slow spreading Ridge : M.A.R.

major experiment including on axis and
off-axis studies at a segment scale
drilling → pogo holes to constrain magmatic evolution
one deep hole off axis for crustal structure
offset drilling in serpentine belts
MARK, 29°N, 35°N, TAG

- Fast spreading Ridge EPR

Correlate geophysical crustal structure
with geology drilling

Hess Deep

- Endorsement of the 735B drilling and
logging experiment

InterRidge Working Group to
lead the preparation of LOI and
proposals

Workshop on Arctic Ridges NOVEMBER

Workshop "Active processes at M.O.R."

january, Paris

drilling and monitoring hydrothermal fields

TAG

Sedimented Ridges

InterRidge has responded to PCOM very positively for the LRP

letter from Roger Searle, chairman

Drilling relevant to

- mesoscale studies
  - 4D architecture
  - fluxes
  - crustal accretion in back arc basins
- Active processes

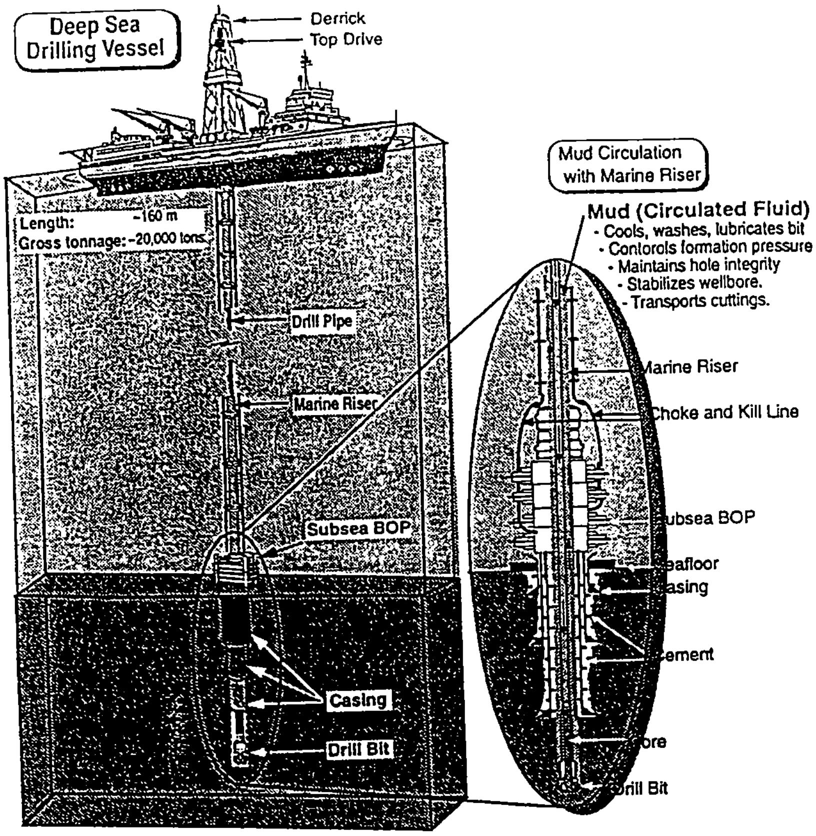


Fig. X. Picture of Japanese riser drilling vessel with full blow-out prevention at the sea floor.

The science objectives on continental margins and sediment filled deep sea basins will require development of a riser system with full (ie.10,000psi) blow-out preventer (BOP) at the sea-floor, with an ultimate target of being deployed in 4km of water with a total drill string length of 10km.

The principal purpose of the riser is to enable circulation of drilling mud.

Drilling mud provides a mechanism for removing cuttings, it provides hole stability, it improves core recovery and it helps control of the well in situations where buoyant gas and/or oil may be encountered. This expands scientific opportunities to drill and to achieve deep penetration with good core recovery.

A BOP is required for reasons of safety and pollution prevention.

DRAFT, FOR LRP 11/18/94

ODP - UNDERSTANDING EARTH DYNAMICS

1. Introduction:

1.1 The Role of Scientific Ocean Drilling. In the last century, humanity has become a major cause of global change, whose impact is comparable to past changes driven by mountain building and volcanism, solar cycles and climatic fluctuations. We are changing our planet in ways and at rates we can not yet predict. In this setting, it is ever more important to increase our understanding of Earth dynamics in all its manifestations. We need this understanding to secure economic resources, to assess hazards from natural catastrophes, and to create the scientific basis for sustainable Earth management.

These needs call for many different approaches to the study of Earth. Ocean drilling ranks highly among these: 70% of the Earth's surface is ocean, and seafloor sediments contain the only comprehensive record of the history of environments and life on the planet. The large-scale motions of continents and ocean floor that are responsible for the major patterns of earthquakes and volcanism have first been elucidated by seafloor studies; further insights can only come from continuing and intensifying such studies, with deep drilling as an essential ingredient.

Sampling the sediments and solid earth beneath the oceans is essential if we are to understand the processes driving natural variations of the ocean and the climate, and dynamics of the solid earth. Much has been achieved over the last 25 years, and much remains to be done. In the international and science communities there now exist many programs whose missions are to study specific components of climate and earth dynamics. Examples are: MESH, IMAGES, InterRidge, ION, NAD, MARGINS. To many of these programs drilling is an important component, and close relationships between ODP and these programs is essential. As a point where all these programs meet, ODP acts as an interdisciplinary coordinator, facilitating productive exchanges between different scientific communities with differnent, but compatible goals. These critical needs and programatic opportunities dictate the following vision and mission for ODP:

the convection in the Earth's mantle and core. On the East Greenland Margin drilling is one component of a large international program to study the effects of a mantle plume on the development of a continental margin and the implications for mineral resources. Many similar examples can be cited from other programs.

As a point where all these programs meet, ODP acts as an interdisciplinary coordinator, facilitating productive exchanges between different scientific communities with diffenent, but compatible goals. These critical needs and programatic opportunities dictate the following vision and mission for ODP:

VISION: In the next 15 years, the ODP (ODP) will advance understanding of Earth Dynamics, focusing on processes that control climate change, natural resources, and geologic hazards. This ~~information~~ knowledge will improve the scientific basis for policies of sustainable earth management.

MISSION: To achieve this vision, ODP will: 1) provide facilities for scientific drilling to probe the sediments, rocks, and fluids below the sea floor that contain key evidence for earth's history and processes, 2) maintain cooperative efforts with global Geosciences programs that use ODP facilities, 3) provide for a scientific advisory structure to interact with scientists and international Geoscience programs, to guide planning, and to select experiments that use ODP facilities, 4) maintain and distribute materials and data for study by scientists throughout the world, and 5) disseminate scientific information to scientists, government agencies, industry, and the public.

Extraordinary pgm —
— superstructure - run by scientists [illegible] from bottom up
- w/ people donating time & effort (volunteers) to see it works well.
— minimal gov involvement —
+.

SUMMARY OF NATIONAL PRIORITIES

Country	Document	Scientific Priority
US	COMPOST	• Climate Change • Margin evolution and processes • Ridges • Lithosphere • Geochemistry and Fluids • Ocean seismic network
Can/Aus	p/c Collins 1994	• Resources • Paleoceanography • Hazards
UK	OD21 WORKSHOP	• Paleoenvironment • Resources • Natural Hazards
Germany	Position paper presented at Davos workshop	• Resources • Hazards • Pollution
Japan	OD21 WORKSHOP	• Dynamics of the Earth's Interior • Earth History • Earthquake Hazards
ESF	Correspondence from H-C Larsen	• Climate change • Margin dynamics • Ocean crust
France	OD21 WORKSHOP	• Global environment change • Ridge processes • Role of fluids in the lithosphere

SUMMARY OF LIAISON GROUP PRIORITIES

Liaison Group	Scientific Objectives	Present Day Technical Constraints	Likelihood of Success	Future Societ Relevan
ANTOSTRAT	• Antarctic Cenozoic glacial history	• ice • core recovery in till	moderate	high
MARGINS	• Fundamental processes in the formation of all continental margins incl.: faulting, strain in the lithosphere, magma generation and emplacement, climate, and fluids	• BOP • deep Drilling	moderate	moderate - high
MESH	• To understand long-term natural variation in global environments that are recorded in the ocean's geological record	• continuous core/log information	high	high
LIPs	• Processes related to LIPs genesis • Emplacement mechanisms • Post emplacement evolution • Impact on hydro, bio, and atmosphere	• deep drilling	low	low
ION	• Establish a network of ocean bottom seismic observatories for hazard prediction and whole earth structure	• downhole instruments	high	high
InterRidge	• Global ridge systematics • Materials flux, crustal accretion, tectonic and magmatic processes • Active ridge processes	• Core recovery from young ocean crust	- low (young crust) - high (old crust)	low - moderate
NAD	• Evaluate the Arctic Ocean paleoenvironmental record at various spatial and temporal scales.	• ice	moderate - high	high
IDEAL	• Large African Lakes multi-disciplinary including: - geochemistry - paleoclimatology	n/a	n/a	moderate

Appendix G6

LONG RANGE PLAN

GLOBAL THEMES

- DYNAMICS OF GLOBAL CHANGE
  - The Ocean's role in CO_2 and Climate
  - Causes and Consequences of a Climate Change
    - Warmer Climate
    - Rapid Climate Change
  - Dynamics of the Earth's Biosphere
    - Biological Evolution in Time and Space

- DYNAMICS OF THE SOLID EARTH
  - Fluxes of Matter and Energy from the Earth's Interior
    - Dynamics of the Core and Mantle
    - Magma Generation and Crustal Formation
  - Deformation of the Earth's Surface
    - Extensional Processes
    - Convergent Processes
    - Isostatic Processes
  - Fluid Circulation and Bio/Geochemistry of the Earth
    - Crust and Mantle Processes
    - Sedimentary Processes

PCOM: [illegible]H BUDGET ITEMS
(DAVE FALVEY).

[illegible] 12/1/94. H1.1

FY95 - SAVINGS AND REALLOCATIONS

ITEM	AGREED SAVING	PROPOSED REALLOCATION
1. SHIP'S DAY RATE	$120K	0
2. DCS DEVELOPMENT	$155K	155 $2[illegible]K[1]
3. PUBLICATION PROGRAM	$240K	$240K
4. "NON-PAYROLL" SUPPORT (TAMU)	$100K	0
5. DATABASE UPGRADE	$150K	$150K
6. OTHER SAVINGS		
JOI/JOIDES	$60K	$95K[2]
LDEO	$75K	$75K
7. NEW INITIATIVES	0	185 $1[illegible]K[3]
TOTAL	$900K	$900K

(1) ~~ALLOW FOR LAND TEST IN FY95; *OR*~~ TRANSFER $85K TO ITEM 7

(2) INCREASED COST OF "INTERNATIONALIZATION" INITIATIVE; *PLUS* HANDLING DIGITAL SEISMIC DATA AT DATA BANK

(3) POSSIBLE USE OF FUNDS FOR NEW INITIATIVES: 85
FURTHER *CLIP* DEVELOPMENT (UP TO $1[illegible]K);
GLOSSY ANNUAL REPORT FOR WIDE DISTRIBUTION (UP TO $50K);
~~SHEAR TOOL FOR LEG 160 ($30K)~~;
~~MAGNETIC SUSCEPTIBILITY TOOL FOR LEGS 160/161~~ ($50K)
[illegible], HAZARDS
SPECIAL OPERATING EXPENSES

PHASE II 1996-1998

gr elements for this phase that will be included in the budget must be decided PCOM meeting.

undary conditions for this PCOM discussion are fundamentally two, and they are:

e budget level will be $44.9M in 1996, 97 and 98 ogram costs increase at about 2% /year, or $1M /year. These annual increases de the increases associated with the major subcontracts (SEDCO-FOREX and umberger) and salary increases at ODP-TAMU and at BRG.

programmatic changes needed to accomplish these budget objectives will require a uction of expeditures of approximately $3M over the three years, 96, 97, 98. Since se reductions cannot come out of the SEDCO-FOREX or Schlumberger subcontracts y must come from the rest of the program, which we here call the operating budget.

he operating budget in FY 1995 is represented by $15M in ODP-TAMU, $2.5M in RG and $1.8M in JOI, or a total of $19.3M. Because the operating budgets must be educed by $3M in 1998 (or about 5% per year) this clearly implies they must reach a evel about 15% to 20% below the FY1995 level in three years.

If t were to take place uniformly across the three contracts at a 20% level it would mean (in 1998) a TAMU operating budget of about $12M, a BRG operating budget of $2M and a JOI operating budget of about $1.6M.

It is the recomendation of the LRP subcommittee that these budget targets be accomplished by programmatic changes that start in FY 1996 and are phased in over 3 years. Examples of areas where programatic changes could occur are publications, shipboard data acquisition, downhole instrumentation, management. PCOM MUST prioritize the programatic changes at the this PCOM meeting.

In addition there should be an active search for alternative and additional sources of support for FY 1999-2003 and a cost analysis for a program for 2004 -2008 based on a riser platform and a "Resolution like" platform, This is an EXCOM/PCOM item that will need continued attention over the next several years. In the search for additional support PCOM strongly reccomends that careful consideration be given to the relative merits of getting new partners versus increasing the support of present partners.

PANCH Recommendation 1

PANCH still supports the computer database upgrade but is concerned about its direction and about the communication between the user community, ODP-TAMU, and the contractor.

PANCH believes that a successful upgrade must produce a system which:

- archives the original, primary data from cores and boreholes (including logging data)
- allows data derived from the primary data to be integrated into the database
- and allows integration and manipulations of these various data types from single sites and multiple sites.

Two important parts of achieving these objectives require communication between the user community and the contractor:

- defining the goals and methodology of each of the proposed data modules
- testing and refining the prototype software for each of the data modules.

To facilitate this communication PANCH recommends to PCOM that they approve:

- **the establishment of a LISTSERVER to serve as a forum for the posting of information on the progress of the computer upgrade including bulletins and items of interest to thematic and service panels as well as concerns and suggestions from the wider earth science community. The chairs of IHP, SMP, and PANCH will explore the requirements for such a LISTSERVER.**

- **the establishment of formal liaisons from the thematic panels and DMP to both IHP and SMP, at least for the duration of the upgrade. These liaisons, with the panel chairs, will serve as the primary conduit of information between IHP (and hence the SC) and the thematic panels.**

- **that the user groups established by ODP-TAMU to test prototype data modules also participate in the initial formulation of the methodology and goals for each of those modules. The work done by the CLICOM group should serve as a model for how such user groups can provide advice and guidance in software development.**

- **that the thematic panels be given the list of data modules and data types as soon as possible and that they be directed to prepare an outline of their suggestions for the data modules of interest to them.**

H2a.4

PANCH Recommendation 2:

PANCH recommends to PCOM that they endorse ODP-TAMU's suggestion to convene a working group to explore a resolution of the "depth problem" . A plan for the rationalization of depth markers for data of all types is a critical part of a successful data integration project.

PANCH further recommends to PCOM that they endorse the mandate of the Computer and Database Upgrade Steering Committee to serve as the direct JOI/JOIDES guding group for both TAMU's Information Services Groupd and TRACOR with regard to the computer/database upgrade project and that PCOM advise JOI to direct the JOIDES advisory structure to communicate advice and comment regarding the upgrade directly to the steering committee.

PANCH Recommendation 3:

PANCH recommends to PCOM that they accept SMP's equipment needs prioritization list which includes:

1. Completion of the MST upgrade.
2. Notification that the shipboard XRF system is aging and may need to be replaced in the near future.
3. Notification that the shipboard magnetometer is aging and may need to be replaced in the near future.

PANCH Recommendation #5

PANCH recommends to PCOM the following procedures for identifying and dealing with non-performers (in terms of manuscript submissionand sample analysis):

1. The Head of Sciences Operations at ODP-Tamu would write to the individuals concerned, giving a deadline for response. The letter should make it clear that an unsatisfactory or nil response would result in the matter being dealt with through the JOIDES structure with the individual's funding agency being informed and that ultimately the individual may be barred from further participation in the program (a copy of the letter should be sent to the JOIDES office, which will forward a copy to the relevant PCOM member with a request to investigate further).

2. An unsatisfactory or nil response should result in IHP taking up the matter. IHP will decide whether the Chair of IHP should send out a second warning letter. If sent, this letter should spell out again the risks of being barred from further program participation. A copy should be sent to the JOIDES Office which will contact the relevant funding organization and will file copies of all correpondence.

PANCH Recomendation #6

PANCH recommends to PCOM that they advise the JOIDES office not to approve any Spring thematic panel meetings proposed to be held later than March 7, except in extraordinary circumstances. This scheduling will provide adequate time for SSP to assemble the data packages for highly ranked proposals and to schedule their Spring meeting early enough before the April PCOM meeting.

PANCH Comment #7

PANCH expresses, once again, concern that the $2500 budget allocated to the panel chairs is not adequate to cover the costs associated with reproducing and mailing materials required for the proper operation of their panels. In many cases, their home institutions are subsidizing the costs of work for JOIDES.

PANCH Comment #8

The thematic panels are all trying to keep active liaisons to major national and international science initiatives. The names of those liaisons will be included in future minutes for the information of PCOM and other parts of the advisory structure.

PANCH Comment #9

PANCH is very much aware of, and shares, the concerns of PCOM relating to the presentation of science goals. There is an obvious need for a coherent long-term science program that addresses both basic science and the perceived requirements of national funding agencies to meet societally relevant goals. PANCH wants to point out that the process by which thematic panels solicit, evaluate, and facilitate proposals is currently proceeding effectively. Nevertheless, PANCH recognizes the value of input from other, related science programs to help refine the science plan. PANCH also recognizes the clear need to convince the wider community that a coherent long-term strategy in fact exists, such as to warrant continuedand, if necesary, increased financila support.

Appendix H2a.6

PANCH Recommendation #4

In an effort to provide some help to PCOM in grappling with the projected budget shortfalls in the 1996-98 fiscal years, PANCH offers the following thoughts about what the program is about and what it needs, at a minimum, to complete its mission in the short-term.

What is the Ocean Drilling Program about?

1. Identifying, evaluating, and prioritizing scientific problems and strategies
2. Helping to solve those scientific problems through drilling, sampling and logging

What do we need to accomplish 2 for a given leg of work?

Need	Essential components	Ideal components or occasional* needs
Drilling platform	1/6 of a platfrom per leg	multiple platforms
Recover core sufficent to solve the problem	APC/XCB/RCB	MDCB, DCS
Make boreholes	casing?? others not identified	
Characterize core	MST, pore water, color logging, bio-, magneto-, chemical stratigraphy macroscopic descriptions, phys. props., photography, hydrocarbon monitoring, smear slides, thin sections, organic carbon, carbonate carbon	XRD, core scanning
Characterize boreholes	standard logging suite imaging tool geochemical tool???	Packers*, WSTP*, Adara*, Fluid sampler*, pressure tool* Formation scale measurements Magnetic tools
Curate core and data	repositories shore-based computer system access to core for sampling and to data	shore-based measurement labs
Disseminate results	data access (elctronic and/or paper?) shipboard data and shipboard syntheses, some post-cruise summaries and data	all post-cruise papers
Update methodology innovate	Is 4% of budget adequate. Without this innovation the program will not survive. But planning this is at odds with short-term budget pressures	
Flexibility	The scientific and logistic flexibility of the program have been a strength--drilling a variety of environments around the globe. How to retain that?	
Management	Need management sufficent to the completion of the scientific goals	

Appendix H2a.7

PCOM: H6-a 1996-98 BUDGET
PUBLICATIONS (Russ Merril)

Attributes of ODP Publications

- Editorial control by the JOIDES community (peer-review, contents, page budget, general quality and appearance).

- Leg coherence to reflect cruise objectives and results in context of the JOIDES planning process.

- Timely publication schedule set by JOIDES community.

- Editorial flexibility to handle special requirements (back-pocket figures, CD-ROMs, diskettes, color figures, maps, paleo plates, etc).

- Wide distribution designed to achieve maximum visibility of Program results.

H2a.8

ODP *Initial Reports* Series

- Report the scientific purposes, activities, methods, and results of each cruise.

- Primary reference for subsequent research.

- Provides scientific context for the core collection and electronic database information.

- Indexes the core collection (with barrel sheets and photos) for scientists who request samples or who study cores and/or data.

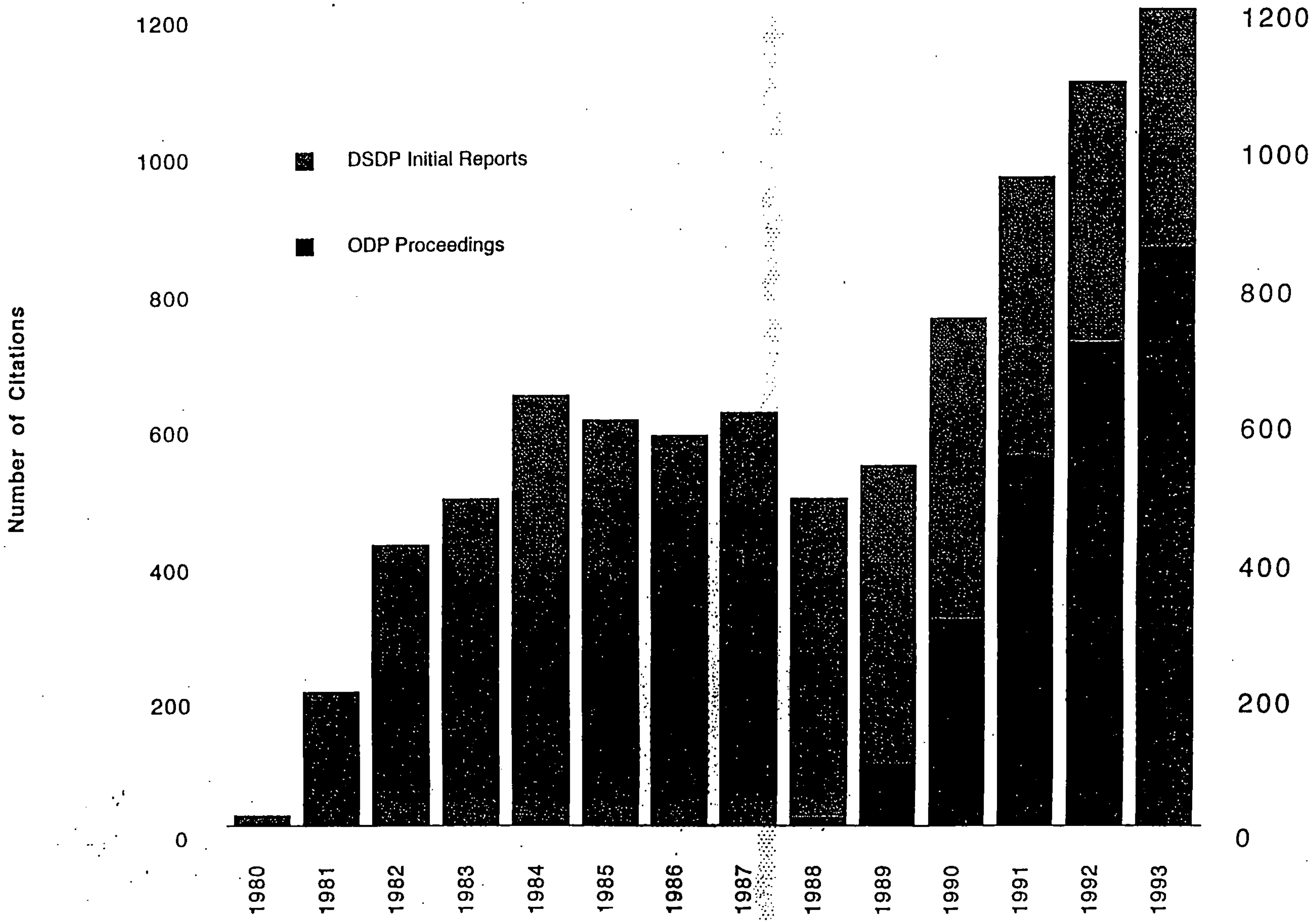
- Fulfills formal reporting requirements of the U. S. National Science Foundation and of the U.S. State Department.

ODP *Scientific Results* Series

- **Specialty papers:** High quality, peer-reviewed scientific reports of cruise results.

- **Synthesis papers:** Reflective reviews of major scientific problems targeted by the cruise and proposals for further work.

Figure 3. Annual Citations in other Journals: Data from Science Citation Index, 1994.



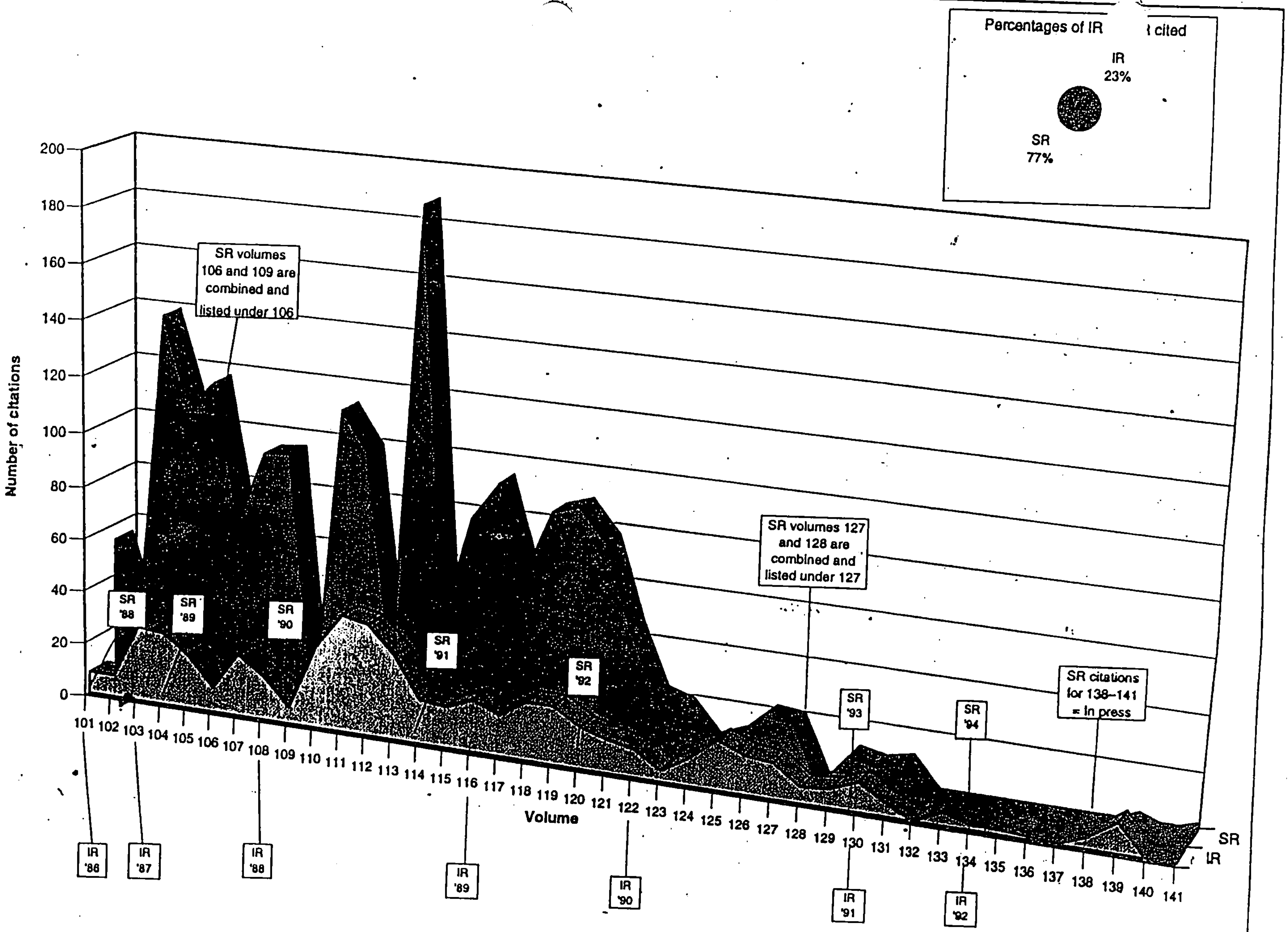
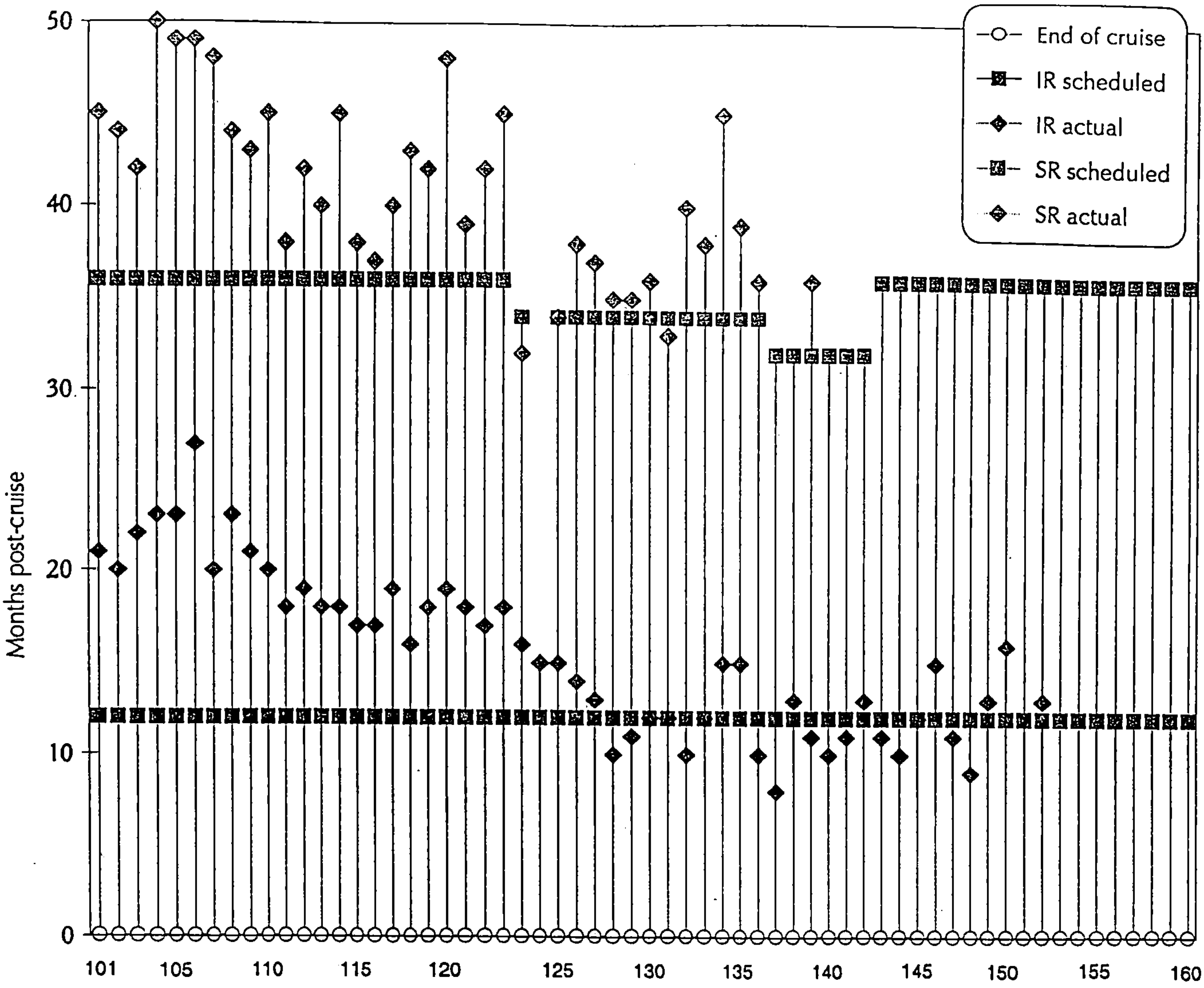


Figure 1. Citations to ODP *Initial Reports* and *Scientific Results* volumes (Data from Science Citation Index, 1994). Boxes show first IR and SR published each year.

H2a.12



Publishing dates for ODP *Proceedings* volumes scheduled versus actual.
Dates based on 12 months post-cruise (IR) and 36 months (SR).

11/28/94

Proposed Distribution Dates of ODP Volumes—Fiscal Year 1995

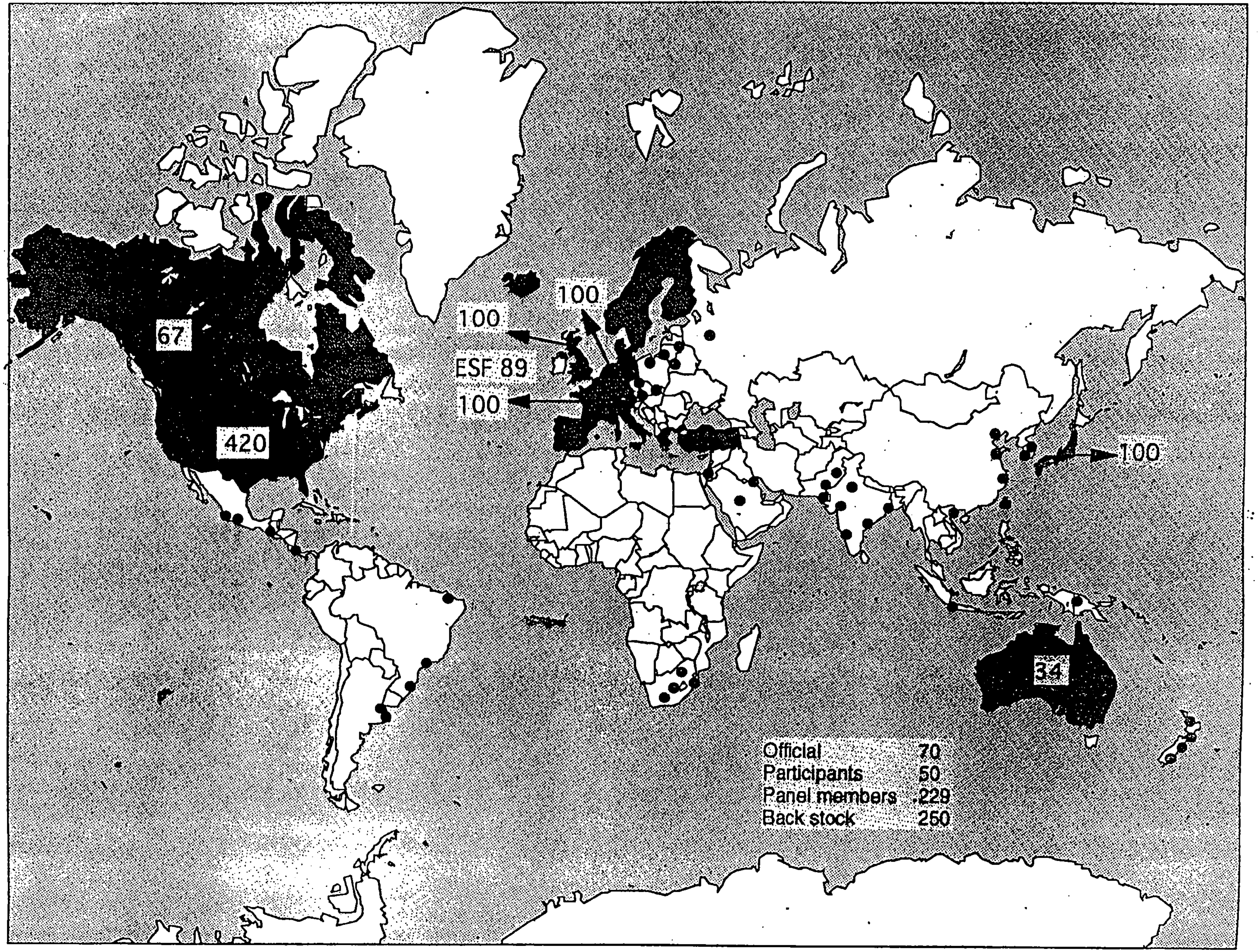
	Initial Reports Volumes	Post-cruise meeting	Date to printer	Date distributed	Months post-cruise		*Scientific Results* Volumes	Review process completed	Date to printer / indexer	Index to printer	Date distributed	Months post-cruise
October												
November	150 150X	1-4-94	7-29-94 7-29-94	9-94 9-94	16							
December	152	4-11-94	9-29-94	12-94	13							
January	153	6-17-94	12-94	1-95	12							
February												
March	154	7-15-94	1-95	3-95	12		142 143	(6-30-94) 9-5-94 (11-1-94) 9-5-94	11-94 1-95	12-94 2-95	5-95 5-95	36 34
April	151	3-9-94	2-95	4-95	19		138	(10-30-93)	2-95	3-95	4-95	45
May	155	10-3-94	3-95	5-95	12							
June							141 137/140	(4-16-94) 10-94 (12-15-93) 10-94	3-95 3-95	4-95 4-95	5-95 5-95	41 49/43
July	156	11-14-94	5-95	7-95	12		144	12-30-94	5-95	6-95	7-95	36
August												
September	157		7-95	9-95	12		145	2-28-95	7-95	8-95	9-95	36

Goal for IR volumes: 12 months post-cruise.
Goal for SR volumes: 36 months post-cruise.

(Date) indicates originally scheduled date prior to delays.
Gray box indicates two separate volumes in one cover.
###/### indicates two voyages

November 3, 1994

Proceedings Distribution



Official	70
Participants	50
Panel members	229
Back stock	250

● Non-partner nations receiving ODP volumes
▨ Partner nations ▒ Books sent to partner nations

Table 3. Comparative prices of internationally reputable earth-science journals.

Journal	Annual number of volumes (issues)	Volume price to U.S. Institutions ($ US)	Approximate number of pages per volume	Price per page ($ US)
Contributions to Mineralogy and Petrology	3 (12)	725	550	1.318
Marine Geophysical Researches	1 (6)	385	340	1.132
Geological Journal	1 (4)	295	400	0.738
Palaeogeography, Palaeoclimatology, Palaeoecology	6 (12)	198	330	0.600
Marine Micropaleontology	2 (8)	215	360	0.597
Marine Geology	7 (28)	198	350	0.566
Chemical Geology	8 (32)	203	370	0.549
Earth and Planetary Science Letters	6 (12)	228	470	0.485
Reviews of Geophysics	1 (4)	220	470	0.468
Tectonophysics	12 (26)	202	450	0.449
Micropaleontology	1 (4)	175	420	0.417
Sedimentary Geology	6 (12)	198	500	0.396
Geologische Rundschau	1 (3)	300	800	0.375
Sedimentology	1 (6)	434	1160	0.374
Eclogae Geologicae Helvetiae	1 (3)	348	960	0.363
Geological Magazine	1 (6)	249	740	0.336
Lithos	3 (12)	118	370	0.319
Paleoceanography	**1 (6)**	**270**	**850**	**0.318**
Tectonics	1 (4)	330	1400	0.236
Journal of Geophysical Research (Solid Earth)	**1 (12)**	**1570**	**7030**	**0.223**
Geophysical Research Letters	1 (24)	590	2720	0.217
Comptes Rendus de l'Académie des Sciences, Série 2	2 (26)	370	1750	0.213
Journal of Petrology	1 (6)	295	1400	0.211
Geochimica et Cosmochimica Acta	1 (24)	895	4460	0.201
Canadian Journal of Earth Sciences	1 (12)	365	2200	0.166
American Mineralogist	1 (6)	250	1580	0.158
Journal of Sedimentary Petrology	1 (6)	152	1210	0.126
Proceedings ODP, Scientific Results	*6 (6)*	*[a]65*	*540*	*0.120*
American Journal of Science	1 (10)	115	1000	0.115
Geology	1 (12)	150	1300	0.115
Geological Society of America Bulletin	1 (12)	185	1700	0.109
Journal of Paleontology	1 (6)	99	1050	0.094
Nature	6 (52)	71	800	0.089
AAPG Bulletin	1 (12)	135	2020	0.067
Bulletin of Seismological Society of America	1 (6)	135	2600	0.052

[a] Estimated manufacturing, salary, and other costs for one book.

11/29/94, T3VOLPRI.XLS

Appendix H2a.16

How to save money? *Initial Reports* Series

- Return to DSDP model: **$300 K** FY96, FY97 **delayed** until FY98
  - *Initial Core Description* issued 6-8 months postcruise.
  - *Proceedings* issued 36 months postcruise.

	Estimated Potential Annual Savings
• Publish barrel sheet / core photo pages on CD-ROM or Internet.	**$ 5 K**
• Reduce print run from 1700 to 1500	**$ 9 K**
• Publish current *IR* on CD-ROM or Internet	**$165 K**
• Combine electronic / print formats - print barrels, photos plus 50 text pages - Publish remainder of cruise report on CD-ROM or Internet, unedited, as delivered by the participants.	**$295 K**
• Eliminate *Initial Reports* - distribute *Hole Summary* to cruise participants & ODP offices - eliminate 7 positions	**$511 K** beginning FY96 2nd Q

Savings estimates shown assume the scenarios are independent.

Appendix H2a.17

How to save money? *Scientific Results* Series

	Estimated Potential <u>Annual Savings</u>
• Reduce print run from 1700 to 1500	$ 9 K
• Publish current *SR* on CD-ROM or Internet	$164 K
• Transform *SR* into quarterly journal	$300 K
- 6-member ERB, 3-year terms - strict 1600-page annual budget (half of current average) - reinstitute comprehensive copy edit & art support	
• Eliminate *Scientific Results* series	$620 K
- Eliminate 3.5 employees	

Savings estimates shown assume the scenarios are independent.

H2a.18

Status of ODP volumes at end of 1994

	Latest volume to achieve	Distribution date IR volume Bills paid	Distribution date SR volume Bills paid
Cruise complete	158	11/95	11/97
Post-cruise meeting complete	156	7/95	7/97
IR volume complete	152	12/94	11/96
Second post-cruise meeting complete	151	3/95	9/96
SR Synthesis papers in review	144		7/95
SR volume to press	143*		3/95

*Volume 143 SR is two months ahead of schedule in order to share a spine with 142.

Timing of Savings if 158 is last volume

	FY95	FY96	FY97	FY98	FY99
Abandon IR	$ 5	$290	$511		
Abandon SR	$ 0	$ 0	$30.6	$248	$620

OM: : DAN REUDELHUBER.

DCS STATUS REPORT

OVERVIEW

NEW DEVELOPMENT PLAN

- * A NEW DEVELOPMENT PLAN FOR ESTABLISHING FEASIBILITY OF CONTINUED DCS DEVELOPMENT HAS BEEN WRITTEN (CONSENSUS FROM AUGUST 25-26 MEETING).
- * THE PLAN DEALS STRICTLY WITH SECONDARY COMPENSATION CONTROLLER DEVELOPMENT.
- * THE PLAN HAS BEEN REVIEWED BY THE TEDCOM DCS SUBCOMMITTEE, AND HAS BEEN IMPLEMENTED.

II. SCHEDULE FOR ESTABLISHING FEASIBILITY

- * DEVELOPMENT PLAN SCHEDULE
- * STATUS, PROGRESS

III. MAIN COMPENSATOR SEAL TEST PROGRAM

IV. DCS CORE BIT TESTS

V. RETRACTABLE BIT TESTS

- * RUSSIAN SRK-76 TESTING AT TERRATEK WITH CYCLIC LOADING (DRB)
- * TESTING OF RUSSIAN TRB DESIGN IN RUSSIA

VI. WEIGHT-ON-BIT TOOL

VII. DCS BUMPER SUB CONCEPT

PCOM ANNUAL MEETING
COLLEGE STATION, TX
11/30/94 - 12/2/94

DCS STATUS REPORT

NEW DEVELOPMENT PLAN

- PROJECT STRUCTURE (see attached)
    * SES IS PRIME SUBCONTRACTOR
    * CONSULTANTS ADVISE ODP AND PROVIDE EXPERTISE TO DESIGN TEAM
    * STRUCTURE BASED ON DISCUSSIONS HELD WITH TEDCOM SUBCOMMITTEE, SES, CONSULTANT AND ODP IN SLC IN AUGUST

- RESPONSIBILITIES OF EACH PARTY (see attached)

- SCHEDULE (see attached)

- WORK IS PHASED:
    * MODIFY/IMPROVE THE DCS COMPUTER MODEL (COMPLETION 1/1/95)
    * PHASE ONE: CREATE A DESIGN/DEVELOPMENT PLAN FOR THE SECONDARY HEAVE COMPENSATION CONTROLLER
    * PHASE TWO: DEVELOP CONTROLLER CONCEPTS AND TEST ON MODEL + MECHANICAL SIMULATOR

☞ * DETERMINE FEASIBILITY

    * PHASE III: IMPLEMENT CONTROLLERS IN SOFTWARE AND INSTALL ON DCS HARDWARE
    * PHASE IV: LAND TESTS

Appendix I1.3

DCS Secondary Heave Compensation Controller Development Plan

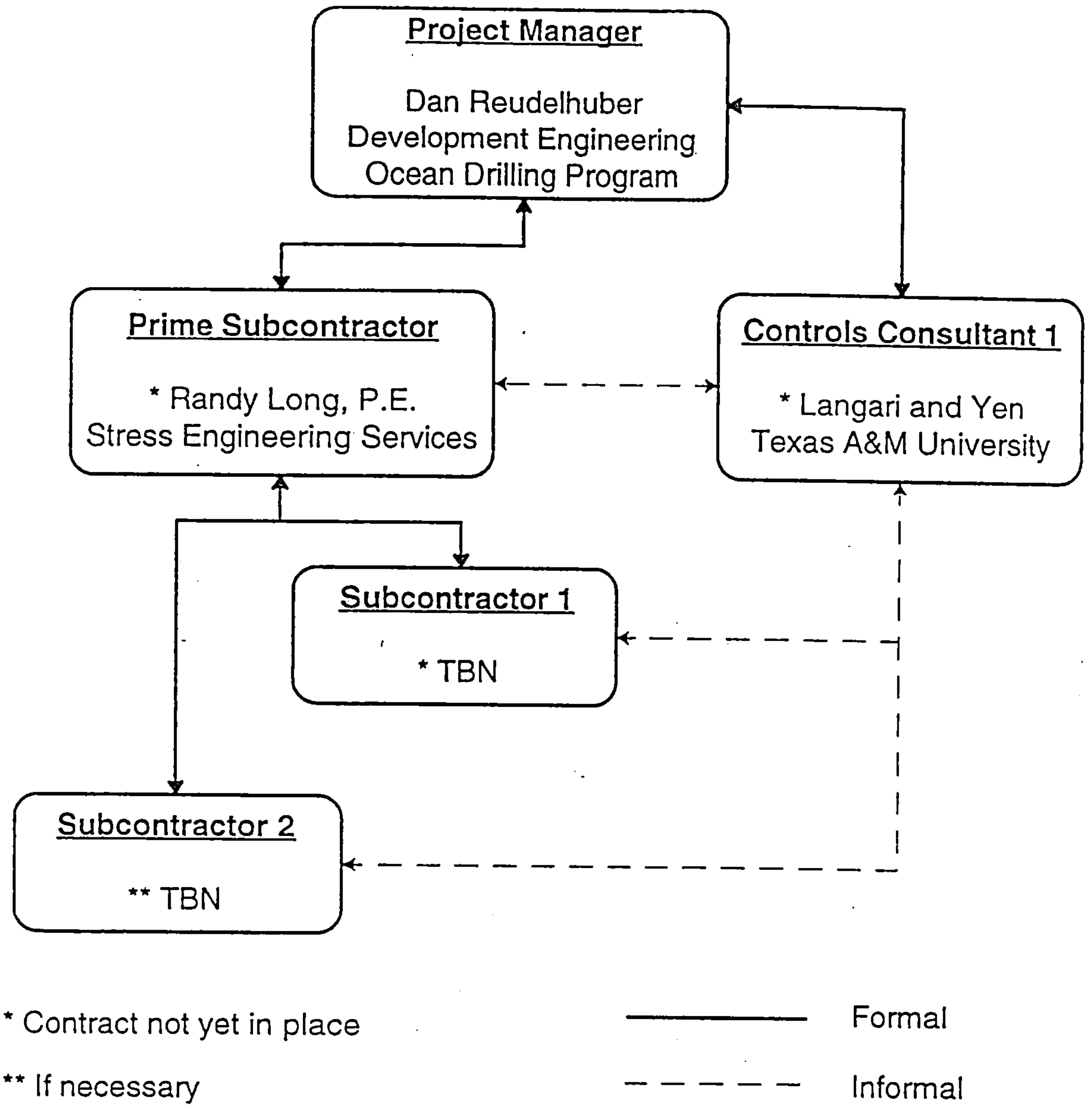


Figure 1: Proposed Structure

9/30/94

heave1.vsd

DCS Secondary Heave Compensation Controller Development Plan

	DCS Model Changes	Phase I Design Plan Development	Phase II Controller Design and Development	Phase III Controller Implementation
ODP	Provide input Monitor progress Provide reports to TEDCOM Seek TEDCOM input Hold progress reviews Approve plan	→	→	→
Control Consultant 1: Langari and Yen (SOW #1)	Provide input to ODP Provide input to Subs. Assist in monitoring Attend progress reviews	Assist in plan development →	Assist with controller design →	→
Prime Subcontractor: Randy Long SES (SOW #2 + #3)	Implement model changes Report to ODP	Manage plan development Provide lead engineering Track progress Report to ODP Track project costs	Manage controller design →	Manage controller implementation →
Subcontractor 1: TBN		Support plan development Investigate development tools	Implement controller design Test in model Test on test stand	Implement controller Test in model
Subcontractor 2: TBN		To be determined	To be determined	To be determined
TEDCOM DCS Subcommittee	Provide feedback Attend progress reviews Monitor progress	→	→	→

9/30/94

Figure 2: Responsibilities

heave2.vsd

DCS Secondary ave Compensator Controller Development Plan

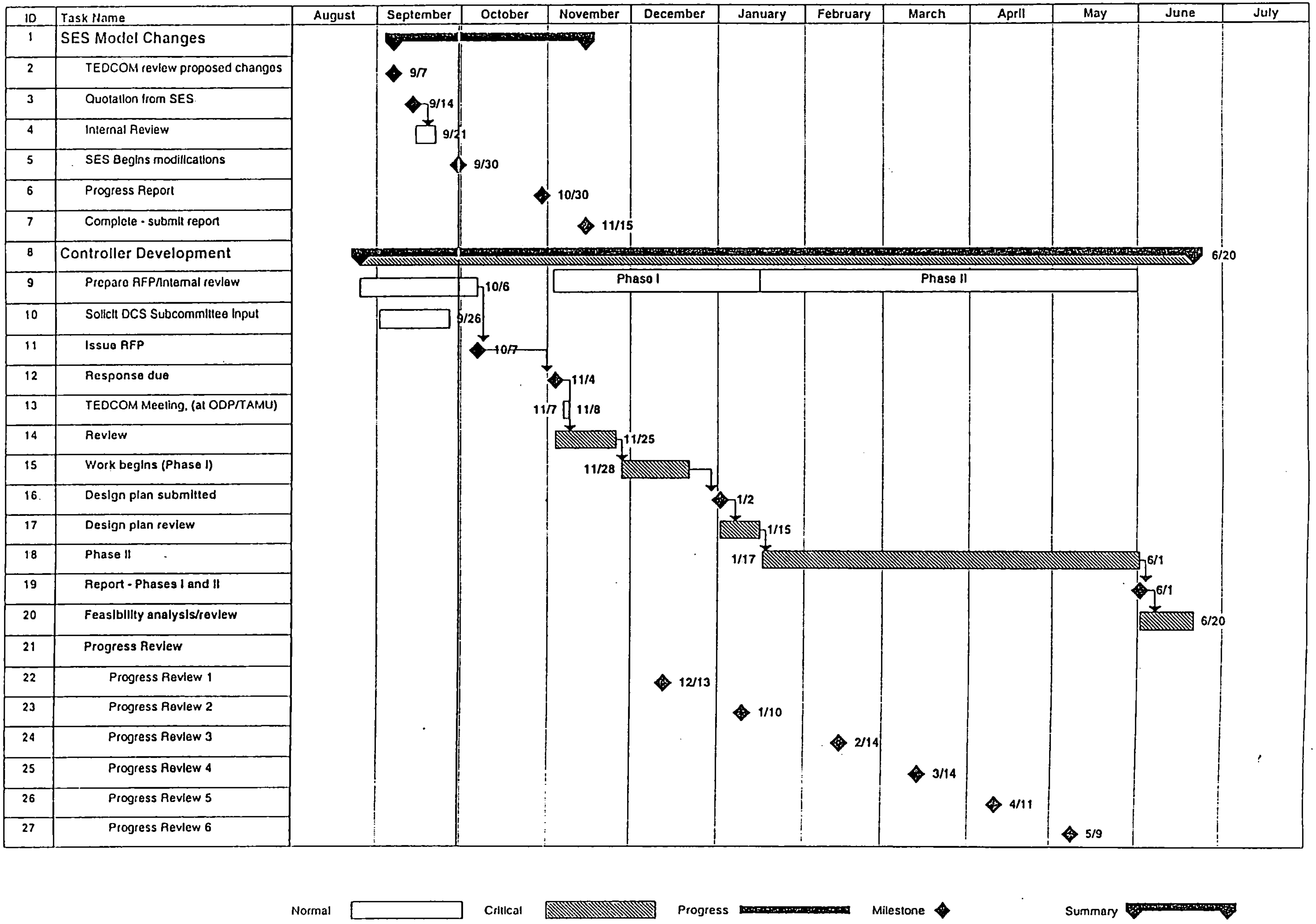


Figure 4: DCS Heave Compensator Controller Timeline

F:\USERS\BILLR\DCS\HEAVE.MPP

Appendix II.5

I1.6

DCS STATUS REPORT

NEW DEVELOPMENT PLAN STATUS

* RFP SENT TO SES (FOR PRIME CONTRACTOR BID).

