

RECEIVED JUN 12 1987

JOIDES Lithosphere Panel Meeting  
Lamont-Doherty Geological Observatory  
Palisades, New York  
13-15 May 1987

Members present:

- |                                |                       |
|--------------------------------|-----------------------|
| R. Detrick (URI), Chairman     | C. Langmuir (L-DGO)   |
| R. Batiza (Northwestern)       | M. McNutt (MIT)       |
| K. Becker (RSMAS) - Days 2 & 3 | C. Mevel (France)     |
| K. Bostrom (ESF)               | J. Mutter (L-DGO)     |
| J. Delaney (UW)                | J. Pearce (UK)        |
| T. Fujii (Japan)               | N. Petersen (Germany) |
| J. Hawkins (SIO) - Day 3       |                       |

In attendance:

- |                   |                    |
|-------------------|--------------------|
| A. Adamson (TAMU) | P. Robinson (PCOM) |
| E. Davis (CEPAC)  |                    |

Absent:

- |                   |                    |
|-------------------|--------------------|
| R. Duncan (IOP)   | J. Malpas (Canada) |
| K. Klitgord (ARP) | S. Scott (WPAC)    |
|                   | J. Sinton (Hawaii) |

AGENDA

1. Approval of previous minutes; agenda
2. Reports from liaisons
3. LITHP White Paper
4. Indian Ocean Issues
5. Evaluation of 3rd WPAC prospectus
6. CEPAC objectives and proposal evaluation
7. Other matters
  - Next meeting
  - Panel membership
  - Evaluation of ODP advisory structure

## MINUTES

### 1.0 Opening remarks, approval of previous minutes and agenda:

The meeting began at 8:33 am with many panel members somewhat bleary-eyed after a 4:30 am fire alarm at the Holiday Inn. The minutes of the January meeting in London were approved with a minor change in the wording of the Lau Basin recommendations previously circulated to panel members. The agenda for the present meeting was also adopted with discussion of the WPAC prospectus deferred until Friday when Hawkins was expected to arrive from Guam.

### 2.0 Liaison Reports:

#### 2.1 PCOM Report (P. Robinson)

The results of the April PCOM meeting, which concentrated on the FY88 budget, were summarized. The FY88 budget is projected to be \$35.5 million (the U.S.S.R. will definitely not be joining). In order to meet this budget and provide for necessary program "enhancements" (ice boats, guidebases etc.) the PCOM budget committee recommended cuts of \$1.15M by TAMU, and \$200K each in the logging program and the JOI office. TAMU came back with a suggested set of cutbacks taken entirely from science operations and services that PCOM did not accept. PCOM passed three motions:

- (1) 4% of the annual budget must be set aside each year for special operations (eg. high latitude and bare-rock drilling)
- (2) engineering development must be maintained
- (3) budget cuts should not come entirely out of science operations and services - TAMU HQ budget should be cut by at least \$500K.

PCOM discussed and voted on a number of potential cuts (see PCOM minutes for details). Some options include making Part B volumes camera-ready rather than typeset, eliminating up to three staff scientist positions, less technical support, longer sample preparation time, removing XRF/XRD/SEM from the ship, etc.

The last option provoked considerable concern on LITHP. There was unanimous agreement that certain basic analytical tools must be available on the ship or it will be impossible to make critical scientific decisions affecting the drilling operations. It will also make it very difficult to attract good people to go to sea. LITHP therefore passed the following motion:

For effective accomplishment of lithospheric objectives, the minimum shipboard analytical requirements are:

- (1) sample preparation facilities
- (2) facilities for bulk rock analysis (eg. XRF)
- (3) facilities for mineral identification (eg. XRD)
- (4) magnetometer
- (5) technical support where necessary

Turning to non-budgetary matters, the status of the Indian Ocean drilling program, approved at the January PCOM meeting, was reviewed. Of interest to LITHP:

Leg 115 - Mascarene plateau (1/2 leg) - ok as proposed

Leg 116 - Intraplate deformation - northern 90E Ridge site dropped from this leg by PCOM; safety panel has not approved two of the intraplate deformation sites (5 and 6A).

Leg 118 - SWIR - 10 days added to leg following LITHP recommendations

Legs 119 & 120 - Kerguelen plateau - PCOM has approved revised Kerguelen Working Group report which includes one deep, re-entry basement hole (SKP4) and possible basement objectives at two other sites. PCOM also approved Prydz Bay drilling.

Leg 121 - Broken Ridge/90E Ridge - transit across Broken Ridge and the two northern sites on 90E Ridge approved.

Leg 123 - Argo Abyssal Plain - basement re-entry hole approved for AAP1B as geochemical reference hole for Sunda Arc and to sample old Indian Ocean oceanic crust.

