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JOIDES Tectonics Panel Meeting
Cincinnati, Ohio
17-19 May, 1984

Panel members present:
J. Leggett (United Kingdom), Chairman
K. Becker (USA)
R. Blanchet (France) (departed Friday noon)
D. Cowan (USA)
J. Ewing (USA)
K. Hinz (Germany)
B. Marsh (USA)
K. Nakamura (Japan)
R. Riddihough (Canada)
J. Van Hinte (European Consortium)
(arrived Fri. noon)
J. Weissel (USA)

In attendance:
A. Meyer (ODP)
K. Tamaki (Japan)

AGENDA

I. Minutes of last meeting
II. Chairman's report on PCOM meeting
III. Report from ODP representative
IV. Review of drilling proposals
V. Review of important thematic and topical problems
VI. Report from European Consortium representative

MINUTES

The meeting began at 9:15 a.m. in the Carrousel Inn.

I. MINUTES OF THE LAST MEETING

Ewing noted that on p. 9, second paragraph, Angola Basin should be changed to Cape Basin. Nakamura noted that in fifth line on p. 6, magnetism should read magmatism. The corrected minutes were approved unanimously.

II. CHAIRMAN'S REPORT ON PCOM MEETING

Leggett reviewed important actions taken at the last PCOM meeting. He presented the revised schedule of drilling legs which would begin with the Bahamas (rather than Gulf of Mexico) in January 1985. The PCOM accepted our recommendation to enter the Indian Ocean after drilling in the Weddell Sea. Various members of our panel then summarized their first-hand knowledge of the recent actions and recommendations of the Mediterranean Working Group, Lithosphere Panel, Sediments and Ocean History Panel, Western Pacific Panel, and the Indian Ocean Panel. Becker gave a more detailed run-down on the status of downhole measurements and outlined some possible hydrogeologic experiments. With regard to site surveys, there was general agreement that they should be influenced by or tailored specifically to drilling objectives so as to provide data useful for identifying sites.

III. REPORT FROM ODP REPRESENTATIVE

Meyer listed the proposed co-chiefs for Leg 101 (Bahamas) and Leg 102 (Barbados). She also reminded us that the Sedco 471 will have 50 bunks for scientists and technicians and can accommodate 20-30 scientists on each leg.

IV. REVIEW OF DRILLING PROPOSALS

A major goal for this meeting was a systematic evaluation of all of the drilling proposals relevant to this panel. Leggett had grouped these by ocean and asked individual members to review and present to the panel one or more groups of proposals.

A. ATLANTIC

1. Bahamas

Ewing summarized the major problems to be addressed on the first ODP leg. What is the nature and history of the Bahama platform; was it a positive feature produced during Atlantic rifting? How are carbonate banks in general constructed, and how do they influence sedimentation patterns?

2. Labrador Sea

Riddihough reminded us that this is an important target for high-latitude paleo-oceanographic data. Although the Labrador Sea opened in the Cretaceous, the time of opening of Baffin Bay and the nature of the crust there are unresolved. In addition to paleo-oceanographic objectives, which

are paramount in the most recent proposal, Riddihough outlined some tectonic questions, including the nature of transitional basement and the age of oceanic crust off SW Greenland. We evaluated the relative merits of drilling in either Baffin Bay or Labrador Sea.

Recommendation to PCOM

We recommend that drilling in the Laborador Sea rather than Baffin Bay be the first priority.

Moved:	Hinz
Seconded:	Weissel
For:	7
Against:	0
Abstain:	3

3. Norwegian Sea

Hinz emphasized that this margin is an outstanding opportunity to determine the nature of the dipping reflectors and, in so doing, establish the characteristics of one type of passive margin. Using seismic reflection profiles, he illustrated the geometry of the clearly visible reflectors and precipitated a discussion on whether they consist of basalt or high-velocity, well-indurated sediments.

Recommendation to PCOM

We award a high priority to drilling dipping reflectors, specifically in the Norwegian Sea as proposed, and recommend that every effort be made to reach basement (reflector K).

Moved:	Weissel
Seconded:	Blanchet

Unanimous

4. MARK I

After a general discussion of drillable tectonic objectives in oceanic crust, Becker said that present plans for bare-rock drilling on this projected leg may have to be scratched if bare-rock capabilities have not been perfected by Spring of 1985. He suggested, following recommendations of the Downhole Measurements Panel, instead using the leg to fish and log holes 417 and 418 and log 395.

5. NW Africa

Hinz reviewed several proposals concerning this margin: one probing Madera abyssal plain turbidites and channels; another German proposal to evaluate coastal upwelling and wind patterns; and a third, by Hinz and Winterer, to follow up on Leg 79, drill to basement, and log to obtain data that can be correlated with seismic sections. Hinz recommends two legs: a paleoenvironment-sedimentological leg combining the first two proposals, and a tectonics leg including a deep re-entry hole near a strong magnetic anomaly

and presumably near the oldest oceanic crust in the area.

