JOIDES Tectonics Panel Meeting
University of Texas, Institute for Geophysics, Austin
27-29 April 1987

Panel members present:
Darrel Cowan (USA), Chairman
Ian Dalziel (USA)
Dan Davis (USA)
Hermann Kudrass (for Karl Hinz) (FRG)
David Howell (USA)
Ken Hsü (ESF)
Bruce Marsh (USA) (27-28 April)
Kazuaki Nakamura (Japan)
François Roure (France)
Peter Vogt (USA)
Tony Watts (USA) (28-29 April)
Graham Westbrook (UK)

In attendance:
Christian Auroux (ODP)
Dick Buffler (NSF) (27 April)
Greg Moore (WPAC)
Paul Robinson (PCOM)
Dave Scholl (CEPAC)

Members absent:
Robin Riddihough (Canada)

AGENDA

1. Minutes of previous meeting
2. Reports from liaisons
3. Indian Ocean drilling plans
4. Western Pacific drilling plans
5. Next meeting
6. Central and Eastern Pacific
7. Thematic objectives in other regions
8. TECP targets for riser drilling
9. Membership changes
10. IOP liaison
11. Sampling strategies
12. Other business

EXECUTIVE SUMMARY
TECTONICS PANEL MEETING
27-29 April 1987
University of Texas, Institute of Geophysics, Austin

1. SOUTHWEST INDIAN RIDGE FRACTURE ZONE

TECP strongly feels that in order to obtain the most comprehensive information concerning the three-dimensional disposition and geometry of structures and fabrics in the Atlantis II fracture zone, a *transect* of holes penetrating tens of meters into basement is definitely preferable to one deep hole on the median ridge using a guidebase.

2. WESTERN PACIFIC DRILLING PLANS

A. Regarding the approved nine-program (~ 22 month) plan:

- We recommend re-instating MAR-2 and 3 to address a high-priority tectonic problem: the nature of serpentinite diapirism in the forearc

- We recommend adding SUL-8 in the Celebes Sea to the Banda-Sulu-S. China Sea transect in order to provide a more complete study of the evolution of the system of small ocean basins in this region

- We do not see how drilling at S-sites in the Sunda program will uniquely address the general problem of arc-continent collision. We ask for either further justification of the rationale for these sites, or new sites that clearly address the processes of collision.

B. Regarding additional programs in the WPAC prospectus:

- We recommend drilling an abbreviated program at Zenisu Ridge, at sites ZEN-1 and 3 or their equivalents, to address the timing and setting of the inception of contraction of oceanic crust.

- We stand by our original endorsement of in situ physical-properties (geotechnical) measurements in the Nankai prism, and recommend that they be included using a conventional hole at NKT-2 or a companion dedicated hole.

MINUTES

The meeting began at 8:30 a.m.

Cowan welcomed Graham Westbrook, our new member from the United Kingdom who has replaced Jerry Leggett. Cowan asked for a volunteer to serve as Secretary for the meeting; Dave Scholl kindly agreed.

1. MINUTES OF THE PREVIOUS MEETING

Cowan noted that on p. 10, under agenda item #7, the Sulu-Negros program had been left out of the lower-priority grouping in the rank-ordered list of drilling legs in the Western Pacific. It would appear between Zenisu Ridge and Vanuatu (2nd leg), with 15 points.

2. REPORTS FROM LIAISONS

2.1 NSF

Dick Buffler reported that the Defense Department has thrown up a last-minute roadblock to prevent the Soviet Union from joining ODP, at least temporarily. He reviewed the ODP budget for the remainder of Fiscal Year (FY) 1987 and for 1988 and noted a potential shortfall. A new budget procedure for ODP, involving input from PCOM, has been adopted, and we should notify PCOM of special engineering needs and the like prior to its December annual meeting. In response Dalziel's question about COSOD II, Buffler reviewed the general procedure for inviting U.S. participants. Westbrook reviewed the five working groups and emphasized that each is actively soliciting information and recommendations from the geoscience community.