PCOM selected four "core" programs for WPAC (Banda-Sulu-S. China Sea; Bonin I; Japan Sea and Nankai), but has taken little other action on WPAC prospectus (they plan to discuss it in detail at their August meeting). PCOM has asked CEPAC to prepare a prospectus and for the thematic panels to give PCOM their initial evaluation.

## 2.2 PANCHM (R. Detrick)

R. Detrick reported on the annual PANCHM meeting held in Hawaii. Among the key issues raised were:

(1) Effectiveness of liaison structure: generally it was felt inter-panel liaison had improved over the past year, but liaison with PCOM remained a problem

(2) Meeting schedule: the panels (and PCOM) should try to have a more regular meeting schedule.

(3)-Engineering priorities: there was a consensus among the panels that hard rock drilling, high temperature drilling, drilling and recovery in alternating hard/soft formations and deep drilling were the highest engineering priorities.

## 2.3 TAMU (A. Adamson)

A. Adamson reviewed some of the budget cuts under consideration by TAMU (see PCOM discussion above). EXCOM will make final decision on FY88

budget. The preparations for Leg 118 (SWIR) were also summarized. Several modifications have been made to the guidebase - the legs have been made an integral part of the unit to make it easier to assemble, a hydraulic release system has been developed for the Kelly hose, stronger running cables will be used etc. The Navidrill, which was successfully tested in Germany, did not work on Leg 114. Major modifications will have to be made and it will not be available for Leg 118.

#### 2.4 IOP (C. Langmuir)

At their last meeting the IOP made several recommendations affecting LITHP:

- IOP favored extending the length of SWIR (Leg 118)
- IOP noted slim weather window for Prydz Bay; supported LITHP recommendations on importance of basement drilling at Kerguelen.
- IOP prioritized sites for Leg 121 as (1) Broken Ridge transect of four holes (no basement objectives), (2) northern 90E Ridge site, (3) central 90E Ridge site
- IOP endorsed Argo Abyssal Plain basement re-entry hole and recommended dropping southernmost 90E Ridge site from Leg 123 to ensure adequate basement penetration at AAP1B.

#### 2.5 Kerguelen Working Group (J. Mutter)

J. Mutter summarized the recommendations of the Kerguelen Working Group. Basement drilling objectives now have an equal priority with the latitudinal paleo-oceanographic transect. There is hope for basement penetration at three sites on Kerguelen - one of the sites (SKP4A) will be drilled as a basement re-entry hole. SKP6B is a back-up basement site if Prydz Bay is not drilled.

The following is a breakdown of the two Kerguelen legs:

- Leg 119 - SKP1, SKP6A and Prydz Bay sites
- Leg 120 - SKP2, SKP3, SPKP4A (re-entry) and KHP1

#### 2.6 WPAC (Hawkins letter)

The panel reviewed a memo from J. Hawkins summarizing the last WPAC meeting (the WPAC liaison was not present). The WPAC panel has proposed an 11 leg program consisting of (in order of priority):

1. Banda-Sulu-South China Sea basins
2. Bonin I (BON-1,2,5A-B,6)
3. Lau Basin
4. Vanuatu
5. Japan Sea
6. Nankai
7. Great Barrier Reef
8. Sunda
9. Bonin II (BON-7 + Ref)
10. Nankai Geotechnical
11. SCS Margin
12. Zenisu Ridge

WPAC recommends only one reference hole (BON-8) and it is planned as only a single bit hole. The reasoning is: "devoting any more time to objectives on the Pacific plate, particularly a deep penetration into the ocean crust, would undermine its own priorities in the arc, backarc and marginal basins of the western Pacific" (p.35, 3rd WPAC Prospectus). CEPAC, of course, also believes that reference holes are important, but are a WPAC problem! As a result this drilling objective is in serious danger of completely falling through the crack between two arbitrarily defined regional panels. More discussion on this later (see p.8). In the Lau Basin, WPAC proposed a half-leg "core" program consisting of sites LG2, 3, 6 and 7. They also felt LG1 (central basin) and LG4 (Lau Basin) were important, but deferred judgement on whether to drill one or both sites pending ongoing site survey work and improvements in crustal drilling technology.

## 2.7 CEPAC (R. Batiza/E. Davis)

CEPAC at its last meeting put together a preliminary prospectus consisting of the following programs (not legs):

Juan de Fuca Ridge (232E)	North Pacific Gyre (199E)
EPR at 13°N (76E)	Bering Sea (195E)
Guyots, Atolls (202/203E)	Young hotspot - Loihi (252E)
Old Pacific Crust (261E)	Cascadia margin (233E)
Ontong-Java (222/248E)	Shatsky Rise (253E)

CEPAC and PCOM have requested input from LITHP on this prospectus. Specific questions concern:

