

P-T estimates of a metapelite containig garnet zoning from Mefjell, Sr Rondane Mountain, East Antarctica

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The Sør Rondane Mountains, East Antarctica have been considered to be situated in the Gondwana suture zones. Therefore the mountains have attracted interest as a key area for understanding amalgamation process of the supercontinent. The mountains consist of amphibolite- to granulite-facies metamorphic rocks with granitic intrusions, and the timings of the main metamorphism are interpreted as c. 640-600 Ma and c. 550-500 Ma. Metamorphic rocks from northern and eastern part of the mountains (Balchenfjella and northern part of Austkampane) record a clockwise *P-T* path, on the other hand, metamorphic rocks from central part of the mountains (Brattnipene and eastern Menipa) record anti-clockwise *P-T* path. This suggests each area records a different *P-T* path. However, pre-peak *P-T* conditions of southwestern part of the mountain such as Mefjell have been still not clear.

In this study, we report a garnet porphyroblast with a prograde zoning in a metapelite from Mefjell. The St-bearing Grt-Sil-Bt gneiss mainly consists of garnet, biotite, sillimanite, quartz and plagioclase, with minor K-feldspar, staurolite, apatite, monazite, ilmenite and magnetite. The garnet grain is 12 mm in diameter, with the change of color from reddish in the core to transparent in the rim. The garnet has core-rim boundary defined by Mn-zoning. The garnet is typically almandine-rich, and shows compositional zoning with decrease in spessartine content from the core ($\text{Alm}_{63}\text{Sps}_{24}\text{Prp}_{14}\text{Grs}_6$) to the rim ($\text{Alm}_{74}\text{Sps}_2\text{Prp}_{20}\text{Grs}_4$), and spessartine content increase again towards the outer-rim ($\text{Alm}_{73}\text{Sps}_{11}\text{Prp}_{20}\text{Grs}_6$). The garnet includes staurolite, sillimanite, biotite, chlorite, plagioclase, K-feldspar, quartz, apatite and ilmenite. Garnet-ilmenite and staurolite-garnet geothermometers yield a temperature increase towards rim from 350-400 to 630-700 °C. Garnet- Al_2SiO_5 -quartz-plagioclase geobarometer applied to rim inclusions yields $7.2\text{kbar} \pm 0.9\text{kbar}$ for an assumed temperature of 650 °C.

Keywords: East Antarctica, Sør Rondane Mountain, pressure and temperature conditions