2.2 PCOM

Paul Robinson gave a detailed breakdown of the FY 88 budget and pointed out a possible $1.5 million shortfall, which will probably have to be met by cuts at TAMU, Lamont, and JOI/JOIDES. He then reviewed planning decisions concerning the Indian Ocean and Western Pacific. Those of interest to TECP include: Red Sea and Makran are out; Mascarene is in. PCOM asked for more basement sites on the Kerguelen Plateau, and the Kerguelen Working Group complied. Prydz Bay drilling (which would require an ice-support vessel) is designed basically to document the time of initiation and retreat of the E. Antarctic ice sheet. Leg 116-Intraplate deformation: there are safety problems near the faults. Leg 118 (SWIRFZ) was given ten more days, and the first priority is to deploy a guidebase for a deep basement hole. Leg 123 (Argo): Site AA1-B deep into oceanic crust approved.

In the Western Pacific, PCOM approved about 22 months of drilling (11-12 legs) that will achieve the top nine *programs* ranked by WPAC. In other words, the "top nine programs have been approved for planning purposes" (see WPAC 3rd Prospectus). A core of four programs (Banda-Sulu-S. China; Bonin-I; Japan Sea; Nankai) will definitely be drilled. PCOM also endorses the Langmuir-Natland proposal for geochemical reference sites but requests further advice from panels about drilling strategies and sites. PCOM needs our thematic recommendations for drilling in the Central and Eastern Pacific now.

Regarding the panel structure, PCOM has appointed two new liaisons to each thematic and regional panel. Which liaison attends a particular meeting will typically be determined by whether it is held inside or outside of North America. New liaisons to TECP are T. Shipley and O. Eldholm. It is expected that panels will meet twice a year rather than three times under ordinary circumstances.

2.3 ODP

Christian Auroux reviewed results from Leg 112 (Peru). One noteworthy interpretation of interest to TECP is that horizontal compression is apparently not transmitted into the "backstop" to the small accretionary prism. He also reviewed results from Leg 113 in the Weddell Sea. The Navidrill was tested successfully on land in Germany; the diameter is 3-4 cm. Navidrill is scheduled to be used on Leg 118 (SWIRFZ).

2.4 WPAC

Nakamura, Howell, and Moore each made comments about panel actions and Western Pacific drilling in general. WPAC would like all twelve of its programs drilled (including the nine already approved); this campaign would probably require on the order of 24 months. WPAC endorsed two shallow reference sites east of the Mariana arc, on the descending plate. There seems to be a slight jurisdiction problem here: is this CEPAC or WPAC territory? Bonin I and II do not now include the serpentinite-diapir sites in the Mariana forearc but rather a seamount on the Bonin forearc ridge. Moore said ALVIN dives on the Mariana diapirs are imminent.

A general discussion concerning longer-term drilling followed. Cowan asked specifically about how possible longer drilling campaigns in the Pacific might be balanced against a second circumnavigation. Robinson said PCOM is not yet wedded to a second circumnavigation; the quality of proposed science is of paramount importance. Results of COSOD-II will also be important. He said C. & E. Pacific drilling is tentatively scheduled for nine legs, but it is not yet certain how three legs of East Pacific Rise drilling will be accommodated. Dalziel, who attended a recent South Atlantic workshop, feels that many of the attractive tectonic objectives in that region may be too deep to drill.

2.5 CEPAC

Dave Scholl handed out excerpts from the minutes of the recent CEPAC meeting (March 30-31). A "1st Prospectus" is due out by the end of May; the handout listed the top ten scientific objectives that will be described more fully in the prospectus. He noted that at present, Ontong-Java drilling will address only the sedimentary record; SOHP-type objectives are similarly the driving force behind the Bering Sea drilling. CEPAC specifically notes its concern that the sediments in the Hawaiian moat may not be datable. CEPAC also wants us to clarify whether we consider deep drilling at convergent margins to be a mature (higher priority) or immature problem.

3. INDIAN OCEAN DRILLING PLANS

Tony Watts who acted as TECP liaison at the last IOP meeting in early April at Lamont, briefly reported on the meeting.