- further development of flexural moat proposals; CEPAC feels there are chronostratigraphic problems with drilling at Hawaii; can this work be done elsewhere?
- timing of EPR drilling; do the legs need to be drilled sequentially or could they be drilling in 504B fashion over several years?
- sedimented ridge crest/ hydrothermal systems; what are the relative merits of Juan de Fuca Ridge, Escanaba Trough and Gulf of California for addressing this problem?
- LITHP interest in Chile Triple Junction, Ontong-Java proposals

## 2.8 TEDCOM (C. Langmuir/K. Becker)

TEDCOM held a Riser Drilling Workshop in College Station which C. Langmuir and K. Becker both attended representing LITHP. Riser drilling is potentially interesting to LITHP since in industry the view is that continuous mud circulation while drilling is essential to remove cuttings and improve crustal drilling rates and recovery. Unfortunately, not only is riser technology extremely expensive, but it is currently limited to water depths of less than 6000'. A complete redesign of the riser would be needed to operate in greater water depths. It is also not clear there is enough room on the Resolution, as it is now configured, for a riser. The consensus was that a riser is probably not in ODP's future.

AMOCO presented results from development they are carrying out on using high-speed, small-kerf diamond bit systems for deep crustal drilling. This technology should be of great interest to ODP. It might be used with the conventional drill pipe as a riser. Side-wall coring was also discussed and apparently the technology is available now. Using this technology in ODP could vastly improve the representativeness of the cored material.

TAMU and ODP are concerned that they are getting too many important engineering development priorities without the manpower and financial resources to properly deal with them. Too much time is spent dealing with leg-to-leg problems that they cannot tackle the longer-term problems.

LITHP reiterates the need for significant advances in crustal drilling technology if many of the highest priority lithospheric scientific objectives are going to be achieved within the current drilling program. By analogy with industry, a staff of 3-4 engineers and an annual budget of \$2-3 million/yr are the kind of resources that will probably have to be devoted to make significant progress in this area. We believe this should be ODP's highest, long-term engineering development priority.

### 3.0 LITHP White Paper

The revised draft of the LITHP White Paper was presented and discussed. The final section of the report, which outlines a long-term lithospheric drilling program, was extensively reviewed. A distinction was made between projects that are scientifically mature and technologically feasible now, with those where a specific drilling strategy is harder to define either because ideas are rapidly evolving or drilling technology is still being developed. There was general agreement that both kinds objectives should be included in a long-term drilling strategy with the long-term goals clearly identified along with the technical requirements to achieve them. Other suggestions were made regarding specific wording within this section and in the rest of the document.

With these changes the panel approved the White Paper. The final document will be distributed in early June to all PCOM members, to the chairmen of all the JOIDES advisory panels, and to the chairmen of the COSOD II working groups.

### 4.0 Indian Ocean Issues

Three Indian Ocean issues were discussed:

(1) **Logging:** PCOM has asked the thematic panels to review logging plans for upcoming legs of interest to their panel. LITHP reviewed logging plans for SWIR (Leg 118). A total of 8.3 days of logging is planned including the standard suite of Schlumberger tools, borehole televiewer/magnetometer, multichannel sonic, gyro-magnetometer, magnetic susceptibility, permeability, complex resistivity, dual laterolog, flowmeter and 18 hrs for a VSP experiment. LITHP was very satisfied with the Leg 118 logging program and strongly endorses this as a major objective of the leg - if a deep re-entry hole is established on SWIR it is of extremely high priority that this logging program be carried out even if

it comes at the expense of additional penetration. Logging plans for subsequent Indian Ocean legs will be reviewed at the next LITHP meeting.

(2) 90E Ridge: As far as can be determined, the southern 90E Ridge site has not been formally eliminated from the Indian Ocean drilling program although PCOM did recommend that no 90E ridge sites be drilled on Leg 116 and IOP ranked this site below the other two 90E Ridge sites in priority for Leg 121. While LITHP agrees with the IOP priorities for Leg 121, in light of the safety panel's rejection of sites 5 and 6A for drilling on Leg 116, LITHP believes PCOM should reconsider drilling the northernmost 90E Ridge site on Leg 116. The remaining two 90E Ridge sites should be drilled on Leg 121.

(3) Argo Abyssal Plain reference hole: PCOM has approved drilling a basement re-entry hole in the Argo Abyssal Plain on Leg 123 as recommended by LITHP, but has asked LITHP to address some specific questions regarding drilling strategies and priorities which have been raised by other panels and at PCOM. We applaud the scientific vision displayed by PCOM in approving the Argo Abyssal Plain basement drilling - this hole will provide unique samples of old Indian Ocean crust as well as serve as a reference hole for the Sunda arc. Since many of the questions raised by PCOM center around the proposed western Pacific reference holes they will be discussed in the WPAC section below.

