Hydration Reactions and water budgets of the lower Earth's crust in the Sør Rondane Mountains, East Antarctica

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Geofluid researches are essential topics to understand formation and evolution of the Earth's crust, and arc magmas are one of the main sources of aqueous geofluids in the crust. The movement of fluids above magma chambers has been geophysically important.The Sør Rondane Mountains (SRM) in the Dronning Maud Land, East Antarctica, has been well studied by geology team of Japanese Antarctic Research Expedition. Here, we could observe various processes of hydration and dehydration reations during metamorphism and volcanism in well exposed outcrops (Higashino et al., 2015, 2013). Based on structural analyses and tectonic processes of the Sør Rondane Mountains, we proceed geofluid researches in the montains. Here, we present hydration reaction observed in three outcrops, Viginghogda, Mefjel and South Belheia (Balchenfjella).

Viginghogda: Fracturing and hydration processes with intrusion of pegmatitic veins
Mefjel: Hydration of pyroxenite and related rocks
South Belheia (Balchenfjella): Hydration of ultramafic rocks associated with felthic intrusions

South Belheia (Balchenfjella): The water budget was constrained by examining the hydration caused by crust–melt reactions (Uno *et al*., 2014). The study area contains a phlogopite–pargasite–peridotite unit that has been intruded by numerous brittle-deformed granitic dikes, creating hydration reaction zones at the dike–host peridotite boundary. These reactions occurred at 0.5 GPa and 700°C, corresponding to middle crustal conditions, and generated a series of reaction zones with distance from the granitic dikes as follows: (i) granitic dike, (ii) pargasite–actinolite zone, (iii) tremolite–phlogopite zone, (iv)anthophyllite–phlogopite zone, (v) phlogopite–olivine–orthopyroxene zone, and (vi) unaltered pargasite–phlogopite peridotite. The presence of amphiboles with a preferred orientation perpendicular to the dike margins and an absence of Cr-rich magnetite indicates that the pargasite–actinolite zone [zone (ii)] grew from the dike margins, with an initial melt/rock boundary located between zones (ii) and (iii). The H_2O contents of reaction zones (ii)–(v) are higher than the content in the hosting pargasite–phlogopite peridotite, suggesting that the intrusion of the dike was associated with hydration reactions.

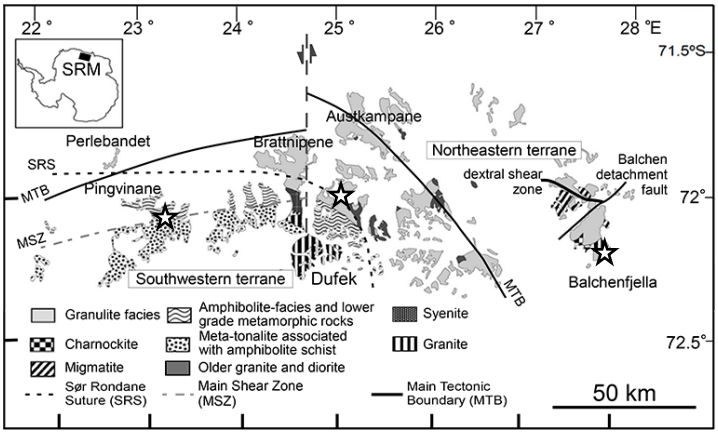

Fig. 1 Sample localities (star mark) in Sør Rondane Mountains.

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