3.1 Southwest Indian Ridge (Atlantis II) Fracture Zone (SWIRFZ)

Cowan noted that the plan adopted by PCOM calls for, as first priority, setting a hard-rock guidebase on the median ridge and drilling a deep hole into basement, which is expected to be largely ultramafic on the basis of dredge hauls. Second priority is a series of shallower holes in a sedimented basin on the floor of the zone (the "gravel pit"). Robinson (who will be a co-chief scientist) reminded us that ten days have been added to Leg 118, which might insure that both ridge and basin will be drilled. Cowan had written a letter to PCOM, dated March 26, 1987, stating that it was his opinion that TECP strongly favors a transect of several intermediate-depth holes over one deep hole. According to Robinson, this letter had not been distributed to the PCOM members. Watts had, however, read it aloud to IOP in April.

Several TECP members again questioned the advisability of first drilling a deep guidebase-assisted hole. There was a general feeling expressed that PCOM's desire to obtain more experience using a guidebase had tilted the leg toward petrologic, rather than structural objectives. Marsh pointed out that TECP had advocated drilling in this fracture zone in the first place, but that now its thematic rationale was subordinated to perceived operational needs. He suggested that we reiterate our advice to PCOM.

TECP CONSENSUS: *TECP strongly endorses the recommendations in Cowan's letter of March 26, 1987: In order to obtain the most comprehensive information concerning the three-dimensional disposition and geometry of structures and fabrics in the zone, a transect of holes is definitely preferable to one deep hole using a guidebase.*

3.2 Broken Ridge drilling plan

In a letter to Cowan dated January 26, 1987, Pisias asked TECP to comment on the drilling strategy that could best address tectonic objectives. In view of the fact that we have not yet received any detailed drilling plan from PCOM or IOP, the panel feels that TECP is unable to offer any constructive comments at this time.

4. WESTERN PACIFIC DRILLING PLANS

Prior to this meeting, Cowan had sent the panel copies of the WPAC 3rd Prospectus and a summary of the minutes of WPAC's March meeting in Tokyo. He suggested that the goals of our meeting should be to: (1) Systematically review each of the twelve programs in the prospectus as they stand now; (2) Evaluate a few new proposals received since late 1986; and (3) Evaluate whether the nine-program (~ 22 month) scenario adequately addresses thematic objectives, or whether additional drilling is needed.

4.1 WPAC 3rd Prospectus

4.1.1 Japan Sea

The panel felt no action on its part is needed since this program is part of the core.

4.1.2 Zenisu Ridge

New seismic data have been obtained which may clarify the tectonic setting of the ridge. Earlier, at our October 1986 Ottawa meeting, TECP had ranked Zenisu in the lower-priority group of programs largely because we thought the seismic data didn't demonstrate the contractional origin of the ridge. The question now is whether we can boost it up in the ratings. Hsü explained that the scientific objective seems to be to study the initiation of a new subduction zone and the stacking of slices of ocean crust. Westbrook pointed out that drilling can potentially date the uplift, and from these data we can obtain strain rates and reconstruct the plate tectonic setting when uplift was initiated. He questioned whether all four sites in the proposed program were needed to achieve the primary objective of dating the uplift. Considerable discussion ensued. Cowan expressed his doubts about whether the general problem--shortening of the descending plate in advance of a subduction zone--was as important as other problems on the WPAC menu. He called for a vote on the issue to convey the sense of TECP as to whether Zenisu should be included in the Western Pacific program.

TECP MOTION: Holes at sites equivalent to ZE-3 and ZE-1, located on Line KT86-ILL4-1 at approx. SP 650 and 750, should be drilled to a depth sufficient to address the timing of formation of Zenisu Ridge. Drilling is subject to a demonstration that sediments are in fact datable.