5.0 Evaluation of the 3rd WPAC Prospectus (this took place on Friday morning, except for the reference hole discussion which was on Wednesday afternoon)

### 5.1 Overview

In the Bonin transect, the Lau Basin drilling and the Japan Sea legs, the prospectus satisfies several important lithospheric thematic interests in the western Pacific. The most serious omission is the absence of a viable reference hole program which has been one of LITHP's top priorities in this area. LITHP questions the high priority assigned by WPAC to the Banda-Sulu-SCS program. This proposal is not ranked at all by LITHP and SOHP, and only in the middle of TECP's western Pacific priorities, yet it is the top priority WPAC program and is allocated two legs in the proposed WPAC schedule. This drilling is clearly of important regional interest, but it seems to lack significant global, thematic objectives. The eastern Sunda arc drilling is another project that has not received strong thematic endorsement, but remains one of WPAC's high priority programs. In general, LITHP believes programs with global, thematic objectives like the Bonin transect, Great Barrier Reef, Reference holes, and Japan Sea should receive a much higher ranking in this prospectus than drilling with more regional interests like Banda-Sulu-SCS, Sunda backthrusting, and Zenisu Ridge. The following are more specific recommendations on these issues:

## 5.2 Reference Holes

The WPAC proposal for a reference hole program consisting of only one, single bit hole at BON-8 is viewed as completely unacceptable by LITHP for two principal reasons.

First, an important part of the proposed program is the comparison of the Izu/Bonin and Mariana arc systems which have arc volcanics with distinctly different major and trace element chemistry. The most obvious difference between the arcs is the much greater abundance of seamounts on the subducting plate in the Mariana. Thus drilling reference sites at both arcs is essential to investigate the role of seamounts on arc chemistry.

Second, there are strong scientific arguments for drilling at least one relatively deep (100-500 m) reference hole. There is still no agreement on what part of the subducting crust is important in arc volcanism (none? just the upper few 10s of meters? a substantial fraction of the crust?). By sampling only the top 20 m of the crust, the range of hypotheses that can be tested will be very limited. Moreover, alteration in the top 20 m is likely to be spatially quite variable raising questions about how representative samples from a single shallow hole will be. A viable drilling program to investigate these problems must include one or more relatively deep holes to constrain the vertical variability, and a larger number of shallow holes to determine spatial variability along an arc or between arcs.

The panel also discussed several specific questions raised by P. Robinson on how to determine what part of the crust is involved in the arc signal and how to relate anomalous sea floor features, like seamounts, to arc volcanics. C. Langmuir replied that isotopic analyses (Sr, Li and B) can be used to distinguish between magmatic sources and alteration products in many cases. The effect of seamounts, or other anomalous features, can be addressed in two ways: (1) by comparing arc magmas from two different areas with different abundances of seamounts on the subducting plate (eg. Bonin vs. Mariana), or (2) examining the progressive changes in arc chemistry along an arc subducting a linear island chain obliquely (Louisville Ridge?).

The panel concluded by re-emphasizing the importance of reference hole drilling in the WPAC program. It is a thematic problem of global significance whose importance has been recognized by both the thematic and regional panels. LITHP believes a minimum reference hole drilling program should consist of one deep (100-500m), re-entry basement hole in the Bonins (BON-8) and at least two shallow holes in the Mariana, one located on "normal" crust and one located on or adjacent to a seamount. This program will require a full leg of drilling.

## 5.3 Bonin transect (Bonin I and II)

- this program is strongly endorsed by LITHP. Questions were raised, however, about the value of drilling into a serpentine diapir at BON-7. Samples can be obtained by dredging and submersibles. The panel consensus was that it would be better to drill the ridge these diapirs have intruded to determine the nature of basement, rather than the diapir itself.



## 5.4 Lau Basin System

- LITHP reaffirmed its priorities, established at the London meeting, for drilling in the Lau Basin. Our highest priority is looking at the interplay between volcanism and tectonics in the early opening of the basin and the petrological evolution of the basin. The sites were ranked, in order of priority: LG2, LG6, LG3, LG7 and LG1. LG1 should be drilled as a basement re-entry site in a sediment pond off-ridge (0.5-1.0 Myr crust) and should serve as an important test of new crustal drilling technology before a major crustal drilling effort in the eastern Pacific.

- Valu Fa (LG4 and LG5) is an important and interesting manifestation of back-arc volcanism, but the panel felt it ranked as a lower priority drilling target. The hydrothermal objectives of drilling in this area are better addressed in the eastern Pacific where more extensive geological and geophysical data exist to design a comprehensive hydrothermal drilling program. If both LG1 and LG4 are drilled neither will be very deep, limiting the value of both holes, unless two full legs of drilling are devoted to the Lau Basin. At this stage, LITHP believes more extensive dredging and submersible sampling of Valu Fa ridge should be a higher priority than drilling.

## 5.5 Japan Sea

- LITHP has strongly supported the Japan Sea program since it presents many interesting problems in back-arc basin evolution and is associated with an anomalously thick oceanic crust. LITHP is thus disappointed that the WPAC prospectus includes only two basement re-entry sites (J1-b, J2-a), one of which projects only 20 m of basement penetration because of the thick overlying sediments.