6. Conjugate margins

The entire panel quickly discussed and endorsed the proposed Galicia leg, which had been thoroughly reviewed at the last meeting. The objectives of a complimentary leg off Newfoundland would be to drill into syn-rift sediments (although the section is very thick (2.2 km) at this margin) and to evaluate the role of transform faulting during the Atlantic opening.

7. Gorringe Bank

Marsh noted that the objective here is to figure out how the mafic and ultramafic rocks identified from dredging and submersible studies (reviewed by Blanchet) originated and were emplaced. There was general agreement that drilling could add little beyond what these studies have already revealed.

Recommendation to PCOM

In view of major uncertainties concerning the tectonic context in which this block originated, we do not favor drilling to pursue thematic questions at this time.

Moved: Marsh
Seconded: Cowan
Unanimous

8. General recommendations for Atlantic drilling

Recommendations to PCOM

After discussing the proposals outlined above, we: 1) support the Downhole Measurements Panel's alternative to MARK I, namely fishing and logging selected sites; 2) strongly recommend drilling the Galicia margin; 3) conclude that there are enough worthy tectonic objectives off NW Africa to support an entire tectonics leg.

Moved: Blanchet
Seconded: Riddihough
Unanimous

B. CARIBBEAN

Cowan limited his review to sites in the Lesser Antilles forearc region contained in a series of French proposals and one by Westbrook. Meyer updated the panel on the recommendations that the Caribbean Working Group formulated at their March 1984 meeting. In general, objectives in the forearc concern: 1) the toe of the slope, specifically redrilling at Site 541 through the decollement; 2) the upper trench slope, to sample possibly large, out-of-sequence thrusts; and 3) deformation along the west (forearc-basin side) side of the Barbados Ridge accretionary prism.

Recommendations to PCOM

1. North of Tiburon Rise, the primary objective should be to redrill 541, through the decollement and to basement if possible, and obtain data concerning physical properties (fluid pressure, composition, temperature; formation porosity and permeability). A secondary objective is to drill LAF 3 to sample an upper-slope landward dipping reflector. A tertiary objective is LAF 2. We do not support redrilling and logging 543, the oceanic reference site.

Moved: Cowan
Seconded: Nakamura
Unanimous

2. South of Tiburon Rise, we rank objectives in the following order (highest priority first): 1) western deformation front (west side of Barbados Ridge); 2) west margins of Tobago Trough (forearc basin and arc basement); 3) frontal accretionary zone (LAF 4, 5, 7).

Moved: Weissel
Seconded: Marsh
Unanimous

3. If the schedule allows on either projected Barbados leg, HPC's at BAR-5 (a site proposed by A. Mascle and B. Biju-Duval in "New Drilling along Barbados Transects," French Scientific Committee) offers an opportunity to drill a gravity deposit in the act of being incorporated into an accretionary prism.

Moved: Cowan
Seconded: Marsh
Unanimous

C. MEDITERRANEAN

Blanchet reviewed three proposals for drilling in the: 1) collision zone in the outer Hellenic arc including the Ionian basin and Mediterranean Ridge; 2) Tyrrhenian Sea, where the objective is to sample syn-rift sediments and reach basement; and 3) Rhone deep-sea fan. The Mediterranean Working Group has given first priority to the Tyrrhenian Sea and Hellenic trench.

Our panel postponed any recommendations concerning objectives until we have more background information on the western Mediterranean Ridge and Ionian Basin.

D. PACIFIC

1. Japan

Nakamura reviewed specific proposals concerning: a) The Toyama submarine fan, related to collision processes; b) the Ryukyu trench, specifically in the vicinity of the colliding Amami Plateau; c) a nascent convergent

boundary in the Japan Sea off Hokkaido; d) the Daiichi seamount; e) young back-arc spreading in the Izu-Iwo arc; f) junction (collision) of the Kyushu-Palau ridge with the Nankai trough; g) Okinawa trough. Leggett summarized his detailed analysis of seismic reflection profiles across the Nankai forearc, highlighting the imbricate accretionary structure.

The panel reaffirms our intense interest in the myriad tectonic objectives near Japan. Before we make any specific recommendations, we will await proposals and recommendations from the Japanese ODP community and the Western Pacific Panel.

2. Western Pacific

Blanchet gave an illuminating review of the tectonics of the Western Pacific region, using cross-sections through Taiwan, Mindoro, and Panay. Several proposals have been put forth for drilling in the South China Sea, Manila forearc region, and Sulu Sea-Negros trough. We agreed that there are a variety of attractive tectonic problems in the region, but it is premature to make any specific recommendations. Nakamura briefly summarized proposals at hand concerning Tonga and New Hebrides.

