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LITHOSPHERE PANEL MEETING, 1-2 MARCH 1984, TEXAS A&M

Summary of Principal Conclusions

1. The priorities described by the COSOD report are unanimously endorsed and will not be repeated in these minutes: the principal objective is to understand the processes of creation of oceanic lithosphere.
2. The most effective way to use drilling to aid in achieving this objective is to concentrate drilling on zero age crust in a small number of 'type' areas.
3. A complete suite of supporting geological and geophysical data should be collected before, during, and after drilling in these same regions which can be thought of as 'Natural Laboratories'.
4. Development and continuing improvement of bare and hard rock drilling capability is essential to the success of this program.
5. Growth of an active and innovative program of downhole logging, measurements, and experimentation will greatly enhance use of drill holes to achieve OLP objectives.
6. The Natural Laboratory for the study of processes at a slow spreading ridge should be the section of the mid-Atlantic ridge immediately south of the Kane fracture zone.

Summary of Proceedings

1. Lou Garrison (TAMU Liason) presented an overview of the ODP management structure and described the new drilling vessel.
2. Jose Honnorez (Chairman, PCOM) summarized the new JOIDES panel structure and the existing schedule for the first twelve or so drilling legs. An important point was that the recent delay of the start of drilling to 1 January unexpectedly results in considerable flexibility in the first years drilling plans.
3. In consequence it was considered appropriate that our first step as a new panel be to establish our own first priorities for drilling objectives in a broad sense, before focussing on specifics.
4. The ensuing discussion lasted most of the day. The clear consensus was that the priorities as described in the COSOD report were strongly endorsed. Some of the highlights of the discussion are listed below:
 - a) Studies of the accretion process should focus on sampling ridges of widely varying spreading rates and sampling each of these ridges at different stages of its evolutionary cycle.

5. Bare-hard rock drilling: presentations were made by Archie McLerran and Stan Serocki concerning development of bare rock spud-in capability and improvement of hard rock and rubble zone drilling capability. A consultant had produced some concept designs which were described to the Panel. Two to three weeks of drill ship time would be needed to test the resulting system. The simple notion of trying to use existing fissures to guide drill pipe rather than an expensive hardware system was suggested but rejected as impractical. The importance was stressed of passing on to the design engineers all that is known (which is considerable) of the detailed morphology and structure of rise crests: taking one of the engineers down in a submersible to actually see it was mentioned but certainly efforts should be made to make available the submersible video tapes so they can be carefully studied. Techniques to penetrate rubble are essential. Major effort must be made to maintain and continuously improve communication between drilling development engineers and the ODP panels.
6. Downhole Measurements: Keir Becker (Downhole Measurements Panel Liason) made a plea for the dedication of drill ship time to the Downhole Measurements Program. This panel's primary targets at this time were 504B, 395A and 417-418. OLP unanimously supported the notion of attempting to clear 417 and was highly supportive in general of devising experiments to make better use of existing DSDP holes (perhaps via wire-line re-entry) and of future ODP holes. Brief discussion considered options of inclusion of some DMP efforts in 1985 Atlantic drilling plans.
7. Mid-Atlantic Ridge Site: lengthy discussions were held concerning where the 'Natural Laboratory' for slow spreading ridges should be located. The two primary candidates were FAMOUS and 22°N (south of Kane). The choice of 22°N was made, rather than FAMOUS because i) the basalt chemistry south of Kane is well known and simple; ii) unlike FAMOUS, it is distant from a hotspot; iii) there is a known chemical anomaly across the Kane Fracture Zone; iv) it was considered a benefit to study of accretion processes to include a segment offset by a large transform. The specific boundaries of this region at 22°N were not defined: this will be done at our next meeting. However, priorities of existing site survey RFP seemed inappropriate, more emphasis being required on ridge segment rather than fracture zone.
8. 1985-86 Drilling Plans: it was decided to request a 4-6 week leg in summer of 1985 during which engineering tests of bare rock drilling would be made at 22°N. If successful, then, a cone would be available for a later return. In addition, on this same leg, an attempt would be made to clear 417, and 395A would be logged (previous logs were inadequate quality). In 1986 a full leg should be dedicated to the 22°N drilling: if attempts failed to achieve bare rock spud-in in 1985 then more engineering tests should be carried out during this leg in 1986.