- LITHP recommends that the location of J-2a be reconsidered, possibly moving it from the center to the edge of the basin where the sediments would be thinner allowing greater basement penetration.

- LITHP recommends consideration be given to deploying "mini" re-entry cones at J1-e and J1-d to enable up to 100 m of basement penetration at these sites

## 5.6 Vanuatu

- significant support exist on LITHP for drilling in this area, especially in terms of studying the very early evolution of intra-arc basins and the role of arc-ridge collision in the evolution of a magmatic arc.

## 6.0 CEPAC Objectives and Proposal Evaluation

The second day of the LITHP meeting was devoted entirely to a discussion of CEPAC objectives and proposal evaluation. The discussion began by reviewing the global lithospheric drilling objectives outlined in Table 1 of the LITHP White Paper and identifying those objectives that

were best addressed in the CEPAC area. Of the ten objectives listed in the table, at least eight could be addressed by drilling in the Pacific. These include important global lithospheric themes such as:

- magmatic and hydrothermal processes at fast spreading and sedimented ridge crests
- formation and magmatic evolution of near-axis seamounts
- structure of the lower oceanic crust; test of the ophiolite model
- hotspot volcanism
- lithospheric flexure and thermal evolution
- origin of oceanic plateaus
- development of young oceanic rifts

The panel next turned to a review of specific proposals that have been submitted for drilling in CEPAC. We concentrated on those proposals of significant lithospheric interest.

### 1. Gulf of California (275E)

This proposal has three major components of lithospheric interest: (1) development of early continental rifting in the Manzanillo rift, (2) completion of a transect of holes along the Gulf of California and two transects across the Guayamas and Farallon basins, (3) geochemical and hydrothermal studies in the Guayamas and Farallon basins. In general, the Gulf of California is a good place to study the development of young oceanic rifts and hydrothermal processes at a sedimented ridge crest.

- several problems were identified with the proposed Manzanillo rift drilling: (1) the origin of the rift is not well-constrained, (2) it is unclear how drilling will test potential models, (3) this is probably not the best area to study the transition from continental crust to an incipient rift; the consensus of the panel was that this is an interesting problem, but not a high priority drilling target.

- the longitudinal Gulf transect to look at the geochemical evolution of magmas along a rift propagating into continental crust is of interest to LITHP, but in the northern Gulf the sediments may be too thick to reach basement with a single bit hole. This drilling could only be endorsed if basement were a realistic objective in the northern Gulf.

- transects across the Gulf to look at its early rifting history are the part of this proposal of greatest interest to LITHP. However, the panel felt it would be best to concentrate on one transect with re-entry holes to ensure basement is reached in the holes drilled in the thick sediments on the margins of the basin. MCS data is required to better define drilling targets; a synthesis of relevant continental studies is needed. Further development of this proposal should be encouraged.

- hydrothermal aspects of the Guayamas Basin drilling are of interest to LITHP, although as designed, the program does not address some fundamental aspects of the hydrothermal system at a sedimented ridge crest as well as the Juan de Fuca Ridge proposal

## 2. Escanaba Trough (232E)

This proposal is focussed on studying the timing of volcanic activity and the chemical evolution of individual volcanos at an oceanic spreading center. It does not directly address hydrothermal problems, although recent studies have shown massive sulfides are present in this area.

- the problem of the timing of magmatic activity at mid-ocean ridges is a very important one

- questions exist as to whether or not the "turbidites" are actually hyaloclastite flows; dating resolution may not be as good as they claim

- a more 3-D perspective is needed to understand the sedimentological setting of potential drill sites; high-resolution (deep-tow?) reflection profiles and more coring needed

- hydrothermal drilling objectives investigating massive sulfides should be included

-the consensus of the panel is that this is interesting and important science and further development of this proposal should be encouraged

## 3. Juan de Fuca Ridge, Middle Valley (224E)

This proposal is aimed at studying magmatic and hydrothermal processes at a sedimented ridge crest. Holes are proposed in an actively forming sulfide deposit and near the center of the valley above a sediment-sealed hydrothermal system. Two basement re-entry holes drilled to ~300 m are included.

- the panel felt this was a mature drilling proposal in an extremely well-studied area that addressed major COSOD I and LITHP thematic objectives; a first-rate proposal

- achieving all the stated objectives may require more than one leg; logging and downhole experiments are extremely important and sufficient time should be devoted to these experiments as well as the drilling

- for studying hydrothermal systems at a sedimented ridge crest the panel generally favored Juan de Fuca over Guayamas basin: tectonically it is a simpler system, it is better studied, some drilling has already been done in the Guayamas Basin. However, so little is known about these systems that at this stage it would be nice to work in both areas.