* BID FROM SES RECEIVED NOVEMBER 22, 1994. BID IS PRESENTLY BEING EVALUATED. NEGOTIATIONS LIKELY TO BE JANUARY 1995.

* RFP SENT TO AND BID RECEIVED FROM CONSULTANTS AT TAMU. CONSULTANTS ARE NOW PERFORMING WORK ON PROJECT.

DCS REVIEW

TEDCOM DCS SUB-COMMITTEE

NOVEMBER 1994 PCOM MEETING

Sub-Committee Members

Shanks - Chair
Schuh
Shatto
Summerour (recommended)

ing 1994 the DCS Sub-Committee met with TAMU:

At Stress to discuss analytical modeling to date and for a status update on the project

At College Station to discuss status and plan a meeting with parvus in Salt Lake City.

At parvus in Salt Lake City to discuss DCS feasibility strategy and review the parvus un-solicited proposal.

The DCS Sub-Committee has reviewed several documents and draft scope of works for various vendors and returned comments to TAMU.

The scope of work for Phase I and II of the TAMU plan will address the major points, prior to land test, outlined in the Sub-Comm letter to TAMU dated November 1993 relating to the milestones felt necessary to determine feasibility.

During the present plan formulation, a dialogue has been maintained between TAMU and the Sub-Comm within the intent of the EDRC report. This project is the first to experience the application and a learning curve is being established. Lessons from this experience will be used to "tweak" the process.

DCS REVIEW

TO CONTROL LOOP

f systems engineering experience specifically with
sels which attempt to accomplish similar results as
osition.

ol logic for the active compensation system utilized
n of the DCS string as an input reference.

rough a clever system to utilize the API string tension as
ension to be inputs to the controller.

of the secondary active compensator is due to the
API string.

of the API string is due to the variation in tension
he primary compensator.

ge in tension of the primary compensator at the API string
easured and the effects on the API should be capable of
odeled as a function of water depth.

ticipated change can be used as an input to the control logic
e secondary compensator can be adjusted in anticipation of the
ge in length of the API string while using the DCS top tension
easure its effectiveness.

DCOM III: DCS

NATLAND?

Those who do not know the past are condemned to repeat it.

-G. Santayana

DSE levels 1) Fractured basalts

climate change 2) Chert/chalk (hard/soft sequences

3) shallow-water limestones

DSE Flux, 4) fractured gabbros/peridotites in offset sections

Resources 5) pyrite/anhydrite breccias in sulfide deposits

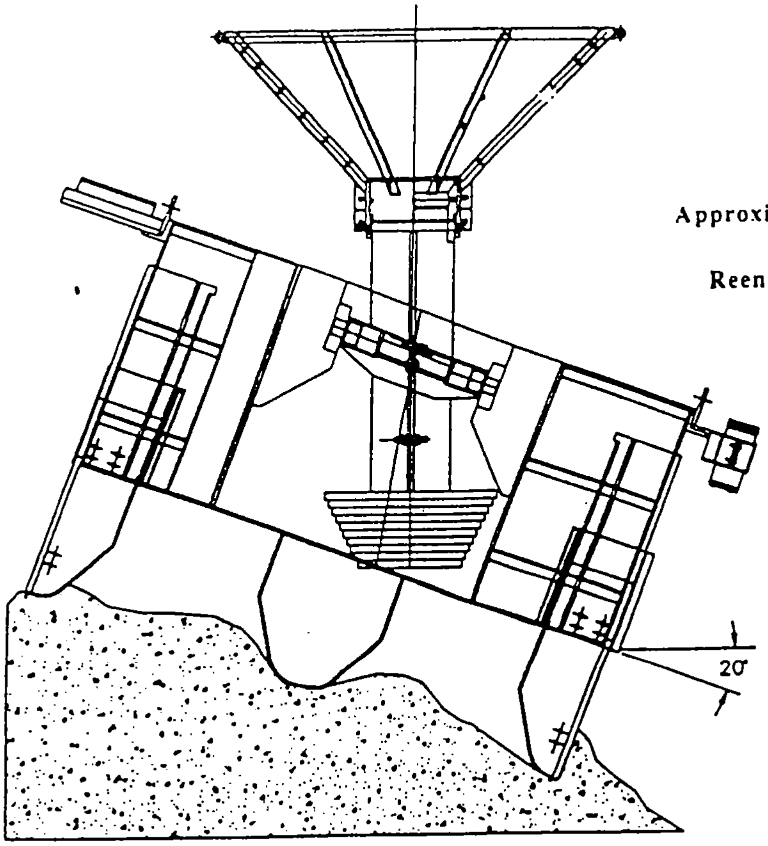
hazards 6) fault zones in active deformation regions in

LEG 153 CC ING SUMMARY

	INTERVAL CORED	CORE RECOVERED	PERCENT (%) RECOVERY
3 SERPENTINITE HOLES (SITE 920)	341 m	144 m	42%
11 GABBRO HOLES (SITES 921, 922, 923, 924)	457 m	117 m	26%
TOTAL (LEG 153)	798 m	261 m	33%
TOTAL (LEG 147) (12 CORED HOLES)	487 m	123 m	25%
TOTAL (LEG 140) (HOLE 504B)	379 m	48 m	13%

PCOM #F: TIM FRANCIS'S & OFFSET DRILLING

Appendix J.1



HRB SPECIFICATIONS

Dry weight (unballasted)	41,400 lbs
Submerged weight (unballasted)	36,000 lbs
Approximate submerged weight (ballasted)	125,000 lbs
Reentry cone diameter	8 ft
Reentry cone uprighting moment factor of safety	2.5
Factor of safety against leg bolt shear	19
Maximum design tilt (into side)	25°
Maximum design tilt (into corner)	30°
Maximum recommended operational limit	20°
Leg extension beneath base	3 ft

DESIGN/DEPLOYMENT CAPABILITIES:

1. Can be set on hard, bare rock out crops with flat or irregular topography on slopes ≤ 20°
2. Requires sediment cover to be less than 3 ft
3. Recoverable/Redeployable
4. Can be relocated on the seafloor

BASE CONTROLS IN POSITIONING HRB

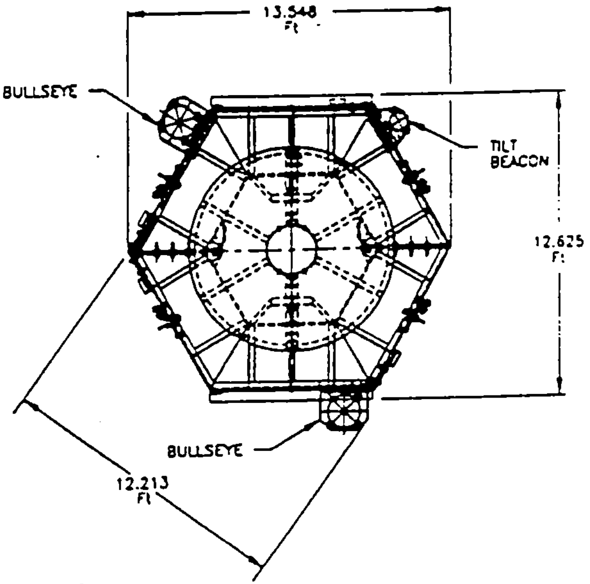
1.	Mechanical tilt indicator (Bullseye) maximum range	23.5°
2.	Electronic tilt beacon (Note 1)	40°
3.	Mesotech (Note 2)	Limited
4.	Visual from V.I.T. (Note 2)	Limited

Notes:

1. Electronic Tilt Beacons have experienced some freezing and/or erratic behavior from shielding by the re-entry cone or canyonous topography
2. Difficult to interpret results/data

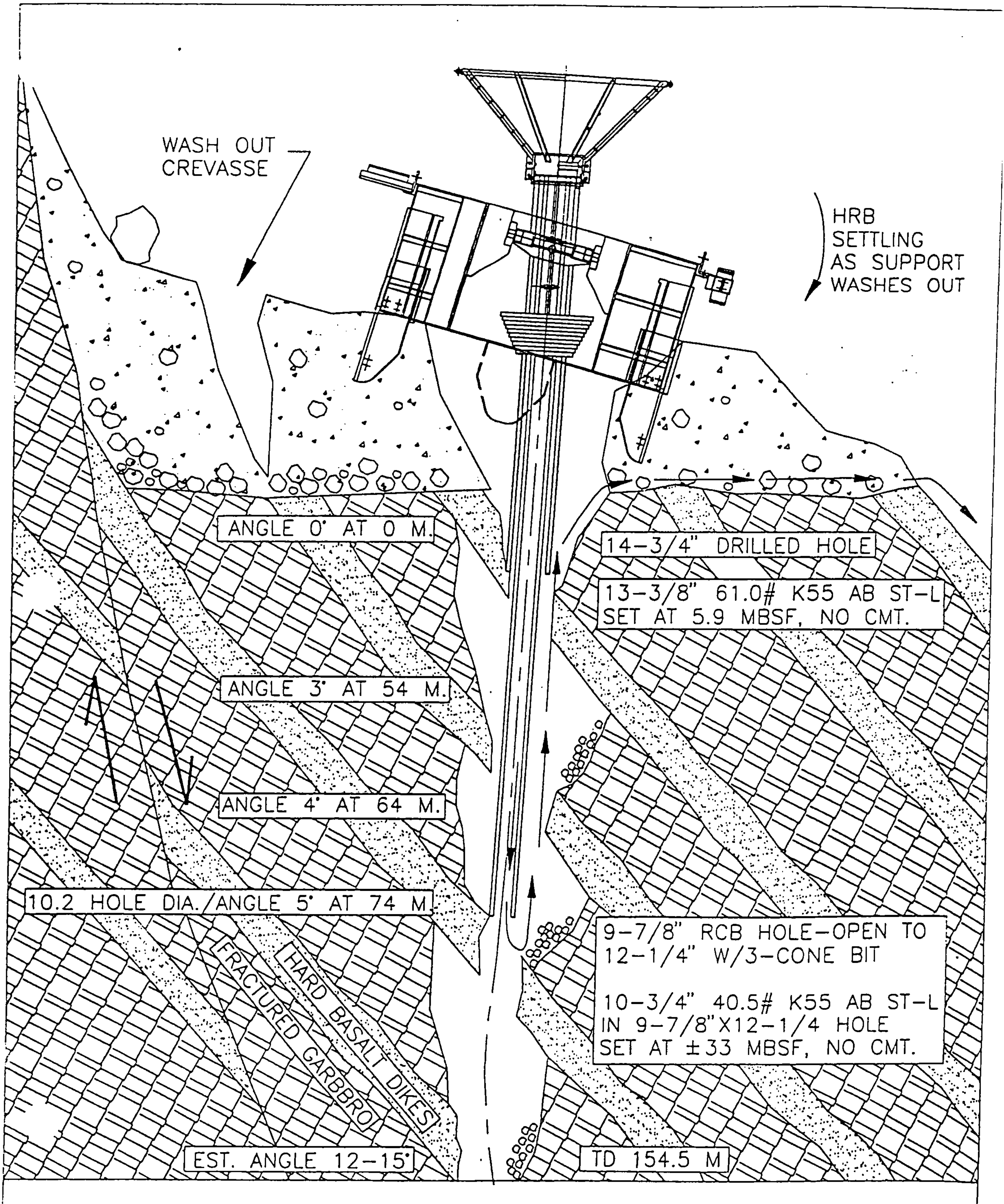
PROBLEMS ASSOCIATED WITH POSITIONING/LANDING AN HRB

1. Seafloor slope
2. Seafloor stability
3. Sediment thickness
4. Sufficient area suitable to land base
5. Weather/sea state/water dept conditions
6. BP471 not suitable or efficient as a survey vessel
7. Very rugged canyonous topography



CONSIDERATIONS OF USING AN HRB

1. Permanent/long term reentry site
2. 1, 2, or 3 casing strings required
3. Time required to under ream or hole open
4. Time to locate/position/run HRB
5. Adequate survey of seafloor deployment area
6. Space availability on BP471 for support hardware of HRB/casing (When considering multiple HRB deployments)


WASH OUT CREVASSE
HRB SETTLING AS SUPPORT WASHES OUT
ANGLE 0° AT 0 M.
14-3/4" DRILLED HOLE
13-3/8" 61.0# K55 AB ST-L SET AT 5.9 MBSF, NO CMT.
ANGLE 3° AT 54 M.
ANGLE 4° AT 64 M.
10.2 HOLE DIA./ANGLE 5° AT 74 M.
9-7/8" RCB HOLE-OPEN TO 12-1/4" W/3-CONE BIT
10-3/4" 40.5# K55 AB ST-L IN 9-7/8"X12-1/4 HOLE SET AT ±33 MBSF, NO CMT.
HARD BASALT DIKES
FRACTURED GABBRO
EST. ANGLE 12-15°
TD 154.5 M

IN ORDER FOR THE OFFSET DRILLING STRATEGY TO PROGRESS, ODP NEEDS AN ENGINEERING LEG TO TEST:

1. NEW SPUDDING TECHNIQUES (TEMPLATE? DIC?)

2. HOLE CLEANING TECHNIQUES

3. NEW CASING SYSTEMS

4. REAMING TECHNIQUES

Appendix K1

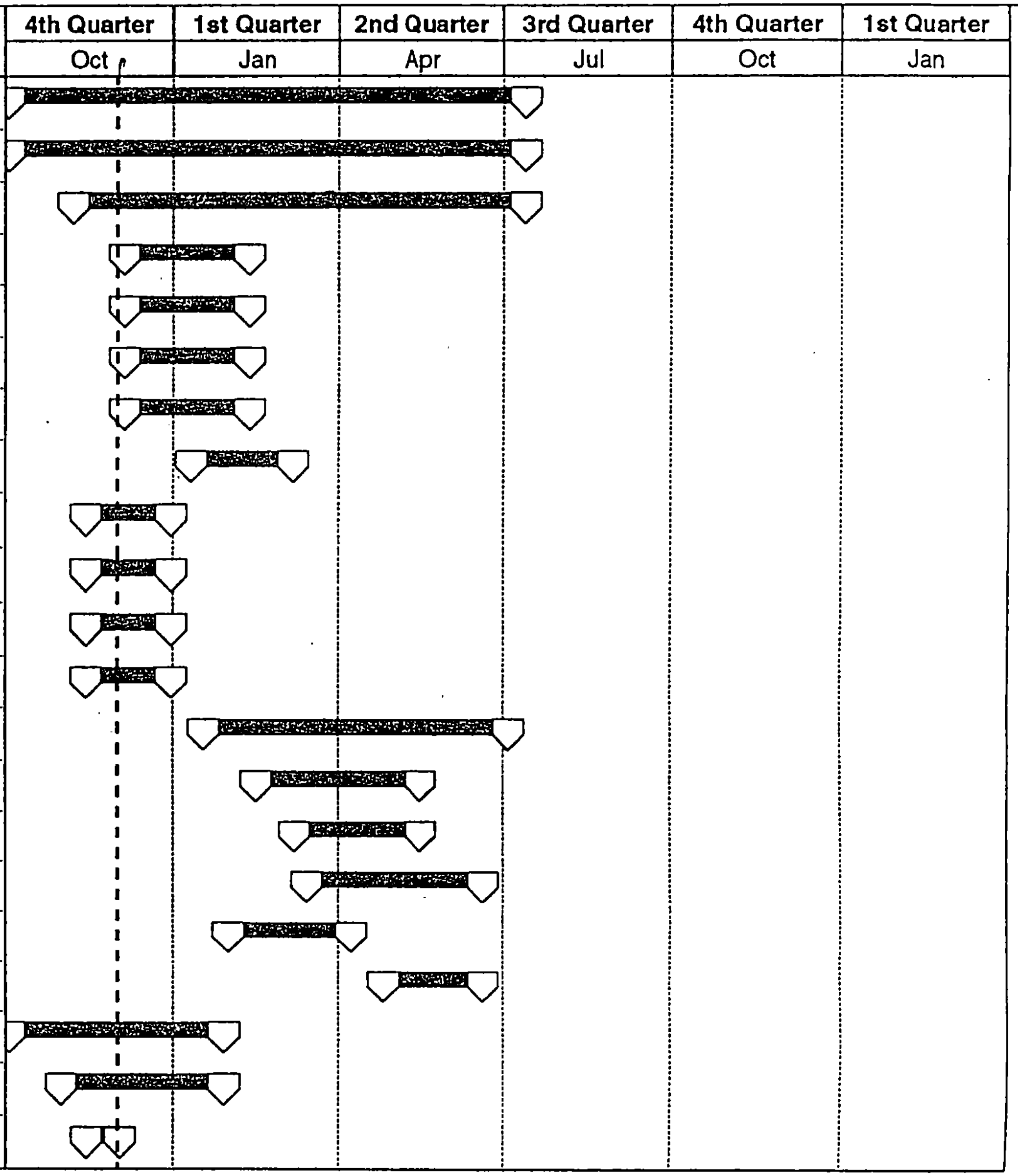
PCOMK3: DATABASE MANAGEMENT UPGRADE.

JOHN COYNE.

Work Phases

- Analysis phase
- Specify Development and Production Environment Phase
- Development/Implementation Phase

ID	Name
1	1 ODP Data Management System Replacement Project
2	1.1 Phase 1 - Analysis
37	1.1.5 Project Requirements Specification
19	1.1.4 Analyze Current Shipboard Environment
20	1.1.4.1 Prepare Ship Data Model Diagrams
25	1.1.4.2 Prepare Ship Work Flow Diagrams
30	1.1.4.3 Prepare Ship Architectural NW Diagrams
71	1.1.10 Training Plan
5	1.1.3 Analyze Current Shore Environment
6	1.1.3.1 Prepare Shore Data Model Diagrams
10	1.1.3.2 Prepare Shore Work Flow Diagrams
14	1.1.3.3 Prepare Shore Architectural NW Diagrams
45	1.1.6 Software Development Plan
64	1.1.9 Test Plan
75	1.1.11 Documentation Plan
60	1.1.8 Transition Plan
56	1.1.7 Installation Plan
79	1.1.12 Implementation Phase Project Plan
88	1.2 Phase 2 - Specify Development / Production Environments
95	1.2.4 Evaluate Development Environment, Tools
91	1.2.3 Re-evaluate Proposed Hardware Platforms



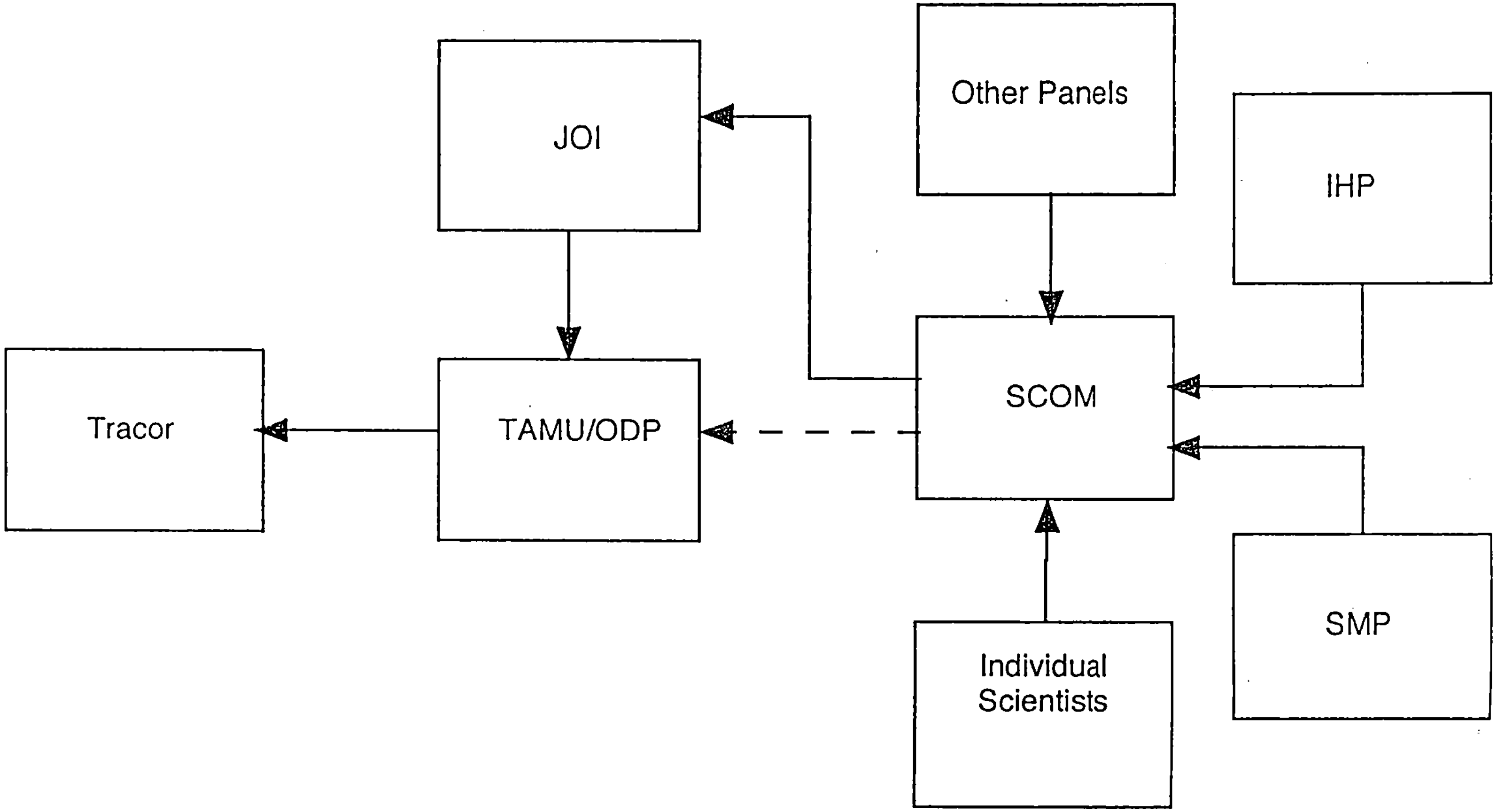
Project: ODP - Phase 1 & 2
Date: 12/1/94

Critical	▨	Progress	▬	Summary	▽▬▽	Marked	▼
Noncritical	▒	Milestone	◆	Rolled Up	◇		

Appendix K2

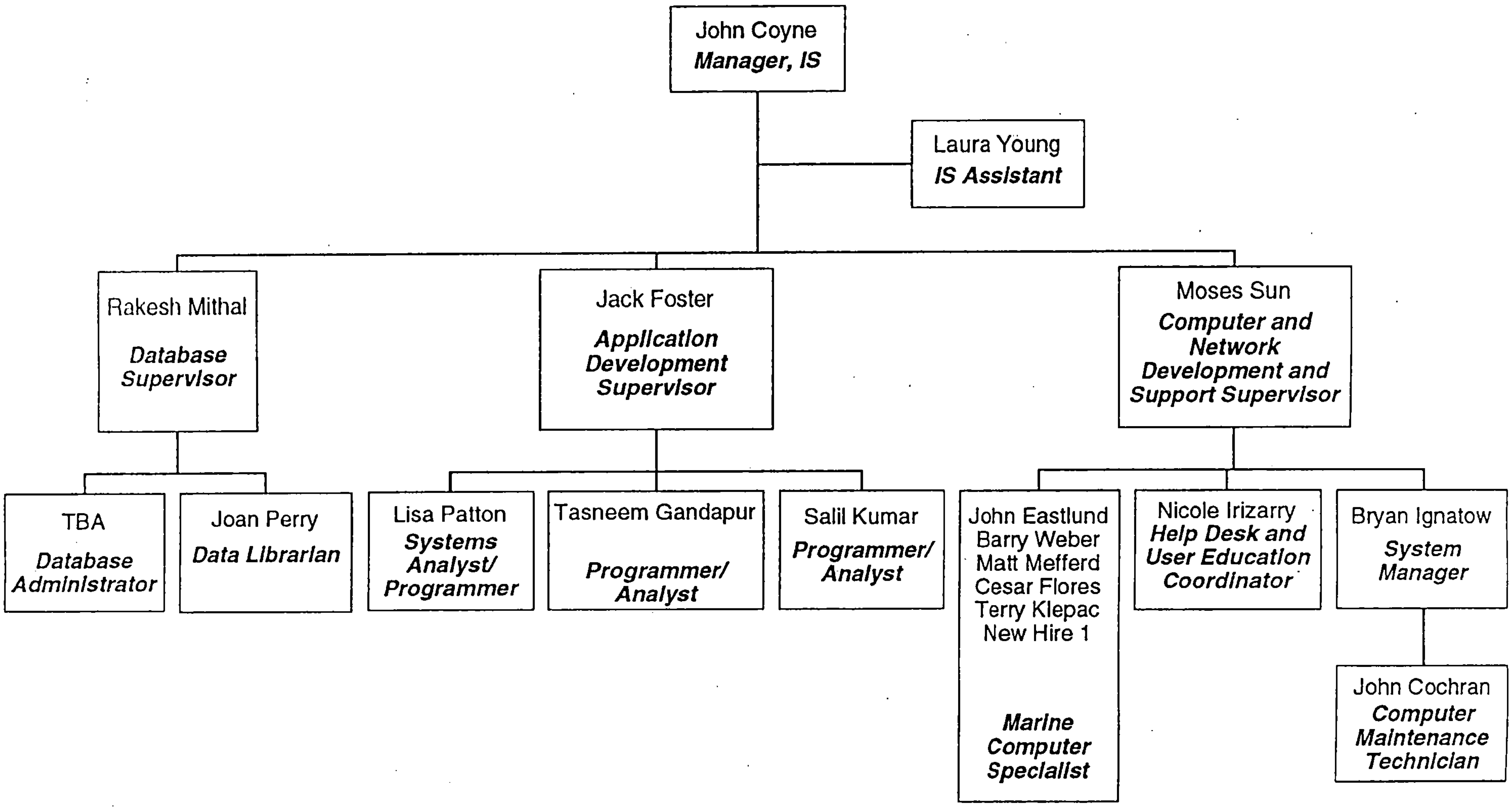
K2

Database Project Advisory Structure



Appendix K3

Information Services



10/5/94

Appendix K5.1

Pcom ~~5~~ K : DATA BASE MANAGEMENT (JOHN COYNE) K5.1

Overview of the Ocean Drilling Program
Data Management Project - JANUS

Objective

To improve the quality, productivity and visibility of the science resulting from ODP drilling operations. This will be accomplished by providing a state-of-the-art data management system. The system will:

1) Ensure the data is collected in a uniform and efficient manner in an integrated database management system sufficient to meet the present and future needs of the scientific community.
2) Provide users from all ODP partner countries easy access to the data.

Work Phases

The work to be undertaken will be completed in the following three phases:

- Analysis phase
- Specify Development and Production Environment Phase
- Development/Implementation Phase

1. Analysis Phase and Deliverables

Work to be performed during this phase consists of the following:

- Information collection and analysis to verify the Best and Final Offer dated 4/29/94 (BAFO)
- Review and analyze applications requirements for each data type
- Determine the design for the overall system, including hardware, software and operating procedures. The work will include:
  - Determining the logical data model
  - Developing workflow diagrams
  - Developing requirements for DBA tools
  - Reviewing and analyzing test requirements and methodology
- Establish preliminary database physical design
- Review and evaluate the network capacity on ship and shore
- Demonstrate the "proof of concept" resulting from the above analysis

  The demonstration of this concept is to be accomplished in the following manner:

  (1) Prototyping
  Prototypes are to be developed and demonstrated to various ODP users. The demonstrations shall include screen designs, screen navigation, utilization of controls on the various screens, and the general flow from screen to screen as envisioned for the fully implemented system.

  (2) Operational Environment

Subcontractor will provide recommendations and information regarding any changes in the existing operational environment which will improve effectiveness and efficiency of the database system and associated applications. These changes will be demonstrated in the proof of concept prototyping.

(3) User Feedback
This iterative process will permit additional feedback from all users to be communicated to Subcontractor as required.

- Develop Quality Assurance process

The deliverables from the Analysis phase will include the following:

- Draft architectural diagrams for ship and shore
- Draft data flow and data model diagrams
- Anlysis Phase Report containing
    (1) Statement of differences (BAFO versus New System Model)
    (2) Requirements specification for the new system model design.
    (3) Software Development Plan for the New System Model
    (4) Development/Implementation Project Plan
    (5) Installation Plan
    (6) Test plan for Ship and Shore
    (7) Training plan
    (8) Documentation Plan for New System Model
    (9) System Transition Plan
    (10) Quality Assurance Plan
    (11) Internet Access Plan

2. Specify Development and Production Environment Phase

This phase will deal with hardware and software and be completed before the end of the Analysis phase. It will include:

- Evaluate and select hardware and software for the database management system
- Determine the requirements for the development environment
    - Evaluate and select development tools for use with the Oracle database system
- Determine the requirements of the test environment

The deliverables from this phase will include:

- Specifications for database server
- Specifications for development tools
- Specifications for development environment
    (1) Hardware
    (2) Software
    (3) Operating procedures
    (4) Version control procedure

3. Development/Implementation Phase

The requirements for this phase will be specified in the Analysis Phase. The priority list for applications to be developed in this phase will be established by the completion of the Analysis Phase. Knowledge from the appropriate JOIDES panels, Tracor and ODP/TAMU will be used to compile this list. Many factors must be evaluated in establishing this list. Each group will have a different set of priorities based on different needs, these must be accommodated in the final list.

The panels and steering committee have developed a priority list based on the importance of various data types as well as the need to provide sufficient data capture capabilities on board the ship.

During the Analysis Phase, Tracor will determine the effort required to develop each application necessary to collect the data types outlined in Exhibit 1. This evaluation will establish the time necessary to complete each application and thus the cost. Some applications may be partially developed simultaneously due to the similarity in their requirements and coding. This may impact the order of development.

The ship laboratory environment is very dynamic. New instrumentation is being introduced on a routine basis. In order for the Subcontractor to develop applications addressing these instruments, ODP/TAMU and the science community must understand the operation of these instruments and identify the data to be captured before development work begins.

In order for efficient and cost effective development to proceed these and other factors must all be considered in the prioritization of applications for development.

The requirements and deliverables for this phase will be specified after completion of the Analysis Phase. The requirements shall include, but not be limited to, the following:

- Prototype and develop the applications to address each data type
- Prototype and develop other applications, as previously defined or subsequently negotiated
- Test and install application final versions

The shore based environment will be studied initially, primarily due to the fact that shipboard access for study and verification of the details associated with a working leg shall not be available until the first quarter of 1995. This approach may be advantageous in that developing an understanding of the shore systems will help form a basis to investigate the ship system. The ship system is the more complex of the two systems due to the processes and proximity. The deliverables shall encompass an overall system design which is based on requirements and information gathered, as well as subcontractor observations as to how the overall information and work flow processes may be performed more efficiently and accurately. This design shall be collectively referred to as the New System Model.

It is anticipated that within the first six months, the Subcontractor will be required to sail on the JOIDES Resolution a minimum of two (2), but no more than six (6) personnel, to become familiar with the shipboard operating environment. Three cruises are predicted at this time; the transit leg from Falmouth to Dakar (December 20, 1994 through January 4, 1994) and a working legs 160 (March 11, 1995 through May 4, 1995) and 161B (may 25, 1994 to July 4, 1994)

During the Analysis Phase, the data acquisition, data storage and applications associated with these data types will be evaluated and a new system model proposed to accomodate these data types. The following data types will be prioritized by the completion of the Analysis Phase accommodating the needs of all interested parties.

1. Age Profile data
2. Carbon/Carbonate data
3. Chem sample Data
4. Color Reflectance data
5. Core Photos data
6. Corelog Data
7. Coring shoe temperature tool data
8. Gas Chromatography data
9. GRAPE data
10. Hardrock Descriptions data
11. Index Properties data
12. Interstitial Water data
13. Leg/Site/Hole data
14. Logging Data
15. Magnetic Susceptibility data
16. Natural Gamma data
17. P-Wave data
18. Paleomagnetic data
19. Paleontology Data
20. Rock Eval/Genofina data
21. Sample Data
22. Sediment Description data
23. Shear Strength data
24. Smear Slide data
25. Sonic Velocity data
26. Structure data
27. Tensor/Sonic Core Monitor data
28. Thermal conductivity data
29. Thin section data
30. Underway Geophysics data
31. WSTP data
32. XRF/XRD

ISSUES RELATED TO DBMS

1. HISTORY

2. STEERING COMMITTEE

3. LOGGING DATA

The ODP Data Base Management Project.

---------------The history of this project is as follows:---------------

1991

In early 1991 JOIDES panels identified the ODP computing environment and data base systems as obsolete and in need of updating.

1992

In 1992 a Data Handling Working Group specified the funcionality and parameters for an upgraded system.

In July 1992 TAMU put together a proposal to implement the upgrade. This was rejected by PCOM, who requested that an RFP be issued and distributed internationally. TAMU, working with a JOIDES computer RFP committee, put together and issued an RFP in October 1992.

This RFP had 3 phases. In Phase I letters of intent were requested. In Phase II three successful bidders were selected and given $50K each to write full blown proposals, after travelling on the drill ship to study the ship- board environment. In Phase III a successful bidder would be chosen to implement the upgrade.

1993

Three $50K awards were made by TAMU in Jan 1993 to EG&G, Tracor, and the Meyer Group.

The EG&G and Tracor proposals were selected for continued evaluation in July 1993 and submitted full blown proposals.

1994

On May 18 and19 1994 TRACOR was selected as the successful bidder.

On May 20, 1994 the BCOM endorsed this selection and funding for the project provided a Steering Committee was implemented by JOI Inc to oversee the project with TAMU and review contracts before any contracts were signed.

The Steering Committee was appointed by JOI Inc in July 1994. It met for the first time on Sept 14, 1994 and developed a draft statement of work apon which TAMU could base a contract.

STEERING COMMITTEE.

Mandate.

The Role and Mandate for the Steering Committee is to provide overall guidance to TAMU on the development of the ODP Data Management System. It's specific tasks include:

- Assist in the development of Program Goals
- Assist in the implementation and review of a data policy for JOI/JOIDES
- Provide guidance for development of the ODP Data Management system, in particular;

a) **Assist in the development of the statement of work**
b) Review System Requirements and Design documents
c) Provide guidance to TAMU and it's developer in the nature and priorities of various user requirements.
d) Review progress and technical reports
e) Provide JOI Inc. with progress reports at least quarterly and report to PCOM at each of their meetings
f) **Review final contract statement of work after TAMU has completed contract negotiations, and make written recommendation on this project to JOI Inc. before any subcontracts are signed by TAMU or it's designees.**

Membership

T.Ahern (IRIS)
J. Baldauf (TAMU)
D. Barnes (BRG)
J. Coyne (TAMU)
T. Hagelburg (SMP)
A. Kerr (SIO)
K. Kibler (TAMU)
B. Lewis Chair
R. Mithal (TAMU)
C. Moore (NGDC)

Draft Report of the JOI Inc. Data Management Steering Committee Meeting of Sept. 13,14, 1994

The meeting was held on Sept. 13 at UTIG and on Sept. 14 at TRACOR. The principal agenda items for the meeting were:

o Review of the mandate of Steering Committee (SC)

o The establishment of a Statement of Work (SOW) that could form the basis of a contract with TRACOR for the implementation of a new Data Base Management system (DBMS) for ODP/TAMU

o Establishment of input required of the JOIDES user community

Important SC Recommendations:

The SC strongly recommends to JOI that an overall SOW should be developed for the whole project with specified milestones and deliverables, along the lines of the TRACOR proposal rather than using a task-orientedapproach as originally planned by TAMURF. The original waterfall approach was cautioned against by committee members with previous experience in developing and managing large-scale software development contracts as a sure-fire trap for cost over-runs.

It was recognized by the committee and TRACOR that a more detailed SOW will only be established after an initial analysis phase and after input of some information from TAMU and the JOIDES community. It is expected that this more detailed SOW will be developed at the next meeting between TRACOR and the SC in December. The SOW resulting from the December meeting will include a more specific list of deliverables and anticipated delivery times for these deliverables. The SC feels that interaction between TRACOR and the SC in the development of this detailed SOW is very important.

Appendix K11

K11

Important SC recommendations

TAMU would pass an electronic version of the current data attributes (and any comments about these attributes) to C. Moore and T.Hagelberg who will get comments on these attributes from IHP and SMP and distribute these comments to the SC. In addition, TAMU wouldlocate and pass a copy of the "black book" containing copies of the1993 IHP/SMP review of data types and parameters to C. Moore andT. Hagelberg imediately.

Lewis would poll PCOM as to whether the logging data should be included in the new DBMS or whether these data should reside only at LDEO

The need for rapid verification of prioritization of data types to be input to the DBMS was identified. J. Coyne was asked to imediately forward to C. Moore and T.Hagelberg a new grouping by laboratory of the various data types. C.Moore and T.Hagelberg (IHP and SMP liaisons) were tasked to pass this grouping and a current prioritized list of data types to respective panelsand to synthesize panel input on the prioritization associated with the attached SOW, as well as comments on the usability of the present data acquisition software. That is, which data entry software can be incorporated into the new DBMS and which needs major rewriting.

ODP/TAMU will establish a broadcast email account at TAMU where SC mail can be broadcast distributed.

DBMS Report to PCOM November 29, 1994

-Ocean Drilling Program Database-

ProjectStatement of Work

(Written by TRACOR)

Summary

DP Data Management Project stipulates that a new database
, including both hardware and software, be installed on the
ES Resolution, as well as at the ODP facilities located at Texas A&M
rsity. This system will be integrated into heterogeneous
uting environments at both sites, and will be usable by all
orms in the respective networks. The shipboard system will
ort data acquisition and retrieval through both manual and
umentation interfaces. Both sites will be equipped with existing
custom data retrieval and analysis applications. Applications and
phical user interfaces will be developed or modified as required in
ler to make use of the new system and its capabilities.
he i nary project objective is to improve the quality, productivity
d visibility of the science resulting from ODP drilling by providing a
ta management environment which meets current and future
eeds of the scientific user community.

Appendix K13

K13

Project Scope

The scope of this project is defined in the Technical Proposal, Best and Final Offer presented to the Ocean Drilling Program April 29,1994. TRACOR Proposal number 035-751-30-11.

Milestones / Deliverables

ITEM Completion date

ANALYSIS PHASE 4/15/95

Subtasks

Verify Initial Study
Determine Detailed Requirements
Determine Prototype Requirements

Milestone - Cost Benefit Analysis for Mac 12/1/94
Dependency - Decision from ODP on Mac/PC Integration 12/15/94

Deliverables
- Draft Functional Requirements Specification
- Logical Data Model
- System Development Plan
  - Testing Strategy
  - Development Strategy
  - Configuration Control
  - Documentation Strategy
  - Internet Access Strategy

SPECIFY DEVELOPMENT AND PRODUCTION ENVIRONMENT 1/1/95

Subtasks:
Analysis of Software Development Tools
Analysis of Hardware Platforms
Determine Physical Design

Deliverables

Hardware/Software Development. and Production Environment Specification

DEVELOPMENT / IMPLEMENTATION PHASE 7/15/96

Subtasks	
Top Level Frames Prototype	4/15/95
Group 1 Frames Prototype	6/1/95
Group 2 Frames Prototype	
Group 3 Frames Prototype	
Group 4 Frames Prototype	
Group 5 Frames Prototype	
Group 6 Frames Prototype	
Group 7 Frames Prototype	
Miscellaneous Applications Prototypes	

Install Final Versions, Documentation

Deliverables (each prototype)
- Physical Database Schema
- Operational Database / Data Mgmnt System
- Frame Specifications
- System Documentation

Total Labor Cost - $1.8M

DATA CATEGORIES

****(note that contents of these groups are subject to review/revision)****

Group	Rank
"Corelog Data, Age Profile, Leg/Site/Hole"	1
Sample D	2
Group 2	
Sed Descriptions	3
Paleo Da	8
Smear Slide	10
Hardrock Descriptions	11
Structure	
Group 3	
Thermcon	4
Sonic Velocity	5
Shear Strength	6
Index Properties	7
Paleomag	12
Group 4	
XRF/XRD	9
Rock Eval/Genofina	13
Carbon/Carbonate	14
Gas Chromatography	15
IW	16
Group 5	
ADARA	17
WSTP	18
Tensor/Sonic Core Monitor	19
Underway Geophysics	20
Seismic	21
Core Photos	
Color Reflectance	
Group 6	
GRAPE	22
P-Wave	23
Mag Susceptibility	24
Natural Gamma	25

Assumptions:

1. The intent of the 9/14/94 meeting at TRACOR is to have an approved Statement of Work such that contract negotiations between TRACOR and TAMRF can be concluded by 10/1/94.

2. All dates given in this proposal are based on an assumed project start date of 10/1/94.

3. Cost indicated is labor only.

4. The application groupings identified in the development schedule are subject to change as a result of user community review.

5. New requirements (i.e. those not specifically identified in the Project BAFO) will affect project schedule and cost.

6. Review cycles are included in development schedules, and any delays will affect deliverables accordingly.

7. ODP/TAMU will have final contract authority.

8. ODP/TAMU will procure all system hardware and off-the-shelf software in a timely fashion.

9. Development schedules presented here may be affected by and adjusted as necessary in order to accommodate ship schedules.

10. Conversion of the legacy data is not a requirement of this project.~

K17

Actions since the Steering Committee meeting Sep 14

1. a) Moore and Hagelburg liaised vigorously with IHP and SMP to get input to data type and priority, using Mosaic. Task completed in early November.

1. b) CLICOM defining software functions for core-core and core-log integration and implementation of software outside the TRACOR contract

2. On Nov 28 a draft Statement of Work was received by Lewis from TAMU for review.

3. On Nov 28 a letter was received from Coyne outling process ODP-TAMU has been going through to achieve SOW.

4. In late Nov 1994 it is revealed that TAMU has signed a contract with TRACOR. The SC was not notified nor has reviewed any material pertaining to this contract. The contract with TRACOR was authorized by JOI Inc.

LOGGING DATA

1. Issue

To what extent should logging data be incorporated into the DBMS

2. Possible solutions

Option 1. No incorporation, no action. CLICOM to take care of corelog integration.

Option 2. Maintain data base at BRG with TRACOR providing user programs for accessing the data, CLICOM to take care of corelog integration software. (What sort of data base system does BRG have, is it accessible easily ?. What extra costs are entailed ?)

Option 3. All logging data approved by the SC input to the new DBMS, TRACOR to provide user programs for accessing the data, TRACOR to take care of corelog integration software.

Option 4. All logging data approved by the SC input to the new DBMS, TRACOR to provide user programs for accessing the data, CLICOM to take care of corelog integration software.

Appendix L1.1.1

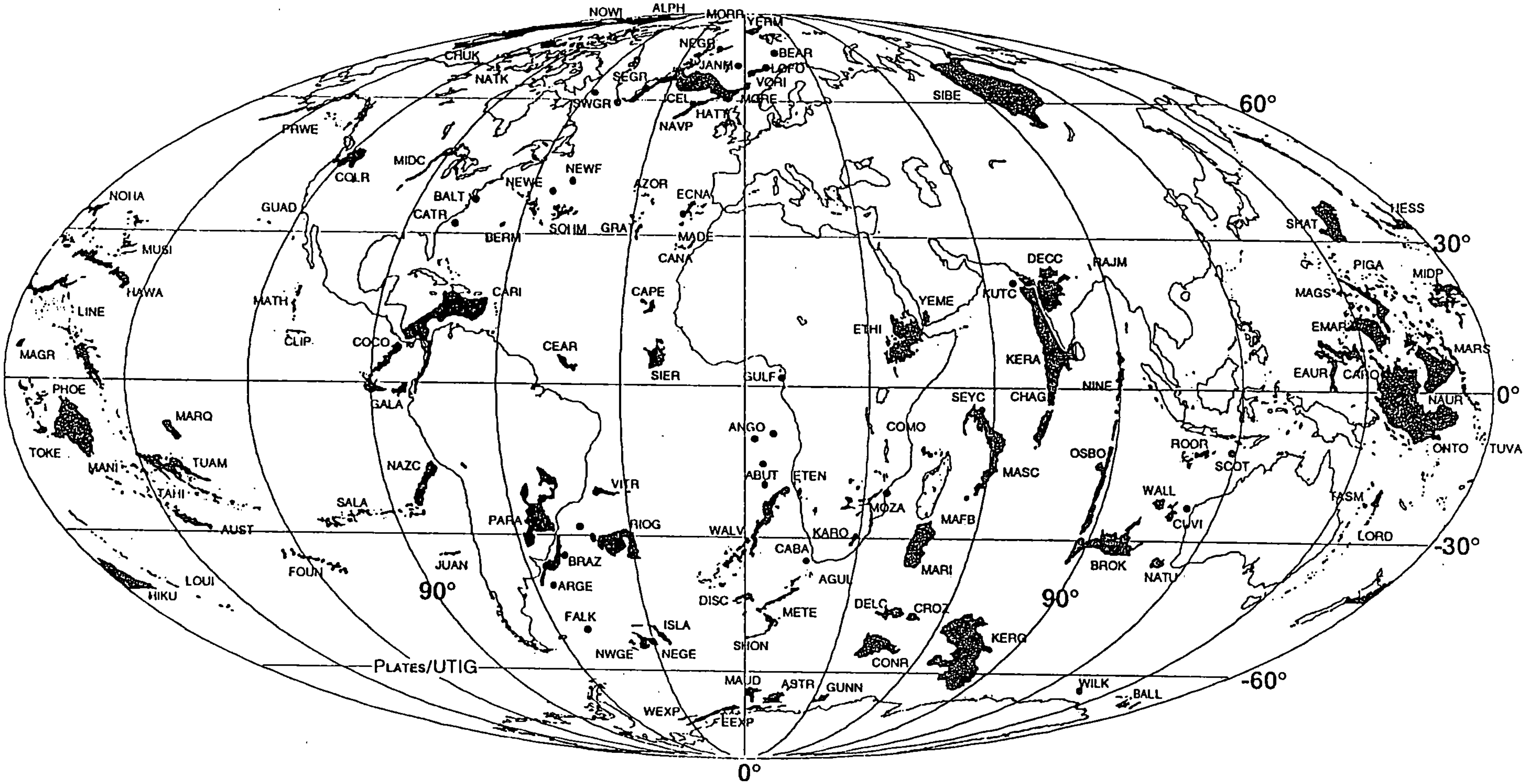


Figure 1. Global large igneous provinces (LIPs), including continental flood basalt and associated intrusive provinces, volcanic passive margins, oceanic plateaus, submarine ridges, ocean basin flood basalts, and seamount groups (see Table 1 for key to abbreviations). Solid circles indicate volcanic passive margins where seaward dipping reflector sequences have been recognized (see Table 2 for key to abbreviations). Modified from the work by *Coffin and Eldholm* [1991] with additional data from K. Hinz (personal communication, 1992). Digital map courtesy of the Plates project (Institute for Geophysics, University of Texas, Austin).

