

Discovery of another petit-spot volcanic field in the outer rise seaward of the Japan trench

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Petit spot is a cluster of volcanic micro-knolls recently discovered in the NW Pacific (Hirano et al., 2006). According to Hirano et al. (2006), this new kind of intra-plate volcanism is explained by leaking of small fraction of upper mantle melt from asthenosphere through flexure-induced fractures in a subducting oceanic plate. Thus, they suggest that it is a non-plume related intra-plate volcanism. Two volcanic fields of petit-spot volcanoes were discovered in the NW Pacific on a single flow line of the current plate motion by JAMSTEC R/V KAIREI cruise (KR04-08) in June 2004. They erupted in 0.1~1.0 Ma on one site and 4.2-8.5 Ma on the other site. Petit-spot volcanism is still enigmatic phenomenon. We do not know the eruption mechanism, the melt formation in the upper mantle, nor their uniqueness.

On the other hand, another possible volcanic field of petit-spot volcanoes was previously shown by multi-narrow beam survey (Hirano et al., 2006). This field is also on the Cretaceous Pacific Plate, but about 200 km away from the same flow line with the previously discovered petit-spot volcanic field. If it is also petit-spot volcanic field, it will imply that this kind of melt leaking volcanism is not unique, but occurs anywhere in the oceanic plates with the similar stress field. During R/V KAIREI cruise in June 2007 (KR07-07), three dives of JAMSTEC ROV KAIKO 7000II took place the volcanic field, called Chocochip knolls. We sampled petit-spot-like young alkaline basalt from two knolls of them, and the other one has a large volcanic caldera with fresh outcrops of mid-ocean ridge basalt and dolerite. The less altered lava samples imply that they probably erupted during Cenozoic time.

Furthermore, these knolls are overlapped with an aftershock distribution of one large outer rise earthquake (M7.1) in 2005. That is sub-parallel to the trench axis, and horsts & grabens structure on the Pacific Plate. The relationship between the petit-spot volcanism and the outer rise earthquake is unknown, but the petit-spot activity certainly disturbs the oceanic plate stratigraphy and possibly changes its physical property.

Reference

Hirano, N., E. Takahashi, J. Yamamoto, N. Abe, S. P. Ingle, I. Kaneoka, T. Hirata, J. Kimura, T. Ishii, Y. Ogawa, S. Machida, K. Suyehiro (2006) Volcanism in response to plate flexure. *Science*. 313, 1426-1428.