## √ 4. East Pacific Rise 13°N (76E)

This is a proposal to establish a suite of holes to study magmatic and hydrothermal processes at a fast spreading ridge. The original proposal is somewhat outdated and needs revision, but the proponents presently envision three bare-rock holes in an L pattern about 500 m apart - two on the rise crest within the axial graben and one located

off-axis. The favored location is just south of the 12°54'N OSC in a well-surveyed, active hydrothermal area.

- this proposal addresses a major COSOD objective and is one of LITHP's highest priority drilling targets in the Pacific. It will require advances in crustal drilling technology and perhaps as many as three drilling legs to accomplish the primary objectives

- LITHP's highest priority is the establishment of a single deep hole through the pillow/dyke boundary (>500 m?) at the rise axis with shallower holes drilled along and across-strike. The best strategy may be to drill several shallow hole first, then select the best hole to deepen to >500 m.

- the 13°N area is a good site to establish this natural laboratory, but other potential sites exist - eg. the ridge segment south of the Clipperton fracture zone. Final site selection should await completion of EPR data synthesis now in progress

- EPR should probably not be drilled as three consecutive legs; it would be best to schedule the first leg as early in the CEPAC program as possible, with subsequent legs to follow at about six month intervals to allow the engineers to react to problems encountered in the early drilling. However, if the technology is available to make young crustal drilling feasible, all three legs should be carried out during this phase of drilling in the CEPAC area.

#### • 5. Explorer Ridge (263E)

This proposal has similar objectives the EPR proposal: establishment of a natural laboratory to study magmatic and hydrothermal processes at a mid-ocean ridge.

- the proposal is partially sold on the basis of proximity to U.S. ports, but this is offset by shorter weather window in this area

- Explorer Ridge is not a "normal" ridge segment: it is anomalously shallow and asymmetrically spreading; the spreading rates are slow. Given the time and resources required to establish a ridge crest natural laboratory, it would be far better to choose a more typical slow spreading ridge (eg. Mid-Atlantic Ridge).

#### 6. Galapagos stockwork (258E)

This proposal is for a single 500 m deep hole into a fossil hydrothermal stockwork partially exposed on a small horst near the Galapagos spreading center.

- the principal criticism of this proposal was that many stockworks have been drilled on land in ophiolites and it is not clear what new would be learned by drilling here; the panel generally felt it would be far more worthwhile to drill an active hydrothermal system since the hydrothermal fluids can be sampled and physical parameters (eg. permea-

bility, porosity) can be determined that will not be preserved in a fossilized system

- there are also practical difficulties with this proposal: a guide-base would probably be required and hole stability may be a serious problem; it may also be difficult to keep from drilling out of the stock-work at depth (ie, it may not be a simple vertical plug)

## 7. Atolls and Guyots (202/203E)

These two proposals address a variety of paleo-oceanographic, tectonic and lithospheric problems by drilling guyots in the Mid-Pacs and paired atoll-guyots in the Marshall-Gilberts.

- the Winterer proposal addresses several problems of lithospheric interest including hotspot age progressions, uplift and subsidence history, and mantle sources; basement drilling is an important objective

- the Schlanger proposal also has basement objectives of interest to LITHP, although the localized nature of the proposed drilling makes it of less interest

- these programs will not be driven by lithospheric drilling objectives; the final decision should be made by all the panels

## 8. Loihi (252E)

The principal objective of this proposal is to sample the earliest lavas erupted by a mid-plate hot spot; a secondary objective is to study a seamount hydrothermal system. Two holes are proposed - a deep hole (~800 m) at the summit and a shallower hole (~200 m) on the ridge flank.

- this proposal addresses a first-order problem of great interest to LITHP; with complimentary DOSEC drilling planned for Hawaii it may be possible to sample a nearly complete range of magmatic products from the earliest eruptions to the latest stages of activity at this one locale - this would be very exciting

- the present proposal has both magmatic and hydrothermal objectives; LITHP favors concentrating more on magmatic objectives

- consideration should be given to drilling on the flanks of the volcano to avoid caldera complications and intrusive bodies

- drilling will require advances in crustal drilling and dating techniques

## 9. Hawaii flexural moat (3E)

The primary objective here is to use the sedimentary sequences preserved in the Hawaiian flexural moat to constrain the thermo-mechanical response of the lithosphere to the formation of a large hot-

spot volcano. A dating precision of about 100,000 to 200,000 yrs is probably needed to distinguish between alternative models.

- drilling provides the best method of dating the sedimentary horizons observed in flexural moats and quantifying subsidence rates; it could have broad implications for rheological properties of lithosphere

- the main question is whether the necessary dating precision can be obtained in this area; CEPAC has noted problems with biostratigraphy techniques because of the absence of diatoms in Holocene and Recent sediments. They downgraded this proposal in their recent prospectus and suggested seeking alternative sites.