L1.1.2

Caribbean LIP

Why drill here for a Large Igneous province?

1. A size comparable to many of the largest LIPs
2. Good evidence that it is indeed a plume:

   near-synchronous ages in several places
   picritic to tholeiitic compositions showing
   high % melts

3. Number of on-land exposures allow more detailed extrapolation from drilling
4. Can be constrained with one transect
5. Lacks age and chemical complexity of OJP, KP
6. Sites also are an important part of K-T impact study

Goals of Caribbean LIP drilling:

1. Document the synchroneity of the volcanic pulse
2. Look for any age progression in the basement (head-tail model)
3. Constrain the magmatic diversity of the plateau--evidence of heterogeneous melts, age or compositional variation across plateau?
4. Tie the main body of the plateau to the on-land exposures
5. Examine evidence (magmatic, chemical) for a link to the Galapago hot-spot
6. Constrain the cooling and subsidence history of the plateau
7. Provide data on the distal ejecta blanket of the K-T impact; constrain volume of ejecta and directional impact

L1.1.4

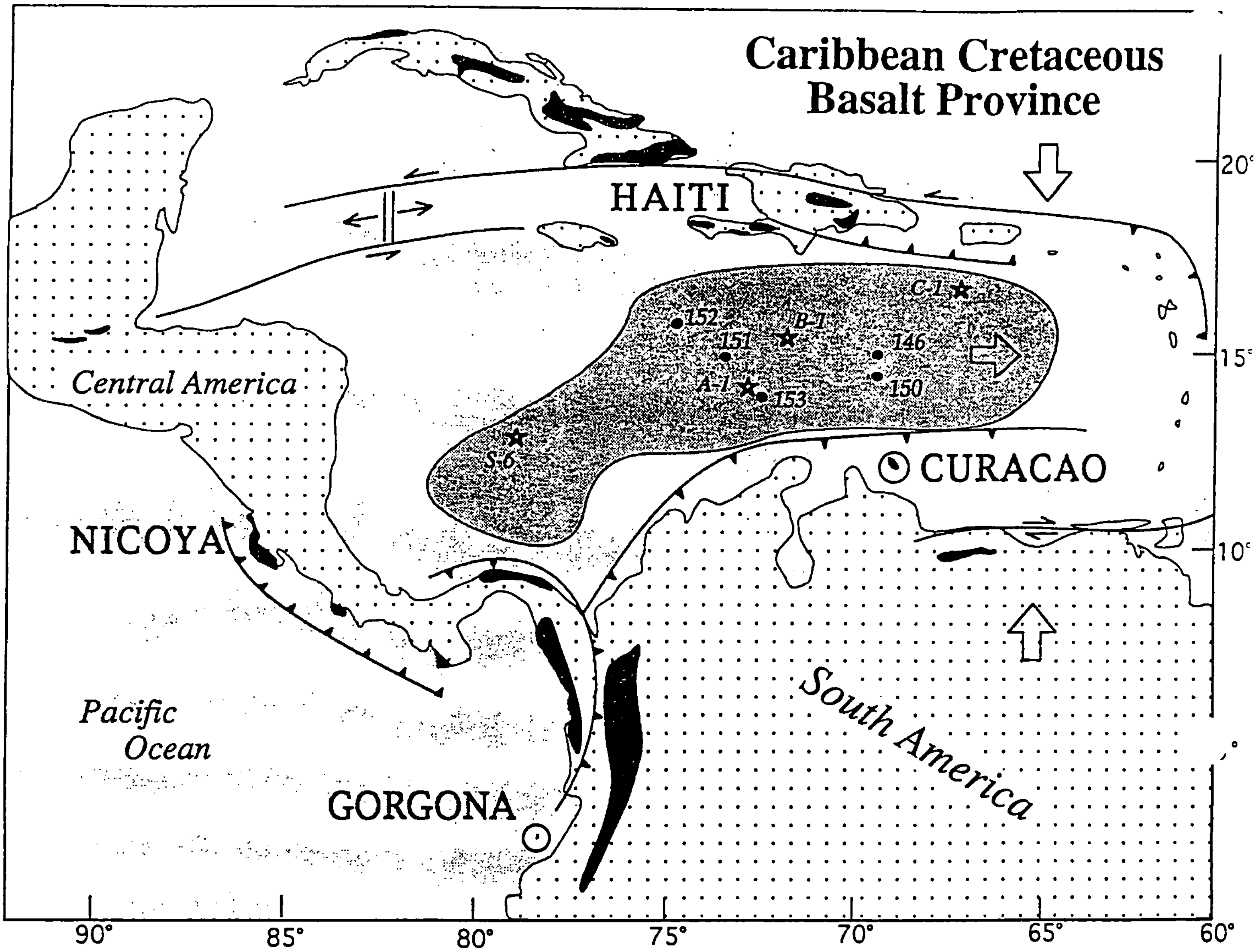


Fig. 1 Map of the CCBP, showing the preserved oceanic central area. The dark pattern in the Caribbean Sea corresponds to the mapped extent of seismic horizon B" in the eastern half (Venezuelan Basin) with a presumed western extension in the Colombian Basin and southern Nicaraguan Rise. Black patches on land are obducted fragments of the CCBP. Four on-land portions are located: Nicoya (Costa Rica), Isla Gorgona (Colombia); Dumisseau Formation (Haiti), and Curaçao. Drilled sites 146, 150, 151, 152, and 153 of DSDP Leg 15 and proposed dirlling sites are also shown.

Appendix L1.1.5

2 Leg Caribbean?

		Days	
Leg 1	Miami to S2A	2	
	S2A	6.7	
	NR1/2	5.5	
	NR4	3.0	
	B1 or S3	10.9	
	S7	9.4	
	C1	10.9	
	Site transit	4.0	
	to San Juan	1.0	
		53.4	2.6 contingenc
Leg 2	San Juan to CB1	1.0	
	CB1	1.9	
	A1	22.1	
	S6	22.6	
	Site transit	5.7	
	to Panama	1.0	
		54.3	1.7 contingenc

CARIBBEAN OCEAN HISTORY

Late Cretaceous - Cenozoic paleoceanograph
paleoclimatology, and chronostratigraphy

- K/P boundary
  ejecta mass, dispersal and deposition mechanisms, environmental effects
- tropical Cretaceous oceans
- Eocene low latitude SST's
- chronostratigraphy ~
  Cretaceous & Paleogene
- Caribbean Current initiation &
  evolution ~ Neogene
- intermediate water mass variations
- Late Quaternary climate change ~
  ultrahigh resolution
- modern anoxic basin

7 primary sites, 1 leg's time (plus to/from port)

⇒ OHP themes addressed ⇐

OHP one-leg 415-Rev_

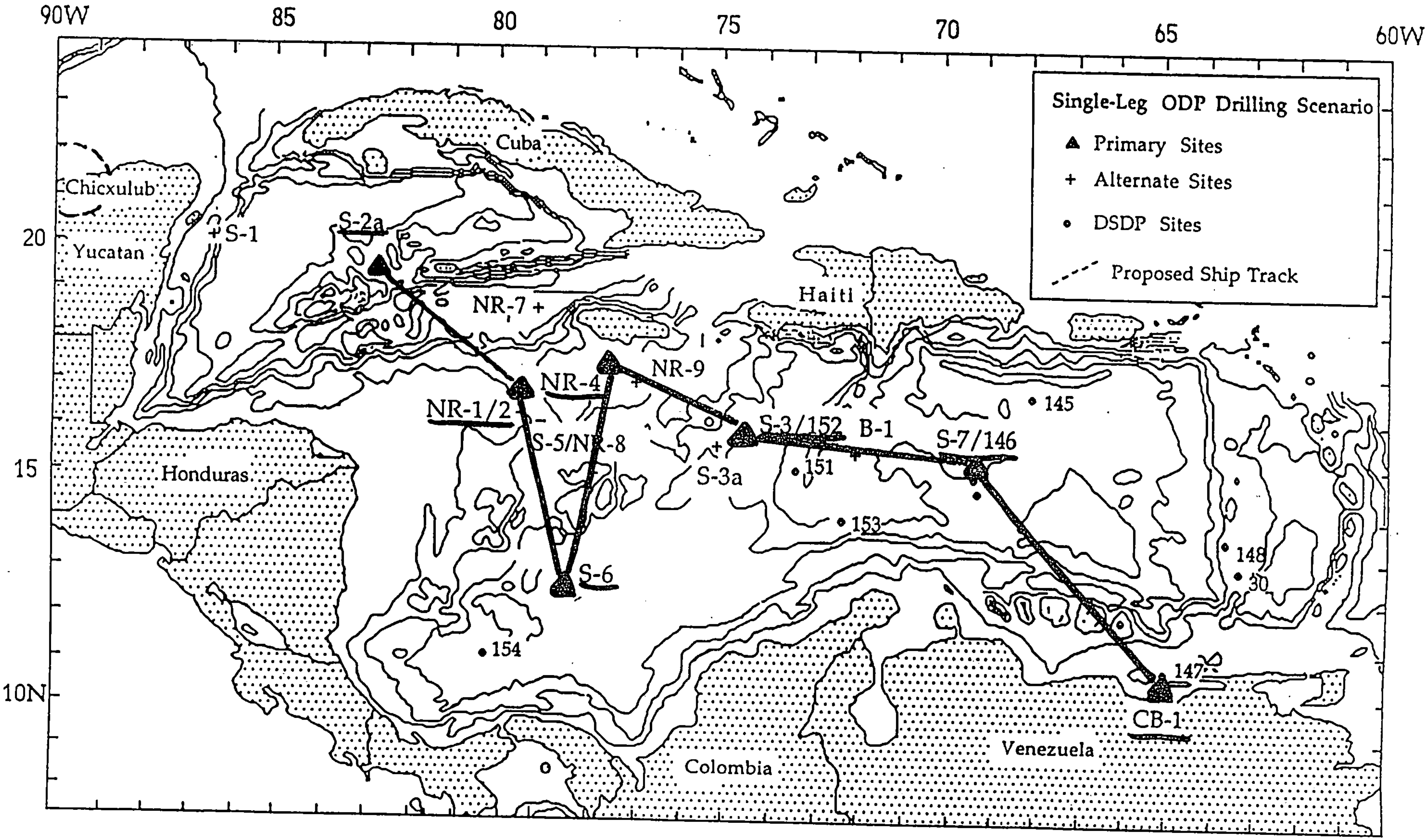


Fig. 1a: Proposed ODP Caribbean site locations and ship track for a single-leg scenario. Site CB-1 in the Cariaco Basin is from ODP proposal #434 (Peterson 1993). Sites NR-1 and NR-4 are from ODP proposal #408 Rev (Droxler et al 1992), and sites S-1 through S-7 are from ODP proposal #415 Rev (Sigurdsson et al 1993). Site B-1 is from ODP proposal of A. Mauffret et al (1994).

SGPP THEMES

SEA LEVEL AND FACIS ARCHITECTURE

FLUID FLOW AND GEOCHEMICAL FLUXES

CARBON CYCLING FROM THE SEA FLOOR TO THE BASE OF THE BIOSOPHERE

6. Ranking of Programs in the FY96 Prospectus

SGPP voted only on Bahamas 412, California 422, Caribbean KT 415, Costa Rica 400, Juan de Fuca 440, and Sedimented Ridges II SR-REV3

Rank	Proposal	Area	#votes	Total	Avg.	Std. Dev.
1	412	Bahamas	10	47	4.70	1.83
2	400	Costa Rica	10	42	4.15	1.00
3	SR II	Sed. Ridges	10	41	4.05	1.64
4	440	Juan de Fuc	10	36	3.55	1.21
5	386	Calif. Marg	1 0	24	2.35	1.25
6	415	Caribbean	10	22	2.20	1.87

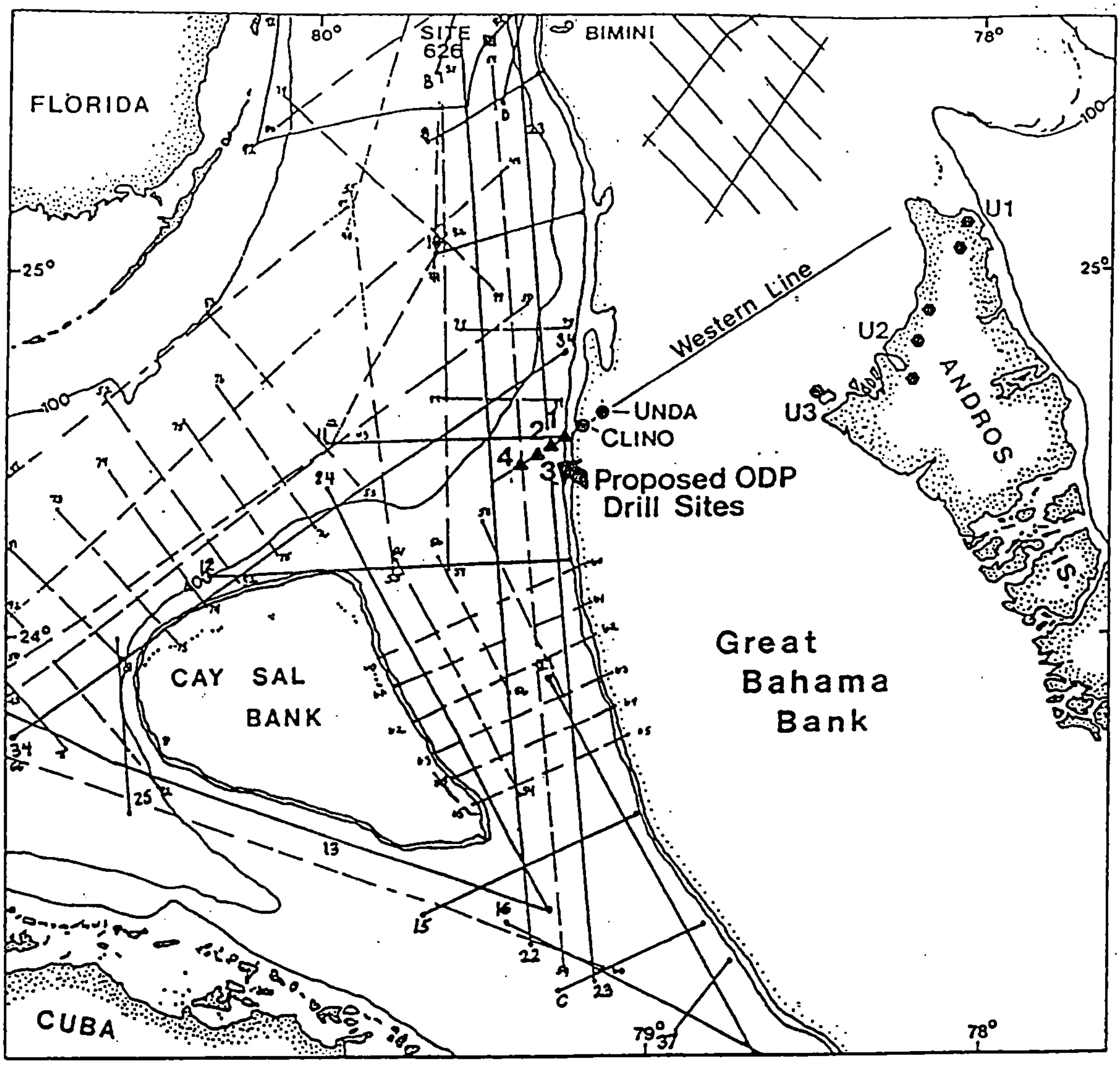


Figure 1: Location map of the Bahamas transect along the Western seismic line with the four proposed drill sites (1-4). UNDA and CLINO are the shallow-water drill sites drilled from a jack-up barge during the Bahamas Drilling Program, and U1-3 are the shallow core borings drilled on Andros Island. Also illstrated are the available seismic lines in the vicinity of the transect.

sedimentary record of sea-level changes. The isotopic record of the microfossils in the basinal parts of the sequences could be used as a sea-level proxy and be correlated directly to the two other indicators of sea-level changes.

For determining the <u>amplitude of sea level changes</u>, the light-dependent sediment production of carbonate secreting organisms provides carbonate sequences with an accurate paleobathymetric indicator. Because carbonate production in low-latitudes is an order of magnitude higher than most sea-level changes, carbonate platforms and reefs are able to keep or catch up with sea-level rises and maintain a relatively flat platform top (Kendall and Schlager, 1981, Schlager 1981). Sea-level drops usually expose the platform top which results in the development of a suite of characteristic features that are easily recognized in the rock record (e.g. karst, red soils, caliche horizons, black pebble horizons etc.) or as diagenetic zones with a typical petrologic and stable isotope signal (e.g., Halley and

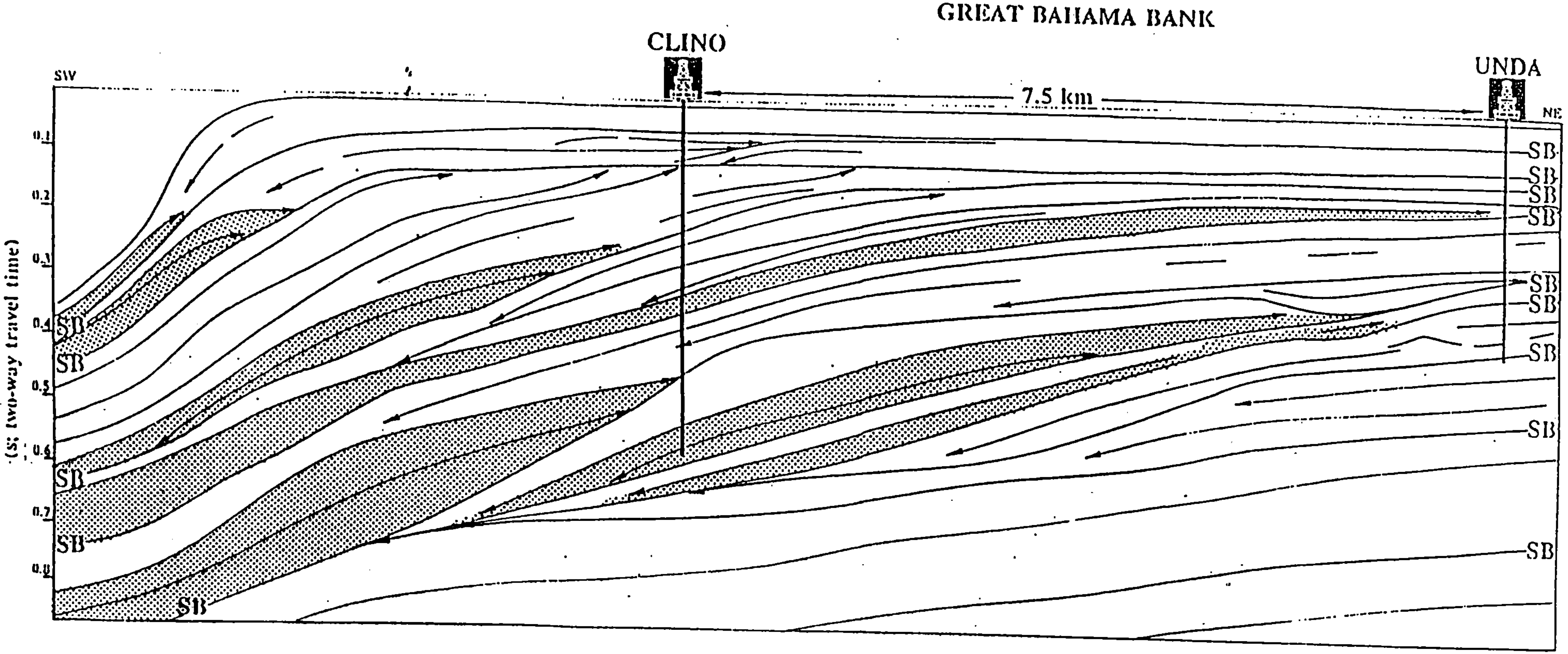


Figure 6: Depositional geometries drawn from seismic reflection pattern through western margin of Great Bahama Bank. Stippled areas are onlapping units that are interpreted to represent lowstand deposits. White areas are either transgressive or highstand deposits.

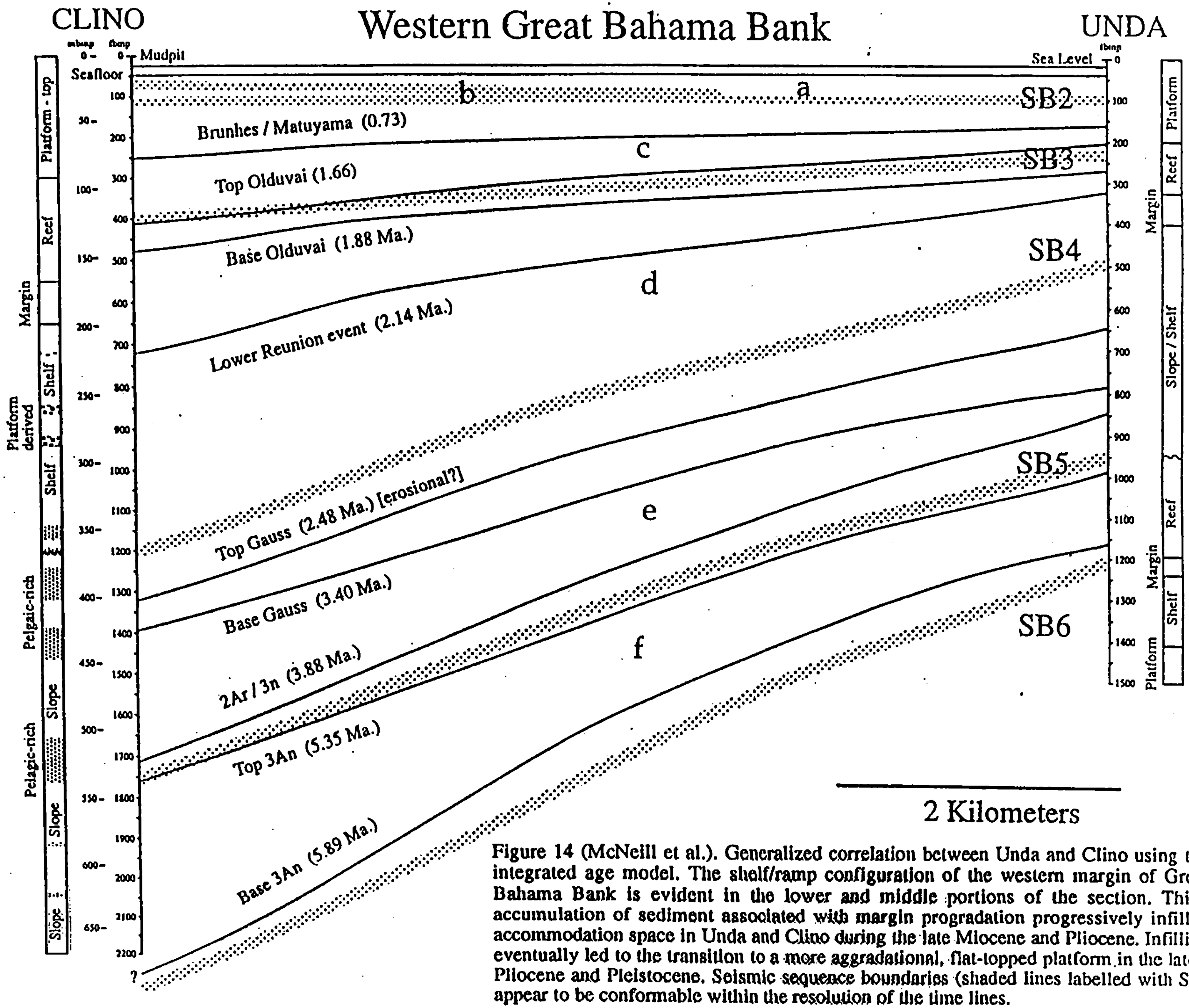


Figure 14 (McNeill et al.). Generalized correlation between Unda and Clino using the integrated age model. The shelf/ramp configuration of the western margin of Great Bahama Bank is evident in the lower and middle portions of the section. Thick accumulation of sediment associated with margin progradation progressively infilled accommodation space in Unda and Clino during the late Miocene and Pliocene. Infilling eventually led to the transition to a more aggradational, flat-topped platform in the latest Pliocene and Pleistocene. Seismic sequence boundaries (shaded lines labelled with SB) appear to be conformable within the resolution of the time lines.

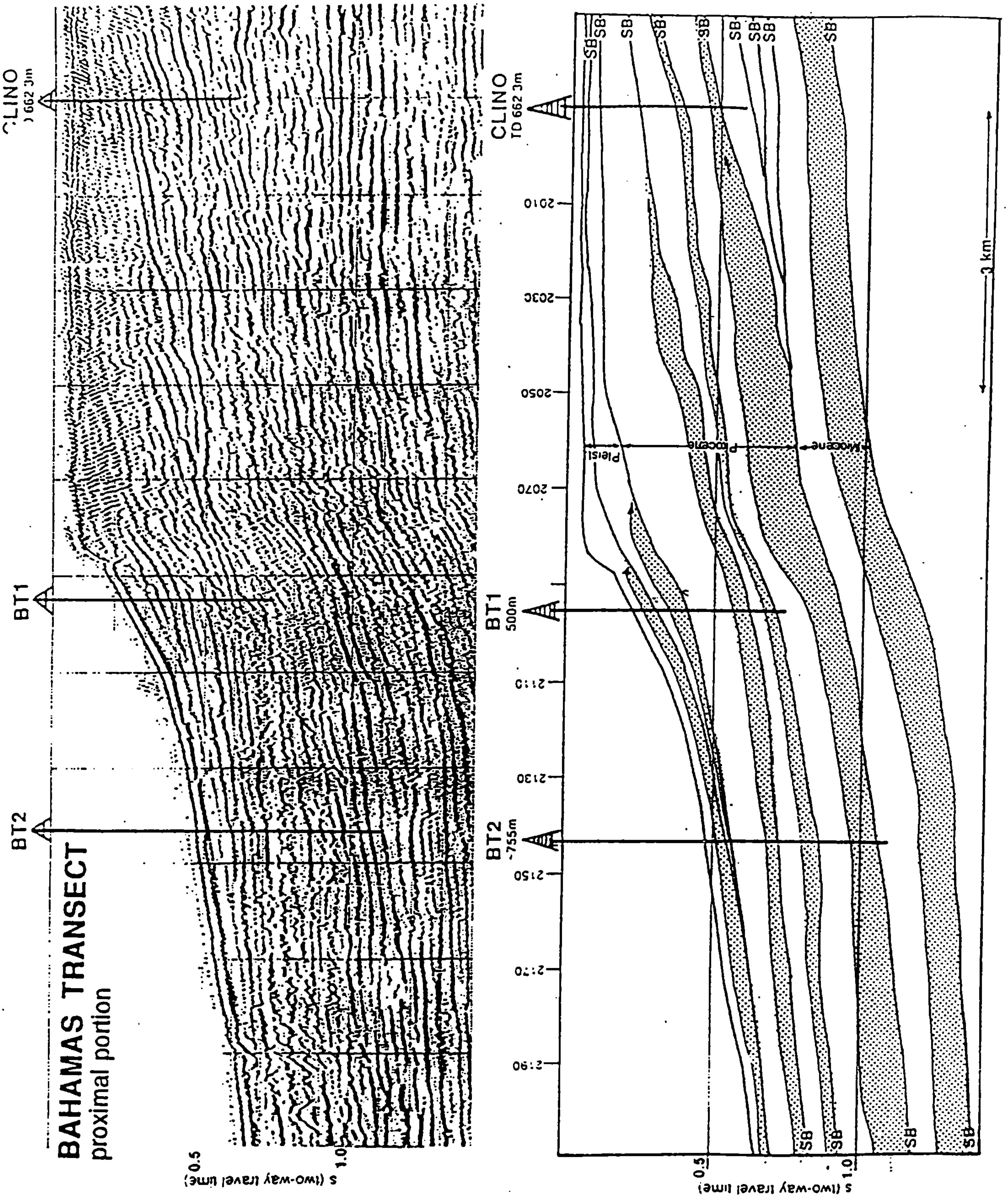


Figure 10: Seismic line and line drawing of proximal portion of Bahamas transect with drill site CLINO on Great Bahama Bank and the proposed drill sites BT1 and BT2 in the Straits of Florida. Stippled areas are onlapping units; white areas are either transgressive or highstand deposits.

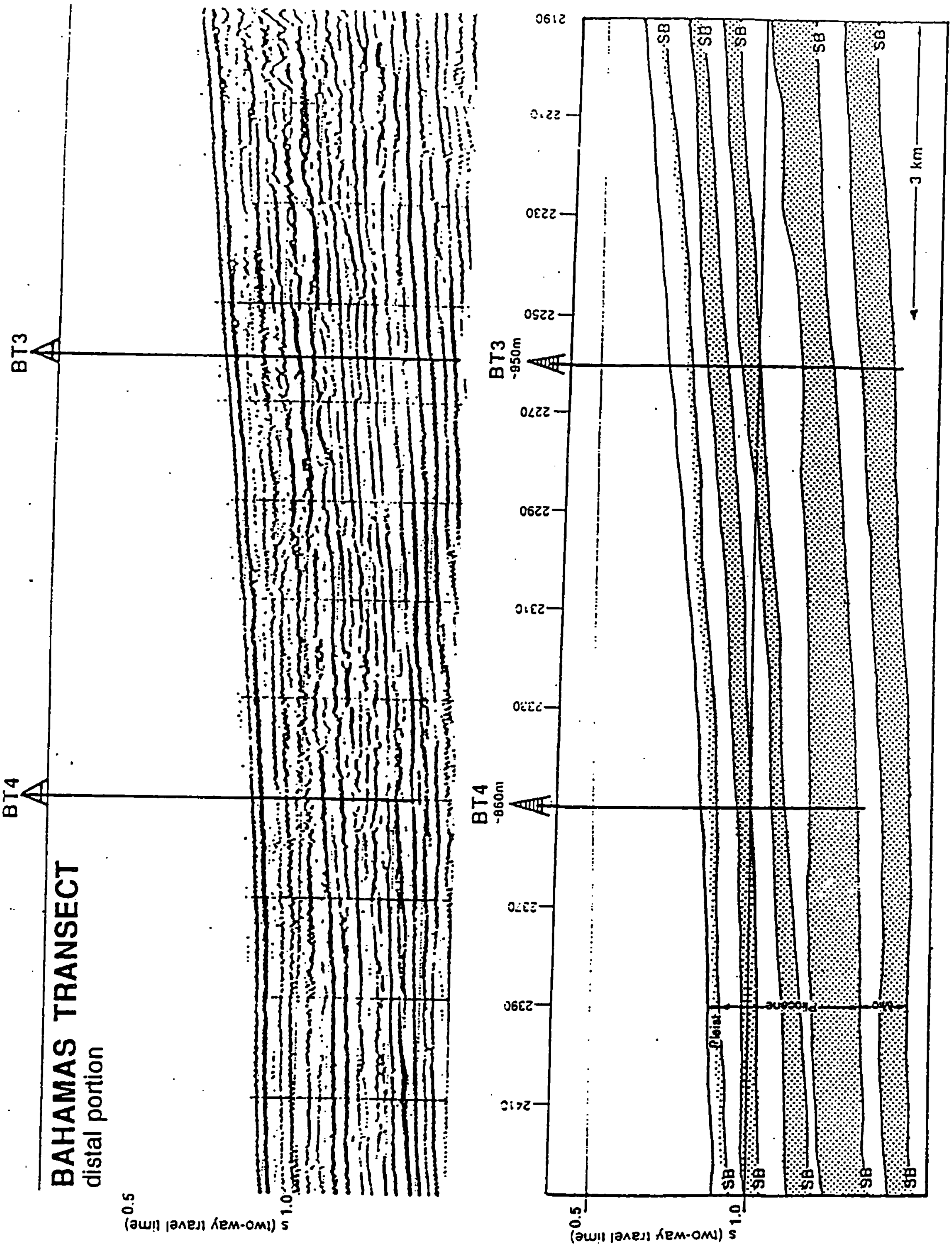


Figure 11: Seismic line and line drawing of distal portion of Bahamas transect with the proposed drill sites BT3 and BT4 in the Straits of Florida. Stippled areas are onlapping units; white areas are either transgressive or highstand deposits.

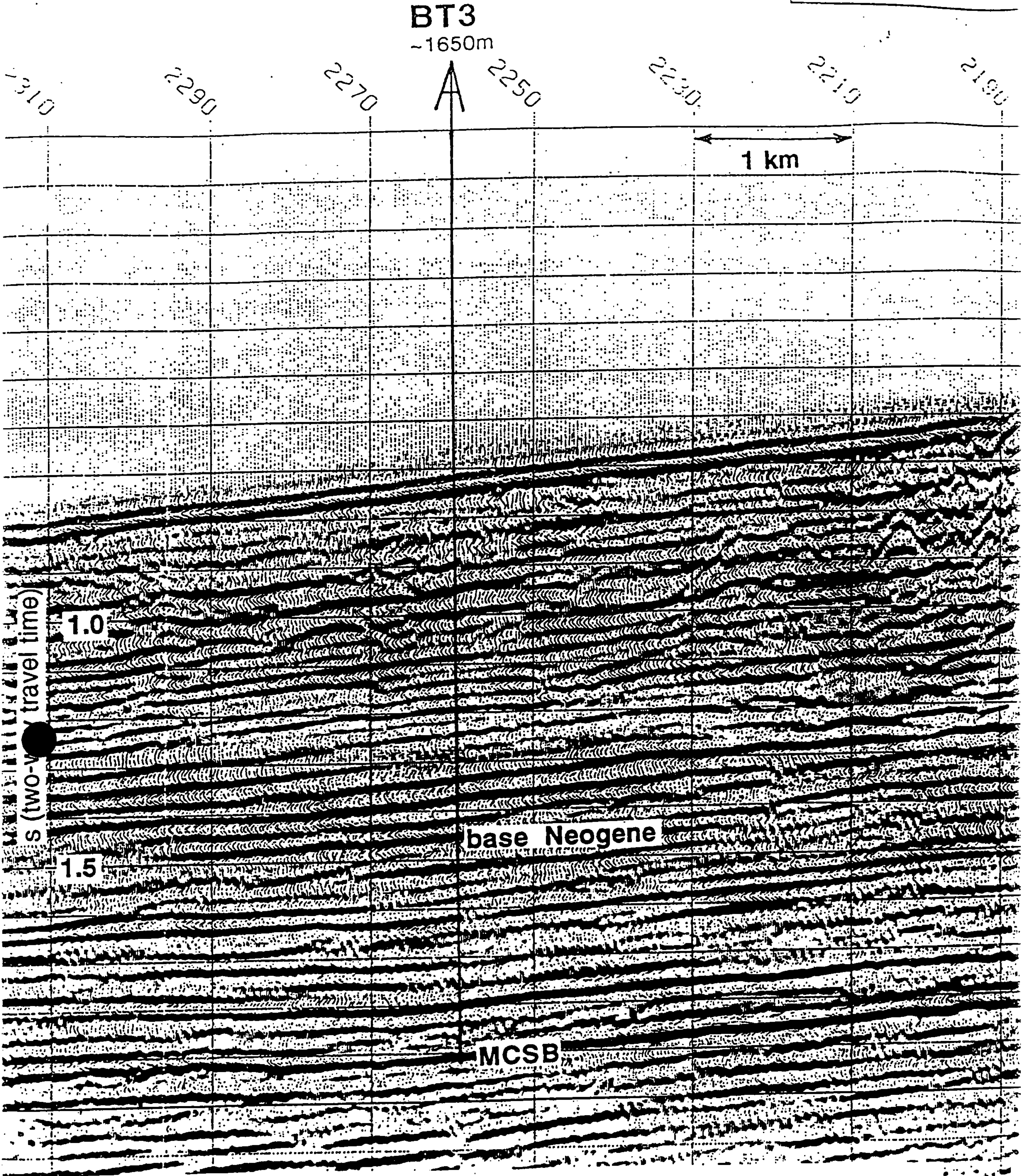


Figure 10: Seismic line with drilling location of BT3, the site proposed to be suitable to reach the MCSB. The site has two objectives, one for sea level and the second major objective is to reach the MCSB 1) to assess the cause of the platform demise in the Mid-Cretaceous, 2) to potentially sample the K/T boundary, 3) to acquire a low-latitude record of the Paleogene "Doubthouse" and its transition into the Neogene "Icehouse", and 4) determine the onset of Florida Current.

Appendix L1.4.1

MAIN OBJECTIVES OF COSTA RICA CONVERGENT MARGIN DRILLING

CONTRACTIONAL PROCESSES-TECP THEME

PROGRESS IN UNDERSTANDING OF EARTHQUAKES

CONVERGENT MARGINS: NEXT STEP AFTER BARBADOS: QUANTITATIVE, PHYSICAL AND CHEMICAL MASS BALLANCE, WITH ON-LAND TIE UP; MULTIDISCIPLINARY APPROACH

-PART OF LONG-TERM COHERENT STRATEGY (NICARAGUA TO COME?)

AIMS:

1 RELATIVE IMPORTANCE OF FRONTAL ACCRETION, UNDERPLATING, OUT-OF-SEQUENCE SUBDUCTION, AND SUBDUCTION EROSION

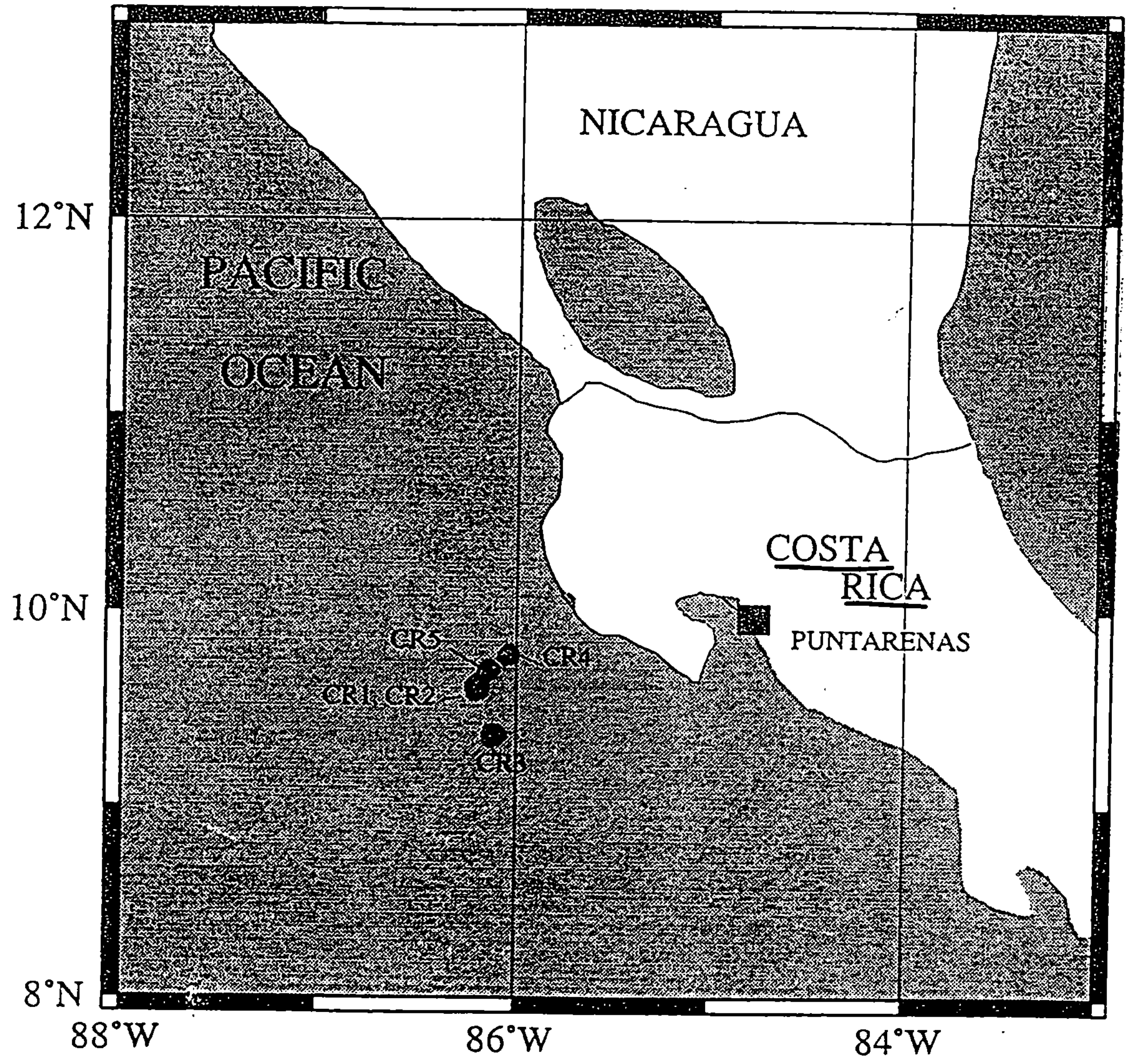
2) TIMING, RATE AND MODES OF ACCRETIONARY PRISM DEVELOPMENT

3) FLUID CONTROLS ON RHEOLOGY

4) SUBCRUSTALLY ACCRETED SEDIMENTS AND GEOCHEMCAL FLUXES Be etc,

Appendix L1.4.2

COSTA RICA ACCRETIONARY WEDGE



Appendix L1.4.3

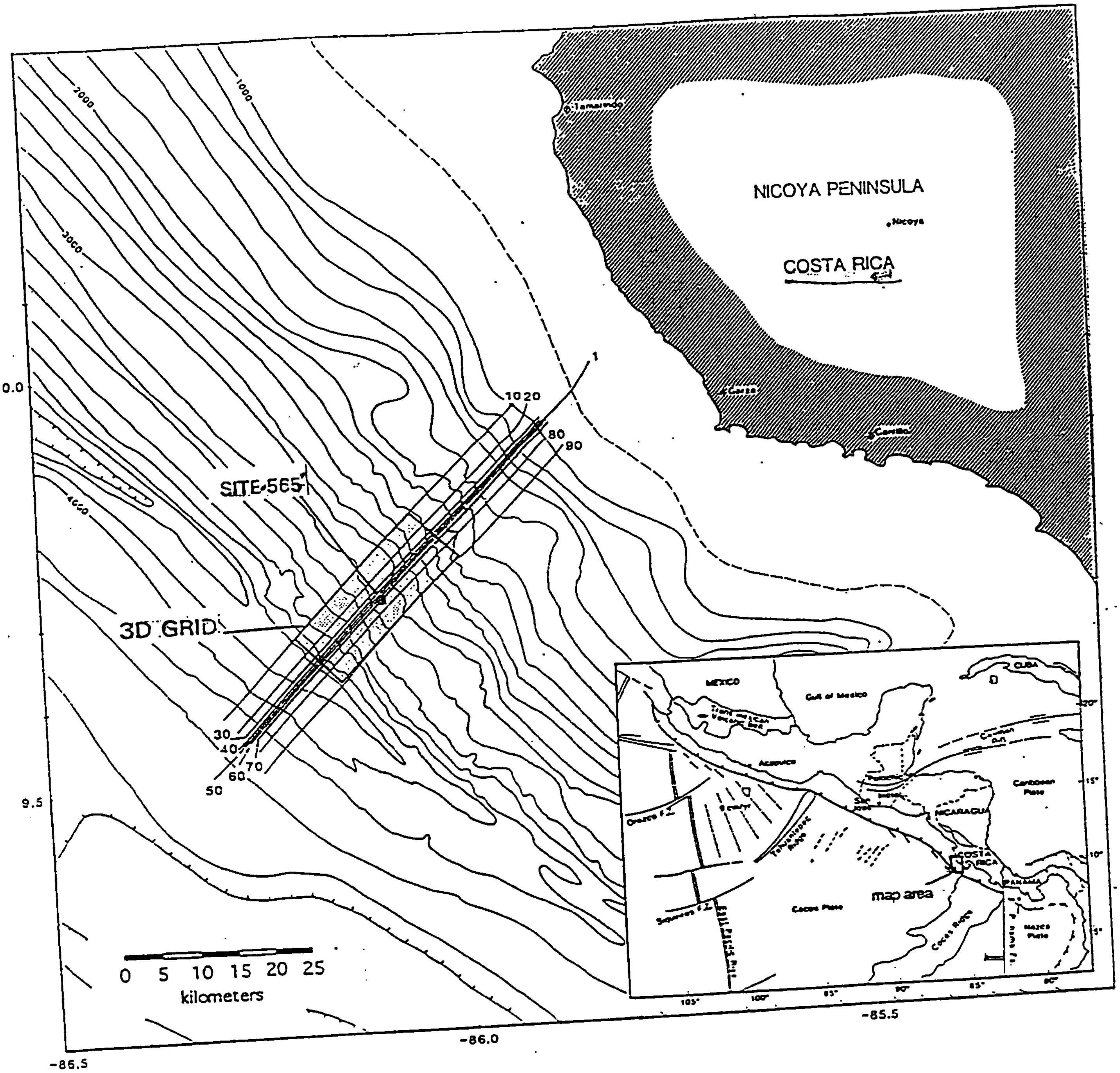
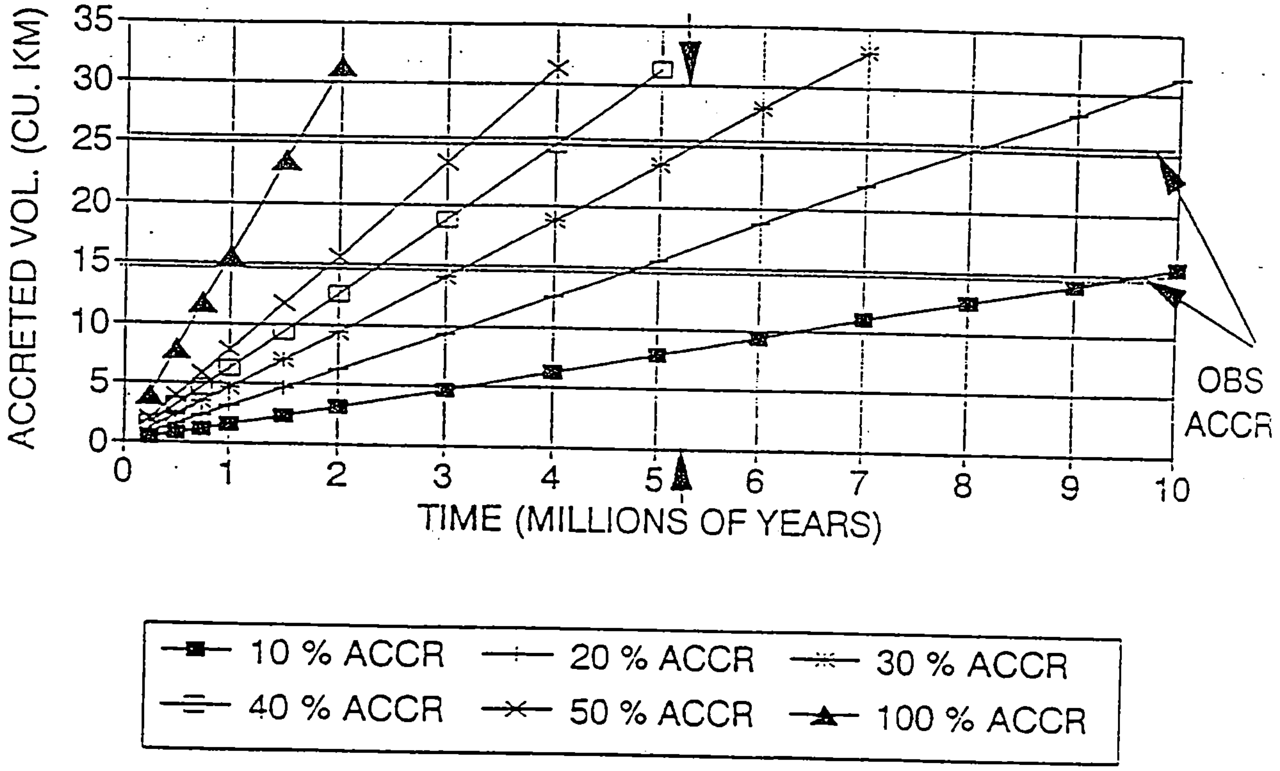