The priority of returning to 504B was questioned given the low penetration and recovery rates and proximity to magnetic equator: but no consensus was reached.

The plan presented by Thierry Juteau to use Gorringer Ridge as a window into Layer 3 and the upper mantle was intriguing but it was felt that the 4 weeks required by the existing plan probably could not be justified given our lack of knowledge concerning environment in which Gorringer crust was formed. However, consensus was it might be supportable as a 'hole of opportunity' for an approximate week of effort and Thierry Juteau was requested to present such an abbreviated program at the next meeting.

9. The Natural Laboratory concept: strong unanimous support existed for this notion. The need for long-term observatories monitoring geophysical, geochemical and geological parameters for periods of years both before and after drilling was made clear. These could include, but certainly not be restricted to, measurements down the drill hole. Bottom instrumentation should be emplaced over regions extending as much as 100 km (depending on the experiment) from the drill hole. The whole approach to the synthesis of geophysical/geological data with the drilling results needs considerable improvement. The site survey concept needs complete overhaul. Drilling must be considered as simply one tool within a suite of many to be used in a unified and coherent approach to the solution of the key problems.

Attendees

G.M. Purdy
K. Becker
K. Bostrom
J. Delaney
R. Emmermann
L. Garrison
J. Hawkins
J. Honnorez
C. Langmuir
M. Leinen
K. MacDonald
P. Robinson
A. Saunders
J. Sinton

Visitors

R. Carlson (part only)
L. Gamboa (part only)
J. Karson
A. McLerran (part only)
S. Serocki (part only)

Panel Members Absent

J. Sclater
M. Ozima

Principal Lithosphere Panel Recommendations
(exactly as presented to March 1984 PCOM Meeting by G.M. Purdy)

A) General and Long Term:

1. The Panel agrees with the general priorities outlined in the COSOD report.
2. The highest priority objective is the understanding of the processes by which new lithosphere is created at a mid-ocean ridge.
3. The Panel strongly endorses the concept of setting up a small number of 'Natural Laboratories' to study these process oriented problems.
4. Drilling would be concentrated in these 'Laboratories'.
5. Drilling would only be one component of the larger experiment ongoing in each laboratory - the design of which would, of course, be tailored to the specific problem.
6. Re-entry drill holes are a major resource: better advantage should be taken of them specifically with regard to downhole measurements.
7. Development of a wire-line re-entry capability is viewed as an important first step toward this goal.
8. The conception that a single site survey operation provides sufficient background data to fully utilize the drilling results is wrong and must be replaced by a long-term commitment of continued geophysical, geochemical and geological data gathering and research in the regions chosen to be the focus of drilling.
9. Not all problems of interest to our Panel need to be addressed in this concentrated manner.

B. Specific and Short Term

1. Recommend that a significant portion of drill ship time (2-3 weeks) be dedicated to engineering development of the bare and hard rock drilling capability as early as possible in the program.
2. If possible, this test drilling should take place within the designated 'natural laboratory' for slow spreading ridges.
3. Suggest short leg during summer of 1985 during which the following operations would be carried out:
 - i) Attempt to clear 417
 - ii) Log 395
 - iii) Carry out engineering tests of bare rock drilling capability.
4. If successful, this should be followed by intensive effort in 1986; if unsuccessful, then further commitment of time should be made to engineering development.

5. Recommendation for the location of the MAR 'natural laboratory' is a 100 km long strip of the ridge at about 23N, south of the Kane fracture zone.
6. The intersection with the Kane should be included as part of this study.
7. The panel is interested in, and is investigating further, the proposal to drill Gorringe Ridge, perhaps as a small one week effort en route to the Mediterranean.
8. The panel recommends that following the Weddell Sea leg in late 1987 the drill ship return to the Pacific.