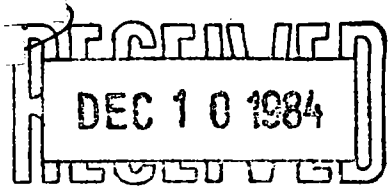


November 6-8, 1984



at Rosenstiel School of Marine and Atmospheric Sciences

Miami, Florida

SUMMARY

1. Drilling Schedule: unanimous and very strong criticism of the schedule as set in Hawaii. Neglect of 504B is unacceptable, only two legs attaching primary lithosphere objectives in the first 4-5 years constitutes an unbalanced drilling program. Panel strongly recommends adoption of EPR and 504B as the two objectives to fill the three Legs 111-113.
2. Bare Rock Drilling: development is on schedule. Long-term, ODP needs real time drill pipe TV capability; for 106 post-emplacment conventional photographic coverage is required as a minimum.
3. MARK Drilling: very successful site survey at MARK area though some worries concerning complexity of chosen ridge segment. Request prompt appointment of 106-110 co-chiefs so they can be involved in remaining planning. Logging 395 should be included as part of 110. Kane Fracture Zone drilling should be back-up on 106.
4. Downhole Measurements: minimum requirements for EPR leg (that do not exist) are i) temperature <math><400^{\circ}\text{C}</math>, ii) flow <math><400^{\circ}\text{C}</math>, iii) water sampling <math><400^{\circ}\text{C}</math> and iv.) side wall coring. Long-term measurements should be vertical array of flow and temperature sensors recording for >6 months down sealed hole. Wireline re-entry is needed. Major problem is how any of these measurements are going to be made. Community interest must be stimulated and coordinated somehow.
5. EPR Drilling: strong endorsement of hydrothermal part of Francheteau proposal.
6. Indian Ocean Drilling: strong endorsement of coordinated and coherent Red Sea program (Working Group should be established); concentrated effort on a single hot spot trace; and the cold spot trace. Crozet Basin seismometer emplacement and Dick fracture zone proposals also strongly supported.
7. 504B: panel will submit proposal for deepening 504B.

1. PCOM REPORT

Jose Honnorez reported on the PCOM meeting held in Hawaii on the 25th-27th September.

a) Drilling schedule: PCOM determined that the three vacant legs (111-113) in the first two years of drilling before the Weddell Sea leg be the following: East-Pacific Rise, Peru Margin and Chile Triple Junction. The alternates, in order of priority, were stated as Yucatan, NW Africa (Mesozoic) and 504B. There was unanimous agreement from the panel that this plan was unacceptable. Criticisms, expressed in the strongest terms, were focussed in three areas (with no particular prioritization):

i) The neglect of 504B: this hole has revolutionized our knowledge of the structure and chemistry of oceanic crust. Months of drilling have been invested there and it provides the best opportunity we have for answering fundamental questions concerning the formation and alteration of the dike sequence (along with natural impact of this upon ophiolite interpretations) as well as the glorious goal of eventually reaching the gabbros. At our last meeting we recommended that certainly one and preferably two legs be spent drilling this hole: as it has now been relegated to a third priority alternate site it seems probable that no progress will be made for the next five years on the hole likely to provide the single greatest advance in our understanding of crustal structure and evolution in more than a decade. The Panel requests PCOM to review the drilling schedule most carefully and to reinstate the deepening of 504B as a primary objective during the first two years of ODP.

ii) The neglect of lithosphere objectives during the first two years of drilling: in the schedule as of the September PCOM only three of the first fourteen legs have primary lithosphere objectives (MARK II, EPR, 0.5 on 102 (417-418 logging), 0.5 on MARK I (i.e. half engineering)). Although important Lithosphere objectives exist in the Indian Ocean (see later in these minutes) they are not considered to be our first-order priorities (LITHP recommended return to Pacific following Weddell). Thus, the only major new efforts at the first-order Lithosphere objectives (creation of oceanic crust) during the first 4-5 years of ODP will be one leg on the MAR and one leg on the EPR. In the Panel's judgement this does not constitute a balanced drilling program.

iii) The neglect of the 'spirit' of COSOD: i.e. the conception held by many that the strategy of ODP would differ significantly from that of DSDP in that it would consist primarily of focussed, process-oriented drilling.