MOVED:	Westbrook
SECONDED:	Davis
9	in favor
1	against
1	abstain

MOTION PASSED

4.1.3 Nankai prism

According to the prospectus, there are two types of drilling proposed for Nankai. A conventional leg would comprise two holes designed to study the accretionary prism and the sediments approaching it: NKT-2 in the toe of the prism, drilled through the decollement; and NKT-1, a reference site on the descending plate. A second program would consist of a hole devoted to the measurement of physical properties (a "geotechnical hole"), which would consume about 1/2 leg. We discussed whether we stood by our October ranking, which placed the geotechnical hole in 7th place in our list of nine programs. Moore said that a planned high-resolution ESP survey would be concentrated in the vicinity of proposed NKT sites, rather than near site 583, drilled on Leg 87. There was a question raised about why a separate hole was needed to NKT-2 and about whether a single hole there could also be used for measurements.

TECP CONSENSUS: *TECP stands by its original ranking of the Nankai physical-properties hole, and reiterates its support for including these types of measurements in the Nankai drilling program.*

4.1.4 Bonin I and II

The Bonin program, as now endorsed by WPAC and PCOM, does not include sites MAR 2 and 3, which were to be drilled on serpentinite diapirs in the Mariana forearc. The program Bonin II does include BON-7, a site on a seamount in the Bonin forearc. Cowan read excerpts from a letter to him from Patricia Fryer dated January 8, 1987, in which she pointed out her view that the evidence supporting a diapiric origin is stronger for the Mariana, rather than the Bonin, seamounts. She stated her concern that the general process of serpentinite diapirism in forearcs would not be addressed by drilling if MAR-2 and 3 were dropped.

Cowan asked the panel whether we still stood by our original endorsement of forearc diapirism as a tectonic objective worth pursuing with the drill. Moore asked what specific information drilling could provide, beyond what is known from dredging and what will be learned from ALVIN dives, scheduled soon. Marsh emphasized again that drilling will illuminate the dynamics, fluid budget, and thermal regime attending diapirism. Westbrook was concerned about whether the diapirs were adequately defined on the Sea MARC images and whether we could be sure that we were drilling into the diapiric mass itself, a debris apron, or uplifted wall rock.

We discussed the origin of the BON-7 seamount. Fryer doesn't think that it is like the Mariana features. Nakamura explained that the Bonin seamount is located on a forearc ridge that is a prominent feature in the Bonin arc and which continues in a subdued fashion southward. Westbrook noted that there are really two problems of interest here: The nature and origin of the forearc ridge, and the serpentinite diapirs themselves. The panel felt that drilling BON-7 may divulge something of interest about the nature of the forearc ridge. However, because it is not clear that BON-7 is actually a serpentinite diapir, we do not consider that drilling BON-7 will adequately address the problem of forearc diapirism as originally highlighted by this panel.

TECP CONSENSUS: *We recommend adding MAR-2 and 3 to the Bonin drilling program because of the compelling evidence that these seamounts are serpentinite diapirs. We endorse drilling at BON-7 as an opportunity to learn something about the forearc ridge on which it is situated, but not necessarily about the key thematic issue in question, serpentinite diapirism in the forearc.*

4.1.5 South China Sea (northern margin)

Cowan asked whether the panel wanted to reconsider its low ranking of this program. Westbrook asked what we could learn by drilling this particular passive margin. It was pointed out that the margin is youthful and the sediment cover is relatively thin, so it offers a chance to study early phases of passive-margin rifting. Hsü suggested that we stand by our earlier ranking, and the panel agreed.

4.1.6 Banda-Sulu-S. China Seas

No recommended changes or additions were proposed at this point in the meeting.

4.1.7 Sunda collision zone

Westbrook noted that although this program is supposed to address the process and results of arc-continent collision, the drilling as planned isn't well focused on this problem. There are two sets of sites: S, to study backthrusting of the accretionary prism on Sumba Ridge; and F, to study back-arc thrusting north of Flores Is. Westbrook said that backthrusting is not a uniquely collisional phenomenon, its connection with collision, if any, in this case isn't clear, and that there may be better places in the world to study backthrusting. Watts noted that the S-sites could document vertical motions coupled with contraction--i.e., the evolution of a small foreland basin. Again, this is may be an interesting problem of convergent margins in general, but not a uniquely collisional process. The panel felt there is definitely some merit to studying "upper-plate contraction", but collision is a higher-priority thematic issue. Recognizing that Silver has a site survey planned for October, TECP wants to encourage the selection of sites other than the proposed S-1, 2, and 3.

