Traces of fluid movement in the active lower crust of collision setting observed in the Sør Rondane Mountains, East Antarctica: A field survey report of JARE61

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The Sør Rondane Mountains (SRM), East Antarctica, is considered as a collision zone formed at ~650-600 Ma (Osanai et al. 2013), and traces of geofluids in the lower crust of the collision setting can be widely observed (Higashino et al., 2013; Kawakami et al, 2017; Uno et al., 2017). Aim of field survey by the 61st Japan Antarctic Research Expedition (JARE61) SRM geology team was to constrain the pressure-temperature-deformation-time-fluid (*P-T-D-t-fluid*) paths of the high-grade metamorphic rocks widely from the SRM and understand the role of geofluids in the evolution of the crust.

In several map-scale mylonitic shear zones (Oyayubi-one and Mefjell), Cl-rich selvages mainly composed of biotite and hornblende were confirmed by *in situ* handy XRF analysis, suggesting that these shear zones were possibly the pathways of Cl-bearing fluid. In addition to the large-scale shear zones, mm-cm thick black selvages composed of Cl-bearing biotite or hornblende (± garnet) are also the traces of Cl-bearing fluid infiltration postdating gneissosity-forming deformation (Higashino et al., 2019). We confirmed wide distribution of such gneissosity-cutting selvages both in NE- and SW-terranes. In most cases, such selvages fill small-scale shear zones that accompany cm- to decimeter-scale displacements. Such selvages were locally developed in the interboudin partitions developed in a garnet-biotite gneiss, suggesting that the timing of the presence of Cl-bearing fluid included the last stage of gneissosity-forming deformation.

Recently, timing of garnet-forming high-grade metamorphism in the SRM was dated to be >600 Ma and <580 Ma both in the NE- and SW-terranes, based on the evaluation of distribution coefficients between metamorphic zircon and garnet (Higashino et al., 2020). This observation suggests that the main metamorphism recorded in high-grade metamorphic rocks could be different in timing from locality to locality, and detailed ***P-T-D-t-fluid*** path analysis is required for the comprehensive understanding of the geofluid activities in the active lower crust.

References

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