Infiltration of prograde Cl-rich fluid into the granulitic continental crust from a collision zone in East Antarctica (Perlebandet, Sør Rondane Mountains)

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Utilizing microstructures of Cl-bearing Bt in pelitic and felsic metamorphic rocks, the timing of Cl-rich fluid infiltration is correlated with the *P-T-t* path of upper amphibolite- to granulite-facies metamorphic rocks from Perlebandet, Sør Rondane Mountains (SRM), Antarctica. Microstructural observation indicates that the stable Al_2SiO_5 polymorph changed from Sil to Ky+And+Sil, and *P-T* estimates from geothermobarometry point to a counterclockwise *P-T* path characteristic of the SW terrane of the SRM. *In situ* laser ablation inductively coupled plasma mass spectrometry for U-Pb dating of Zrn inclusions in Grt yielded ca. 580 Ma, likely representing the age of Grt-forming metamorphism at Perlebandet.

Inclusion-host relationships among Grt, Sil, and Cl-rich Bt (Cl > 0.4 wt%) reveal that formation of Cl-rich Bt took place during prograde metamorphism in the Sil stability field. This process probably predated partial melting consuming Bt (Cl = 0.1-0.3 wt%). This was followed by retrograde, moderately Cl-bearing Bt (Cl = 0.1-0.3 wt%) replacing Grt. Similar timings of Cl-rich Bt formation in different samples, and similar $f(H_2O)/f(HCl)$ values of coexisting fluid estimated for each stage can be best explained by prograde Cl-rich fluid infiltration. Fluid-present partial melting at the onset of prograde metamorphism probably contributed to elevate the Cl concentration (and possibly salinity) of the fluid, and consumption of the fluid resulted in the progress of dehydration melting. The retrograde fluid was released from crystallizing Cl-bearing partial melts or derived externally. The prograde Cl-rich fluid infiltration in Perlebandet presumably took place at the uppermost part of the footwall of the collision boundary. Localized distribution of Cl-rich Bt and Hbl along large-scale shear zones and detachments in the SRM supports external input of Cl-rich fluids through tectonic boundaries during continental collision.