TECP CONSENSUS: *TECP still considers collision as a first-order problem worthy of investigation by the drillship. The F(Flores) sites do address this problem, but the S-sites, as presently proposed, do not. TECP recommends that either more thematic justification be provided for the S-sites, or that new sites with a clear connection to the collision process, be proposed.*

4.1.8 Vanuatu

The panel briefly discussed the necessity for drilling both the north D'Entrecasteaux Ridge and the Bougainville Guyot. TECP stands by its original ranking and concluded that all of the drilling in this program is worthwhile.

4.1.9 Lau Basin-Tonga

Scholl reviewed the tectonic setting and geology of the Lau Basin and Tonga Ridge and outlined the drilling program as it stands. Although certain sites will be devoted to geochemical and petrologic objectives, the panel felt that the program as a whole will result in new information concerning the timing of tectonic events and the overall evolution of this intraoceanic system.

4.2 New Proposals

4.2.1 NW Borneo

H. Kudrass displayed a spectacular BGR seismic section across the convergent zone offshore of Sabah (NW Borneo). It showed a series of folds and imbricate thrusts resulting from the consumption of the floor of the S. China Sea, which is a subsided platform covered by lower Miocene carbonates. K. Hinz and Kudrass were interested in whether TECP would encourage the submission of a drilling proposal in this system. Westbrook asked: What is the fundamental problem to be addressed here? Cowan pointed out the topical similarity to Makran: determine the rate of growth of an accretionary wedge, partly by dating and determining the subsidence history sediments in small basins on the wedge. He pointed out that the panel is more interested in drilling deeply in prisms than accomplishing another shallow transect. Roure said that you can study the

development of thrust systems in some young examples on land, for example in the Apennines. Hsü emphasized that Sabah drilling results would definitely be of interest in a regional sense. Nakamura noted that the fundamental implications of drilling results here would be diminished because we do not know the convergence rate.

TECP CONSENSUS: *We do not encourage Hinz and BGR to prepare and submit a drilling proposal. However, we recognize that the basin problem--the rate of growth and distribution of deformation across a prism--is interesting and important, but cannot elevate it to a high priority at this time.*

4.2.2 Sulu-Negros collision zone (27D & 48D addendum)

We re-examined an addendum to 27/D and 48/D. This program does not appear on the WPAC list of twelve recommended programs; we ranked it in our low-priority group in October. Two of the sites (S-4 and S-5) are in the Banda-Sulu transect program and will be drilled. Hsü emphasized again how important it is to understand the evolution of this kind of small ocean basin and that it is essential that both holes be drilled to oceanic basement. There was general concern that top of basement could be identified with certainty on the available MCS data. Better quality data are probably necessary. TECP also endorses a hole at site S-8 in the Celebes Sea to provide a more complete picture of the evolution of the small Indonesian ocean basins. It seems that the origin and age of this basin is a valid problem in a regional context.

TECP CONSENSUS: *We endorse S-4 and 5 but request better quality seismic data and an assurance that these holes will reach oceanic basement. We advocate drilling S-8, to study the origin of the Celebes Sea, pending adequate site-survey data defining the top of oceanic basement and a thin, drillable sediment cover.*

4.2.3 Ogasawara Plateau region (260/D)

Vogt noted that one possible result of proposed drilling would be new information on the age and history of Westpac seamounts. However, it was not clear to the panel how any of the sites would address the processes of collision, because collisional structures are not defined in the data presented with the proposal. The geochemical and petrologic objectives outlined for OP-4 and 5 on the trench wall could possibly be achieved by dredging.

TECP CONSENSUS: *TECP cannot identify major high-priority thematic issues that would be addressed by drilling the proposed sites.*

4.2.4 W. Woodlark Basin (265/D)

It was reported that LITH felt that dredging, rather than drilling, would suffice in this area. Vogt felt that there are not enough data available or presented to permit evaluation of the model.