- an alternative site in the Marquesas was discussed by LITHP and M. McNutt summarized the results of a recent cruise to that area. Because of its location in the equatorial high productivity zone, the biostratigraphy of the pelagic sediments is likely to be much better; however the overlapping sequence of reflectors observed in the Hawaiian moat has not been documented in the Marquesas - this kind of data would be required before this area can be considered as a target for flexural moat drilling.

- it may be premature to eliminate Hawaii as a location to carry out this drilling; both magnetostratigraphy and tephrochronologic techniques could provide the necessary dating resolution. A. B. Watts has also noted in a letter to LITHP that cores only 3-4 m long from this area in the Lamont core collection have a few layers with high enough carbonate content that they may be datable using coccoliths

- more discussion on the dating question should be carried out between LITHP, CEPAC and TECP; proponents are encouraged to develop an alternative Marquesas proposal

#### 10. Old Pacific Crust (261E)

This proposal seeks to drill Jurassic basement in the western Pacific in an area where previous drilling found a massive intrusive complex (Site 462 in the Nauru Basin).

- the nature and origin of the great mid-Cretaceous volcanic event is of interest to LITHP; thus sampling of the sill complex would be important, although questions were raised as to how useful samples from a single site would be

- Jurassic crust objectives duplicate to some extent drilling at AAP1B in the Argo Abyssal Plain

- the consensus of the panel was that this is a good proposal that has achievable drilling objectives if the site survey work is successful at finding a suitable site. However, this is not one of LITHP's top drilling priorities in the Pacific - the site survey work may be of greater interest to LITHP than the actual drilling.

## 11. Ontong-Java Plateau (222/248E)

This is actually a multi-disciplinary proposal aimed at a variety of lithospheric, tectonic and paleo-oceanographic objectives.

- origin and composition of large oceanic plateaus like Kerguelen and Ontong-Java an important lithospheric drilling objective

- basement should be an objective of as many holes as possible drilled on Ontong-Java and at least one basement hole should be a re-entry hole with 100 m or more of penetration

- for some of the tectonic/collisional objectives the role of drilling is not well-defined in this proposal

- LITHP believes Ontong-Java should be drilled as part of the Pacific program, but would not rank these proposals as highly as CEPAC

## 12. Magnetic Quiet Zone (231E)

The objective of this proposal is to drill six holes on old crust in the northwest Pacific in order to date basement and constrain tectonic reconstructions for this area.

- as written the proposal has no significant lithospheric drilling objectives

- should a ship with the capabilities of the Resolution be used to date basement to refine plate tectonic reconstructions?

- proposal of marginal interest to LITHP; we would not rate it very highly

## 13. Misc.

Proposals for drilling the Blanco fracture zone and a near-axis seamount were not discussed since they had not been distributed to the panel before the meeting. Older proposals such as Chile ridge triple junction and the Aleutian margin proposals were not discussed because of time constraints. These proposals and other new proposals will be reviewed at the next LITHP meeting.

## 14. Summary

Based on the themes outlined in the LITHP White Paper and the proposal evaluations described above, the panel divided the CEPAC proposals into four groups. Group 1 are the proposals which have LITHP's highest ranking - they all are programs that address fundamental global lithospheric problems and, in our opinion, should be part of any Pacific drilling program (one program, 504B, does not have a new proposal, but it is included on the basis of the strong endorsement given to this drilling in the COSOD I document and the LITHP White Paper). Group 2 proposals are ranked high by LITHP, but with certain qualifications mentioned above. If these problems are resolved they could potentially move into our Group

1 category. Group 3 proposals have important scientific objectives, but have limited lithospheric drilling objectives - we hope they get drilled, but they are not our highest priority in the Pacific. Group 4 proposals are either scientifically immature or have serious deficiencies - they are programs we recommend be dropped from further consideration.

Group 1 (Highest Ranking)	Legs
Juan de Fuca/sedimented ridge crest (224E)	1 1/2
Young hotspot volcano - Loihi (252E)	1
East Pacific Rise (76E)	3
Structure of layer 3 - 504B	1-2

#### Group 2 (High, but with qualifications)

Early continental rifting; Gulf of Calif. transect (275E)  
 Guayamas hydrothermal (275E)  
 Hawaiian flexure (3E)  
 Escanaba Trough (232E)  
 Old Pacific Crust (261E)

#### Group 3 (Limited LITHP interest)

Atolls and guyots (202/203E)  
 Ontong-Java (222/248E)  
 Magnetic Quiet Zone (231E)

#### Group 4 (Immature/serious deficiencies)

Galapagos stockwork (258E)  
 Explorer Ridge (263E)  
 Manzanillo Rift (275E)

The first CEPAC prospectus includes three of our four Group 1 programs and one of our Group 2 programs. Thus at this point, the prospectus includes a strong lithospheric drilling package. We do believe, however, that more of our Group 2 programs should be developed as mature drilling programs in the prospectus, especially given the present uncertainty concerning the technical feasibility of several of the Group 1 programs. The main impediment to a strong lithospheric drilling program in CEPAC is still the arbitrary time limit of 9 legs placed on CEPAC drilling. As the above table indicates, a realistic estimate of the time required to achieve only our four Group 1 objectives is about 7 legs. Clearly, if CEPAC is limited to a total of 9 legs for all drilling in the central and eastern Pacific we will be lucky to achieve more than one of our highest priority CEPAC objectives. LITHP thus considers it essential that PCOM allocate sufficient drilling time to CEPAC to achieve the primary thematic drilling objectives in this area. For LITHP, these requirements are clearly outlined in the above table.