Figure 1a

ACCRETION VS TIME: COSTA RICA

SOLID ROCK VOLUME ACCUMULATION



13 Figure

Appendix L1.4.5

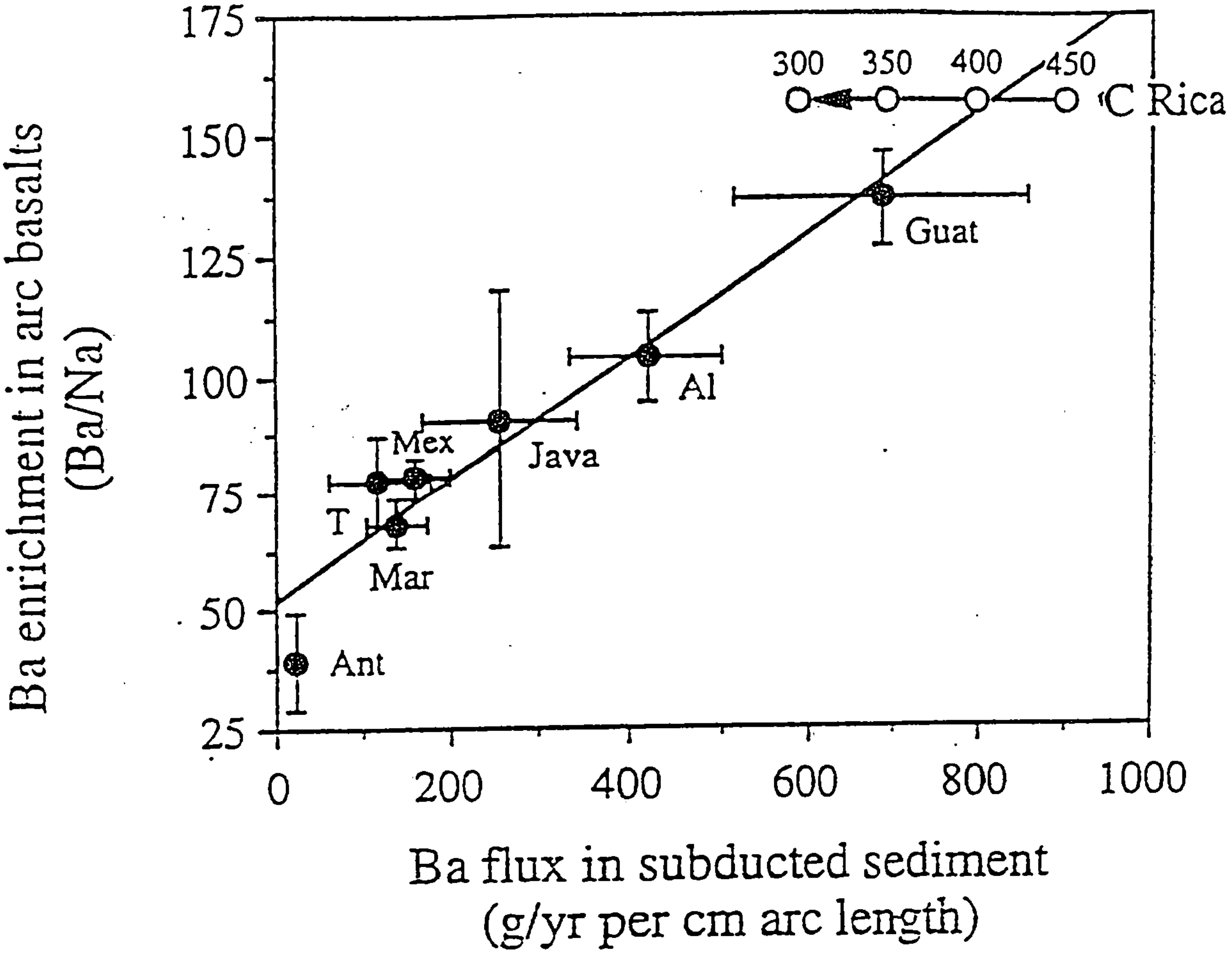


Figure 1

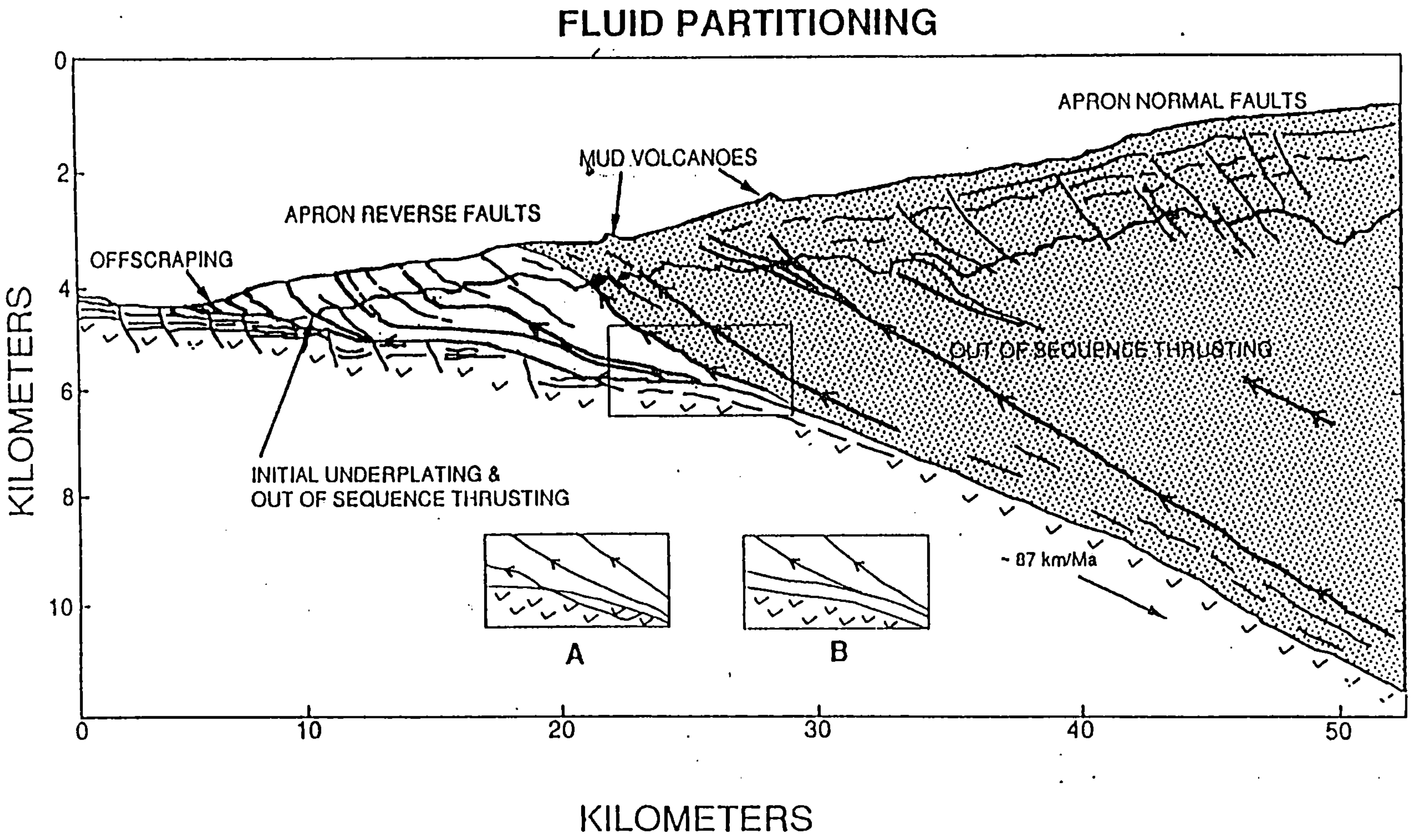
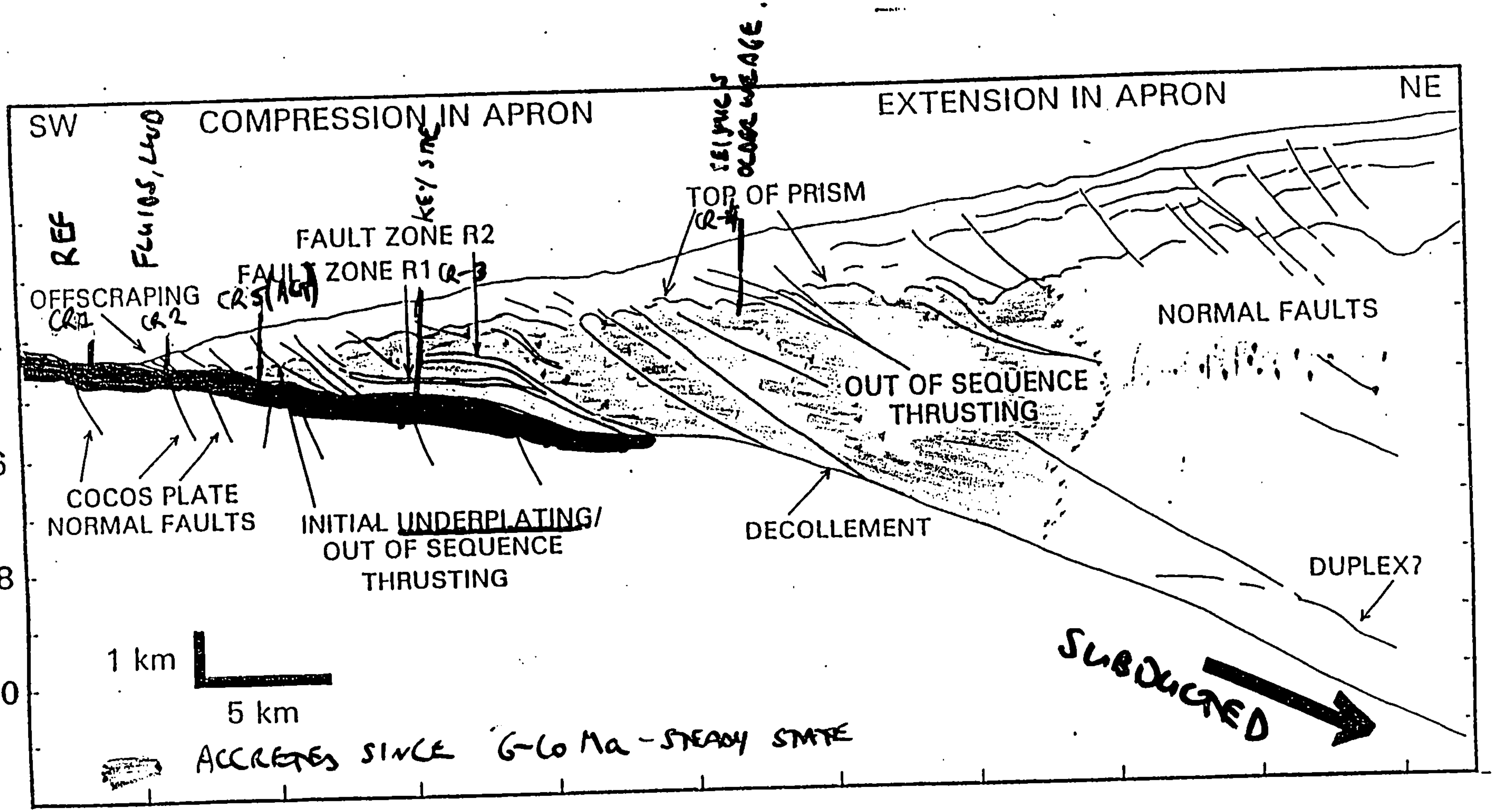

FLUID PARTITIONING
APRON NORMAL FAULTS
MUD VOLCANOES
APRON REVERSE FAULTS
OFFSCRAPING
OUT OF SEQUENCE THRUSTING
INITIAL UNDERPLATING &
OUT OF SEQUENCE THRUSTING
~ 87 km/Ma
A
B
KILOMETERS
0
2
4
6
8
10
KILOMETERS
0
10
20
30
40
50

Figure 1

VO
RENCH
SED


SW
COMPRESSION IN APRON
EXTENSION IN APRON
NE
REF
FLUIDS, LWD
KEY SITE
SEISMICS OLDER WEDGE
TOP OF PRISM
CR-4
FAULT ZONE R2
FAULT ZONE R1
CR-3
OFFSCRAPING
CR5(ALT)
CR1
CR2
NORMAL FAULTS
OUT OF SEQUENCE THRUSTING
COCOS PLATE NORMAL FAULTS
INITIAL UNDERPLATING/ OUT OF SEQUENCE THRUSTING
DECOLLEMENT
DUPLEX?
2
4
6
8
10
1 km
5 km
SUBDUCTED
ACCRETES SINCE 6-6 Ma - STEADY STATE

PROGRAM	COSTA RICA ACCRETIONARY WEDGE
Proposal	400-Rev2
Title	Determination of mass balance, fluid flow, and deformation mechanisms of the Middle America Trench and accretionary complex off Costa Rica
Proponents	E.A. Silver, K. McIntosh, M. Kastner, T. Plank, J. Morris, and T. Shipley

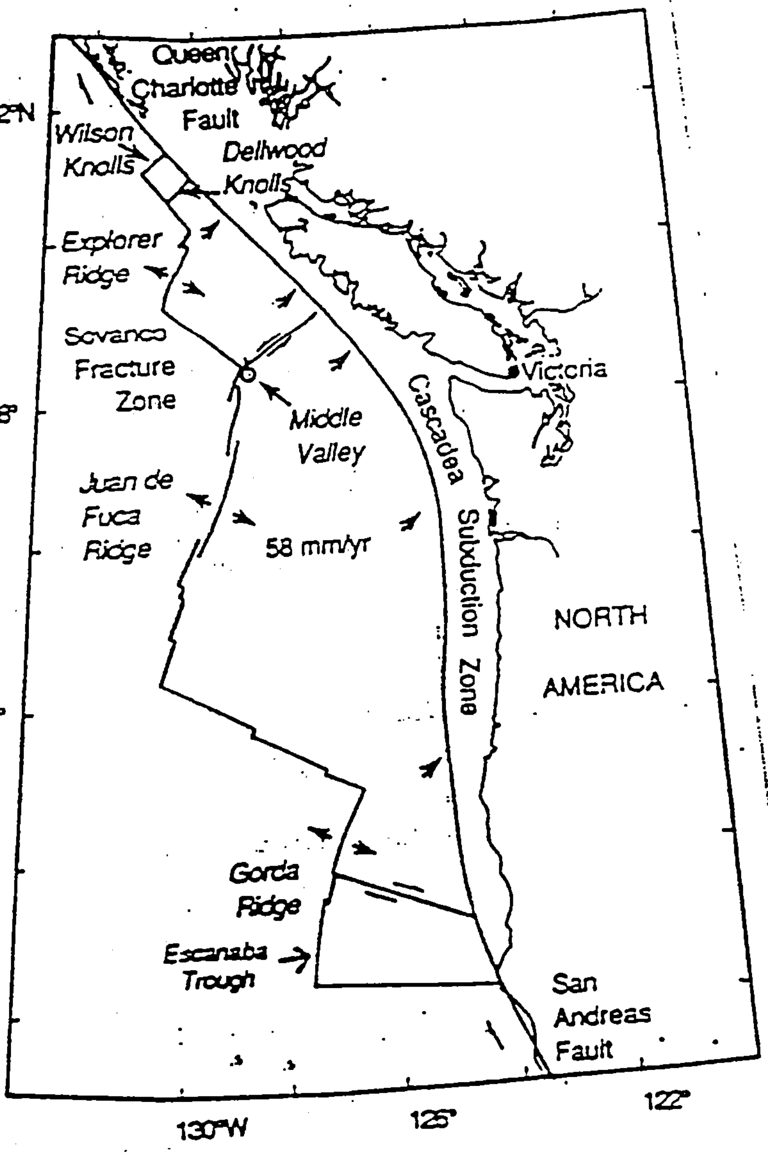
- CORK experiments. LWD is PRIORITY; CORK IF TIME.
- Are the estimates of the operational time requirements for 4 sites unrealistic?. YES, ACCORDING TO ELI SILVER
- If a more conservative plan is developed, which components of the proposed programme should be dropped? ESSENTIAL TO DROP — ALL SITES NEEDED
- Would the involvement of a physical hydrogeologist to assist in the development of predictive models of the pore pressure distribution within the prism be beneficial ?. AT LEG STAFFING STAGE.
- The proponents should consider the relative importance of CORK versus LWD logs. DONE ALREADY LWD FIRST
- VSP experiment: Should DMP should be consulted with respect to design and implementation of the VSP? YES.
- Availability of new in-situ fluid sampler? SGPP to comment - Bill Hay

PROGRAM	EJUAN DE FUCA HYDROTHERMAL CIRCULATION
Proposal	440----, 440-Add
Title	Investigating the Nature and Consequences of Hydrothermal Circulation in Oceanic Crust: Drilling on the Eastern Flank of the Juan de Fuca Ridge
Proponents	E.E. Davis, M. Mottl, K. Rohr, K. Becker, D. Chapman, A. Fisher, G. Wheat and H. Villinger

- One or two legs?
- Prioritisation of sites.

L1.5.1

SR II



DAY 3

PCOM: ~~8~~L.1 – LITHP

Sherm Bloomer

Sedimented Ridges II

Goals of Program:

Leg 1: focused on hydrology of system

Site 855: recharge zone along a fault
Site 856: ancient site of discharge and mineralization
Site 857: hydrothermal reservoir feeding discharge
Site 858: an active discharge zone

successfully drilled in high-temperature areas
successfully recovered sulfides

Leg 2: focused on size and origin of deposits

Bent Hill: geometry and origin of large deposit with recrystallization
Escanaba Trough: geometry and origin of larger deposit, at younger stage, with sediment signature
Dead Dog field: fine scale hydrology of active field, growth style of mounds

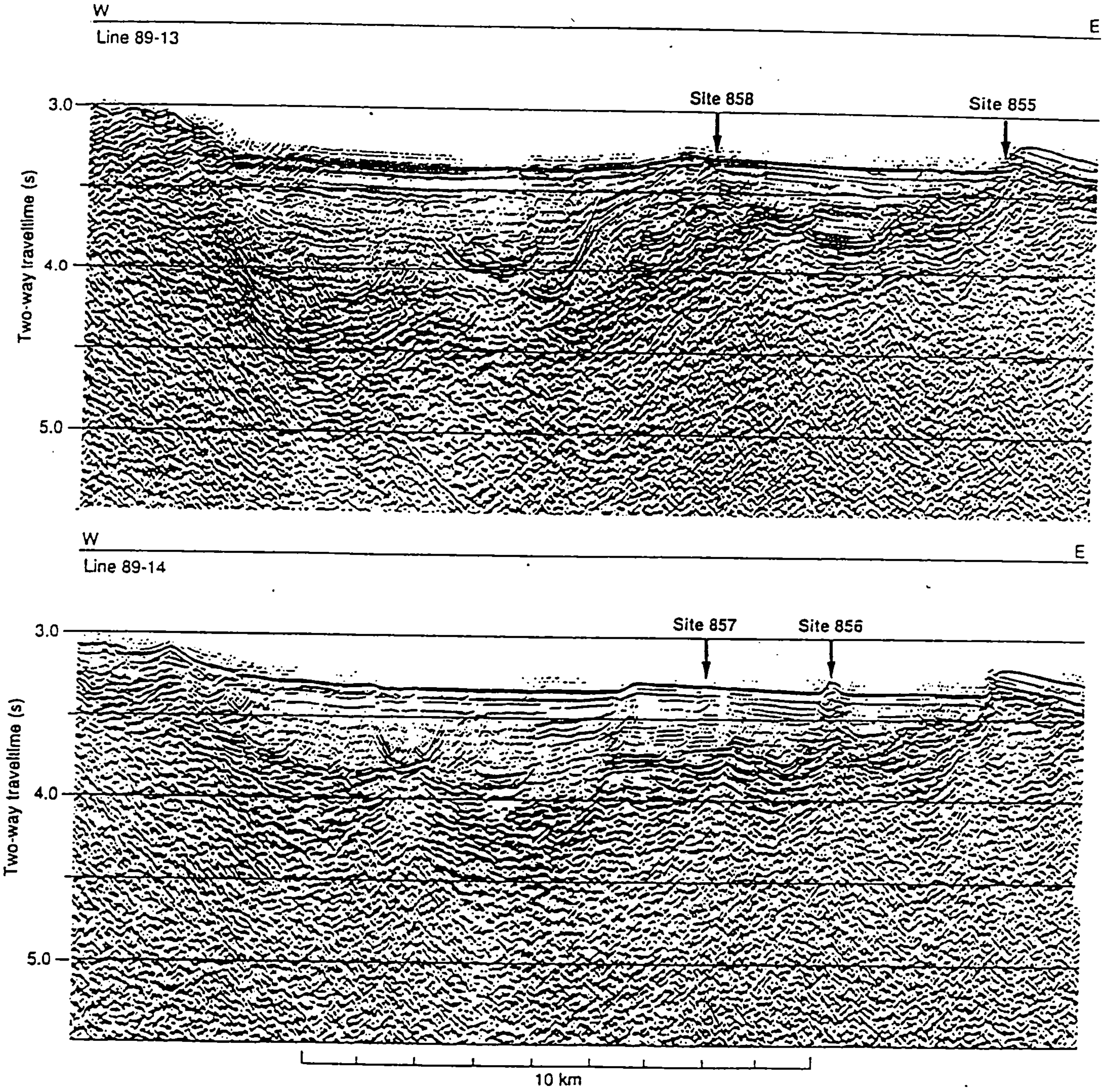


Fig. 2. East-west multichannel seismic reflection profiles crossing the Leg 139 drilling sites. Location of seismic lines is shown on Fig. 4.

Sedimented Ridges Leg II Goals

Bent Hill site

- extent and composition of the deposit
- degree of chemical zonation
- nature of hydrothermal alteration around deposit
- paleohydrology (from veins and fractures)

tectonic controls on deposit formation

Escanaba Trough site

- extent and formation of a large deposit at early stage
- element fluxes in a deposit of sedimentary origin
- nature of alteration around the deposit

tectonic evolution near a volcanic edifice
Pleistocene sea level changes

Dead Dog vent field:

small scale hydrogeology of the field
extent of local-scale recharge and mixing
growth styles of active mounds

CORK Experiment

- formation scale permeability

long-term laboratory

L1.5.5

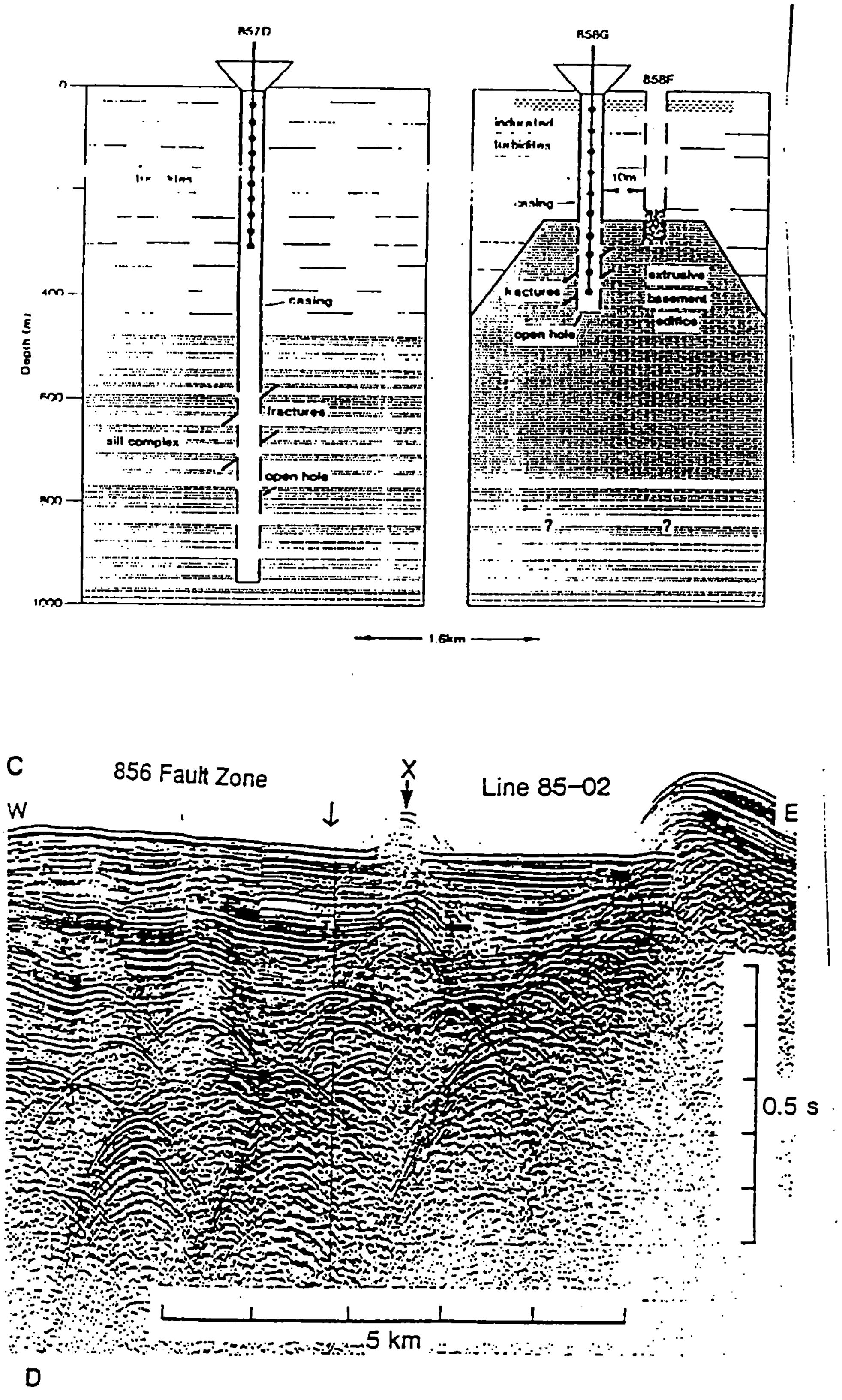


Fig. 5 Top-Diagram showing the depth to basement in the two holes which have been instrumented with CORKs. Basement (shaded) at Site 857 is defined as the top of a sill-sediment complex at 470 mbsf. Basement under Site 858 rises to 250 mbsf and is extrusive basalt.
Bottom-Single channel seismic line 85-02 showing the location of Bent Hill (X, Site 856). Shallow sedimentary reflectors pass under Bent Hill without apparent offset. West of Bent Hill the 856 fault zone offsets basement. The 856 fault zone is not shown on the map of Rohr and Schmidt (1994) (Fig. 4), but corresponds to the western boundary of Sill Y from 89-22 at least as far north as line 89-24 (E. Davis, pers. comm.). The location of line 85-02 is parallel to, but a few tens of meters north of line 89-14 shown on Fig. 4.

Table 1. [illegible]ation and time estimates for drill sites proposed in SR II-rev[illegible]

Site Name	Position		Water depth	Penetration			Brief site-specific objectives	Priority		Time
				Sed	Bsmt	Total				
857D	48° [illegible].50′	128° 42.65′	2420	0	200	200	ReCORK, packer test, fluid samples	1		8.0
858G	48° [illegible].36′	128° 42.53′	2415	0	0	0	UnCORK, fluid samples, temp. log	1		4.0
DD 1	48° 27.35′	128° 42.60′	2410	50	0	50	Vent field hydrography, alteration	2	0.5	
DD 2	48° 27.35′	128° 42.60′	2425	50	0	50	Vent field hydrography, alteration	2	0.5	
DD 3	48° 27.35′	128° 42.55′	2425	50	0	50	Vent field hydrography, alteration	2	0.5	
BH 1	48° 26.02′	128° 40.85′	2435	200	50	250	Penetrate sulfide and underlying alteration	1		5.5
BH 2	48° 2[illegible].02′	128° 40.89′	2440	200	20	220	Transect across sulfide, fault	1		2.5
BH 3	48° [illegible].02′	128° 40.93′	2450	200	0	200	Transect across sulfide, fault	2	2.5	
BH 4	48° 26.02′	128° 41.02′	2460	250	0	250	Transect across sulfide, fault	1		2.5
BH 5	48° 26.02′	128° 41.18′	2465	400	0	400	Transect across sulfide, fault	1		3.5
BH 6	48° 26.02′	128° 41.39′	2465	450	20	470	Reference sediment section	1		5.0
BH 7	48° [illegible]5.95′	128° 40.90′	2460	200	20	220	Southern sulfide transect	2	2.5	
BH 8	48° [illegible].85′	128° 40.90′	2445	200	0	200	Active vent on massive sulfide	2	2.5	
ET 1	41° [illegible]00′	127° 29.33′	3240	200	50	250	Transect across sulfide, fault	1		3.0
ET 2	41° 00.00′	127° 29.41′	3250	200	20	220	Transect across sulfide, fault	1		2.5
ET 3	41° 00.00′	127° 29.48′	3255	200	20	220	Transect across sulfide, fault	2	2.5	
ET 4	41° 00.00′	127° 29.56′	3260	200	20	220	Transect across sulfide, fault	1		2.5
ET 5	41° 00.00′	127° 29.45′	3250	200	400	600	Penetrate sulfide and underlying alteration	1		9.0
ET 6	40° [illegible].00′	127° 30.50′	3170	500	20	520	Test laccolith model of hill uplift	2	3.5	
ET 7	40° [illegible].50′	127° 30.50′	3340	600	20	620	Reference sediment section	1		7.0

Drilling Time	1st Priority	55.0
	2nd Priority	15.0
Transite between sites 450 nm		2.0

Notes:

Drilling time estimates for sites 857D and 858G are provided in more detail in the letter from Davis, Becker, and Fisher to Kidd dated 9-28-94.

Time estimates for DD 1-3 provided by ODP/TAMU are for 300m of drilling including 50 m basement penetration. These are intended to be 50m total penetration APC/XCB holes.

Time estimates for BH 1-7 given here exceed those of ODP/TAMU because of potential difficulty in drilling sulfide-rich sections. We have revised the transect across the sulfide mound from 5 holes to 4 holes by assinging a priority of 2 to hole BH 3, the exact location of the 3 holes in the transect will in part be determined by results of drilling.

Time estimates for ET 1-5 given here exceed those of ODP/TAMU because of potential difficulty in drilling sulfide-rich sections. We have revised the transect across the sulfide mound from 4 holes to 3 holes by assinging a priority of 2 to hole ET 3, the exact location of the 4 holes in the transect will in part be determined by results of drilling.

Time estimates for ET 5 differs from that of ODP/TAMU based on anticipated nature of the basement penetration. Expected basement is a sill-sediment complex similar to that drilled at site [illegible]57D and time estimates are based on penetration rates at that site. If true basaltic basement, such as is present under Site 858G, is present deep of penetration in this hole will be significantly less. Available seismic data do not allow us to confidently identify the nature of the basement at this site and this determination is a more important scientific goals for this hole than 400m of basement penetration. As the calculated drilling and transite time for the priority 1 holes exceeds 56 days, the depth of penetration at this site

Hole ET 7 has been changed to a priority 1 hole as we feel the reference sediment section is needed to achieve an understanding of the hydrothermal system drilled at this site. The depth of basement penetration has been changed from 50m to 20m to indicate that this hole will be drilled to bit destruction using the XCB system.

Appendix L1.6.1

CALIFORNIA MARGIN

Evolution of eastern boundary current

- California Current evolution, upwelling response
- deep and intermediate Pacific water mass evolution
- terrestrial - marine correlations
- production, preservation, burial of organic carbon

3 east-west transects
2 coastal transects N-S
Borderlands basins

⇒ OHP thematic priorities / links to existing drilling

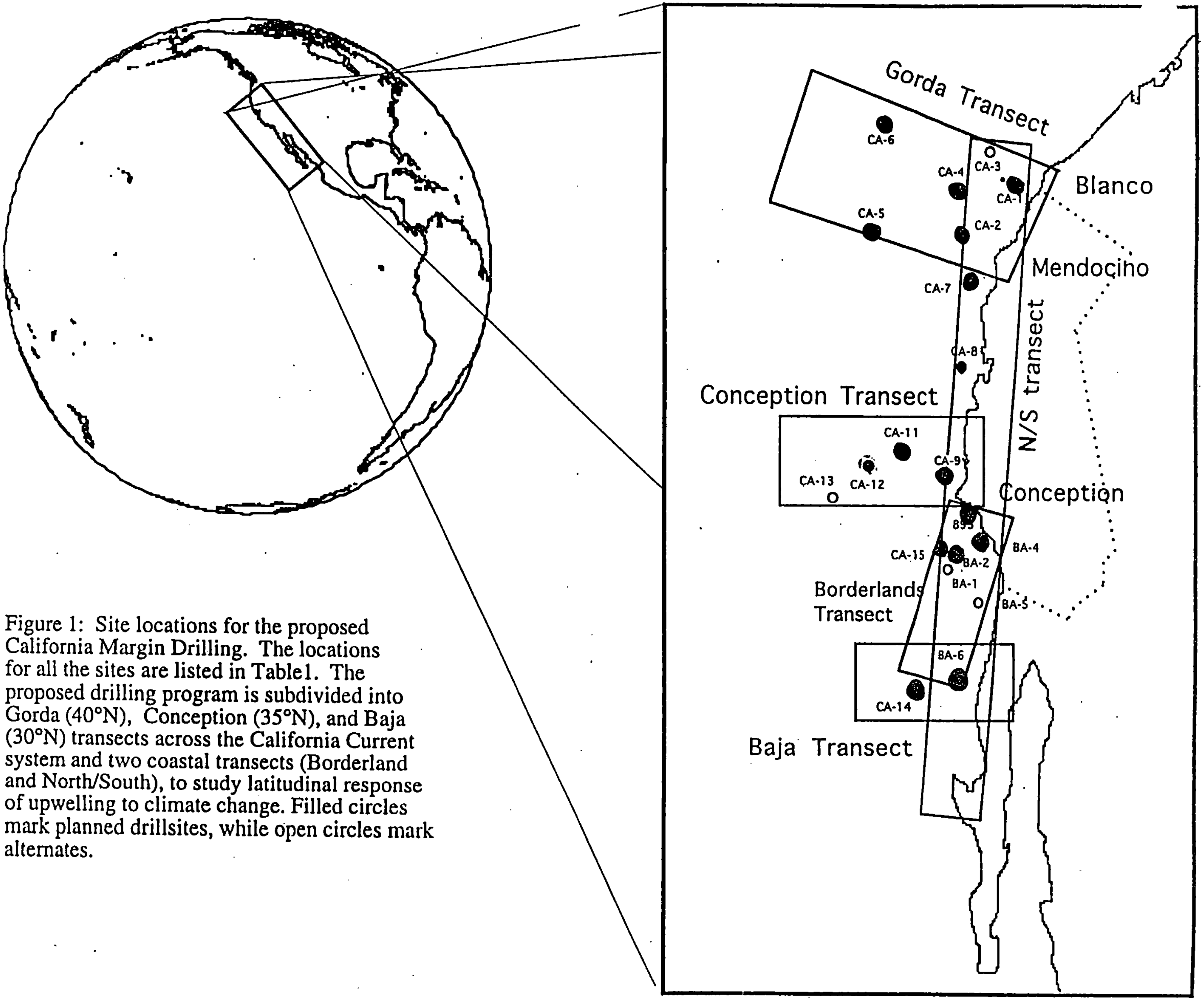
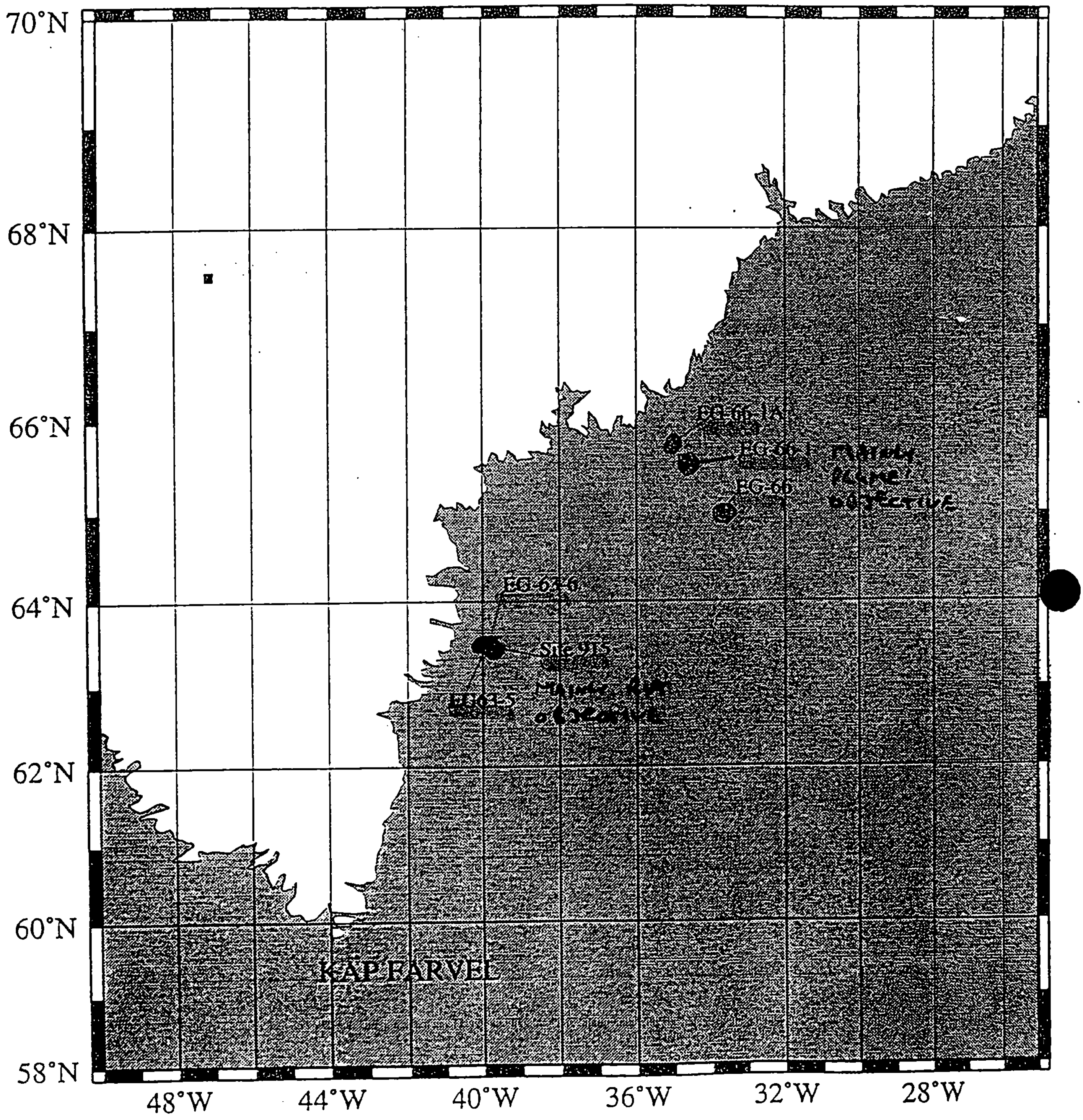


Figure 1: Site locations for the proposed California Margin Drilling. The locations for all the sites are listed in Table1. The proposed drilling program is subdivided into Gorda (40°N), Conception (35°N), and Baja (30°N) transects across the California Current system and two coastal transects (Borderland and North/South), to study latitudinal response of upwelling to climate change. Filled circles mark planned drillsites, while open circles mark alternates.

58.3 d

Appendix L1.7.1



Appendix L1.7.2

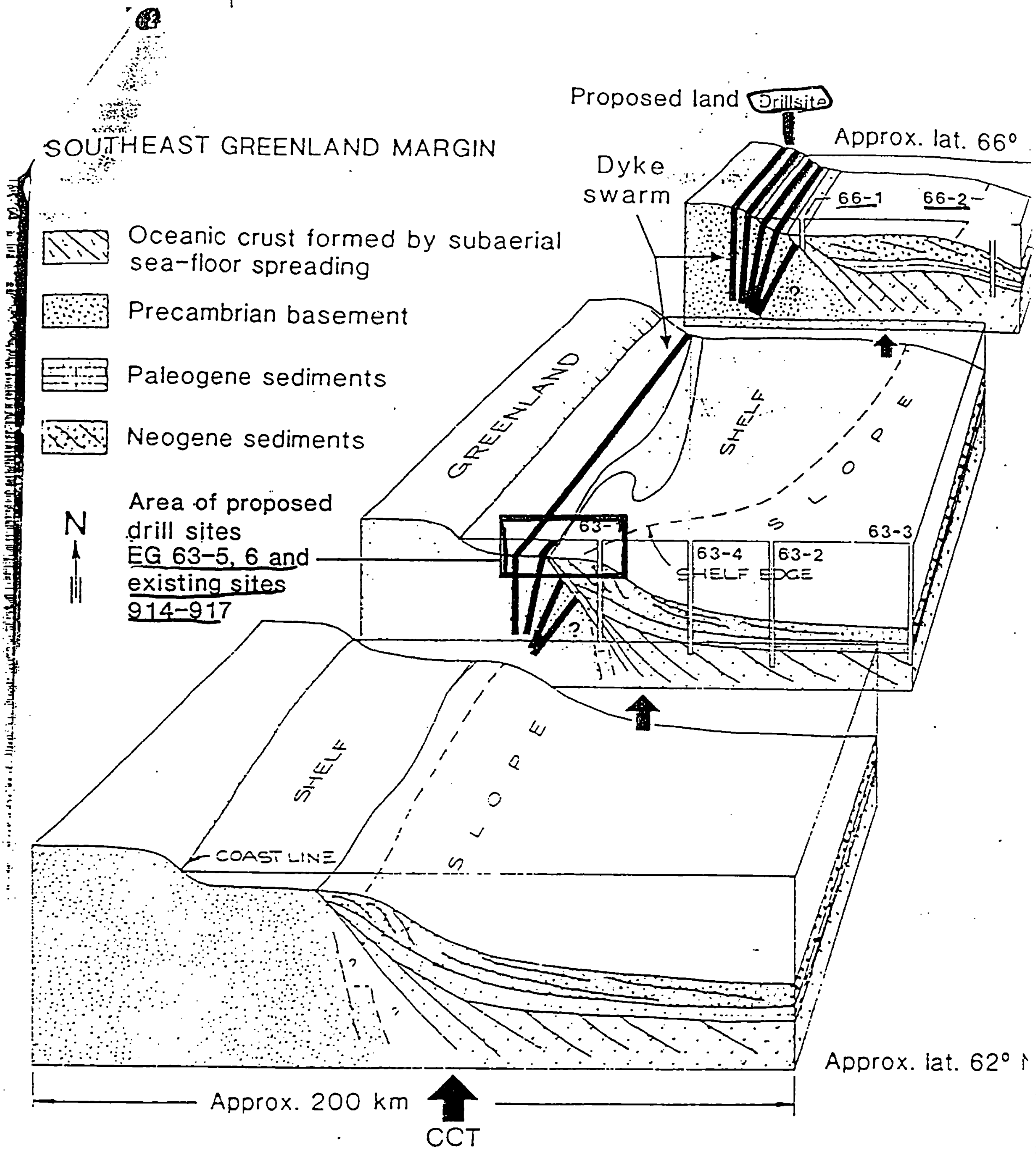
SE GREENLAND '2'

FITS IN WITH TECP THEMATIC OBJECTIVES

INVOLVES A LARGE INTERNATIONAL COMMUNITY, INCLUDING MAJOR ON-LAND DRILLING EFFORT

MAIN OBJECTIVES:
i) NATURE OF SDR-SOLVED ON LEG 152
ii) UNDERLYING RIFT PROCESSES- NOT SOLVED
iii) THERMAL EFFECTS;ROLE OF MANTLE PLUME NOT YET SOLVED EITHER.

Appendix L1.7.3



LAND-SEA TECTONICS INTEGRATION OPPORTUNITY !

3D view of the SE Greenland shelf seen from the south. The trend of the COT is oblique to the coast line and is very close to or on the coast to the north. Modified from Larsen. H.C., "The East Greenland shelf", in The Geology of North America, Vol. L, The Arctic Ocean Region, A. Grantz, L. Johnson, and J.F. Sweeney, Editor, The Geological Society of America: Boulder, Colorado. 185–210, 1990.

