

The composition of back-arc basin basalts in the West Philippine Basin and association with mantle dynamics

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The Philippine Sea Plate was expanded by multiple extensions of backarc basins. Ishizuka et al. (2011) and Haraguchi et al. (2012) pointed out that the enriched mantle was flowed from backarc side during the spreading of the Shikoku Basin from 25 to 15 Ma (Okino et al., 1994, 1999). Haraguchi et al. (Meeting of the Volcanological Society of Japan, 2013) considered that the process of flowing of the enriched mantle estimated by the composition of the backarc basin basalts (BABB) recovered by the drilling of the Deep Sea Drilling Project (DSDP), Ocean Drilling Program (ODP) and Integrated Ocean Drilling Program (IODP). In this study, we attend the BABB of the West Philippine Basin, precede backarc spreading of the Shikoku Basin, and consider mantle dynamics by geochemical characteristics of BABB.

The first drillings in the West Philippine Basin by the Deep Sea Drilling Project are the Leg 31 same as the Shikoku Basin, and following operations are Leg 59 and the Ocean Drilling Program (ODP) Leg 195. And the diving of the R/V *Shinkai 6500* during the Y9611 cruise by R/V *Yokosuka* and dredges during the KR9801 cruise by R/V *Kairei* at the spreading axis (e.g. Fujioka et al., 1999). In this study, we discuss the new analyzed data of the basements of DSDP Leg 58 Site 446 and ODP Leg 195 Site 1201, and compare the data of the former studies.

Site 1201 is located in the west of the West Philippine basin, about 500km north from the Central Basin fault, axis of the spreading center. The main purpose of this site is the set up of the borehole site WP-1. Thickness of covered sediments at this site is more than 500m. The chemical characteristics of basements at this site are the typical BABB, not find the island arc characteristics. SiO₂ and MgO contents of these basalts are 49-53 and 5-8 wt%, respectively, and are similar to the basalts from the DSDP Leg 58 Site 442~444 in the Shikoku Basin. The TiO₂ contents of these basalts are 0.9~1.0 wt%, lower than those of the Shikoku Basin. The alkali elements are 1.5-2.8 wt% of Na₂O and 0.1-1.6 wt% of K₂O, similar K₂O and lower Na₂O contents to Shikoku Basin BABB. The trace elements are 320-420 ppm of Cr, higher than Shikoku Basin BABB, and lower Sr, Y and Zr. The Zr/Y and Nb/Zr ratio are also lower than Shikoku Basin BABB. We consider that these characteristics are the existence of the depleted parent mantle before the spreading of the Shikoku Basin pointed by Ishizuka et al. (2011) and Haraguchi et al. (2012).

Site 446 ate located in the Minami Daito Basin between the Daito and the Oki Daito Ridges. Thickness of covered sediments is about 350m. These volcanic rocks are considered to the intrusion in the sediment layer, different from the basement. The chemical characteristics of this volcanics are classified into alkali basalts, and prominent enrichment of TiO₂, more than 4 to 5 wt%. This extremely enrichment of TiO₂ is not found from other inner plate volcanism in the Philippine Sea Plate. Therefore, we assume that the different inner plate volcanism from the mantle plume in the West Philippine Basin about 40 Ma (Deschamps and Lallemand 2002) were more active in the other Philippine Sea region.

We discuss these analyzed data and former data of the basements in the Philippine Sea Region, and consider parental material composition and magma dynamics before 30 Ma.

Keywords: Backarc basin basalts, Incompatible element ratio, Parent material of magma, Mantle dynamics