Variability of protoliths and P-T conditions of amphibolites from the Ohmachi Seamount (Izu-Bonin-Mariana arc)

T. IMAYAMA[1] • H. UEDA[2] • T. USUKI[3] • M. MINAMI[4] • Y. ASAHARA[5] • T. NAGAHASHI[6]

[1] Research Institute of Natural Sciences, Okayama Univ. of Science, Okayama, Japan (t.imayama@gmail.com)
[2] Faculty of Science, Niigata Univ., Niigata, Japan
[3] Institute of Earth Sciences, Academia Sinica, Taiwan
[4] Institute for Space-Earth Environmental Research, Nagoya Univ., Nagoya, Japan
[5] Graduate School of Environmental Studies, Nagoya Univ.
[6] Japan Science and Technology Agency, Sendai, Japan

Three types of amphibolites were found around a large serpentinite body in the basement of the Ohmachi Seamount in the Izu-Bonin-Mariana arc. The epidote-albite amphibolite shows a mid-ocean ridge basalt geochemical affinity. The epidote-garnet amphibolite originated in an arc tectonic setting and contains relict glaucophane, showing blueschist-facies metamorphism (M_D1) prior to amphibolite-facies recrystallization (M_D2) that formed barroisite and paragonite. The Rb–Sr garnet-whole-rock isochron (289 ± 58 Ma) could represent the timing of blueschist-facies metamorphism. In contrast, the Rb-Sr barroisite-paragonite isochron of 67 ± 13 Ma is interpreted to date amphibolite-facies recrystallization or an errorchron due to insufficient equilibrium with the whole-rock Sr isotope composition. The garnet-zoisite amphibolite formed in a mid-oceanic ridge setting and preserves relicts of eclogite-facies paragenesis (M_R2a), including zoisite, kyanite, omphacite, and magnesiohornblende, followed by amphibolite-facies metamorphism (M_R2b) represented by actinolite and then by a later M_R3 event that resulted in the formation of edenite and pargasite. The Rb–Sr mineral isochron (244 ± 28 Ma) defined by zoisite + magnesiohornblende + edenite/pargasite represents the time at which the rock recrystallized in the amphibolite facies (M_R2b) or cooled (M_R3) through ~500°C, indicating that eclogite-facies metamorphism occurred before ca. 244 Ma. The two Permo-Triassic isochron ages (289–244 Ma) indicate that the high-pressure metamorphism of the basement in the Ohmachi Seamount occurred by ancient subduction rather than along the modern subduction zone. The different protoliths and P–T conditions of amphibolites exposed in the serpentine mélange of the Ohmachi Seamount are interpreted as evidence for a fossil subduction channel preserved in a modern intra-oceanic arc.