3. Peru-Chile trench

Using a recent proposal from the University of Hawaii for a site selection survey off Peru, Cowan noted that the key objective here is to study a margin which has probably been truncated, perhaps by subduction erosion. A recently reprocessed 24-fold reflection line defines a "transition zone" between the lower accretionary prism and continental basement underlying the upper forearc region. This transition zone can probably be sampled by drilling and might offer some useful comparisons with the upper slope region drilled off Mexico on Leg 66.

Recommendation to PCOM

From a thematic standpoint, we favor drilling on the upper slope, rather than near the toe of the trench slope, to probe the outboard extent of basement, its uplift history, and the nature of the transition zone.

Moved: Cowan
Seconded: Marsh
Unanimous

4. Chile Ridge triple junction

Cowan's review of this area was necessarily incomplete because we have no proposal to evaluate. We simply need more information on this objective. Many panel members questioned how drilling could address fundamental tectonic problems concerning triple junctions.

E. INDIAN OCEAN

1. Offshore Makran

Leggett noted that although this margin shares some similarities with the Nankai and the clastic-dominated part of the Barbados Ridge Complex, structures along it are much more regular and can be followed for tens of kilometers along strike. A major focus of drilling would be to establish deformation rates. An important advantage of drilling here is that results could be tied into a mapping program underway in the on-land portion of the Makran.

2. General problems

Weissel first reviewed an interesting hypothesis that part of the oceanic lithosphere in the Indian Ocean is being compressed and is responding by large-wavelength buckling and small-scale block faulting. Drilling could constrain the timing of this deformation by documenting how it has influenced sedimentation. Weissel then summarized the problems concerning the Kerguelen platform, and reviewed the evolution of the passive margins ringing Australia. He then began a systematic review of the 40-odd proposals contained in the booklet prepared by the Australian Consortium, but it soon became apparent that our panel's detailed evaluation of each of these proposals was not warranted at this time.

Weissel summed up and suggested that a number of attractive targets addressing passive margin tectonics can be drilled on the western and southern margins of Australia, and the panel agreed that the Indian Ocean Panel should closely examine these margins, especially the latter.

F. WEDDELL SEA

Van Hinte reviewed the general tectonics of the Weddell Sea, Scotia Sea, and related areas. A number of sites have been proposed, and of them, the panel identified the following, described by Hinz and Van Hinte, as the most attractive from a tectonic standpoint: 1) W-4, E. margin of Weddell Sea (breakup unconformity, dipping reflectors); 2) W-1, 2, Maud Rise; 3) W-3, Astrid Rise (drill below interpreted breakup unconformity into stratified sequence); 4) SA-6, Islas Orcadas; 5) SA-8 Meteor Rise (subsidence history at both sites); 6) SA-1 (tephrochronology, history of arc volcanism).

During discussion of these sites, a consensus emerged that the drilling program appears too ambitious for the time available, and we suggest that ODP ask the Southern Oceans Panel to construct a more realistic program.

V. REVIEW OF IMPORTANT THEMATIC AND TOPICAL PROBLEMS

At the last meeting, we formulated a list of thematic tectonic problems at passive margins, active margins, and in mid-plate regions (see Minutes, p. 12). We began a point-by-point discussion, but soon agreed that, since new members had joined since the last meeting, we should individually think over the list and send modifications and revisions to Leggett.

As we were discussing problems at passive margins, the value of geophysical data was repeatedly mentioned. Many tectonic problems at ocean margins involve the geometry of structures and rock units in the third dimension and, indeed, in many cases even the identity of the rock bodies themselves. It was

pointed out that ODP is intended to be a program that integrates drilling with other research techniques to provide a more comprehensive solution to the major problems of the oceanic realm.

Recommendation to PCOM

Our recommendations for using the drill to solve major tectonic problems are based on the expectation that ODP will make every effort to ensure that first-class geophysics will be carried out to support drilling. Processes at ocean margins are not surficial but they have a lithospheric or sublithospheric origin and are highly three-dimensional. In particular, we need multiline surveys, wide-aperture, expanded-spread surveys, and enhanced velocity resolution. There is considerable scope for innovative geophysical research applied to ODP drilling. We urge PCOM to encourage support for such investigations.

Moved: Weissel
Seconded: Riddihough
Unanimous

VI. REPORT FROM EUROPEAN CONSORTIUM REPRESENTATIVE

Van Hinte reviewed the organization of the Consortium and outlined its role in scientific planning for ODP.

The meeting was adjourned at 10:45 a.m., 19 May.