Fig. 2

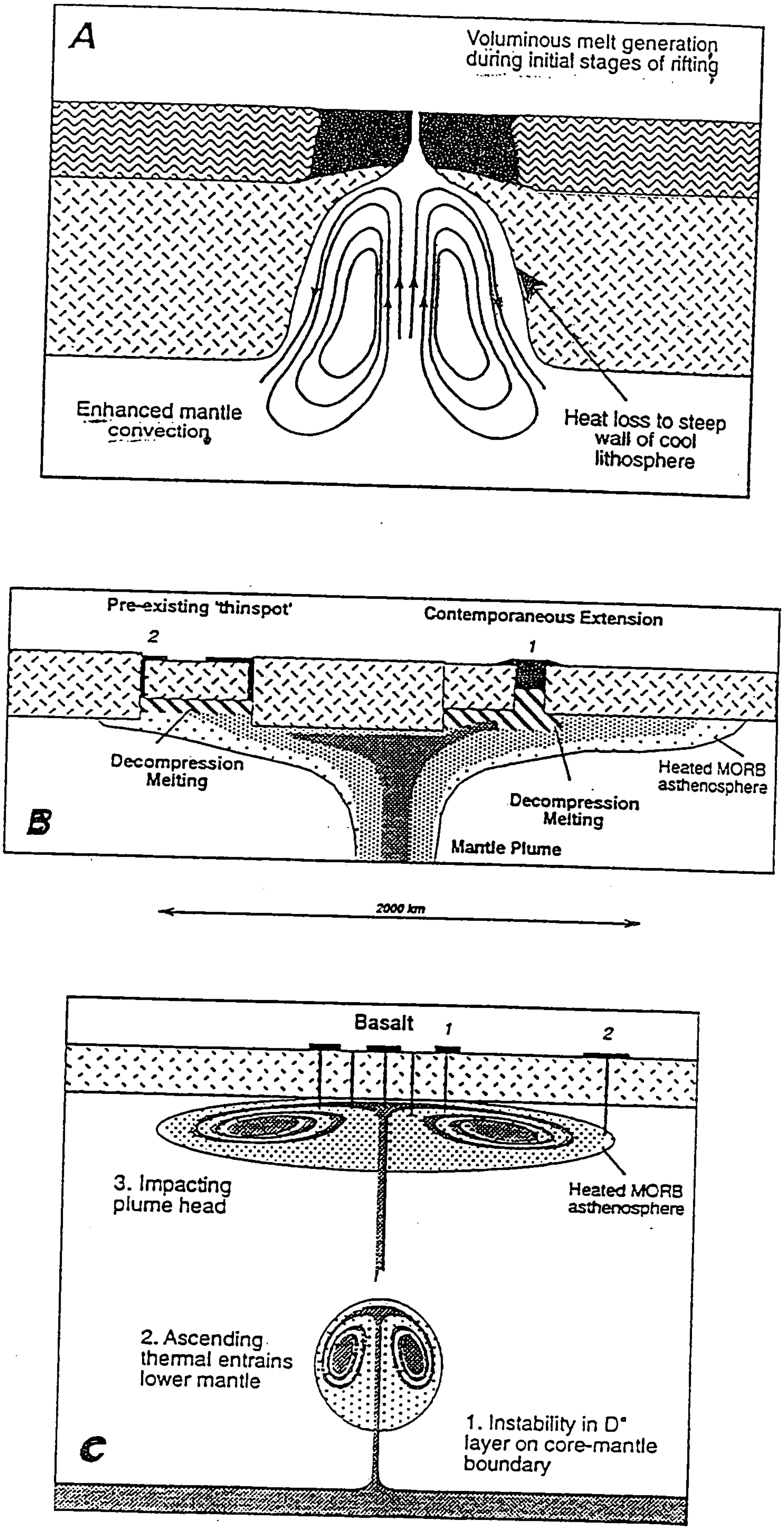
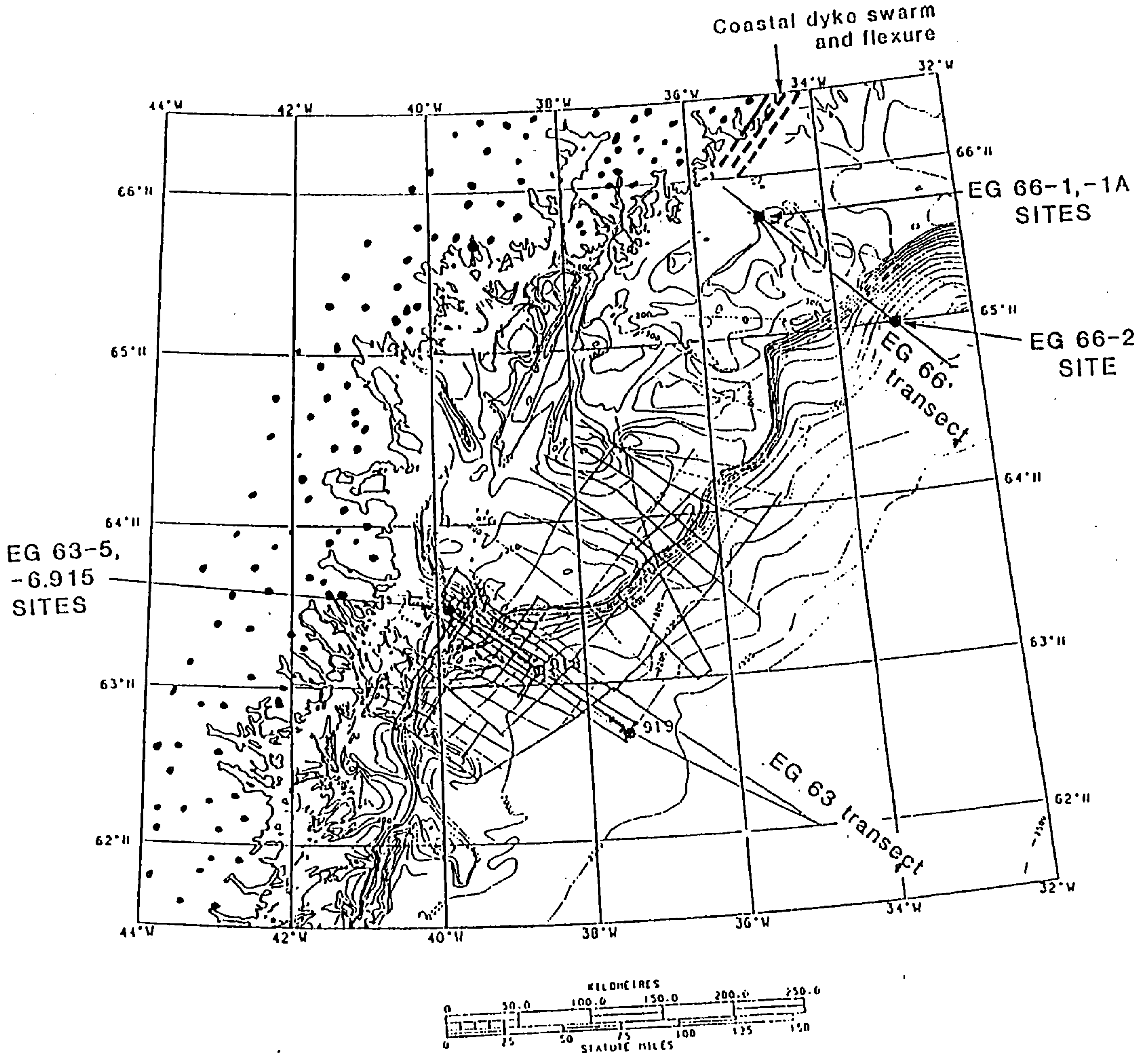
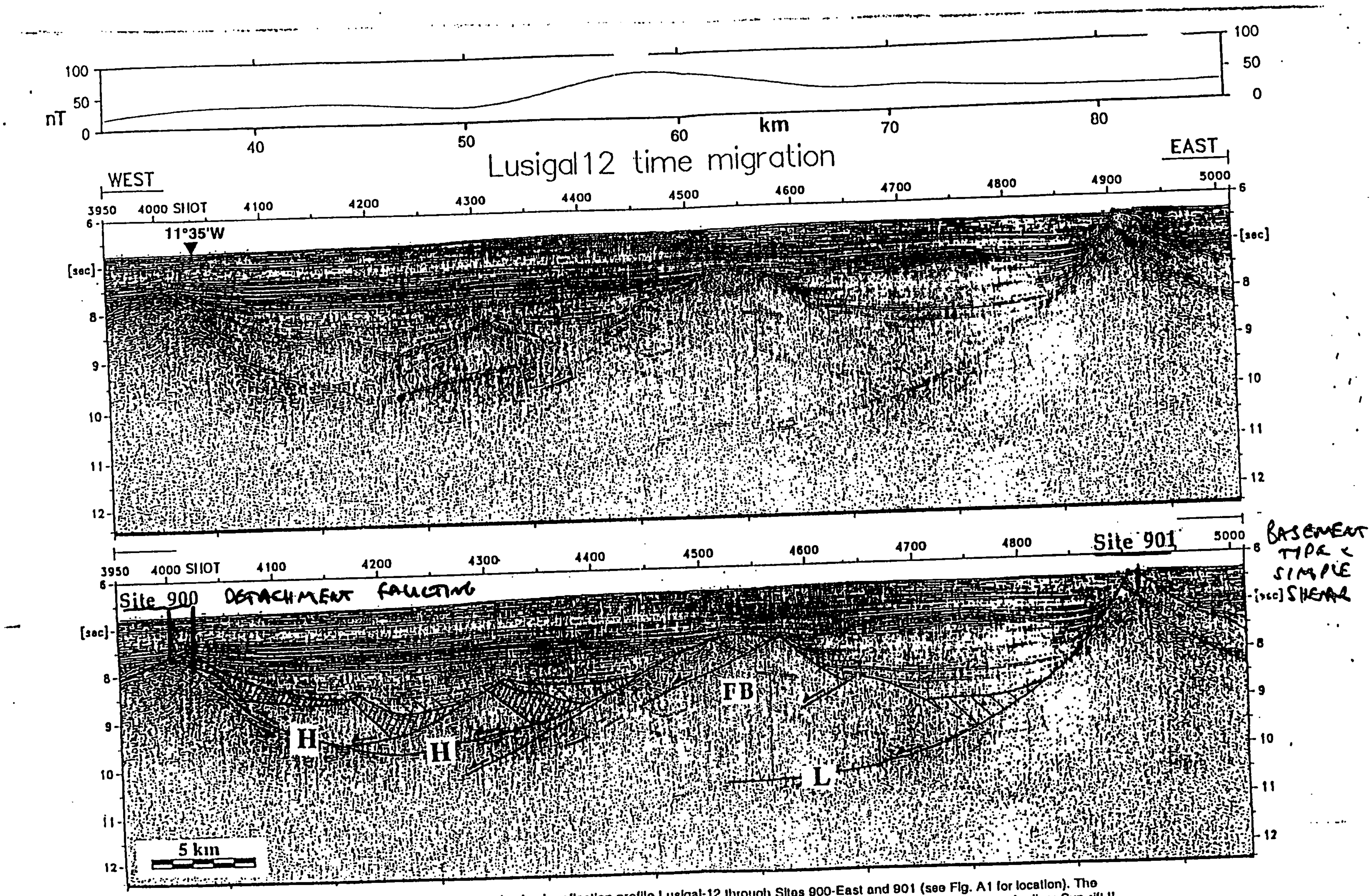


Figure-Intro-9 (Aldus Freehand)

Fig. 1

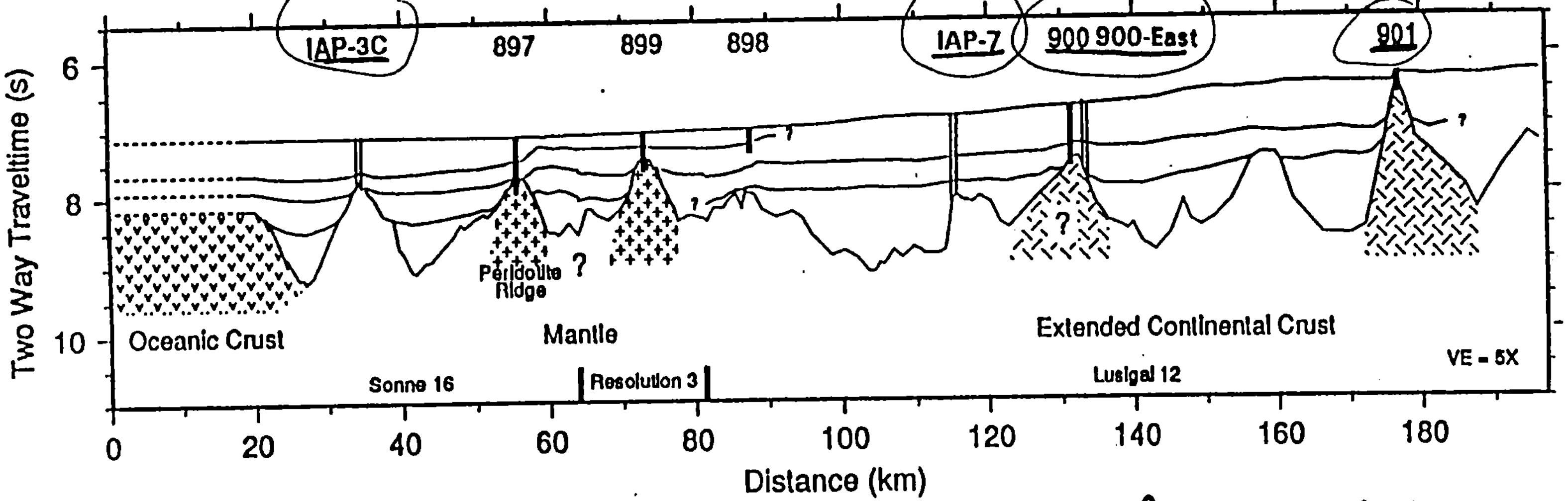

Coastal dyke swarm and flexure
EG 66-1, -1A SITES
EG 66-2 SITE
EG 66 transect
EG 63-5, -6.915 SITES
919
EG 63 transect
44°W
42°W
40°W
38°W
36°W
34°W
32°W
66°N
65°N
64°N
63°N
62°N
KILOMETRES
0
50.0
100.0
150.0
200.0
250.0
25
50
75
100
125
150
STATUTE MILES



DETACHMENT FAULTING

BASEMENT TYPE < SIMPLE SHEAR

Figure 4. East-west migrated multichannel seismic reflection profile Lusigal-12 through Sites 900-East and 901 (see Fig. A1 for location). The lower profile is an interpretation of basement reflections seen in the upper profile. Syn-rift I sediments marked by close diagonal ruling; Syn-rift II sediments by coarser ruling. H is a detachment fault controlling extension during syn-rift I phase; L is a listric fault active during Syn-rift II phase. Pre-rift units are probably present in fault block FB, but are not identified. The magnetic anomaly profile (top) was computed from the dataset used



OLD OCEANIC BASEMENT

TEST SIMPLE SHEAR

FAULT 900 DETACHMENT

DEEPEN

TEST CONTINENTAL BASEMENT AND SIMPLE SHEAR

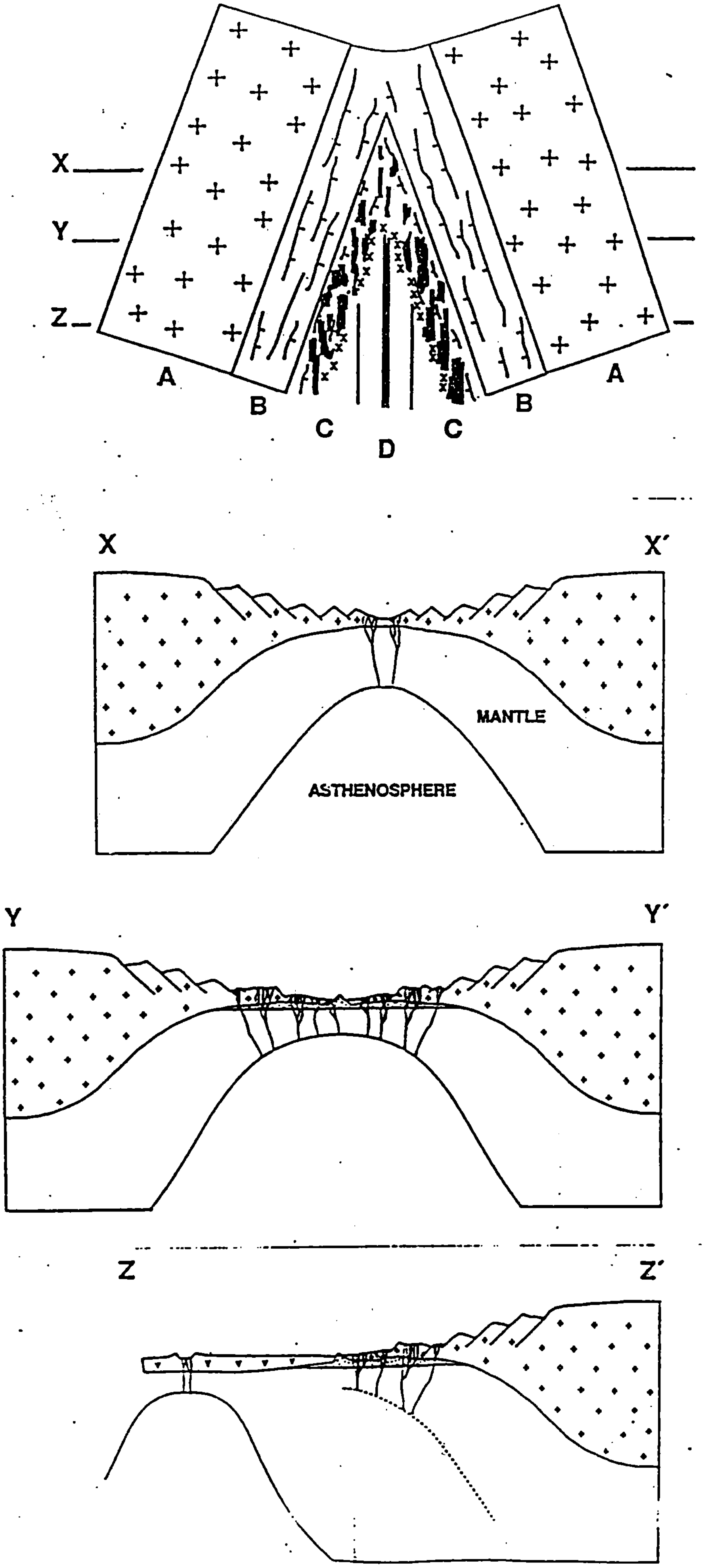
CONTINENT - OCEAN TRANSITION - BEST LOCATION

Figure 2. Composite seismic time-section created from the track segments of the Sonne, JOIDES Resolution and Lusigal profiles shown in Fig. 1. The irregular surface is the top of the acoustic basement. Basement was sampled at Sites 897, 899 and 900 during Leg 149. The nature of basement (oceanic, continental or upper mantle) is indicated; at Site 901 it is inferred. Proposed Sites 900-East and IAP-7 are also indicated.

CONTINENT–OCEAN TRANSITION.

Figure 3. This is part of a new (August,1993) reduced-to-the-pole magnetic anomaly chart of the whole west Iberia margin produced in collaboration with the Atlantic Geoscience Centre, Dartmouth, Nova Scotia, Canada. The chart was made from a 5-km gridded data set and is contoured at 25 nT. The main chart is based on over 400,000 sea-surface observations which have been corrected to remove the effects of secular variation, high geomagnetic activity, spurious tracks and systematic cross-over errors. Greater confidence in the quality of the resulting data set allowed the use of the small contour interval. ODP Leg 149 drilled to basement in this area (white dots); sites proposed here are shown by red squares. The data have been reduced to the pole to clarify many features. Major linear trends in the anomalies are picked out by bold lines. The chart clearly shows the strong positive J anomaly which appears just west of 13°W and south of 41°30'N. Between anomaly J and the continental shelf (ca. 9°15' W) other less strong positive anomalies are associated with the shallow region south of Galicia Bank. South of about 41°N the chart can be divided into three distinct zones (bounded by the broad N-S stripes) based on the character of the anomalies (see text).

Appendix L1.9.6



- LEG 149 RESULTS
- REPROCESSING
- MODELLING

↘

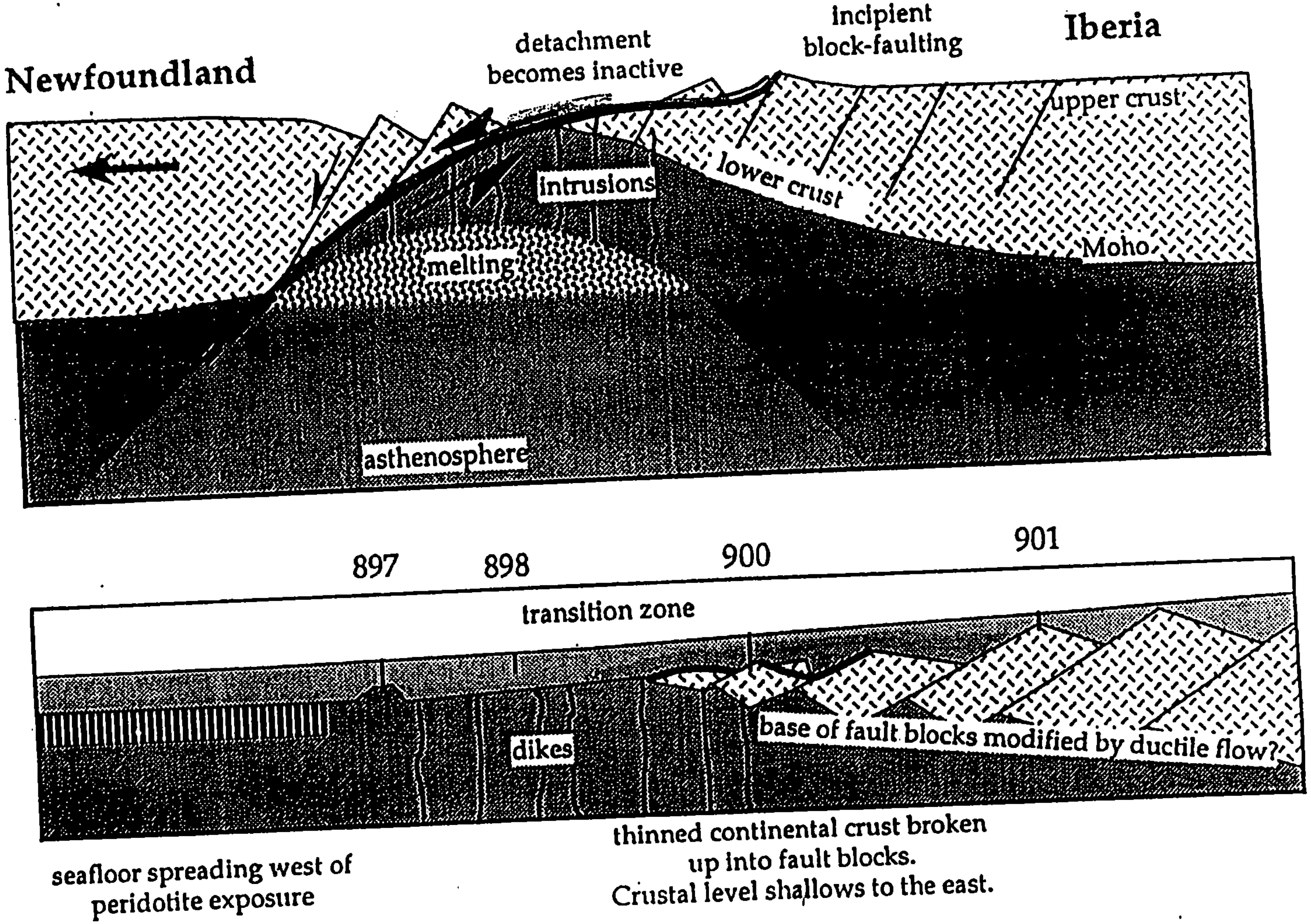
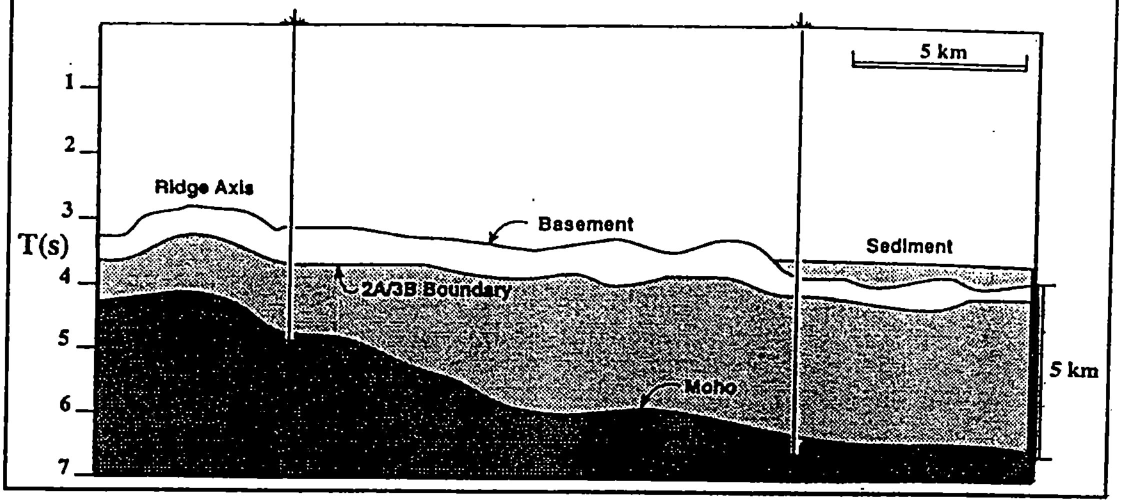


Figure 10. Cartoon incorporating available geophysical evidence into a single integrated model for the evolution of the Iberia Abyssal Plain margin. As high level extension was accommodated along a detachment fault, upwelling of asthenosphere in response to "pure shear extension at depth caused melting, and intrusion of lower crust in transition zone. Intrusion probably continued during subsequent block-faulting which dissected the lower plate to the detachment fault. Further drilling will test this model by investigating nature of crust in the transition zone and testing the detachment hypothesis.

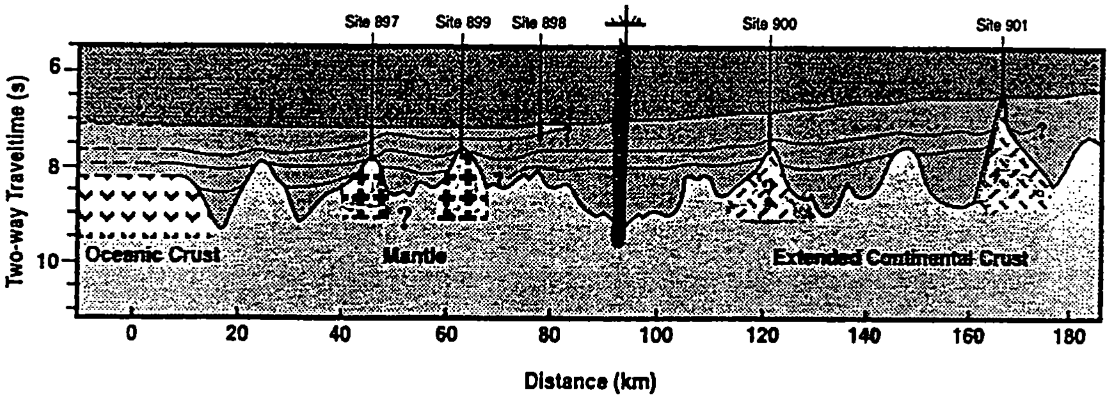
2.3.3.2 Sites related to the process of formation of Ocean Crust

SAMPLING A COMPLETE SECTION OF OCEAN CRUST



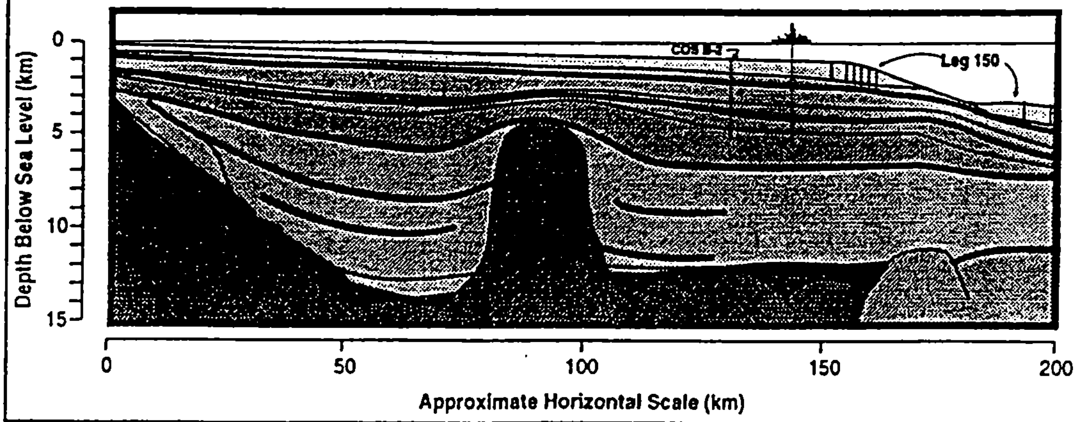
2.3.3.3 Sites related to plate rifting and the formation of sedimentary basins

PROCESSES AT DIVERGENT PLATE MARGINS



2.3.3.4 Sites related to sedimentation on continental margins

RESPONSE OF CONTINENTAL SHELVES TO SEA-LEVEL CHANGES



Appendix L1.9.3

IBERIA 2

EXTENSIONAL PROCESSES KEY PART OF TECP OBJECTIVES

PART OF LARGER INTERNATIONAL EFFORT e.g. MARGINS, MARGE ETC

STUDY OF ROLE OF SIMPLE SHEAR IN RIFTING; A KEY GLOBAL PROBLEM OF INTEREST TO MARINE, LAND GEOLOGISTS, INDUSTRY ETC.

TECP DECISION TO FOCUS ON IBERIA BEFORE NEWFOUNDLAND CONJUGATE (too deep etc).

DRILLING HIGHS IN FACT SENSIBLE TO REACH LOWER PLATE OF DETACHMENT

NEW PROPOSAL INCLUDES MODELLING OF CONTINENT-OCEAN BOUNDARY, ADDITIONAL INTERPRETATION OF GEOPHYSICAL DATA ETC

NEW CRUISE IN EARLY 1995

Appendix L1.9.2

DRILLING PLAN FOR IBERIA

-LEG I49 WAS NECESSARY TO DEFINE THE CONTINENT OCEAN BOUNDARY w.r.t. CONTINENTAL vs OCEANIC CRUST

-IBERIA 2 TO CHARACTERISE CONTINENT-OCEAN BOUNDARY (only one hole on Leg 149 within this)

NEW OBJECTIVES:
-DETERMINE NATURE OF BASEMENT, ESPECIALLY NATURE OF LOWER CRUST

-TEST ROLE OF EXTENSIONAL DETACHMENT FAULTING AND SIMPLE SHEAR; DRILLING THROUGH FAULT ZONE;

-NATURE OF OLDEST OCEANIC CRUST

-ENIGMATIC UNITS ABOVE S'-POSSIBLE KEY DETACHMENT FAULT (GAL 1).

-BALANCED SECTION THEN POSSIBLE ACROSS RIFTED PASSIVE MARGIN.

LONG TERM AIMS: IBERIA 3? DEEP HOLE (TEST ODP TECHNOLOGY, PRIOR TO RENEWAL?).

L1.9.1

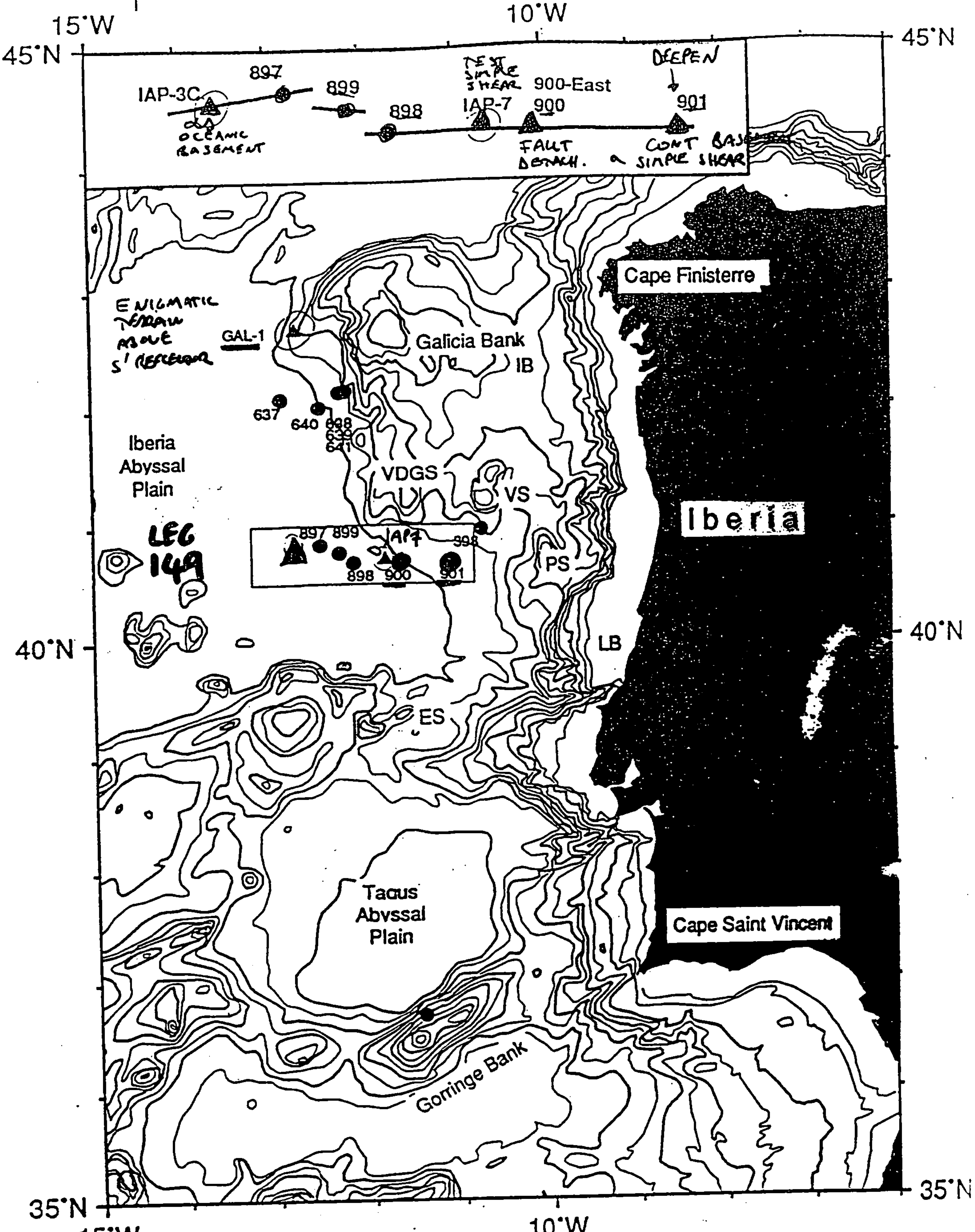


Figure 1. Bathymetric chart of the west Iberia margin; contours at 200, 500, 1000, 1500 m etc.). Existing DSDP/ODP sites are shown by black dots. Sites proposed here are shown by black triangles. Inset is expanded plot of the boxed area at 40°40'N showing old (circles) and proposed (triangles) drill sites and tracks of seismic reflection profiles used to create the composite cross-section in Fig.2.

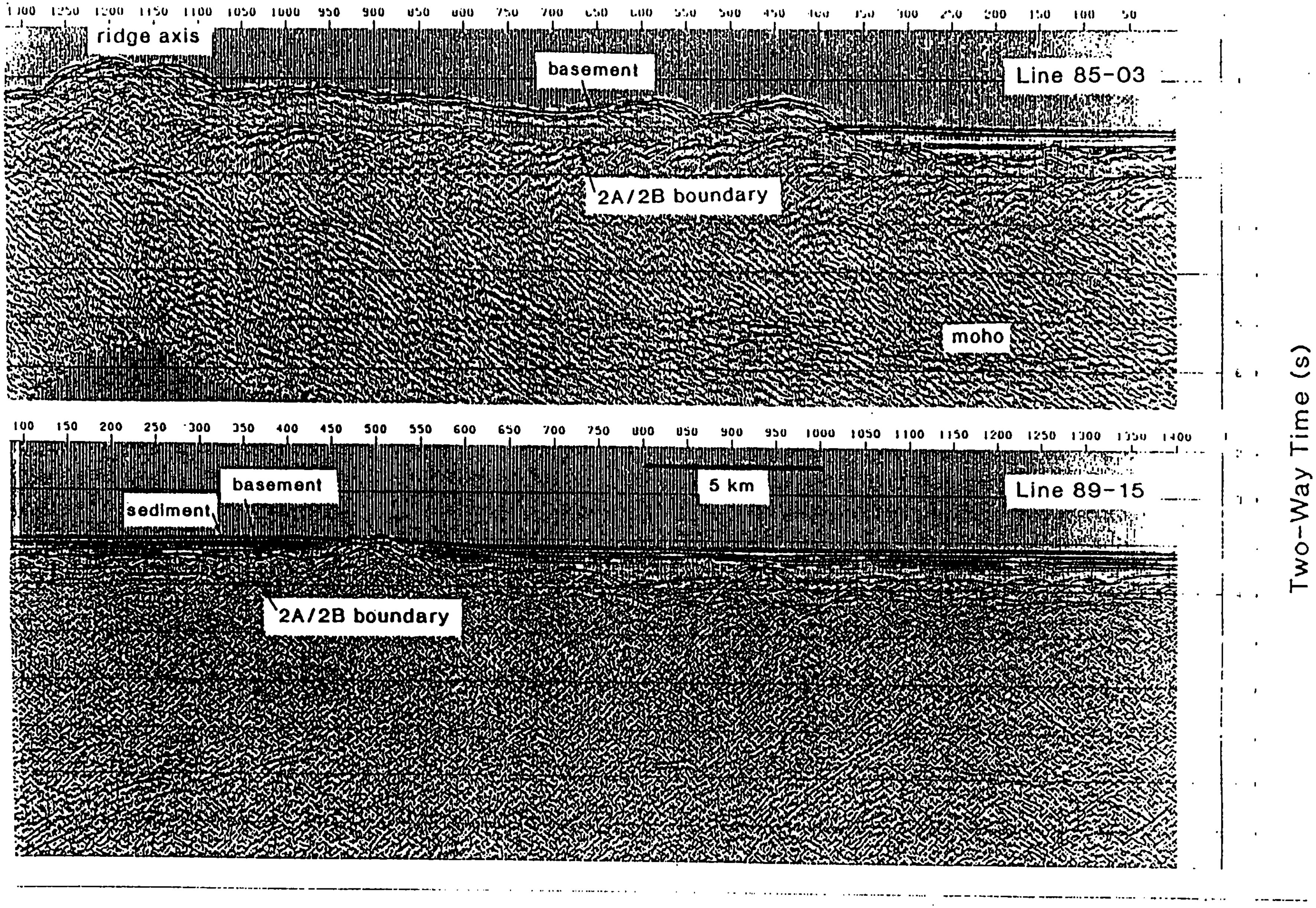


Figure 2

Appendix L1.8.7

PROPOSAL #440, TABLE 1 (Revised 94-11-08)

Hole Summary for Ridge-Flank Hydrothermal Drilling Leg

Hole	LatN/LongW	Lithology	Depth	Sampling	Reentry	Site Time	Priority	Total Time
Transit to/from area						4.0 days		4.0
HT-1	47° 57.11' 128° 48.58'	Sediment Basalt	100 m 25 m	APC/XCB RCB	No	3.2 days	4	7.2
HT-2	47° 55.50' 128° 43.08'	Sediment Basalt	200 m 25 m	APC/XCB RCB	No	3.2 days	4	10.4
HT-3	47° 52.72' 128° 29.80'	Sediment Basalt	300 m 25 m	APC/XCB RCB	No	3.2 days	4	13.6
CC-1	47° 55.30' 128° 38.79'	Sediment	200 m	APC/XCB	No	2.6 days	1	16.2
CC-2	47° 55.20' 128° 38.28'	Sediment	200 m	APC/XCB	No	2.6 days	1	18.8
CC-3	47° 54.96' 128° 36.86'	Sediment Basalt	200 m 25 m	No core RCB	Reentry with CORK	6.5 days	1	25.3
[illegible]	47° 54.86' 128° 36.28'	Sediment Basalt	200 m 25 m	No core RCB	Reentry with CORK	6.5 days	1	31.8
PP-1	47° 51.46' 127° 40.80'	Sediment	500 m	APC/XCB	No	5.0 days	2	36.8
PP-2	47° 51.74' 127° 42.20'	Sediment	200 m	APC/XCB	No	2.0 days	2	38.8
PP-3	47° 51.93' 127° 42.93'	Sediment	50 m	APC/XCB	No	1.0 day	2	39.8
PP-4	47° 53.22' 127° 40.11'	Sediment Basalt	500 m 25 m	No core RCB	Reentry with CORK	6.4 days	3	46.2
PP-5	47° 53.65' 127° 42.14'	Sediment Basalt	50 m 25 m	No core RCB	Reentry with CORK	5.0 days	3	51.2
PP-6 array	47° 42.70' 127° 47.53'	Sediment	300 m 25 m	APC/XCB	No	3.0 days	5	55.2
PP-6	47° 42.60' 127° 47.27'	Basalt	200 m	RCB	HRGB with CORK	(15 days)	6	(66.2)
PP-6	47° [illegible]	Sediment [illegible]	[illegible] m [illegible]	APC [illegible]	Reentry with CORK	[illegible]		(66.2)

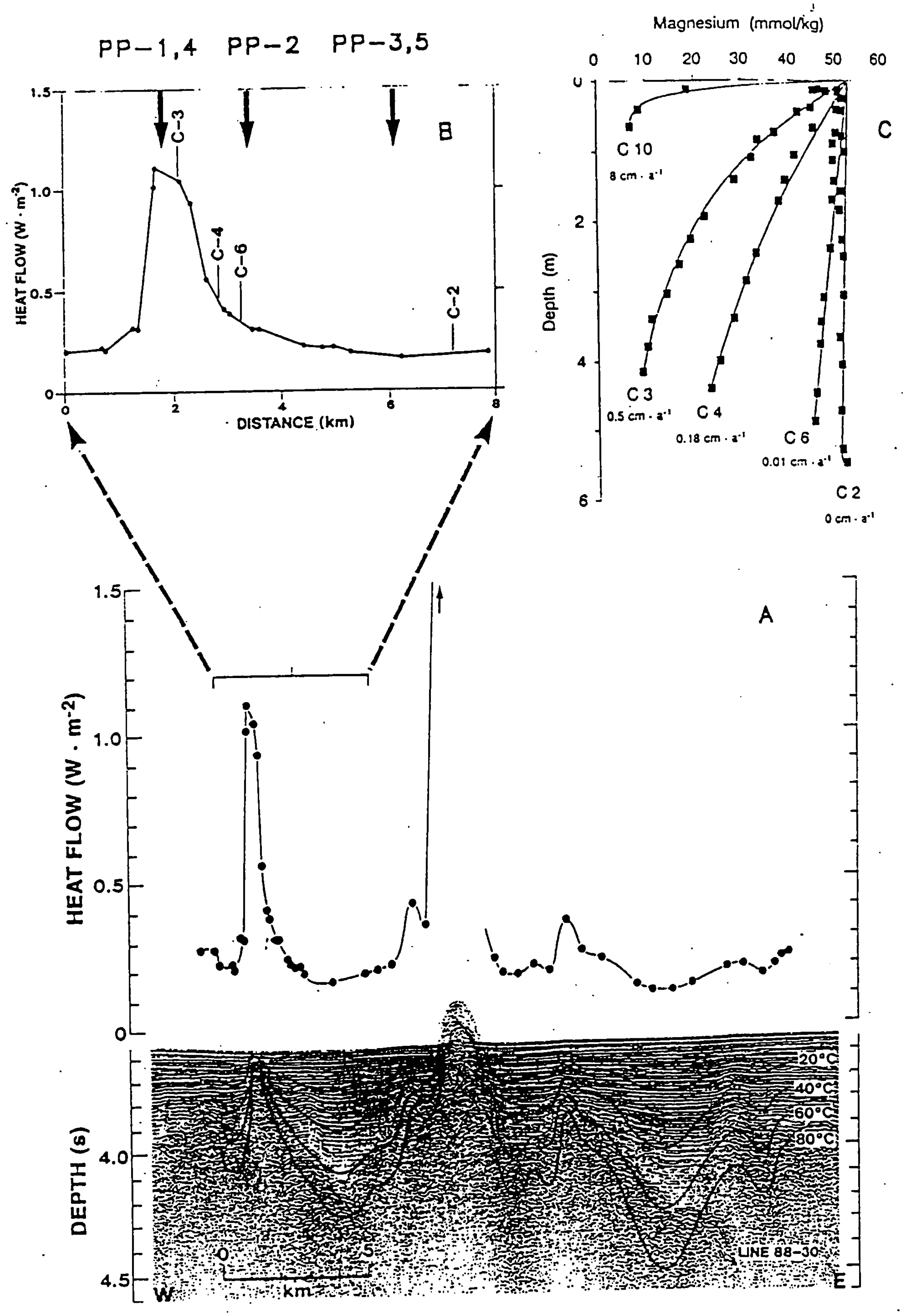

PP–1,4
PP–2
PP–3,5
B
HEAT FLOW (W · m^{-2})
1.5
1.0
0.5
0
C–3
C–4
C–6
C–2
DISTANCE (km)
0
2
4
6
8
Magnesium (mmol/kg)
0
10
20
30
40
50
60
C
Depth (m)
0
2
4
6
C 10
8 cm · a^{-1}
C 3
0.5 cm · a^{-1}
C 4
0.18 cm · a^{-1}
C 6
0.01 cm · a^{-1}
C 2
0 cm · a^{-1}
A
HEAT FLOW (W · m^{-2})
1.5
1.0
0.5
0
DEPTH (s)
4.0
4.5
20°C
40°C
60°C
80°C
LINE 88-30
0
5
km
W
E

Figure 7

L1.8.4

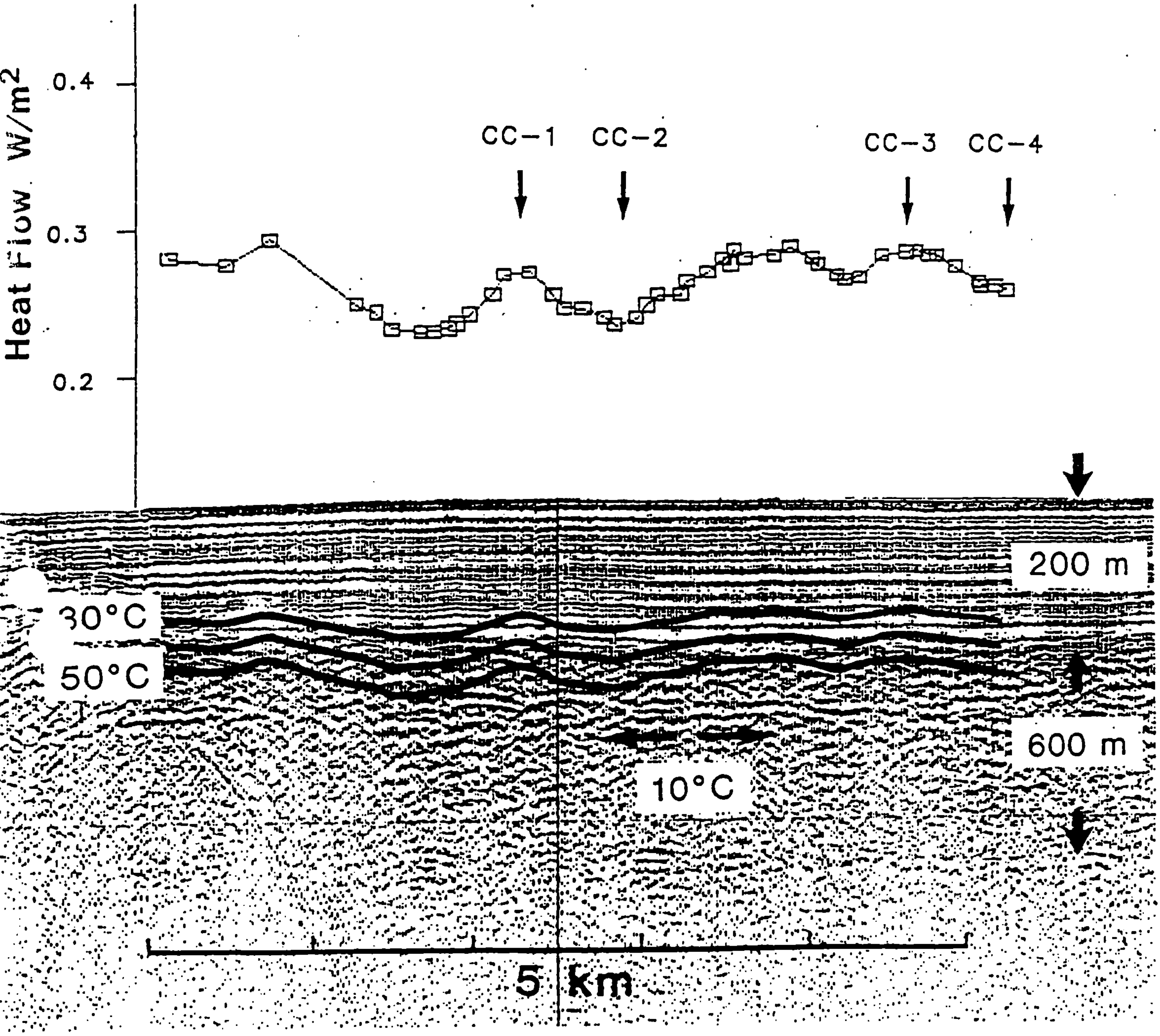


Figure 5

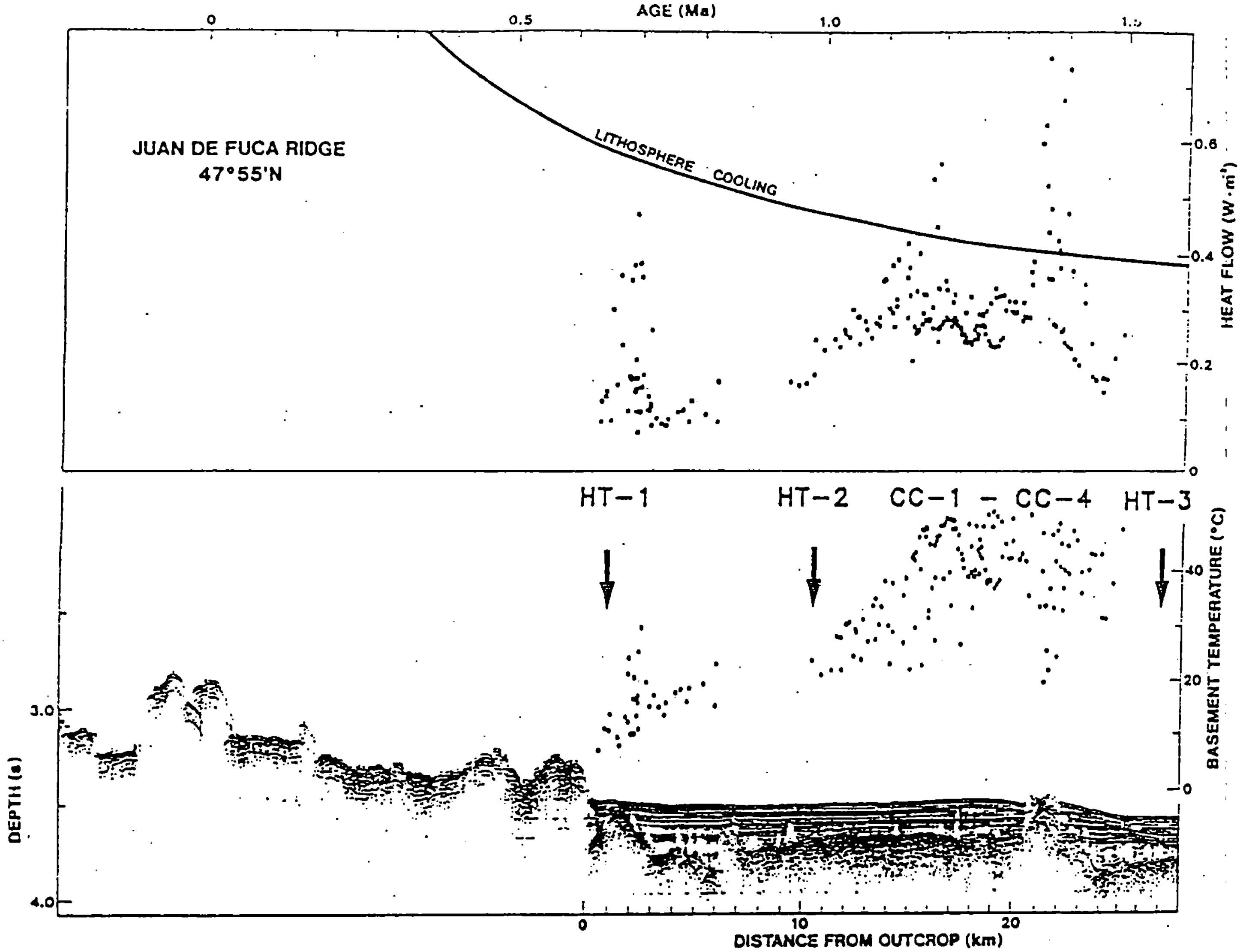

AGE (Ma)
0
0.5
1.0
1.5
JUAN DE FUCA RIDGE
47°55'N
LITHOSPHERE COOLING
HEAT FLOW (W·m⁻²)
0.6
0.4
0.2
0
HT-1
HT-2
CC-1 – CC-4
HT-3
BASEMENT TEMPERATURE (°C)
40
20
0
DEPTH (s)
3.0
4.0
0
10
20
DISTANCE FROM OUTCROP (km)

Figure 4

L.1.8.2

Eastern Juan de Fuca Hydrothermal Circulation

Examination of three off-axis hydrothermal regimes:

1. transition from open to closed hydrothermal circulation
2. cellular convective flow in a porous medium
3. hydrothermal flow forced by basement relief

All accessible here

All important processes in evolution and alteration of crust

Three experiments combining drilling, CORKs, extensive survey data, and modeling

Appendix L1.8.1

Juan de Fuca

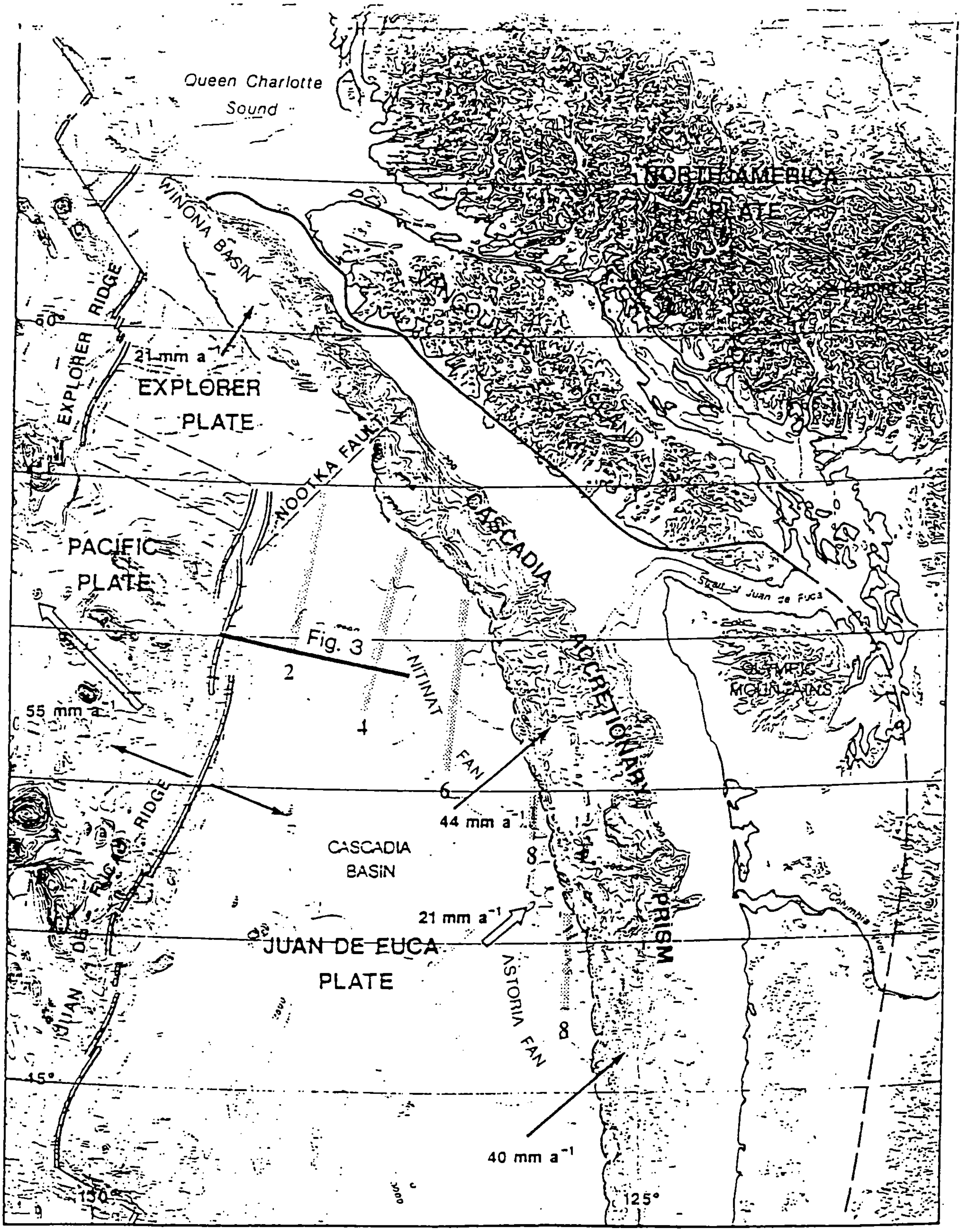


Figure 1

ON-LAND DRILLING?