The Panel reiterates its request for Legs 111-113 to be devoted to EPR and 504B drilling in the manner described in our June minutes.

b) No action was taken by PCOM on our request for an EPR working group.

2. TAMU REPORT: LOU GARRISON

a) SEDCO has the contract for the guide base design, which should be completed in time for presentation at the January PCOM: guide base development is on schedule.

b) Precise site location: TAMU has purchased a 675 kHz Mesotech Model 671 drill pipe sonar with the intention of using it as the primary means for precise guide base location determination i.e. as the means for detecting and avoiding fissures and/or unacceptably large seafloor slopes. A strong panel consensus was that this alone was insufficient, especially for the early attempts at bare rock drilling, where if failure or problems were experienced it would be essential to have unambiguous (i.e. not dependent upon subjective interpretation of sonar images) knowledge of detailed seafloor morphology. Strong, long-term recommendation is for TAMU to acquire real-time, down-pipe TV monitoring capability (\$150-250K), but given funds are not available for this in time for 106 then some alternative (less costly) method for obtaining optical images must be sought. Two possibilities were discussed:

- i) Pre-emplacment wireline ANGUS-type camera survey by drill ship in its own acoustic nav net thus allowing co-chiefs to pick guide base location (following processing of film) accurate to a few meters: rejected due to 'waste' of ~2 days of drill ship time, although some strong support was expressed for this option.
- ii) Some kind of guide base or drill pipe camera that would provide photos after the fact so at least if difficulties were encountered it could be determined whether or not morphology was the cause. The panel strongly recommends this as an essential minimum.

In addition the Panel recommends attempts at 'ground truthing' the sonar with photos perhaps during MAR crossing on 103 or 105. For the long-term, however, the Panel requests that PCOM instructs TAMU to acquire an effective real-time drill pipe video capability. The Panel recognizes that the spud-in capability is only one part of the zero-age drilling problem: the other and perhaps larger problem is rubble drilling. Again, the Panel requests that TAMU investigate ways of overcoming this problem.

3. MARK SITE SURVEY REPORT: R. DETRICK

Bob Detrick presented the results of the extremely successful SEABEAM cruise on R/V ROBERT D. CONRAD to the MARK area. Essentially continuous coverage was obtained over the whole of the Kane transform and a >100 km length of the southern ridge segment. The Site Survey team's preliminary interpretation of the data was that the transform exhibited all the normal classical characteristics of fracture zone morphology; however, the southern ridge segment appeared complex and anomalous: specifically its lack of a definable neovolcanic zone e.g. linear string of volcanoes as in FAMOUS and secondly, because of termination of western crestal mountains 30-40 km south of the fracture zone. Purdy presented new results of refraction experiment that suggested this coincided with a dramatic thinning of the crust.

The discussion focussed on recommendations to the Site Survey Team concerning the January SEAMARC I cruise on C.S.S. HUDSON. The plan as presented by Detrick was generally approved with the following three modifications: additional coverage north of the MAR-KFZ intersection to study possible young volcanic features; at least one additional E-W traverse of the ridge within 30-40 km of the intersection; and coverage of small selected areas within the median valley in high-frequency, high-resolution mode. The

Panel endorsed the Site Survey Team's existing plans for ground truthing the SEAMARC in one or two areas using the Ryan 'Cheap Tow' camera system and for the acoustic beacon deployment. TAMU was urged to organize delivery of beacons, complete with 'long-life' mooring hardware, to Detrick in a timely manner.

