# Trace element and Sr isotopic compositions of gabbros and peridotites at the CM1A drilling site of Wadi Tayin block in the Oman ophiolite

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Detailed petrological structure of the oceanic plate, which covers around 70% of the earth's surface, is still a debate due to difficulty in obtaining samples directly. Petrological section of the oceanic plate and its physical and chemical characteristics have been suggested from detailed observations of ophiolite, as ophiolites are believed to be fragments of the oceanic plate obducted to the surface by tectonic thrusting. However, it has been pointed out that geochemical signature of constituent rocks of ophiolite has often been affected by weathering and metamorphism during/after obduction which have severely changed their original elemental and isotopic compositions (e.g., Pearce & Cann, 1971).

The Oman ophiolite is one of the best preserved sections of oceanic plate (oceanic crust and upper mantle) worldwide, and consists of multiple blocks that lie along more than 400 km of the Arabian coast (eg, Nicolas et al., 1988). The Oman Drilling Project by the International Scientific Drilling Program was proceeded at multiple sites in the Oman ophiolite. We study samples of the CM1A site that penetrates the crustal-mantle boundary of the Wadi Tayin block in the southern Oman ophiolite.

The core sample is 404.15 m in length, composed mainly with olivine gabbro in the upper 160 m (Layered Gabbro sequence), with massive dunite from 160 m to 310 m (Crust-Mantle Transition sequence), and with deeper harzburgite (Mantle sequence)(Takazawa et al., 2019). Geochemical and isotopic compositions of these samples are expected to provide a continuous chemical composition of the oceanic plate, including the crustal-upper mantle boundary without chemical modification by surface weathering and metamorphism.

We analyzed trace element compositions of two gabbro samples and a dunite sample from Layered Gabbro sequence, three dunite samples from Crust-Mantle Transition sequence, and a harzburgite sample from Mantle sequence. Trace element concentrations generally decrease from the gabbros in Layered Gabbro sequence to the dunites in Crust-Mantle Transition sequence through the dunite in Layered Gabbro sequence and the harzburgite in the Mantle sequence. Multi-elemental patterns of samples, that is trace element concentrations normalized to mid-ocean ridge basalt, show following signatures; (1) the gabbros have gently convex shape at medium rare earth elements (REEs) with positive anomalies of Ba, Pb, Sr and Eu and negative anomalies of Th and U relative to neighboring REEs, (2) multi-element patterns of the dunite in Layered Gabbro sequence share depleted pattern from heavy REEs to medium REEs with positive anomalies of Sr and Eu of the harzburgite in Mantle sequences. The dunite, however, shows depleted pattern from middle REEs to light REEs, while the harzburgite shows enriched pattern with incompatible elements compared to middle REEs, and (3) the dunite samples in Crust-Mantle Transition sequence show U-shaped patterns, and extensive positive anomalies of Pb and Sr relative to surrounding elements.

We will report Sr isotopic compositions of these samples by comparing to the data from the Oman outcrop samples.

References

Nicolas et al., Tectonophysics, 1989; Pearce & Cann, EPSL, 1971; Takazawa et al., Abs of JpGU, 2019

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