Reconstruction of the Mineoka-Setogawa ophiolitic mélange: deciphering evolution of the Izu-Bonin-Mariana Arc

Y. ICHIYAMA[1*], H. ENOMOTO[1], H. ITO[2], A. TAMURA[3] AND S. ARAI[3]

[1] Chiba University, 1-33 Yayoi, Inage, Chiba, 263-8522 Japan (*correspondence: ichiyamay@earth.s.chiba-u.ac.jp)
[2] Central Research Institute of Erectric Power Industry
[3] Kanazawa University

A Paleogene accretionary complex, the Mineoka-Setogawa Belt in central Japan, contains fragmented ophiolitic rocks. Our recent investigations have revealed that these ophiolitic fragments were derived from the Izu-Bonin-Mariana (IBM) arc [1]. Reconstruction of the Mineoka-Setogawa ophiolitic fragments can help us to read the evolution of the IBM Arc. Three types of basaltic rock are recognized based on the petrographical, geochemical and geochronological characteristics. Type-1 is characterized by MORB-like geochemistry and shows Ar–Ar ages of about 50 and 80 Ma [2]. Type-2 strongly exhibits LREE-enrichment and HREE-depletion in REE patterns and shows Ar–Ar ages of about 20 Ma [2]. Type-3 has arc tholeiitic characteristics and shows a zircon U–Pb age of about 19 Ma. The type-1 50 and 80 Ma basaltic rocks compositionally correspond to MORB of the West Philippine Basin (WPB) and the Pacific Plate, respectively. The geochemical signatures of the type-2 basaltic rocks are similar to those of alkali basalts of small seamounts on the northwestern Pacific Plate. The type-3 is probably the IBM Arc products at the earliest stage after the spreading of the Shikoku Basin. Plutonic rocks (gabbro, diorite, and tonalite) show the zircon U–Pb ages of about 35 Ma and are products during the Eocene-Oligocene IBM Arc magmatism before the spreading of the Shikoku Basin [1]. These plutonic rocks intrude into residual peridotites, indicating that the peridotite existed prior to the plutonism. Most peridotites are harzburgite with chromian spinel of Cr# = 0.4–0.6 [3]. They can be residue after the extraction of the type-1 basaltic magma. These characteristics of the Mineoka-Setogawa ophiolitic fragments record the IBM arc evolution as follows: (1) the formation of the MORB-like basaltic magma and its residual mantle of the WPB, (2) the start of subduction of the Pacific Plate into the WPB and the accretion of the Pacific MORB, (3) the Eocene-Oligocene IBM arc magmatism, (4) the accretion of small seamounts on the Pacific Plate and restart of the IBM magmatism in the early Miocene, and (5) the collision between the IBM and Honshu arcs in the middle Miocene.

[1] Ichiyama et al. (2017) Lithos (in press), [2] Hirano et al. (2003) Geol. Soc. Landon, Spec. Pub. 218., [3] Arai & Ishida (1987) J. Japan. Assoc. Mineral. Petrol. Econ. Geol. 82.