## 7.0 Other matters

### 7.1 Meeting schedule

LITHP will try to meet regularly in late September and early March of each year. Our next meeting, which we hope will be a joint meeting with CEPAC, has been tentatively scheduled for 30 Sept. - 1 Oct. 1987 in Paris with C. Mevel serving as host. More tentative plans for a March 1988 meeting in Miami and a Sept. 1988 meeting in Tokyo were also discussed.

### 7.2 Panel membership

J. Delaney and J. Sinton are scheduled to rotate off LITHP this year. LITHP nominates Jill Karston (UW) to replace J. Delaney and L. Cathles (Cornell) or N. Sleep (Stanford) to replace J. Sinton (Cathles previously declined an invitation to join LITHP but with his new position at Cornell the panel hoped he might reconsider). PCOM should also note that it has yet to appoint a geochemist to replace M. Leinen on LITHP.

The Panel thanks both Johns for their long service on the panel and wish them well with their new found freedom.

### 7.3 Evaluation of ODP advisory structure

This provocative topic, suggested by the PCOM chairman, was briefly discussed, although the panel did not have time at the end of a long three day meeting to do the subject justice. There is, however, continuing frustration in LITHP that despite the changes that have been made over the past year, the program still has a regional focus that often serves as an impediment to achieving many of the global thematic drilling objectives outlined at COSOD. The controversy over reference holes and the exclusion of the Great Barrier Reef drilling from the core WPAC program approved by PCOM are only the latest symptoms of this problem.

The panel discussed several factors which may have contributed to this situation. One factor is the advisory panel structure itself in which the task of actually constructing a drilling prospectus or program is left to the regional panels. The role of thematic panels is purely advisory. Although it was noted that regional panels are composed of first-rate scientists who also are as interested in global problems as members of thematic panels, problems arise when regional and thematic objectives compete for the same limited amounts of drilling time.

A second problem may be PCOM itself. It was noted in the discussion that no effort is made to ensure that the PCOM membership has a necessary balance of expertise in the various key areas represented by the thematic panels. Decisions are too often made on the basis on incomplete or incorrect information provided by a liaison structure that has not worked well in the past. Suggestions were made to change the way PCOM membership is chosen, possibly having "thematic advocates" on PCOM, or having

thematic panel chairman attend PCOM meetings (the last suggestion was vigorously opposed by the LITHP chairman!).

The main problem, however, may be how the long-term planning has been done in ODP and the circumnavigation philosophy that has driven the program in its first five years. This has led to totally arbitrary time blocks assigned to regional areas without consideration to global thematic drilling objectives, where they are best attacked, or how long it will take to achieve them. The result has been a program with a decidedly regional focus, with the regional and thematic panels fighting over the limited number of legs arbitrarily assigned to a particular area. As long as the long-term planning by PCOM is carried out in this fashion, no amount of fiddling with the panel structure, liaisons etc. is going to change the regional focus of the program.

The most constructive suggestion to emerge from this discussion was that the long-term planning for the second five years of ODP be done in a different way. First, the idea, a priori, of a second circumnavigation, should be dropped. Each of the three thematic panels should be assigned the task of identifying a five year drilling program comprised of say 12 legs that would address the major global thematic drilling objectives outlined by COSOD I and II and these panels. In each case they would identify the key problems, where in a regional sense the drilling should be carried out, and the amount of drilling time required. Each "thematic prospectus" would be reviewed by PCOM and used to construct a tentative five year drilling plan outlining approximately where the ship will go and how much time it will spend in each area. These plans would then be publicized and specific drilling proposals solicited. The regional panels would then take these proposals, and working within the thematic guidelines already developed, produce a detailed drilling program for their particular area. These plans would be reviewed by the thematic panels and PCOM to ensure they fulfill the original global drilling themes, but if the regional panels felt important regional problems had been overlooked, they could make a case for changes to the original plan.

Clearly, this kind of approach will not eliminate the problems that will inevitably arise when a variety of groups with competing interests are using a scarce and valuable resource like a drillship. However, to us this is a far more logical way to plan a global drilling program than steaming around the world twice spending an arbitrarily assigned, equal number of legs in each major ocean basin!