WPAC Minutes November 2-5, 1987 University College, London

Present: Taylor, (Chair), Gill, Ingle, Rangin, Kudrass, Hyndman, Audley-Charles, Cronan, Jongsma, Recy, Scott, Tamaki, Moore Hawkins (LITHP), Brenner (SSP), Pisias (PCOM), Garrison (ODP), Sarg (SOHP), Subardjio Tjokrosapoetro (Indonesian MGI)

Absent: Natland (SWIR)

1. Pisias (PCOM) explained his Sept. 2 1987 letters (attached). FY89 plans seem viable if WPAC confirms the TECTP + LITHP endorsement of a half-leg in BONIN II for diapirs. PCOM believes additional legs with strong thematic panel endorsement, or engineering test legs, will be added to, not replace, previously approved WPAC legs. For each leg, alternative sites should be proposed in case of problems. TAMU requests recommendations now for co-chief scientists for the first six legs.

2. Garrison (ODP). Clearances are problematic and each leg represents a separate issue. SWIR illustrates that drilling should be postponed when site surveys and engineering abilities are questionable, and that bare-rock holes require special site survey information, especially bottom photography. Navi-drill technology remains the highest priority engineering development, and is being retested on Leg 118. New mud-motors for hard rock drilling also are being tested there. Mining technologies for high-rpm drilling of smaller-diameter holes are being considered for esting by Leg 121. Hard-rock guide bases will be improved whether or not eployed on Leg 118. Standard use of mini-cores is debated by ODP engineers, and used mainly when a new bit is necessary. XCB is performing well, giving greater recovery in fine-grained sediments, and better logging conditions. Karig's geotechnical tool is in the planning stage only. Fluid chemistry studies seem possible with existing technologies.

3. Indonesian clearances have been problematic by being denied or delayed, and by requiring an Indonesian co-chief scientist, that cores and data be owned by Indonesia, and that publications first be cleared by Indonesia, terms which are unacceptable to ODP. Similar terms prevented drilling in the Red Sea. We note that free access to the data are guaranteed to Indonesian participants, and hope that Indonesia will modify its requirements.

4. Sunda. The planned MCS site survey was not done. TECTP continues not to rank Sunda highly because of regional complexity and difficulties of obtaining clear information about arc-continent collision by drilling at the revised sites which Silver proposed. Future proposals emphasizing the Wetar Strait area may interest TECTP more. A workshop on collision processes also may help to define the role of drilling in collision studies. WPAC drops Sunda drilling pending new proposals.

5. Banda-Celebes-Sulu-SCS Transect. Latitudes and longitudes of the Third Prospectus were corrected. PCOM approved one leg including one site in each of the Banda, Sulu, and South China Seas, plus or minus the Celebes Sea. The Banda and SCS5 sites have clearance uncertainties; the Sulu site has safety uncertainties due to high heat flow and gas potential.

In response to PCOM's charge to provide a one-leg scenario for 1988 with sufficient viable alternate sites, WPAC proposes to break the transect into two ~40-day legs one in 1988 and the other in 1989-90.

Even if basin age is the primary drilling focus, the transect's irreducible core is one site in each of the South Banda (Banda 1), North Banda (Banda 2), Celebes (CS 1), and Sulu (SUL 5) Basins, plus 1 in each of the southwestern (SCS 5) and eastern (SCS 9) South China Sea. Each of these five basins, and the two parts of the South China Sea, may have a different age, origin, and sedimentologic and tectonic history. While they can be ranked, and cut to fit into one leg, sites which are scientifically and technically sound will be eliminated arbitrarily.

The southeast Asian marginal basins are nested between a series of arcs, trenches and microcontinental terranes at the hub of the Asia-Australia-Philippine-Pacific Plates convergence. Their stratigraphy and paleomagnetism record a history of surrounding volcanism and deformation, as well as basin development, that is critical to unravelling the tectonic and paleo-oceanographic evolution of an area that many geologists use as the best modern analog to Alpine, Caledonide and Laramide evolution. The surrounding land areas contain a prolific and diverse suite of Tertiary arc and ophiolite terranes. Competing models/reconstructions concerning processes of arc reversal, obduction, back-arc spreading, basin entrapment, strike-slip slivering and arc collision could be tested and refined if the basins history could be compared to the land geology. Drilling in this type region is the only way to provide the necessary information.

WPAC and the thematic panels concur that the stratigraphic history and age of the basins is the most important single focus. Therefore WPAC agreed with PCOM to defer Banda 3 and Sul 4. The remaining 6 sites all should be retained for reasons which follow.