TECP CONSENSUS: *We cannot identify high-priority issues that could be uniquely addressed by the proposed drilling.*

4.2.5 Long-term down-hole measurements around Japan (272/F)

We briefly discussed this proposal. Nakamura said that new, site-specific proposals will be forthcoming. TECP encourages these kinds of measurements and gives the general concept our qualified support, pending specific plans.

4.3 Summary of recommendations for Western Pacific drilling

At this point, we tried to summarize our discussions and recommendations about the W. Pacific program. Considering the nine-program (approx. 22 months) scenario approved by PCOM, we had tentatively suggested standing by our original (October 1986) ranked list, but adding sites at SUL-8 (approx. 15 days), and two sites (equivalent to ZEN-1 and 3) on Zenisu Ridge (approx. 10 days). Moreover, we had recommended re-instating MAR-2 and 3 (approx. 20 days) and keeping the Nankai geotechnical measurements, whether they could be accomplished in a single hole NKT-2, or a companion (possibly adding 30 days). In effect, we had added 35 days (SUL-8 and MAR-2, 3) to the approved nine-program list, and endorsed a maximum of 40 days in two programs (Nankai geotechnical and Zenisu Ridge) that are in WPAC's twelve-program list but not yet approved. In short, we had recommended adding about (very rough estimate) 75 days to the approved program.

Westbrook felt that PCOM might be more inclined to approve some or all of our additions if we could delete some sites of low thematic priority from the approved program. He suggested that because several back-arc basins are scheduled to be drilled, we could trim the Coriolis trough sites from an already lengthy (1.5 legs) Vanuatu program and use the time to drill the Zenisu sites, which he particularly favored. But Marsh and Howell pointed out that we have consistently identified the evolution of back-arc basins as a high-priority problem.

TECP MOTION: Time be found for drilling an abbreviated Zenisu program (sites equivalent to ZEN-1 and 3) by deleting drilling in the back-arc region of Vanuatu.

MOVED: Westbrook.

SECONDED: Hsü

3	in favor
8	against
1	abstain

MOTION FAILED

TECP RECOMMENDATIONS TO PCOM AND WPAC:

The following sites should be added to those already in the approved nine-program drilling plan: SUL-8 (Celebes Sea), and MAR-2, 3 (serpentinite diapirs). Furthermore, we recommend adding an abbreviated two-site (ZEN-1 and 3) program on Zenisu Ridge to the approved plan. We stand by our original endorsement of geotechnical measurements in the Nankai prism, whether they can be made in a "conventional" hole or instead require a

separate dedicated hole. We recommend adding sufficient time to the drilling plan in either case. We also ask for either more complete justification for how S-sites in the Sunda program bear on the process of collision, or that new sites clearly relating to collision be proposed.

5. NEXT MEETING

K. Hsü kindly invited us to meet in Switzerland in September. We selected September 28 and 29, and a half day on September 30 if necessary. Hsü will arrange a 2-1/2 day field trip after the meeting. [Field trip changed to before the meeting by letter from Hsü dated May 6.] He suggested we meet in Samedan, near St. Moritz. Cowan will write the JOIDES office and request these dates and venue.

6. CENTRAL & EASTERN PACIFIC

PCOM had requested our evaluation of the tectonic content of the drilling proposals and packages that CEPAC ranked highly. Also, PCOM wants us to comment on the tectonic content of specific proposals insofar as they deal with our key thematic issues. Because we had already scheduled, as a main item on our agenda, a discussion and finalization of the draft of our white paper, Cowan suggested that we first proceed through the topics in the draft. Scholl earlier had raised some questions arising from the March 1987 CEPAC meeting for our clarification and comment.