EARLIEST VOLCANISM BREAKUP UNCONFORMITY, UNDERLYING CRUST

BASALTIC LAVAS OF EARLY OCEANIC SDRS

POST-BREAK UP OCEANIC LAVAS

Fig. 12

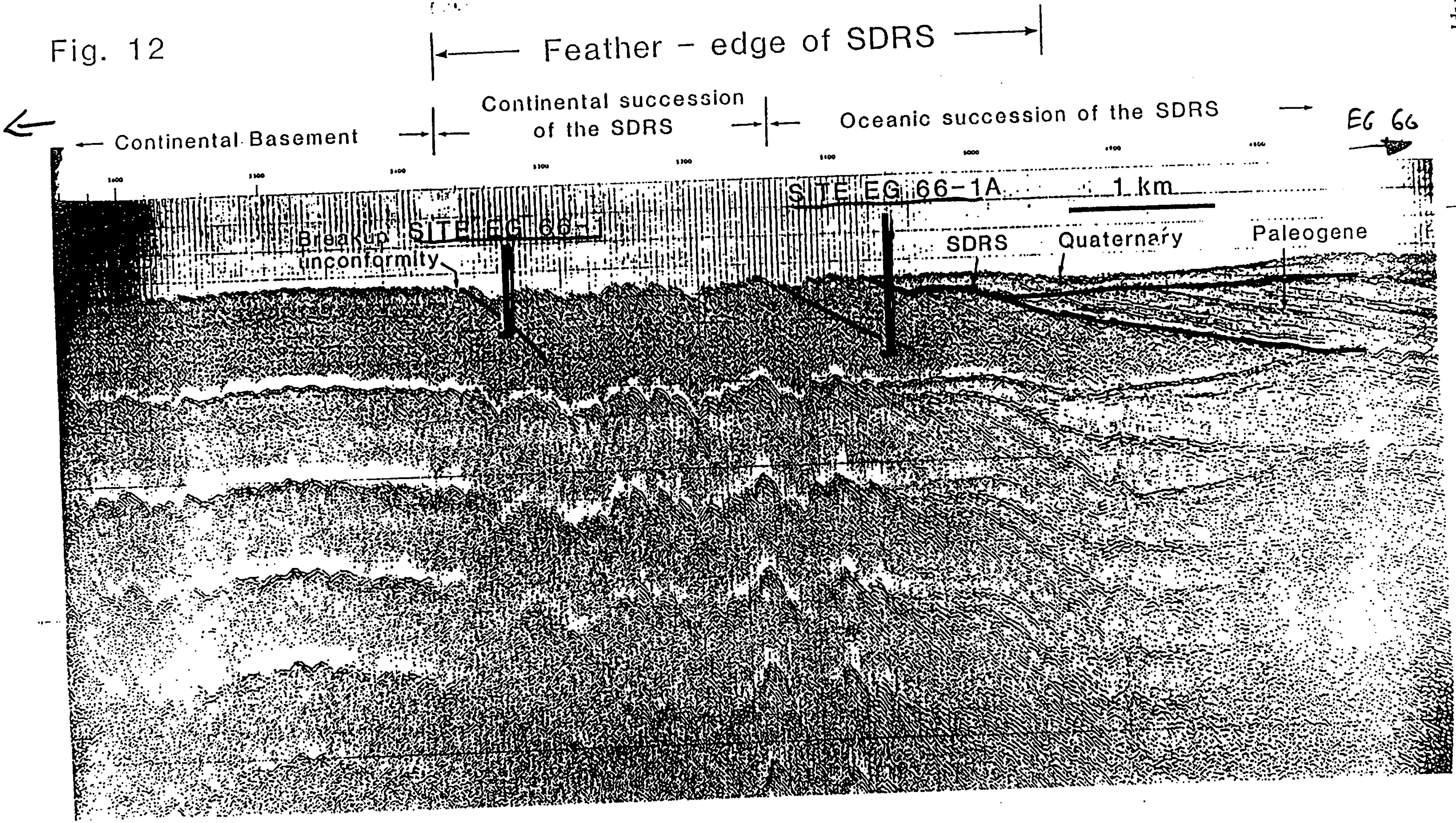
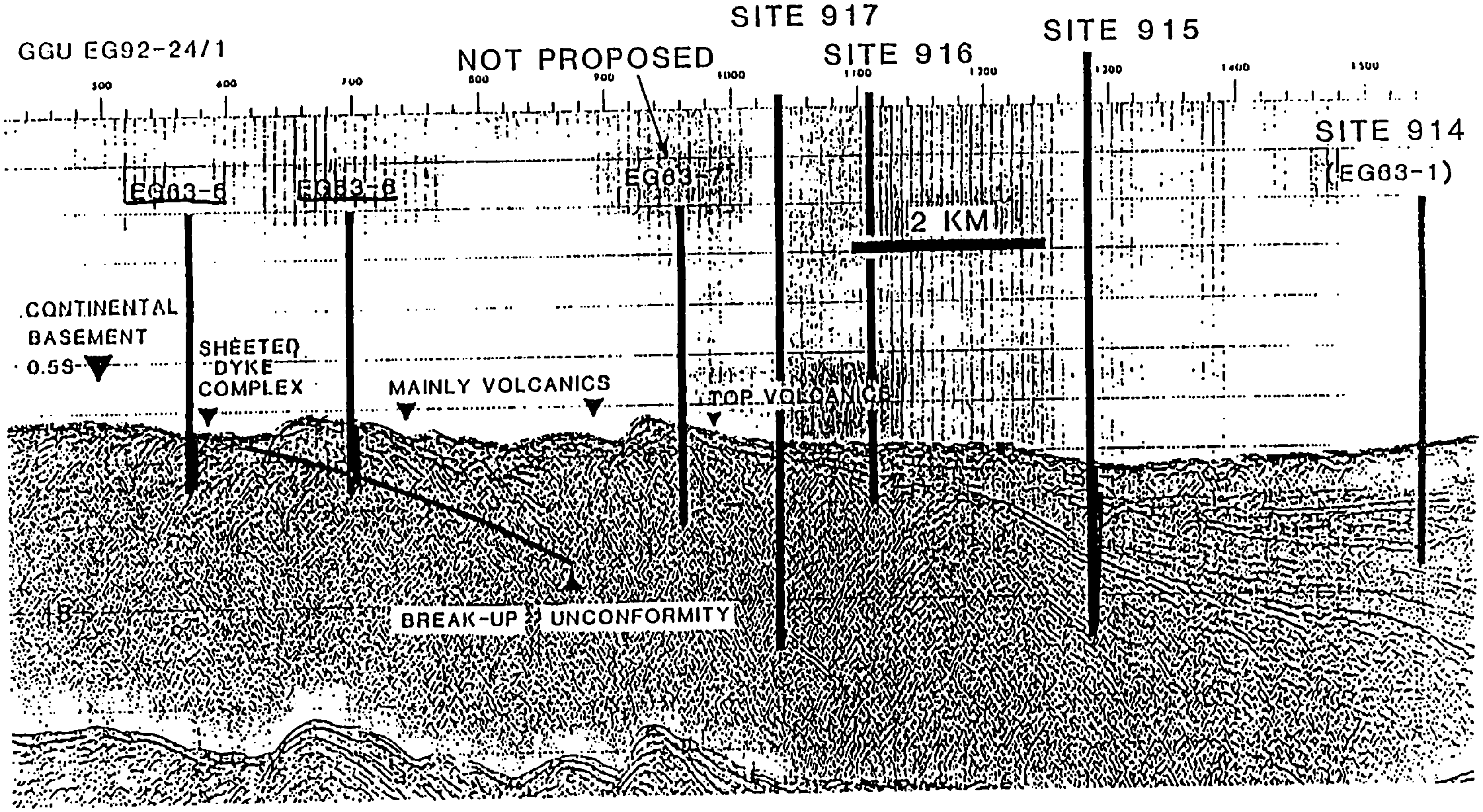


Fig. 7

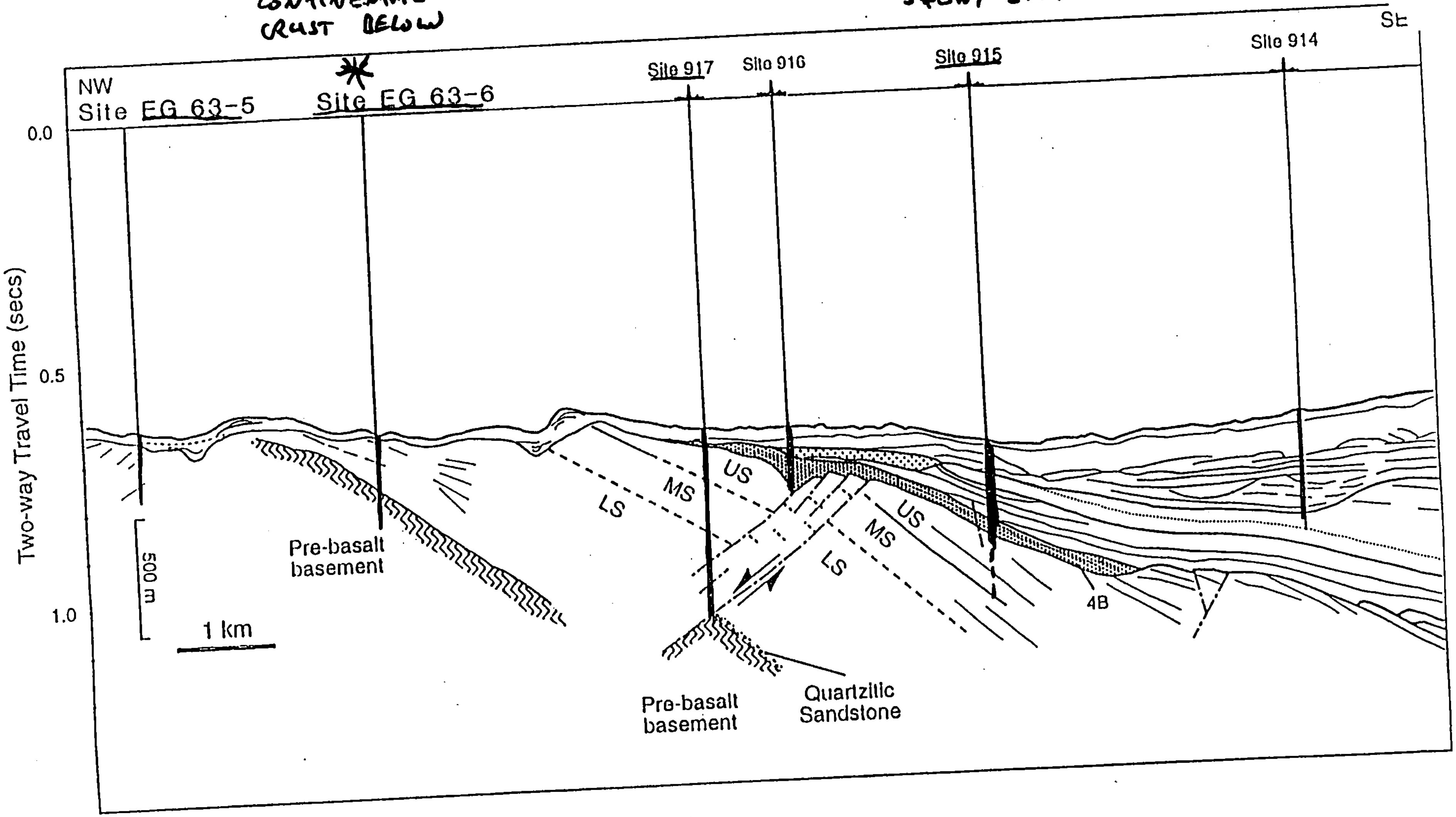

SITE 917
GGU EG92-24/1
NOT PROPOSED
SITE 916
SITE 915
500
600
700
800
900
1000
1100
1200
1300
1400
1500
SITE 914
(EG63-1)
EG63-6
EG63-8
EG63-7
2 KM
CONTINENTAL
BASEMENT
0.5S
SHEETED
DYKE
COMPLEX
MAINLY VOLCANICS
TOP VOLCANICS
1S
BREAK-UP
UNCONFORMITY

CONTINENTAL CRUST DEFORMATION

Fig. 8

OLDEST SDRs & CONTINENTAL CRUST BELOW

TRANSITION IN VOLCANISM FROM PICRITES TO STEADY STATE



S TRANSECT – TECTONICS MAINLY

OBJECTIVES OF NEW LEG: TWO TRANSECTS

EG63

-DRILL FEATHER EDGE OF SDRS; EARLIEST MAGMATISM AND CRUSTAL STRUCTURE BELOW;

-DEEPEN SITE 915 TO RESOLVE VOLCANIC EVOLUTION (picritic volcanism to steady state)

EG 66

-TRANSECT HALF WAY TO ICELAND PLUME TRACK TO DETERMINE ROLE OF PLUME AND NATURE OF PLUME IN RIFT VOLCANISM (essential in the oceans to avoid crustal contamination)

-RIFT CRUSTAL STRUCTURE

-EARLY OCEANIC SDR SUCCESSION

-EARLIEST OCEANIC BASEMENT

-COMPARISON OF RIFT HISTORY ALONG THE MARGIN AND ON LAND

	Site	water depth (m)	drilling	penetration (m)	recovery %	lithology
LEG 133	823A	1638.4	APC	119.8	103.3	carbonate and siliciclastic sand and mud
	823B	1637.9	APC/XCB	754.85	93.7	carbonate and siliciclastic sand and mud
			XCB		92	
	823C	1637.8	RCB	227	82	siliciclastic and carbonate sandstone
LEG 115	716A	2266.3	RCB	287.8	47.8	n. ooze, limestone, basement
	716	544.3	APC	262.7	102	forambearing nannof. ooze

average recovery Legs 115 and 133, APC/XCB = 73.2%

average recovery APC = 100.8%

average recovery XCB = 15.8 %

average recovery Legs 115 and Leg 133, RCB = 47.8 %

	Site	water depth (m)	drilling	penetration (m)	recovery %	lithology
LEG 133	811A	937.1	APC	213.6	99.4	nannofossil ooze
	811B	948	APC/XCB/VPC	199.3	7.8	calcareous sand, lithified grainstone
	812A	461.6	APC/XCB	189.9	21.4	c. ooze, chalk, dolomitized packstone
			APC		93.48	
			XCB		4.29	
	812C	461.9	APC/XCB	137.8	82.8	n. ooze, dolomite
			APC		101.44	
			XCB		14.52	
			APC		101.5	
			XCB		0.18	
	813A	539.1	APC/XCB	199.43	86.1	n. ooze, calc. sand, dolomite
			APC		102.3	
			XCB		3.07	
	813B	538.9	APC/VPC	196.2	103.2	n. ooze, calc. sand, dolomite
	814A	520.4	APC/XCB	162.4	54.1	n. ooze, calc. sand, dolomite
			APC		103.2	
			XCB		5.88	
	815A	465.5	APC/XCB	473.5	87	n. ooze, some clay, bioclastic packstone
			APC		103.1	
			XCB		74.3	
	816A	437.8	APC/XCB	111.5	87.5	n. ooze - clayey n. ooze, dol. rud-floatstone
			APC		103.2	
			XCB		6.6	
	816B	437.8	RCB	77.2	13.6	n. ooze - clayey n. ooze, dol. rud-floatstone

Appendix L2.3.1

	Site	water depth (m)	drilling	penetration (m)	recovery %	lithology
LEG 101						
	626C	855	HPC/XCB	179	37	carbonate ooze
	626D	854	HPC/XCB	456	3.4	c. ooze, c. sand
	627A	1036	HPC	8.8	100.7	c. ooze
	627B	1036	HPC/XCB	536	65.4	c. ooze, turbidites, dolomite (bottom)
			HPC		97.6	
			XCB		93.2-4.4-37	depending on lithology
	628A	966	HPC/XCB	298.4	72.7	c. ooze, turbidites, debris flows., limestones
	629A	553	HPC	16.5	37.6	carbonate ooze
	630A	807	HPC/XCB	250.3	88	c. ooze, turbidites, debris flows, limestones
			HPC		98.9	
			XCB		64.1	
	631A	1081	HPC/XCB	244.3	65.1	carbonate ooze, turbidites, debris flows
	632A	1996	HPC/XCB	141	59.1	c. ooze, turbidites, debris flows, limestones
	632B	1996	RCB	283.3	21.4	c. ooze, turbidites, debris flows, limestones
	633A	1681	HPC/XCB	227.3	46.7	c. ooze, turbidites, chalk, limestones
	634A	2867	RCB	479.4	8.5	chert, chalk, limestone
	635B	3480.5	RCB	117.7	26.5	marl with debris flows

average recovery HPC/XCB = 54.9 %

average recovery RCB = 18.8 %

3 of 5

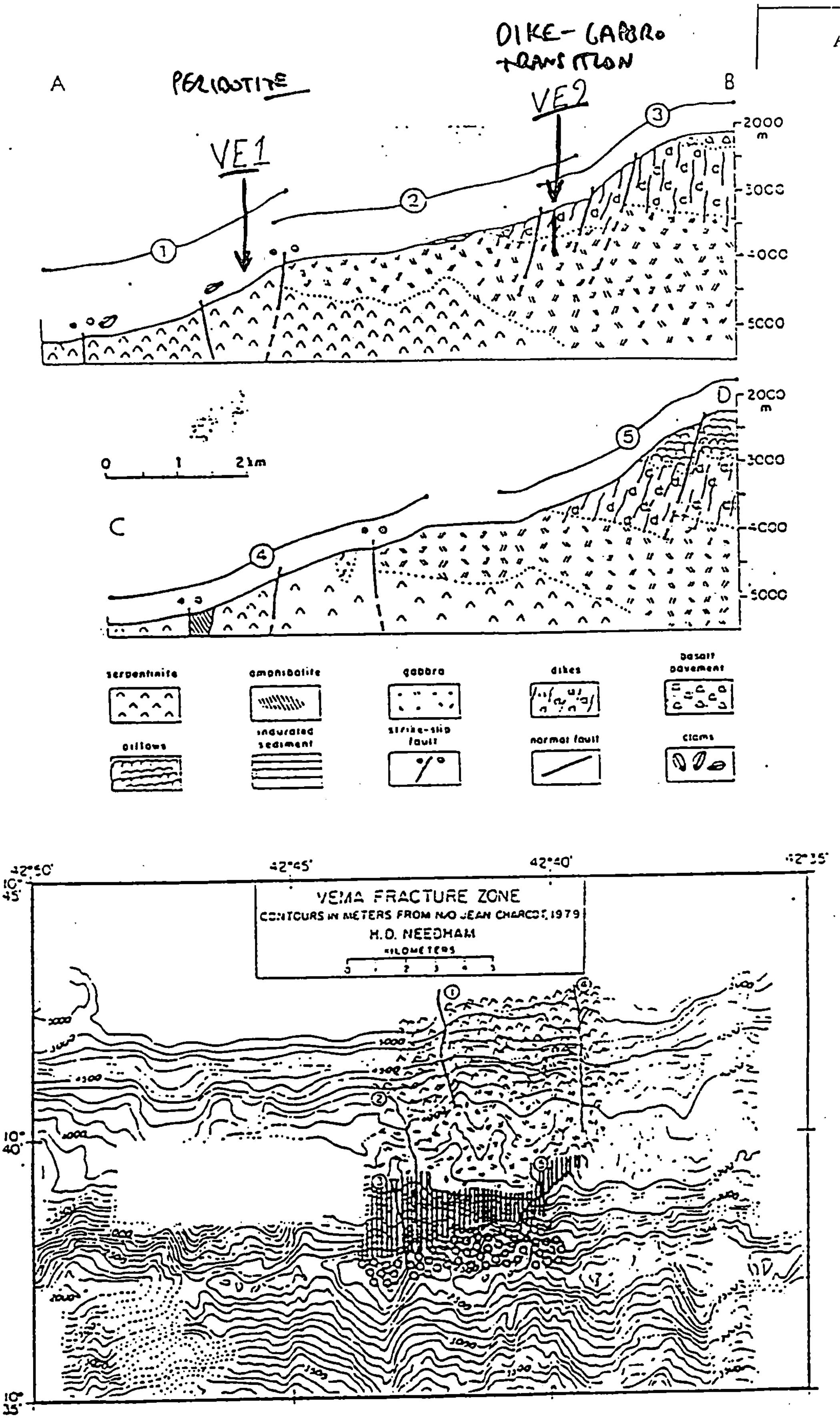
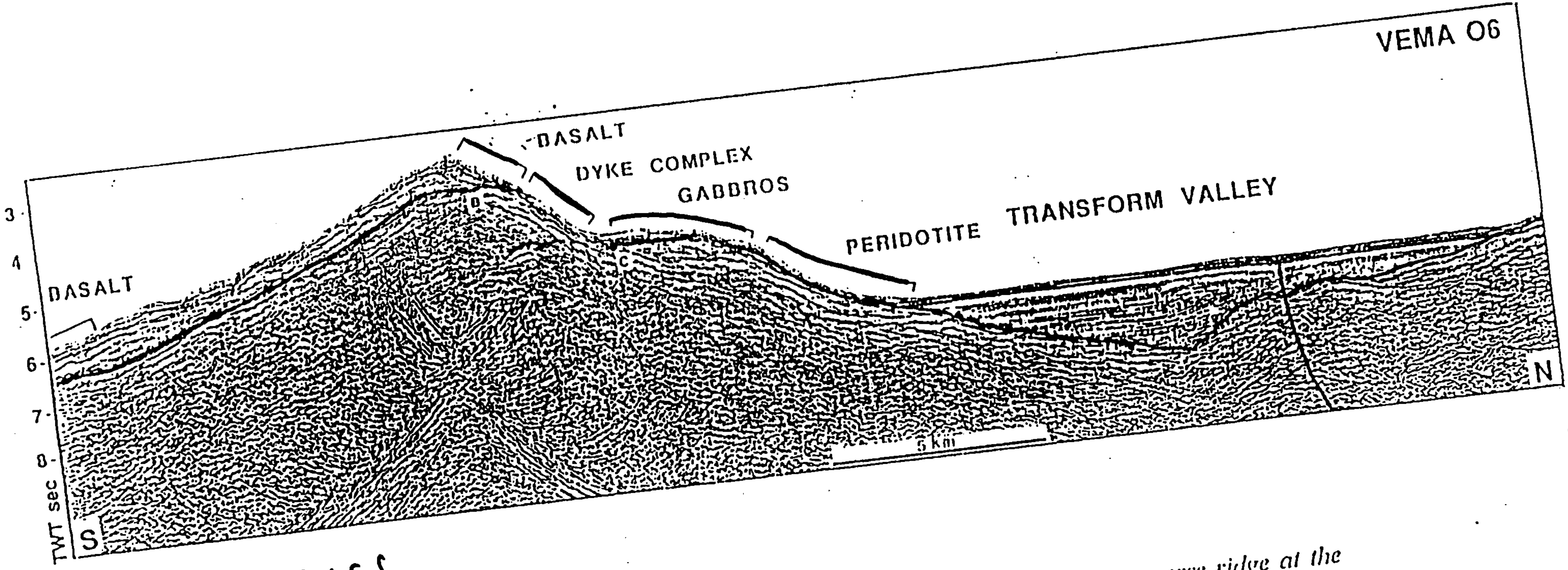
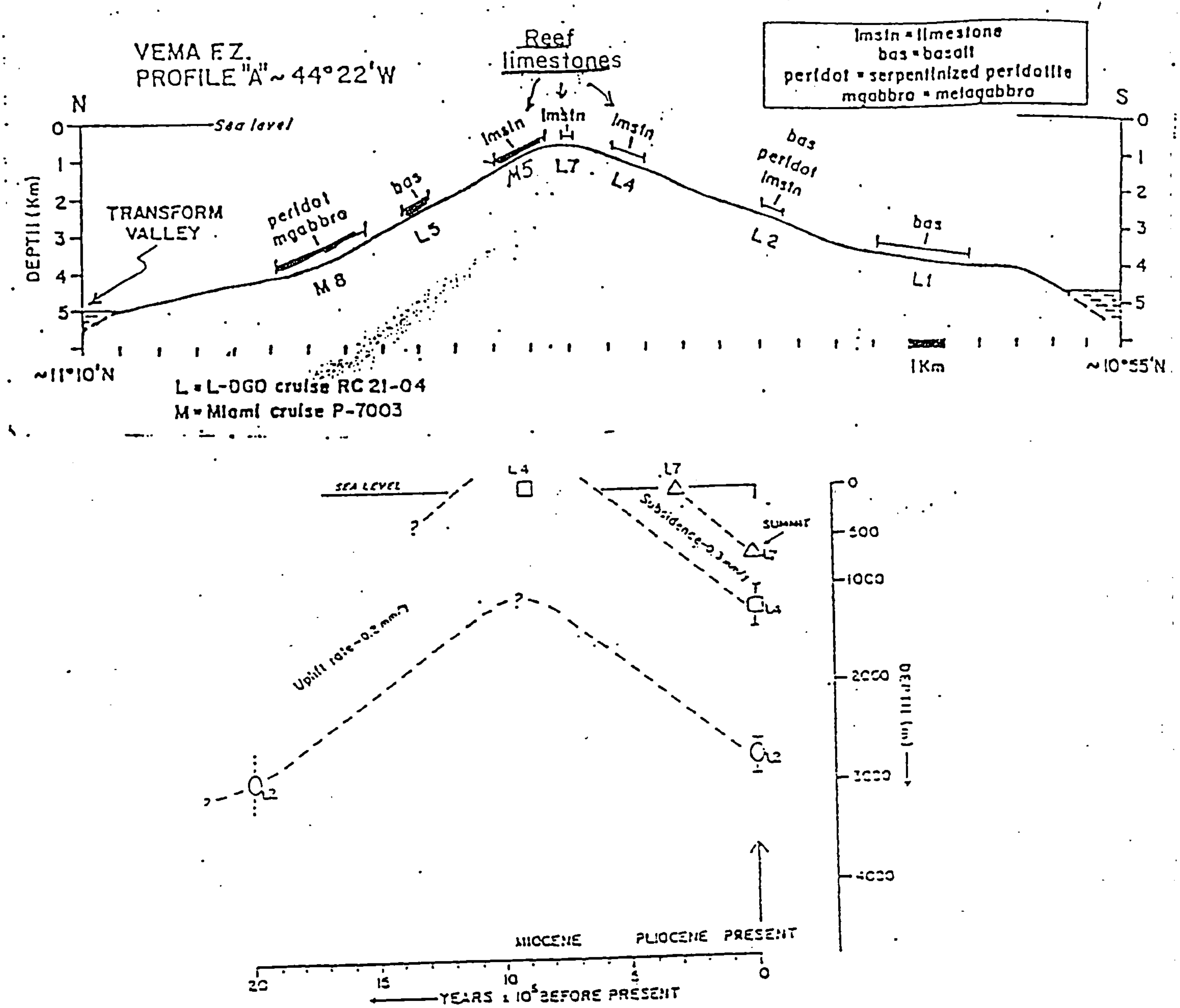


Figure 9 - A series of dives by the submrsible Nautile established that the North side of the Vema transverse ridge exposes, in correct stratigraphic order, all of the stratigraphic units expected in classical models of oceanic litosphere: from base to top, a mantle-derived ultramafic unit, a lower crust gabbroic interval, a sheeted dike complex, and an upper crustal unit of basalt.



NAUTILE DIVES

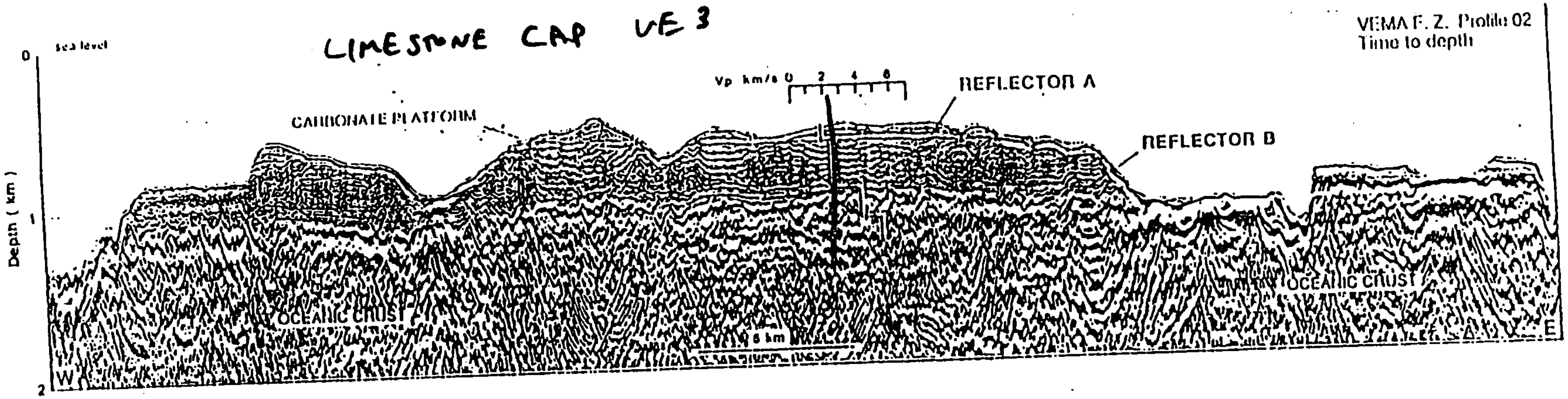
Figure 10 - N-S mutlichannel seismic reflection profile of the transverse ridge at the site of the Nautile dives. Lithology obtained from the Nautile dives is superimposed. (Bonatti, Ligi, Carrara et al., in preparation).



DREDGING

Figure 4 - Shallow water limestones recovered from the crest of the transverse ridge provide the only available constraints on rate and timing of subsidence on the southern transverse ridge. Profile above shows numbered dredge stations on L-1 profile across transverse ridge. Lower graph shows age versus depth constraints inferred from dredged limestones, where numbers are keyed to dredge stations. These few data points encourage us to believe that the use of biostratigraphic ages and paleoenvironmental indicators is a viable technique for estimating rates and timing of vertical tectonics in this field area. The rate of uplift is not yet constrained by observation. To construct this figure a hypothetical rate of uplift of 0.2 mm/yr was calculated by assuming a steady state topography for the transverse ridge with horizontal motion of the seafloor along transform-parallel flowlines. It seems likely, however, that the transverse ridge is not a steady state feature. Figures from Bonatti et al (1983).

LIMESTONE CAP VE 3



TRANSVERSE RIDGE

Figure 5 - Multichannel seismic reflection profile along the crest of the transverse ridge, showing a carbonate platform overlying an eroded block of oceanic crust. Length of profile is about 50 km. Target VE 3 is indicated. A portion of this profile is shown in figure 6. From Bonatti, Ligi, Vera et al., 1994.

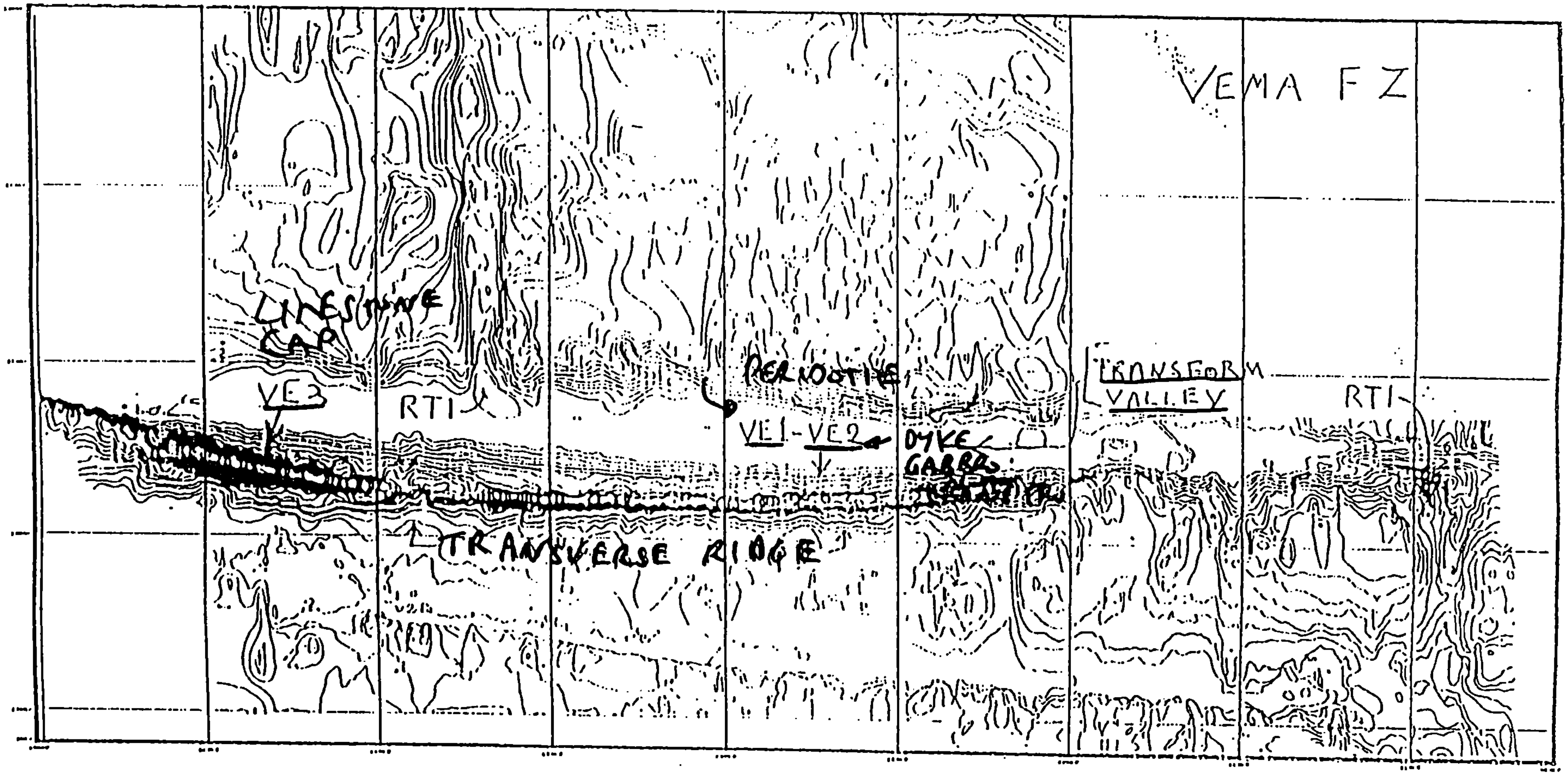


Figure 1 - Morphobathymetry of the Vema F.Z. Data from French Multibeam surveys (Needham et al.), Prince and Forsyth, and cruise EW 9305 (Kastens et al.). Approximate location of drilling targets VE 1, VE 2 and VE 3 on the transverse ridge are indicated.

VEMA FRACTURE ZONE

RELATES TO TECP THEMATIC OBJECTIVES TO STUDY TRANSLATIONAL (STRIKE-SLIP) AND VERTICAL TECTONIC PROCESSES.

INCLUDED IN PROSPECTUS AT REQUEST OF MAJORITY OF TECP

REASON: TO RECOGNISE VEMA AS KEY AREA FOR STUDY OF TRANSFORM TECTONIC PROCESSES.

OBJECTIVES:

i) DRILL THROUGH SHALLOW-WATER LIMESTONE CAP TO DETERMINE AGE AND SUBSIDENCE HISTORY; POSSIBLY GOOD WAY TO RETRIEVE LONG OCEANIC CRUST SECTION UNDER LIMESTONE CAP;

ii) SAMPLE SHEETED DIABASE-GABBRO TRANSITION

iii) SAMPLE PERIDOTITES

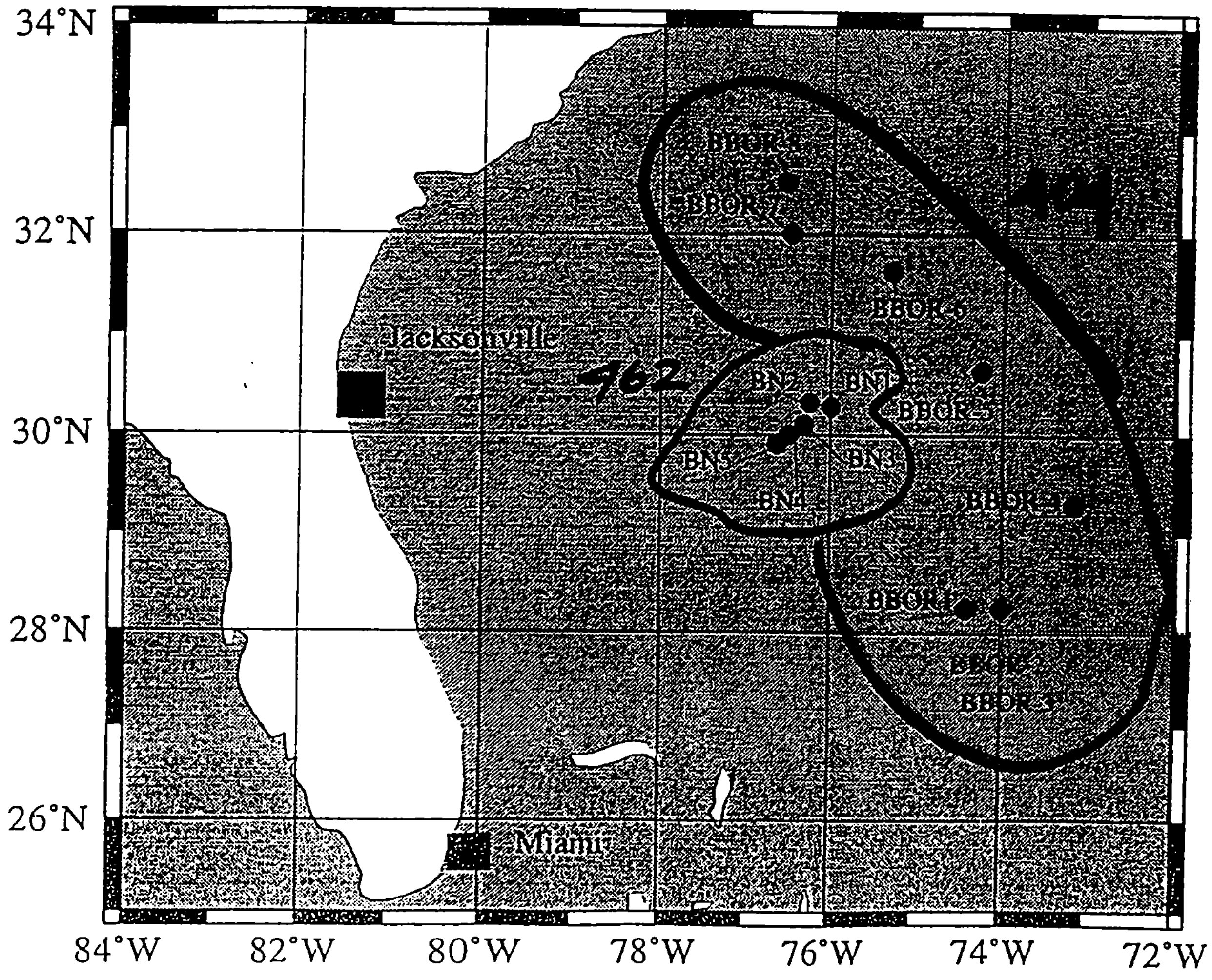
PROBLEMS:
i) Bare rock drilling?
ii) Site survey data as good as MARK/HESS but maybe needs to be better.
iii) TECP only really interested in limestone cap

If an engineering leg VEMA should be considered

462 - 1 SITE ADDED
ALL SITES DEEPENED

404 → + BR-1 + 2 CS SITES

WESTERN NORTH ATLANTIC SEDIMENT DRIFTS



WESTERN NORTH ATLANTIC SEDIMENTS DRIFTS

Late Neogene paleoceanography

- paleohydrogeography
    NADW
    glacial intermediate water
- test "sea salt" oscillator model
- changing sedimentary fluxes

Depth transect BBOR + Bermuda Rise site

BLAKE NOSE & BLAKE PLATEAU

Paleogene and Cretaceous
intermediate water history

- low vs. high latitude sources
- low latitude SST's
- paleoceanographic transitions
- chronostratigraphy

Depth transect of sites Blake Nose

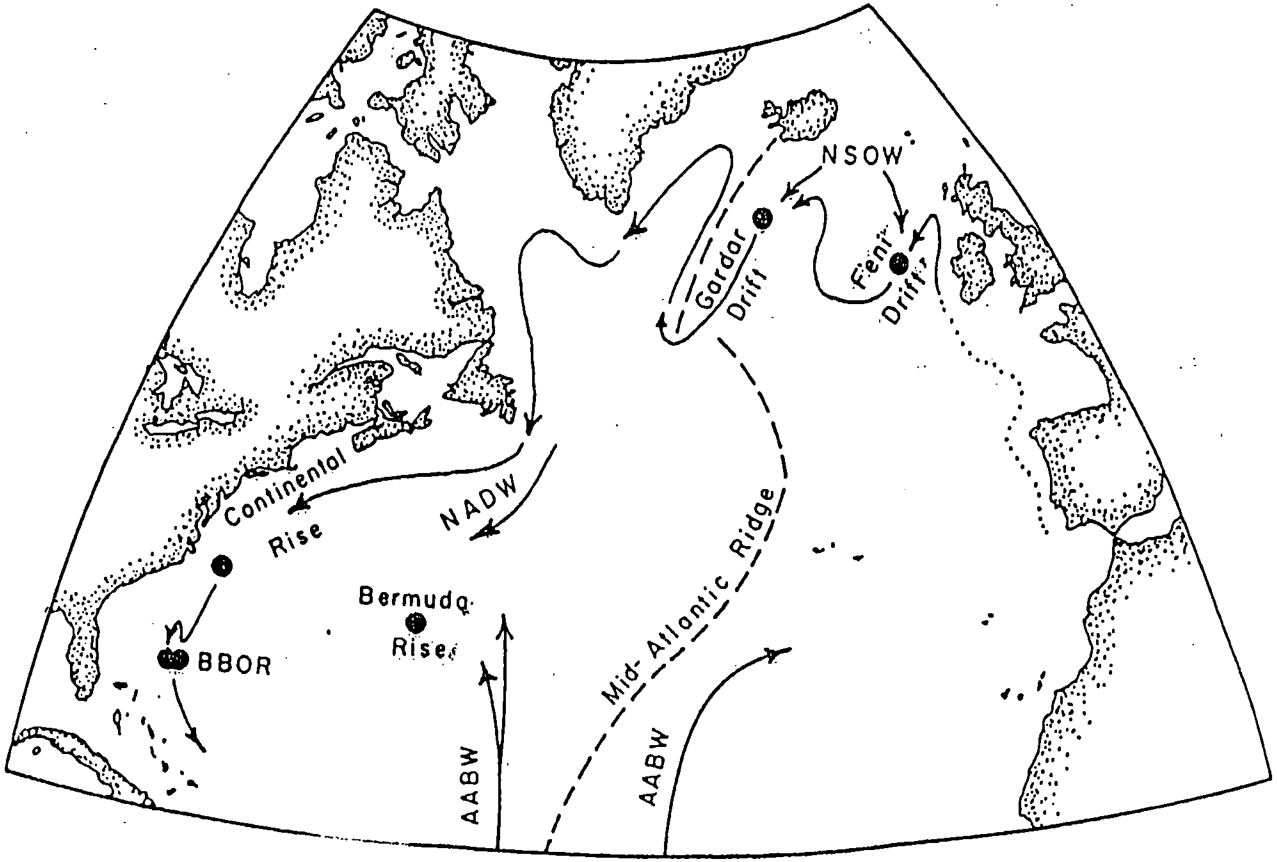


Figure 1. Location of some sediment drifts in the North Atlantic Ocean, including the Bermuda Rise and Blake-Bahama Outer Ridges (BBOR; after Keigwin and Jones, 1989).

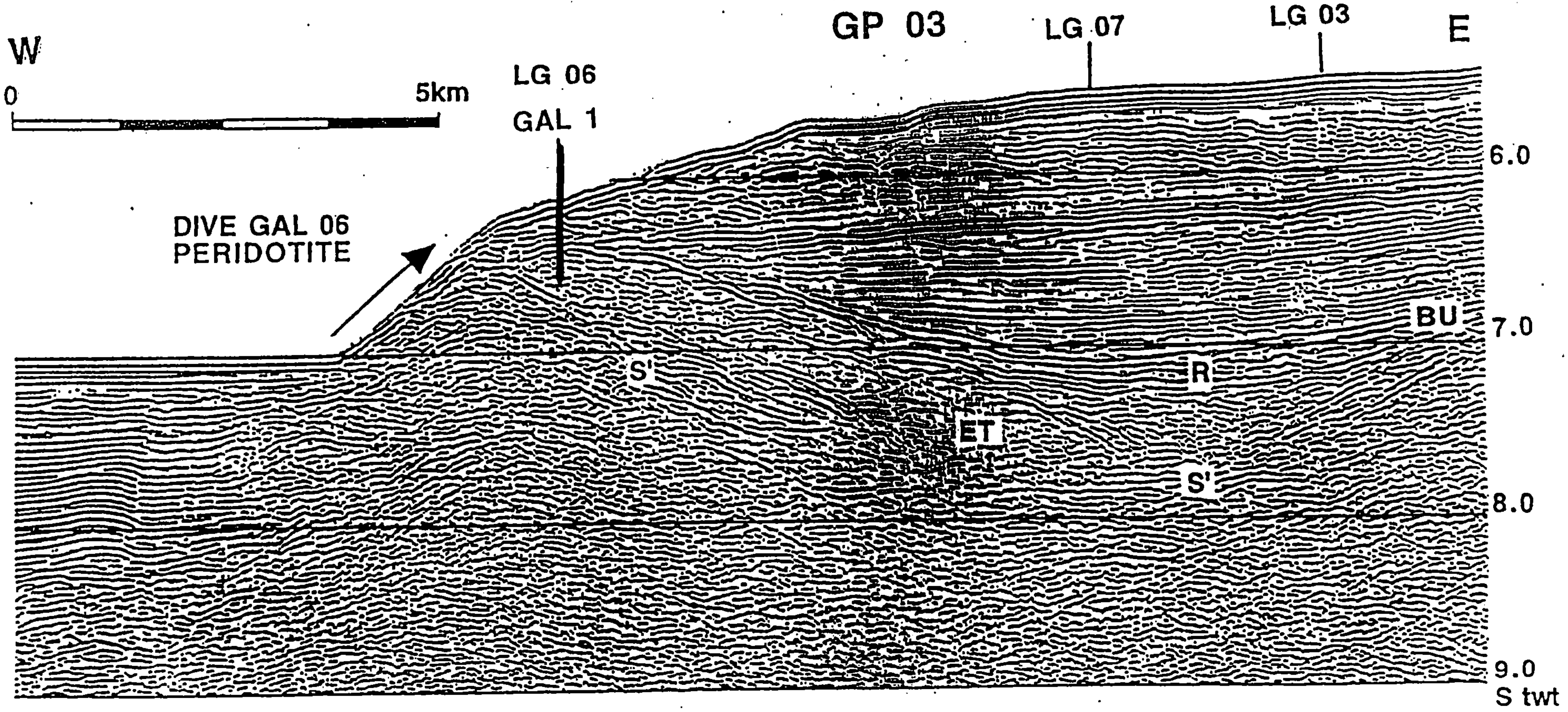
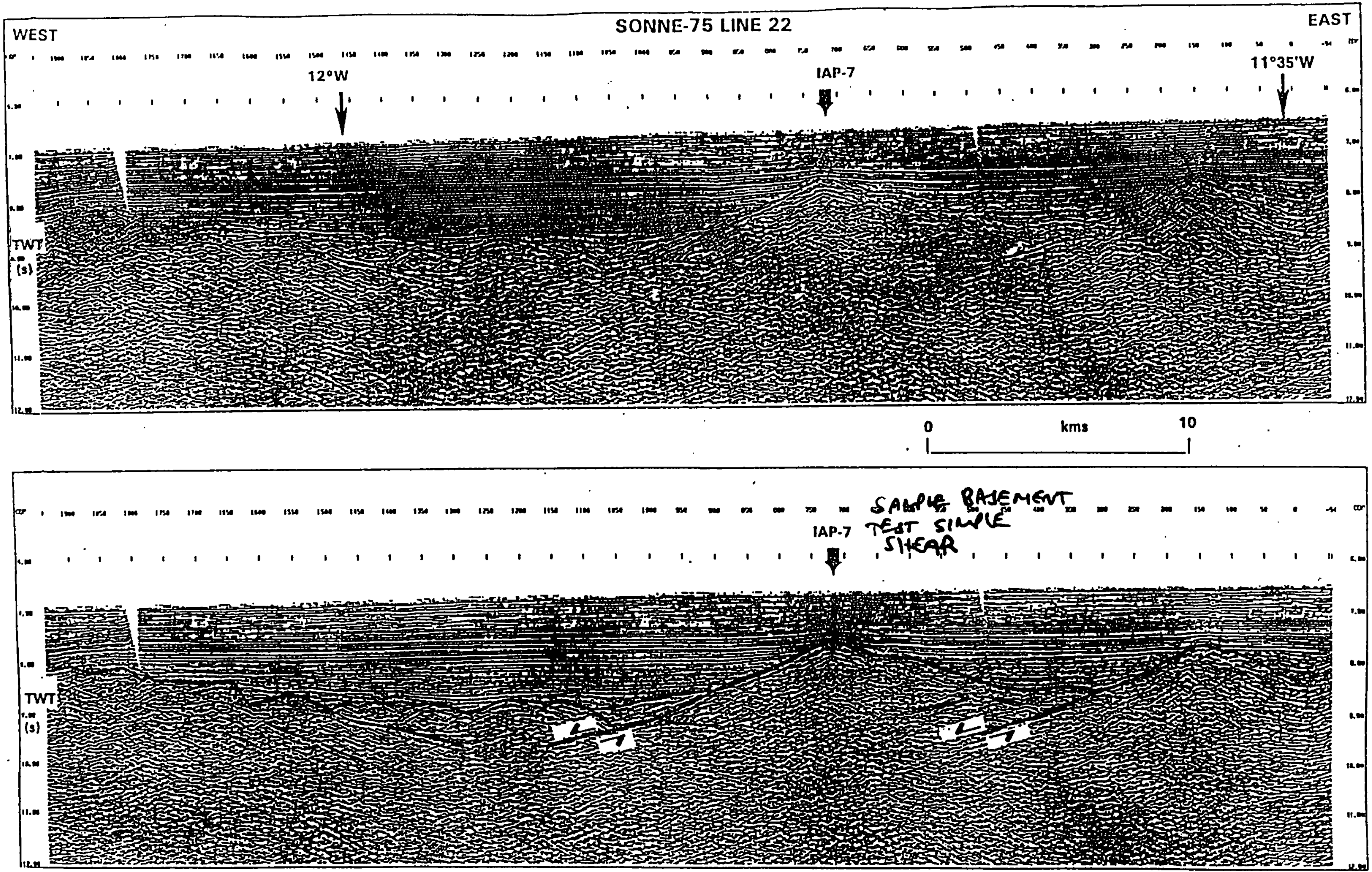


Figure 13. Processed multichannel seismic line GP 03 showing the peridotite ridge which was sampled at diving site 06, the S' reflector connected with the top of the ridge, the Enigmatic Terrain (ET) covered by late syn-rift sediments (R), the break-up unconformity (BU) and post-rift sediments. The location is shown on Fig. 12, as is the diving site where basement and Tithonian carbonate were sampled a few kilometres further east.