South Banda Basin (Banda 1) is a logical progression from the Jurassic Indian Ocean crust of Leg 123. Additional site survey work for both Banda 1 and 2 can be done by the Darwin in February 1988.

North Banda Basin (Banda 2) has a large areal extent and differs from the above in having generally less sediment, which has less frequent acoustic layering yet more pronounced transparent layers, and a few prominent reflectors with greater areal extent. Differences in water depth, heat flow, or magnetics are poorly known. However, the North Banda Basin is separated from its southern namesake by a profoundly different terrane (the Banda Ridges), and cannot safely be assumed to share a common history.

The Celebes Sea hole (CS1) promises basement penetration after only 750 m of sediment. Crossing MCS lines exist, and a regional magnetic study including the drill target has been made. TECP endorsed the inclusion of this site.

The Sulu Sea hole site (Sul 5) is characterized by high heat flow, thermogenic methane-bearing sediment, and a partial anoxic history. However, the safety risk may be tolerable because the sediments are structureless turbidites, and the methane and heat may be convectively transported from the adjacent accretionary prism. This basin may differ dramatically in age and origin from the other four above. Alternate sites further from the accretionary prism are needed to minimise safety risks.

The Western South China Sea site (SCS 5) has few age constraints. An off-axis site is preferred in order to establish the time of opening versus cessation, and the igneous geochemistry of initial basaltic basement. New data from BGR, France, LDGO, and China are adequate to define both SCS sites, but need synthesis.

The eastern SCS site (SCS 9) lies on magnetic anomalies which, when unambiguously identified, provide the key to the evolution of the main part of the basin. It provides an oxic open basin comparison to the anoxic filled basin site in the Sulu Sea.

The 1988 transect leg could contain Banda 1 and 2 and SCS 5, with the other 3 sites as alternates. A subsequent shortened leg could contain the other 3 sites, with the advantage of a year's delay for refining site selection and obtaining clearances. Current time estimates include minimum logging time only.

Possible co-chief scientists (proponents underlined):

a) Banda: Silver, Reed, Jongsma
b) Celebes: Hinz, Hilde
c) Sulu: Rangin, Thunell
d) S. China: Pautot, Lewis, Hsu

6. Bonin I and BonMAR (renamed from Bonin II). WPAC accepted the recommendations of LITHP and TECTP that the summit of Mariana "Conical Seamount" (MAR 3) has the highest priority for drilling forearc diapirs. Discussion dwelt on whether the third site for BonMAR should be adjacent to Mar 3, or at Bonin 7.

7. A second hole in the Marianas (Mar 3a) would permit studies of the unroofing history and, via inverted stratigraphy, the petrology of the intruded forearc. Drilling both Mariana 3 plus Bonin 7 would complete both the Bonin and Mariana transects, a comparison of fluid fluxes between two forearcs and at two different heights above the subducted plate. WPAC divided evenly between these two options. Logistics favor doing Mar 3 + 3a first, with Bonin 7 as a high priority alternate. Time may be saved by drilling less than 700m into the diapir at Mar 3, thus permitting both tions above.

rossing MCS lines for all Bonin sites now exist, and SCS lines for Mar 3 + 3a are being obtained. Possible co-chief scientists for Bonin I include Taylor, Okada, Honza and Ludden; for BonMar include Fryer, Fujii, Bloomer, Ishii and Heggarty.

7. Japan Sea I and II. Sites remain as in the Third Prospectus, J1d may need to be moved, based on new site survey information. Suyehiro et al.'s new proposal for implacement of a long-term recording seismograph rather than the week-long oblique experiment previously proposed, at site J1b was endorsed, pending thematic panel approval. Proponents and TAMU are asked for feasability and time estimates. DHMP, TECTP and LITHP should review the proposal's contributions to studies of earthquakes related to incipient subduction, and of the Japan Sea crustal section which is twice normal based on OBS refraction experiments. The downhole experiment tentatively is assigned to the Japan Sea II leg which could be lengthened to up to 37 days. Suggestions from LITHP to move J2a for basement objectives compromise the primary objectives of the hole and were not endorsed.

Possible co-chief scientists for Japan Sea I include Tamaki and Cadet, for Japan Sea II include Suyehiro, Urabe, Scott and Oba, and for either leg include Ingle, Klein, R. Garrison, and A. Robertson.

The new proposal by Okamura and Yamazaki was discussed. WPAC considers this a potentially important study of seamount collision, local ...istrosome development, and tectonic erosion. WPAC prefers the MGL1 site ...ecause the evidence there for the subducted seamount is better, and the seamount is buried less deeply. Two holes near MGL1 will be necessary in order to provide a comparison between the affected and unaffected prism toes. WPAC requests that proponents provide before the end of 1988 crossing MCS lines, SEAMARC imagery for MGL1, and an evaluation of how expected lithologic and structural data will test models. Discussion by TECTP is needed urgently.

