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イタリア・フィネロかんらん岩体の Sr-Nd 同位体・微量元素組成
Sr-Nd isotopic and trace element geochemistry of the Finero peridotite massif, southwestern Alps, Italy

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The Finero mafic-ultramafic complex is one of the orogenic peridotite massifs emplaced into granulite facies metabasites of the Ivrea-Verbano Zone of Northern Italy. The Finero mafic-ultramafic complex is an antiformal body that comprises four main units from core to rim: a Phlogopite Peridotite, an layered Internal Gabbro, an Amphibole Peridotite, and an External Gabbro (e.g. Cawthorn, 1975, JG; Coltorti & Siena, F, 1984, N. Jb.Mineral. Ab). The Phlogopite Peridotite and other units have been interpreted as residual mantle left after extraction of 18 % mid-ocean ridge basalt (MORB) and a crustal cumulate body, respectively (Coltorti & Siena, 1984, N. Jb.Mineral. Ab.; Siena & Coltorti, 1989, N. Jb.Mineral. Ab. Hartmann & Wedepohl 1993, GCA). The Phlogopite Peridotite unit consists of dunite and harzburgite with minor pyroxenites and chromitite. Amphibole and phlogopite are remarkable in the phlogopite peridotites of the Finero Phlogopite Peridotite massif than other Ivera-Verbano peridotite massifs (Balmuccia and Baldissero, Hartman & Wedepohl, 1993, GCA). Amphibole ubiquitously occurs, and amphibole and/or phlogopite-bearing segregations and veins are locally abundant of the Finero Phlogopite Peridotite unit (e.g., Selverstone & Sharp, 2011, EPSL). These hydrous minerals were believed to be formed by interaction with residual peridotite and slab derived flulid/melt (e.g. Zanetti et al., 1999, CMP). Apatite and carbonate also founded in the phlogopite peridotite as sporadic region and thin layer (e.g. Zanetti et al., 1999, CMP; Morishita et al., 2003, Lithos). The sporadic region seems to be influenced by mantle derived melt (Raffone et al., 2006, MCA) or slab-derived CO_2 bearing hydrous agent (Morishita et al., 2008, CG), whereas the thin layers was expected to result from passage of evolved slab-derived CO_2 bearing hydrous agent (Morishita et al., 2003, Lithos; Matsumoto et al., 2005, EPSL; Morishita et al., 2008, CG). In recent, Selverstone and Sharp (2011, EPSL) divided the Finero phlogopite peridotites into the four groups (from type 1 to type 4) based on the petrographic feature of hydrous minerals and suggested at least two chemically distinct metasomatic fluids from the Cl, H, and O stable isotope geochemistry with petrologic and major and trace element data.

Our purpose of this study is to confirm the relationship between the petrographic features and other geochemical signatures such as trace element and Sr-Nd isotopic compositions. Sr-Nd isotopic compositions of acid washed amphibole separates from the spinel harzburgite with minor amphibole and/or phlogopite (type 1), harzburgite with segregation phlogopite and/or amphibole (type 2) and amphibole-rich segregations (type 3) are significantly enriched character ($^{87}Sr/^{86}Sr$ =0.7075 - 0.7091, $^{143}Nd/^{144}Nd$ = 0.51232 - 0.51237) similar to those of the continental crust as suggested by previous studies (Voshage et al., 1987, CMP; Lu et al., 1997, CG; Zanetti et al., 1999, CMP; Matsumoto et al., 2005, EPSL). Such enriched isotopic feature is common for the peridotite xenoliths from cratonic subcontinental lithospheric mantle (e.g. Pearson et al., 1995, GCA). Amphibole of type 1 spinel harzburgite has most enriched Sr-Nd isotopic compositions. Amphibole of the type 2 and type 3 spinel harzburgites have similar Sr-Nd isotopic compositions with each other. Selverston and Sharp (2011, EPSL) inferred that these segregations had originated hydrous melt induced by H_2O-CO_2 fluid derived subducting slab. Our results combined with previous studies, therefore, suggest that hydrous silicate melt formed amphibole-rich segregation has relatively depleted Sr-Nd isotopic compositions.

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