

オマーンオフィオライト中の珪長質岩類のバリエーションとその成因 Petrology and petrogenesis of felsic rocks in the Oman ophiolite, Oman

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The Oman ophiolite is a sliver of the Neo-Tethys oceanic lithosphere obducted onto the Arabian plate during the late Cretaceous time. Lippard et al. (1986) classified the felsic rocks in the Oman ophiolite into three stages; high-level intrusive rocks of axis stage, late stage intrusive rocks, and younger biotite granites associated with emplacement stage. Rollinson (2009) described similar classification of the felsic rocks in the Oman ophiolite, and discussed petrogenesis of these felsic rocks.

The axis stage felsic rocks characteristically intrude into the boundary between lowermost sheeted dike complex and upper gabbro. We investigate felsic rocks intrude into the boundary between lowermost sheeted dike complex and upper gabbro in Wadi Rajimi, Wadi Khabiyat, and eastern margin of the Lasail complex. The base of the sheeted dikes are infiltrated by quartz dioritic vein networks, which sometimes occurs as pockets and patches. In some places, sheeted dikes are composed of hornblende and pyroxene hornfels cut by quartz dioritic vein networks. These occurrences resemble to the anatectic migmatites of axial magma chamber roof exposed in the Troodos ophiolite, Cyprus, described by Gillis and Coogan (2002). They describes disequilibrium melting models to explain relatively lower REE concentrations in axis stage felsic rocks. Incompatible element concentrations sometimes lower in the quartz dioritic vein compared with the values predicted by equilibrium melting of sheeted dikes, this discrepancy can be explained by disequilibrium melting model. Disequilibrium melting may play a significant role on the petrogenesis of axis stage felsic rocks.

Lasail plutonic complex (4.7 x 3.8 km), as a typical example of late stage intrusive rocks, is located to the south of Wadi Jizi, and intrudes into the base of V1 volcanic rocks and sheeted dike complex. The Lasail plutonic complex consists of various rock types ranging from ultramafic cumulates to tonalite, and is associated with minor amounts of axis stage gabbro to quartz diorite. Petrochemical evidence suggests that the massive gabbro 2 was formed by the partial melting of residual MORB mantle which is contaminated with slab melt derived from the axis stage rocks interacted with seawater. In addition, petrogenesis of felsic rocks in the Lasail complex can be explained by the partial melting model of pre-existing layered gabbro.

Small intrusive bodies of young biotite granites and tourmaline leucogranites are intruded into harzburgite in the upper part of the mantle sequence at the west of Zaymi, upper stream of the Wadi Fizh. Chemical compositions indicate the analysed granitic rocks were largely minimum melts that crystallised at variable aH₂O and pressures around 2 to 4 kbar. Petrochemical modelling suggests that the granitoids formed largely by the dehydration melting of muscovite rich metasediments of ophiolitic metamorphic sole similar to the model of Cox et al. (1999).

U-Pb zircon ages analyzed by LA-ICPMS are 100 +/- 2 and 99 +/- 2 Ma for late stage tonalite and 100 +/- 1 Ma for axis stage quartz diorite (Tsuchiya et al., 2013). These ages are slightly older than the ages reported for felsic rocks in the Oman ophiolite (ca., 95 Ma; Tilton et al., 1981; Warren et al., 2005), and suggest that the conversion from ridge stage to detachment stage took place rapidly. If two diverging plates moved from divergent hemisphere to convergent hemisphere, divergent boundary (ridge) switches to convergent boundary (detachment or subduction) in a short time span, and very rapid change from divergent to convergent plate boundary may occur (Niitsuma, 2010). The Oman ophiolite may be a rare example of rapid conversion from divergent hemisphere to convergent hemisphere.

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