Received 1-October-2003

IODP Proposal Cover Sheet

640-Pre

☑ **New** ☐ **Revised** ☐ **Addendum**

Above For Official Use Only

Please fill out information in all gray boxes

Title:	Drilling the Godzilla Mullion detachment in the Philippine Sea: formation of detachment fault in intermediate-spreading oceanic lithosphere		
Proponent(s):	Yasuhiko Ohara, Kyoko Okino, Jonathan E. Snow, Matthew Salisbury, Anne Descahmps, Javier Escartín, Benoit Ildefonse and Chris J. MacLeod		
Keywords: *(5 or less)*	Megamullion, detachment faulting, oceanic lithosphere, spreading ridge, mantle	Area:	Western Pacific

Contact Information:

Contact Person:	Yasuhiko Ohara		
Department:	Ocean Research Laboratory		
Organization:	Hydrographic and Oceanographic Department of Japan		
Address	5-3-1 Tsukiji, Chuo-ku, Tokyo 104-0045, Japan		
Tel.:	81-3-3541-4387	Fax:	81-3-3541-3870
E-mail:	ohara@jodc.go.jp		

Permission to post abstract on iSAS Web site: X Yes ☐

Abstract: (*400 words or less)*

Increasing number of studies has recently identified domed massifs with prominent axis-normal striations (corrugations) along slow- and intermediate-spreading ridges. These massifs (termed “megamullions”) are interpreted as exhumed footwalls of long-lived oceanic detachment faults developed at magma-starved ridge segments. To know the mechanism in which oceanic detachments form and develop is crucial to understand the tectono-magmatic development of oceanic lithosphere. Models for hitherto unknown oceanic detachment faulting need to be justified by using ample data sets.

In order to better understand the formation mechanism of oceanic detachment faulting, we propose to drill the Godzilla Mullion detachment in the Parece Vela backarc basin. The Godzilla Mullion detachment is the world’s largest megamullion structure formed in a fastest intermediate-spread (7 cm/y full-rate) backarc basin setting in the Philippine Sea, providing an excellent tectonic window for oceanic lithosphere community.

Oceanic detachments provide a valuable opportunity to directly study the architecture of oceanic lithosphere, together with the tectono-magmatic processes that were associated with its formation and evolution. Our proposal will thus provide important new data sets to oceanic lithosphere community. Numerous studies including previous ODP Legs (109, 118, 147, 153, 176 and 209) revealed substantial spreading rate (slow or fast) dependent signatures for the structure and composition of oceanic lithosphere. However, models for the oceanic lithospheric architecture and processes still need to be understood in terms of full-range of spreading rate spectrum. Our proposal for drilling the intermediate-spread Godzilla Mullion detachment will thus provide a necessary bridge in spreading rates between slow (ODP Legs 109, 118, 153, 176 and 209) and fast sites (ODP Legs 147 and 206).

We propose to drill a transect of relatively short five holes (~ 350 m) and a relatively deep single hole (~ 1050 m) along a plate flow line from the near-breakaway to the termination (hanging wall). One of the remarkable merits of drilling the extinct Parece Vela backarc basin, as opposed to a modern ridge, is that it is sedimented. The previous data indicate that, although local, there are some sediment ponds (~ 50 m thick) on the surface of the Godzilla Mullion detachment. By placing the proposed drilling sites on these local sediment ponds, we can spud without using costly bare-rock guide bases.

640-Pre

Scientific Objectives: (*250 words or less*)

The primary objective of our proposal is to study the mechanism of oceanic detachment faulting.

The oceanic lithosphere community has been relying on two-end member spreading rate ridge systems to model the mid-oceanic ridge processes. However, the spreading-rate dependent model for the structure and composition of oceanic lithosphere still needs to be understood in terms of full-range of spreading rate spectrum. Our proposal for drilling the intermediate-spread Godzilla Mullion detachment will thus provide a necessary bridge in spreading rates between slow (ODP Legs 109, 118, 153, 176 and 209) and fast sites (ODP Legs 147 and 206), addressing the following ancillary objectives:

(1) Lithospheric architecture of intermediate-spreading ridges
(2) Mantle dynamics and melt migration at intermediate-spreading ridges
(3) Fluid circulation in oceanic lithosphere
(4) Peridotite physical properties in serpentinizing lower crust

Please describe below any non-standard measurements technology needed to achieve the proposed scientific objectives.

None

Proposed Sites:

Site Name	Position	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
GM-1	15°34’N, 138°53’E	5500	50	300	350	Sampling serpentinized peridotite from near the breakaway.
GM-2	15°45’N, 139°07’E	5700	50	300	350	Sampling serpentinized peridotite.
GM-3	15°59.5’N, 139°12’E	5200	50	300	350	Sampling serpentinized peridotite.
GM-4	16°11’N, 139°25.5’E	5200	50	300	350	Sampling serpentinized peridotite.
GM-5	16°25’N, 139°27’E	5200	50	300	350	Sampling serpentinized peridotite from near the termination.
GM-6	16°27.5’N, 139°28.5’E	4800	50	1000	1050	Sampling the basaltic hanging wall into the underlying detachment.