8. Nankai. The one approved leg for 1988 includes 20 days of logging and special experiments, which is adequate for substantial downhole experiments. WPAC supports development of the Karig Tool which could be tested during 1988.

Possible co-chief scientists include Taira, G. Moore, Karig, Davis, Yorath, and Pickering.

A second leg can combine two of three objectives: geotechnical, fluid geochemistry of the accretionary prism, and Zenisu. New proposals with fluid geochemical objectives are encouraged. Taira's revised Zenisu proposal was reviewed and re-affirmed as a viable opportunity to gain information about intra-oceanic plate shortening by drilling. Although WPAC agrees that the process of ophiolite emplacement is important, members are divided whether a half leg is better spent on Zenisu or on additional Nankai sites. Zenisu's youth, background information, and ...hydrology provide a unique drilling opportunity to evaluate the timing, ...chanics, and role of fluids in ophiolite emplacement, wheras Nankai's objectives will be addressed elsewhere and already occupy one and a half legs. However, hydrogeologic characterization of Nankai may require drilling at more than two sites.

9. Geochemical Reference Sites. WPAC discussed the one and a half leg proposal by LITHP for one re-entry site near Bonin 8 and 3 shorter holes near Mariana site 452. We cannot assess the regional suitability of specific sites with which to meet LITHP's thematic objectives until a more mature proposal is provided. More specificity is needed about the site surveys of proposed sites, and their rationale. The Bonin site might best be located on the well-defined magnetic anomalies east of the fracture zone at 30 N where there are crossing MCS and refraction lines. Those in the Marianas might use the Conrad MCS lines near site 452. Whether there are differences in subducting sediments between the two locales can be determined only by drilling. However, whether plausible differnces in sediment can account for known differences in the geochemistry of volcanic rocks in the two arcs needs to be predicted in more detail than in existing proposals. If, for example, the modern geochemical fluxes in the Mariana volcanic arc-forearc pair become better known by drilling (including site 3a) than in the Bonins, then perhaps the deep hole should be in the south not north. Or, if the greatest Quaternary geochemical anomalies on the overthrust plate occur in the northern Mariana seamounts, then reference sites might best be placed opposite here.

10. Lau. WPAC endorsed LITHP's proposal in which LG2, LG1 or 7 and LG6 constitute the basic program. The four holes can be drilled in one leg as follows:

			Time in Days		
Site	Sediment	Basement	Re-entry	Drilling	Logging
2	300	200	7	10	3
1 or 7	100	200	7	8	3
3	500	--	-	4	1
6	500	50		8	1

Total = 52 days + transit 4 days

Because forearc site LG6 can be included in a one leg scenario, and has been a high LITHP priority, WPAC believes it should be considered as an essential, not alternate, site. The forearc site LG6 would provide the history of arc volcanism during the pre-, syn-, and post-rift stages of back arc spreading. This is an integral component to the thematic focus of Lau-Tonga drilling which concerns are rifting and backarc spreading.

WPAC cannot fathom TECP's inability to recognize the tectonic implications of sites LG2 and 3 which constrain the age, along-strike synchroneity, and vertical history of arc rifting, or the implications of LG6 which might extend to the southern hemisphere the unique tectonic circumstances which resulted in extensive boninitic magmatism in the early Tertiary.

Site-Survey work for this 4-hole program will be completed during 1988 by American and English cruises. WPAC requests models of magnetic anomalies between LG1 and 2, SCS lines for LG1, 2, and 7, and critical evaluation of ther the basement at LG2 is oceanic or attenuated arc crust.

WPAC remains keenly interested in drilling hydrothermal deposits at Valu Fa because it is likely to be more relevant to on-land ore deposits than are those at mid-ocean ridges, and because its magma types are important components of backarc basins. Even so, WPAC does not propose substituting Valu Fa for one or more of the 4 sites above. However, a bare-rock guidebase can be set in a week, and an unsupported bare rock start is possible but at the expense of losing the upper 30-40 m of core. Also, some experimental engineering drilling using mining technologies may be undertaken in the Lau Basin. Therefore, WPAC encourages submission of a new proposal focused solely on hydrothermal objectives, which LITHP should consider relative to CEPAC sites.

11. South China Sea Margin. Tectonic objectives are the driving force for this proposal. WPAC recognizes that the margin now has the best imaged stratigraphy and crustal structure of any continental margin worldwide, and that its Tertiary age is ideal for resolving time/depth relationships. Because these relationships can test rifting models and can be determined only by drilling, WPAC endorses the proposal and awaits thematic panels' reviews of the current revision.