6.1 Geochemical reference holes

Marsh reviewed again the need for reference holes to study the contribution that descending oceanic sediments and upper crust make to arc magmatism. He felt that the Langmuir-Natland proposal (267/F) addressed these problems well with an attractive drilling strategy. Robinson and Cowan asked specifically about deep vs. shallow drilling, and which specific locations would be best. Marsh answered that although a deep hole will give an alteration profile through 300 km or so of oceanic crust, a series of shallow holes has higher priority because we need regional geochemical coverage on a scale comparable to what we already have from arcs. Any arc that is known to have regional variations in magmatism and a simple tectonic history is suitable. Thus, the Aleutians or any of the major W. Pacific intraoceanic arcs (Bonin, Mariana) are fine, as long as enough holes are drilled to encompass the aforementioned geochemical variability.

Marsh will contribute additional text on these issues for the white paper.

6.2 Plate kinematics

Vogt systematically reviewed the key points in his text for the white paper. In his view, the highest priorities are: Opportunistic holes in or transects across crust with M-series anomalies; holes in Jurassic crust; and holes to investigate pre-70 Ma hotspots. Drilling strategies and relevant proposals are detailed in the white paper. Nakamura summarized again how drilling in tilted sediments in trenches and dating them could provide convergence rate. In theory, any convergent margin featuring tilted sediments--Aleutian, Peru-Chile, Cascadia--would be suitable for drilling.

6.3 Ridge-trench interactions

Cowan asked whether we could add to Roure's text to point out how a drilling strategy could address specific questions about the evolution of such zones. The consensus was to leave the text as is. There will be a site survey in early 1988, so we can expect a more fully developed proposal pending new results.

6.4 Lithospheric flexure

Watts pointed out the basic question: What are the transient deformational effects when a load is imposed on the lithosphere? The phenomenon is observed in several distinct settings. A moat is developed around islands in the Hawaiian archipelago. Huge deltas cause flexure. The outer swell in front of oceanic trenches forms as the crust is loaded by the approaching prism. He emphasized that a major reason that the Hawaiian example is attractive is that we have excellent MCS data illustrating the progressive tilting of sediments in the moat.

Scholl brought up the dating problem: If sediments are largely or entirely red clay, can they be dated? Hsü felt there is a good chance that enough calcareous microfossils will be found to allow dating. The panel agreed that drilling in the Hawaiian moat is still warranted.

Watts will prepare a generic section on flexure for the paper.

6.5 Oceanic plateaus and aseismic ridges

The panel accepted the text as written and recognized that the problem is immature until much better site-survey data are available to define basement structure.

6.6 Accretionary prisms

Cowan asked that the panel clarify its objectives in clastic-dominated prisms, especially in light of possible results from drilling into or through the decollement at Nankai. Hsü wondered if we should wait and see what COSOD-II will recommend, but Scholl said that we should keep the subject active ourselves because CEPAC favors shallower drilling in prisms.

There was a clear consensus that we should not only endorse deep drilling, but elevate it to the "mature" category. Hsü, Davis, and Dalziel all stressed that we have no data on the physical properties of materials from deep within clastic-dominated prisms, and they advocated drilling as deeply as 2 km in the Cascadia prism off Vancouver Island (proposal 237/E) upslope from the deformation front. Davis noted that we particularly need to calibrate modeled velocities at these depths with actual measurements of sediment properties. With regard to a comment in the draft, Westbrook questioned the feasibility of testing the duplex model of accretion, say off Costa Rica, by drilling.

In answer to one of CEPAC's concerns as transmitted by Scholl, the consensus of TECP is to favor deep drilling off Vancouver rather than shallower holes off Oregon. Moreover, we elevate the concept of deep drilling--the problems it can address--to the mature category while recognizing that some of the operational and technical problems of deep drilling and in situ measurements are still to be overcome.

6.7 Structures in oceanic crust

In the absence of Riddihough, who wrote this section, the panel could only make a few general comments. It felt that the existing text serves as a preamble to the general problem but that more details are needed. Vogt stressed the importance of documenting the lateral variability of crustal properties; "crustal fabric" was another topic mentioned. Cowan said that Riddihough was sending additional text which would be incorporated into the final draft.

The panel agreed that our forthcoming white paper would serve, at this stage, as our statement of drillable thematic problems in the C. and E. Pacific. Scholl pointed out that there are several proposals concerning the Gulf of California that CEPAC has yet to consider. Cowan will distribute these to TECP in advance of our September meeting so we can discuss them as well.