4. MARK DRILLING: LEGS 106 AND 110

a) The Site Survey results were discussed with some concerns being voiced concerning the lack of an identifiable neovolcanic zone and the major along-axis changes in ridge morphology. The former was not a concern as it is not clear that on slow-spreading ridges such a concept is valid; the latter, however, especially with regard to study of along-axis geochemical changes north and south of the Kane could be a problem. A possible interpretation presented by Purdy is that the 30-40 km ridge segment immediately south of Kane suffered a recent ridge jump of 10-20 km to the east. Consideration was given to the diversion of some of the SEAMARC coverage to the ridge segment north of Kane but this was rejected in favor of a concentrated effort as planned with the aim of elucidating the recent volcanic history on the ridge south of the Kane.

b) The logging of 395: discussion was held concerning when this should be carried out to give maximum manning efficiency. Suggestion was that Kane fracture zone drilling should be the back-up program on 106 (if guide base testing proves disastrous): minimum logging team would then be required on this leg. Leg 110 would then carry a full logging and downhole measurements team that would log and carry out suite of downhole measurements in both 395 and the deepened MARK hole.

c) Co-chiefs for 106 and 110: the Panel urges PCOM to treat these two legs as one continuing program and encourages communication and overlap between the participants. Panel requests PCOM and TAMU to appoint co-chiefs for 106 and 110 in sufficient time so they can attend our February meeting. Suggestions for co-chiefs combining qualities of previous drilling experience, site survey participation and, on 110, downhole measurements expertise are as follows:

106: Honnorez and Ryan; alternates Juteau and Detrick-Fox.

110: Bryan and Becker-Hyndman; alternates Langmuir and Von Herzen-Langseth.

5. DOWNHOLE MEASUREMENTS

The plan made at our June Lithosphere Panel meeting was that this should be a full joint meeting with DMP so that the important and immediate problems of EPR hydrothermal planning, and initiatives for long-term monitoring and advanced downhole measurements could be considered. Under the circumstances only limited progress could be made on these issues.

a) Becker reviewed existing capabilities in both Schlumberger logging and in the downhole measurements especially with regard to temperature limitations.

i) Temperature measuring capabilities: Schlumberger, <150°C;
Barnes-Uyeda, <100°C; Von Herzen, <70°C.

- ii) Flow meter, water sampling and temperature: Becker recently funded by NSF: capable of $<200^{\circ}\text{C}$ and 100m/hr.
- iii) Large-scale resistivity: Becker existing gear $<100^{\circ}\text{C}$.
- iv) TAM Packer: Becker $<120^{\circ}\text{C}$ (need was expressed for water sampling along with this).
- v) 3-component seismometer: Stephen (WHOI) $<150^{\circ}\text{C}$ (maybe better)
- vi) 3-component seismometer with temperature and tilt: Duennebier (HIG) $<120^{\circ}\text{C}$
- vii) Magnetometers: U.S.G.S. $<100^{\circ}\text{C}$ FRG?
- viii) Accurate depth measurements: what is existing capability and how good do we need it?

a) A discussion ensued regarding predicted requirements. This focussed specifically on the EPR leg, as a more general discussion was held at our previous meeting. Consensus was to focus on emphasizing a modest minimum capability and then set about devising ways of obtaining it. Four primary capabilities were defined that were judged to be essential:

- i) Temperature $<400^{\circ}\text{C}$, absolute to $\pm 1-2^{\circ}$, relative $\pm 0.2^{\circ}\text{C}$
- ii) Flow $<400^{\circ}\text{C}$: limits of flow rates to be measured requires careful study.
- iii) Sealed small volume formation water sampling $<400^{\circ}\text{C}$.
- iv) Side wall coring (as insurance against poor recovery).

Future goals that are probably fantasy right now should be high-temperature conductivity-salinity and neutron activation remote sensing geochemistry.

c) Long-term measurements: again very strong support was demonstrated for simultaneous long-term (several years) measurement of a wide range of parameters: temperature, flow, seismic activity, detailed geodetic measurements, tiltmeters, strain, and periodic small-volume water sampling. However, a realistic goal for this first EPR leg was stated as the emplacement of a vertical array of temperature and flow meters downhole capable of recording for more than six months. This requires the capability to seal the hole upon departure of the drill ship. Is this feasible? The hope was expressed that an OBS array could be deployed around the drill site for a comparable period of time.