WPAC believes that the subsidence history of this margin can be evaluated quantitatively using the proposed sites, and that a minimum of four sites are necessary to evaluate the rifting-subsidence history across the margin. Site 4 is above the hinge zone, where the crust is little ttenuated. Sites 2 and 3 are in the region of transitional crust and are .t significantly different distances across the transect. Both sites 3B and 3C would be required if the differential subsidence on either side of the master detachment surface is to be documented. Site 1 is on oceanic crust and would date the onset of spreading as well as provide a complete stratigraphic section of basin evolution. Our panels site priorities are 3 and 2 before 4 and 1.

Although the conjugate margin is not recommended for drilling at this time, abundant geophysical and sample data, including published well sections, exist against which the China margin data can be compared.

In addition, WPAC considers as sound the SOHP objectives to include the SCS as a regional example of siliciclastic sedimentation, and to utilize the contrasting tectonic history of the various marginal basins to distinguish tectonic versus sea level controls on submergence histories.

12. Northeast Australia. WPAC concurs with SOHP's reply to PCOM justifying site NEA1-6 and 8-10, and expects this program to be included as a full leg in the second year of drilling. Sites 11 and 14 are to be alternates. Site 13 is not endorsed because similar sequences also are known from other margins which are not drifting into the tropics.

WPAC agreed with SOHP's arguments why a comparison of stable sites 1-5 versus subsiding sites 6, 8, 9 and 10 may resolve causes of eustatic sea level changes. Site survey work is complete and extensive and results are awaited eagerly by SSP. Drilling times are conservative, and mining technologies may be important. Clearances seem probable, although whether permission will be granted for 800-1000m holes still needs to be established.

WPAC concurs with thematic panels that the proposal to study the Mississippi Valley Type of mineralization should be accommodated within the sites listed above, as part of planned studies of diagenesis. This requires that the holes be deep enough to achieve MVT's objectives, but not additional or different sites. There is insufficient time to accommodate MVT proponents' request to use packers, but either pore fluids or drill string packers may suffice. Although LITHP endorsed an additional half-leg for MVT objectives, it gave this idea low priority and WPAC does not propose it.

13. K. Hooper is advised that the microfaunal work he proposes will be done routinely at all site, and is invited to participate.

14. Vanuatu. WPAC replied to PCOM's request for a one-leg program by endorsing the proponents' proposal to retain sites DEZ1, 2, 4, 5 and IAB 1a and 2a. Loss of the backarc group is deplored. Site survey work is complete, and results are being processed. As a result, several sites may be moved slightly with a commensurate saving of up to 9 days drilling time. Proponents are asked to provide data and revised site sheets to SSP before its next meeting which are sufficient to estimate drilling times.

Shervais' proposal to drill 100-300 m into basement at IABa or 2b cannot be accommodated because it would displace holes more closely related to the collisional focus endorsed by PCOM.

Panel Membership. WPAC thanks Ingle, Recy, and Jongsma for the quality and longevity of their input as they cycle off the panel. A strong preference for Don Tiffin as an at-large member was re-iterated; Jacques Daniel, Philip Huchon are alternates. Replacements for Ingle should be a stratigrapher-paleoceanographer with regional interests; possibilities include J. Hein, G. Devries-Klein, and R. Thunnel. WPAC welcomes Garrison as a replacement for Sarg as SOHP liason.

Next Meeting: The panel will meet in April prior to PCOM and after SSP. The preferred location and times are Hannover and 8-10 April.

cheduling. A recommended schedule for FY89 and FY90 is:

Leg	Objective	Destination	Dates	Total Days
124	Banda-SCS	Manila	23 10-19.12	<42
-	Engineering	Guam	?	
125	BonMar	Tokyo	Jan-Feb 88	(56)
126	Bonin I	Tokyo	Mar-Apr	(56)
127	Nankai	Yokohama	May-June	58
128	Japan Sea I	Niigata	July-Aug	54
129	Japan Sea II	Nagasaki	Sept	38
-	Dry Dock		Oct	14
130	Geochem. Ref	Guam	Nov-Dec	(56)
131	Nankai II	Nagasaki	Jan-Feb	(56)
132	S. China Margin	Hong Kong	Mar-April	(56)
133	Banda-SCSII	P. Moresby	May	~40
134	NE Australia	Noumea	June-July	(56)
135	Vanuatu	Suva	Aug-Sept	(56)
136	Lau-Tonga	Pago Pago	Oct-Nov	(56)

Summary of drilling issues (alternating hard/soft layers everywhere!)