SAMPLE BASEMENT
TEST SIMPLE
SHEAR

Figure 5. East-west time-migrated multichannel seismic reflection profile Sonne-75 Line 22 through Site IAP-7 (see Fig. A1 for location). The lower profile is an interpretation of basement reflections seen in the upper profile. Note the two listric-like normal faults beneath IAP-7 and the next block to the east. Such faults appear to be absent under the relatively smooth basement west of IAP-7. 12°W is shown to give a common reference point with other adjacent E-W profiles.

Much still remains to be learned about processes in contractional settings. On an intrinsic level, we need to quantify and relate to each other: strain (finite strain, strain rate, deformation mechanism, fabric); stress (orientation, deviatoric stress, pore pressure); physical properties (porosity, permeability, temperature); and mechanical parameters (strength, cohesion, internal friction, compressibility). In the context of the accretionary prism we must determine: (1) how deformation is distributed throughout the prism; (2) how dewatering is distributed, i.e. what are the mechanics and paths of water flow, what geochemical fluxes are involved, and how is water flow related to stress levels; and (3) what factors control the mechanical partitioning of the incoming sediment cover into that section offscraped by thrusting and folding and that section subducted beneath the prism toe?

It still remains to evaluate the rates, magnitude, and episodicity of fluid flow and to link these hydrogeologic processes to observed geologic features. For example, the volume of fluid flow and ambient fluid chemistry and temperature should be related to the distribution of faults, small-scale features, permeable stratigraphic layers, and to the degree of cementation, veining, and mineralogical alterations. Such observations at drillable depths in accretionary prisms are necessary to provide a basis for interpretations of similar phenomena at crustal depths inaccessible by drilling and also provide the modern analogue to ancient terranes in orogenic belts.

The settings of collision zones vary considerably, from the subduction of seamounts and aseismic ridges, to the impingement of island arc systems and continental margins. It is not yet well known, for example, how topographic irregularities on an oceanic plate or the thick sediment cover of continental margins interact with the forearc, or how collision affects the distribution of deformation across the entire zone of convergence. Drilling actively subducting seamounts as well as propagating collision zones could shed light on critical collisional processes, including the nature and timing of displacements along faults, sources and processes of syndeformational sedimentation, vertical movements of the forearc, crustal flexure and deformational style. Stratigraphic analyses of appropriate sedimentary sections in active collision zones could constrain the initiation and rates of collision processes. We need to determine the timing and magnitude of vertical forearc movements in young collision zones. During collision, large slices of oceanic crust (i.e. ophiolites) may be emplaced onto continental margins. Drilling into active collision zones is needed to establish the critical relations between the emplacing oceanic slab and the parent oceanic crust. Also, the tectonic effects of flexural loading to form foredeeps need investigation by drilling.

Additional drilling at erosive margins is required to more carefully define the magnitude and rate of removal of accreted material. Subsidence studies require detailed benthic paleontology in areas where faunal diversity and sedimentation have been favourable through time. The loci of maximum subsidence and areas of stability or accretion might be quantified in one time slice. Such data would greatly increase knowledge of this tectonic mechanism.

3.2.4 Drilling strategy

It is intended to concentrate drilling on a few "end-member" accretionary prisms (e.g. Barbados, Nankai, Cascadia) that can be treated as natural laboratories to obtain data that will permit better quantification of the behaviour of accretionary prisms. Precise

3.2.2 Accomplishments to date

Drilling has already made great advances in understanding and quantifying tectonic processes, particularly in forearc (accretionary) settings. Holes drilled through accretionary complexes and into subducting sediments have permitted initial characterisation of the decollement zone and underthrust sediments, with enormous implications for the interpretation of other accretionary setting, including those on land in orogenic belts. ODP drilling has allowed an assessment of the effects of fluid expulsion on deformation. Pore water chemistry, temperature anomalies and structural observations from drilling indicate that fluids are moving, primarily through zones controlled by fracture permeability (associated with faults), and secondarily by intergranular permeability along stratigraphic horizons. The accretionary wedge and underthrust sediments comprise two distinct fluid reservoirs, separated by a permeability barrier paralleling the decollement zone. Drilling into serpentine diapirs in the Mariana forearc (Leg 125) documented fluid expulsion from subducting or underplated sediments several tens of km deep. ODP drilling along some convergent margins showed that continental lithosphere extends to within tens of km of the trench axis, indicating that massive tectonic erosion has taken place (Legs 112, 141). Extensive drilling in the frontal portions of accretionary prisms now provides excellent constraints both on the structural geometries and plumbing system development during accretion.

ODP drilling has focused on the relationships between deformation and fluid flow, both in oceanic basement and in accretionary complexes. During deformation, porosity is being continuously modified. This "dynamic" porosity is a key to understanding the hydrodynamics of actively deforming regions. Drilling in the Peru, Nankai, Barbados, and Cascadia accretionary prisms (Legs 112, 131, 156) demonstrated the influence upon fluid flow patterns of deformation fabrics in partially consolidated sediments and in fault zones. Geometrical and cross-cutting relations of deformation and dewatering microstructures and cement phases reflect the temporal variations in fluid flow relative to the deformation history. Drilling in the Nankai accretionary prism provided a unique chance to compare the deformation and hydrogeological regimes above and beneath the basal decollement. Techniques and instrumentation developed include Logging While Drilling (LWD) and fitting of boreholes with instrumented borehole seals (see Sections 4 & 5).

Collisional processes pose problems for drilling in view of their obvious complexity and variety. Drilling in the south Chile region (Leg 141) was aimed at testing a model for ridge-trench collision that includes rapid uplift and subsidence of the arc and forearc, high levels of regional metamorphism and elevated thermal gradient, arc magmatic hiatus, anomalous forearc magmatism, and localised subsidence and extensional deformation of the forearc in the collision area. The results have revealed regional uplift just north of the collision (pre-collision margin), extensional deformation in the area of ridge collision, and possible anomalous magmatism and hydrothermal activity within the inner slope of the trench. The subducting Chile Ridge may be causing erosion of the accretionary prism as it sweeps down the margin. Drilling in the Vanuatu forearc (Leg 134) demonstrated the accretion of sediments and volcanic rocks from an incoming oceanic high as discrete thrust sheets that are forming a new tectonostratigraphic terrane.

3.2.3 Remaining unsolved problems

information on extension and early spreading can be obtained by drilling structures footwall anticlines; detachment faults) and seismic facies changes (e.g. in deep sea) th ay happen to be hydrocarbon traps and thus need a riser. Riser drilling will an entirely new suite of targets for tectonic drilling. Targets include the Atlantic gin (e.g. New Jersey), Sea of Japan, Gulf of California and Red Sea. Also, drilling to ement in other settings may be required, where overlying sediments are potentially drocarbon rich (e.g. California borderland).

elative shallow drilling

onger term tectonic interest in shallow drilling will focus on study of important settings hat remain inadequately documented (e.g. sheared passive margins; small ocean basins; unusual plate boundaries; complex microplate areas). Redrilling of some classic areas to obtain better material, assuming improved recovery (e.g. successions with shallow-water limestones, conglomerates, weakly consolidated sands and cherts) may be necessary. Structurally oriented studies of very young oceanic crust using DCS may also become a priority.

3.2 CONTRACTIONAL SETTINGS

3.2.1. Rationale

Aspects of interest to TECP include the mechanics, kinematics, and mechanisms of deformation within accretionary wedges, mass balances between "input" from the subducting plate and "output" in forearc and arc-axis regions, including thermal evolution and fluid flow; and the modification of these processes by collisions with seamounts, arcs and continental fragments.

Past achievements show that processes operating in accretionary prisms are amongst the most tractable to study by drilling. Accretionary prisms constitute a natural experiment, in which porous sediments are deformed and consolidated under differential stress. These are fundamental processes about which we still have much to learn. Fluids profoundly influence the development of accretionary prisms. The partitioning of accreted, underthrust and subducted sediments, the regional temperature regimes, the nature of diagenetic/ metamorphic processes, the distribution of hydrocarbons and even the surface biology depend to some degree on large-scale fluid flow, fluid pressures and permeability, and the episodicity of these phenomena in accretionary prisms.

The process of subduction erosion is an enigma in contractional settings. By its very nature subduction erosion does not leave a positive record; this process can only be inferred from missing terranes, or anomalous subsidence in forearcs. Drilling in active margin settings can provide essential data (e.g. subsidence history) for understanding this process, which may well be of global importance.

Collisional processes at contractional margins lead to many of the world's greatest mountain belts (e.g. Himalayas, Karakoram, Alps), yet active collisional settings at modern convergent boundaries remain virtually unstudied by academic drilling. This topic is much larger in scope than the topic of accretion at subduction zones outlined above, and requires study of a number of key locations potentially providing a wide range of types of information. Close integration with land studies will also be essential.

spreading geometry and the role of trench dynamics (e.g. Lau basin) are important to define.

Phase 1 Recommendations 1996- 1998
There are a number of remaining objectives in the Atlantic, backed by currently highly ranked proposals. These centre on resolving uncertainties about the crustal structure of the continent-ocean transition in both volcanic ('Greenland margin 2') and non-volcanic settings ('Iberia margin 2'). A major goal is to understand ocean ridge constructional processes in three dimensions (e.g. InterRidge initiatives on studying fast versus slow spreading ridges; MOR versus marginal basin oceanic crust) and to test models for the origin of seismic reflectors in the oceanic crust. The availability of targets will, however, depend on the development of a routinely functioning Diamond Coring System during 1996-98. An additional aim is to study young rift basins that document the transition from rift to oceanic crust under shallow sedimentary covers (e.g. Woodlark basin, northern Gulf of California, Gulf of Aden). The Woodlark basin includes extrusive rocks similar to those in some ophiolites (i.e. high Mg andesites) and is of interest to many land geologists. Much of importance remains to be learnt about forearc (e.g. Tonga), arc (e.g. Tonga Ridge; Lau-Havre-Taupo troughs) and backarc (e.g. Bransfield Straits; N. Mariana) extensional settings. Successful proposals will be those that pose most effectively testable hypotheses capable of shedding light on quantification of fundamental tectonic processes

Phase 2 Objectives for drilling during 1998-2003
Drilling of transects across conjugate rifted basins is likely to remain a high priority. Younger basins have an advantage as noted above, as less drilling is needed to penetrate key reflectors (e.g. Gulf of California, Red Sea, Gulf of Aden, Woodlark Basin). Conjugate and transect drilling of backarc systems (e.g. Lau-Havre-Taupo; Marianas) will be a high priority. Volcanic rifted margins will also remain possible targets (e.g. Southern South America). Completion of conjugate rifted margins (Iberia-Newfoundland) could be a priority. Studies that involve real-time monitoring of processes via observatories will probably gain momentum (e.g. in marginal basin and MOR). Assuming DCS is by then operational, targets will be legion (e.g. Mid-Atlantic Ridge, Hess Deep, marginal basins, Valu-Fa ridge, Romanche/Vema transforms etc.)

Phase 3 A vision beyond 2003:
Deep drilling. A number of critical tectonics problems can only be resolved in the future by very deep drilling (2-4 km) in deep water, whether or not a riser is available. Drilling as deeply as possible into oceanic lithosphere (e.g. deepening of 504B or equivalent) and study of deeper-level structural processes (e.g. detachment faulting) will remain a priority. At margins as well, pure versus simple shear models will probably still need to be resolved. For example, the Iberia margin S reflector could be drilled as an example of a possible simple shear detachment fault zone. Similar reflectors may be identified in other basins, possibly requiring less deep penetration. In general, the continent-ocean boundary will remain an important but poorly documented setting.

Arc splitting and rift-drift transition in backarc basins (e.g. Sea of Japan; Tyrrhenian Sea; Lau Basin) will require similar investigations.

3.1.4 Drilling strategy

To solve tectonic problems discussed above through drilling, TECP recommends that several complementary approaches be utilised:

Transect drilling of geophysically well constrained conjugate margins (e.g. NARM) and backarc (e.g. Tonga) basins that exhibit large variations in rifting and break-up processes, to sample diagnostic and tectonically significant sediment packages and basement lithologies. This approach is needed to understand the deformation pattern of the margins, the distribution of strain, and to investigate the detailed nature of igneous material and the transition from rift to spreading processes.

Transect drilling across young or active features. This approach should be used for rifted margins where conjugate pairs are unambiguously separated by only a narrow zone of 'new' ocean floor (e.g. Red Sea, Gulf of Aden, Cayman trough), where full back-up and seafloor spreading has not yet commenced (e.g. the western Woodlark Basin), and across oceanic ridges at high and low magma budget end-members (Mid-Atlantic Ridge, East Pacific Rise). This drilling will provide important direct information on well constrained recently formed extensional features, that are exposed or only shallowly buried by sediment.

Drilling of specific features imaged on seismic data that are geophysically well constrained within their extensional settings, and which are considered to be globally significant for rifting processes. Detachments faults are a particular example that can be found in multiple settings including passive margins and mid-ocean ridges. Although the preferred method of studying such features is as part of a drilling transect, these transects may not always be the best and most readily drillable locations for such features, especially where one side or conjugate is inaccessible to the drill. Examples of this approach would be the drilling of the S reflector on the Galicia margin, a well-characterised site which is not located on a drilling transect, or at a slow-spreading ridge near a transform. Further drilling of forearc lithosphere (e.g. Mariana and Tonga) would test whether the large obducted ophiolites (e.g. Oman ophiolite) record mid-ocean ridge or supra-subduction zone lithosphere.

Drilling longitudinal transects along extensional belts. This is particularly important to elucidate backarc rift and spreading processes (e.g. N Mariana, Japan Sea, and Lau-Havre-Taupo areas) where spatial variation along-strike of propagating rifts provide information on the temporal development on the basins; it could also be useful in small rifted oceanic basins (e.g. Red Sea). In addition, the longitudinal variation in the tectonic style of rifts and ridges where the extension rate, proximity to hotspot, or other critical parameter changes rapidly along-strike can provide critical information on the interplay of competing processes.

Experiments to study the *in situ* stress state in and around extensional terranes, and specific rift-related features (see Section 4). The stress field is important to determine the plate-driving forces that produce extension, the local variations of stress near active faults and spreading ridges, and especially at low-angle detachment faults. The rotation and level of stress associate with possible detachments is critical to theories of their development. In backarc basins stress fields associated with the transition from rifting to

We need to determine the rheological controls on flexural rigidity at rifts and passive margins.

fundamental process of "orogenic collapse" can be investigated by drilling where basins have collapsed below sea level.

Decoupling of strain and the rheologic layering of the lithosphere.
Numerous studies of lithospheric deformation have tried to relate the brittle faulting and volcanism observed at shallow crustal levels to deeper level processes such as ductile flow, magmatic intrusion and metamorphic processes. Although there is no consensus at present, it is clear that in many environments the upper and lower lithosphere are decoupled. The nearly flat Moho discontinuity across areas of very different extensional strains in the Basin and Range Province of the western U.S.A. is a dramatic symptom of this condition. Detachments are another result. While asymmetry in rifting at upper to middle crustal levels is observed, extension and flow in the lower lithosphere may be more symmetric. How does the rheologic layering of the lithosphere control the deformation style and decoupling of upper and lower lithospheric deformation?

Magma budget, extensional style and the continent-ocean transition.
At both rifts and ridges, there is a dramatic difference in tectonic style between magma-rich and magma-poor regions. Magma budget appears to account for the range of expressions of the ridge relief between high-magma budget regions, such as the Reykjanes Ridge, and highly faulted, low-magma budget areas, such as that near the 15 20'N Fracture Zone. At slow-spreading environments mechanical extension predominates over magmatism, unless interrupted by an episode of magmatic activity. In contrast, fast-spreading ridges tend to have high magma budgets and therefore show only very small amounts of tectonic extension. There is a strong similarity between volcanic margins and fast-spreading ridges on the one hand, and non-volcanic margins and slow-spreading ridges on the other hand. However, tradeoffs in extension rate and thermal structure, and their interaction, which controls the extensional style are not yet quantified. The transition from continental rifting to sea-floor spreading is associated with a transition from mostly mechanical extension to magmatism (mechanical extension, depending on the rate of spreading) as the zone of extension narrows. Thus the continent-ocean transition zone can play a unique role in understanding these processes. Studying the extensional parameters of spreading segments with different magma budgets at a constant spreading rate could help evaluate the role of crustal underplating by magmatic processes. Backarc basins, with nearby arc volcanic sources may also prove to be an important variant.

Flexural strength of extending lithosphere.
While the flexural strength of oceanic lithosphere subject to bending loads as islands and trenches is understood, the flexural strength of lithosphere under extension remains controversial. The flexural rigidity of some rift basins has been estimated to be very low to negligible, yet flexural uplift of rift margins is well documented. There is no effective predictive model of the rigidity of lithosphere either during or following extension. The amount and timing of vertical motions provide critical data on the isostatic response during extension. Subsidence has long been recognised as a key parameter related to the amount of extension, synrift subsidence and sedimentation but is still not fully understood. The importance of rift-flank uplift and the resultant patterns of erosion, sedimentation and hydrothermal fluid circulation have only recently been recognised. Contradictory evidence of both low and high flexural rigidities have been documented.

of which are still active. The potential for studying a wide range of stages of development, both active and inactive systems, and faults in different rift settings makes oceanic studies appealing. Drilling of active systems offers the possibility of documenting the stages of development of hanging wall and footwall structures, fault rock characteristics, *in situ* stress, fluid pressures, and seismicity. It should be noted that the palaeomagnetic technique (using oriented core) has an important application here to determine rotations about horizontal as well as vertical axes.

Tectonic and magmatic segmentation of rifts and ridges

Recent studies confirm that the structural geometry of the most slow-spreading ridges is similar in many respects to that of continental rifts and rifted margins. Tectonically extending lithosphere is composed of discrete rift segments, each a few tens of kilometers in length, either linked end-to-end, or en echelon. Offsets between segments may be large or subtle (in the order of 1-10 km of offset) and may be marked by a change in fault polarity. At ridges, this segmentation is mimicked by geophysical and geochemical anomalies, such as the prominent "bulls eye" gravity lows along the Mid-Atlantic Ridge. In the Red Sea, continental breakup is discontinuous and was initiated at segment centres. At other margins and backarc basins propagation of the rift-drift transition may proceed stepwise from segment to segment. These observations strongly suggest that the lithosphere-asthenosphere system responds to plate separation in a discontinuous, but systematic way. Segmentation thus appears to be a universal response to extension. What controls the location and spacing of rift segmentation? Pre-existing structure may influence rifts, but ridges are also segmented. Are they the result of thermal anomalies in the mantle, mechanical thinning of the crust or some combination of the two? Morphological stratigraphic and geophysical observations alone cannot uniquely constrain the processes operating along these segments; geological observations superimposed on a geophysical base can help in this regard. ODP remains an important means of testing geological models and hypotheses concerning variations in the distribution of mechanical extension and of magmatic rocks as a function of this segmentation.

Stresses that drive plate boundary deformation.

Stresses expected from lithosphere-asthenosphere and inter-plate dynamics are very small compared to the yield strength of rocks determined in laboratory experiments. Yet extension is widely observed in both continental and oceanic realms. Backarc basins reorganise from a rifting configuration, that is strongly coupled to the adjacent trench, to an independent spreading system. This transition may be a key to determining the magnitude and transmittal of stresses in the plates. It may also help resolve the driving mechanism of backarc spreading, variously thought to be due to diapiric rise behind an arc, mantle corner flow at the downgoing slab, or absolute plate motion of the slab. Mid-ocean ridges are sites where these stresses are small relative to other boundaries. Drilling and borehole studies can provide information on the structure developed over time in sections of oceanic crust. Stress measurements are required to evaluate hypotheses regarding both stresses near plate boundaries, and stresses required to induce internal deformation of plates. In these areas it should be possible to relate directly deformation structures mapped on the sea floor to deviatoric stresses, a link that is required to evaluate laboratory deformation experiments under natural conditions and time scales (see Sections 4 & 5). Finally, many mountain chains show evidence of pervasive crustal extension and subsidence soon after the climax of collisional deformation. This

MARGINS: This is a US initiative for integrated process-oriented study of continental margins. Drilling will be a key component of MARGINS.

Continental drilling (ICDP, i.e. International Consortium of Continental Drilling). Oceanic and continental drilling could effectively be combined in some areas. Continental drilling is inherently cheaper than ocean drilling and a larger array of back-up data is more readily available (e.g. geological mapping and cross-sections). Linked oceanic and continental drilling would help bring together the marine and land-based communities and stimulate new tectonic hypotheses applicable to global tectonic problems.

InterRidge (Ridge, Fridge, Bridge etc) These are international and national programs to understand mid-ocean ridge dynamics. Some collaboration has already begun. Effective scenarios would include, first InterRidge type surveying to determine drill locations, followed by drilling and instrumentation, then possible follow up to drilling in the light of data obtained, all within one integrated project.

Link with hydrocarbon industry. Advent of a riser system will permit drilling of prospective hydrocarbon areas and aid study of deep-water stratigraphy. Some ODP and industry interests will then run in parallel. These include the following: testing hydrocarbon potential of deep-water settings (e.g. passive margins); geochemical (e.g. maturation) and geophysical (e.g. VSP, 3 D seismics) studies, and borehole logging (methods, modelling and interpretation). Partnership with industry could also broaden the funding base.

An understanding of extensional processes and the internal structure of the regions created or deformed by extension requires detailed information concerning the geometry and kinematics of faulting and magmatism. Direct sampling of extensional terranes by drilling, as well as imaging via borehole logging and geophysical studies, are capable of revealing structural details from which the major processes of extension may be inferred. Drilling can help constrain the distribution of volcanics and intrusives and their relationship to extensional structures. Borehole data can determine the vertical (uplift and subsidence) motions of the rift and its surroundings. Moreover, boreholes can provide access to subsurface regions of the lithosphere and play a major role in natural laboratories, if established. These results can help to solve the major tectonic problems of extensional regimes as follows.

Role of detachments in extension.
In extension, low-angle normal faults have been identified in geological and geophysical studies of both ridges and passive margins. One of the major paradoxes of tectonics today is the inferred low shear stresses required for slip on such major crustal fault zones. Studies of rock mechanics and deformation history have thus far failed to explain the evolution and significance of detachment faults,. Are these faults active at low-angles, or have they been rotated into their present attitude? The general perception is that asymmetry in extension is as the norm. If so, is this a fundamental mode of extension? Is it limited to upper and middle crustal levels? Detachments have been imaged at many passive margins. In several settings, they appear to have brought mantle material to the surface. The Mid-Atlantic Ridge also appears to have numerous low-angle faults, many

106, 109, and 147. These results support models of extension by simple shear within the uppermost crust. Drilling on the southwest Indian rift (Leg 118) revealed evidence of a complex interplay of intrusion, alteration and deformation beneath a slow-spreading ridge. In addition, drilling off the northwestern margin of Australia (Legs 122, 123) documented a complex multistage history of rifting and drifting at this passive margin. All these results confirm the tectonic complexity of extension at "non-volcanic margins" and slow spreading ridges. For example, Legs 122 and 123 documented a complex multi-stage history of rifting, in which successive pieces were rifted from the Australian continental margin.

The results of ODP Leg 104 suggested that SDRS's, which characterise the outermost regions of up to 40% of continental margins, may represent large piles of volcanic material. Further detailed investigation of seaward-dipping reflector sequences was successfully carried out during Leg 152. The lavas were initially erupted subaerially. The recognition of "Volcanic-rifted margins" (VRM) has revolutionised ideas about continental break-up and the role of magmatism. ODP drilling in island arc axial regions (Legs 125, 126) has established that intra-oceanic subduction initiation, involving both boninitic and tholeiitic volcanism, created a broad extensional terrane, up to 400 km wide and thousands of kilometers long, that formed in ~10 m.y. These features may well be counterparts of the class of "Supra-subduction Zone" ophiolites, including the Cyprus, Oman and Greek ophiolites. Backarc basins also reveal an interplay of arc volcanism, and rift volcanism and extension, as well as episodicity and compositional changes in magmatism.

The individual tectonic settings of extension also shed light on the processes controlling extension. Trenchward migration in the Tyrrhenian Sea (Leg 107) of the locus of spreading suggested the concept of "roll back" as an important tectonic process. Leg 141 drilling off Chile also suggested that extensional collapse of the margin took place in the area of ridge-trench collision.

3.1.3 Remaining unsolved problems

The solution of important rifted margin problems requires an integrated, multidisciplinary approach in which ODP drilling is one part. ODP has a central to play in providing direct information on the nature of rocks and structures in extensional belts, on the tectonic processes which produce them, and consequently on the construction and testing of models describing extension in various settings. Studies that need to be used in conjunction with drilling include seismic reflection and refraction studies of deep structure, potential field data, dredging and submersible observations to characterise surface structure and rocks. Theoretical modelling of subsidence and thermal history of sedimentary basins on a lithospheric scale also are needed to determine the relationships between heat and mass transfer during crustal extension, and the history of syn- and post-rift vertical movement. Isotope and trace element studies of magmas can be used to determine the degree of mass transfer between enriched and depleted mantle, asthenosphere and older continental and oceanic lithosphere, and crust and mantle.

This work and many of the long-term objectives of the Tectonics Panel can be advanced by linkage with other international programmes. A number of such linkages would be dependent on initiatives by ODP as a whole. The most obvious candidates are:

(uplift and subsidence) of the margin, and changes of relative sea level, climate and oceanography caused by plate dynamics and global climatic change.

At mid-ocean ridges, interplay of the processes of magmatic construction, manifest as the extrusion of lavas, intrusion of dikes and crystallisation of plutonic rock bodies at depth, and mechanical extension, shown by near-surface faulting and deeper-level ductile flow coupled with shear zones linking the extensional faults, creates the diverse structures of fast and slow spreading ridges. A fundamental control appears to be "magma budget", that is the volume of magma and the amount of heat delivered to the ridge axis per unit of plate separation. These competing effects create the structural fabric of mid-ocean ridge axes, ridge-axis discontinuities (e.g. small offsets, overlapping spreading centres, transform faults etc.), the tectonic segmentation of mid-ocean ridges, and the origin of structural/tectonic asymmetries across spreading centres. Mid-ocean ridges thus provide a natural laboratory for understanding extensional processes.

Extension is associated, not only with the development of passive margins and mid-ocean ridges, but also with the formation of backarc basins, during the initiation of subduction zones, and within the forearcs of subduction zones in the midst of continental collision zones. Backarc basins are a key extensional setting to investigate rift and ridge propagation and the interplay of mantle flow and plate tectonics. There are considerable similarities in the extensional styles observed in these various tectonic settings. In each of these there is an interplay of processes, such that extension runs the gamut from wide to narrow rift zones, symmetric to asymmetric geometries and mechanical rifting to magmatic spreading. The same scientific questions about strain partitioning, rift segmentation, igneous versus mechanical extension, and the processes that control them link all extensional environments.

3.1.2 Accomplishments to date

ODP drilling already has made significant contributions to our understanding of the variation in extensional style by providing direct information on globally recognised features that were previously only imaged on seismic data. This drilling has helped characterise the nature of specific extensional settings and 'ground-truthed' some of their seismically-imaged features. Drilling has also helped to establish the similarity of extension processes in different drilling settings, for instance, mechanically extended regions at mid-oceanic ridges and the seaward-dipping reflector sequences (SDRS) at volcanic rifted margins.

Mechanical extension of the lithosphere, well-known at continental rifts and passive margin, has now been established as a major process also in oceanic settings. Drilling on Broken Ridge during Leg 121 revealed rapid uplift of a fragment of an oceanic platform, and documented the importance of flexure during extension in oceanic settings. Drilling has also shown the similarity of extension in backarc basins (Legs 107, 127,128, and 135) to that of passive margins prior to initiation of sea floor spreading. The propagation of rifting at these backarc basins has also been established. Slow-spreading environments such as the Mid-Atlantic Ridge can be viewed as extensional plate boundaries, where mechanical extension predominates over magmatism. ODP drilling has established that tectonic denudation by amagmatic extension can expose peridotites at passive margins (Legs 103, and 149), backarc basins (Leg 107) and at mid-ocean ridges (MOR) (Legs

The Tectonics Panel also believes that the study and quantification of active or recently active systems in general will in the future prove more rewarding than continued study of ancient dead systems that are commonly deeply buried and thus difficult to reach by drilling. However, the Panel recognises that its mandate remains broad and does not wish to exclude any existing aspects from future study. TECP also notes that in addition to focusing on young, active (or recently active) systems, it will still be essential in future to document important tectonic settings that remain little investigated (e.g. strike-slip and collisional).

In **Section 3** below, we discuss in turn the rationale for drilling, unsolved problems, ,and future drilling strategy for each of the four large scale kinematic environments listed above. Study of these is achieved mostly by study of the downhole products of deformation. Such study utilises number of approaches, each involving specific methodology, for example investigation of stress/strain evolution (rheology), or fluid flow related to deformation. These aspects are set out in **Section 4.** Obtaining the necessary information requires the development of specific technology, including the means to: improve core recovery in different settings (e.g. development of a Diamond Coring System); document retrieved core (e.g. colour scanning) and obtain data by remote sensing (e.g. wireline logging). The Tectonics Panel also favors development and installation of at least one multidisciplinary seafloor earth observatory, preferably in an active margin setting. This topic is discussed in **Section 5.**

3. SPECIFIC KINEMATIC ENVIRONMENTS

3.1 EXTENSIONAL SETTINGS

3.1.1 Rationale

Extension is a pervasive tectonic process that occurs in a wide variety of tectonic settings. Rifted (i.e. passive or Atlantic-type) margins are formed by deformation and modification (rifting) of continental lithosphere, and are amongst the most prominent topographic features on Earth. Continental rifting is commonly the first event in the formation of the Earth's great ocean basins. The ocean floor grows by active tectonic extension along mid-ocean ridge plate boundaries. Propagating rift tips produce extension in the oceanic lithosphere, while extensional backarc basins develop behind many subduction zones. Rift propagation through continental lithosphere is currently proving very interesting. For example, what is the critical break point of the continenal lithosphere (e.g. in the North Atlantic and Red Sea). All of the oceanic lithosphere in the present-day plate mosaic, as well as all the oceanic lithosphere created since the initiation of plate tectonics, and ca. 60% of the world's continental margins, have been created by extensional tectonics.

Patterns of continental break-up are primary indicators of the structure and rheology of the continental lithosphere. Pre-existing continental structures and tectonic fabric, and the lithospheric composition and thermal regime play key roles in determining rift location, style and the amount and rate of extension. The structure and stratigraphy of rifted continental margins provide unique records of the foundering of the continental lithosphere, the embryonic stages of ocean lithosphere formation, the vertical movement drilling will be essential in some unstable environments. Multi-disciplinary borehole experiments and monitoring will become the norm rather than the exception in TECP-supported studies.

1 INTRODUCTION

It has occasionally been suggested that the drill is not an effective tool for addressing tectonic problems, as targets are often deep (>2 km below seafloor) and geologically complicated (e.g. rifted margins). However, in practice this is not a valid criticism, since achievements and progress have been very substantial overall. Undoubtedly, one of the greatest successes of ODP has been the drilling of accretionary prisms, where study has moved on from essentially the description of anatomy, to *in situ* monitoring of active processes, as at the Nankai, Cascadia and Barbados active margins. The Tectonics Panel has consistently supported an increasingly complex set of drilling experiments in the toes of those accretionary prisms in which the deformation fabrics, fluid compositions, and pore pressures can be determined *in situ* . This will be a continuing theme in the future. Drilling into various rifted margins, notably those of continents, arcs, and plateaux has also so far successfully characterised different types of basement. These include tilted fault blocks (e.g. Iberia margin), dipping reflectors (e.g. SW Greenland margin) and peridotite bodies (e.g. Tyrrhenian Sea). Vertical motion histories have been quantified effectively as indicators of tectonic processes, but drilling into rifted margins has not yet reached the stage where measurement and quantification of the tectonic processes is possible. However, this in planned for the future. In addition, only limited progress has yet been made on the study of strike-slip processes, e.g. oceanic fracture zones and translational continental margins, as few such settings have been drilled. Also, collisional processes remain inadequately documented and thus the links with continental tectonic processes and mountain building remain to be fully documented. There is this a strong case for continued exploratory, as well as carefully focused drilling in the future.

2 FUTURE TECP OBJECTIVES

In future the Tectonics Panel intends to focus on the study of large-scale tectonic processes operating in the following kinematic environments: i) *Extensional* ; ii) *Contractional* ; iii) *Translational* ; and iv) *Vertical.* This approach recognises that fundamental tectonic processes operate globally and transcend the conventional division into plate tectonic settings. For example, extensional processes operate to some extent at rifted margins, but also in arc and transform areas. Focus on such fundamental processes in a range of tectonic environments encourages the collection of appropriate data sets that in turn facilitate the development of comprehensive theory.

ODP TECTONICS PANEL
WHITEPAPER ON GLOBAL THEMATIC PRIORITIES
REVISED NOV 1994

OVERVIEW

The thematic focus of the JOIDES Tectonics Panel is on the processes and products of Earth deformation. This includes the mechanisms, kinematics and dynamics of deformation, as well as the architecture of the resulting structures, set in a time framework. Understanding the deformation of the Earth in general is important because it shapes the environment in which we live, determines the location and concentration of earth resources, influences the long-term climate, and triggers short-term natural hazards such as earthquakes and landslides. Much of the additional information we need will require continued and indeed expanded drilling in the oceans. Other techniques cannot by themselves provide the necessary data. Tectonic processes operate on all scales from the molecular to the motion of the vast crustal plates. Today, tectonic processes are active in many parts of the world, and through time have moulded the earth as we know it. Understanding the forces that drive the dynamic earth has been a historic goal of earth scientists. The study of the oceans provides unrivalled opportunities for better understanding of fundamental Earth processes.

Tectonically-focused ocean drilling uses two complementary approaches: (i) characterising the history and styles of deformation recorded in the structures and stratigraphy of former plate boundaries; (ii) determining the controlling parameters and mechanisms of active deformation. Global-scale tectonic processes include rifting, spreading, transform faulting, subduction, collision, mantle convection and bolide impacts. An understanding of tectonic processes involves the determination of geometry, kinematics and dynamics and includes inferences concerning displacement, strain, strain rate, pressure, temperature, composition and stress field. Understanding of fundamental tectonic processes, however, cannot be achieved by deep drilling alone. Mechanisms and their effects transgress the boundary between land and marine domains and call for future close interaction between marine- and land-based earth scientists. In the future, TECP also seeks to participate with other global geoscience programs to establish well characterised natural laboratories, preferably in active systems, in which ODP drilling is one component of a much larger set of observations, rather than an isolated one-dimensional sampling of the subsurface. In addition to providing rock samples, TECP requires drilling to be augmented by advanced borehole studies to determine the conditions of pressure, temperature, stress, strain and fluid compositions. Also required is the emplacement of borehole seismometers to monitor active deformation and determine global Earth structure.

Although much can be done with existing technology, the desire to study , for example, active fault zones, often at >2 km depth will require substantial technology development, ultimately including controlled circulation. Drilling in fractured formations would benefit from a Diamond Coring System. Determination of *in situ* conditions will require high temperature, and perhaps slim-hole, logging tools and sampling devices. Logging while

Appendix L3.2

Leg	Approx. Date	Option 1	Option 2	Option 3	Option 4	Option 5
163	Sep-Oct	SE Greenland	Gas Hydrates	SE Greenland	Gas Hydrates	SE Greenland
164	Nov-Dec	Gas Hydrates	Caribbean 1	Gas Hydrates	Caribbean 1	Gas Hydrates
165	Jan-Feb	Caribbean 1	Bahamas	Caribbean 1	Bahamas	Bahamas
166	Mar-Apr	Bahamas	Caribbean 2	Engineering *	Caribbean 2	Iberia
167	May-Jun	Caribbean 2	California M	Caribbean 2	California M	Caribbean 1
168	Jul-Aug	Calfornia M	Sed Ridges II	Calfornia M	Sed Ridges II	Caribbean 2
169	Sep-Oct	Sed Ridges II	Juan de Fuca	Sed Ridges II	Costa Rica	Costa Rica
170	Nov-Dec	Costa Rica	Costa Rica	Costa Rica	Engineering •	California M

* @ Vema FZ/MARK

• @ Vema FZ/MARK/HESS

JOIDES Spring (global) Ranking 1994

Rank	LITHP	OHP	SGPP	TECP
1	Caribbean Workshop* LIP's Objective	Caribbean Workshop* Ocean History Objective	348—/348-Add New Jersey Sea Level II	447— W. Woodlark Basin
2	GENERIC Giant LIP	386-Add2 California margin	400-Rev/Add2 Costa Rica acc. wedge	400-Rev/Add2 Costa Rica acc. wedge
3	Tie SR-Rev2 I Sedimented Ridges II	Tie 348-Add (shallow) I NJ Margin II	412—/Add/Add2 Bahamas Transect	450— Taiwan arc/con collision
4	I 440---- Tie E. J. de Fuca Hydr.	I 430---- Tie Sub-SAT	386-Rev2/Add2 California Margin	NARM-Add3 NARM IAP II
5	426— Aus.-Antarctic discord.	441---- (1 OHP leg) SW Pacific Gateway	SR-Rev2 Sed. Ridges II	442— Mariana back-arc basin
6	400-Add2 Costa Rica acc. wedge	354-Rev2 Benguela Current	434— Caribbean Quat. climate	340-Rev N Australian margin
7	NARM-DPG NARM Vol. II Vøring	404— NW Atl. sed. drifts	354-Rev2 Benguela Current	NARM-Add2 E Greenland Trans. Ext.
8	446----, 451---- combo. Tonga Arc/Forearc	427-Add South Florida sea level	440— E Juan de Fuca Hydroth.	333-Rev2 Cayman Trough
9	420— Oceanic crust evol.	367-Rev + LOI 21 GAB Cool water carbs.	355-Rev3 Gas Hydrates (Peru)	445— Nankai deformation/fluid
10	435-Rev2 Mariana Mass Balance	449— Mesozoic Weddell Basin	435-Rev2 Mariana Mass Balance	438— Ocean crust reflectors

* Based on the result of a workshop on Caribbean Ocean drilling and includes protions of proposals 384, 408, 411, 415, and 434

I. Shipboard Measurements — Recommendation

TECP strongly recommends that a computerised method of structural data collection be advanced and incorporated into the database, as an integral part of upgrading the ODP data base as a whole.

IHP — 24 - 27 August 1994

A. Software Development — Recommendation

IHP recommends that ODP continues work on FossiList so as not to lose momentum.

B. Software Development — Recommendation to ODP

IHP cannot endorse further work on Etch-a-sketch until it is known whether reworking of this program is to be included as part of the computer and database upgrade project (JANUS).

C. Post-Cruise Meeting/Publications — Recommendation

IHP recommends permitting Leg 154 Scientific Shipboard Party to hold its second post cruise meeting Oct. 10-14, 1995, but shortening the publication deadline to 4 months after the post cruise meeting.

D. Data Base Centres — Recommendation

The IHP recommends that PCOM endorse the concept of specialised data centres associated with core repositories and readily accessible micropalaeontological reference centres. Such an endorsement would be useful for prospective Database Centre organisers in their efforts to secure funding. The IHP further recommends that north German institutions be encouraged to spearhead an international effort to develop an ODP Stratigraphic Database Centre associated with the core repository at Bremen University, in co-operation with other European laboratories participating in ODP activities. From presentations made to us during our meeting it appears that GEOMAR in Kiel is a likely location for a nearby Micropalaeontological Reference Centre.

E. Publications — Recommendation to ODP

Based on the review of the ETH Neogene Chronologic Database by Bill Riedel, John Saunders and Brian Huber, IHP recommends publication of the Lazarus et al. database as a Technical Report. Bill Riedel will follow up to ensure that this will get done.

F. Publications — Recommendation to ODP

Any follow-up CD-ROM in future should include the Boyce correction to all ODP data.

G. Publications — Recommendation to ODP

The IHP appreciates the Leg 155 Scientific Shipboard Party's desire to be thorough, but feels this is excessive and that if the expansion of the volume is because of interpretation of the data that this be severely curtailed or another aspect of the volume be cut back in order for the volume to fall close to the accepted size.

H. Budget/Publications — Recommendation

Because, aside from the cores themselves, data and publications are the most tangible product of this large and long-standing research program IHP is concerned that actions perceived as required to fix a short-term budget problem would send an adverse message to the scientific community about ODP'S view of the worth of its publications. IHP strongly recommends to PCOM that it rescind its directive to ODP Publications to delay publication of the IR volumes.

SGPP 12 - 14 October 1994

A. Technology Development/PCS Motion to PCOM

SGPP requests that PCOM press for testing of the modified PCS on a Leg well prior to 163, preferably on 160 but at the latest on 161A. The test is essential to ensure that there is a working PCS on the Gas Hydrate Leg 163.

TECP 20 - 22 October 1994

A. Technology Development/WSTP Recommendation

TECP strongly endorses the continued development of the WSTP with particular emphasis on determining in situ pore fluid pressure measurements.

B. Technology Development/CORKS Recommendation

TECP strongly supports the deployment of CORKS, whenever practicable, as a means to obtain valuable quantitative measurements of environmental parameters that control deformation in active tectonic environments.

C. Technology Development Recommendation

TECP recommends that near future (5 years) tool development should focus on adapting existing sensors for down-hole radar technology and NMR tool.

D. Technology Development Recommendation

TECP recommends that long term tool development should focus on cross-borehole or sea-floor to borehole experiment technology.

E. Shipboard Measurements Recommendation

TECP strongly recommends that structural data be summarised by addition of an exiting column to the published Core Barrel Summary Sheets.

F. Shipboard Measurements Recommendation

TECP strongly recommends that a Structural Data Table be completed; i) Routinely (i.e. mandatory) during legs that have been highly ranked by TECP (in the top 6); ii) Whenever structural data are noted in cores by shipboard scientists during other legs. TECP wishes to make it the responsibilities of the Co-Chief Scientists and the TAMU Staff Scientist to monitor the presence of structural data and activate (mandatory) completion of the structural table whenever structural features are noted.

G. Shipboard Measurements/Publications Recommendation

TECP strongly recommends that the structural data collected at sea be published in full, at least on CD ROM.

H. Publications Recommendation

TECP recommends the writing of a structural technical note at a meeting of a small selected group of structural geologists in the spring of 1995. Travel funds are requested for U.S. participants to attend (ca 5 people).

F. Computer Upgrade **Recommendation**

The Panel recommends that PCOM review the status of the computer upgrade to confirm that the goal of the project is to produce a true relational database, which will allow easy access to, and manipulation and combination, of all forms of data on the core. We also recommend that clear statement of the goals of the upgrade and the structure of the development and review process be prepared and disseminated to all of the panels as soon as possible.

G. Technology Development **Recommendation**

The Panel recommends that PCOM facilitate (through whatever action they deem most appropriate) the development and testing of a chip-catching tool as outlined in correspondence between Hartley Hoskins (WHOI) and engineers at ODP-TAMU.

H. White Paper **Comment**

The Panel confirms that the most recent version of its White Paper is indeed an accurate representation of our scientific priorities and of a ten-year plan, given our present understanding, which should allow us to accomplish a number of those goals. We recognise that PCOM's vision of those White Papers changed as they were being written, and that we have not provided a longer-term vision or overall thematic focus. A subcommittee of the Panel will develop some materials addressing those specific issues before the December PCOM meeting.

I. Proposal Rankings/NARM DPG Report **Comment**

The Panel reviewed the NARM DPG Report and the various NARM proposals and concluded that we had to begin ranking NARM proposals individually, using the DPG report as a conceptual guideline rather than a concrete plan.

OHP 27 - 29 September 1994

A. Ship Operations/Scheduling **Recommendation**

After thorough review of the plans for the North Atlantic and Arctic Gateways Leg II, Leg 162, OHP reaffirms our endorsement of the drilling plan, including the selection of sites and their assigned priorities, resulting from the Fall 1993 OHP-sponsored planning session. In addition, we state our strong confidence and enthusiasm for the scientific and logistical judgement and skills of the assigned co-chief scientists for this leg.

B. Budget **Recommendation**

In response to the request to prioritise needs relative to the budget situation, OHP emphasises retaining support for (1) those things which cannot be done later, (2) those things which are necessary for stratigraphy and chronology and thus allow the definition of the completeness and continuity of recovered sedimentary sections, therefore potentially influencing drilling strategy in real-time, and (3) those things which communicate the objectives and results of the program to the community. As a programmatic, budgetary decision, OHP does not support further expenditure on the current diamond coring system.

C. Inter-Panel Liaison **Recommendation**

OHP recommends that PCOM request that SSP name liaisons to attend the OHP meetings (and those of the other thematic panels as well if those panels request this). Given the significance of SSP evaluations in constructing the 4-year ship track and the prospectus, it is important that SSP have a clear understanding of OHP priorities in general and of our interests in specific proposals. SSP liaison attendance at the spring OHP meeting for spring global ranking would be the highest priority.

JOIDES PANEL RECOMMENDATIONS, CONSENSUS'S, COMMENTS AND RESPONSES

LITHP 3 - 5 October 1994

A. Budget Response

The Panel appreciates being kept informed about the budget situation and recognises the increasingly pressing financial situation which the program faces. However, in the absence (by the time the meeting occurred) of specific budgetary goals, the panel did not feel that it could provide informed advice about budgetary prioritisation.

B. DCS Recommendation

The Panel recommends to PCOM that they review the development of DCS and make a commitment to its development, in light of the recommended changes in engineering development and operations at ODP-TAMU, as a tool to be deployed in phases, with clearly stated specific short-term and long-term operational goals. For example, after the resolution of the present status of the software, we could aim for the development of a system which between 1998 and 2003 could be deployed to recover short cores (in up to 4500 m of water) in selected, difficult lithologies or locations (carbonate caps, exposed or near-surface fault surfaces, zero-age basalts). This development would be a stepping-stone to the development, post-2003, of a DCS which could be routinely deployed for more standard coring operations in various locations and lithologies.

C. Offset Drilling Engineering Leg Recommendation

The Panel recommends to PCOM that they seriously consider the request from ODP-TAMU for an engineering leg to test a variety of tools and techniques that may improve our drilling results in tectonized and faulted terrains. The Panel still believes that the recovery of significant sections of the major layers of the ocean crust and of the transitions between those layers are among its highest priority goals. It is, however, unclear how to proceed with our offset section strategy until we can identify the key variables which are influencing drilling conditions and recovery in different environments.