As in previous meetings the panel reaffirmed the importance of wireline re-entry development.

d) Dick Traeger (Los Alamos) provided a detailed review of high-temperature capabilities in continental drilling. A vast range of tools with exactly the capabilities needed by JOIDES are becoming available. In particular, a set of 400°C tools for temperature, pressure, fluid sampling and flow are being

assembled for the Saltons Sea drilling. There is a small chance they could be borrowed for the EPR leg. This needs to be followed up: but by whom?

e) The key issue, however, is how is any of this going to actually be achieved? We can recommend objectives to DMP but what can they do? The system within which we operate is designed only to respond to proposals. Much discussion ensued; the only conclusion of which was to attempt to stimulate proposals by writing a brief article for EOS describing what opportunities might exist if the EPR is successfully drilled as well as targeting specific interested individuals with personal letters, Purdy-Salisbury-Becker will do this. This problem needs PCOM's attention.

6. EPR DRILLING

The Francheteau proposal was reviewed in some detail. This proposal consisted of three components i) establishing a cluster of holes in a hydrothermally active area, ii) a transect across the rise crest, and iii) deep structure of OSC's. The panel strongly endorses the first of these objectives. Three issues require further detailed discussion: the precise justification for the configuration of the holes to study the hydrothermal vents; the exact nature of the downhole measurements; and the regional context of the 13°N area compared with MARK (e.g. proximity to large offset fracture zone). The Panel requests that Francheteau attend the next meeting so these matters can be discussed and a final detailed plan established.

7. INDIAN OCEAN DRILLING

We began the review of these proposals by asking what the Indian Ocean had to offer in terms of lithosphere objectives:

- i) Aseismic Ridges and Oceanic Plateaus
- ii) Hotspots
- iii) Residual depth anomalies and ultramafic variability
- * iv) Major change in spreading direction
- v) Triple Junction
- vi) Australian-Antarctic Discordance
- * vii) Intermediate spreading rate ridge
- viii) Rifting - young ocean
- * ix) Fossil spreading ridge.

Those marked by an asterisk were discounted because comparable or better examples existed in more accessible places. The proposals were reviewed with these objectives in mind.

Two grading schemes applied to proposals, A, B and C for non-lithosphere primary sites and 1, 2 and 3 for primary lithosphere sites. Of course, we

rate all the latter sites higher than the former. A summary of the results is given below.

Site	Location	Proponent	Grade
L1	Red Sea	Bonatti Ross	1
L2	Carlsberg Ridge	Natland	2
L3	Chagos/Mascarene	Duncan	2
L4	SW Indian Ridge	Dick	1,2,3
L5	SE Indian Ridge	Duncan	2
L6	SE Indian Ridge	Langmuir	1
L7	Crozet	Brocher	1
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S9	SE Indian Ridge	Owen and Rea	B+
T5	NW Indian Ocean	Heirtzler	C
T6	Central Indian Ocean	Weissel et al.	N
T7	90°E Ridge	Curry and Duncan	A
T10	S. Australian Margin	Cande and Mutter	C
T11	Broken Ridge	Curry	C
T12	SE Indian Ridge	Forsyth	I
Southern Ocean	Wilkesland Adelie	Wannesson	C
Informal Pre-submission	Kerguelen	Schlich et al and Ciesielski	A

N = no discernible lithosphere objective, therefore ungraded.

I = insufficient information upon which a responsible review could be made

Some notes on the results of these reviews:

- L1 Very strong general support for Red Sea drilling. Bonatti-Ross proposal combines several important problems: oceanization of continental crust; geochemical evolution as ridge propagated to north; mantle peridotite drilling; several hydrothermal problems. Much detailed criticism of this proposal was presented, but it seems several other proposals are imminent and some unified and practical plan should be put together for our

review. Panel supports formation of Red Sea working group with strong Lithosphere representation. Suggested members are Bonatti, Emmerman, Hawkins, Juteau.