Banda - SCS	- Pelagics through turbidites; <50 basement, SUL5 hot, gas
n-Mar	- <700m into serpentinite with surface fluff
	- Bon-6 re-entry site (150m basement), similar lithologies to 458-459 but with more volcaniclastics
BoninI	- some coarse volcaniclastics
	- Bon-2 re-entry site with 200m basement
Nankai	- turbidite sands, 2 re-entry sites, decollement with overpressured fluids (?), test of Karig tool, packes, pore fluid samples, major logging
Japan Sea I	- potential gas problem, coarse turbidites and diatomaceous pelagites
	- J1b re-entry for long-term instrumentation
Japan Sea II	- J2a re-entry
Geochem. Ref	- 10 to 30m Quaternary sediment then Cretaceous chert
	- see sites 452 etc
Nankai II	- geotechnical tools
S. China Margin	- coarse sands, some possibly cemented
NE Australia	- vugular carbonates, mixed lithologies
Vanuatu	- volcaniclastics, carbonates, decollement, basement
Lau-Tonga	- volcaniclastics, LG2 like site 203.

Revised Banda-Celebes-Sulu-South China Sea Locations

	Lat	Long	Comments
Banda 1	6 00'S	128 07'E	location corrected in phone conversation with Silver
Banda 2	4 56'S	124 56'E	
CS 1	4 45.4'N	123 28.5'E	BGR proposal
Sulu 5A	8 49.5'N	121 36.1'E	Moved slightly by new BGR proposal
SCS5	12 20'N	113 30'E	Clearance difficulties foreseen. Site to be relocated after further data examination and synthesis.
SCS 9	16 10'N	117 53'E	

1987 WPAC Executive Summary

1. Meetings: WPAC met twice in 1987: in March, to prepare the 3rd Prospectus; and in November to respond to PCOM and thematical panel recommendations.

2. Clearances: Indonesian clearances have been problematic by being denied or delayed, and by requiring an Indonesian co-chief scientist, that cores and data be owned by Indonesia, and that publications first be cleared by Indonesia, terms which are unacceptable to ODP. Similar terms prevented drilling in the Red Sea. We note that free access to the data are guaranteed to Indonesian participants, and hope that Indonesia and any other countries considering such restrictions will modify their requirements.

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5. Bonin I and BonMAR (renamed from Bonin II): Bonin I and half a leg of BonMar to drill Bon 6 remain unchanged. Site surveys are complete. WPAC agreed with LITHP and TECTP that the summit of Mariana "Conical Seamount" (MAR 3a) has the highest priority for drilling forearc diapirs. Discussion dwelt on whether the third site for BonMAR should be at Mar 3, or at Bonin7. A second hole in the Marianas would permit studies of the unroofing history and, via inverted stratigraphy, the petrology of the intruded forearc. Drilling both Mariana 3 plus Bonin 7 would complete both the Bonin and Mariana transects, a comparison of fluid fluxes between two forearcs and at two different heights above the subducted plate. WPAC divided evenly between these two options. Logistics favor doing Mar 3 + 3a first, with Bonin 7 as a high priority alternate. Time may be saved by drilling less than 700m into the diapir at Mar 3, thus permitting both options above.

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12. Lau-Tonga: WPAC endorsed LITHP's proposal in which LG2, LG3, LG1 or 7 and LG6 constitute the basic program. The four holes can be drilled in one leg and, WPAC believes LG6 which has been a high LITHP priority, should be considered as an essential, not alternate, site. The forearc site LG6 would provide the history of arc volcanism during the pre-, syn-, and post-rift stages of back arc spreading. This is an integral component to the thematic focus of Lau-Tonga drilling which concerns arc rifting and backarc spreading.

13. Mining Technology: WPAC recognizes the desirability of testing proposed high-rpm drilling of small diameter holes prior to the Bonin, Northeast Australia, Lau-Tonga, as well as the East Pacific Rise legs. A location with sufficient survey information (Sea Beam, bottom photographs, ALVIN dives) for a bare rock site in zero-age crust exists at 18°N in the Mariana back-arc basin. An engineering mini-leg could be accommodated early in the WPAC schedule, following Leg 124.

14. Scheduling. A recommended schedule for FY89 and FY90 is:

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130	Geochem. Ref	Guam	Nov-Dec	(56)
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132	S. China Margin	Hong Kong	Mar-April	(56)
133	Banda-SCSII	P. Moresby	May	~40
134	NE Australia	Noumea	June-July	(56)
135	Vanuatu	Suva	Aug-Sept	(56)
136	Lau-Tonga	Pago Pago	Oct-Nov	(56)