

Petrology of peridotite in the Western Mirdita Ophiolite, Albania: The origin of fertile peridotite

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Based on geochemistry, the volcanic sections of the Western and the Eastern Mirdita Ophiolite (Albania) are characterized by mid-ocean ridge basalt-like and arc-like signatures, respectively. The peridotite bodies in the Western Mirdita Ophiolite (WMO) has never been well characterized yet. Gomsiqe and Puke massifs in the WMO are examined in this study. The Puke massif mainly consists of plagioclase- and amphibole-bearing lithologies, whereas only a few plagioclase-bearing peridotites were found in the Gomsiqe massif. Peridotites in the Gomsiqe massif and the Puke massif show different structure and petrological characteristics. The Gomsiqe massif consists of less or moderate deformed spinel lherzolite with small amounts of dunite, pyroxenite and gabbro, whereas the Puke massif consists of highly deformed plagioclase- and amphibole- bearing peridotite, troctolite, and gabbro. Major and trace element compositions of minerals in lherzolite of the Gomseque massif indicate residue of low-degree of partial melting and are similar to those of ocean floor peridotites directly recovered from mid-ocean ridges. Based on spinel compositions, dunites in the Gomsiqe massif are classified into two types: low-Cr# [=Cr/(Cr+Al) atomic ratio] spinel (0.2-0.4)-bearing dunite, and high-Cr# spinel (0.6-0.7)-bearing dunite. The former was related to mid-ocean ridge basalts whereas the latter was of arc-related magmas. Based on lithology and mineral chemistry, plagioclase- and amphibole- bearing peridotites in the Puke massif was formed by infiltration of MORB-like melts followed by and H₂O and SiO₂-rich fluids/melts, probably derived from subduction zone, respectively. Plagioclase peridotite may have been formed by melt impregnation because plagioclase and clinopyroxene occur as veins in plagioclase- bearing peridotite. In spite of constant Cr# of spinel, TiO₂ content in spinel in plagioclase- rich peridotite is higher than that of plagioclase- poor peridotite. On the other hand, low Nb, Zr amphibole in amphibole- bearing peridotite resembles to that in metasomatized peridotite from subduction zone. In conclusion, the Gomsiqe and the Puke massif might experience a sequence of events during their evolution in response to the change in tectonic setting from oceanic lithosphere formed at mid-ocean ridges to the subduction.

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