- L2: Very good problem but why in Indian Ocean? Better done elsewhere.
- L3: Geochemical variation along a hot spot track better studied in concentrated manner along a single track e.g. 90°E Ridge. Study of Seychelles continental fragments better done with seismics than drilling.
- L4: Very strong endorsement for fracture zone drilling in general (Grade 1), less of an endorsement for drilling those fracture zones specifically (Grade 2) because of inaccessibility, and much criticism of peridotite-upper mantle stratigraphy objective (Grade 3) because i) fracture zones mess things up, ii) better done on land exposures, iii) looking at a few hundred meters is simply scraping the surface and not getting at the big problems.
- L5: Rather than try to sample every hot spot trace, do a good job on one.
- L6: Proposed by a Panel member. Unique feature, fundamental problem of mantle heterogeneity: very strong support.
- L7: Unique opportunity, first class objectives, very strong support given adequate progress made on solving the technical problems. Reservations expressed concerning misrepresentation of this project to legitimize nuclear weapons testing. Specifically not supported by Professor Banno.

8. OVERVIEW OF LITHOSPHERE PANEL PRIORITIES IN THE INDIAN OCEAN

The three major targets are fundamental processes of which there are particularly good, if not unique, examples in the Indian Ocean. In no particular order of priority they are i) Red Sea, ii) 90°E Ridge, and iii) Cold Spot Trace. The Red Sea needs a working group to generate a coherent unified plan. The Indian Ocean has many hotspot traces and, not surprisingly, the proposals we reviewed, in total, wanted to sample all of them. Geochemical variations along a hotspot trace is a complex problem: rather than scatter our meager resources over several of them we recommend a concentrated and detailed effort on one of them: for this we recommend the 90°E ridge but this choice was made without adequate comparative data. The Cold Spot objective is simply an opportunity to sample a unique phenomenon that may elucidate mantle heterogeneity problems.

In addition, the Dick fracture zone proposal and the Brocher Crozet Basin objectives were considered strong, high-priority efforts.

9. 504B PROPOSAL

The Panel considered the deepening of 504B to be an essential part of the first two years of drilling: the community has 'taken it for granted' that this would occur and thus the proposal pressure that the system needs to function has not been generated. To overcome this difficulty the Panel decided itself to submit a 504B proposal and plans were laid to achieve this before the January PCOM meeting. An advance copy of a Mottl proposal for

single-bit holes around 504B was reviewed and considered an ideal back-up program to the above effort.

10. WESTERN PACIFIC DRILLING

A discussion led by Jim Hawkins was held on the back-arc spreading objectives in this region. Jim was encouraged in his plans to hold a workshop and we planned to define specific site survey objectives at our spring meeting. John Sinton and Margaret Leinen were requested to provide a very brief review of more general Pacific objectives for our next meeting.

11. NEXT MEETING

1. Hawaii Volcano Observatory, 26-27 February. Guests: 106-110 Co-Chiefs and Francheteau (Postscript: venue not approved by JOIDES office - now set at DSDP, Scripps, same date).
2. Strasbourg, 23-24 May (Postscript: not confirmed but seems possible).

Attendees

G.M. Purdy

J. Delaney

C. Langmuir

M. Leinen

K. Bostrom

~~S. Banno~~ (representing Ozima)

T. Juteau

R. Emmerman

J. Sinton

J. Sclater

J. Hawkins

P. Robinson

Absent

K. MacDonald

A. Saunders

Liaisons

J. Honnorez (PCOM)

L. Garrison (TAMU)

A. Adamson (TAMU)

Visitors

G. Brass (NSF)

R. Traeger (DMP)

F. Duennebier (DMP)

R. Detrick (URI: MARK)

K. Becker (DMP, Site Survey Team)

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