7. THEMATIC OBJECTIVES IN OTHER REGIONS

The chairman thought that it would be advisable for TECP to start thinking about tectonic issues in oceans other than the Pacific, particularly with regard to whether they are important enough to be addressed during a second circumnavigation after the completion of Pacific drilling. He asked panel members, and especially those with expertise in the Atlantic, to identify key problems and to highlight any which we should discuss more fully in the near future.

South Atlantic: Dalziel reported on a South Atlantic workshop recently convened by J. Austin. Several tectonic themes were identified, but Dalziel feels that many interesting ones, especially along the continental margins, might be too deep to drill. Among the general issues discussed were: Ridge segmentation; comparison of conjugate margins; evolution of the South Atlantic TJ; evolution of transform-shear margins; tectonic controls of paleo-oceanographic gateways; absolute plate motions; and evolution of the Scotia Sea region.

North Atlantic: Vogt mentioned: The variation of crustal properties along strike, near fast- and slow-spreading ridge segments; testing for catastrophic impact structures.

Mediterranean: Hsü suggested investigating the active collision zone near Cyprus, and possible impact sites in general.

Caribbean: Westbrook listed: Age and origin of Caribbean basins and the Cayman trough; accretionary processes off Panama; and the nature of mid-plate volcanism in the Venezuelan basin.

General: Watts thought that the entire subject of passive margins needs an up-to-date review. There are important questions regarding eustacy, and competing models for subsidence, for example. We need a general discussion and identification of key problems and of how and where to address them. Are old or young margins better? How will the proposed drilling in the Gulf of California fit in? We agreed to begin our review at our September meeting.

8. TECP TARGETS FOR RISER DRILLING

Because Davis was going to attend a workshop on riser drilling at TAMU on April 30, we had a brief discussion of tectonic problems that could be addressed using a riser. The main advantages of a riser are fluid control and hole stability. New objectives at

passive margins (identity of reflectors; unconformities) and in accretionary prisms (mud diapirism, for example) will become drillable targets.

9. MEMBERSHIP CHANGES

The Chairman reminded the panel that some U.S. members are due to rotate off at the end of calendar year 1987: Cowan as chairman and possibly as a member, Marsh, Howell, and Vogt. Howell and Vogt expressed a willingness to serve through the first meeting of 1988. Cowan asked the panel to suggest replacements at our next meeting.

10. IOP LIAISON

Leggett, who was replaced by Westbrook, was our liaison to IOP. Cowan, reminding the panel that planning for the imminent round of drilling in the Indian Ocean is largely complete, asked for volunteers. Westbrook and Hsü suggested we use a "liaison of opportunity"--someone, for example, located close to the next meeting--rather than the permanent liaison we assign to active panels. Robinson said this arrangement is OK in principle. Cowan will appoint a liaison when IOP finalizes plans for its next meeting.

11. SAMPLING STRATEGIES

The PCOM Chairman asked for our response to correspondence between him and Biju-Duval. It was generally not clear to our panel exactly what was involved. There seemed to be general agreement with Hsü's position that definite priority continue to be given to shipboard scientists rather than to an Apollo-style program where anyone can apply.

12. OTHER BUSINESS

Nick Pisias asked for our assessment of how the panel structure is working, particularly with regard to the identification of thematic problems. Cowan and Hsü felt the system is fine. Westbrook favored appointing new chairmen from existing panel members so that some continuity can be maintained. He wondered why regional panels stay active after drilling in their region is complete. It was pointed out that the off-season affords a good opportunity for thinking about issues and formulating the most important ones, out of many possibilities, for future drilling.

Dalziel asked when the next meeting, beyond the September one, would likely be. Cowan said PCOM endorsed a two-per-year meeting schedule for panels. Because we need to meet a couple of months in advance of PCOM, early May would seem an appropriate time.

Cowan thanked Paul Robinson for his conscientious and very helpful service to TECP as liaison from PCOM.

The meeting adjourned at 12:05 p.m. on April 29.