D. Ship Operations/Scheduling Comment

The LITHP is disappointed by the removal of Return to 735B from the FY95 schedule. The sudden loss of this leg has hurt our long-term strategy for understanding the lower ocean crust and left a key part of our offset-section strategy drilling uncompleted. The Panel wants PCOM to realise that Return to 735B will continue to be one of our high priority sites and we hope that a serious effort will be made to drill this globally important site at the first opportunity.

The Panel strongly endorses the idea of ranking proposals by science, and does not want to be put in a situation in which logistic factors influence our deliberations. We trust PCOM to create areas of operation within which highly ranked proposals can realistically expect to be drilled.

The Panel also wishes to note that this kind of sudden change in scheduling can create serious personal and professional problems for scientists who have accepted positions as co-chief scientists or scientific staff for legs which are subsequently cancelled. We hope that PCOM recognises this and will make every effort to see that we do not again begin to staff a leg until we are committed to drill it.

E. Mini-Legs Recommendation

The Panel recommends to PCOM that they explore options to occasionally accommodate mini-legs for transit to reach high priority sites. We fear otherwise that the ship will become mired in limited areas of the ocean because of the strictures of long transits and 56-day legs.

particularly rapidly around the time at which the fault becomes unstable and moves. The actual strength of the fault during slip is governed by its properties within an unstable period and not the intervening quiescent periods. Long-term observatories will provide more reliable, quantitative constraints on parameters used in steady-state models of active tectonic systems and will also enable us to evaluate the viability of steady-state models.

Initially, the observatory environments should be tectonically simple with high strain rates. Some of the parameters of particular interest to the concerns of the TECP panel would be the variation in stress, fluid pressure, and strain patterns in three dimensions. The necessarily one-dimensional ODP borehole observations should be extended into three dimensions using surface geodetic and stain measurements and it is highly likely that more than one observatory borehole will be necessary to adequately constrain any given system.

The practical use of many different types of strain measurement system requires very good coupling between the instrument package and the seabed. In active sedimented environments the mobile nature of the high porosity near surface sediments can cause problems, with local differential subsidence and fluidisation during earthquake events being potentially significant. Cased ODP holes (with or without emplaced CORKs/ borehole seismometers) supporting and stabilising simple surface platforms to which third party instruments could be securely attached/detached (by submersible or on deployment) would provide a practical answer to this problem. Depending on the local environment and scientific objectives such platforms could be supported by relatively simple (low cost) short (cased) holes a few tens of meters in depth or be part of more substantial observatories that include CORK systems. We have the opportunity to use currently available technology to initiate strain measurement programs that can form an integrated part of observatory systems in active tectonic environments. The following are examples of two types of relatively inexpensive sensors that offer immediate possibilities to ODP and TECP objectives. Highly accurate pressure sensors can be used to measure changes in the observatories depth below the sea surface (i.e. vertical motion in response to faulting) to 10^{-8} accuracy of full scale (i.e. changes of a few mm at full ocean depths). Sonic extensiometers can also be placed on top observatory platforms to measure changes in distance between platforms. Such devices are accurate to a 1-2 cm over distances of 1km between sensors and can be put out in arrays of 16 or more units. Together with tilt meters these types of sensor could form part of the same modular strain measurement package.

Another approach to long-term observations is the long-term objective of developing an oceanic seismic network that is capable of measuring deep earth structure using seismic tomography. In this case seismometres are installed at suitable depths in ideally located oceanic boreholes. To date the only hole for OSN was cored south of the Hawaiian Islands, but mor such holes may be planned in the future.

Notes to editor: e.g. Authorship of Whitepaper

This should comprise all TECP panel members, both Chairs from 1993 to present (Eldridge Moores and Alastair Robertson) and PCOM reps.Brian Taylor and Hans-Christian Larsen) as they made an important contribution.

variations. Tools that measure tilt, vertical displacement of the CORKS, displacement across faults, and lateral stress variations should all eventually form part of long term monitoring.

In the long term, ODP should also be aiming to provide improved recovery and continuous, deeper sections. An emphasis on sampling fault zones, accompanied by technological developments to enhance the recovery of fractured material is also needed. An increasing demand for deeper holes means that high temperature tool development will also become a high priority. Comparisons of past and present fluid flow regimes and the impact of deformation on fluid circulation also need to be carried out in these deeper settings.

5.2 Observatories

The complex rheology, style of deformation and stress/strain patterns observed in both active and previously active plate boundary environments is a product of complex non-linear coupled interactions. Processes directly involved in deformation (i.e. porosity/permeability reduction, lithification, changing deformation mechanisms, fluid transport and chemical alteration), and environmental factors (i.e. depth, temperature, fluid pressure/stress) interact to continually change the properties of the deforming system. Although some of these parameters and interactions can be quantified by laboratory-based experimental and field-based studies, ODP presents an unparalleled opportunity to study active deformation processes in their natural setting. Continental drilling complements ODP objectives, but many tectonic processes can only be investigated in marine environments.

Past ODP drilling has significantly advanced our largely qualitative understanding of the processes controlling deformation at plate boundaries. In the long term, substantive further progress requires the acquisition of quantitative, *in situ* measurements. These measurements are essential for the development of quantitative models that aim to simulate the complex interactions of tectonically active systems. The quantitative testing of these models should ultimately form part of the driving basis for future ODP proposals. The necessary technological developments outlined above would place ODP at the forefront of studies of active tectonic systems.

A general, but significant result of ODP studies in active tectonic systems is the evidence for changing deformation processes, physical and chemical properties, sometimes even when measured on human time scales. As an example, recent ODP studies of currently active accretionary wedge environments (i.e. ODP Legs 110, 131, 146, 156) have strongly indicated that deformation is dominated by transitory processes with non-steady state fluid flow patterns being indicated by temperature transients and large changes in structural fabrics indicating that faulting events may be associated with substantial overpressuring coupled to transient brecciation events (as in the decollement of the Nankai accretionary wedge, Leg 131). These events probably act over short time frames (time scales that range from hours to less than a few tens of years).

The significance of such instantaneous measurements can only be evaluated when placed in the framework of variations over longer time scales. For example, within a fault zone the strain patterns, stress state, fluid pressure, and strength change with time and do so geometries and relations. Major results to-date have been focused at a few sites but a dramatic improvement in the quality and quantity of structural data has resulted from the introduction of some key technological developments.

Now that structural measurements are routinely acquired during ODP legs there is tremendous potential for correlating downhole measurements with core structures. Increasing awareness of the value of structural measurements is driving technological developments to recover oriented core and establish recovery depths for core material. These developments facilitate the integration of discontinuous core sections with continuous logging data such as FMS or Borehole Televiewer data. This enables a close comparison between physical and chemical property variations in continuous logs or *in situ* point measurements and deformation fabrics in the core. Continued development of computer facilities is required to provide routine, shipboard semi-automated analysis of core structures, such as penetrative fabrics or fractures.

In situ measurements of stress, strain, strain rate and pore fluid pressures are a high priority for TECP. Borehole televiewer images have been successfully used to infer *in situ* stress conditions in Hole 504B. Drilling in the Nankai accretionary prism provided a unique chance to compare the hydrogeological regimes above and beneath the basal decollement. Logging While Drilling (LWD) was also used with remarkable success to reveal zones of overpressure within and just above the Barbados accretionary prism decollement. Packer tests in cased holes have determined the permeability and *in situ* fluid pressures in major fault zones in both the Cascadia (Leg 146) and Barbados accretionary wedges (Leg 156). Long-term borehole seals (CORKs) with associated temperature and pressure sensors have also been developed and successfully deployed for long-term monitoring of fluid behaviour in fault zones. These achievements indicate a bright future for the role of ODP in monitoring active tectonic environments, but TECP urges further support be given to technological developments that improve the reliability of existing tools, modify existing technology for ODP boreholes or develop completely new technology.

These developments should include the redevelopment of a water sampler and temperature and pressure tool (WSTP) and the development of the Lateral Stress tool (LAST). Techniques for 'looking-out' from the borehole wall, such as radar images or cross-well seismic experiments should also be developed as a means to filter out drilling-related features and examine the undisturbed deformation record. Existing radar technology and NMR could be modified to be deployed in ODP boreholes (i.e. primarily repackaging existing sensors to fit the specifications of ODP operations). Long-term tool development should focus on cross-borehole or seafloor to borehole experiment technology. These techniques have a potential to relate borehole measurements and core analysis to regional three-dimensional structural and lithological frameworks. TECP therefore endorses a long-term plan to investigate the feasibility of and develop cross-borehole experiments and non explosive seafloor sources. The improved three-dimensional constraints would greatly enhance the value of core structural data. Packer studies should be extended to cross-borehole studies to examine the lateral permeability structure of both deformed and undeformed sections. These would be complemented by studies of water-rock interaction during deformation and the impact of reaction progress on failure mechanisms. TECP has a continuing interest in using CORKS as a platform for stress and strain monitoring and spatial and temporal fluid pressure and temperature gradients. Fault slip rates and mechanisms are also influenced by the evolving stress states and physical properties resulting from steady or transient fluid flow. To date ODP borehole investigations have yielded valuable qualitative and quantitative constraints on in *situ pore* fluid pressures, physical properties (e.g. direct measurements of porosity and permeability), the relative timing of fluid flow and deformation (e.g. cementation histories) and past and present fluid flow networks in accretionary wedge and oceanic settings. For example, cross-cutting fracture arrays and the fabrics of hydrothermal minerals within them have been used to interpret the spatial variations of kinematic histories in sections of oceanic basement. At Site 504B, localised, intense hydrothermal veining is closely associated with a deformation zone within the pillow-dike transition. The highly successful Logging While Drilling (LWD) conducted as part of Leg 156 in the Barbados wedge suggests that the decollement zone of the Barbados wedge is extremely porous, and is probably associated with an open fracture sytem where fluids are migrating along the fault at lithostatic fluid pressures. This is just one of several legs that have made significant steps towards mapping the evolving porosity and permeability in the crust and their relation to deformation processes in actively deforming regions. From this promising start, TECP encourages proposals that address the relationships between deformation and fluid flow, in settings such as active hydrothermal systems at a seafloor spreading centres (Leg 158), the fault-related fluid conduits in an accretionary complexes (i.e. Legs 110, 146, 131, and 156), or even where a hot spreading centre is being subducted beneath an accretionary prism (Leg 141).

Acoustic properties

Deformation not only influences porosity and permeability but also modifies acoustic properties. Constraining patterns of deformation in different tectonic environments is therefore an important aspect for modelling lithospheric structure based on acoustic signatures. Strong preferred orientations of penetrative foliations or fractures generate seismic anisotropies, while the combined metamorphic and deformation histories will change elastic properties and thereby modify acoustic signatures. The combination of ODP core and logging data provide a powerful method to calibrate the acoustic properties of variably deformed lithologies. Integrated lithological, physical property and microstructural data were used to link regional-scale three-dimensional seismic reflection profiles to the borehole data in the Barbados wedge (Leg 156) to study the heterogeneous three dimensional character of a major active fault zone.

5 TECHNOLOGICAL DEVELOPMENTS/ MEASUREMENTS

The main objectives here are to quantify active deformation and non-linear coupled processes.

5.1 *In situ* measurements

Investigations of deformation mechanisms in the crust and upper mantle in active tectonic settings represent an expanding strength of ODP. Combined *in situ* measurements and microstructural and petrological studies can provide qualitative and semi-quantitative estimates of differential stress magnitudes, strain, strain rate, temperature, pore fluid pressure and confining pressure conditions during lithospheric deformation. Such measurements form the essential building blocks of regional interpretations and provide valuable comparisons for kinematic interpretations based on macroscopic structural shear zone deformation from the late stages of crystallization of a magma over decreasing metamorphic grades with increasing hydrothermal alteration.

Stress magnitude and orientation

ODP boreholes provide a means to determine the distribution of stress magnitudes and orientations that are essential for understanding how major plate driving forces are expressed at different lithospheric levels in different tectonic settings. Variations in differential stress magnitudes can strongly influence the mechanisms by which lithospheric failure occurs and the distribution and orientation of deformation fabrics are also related to deviatoric stress conditions. The evolution of stress fields can be established from comparisons of paleostress conditions (from core microstructures) with *in situ* stress estimates (e.g. Holes 504B, 735B and Lau Basin). The lateral and vertical variations in *in situ* stress and paleo-stress conditions over a wide range of scales remain a high thematic interest for TECP. These measurements are critical to improving the resolution of a global stress map so that deviations from regionally consistent stress orientations can be related to contrasting plate margin and intraplate settings. On more local scales, it is important to evaluate the heterogeneity of stress fields related to specific structures such as active fault zones or folds and across rheological transitions.

Thermal evolution

The mechanical evolution of some tectonic settings is strongly influenced by their thermal histories. Temperature is the major control on the transition from brittle to ductile deformation. Fluctuations in thermal gradients can modify physical properties (e.g. thermal cracks) and vary pore fluid conditions (e.g. dehydration reactions and hydrothermal circulation) that also strongly influence the rheological properties of lithospheric materials. Changes in thermal gradients induced by variations in the distribution and extent of magmatism, hydrothermal circulation or major shear zone displacements can cause concomitant changes in deformation mechanisms, modifying strength contours in the lithosphere. ODP boreholes provide a means to evaluate present-day temperature gradients and compare them with past thermal gradients established from metamorphic phases. These provide a means to relate *in situ* stress measurements to seafloor cooling patterns. For example, complex deviatoric stress patterns are predicted as the oceanic lithosphere cools and thickens following its formation off-axis, approaching ridge-transform intersections, or at propagating rift tips. They can also be used to relate strain histories to different pressure and temperature conditions in order to test thermo-mechanical models for the evolution of passive margins.

Fluid flow

Stress conditions and strain histories are also strongly influenced by fluid flow in the crust. Variations in fluid pressure modify effective stress levels and fluid temperature and composition influence water-rock interactions and thermal and chemical gradients. Changes in the deformation environment caused by fluid flow can change the mechanical behaviour of the lithosphere. In turn, deformation can change lithological properties modifying fluid flow paths and fluid pressures, thereby generating a feedback mechanism between fluid flow and deformation. For example, dilatancy during brittle failure will enhance porosity and modify permeability, whereas recrystallization at high temperatures or volume loss during pressure solution (enhanced by low effective stresses) would decrease porosity and permeability. Faults and shear zones can act as,conduits for aqueous fluids or magmas, modifying local fluid circulation patterns and thermal

The strength of the lithosphere in all tectonic environments is controlled by the physical and chemical conditions during deformation and the inherent properties of deforming lithologies. Changes in environmental parameters such as pressure, differential and deviatoric stress, temperature, pore fluid pressure and chemistry modify the mechanical response of rocks determining, for example, whether failure occurs by seismogenic faulting or steady-state creep. These changes in failure mechanisms cause temporal and spatial variations in strength and the bulk rheological behaviour of the lithosphere. The timing, nature and distribution of deformation is therefore a key aspect for understanding the detailed rheology of crust and upper mantle and the initiation and evolution of plate boundaries.

ODP has made a strong start exploring deformation mechanisms in the crust and mantle in different tectonic settings that complement onshore investigations, rock deformation and theoretical experiments. For example, drilling has provided unique insights to the earliest stages of deformation in partially consolidated sediments in the toes of accretionary prisms, the physical property variations through a continuous 2 km section of *in situ* oceanic crust, and the high temperature plastic and syn-magmatic deformation in the lower oceanic crust. Such targets have significantly expanded our knowledge of the time-dependent deformation processes in different lithologies and present-day deformation environments in diverse tectonic settings.

ODP currently provides the only opportunity to constrain and compare the past and present conditions, distribution and rates of deformation of ocean margins and basins. With this aim, TECP is concerned with two complementary approaches. The first approach concerns direct measurements of active deformation and deformation environments using borehole and seafloor instrumentation. The second approach provides the complementary geological records from core, logging and seafloor data. Combining these approaches is essential to constrain short and long term variations in the location and rate of deformation and structural style.

Strain distribution at gradients.

Records of strain distribution and strain-rate gradients combined with kinematic indicators can be used to demonstrate the response of the lithosphere to evolving tectonic environments. For this purpose TECP endorses proposals which target rheologically significant boundaries at different lithospheric levels and aim to explore lateral variations in strain and strain rate at the same lithospheric levels. Such targets would include the dike-gabbro transition, major shear zones at passive margins and the basal decollements of accretionary prisms. These settings provide key locations to investigate the influence of changing lithology on deformational mechanisms and associated changes in strength and the lateral and vertical variations in kinematic frameworks. Some targets will require deep drilling whereas others demand high resolution studies to determine paleo-stress and strain gradients and the detailed lithological and structural geometries which play a key role in strain localisation. *In situ* monitoring, combined with the fine-scale structures in ODP core and paleomagnetic data, provide valuable semi-quantitative constraints on strain and the kinematics of deformation, including shear sense indicators on faults, local or regional-scale tilting and mantle flow fabric (e.g. Holes 894 and 735B). In conjunction with syn-kinematic mineral assemblages, they also provide a means to trace changes in strain with variations in pressure and temperature that may be associated with magmatic or burial and exhumation histories. For example, studies in Hole 735B, document the

Of greatest importance is to document the three-dimensional complexity of a transform rifted passive margin and an oceanic fracture zone. A return to the Ivory Coast (Equatorial Atlantic) transform could be foreseen if warranted by initial results and/or selection of a young still active transform margin. Of the wide range of oceanic transform faults and fracture zones, the Vema Fracture Zone with its unique limestone cap is an obvious target; a still active transform setting could also be envisaged. It is anticipated that scheduling of drilling to study translational kinematic environments will be integrated with other priorities based on the quality of specific proposals.

3.4 VERTICAL TECTONIC PROCESSES

3.4.1 Rationale

Although vertical tectonic processes specific to particular kinematic environments have been covered above, globally operative processes resulting in vertical motions are also of interest to TECP. For example, the viscoelastic response of the plates to locally applied or removed loads (i.e. ice sheets, denudation along low-angle normal fault systems during rifting), detected in subsidence or uplift of shallow marginal areas, can constrain the rheological stratification of the lithosphere-asthenosphere system. The subsidence history in a region of changing gravitational and thermal load, such as the Hawaiian Arch, can constrain the processes and time constants of plate weakening. Studies of response to loading/unloading at continental margins may further constrain the flexural rigidity and expected elastic response of plates as a function of such variables as age and heat flow. Long-wavelength or plate-wide episodes of epirogenic uplift of subsidence, if detected and differentiated from eustatic sealevel changes, may be related to longer-term dynamic topography and changes in the circulation pattern of mantle convection. The relationship of uplift events to large-volume volcanism (e.g. the Large Igneous Provinces of LIPs) may constrain the dynamic topographic effects of localised mantle upwellings (plume heads) and thus be important to models of plume evolution, thermal budget, and interactions with the mantle convection system and with the lithosphere. Responses of the plates to changes in stress (for example, due to plate reorganisations or orogenesis and plateau development at convergent plate boundaries) may includer local flexurally-induced vertical motions: if these can be arrurately characaterised, they will place useful constraints on stress levels required for deformation of the plates and perhaps on the levels of stress changes resulting from changes in plate geometries.

3.4.2 Drilling strategy

Elucidation of vertical tectonic processes requires determination of uplift and subsidence rates in all global settings, at a variety of time-scales. This is most feasible in settings where relative depth information can be easily obtained (e.g. from biofacies and lithofacies information in shallow water sedimentary rocks) and should be obtained whenever possible as an integral part of all ODP investigations. It is envisaged that progress by drilling will mainly come from specific recognition of the role of vertical tectonic effects and that results will be obtained in conjunction with other drilling objectives.

4. DEFORMATION PROCESSES

4.1 Rationale

scale, is deformation along strike-slip faults pervasive or only local? Is a penetrative cleavage present?

iii) Nature of the crust. Questions arise as to whether the crust near a continent-ocean transform boundary is stretched continental crust, oceanic crust with intrusions (e.g. of serpentinised ultramafic rocks), or a complex mixture of both oceanic and continental crustal types. Is the base of the continental crust at the boundary tectonically eroded by the moving oceanic lithosphere? To what extent is this crust thermally metamorphosed and when in its history does such metamorphism occur? Are basins within a transform margin thin-skinned, or do they represent lithospheric stretching? The nature and composition of basement ridges and median valleys at oceanic transform faults is not well documented;

iv) Tectonic-sedimentary history. Small independent basins controlled by strike-slip and oblique faulting form in many translational settings (e.g the California Borderland, the Gulf of Aqaba). These basins probably are isolated from open oceanic deep-water circulation. Transverse ridges along oceanic transform faults create barriers to both shallow and deep marine circulation. These affect the provenance of the sediments, the nature of timing of development of anoxic versus well-oxygenated fine-grained sedimentation, and the establishment of oceanic "gateways".

3.3.3 Drilling strategy

The only ODP leg devoted to a translational setting so far is the Ivory Coast-Ghana transform margin, which is scheduled for drilling during early 1995. This leg will focus on a longitudinal transect of the outer margin high, including drilling of small ridges close to the continent-ocean boundary. This margin is, however, only one among many translational settings. Two other proposals, currently under consideration, the Vema Fracture Zone and the Cayman Trough, are geared toward different problems in different settings. The Vema Fracture Zone proposal offers to study the timing and kinematics of the development of transverse ridges along transform faults and fracture zones. The Cayman trough proposal focusses on the interaction of a long transform-short ridge geometry, and on the effects of transpression. Because the Cayman Trough consists of a single rift segment, it is possible to compare sections of the margin not yet affected by the passage of the ridge with those affected by it. Recent transpression along the fault bounding the trough raised the Sierra Maestra Range in southern Cuba, and modified offshore structures, and is posing seismic hazard to the second largest city of Cuba.

Although no other proposals exist at present, proposals should be encouraged in other translational settings. These include the following: The California margin - to document the evolution of the margin, vertical motions on the land, the migration of fault activity, and the influence of the subducted plate in this highly-populated transpressional margin; the Gulf of California and the Gulf of Aden - to document the opening of an ocean basin in a highly oblique setting with varying initial thermal conditions (previous subduction, the presence of a hot spot); the Gulf of Aqaba - to document the initial stages of pull-apart to ocean basin development, the Romanche Fracture Zone - to document the shearing, translation, and deformation of thin continental slivers; the Exmouth Plateau and southern Newfoundland - to compare volcanic and non-volcanic translational margins.

3.3.4 Priorities and phases of drilling

- active stresses in subduction systems as determined by *in situ* observations (e.g. breakouts), borehole logging, and geophysical experiments (e.g. downhole seismometers, VSPs);
- sampling of fluids and gases at deeper levels of accretionary wedges to test alternative models of chemical and physical interaction and hydrological systems;
- constraining geochemical mass balances of accretionary systems
- formation and unroofing of blueschists.

Relatively shallow drilling As increasingly high quality site surveys become available, there will almost certainly be continued strong demand for relatively shallow drilling to study contractional processes using a platform similar to the Resolution (especially if DCS is routinely available and core recovery is improved).

3.3 TRANSLATIONAL SETTINGS

3.3.1 Rationale

Translational settings include divergent and convergent continental margins with a substantial oblique component, and oceanic transform faults. Complex three-dimensional tectonic, thermal, and magmatic phenomena in these settings defy traditional cross-sectional geological analysis. The existence of large earthquakes and oil-rich basins along translational margins such as California and the southern and northern Caribbean margins underscore their societal relevance. Despite their obvious scientific importance both in the modern oceans and in orogenic belts (e.g. Alpine-Mediterranean (Tethyan) system), and their obvious importance in understanding of global tectonic processes, these settings have remained virtually undocumented by scientific ocean drilling. Drilling is however essential to help answer fundamental questions concerning the dynamic processes active at the ocean-continent translational boundary, the deformation and the partitioning of motion in oblique settings, the nature of the crust at margins and transform faults, and the effects of translational tectonics on sedimentation and paleoceanography.

3.3.2 Unsolved problems

i) Geodynamical aspects: A key unknown is the detailed thermal history, which largely governs the vertical behaviour of a transform margin. Transform margins appear to show reduced magmatism and subsidence relative to normal rifted passive margins. Vertical motions can be transient and may provide evidence for the level of conductive and/or advective heat dissipation from the rifted lithosphere. The vertical motion history can best be determined by charting subsidence from the sedimentary cover. Localised uplift can also take place by transpression along the transform or by serpentinised diapirs in transtension;

ii) Crustal deformation, partitioning of oblique motion, and mechanical coupling versus decoupling. The partitioning of motion between subduction, crustal shortening, and horizontal translation results in principal stress orientations at a high angle to the trace of faults, block rotation along vertical and horizontal axes, the termination of vertical faults against crustal detachments, and the formation of asthenospheric windows. Translation of crustal fragments along the transform by strike slip, as small "exotic terranes", possibly even out into the ocean basins along fracture zones has been suggested but the mechanism and depth level of translation have not been established. On a smaller wedges (e.g. Barbados, Cascadia, Nankai, Japan trench). Another priority could be drilling of an integrated transect across a trench, forearc, arc-backarc system (S W Pacific), to shed light on overall physical and chemical mass balance (e.g. flux to the mantle). Also, there may be interest in studying the initiation of subduction zones (e.g. Caroline Basin or Zenisu Ridge). Quantification will assume increasing importance. It is also hoped that long-term monitoring of *in situ* observatories will take place.

- Collisional settings: Further progress will depend on drilling deeper into collisional settings (e.g. Mediterranean Ridge Phase) and study of additional areas (e. g. Indonesia/N Australia margin).

A major effort during 1998-2003 will need to be directed at developing techniques (both shipboard and shorebased) that will allow improved extraction of tectonic information from recovered cores (i.e. microstructural studies) and boreholes (i.e. logging). Much depends on the available funding and overall equipment development prioritisation within ODP. Equipment development will particularly be necessary to provide information on the following:

- *in situ* measurements of stress and permeability in relation to values determined in boreholes, especially across key boundaries (e.g. rift decollements; forearc/ subduction zone);
- fluid flow, particularly along active faults (e.g. in hydrothermal systems) and effects of deformation on fluid circulation (i.e. dewatering and 'dynamic porosity');
- how chemical and mineralogical reactions (e.g. clay mineral transformations) affect rock failure (e.g. in accretionary wedges);
- strain paths during burial and uplift of oceanic rocks, in the light of land comparisons.

Phase 3 a vision beyond 2003

For contractional process objectives, ideally, it will be necessary to extend the range of deep drilling up to 5 km in >3-4 km of water depth. Drilling possibilities are as follows:

Drilling with riser. This would not only allow drilling of potentially hazardous hydrocarbon areas, but would also allow greatly improved core recovery at depth within boreholes. However, such drilling could involve a restriction in water depth, at least initially (<2km?), which would greatly limit targets for contractional process drilling.

Deep drilling. A number of critical tectonics problems can only be resolved in the future by very deep drilling (2-4 km) in deep water, whether or not a riser is available. Improved recovery and hole stability are keys to progress (e.g. recovery of weakly consolidated siliciclastic turbidites) and for this a riser system would be very beneficial. Specific tectonic processes for future study would include:

- the relative importance of underplating versus frontal accretion and the effects of oblique, as opposed to orthogonal subduction.
- oblique subduction as a mechanism for possible long-distance lateral transport of "suspect terranes" (e.g. S W Japan or Western U.S.A.);
- anatomy of deeper levels of accretionary wedges, aided by land comparisons(e.g. circum-Pacific);

- evaluation of the nature and role of tectonic erosion processes. Future targets for drilling to understand subduction erosion processes include the Peru Trench, where much information already exists from Leg 112 and subsequent marine surveys, the Izu-Bonin/Mariana Trenches, which were drilled on Leg 125/126 (as well as on several DSDP legs), and the Tonga Trench, which has one ODP hole (drilled on Leg 135) and much existing MCS data.

- Forearc-backarc tectonic settings: Much of importance remains to be learnt about forearc (e.g. Tonga), arc (e.g. Tonga Ridge; Lau Havre Taupo) and backarc (e.g. Bransfield Straits; N Mariana) settings. Successful proposals will be those that pose most effectively testable hypotheses capable of shedding light on quantification of fundamental tectonic processes.

- Greater understanding of accretionary processes will also come from experimental work. Modelling will also become increasingly useful as the constraints imposed by drilling data improve. Many experimental studies require whole-round cores that can only be provided by drilling. These aspects are discussed further in Sections 5 and 6.

Phase 1 Recommendations 1996- 1998
The rationale for selection of future drilling topics is as follows:

- Convergent (subducting) margins: Already well characterised accretionary complexes (e.g. Nankai, Cascadia 2) are ideal settings for more advanced study of *in situ* processes. The recovery of fluids and gases at *in situ* temperatures and pressures is a high priority, as is the determination of *in situ* porosity and permeability. Study of the mass balance of an ideal subduction/accretionary system is also important (e.g. Costa Rica). Geochemically based studies of crustal fluxes through subduction zones to the mantle are anticipated (e.g. Nicaragua).
- Collisional settings. Two legs of partly collision-related drilling are scheduled for 1995. Leg 160 in the Eastern Mediterranean will investigate the collision of the Eratosthenes Seamount with the Cyprus active margin, while Leg 161 will study the subsidence history of the Alboran Sea in the Western Mediterranean as a possible "orogenic collapse" basin. Also the Taiwan arc-continent collision zone has a clear potential to provide a model for the growth of continents through the accretion of exotic oceanic arcs. The Taiwan system is a single, simple propagating collision, progressing from pre-collisional subduction along the intraoceanic Luzon arc to the south; a transition to initial collision over a 150 km-long region south of Taiwan; and relatively well studied mature collision exposed onland in Taiwan. Otherwise, new drilling proposals will be evaluated in relation to the extent to which they shed light on fundamental global, rather than merely local tectonic processes.

Phase 2 Objectives for drilling during 1998-2003
Tectonic objectives during this period are likely to include completion, as far as possible, of the objectives for Phase 1. It is assumed that by this time DCS will be operating routinely and that a sophisticated computerised system of core-log integration will be functional. Major objectives are likely to include the following:

- Convergent (subducting) margin settings: emphasis during this time will probably continue to be placed on *in situ* monitoring of already well studied accretionary downhole measurements of temperature, stress, fluid pressure, and permeability, as well as *in situ* pore fluid samples must be obtained from ODP boreholes. As noted earlier, an ambitious coring and down-hole measurement program, using innovative Logging-While-Drilling technology, has recently proved successful on the Barbados prism (Leg 156). This is being combined with installation of a borehole seal to be followed by long-term monitoring. This approach can be applied elsewhere (e.g. Nankai) in the future. Examples, of such specific targets include the following:

- characterisation of the permeability and porosity structure of an accretionary prism. It will be necessary to measure *in situ* values of permeability and porosity across thrust faults and basal decollements and to combine these measurements with laboratory measurements on core samples. Use of LWD technology as well as long-term observatories will be important;

- drilling a protothrust zone, where it should be possible to quantify strain and define the stress path better than in more highly deformed parts of the prism. Both the Nankai and Cascadia margins, for example, have well-developed protothrust zones;

- determination of the physical mass balance in the prism. A suitable area (e.g. Costa Rica, Nicaragua) will have thin (or no) trench turbidites, well-defined plate kinematics, with seismically-imaged structures that are shallow enough to reach with the drill, and with no erosion of the accreted sediments. These constraints should allow estimation of the incoming sediment volume, control the prism geometry, and limit sediment loss only to sediment subduction;

- characterisation of a young collision zone. Propagating collisions are particularly conducive to stratigraphic study since drill sites can be located along a continuum of deformation between the region of subduction and collision. As a collision suture propagates along a continental margin, sediments deposited in flanking basins record collisional events both in their detrital composition and in their subsequent deformation. Drilling a propagating collision would shed light on systematic along-strike variations in structural geometry and tectonic processes as the collision develops. Such movement may reflect displacements along crustal-scale structures imaged independently by geophysical techniques. Several modern collisions exhibit the structural closure of the forearc basin, strata of which may then become incorporated into the rear flank of the accretionary wedge. Some active collision zones also become emergent along strike, such as Taiwan, New Guinea, Indonesia-Timor and Cyprus, allowing detailed onland investigations of deeper crustal levels, unroofed by ongoing collision. Drilling into incipient collision zones may shed light on the nature and timing of vertical and horizontal displacements, synchronous sedimentation, crustal flexure and deformational style.

- study of the effects of seamount subduction. The Costa Rica section of the Middle America Trench is an excellent region for drilling in an area of seamount subduction. A database of 3-D seismic reflection and multibeam bathymetry demonstrates that structures associated with seamount collision extend to shallow levels that could be drilled.

I. Shipboard Measurements Recommendation to ODP

IHP recommends that another column be added to the VCD barrel sheet to accommodate structural geology information should PCOM agree to include structural data as prime data.

J. Shipboard Measurements Recommendation

IHP recommends that structural data be included in the database as primary data.

K. Panel Membership Recommendation

IHP recommends that Pat Diver, a representative of the oil industry, joins the panel as a regular member.

SMP 25 - 27 September 1994

A. Upgrade of Multiple Sensor Track (MST) Recommendation

SMP recommends that ODP/TAMU be encouraged to go ahead as soon as possible with the envisaged upgrade of the MST. Funds have been allocated for this purpose and SMP recommends strongly that special attention be given to a more centralized work station capable of replacing the manifold of computers presently associated with the MST.

B. Publications Recommendation

SMP notes from visits to the ship's laboratories that "cook books" of laboratory procedures are important items that are often missing in the various laboratories. SMP recommends that such "cook books" be developed through co-operation between laboratory users of the appropriate expertise and designated ODP technical staff. SMP suggests that future staffing by ODP may bear this aim in mind, sothat procedure cook books can be developed in the near future.

C. Equipment Utilisation (XRF) Recommendation

SMP wishes to stress that the X-Ray Fluorescence apparatus on board ship should be utilized to its fullest extent to include a full set of major and trace element determinations. The SMP strongly endorses the proper use of the XRF by the technical staff, with the aim of continuing the collection of high quality major and minor element data, comparable with most competent shore-based laboratories. If experienced XRF scientists sail, then these scientists should assume responsibility for the operation of the XRF, get thoroughly involved in the analyses, and provide guidance and training for the technicians.

D. Software Development Recommendation

SMP urges that the further development of Etch-a-Sketch and similar programs be put on hold. SMP considers it of importance that for the capture of data on VCD, Etch-a-Sketch, Rocky, or Structure Data, the capability be explored by TAMU of commercially available CAD programs.

E. Data Base Steering Committee Recommendation

SMP urges PCOM/JOI to consider the appointment of one extra member of one of the other member countries to the Data Base Steering Committee, having obtained the assurance of active participation in this effort.

F. Software Development Recommendation

SMP recommends that the development of this software continues in the near future. SMP urges that, in order for Fossilist to become operational, due attention be given to inclusion of the prime data fields as defined by IHP/SMP. IHP urges that ODP give first priority to the continued development of Fossilist, sothat the impetus will not be lost and the program will become fully functional in the near future.

DMP 21 - 23 September 1994

A. Shipboard Measurements/Budget Recommendation (for reconsideration)

The DMP recommends that a flexible funding philosophy be adopted to insure resources for in-situ stress experiments as determined by the DMP and the Thematic Panels. (This cost is estimated to be $40K/leg for the rental and shipping of two BHTV tools. The number of legs per year will depend on the ship's track; historically about two legs per year merit support.)

B. 3rd Party Tools Recommendation (for reconsideration)

In regard to the Third-Party-Tool Guidelines, the DMP recommends that memory tools that provide depth-data profiles be the responsibility of the Borehole Research Group; memory tools that return point measurements be the responsibility of the Science Operator.

C. Shipboard Measurements/Budget Recommendation

The DMP recommends that the BRG develop a budget scenario detailing the programmatic impact of level funding, i.e. a yearly 3-5% inflationary decrease in real dollars. This trial scenario should include at least: (1) details of actual expenditures over the past three years, (2) an estimate of expenditures for the next three years, (3) an estimate of the cost reduction realised by eliminating either the Geochemical Tool or the Formation Microscanner from the standard logging suite (which ever the BRG deems the most expensive to operate), and (4) and an estimate of the cost per leg of running the chosen tool as a speciality item. The requested information is to be presented to the DMP at its Spring meeting.

D. Shipboard Measurements/Budget/LWD Recommendation

The DMP recommends that Logging-While-Drilling be an integral part of the Leg 160 operations since sloughy hole conditions characteristic of accretionary prisms will be encountered. Historically such hole conditions have thwarted conventional logging attempts; the success at Barbados demonstrates the feasibility of Logging-While-Drilling technology and the value of log data obtained in accretionary prisms. The estimated cost of this effort is $250K.

E. Publications/Budget Recommendation

The DMP recommends that the Logging Brochures currently under development at the BRG be given distribution through out the JOIDES Panel Structure, and necessary funds be allocated for this thrust. Past experience indicates that the cost will be about $20K.

F. Add-on Science Recommendation

The DMP recommends that add-on experiments be subjected to a uniform scientific and feasibility review by appropriate JOIDES Panels, and that a minimum of six months time be allocated for this task. More time will be required if the experiment is unique, difficult, or if information given to the panels is inadequate.

F. Technology Development/Budget Recommendation

The DMP recommends that a feasibility, practicality, and cost study be conducted to advance the concept of Logging While Coring in the ODP. The study would be conducted in FY96, and it would a joint effort between the BRG, ODP/TAMU, and a logging service company, with the DMP and TEDCOM acting in an advisory role. Appropriate funds, not to exceed $30K, are sought under the BCOM mandate that 4% of a contractor's budget be spend on innovation. Significant additional funds may be sought in FY97 pending the results of the requested study.

PANCH 93 30 November 1993

A. Panel Meeting Attendance Agreement

PANCH agreed thematic panel chairs should attend the spring PCOM meetings to:
1. present and discuss multi-disciplinary proposals that are perceived to be "slipping through the cracks"
2. be involved in discussion of the global rankings and to participate in the long-range planning discussions

B. Proposals Consensus

In response to the problems raised by the ASRC Subject 4, handling of Drilling Proposals, the PANCH advise PCOM to recommend to EXCOM the following

1. Request that PCOM reaffirm the existing proposal submission guidelines as summarised in Attachment A endorsed by PANCH (see PANCH Report handout).
2. Request that PCOM establish the criteria for reviewing drilling proposals proposed by PANCH (see PANCH Report handout).
3. Request that PCOM ask the JOIDES Office to collate and forward to proponent(s) any reviews from service panels, in addition to reviews from Thematic Panels as is presently the case. Furthermore, the JOIDES Office will also provide advice to the proponent(s) on a recommended course of action such as submit revised proposal or prepare site survey package.
4. Request that, when approving JOIDES Thematic and Service Panel meetings, the PCOM Chair make every attempt to conform to a meeting schedule as described in Attachment C and endorsed by PANCH (see PANCH Report handout). This schedule formalises the meeting schedule that is presently in effect.

C. DCS Consensus

PANCH is concerned that management at TAMU has not kept DCS development going adequately. PANCH would like to see changes to rectify the situation. This is not a criticism of any person, rather that resources and management of technology development are not adequate to handle the job. We need a new way of handling DCS, ODP needs to explore the possibility of partnership with industry.

There is no question of any sea test until a land test has successfully met predetermined criteria as approved by TEDCOM. If the land test is unsuccessful, then the future of DCS should be a matter of urgent reappraisal.

D. Computer Upgrade Consensus

PANCH endorsed the continued involvement of the Computer RFP Evaluation Committee. They are to work actively and frequently with TAMU and advise them on computer development.

E. Technology Development/PCS Consensus

PANCH recommends that C.K. Paull and other SGPP members work with TEDCOM and TAMU to try either to modify the existing PCS system or develop a new one (PPCS) to meet the needs for a gas hydrate leg.

F. Technology Development/RFP's Consensus

PANCH recommends that the British Geological Survey (BGS) be allowed to test the ODP-TAMU VPC tool to see if it can work. TAMU should proceed to identify any available systems that work. In the future RFPs should be sent to all partners.

G. Downhole Measurements Consensus

PANCH recognises that it is important to both LITHP and TECP to measure in situ stress on a routine basis, in appropriate holes. DMP should explore the most efficient means of maintaining this capability, and return a recommendation to PCOM.

H. Computer Upgrade Consensus

PANCH view the development of the computer system as essential. The PANCH view it as the most important single item of equipment development because of its potential for immediate benefit.

I. Equipment Prioritisation Consensus

PANCH endorsed the SMP equipment prioritisation list:

1. Bar code readers
2. Palaeo microscope w/ imaging & phase contrast
3. Imaging resistivity (requires review of technical staff implications)
4. Thermal conductivity heater box
5. Spinner magnetometer replacement

The following are items which have high priority, but require further review before acquisition: seismic towing system, velocimeter under pressure control, furnace/fixer.

J. CLICOM Consensus

PANCH recommends that PCOM establish a small working group, chaired by Andy Fisher (Indiana), with Mike Williams of DMP, Joris Geiskes of SMP and ex officio members Peter Blum (TAMU) and Peter DeMenocal (ODP-LDEO), to review the current activity on the CLIP program as in the contract with ODP-LDEO in the 1994 Program Plan.

K. Technology Development Consensus

PANCH recognises the "splicer" as a highly desirable program that will result in greatly increased efficiency on Leg 154. We urge that it be made ready in time.

L. Microplaeonotology Data Base Centre Consensus

PANCH recognises the desirability of the Micropalaeo Data Base Centre, as it would be highly useful to the ODP program and we encourage the proponents to continue their efforts to make this facility accessible world-wide through the Internet.

M. Shallow Water Drilling Report Consensus

PANCH has discussed the report of the Shallow Water Drilling Working Group. While generally endorsing the report, PANCH foresees some complications about how the process will fit into the JOIDES Advisory Structure. Nevertheless, PANCH recommends PCOM approve the report, subject to working out details of such questions as quality control, certification of safety etc. We can foresee a provisional approval on scientific grounds, subject to completion of surveys around the sites and demonstration of safety of the proposed drilling.

N. Long Range Plan/Programme Renewal Consensus

PANCH recommends that the JOIDES Office hire a professional science writer to interact with the thematic panel chairs and others to produce the desired document focusing on aspects of renewal of the program in 1998.

O. Shipboard Measurements/Staffing Consensus

PANCH recommends
a. the implementation of routine collection of structural data
b. structural geologist be appointed to the SMP for the next few years until this routine is established
c. staffing and selection of co-chiefs for drilling legs reflect the rankings of the various thematic panels and the objectives of the drilling.

P. SSP Endorsement/Back-up sites Consensus

PANCH endorses the SSP recommendation concerning backup sites.

Q. ASRC Recommendation Consensus

PANCH recommends that PCOM endorse the ASRC recommendation that an external group be nominated to review the engineering drilling department within ODP and the interaction between TAMU and TEDCOM.

R. Technology Development Consensus

PANCH recommends that JOI recommend that TAMU explore additional sources of technical support, including technicians from other partners, graduate students, or school teachers.

PCOM: L .1.a. PANEL RECOMMENDATIONS
(TECP)

TECP Structural data implementation plan
Tabled at PCOM, Nov, 1994

Introduction

This implementation plan is outlined as specific recommendations to PCOM in the Agenda book for this meeting. It stems from a request from PCOM at the Spring (Cardiff) PCOM meeting. Plans to improve the collection, archiving and analysis of ODP structural data effectively began in 1991 during Eldridge Moore's term as TECP Chair. Progress was made but was not carried through, partly because the TAMU staff scientist involved left before the work was completed. At the 1993 Fall (Miami) meeting Eldridge Moores and Alastair Robertson (then incoming TECP chair) reminded PCOM of the TECP continued interest in this matter. Recommendations of the PANCH meeting on this subject have already been implemented in part (i.e. inclusion of structural geologists on appropriate cruises). Following discussion at the Spring 1994 (Hawaii) TECP meeting, specific recommendations were put to PCOM by TECP and presented by Brian Taylor as TECP liason. PCOM endorsed the setting up of liasions with IHP and SMP and requested an implementation plan. The setting up of a TECP sub-committtee to look at computing aspects in addition, was also endorsed by PCOM. The matter was discussed again at the August PCOM, but decisions were deferred until the present November 1994 meeting at College Station. Over the last year, TECP has discussed the matter twice and presented details of TECPs intentions to IHP, SMP, DMP, LITH and SGPP (mainly by liasons in person). The response from each of the above panels has been positive, as recorded in the minutes. It is also clear from the draft Long Range Plan that the collection, archiving and analysis of structural data will be important to the future development of scientific ocean drilling. It is vital that apparent short-term problems (e.g., staff availability) are not allowed to stiffle this important initiative. If the syste is to be got up and running smoothly before the end of the current phase of ODP (1998) there is no time to lose.

Basic assumptions

TECP assumes that in the present financial climate little additional funding is likely to be available for the structural data initiative. We have therefore devised a high impact, low budget approach, where most of the work will be carried out by the structural community itself (mainly shipboard). As far as computing is concerned, we only ask that structural data be considerad as essential information and handled in the same way as other essential data (e.g. fossils, sedimentary structures). However, we would also hope that TECP and other thematic panels will be involved in the specification of computing software, rather than merely as testers of already designed software.

Background information

What Structural Geologists Want

The structural community wants the structural data collected on the ship to be accorded the same priority as other shipboard data, to be standardized and

Intensity Factors

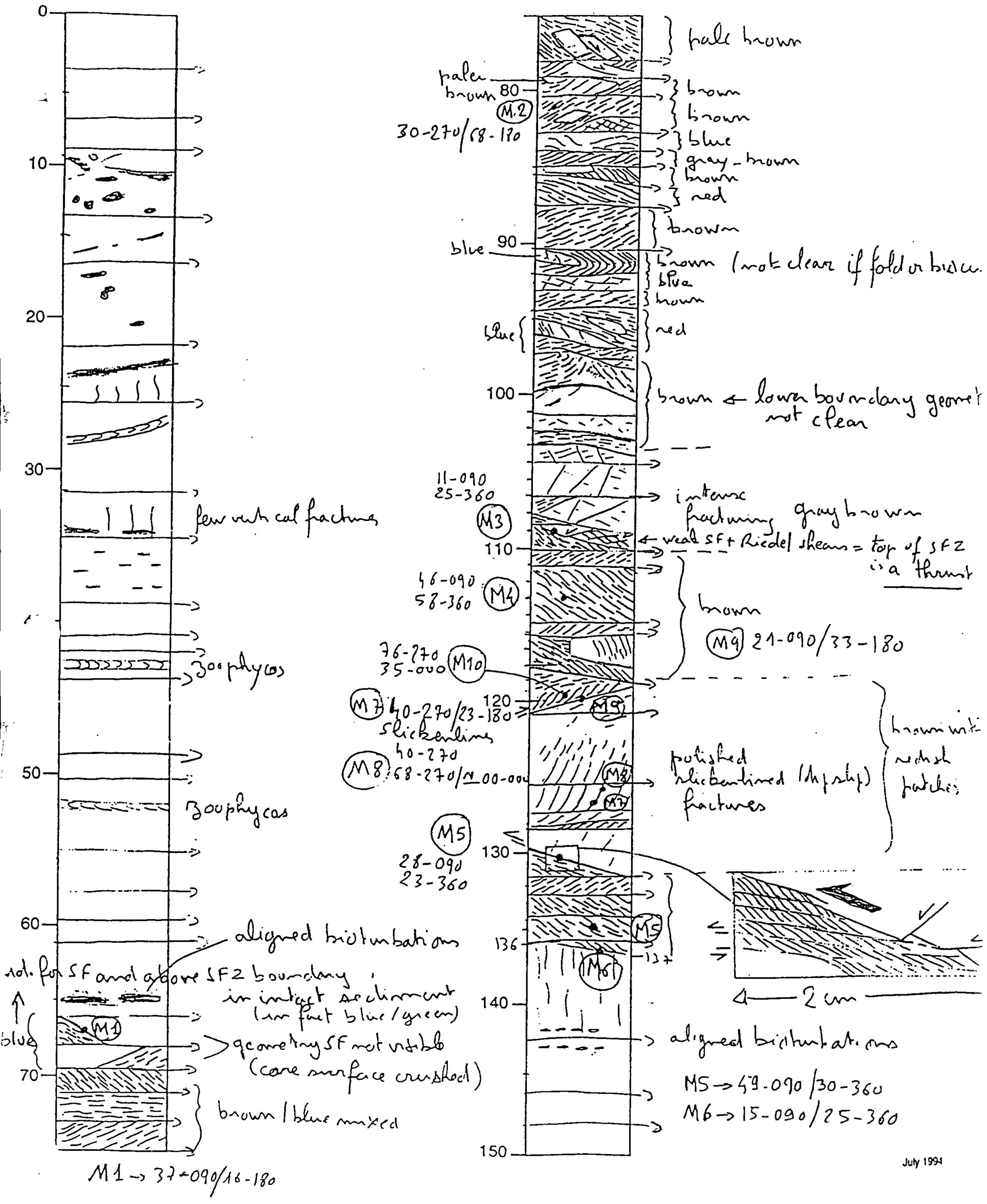
Category	0	1	2	3	4	5
Fractures	Unfractured	Minor fracturing	Minor observable displacement, i.e., a fault	Strong Faulting		
Folds	No folding	Gentle folding	Moderate folding	Strong Folding	Intense Folding	
Veins	No Veins	Weak veining	Moderate veining	Strong Veining	Intense Veining	
Ductile fabric	Fabric absent	Weakly Foliated	Strongly foliated	Porphyroclastic	Mylonite	Ultramylonite
Brittle fabric	Unsheared	Dense anastomosing fracturing and incipient brecciation	Fault brecciation. rotated clasts	Protocataclasite, Rotated, and translated grains showing size reduction	Cataclastite	Ultracataclasite
Magmatic fabric	Isotropic	Weak Shape Fabric	Moderate Shape Fabric	Strong Shape Fabric		

Table 2

Appendix N1.2

STRUCTURAL GEOLOGY DESCRIPTION

Leg 156 Hole 949B Core 13X Section 2 Observer PL



July 1994