

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

TSUBOKAWA, Yumiko^{1*} ; ISHIKAWA, Masahiro¹ ; ICHIKI, Takashi¹ ; KAWAKAMI, Tetsuo² ; MADHUSOODHAN, Satishkumar³ ; TSUCHIYA, Noriyoshi⁴ ; GEOFF, Grantham⁵

¹Yokohama National University, ²Kyoto University, ³Niigata University, ⁴Tohoku University, ⁵Council for geoscience, South Africa

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 (Alm₆₃Sps₂₄Prp₁₄Grs₆) to the rim (Alm₇₄Sps₂Prp₂₀Grs₄), and spessartine content increase again towards the outer-rim (Alm₇₃Sps₁₁Prp₂₀Grs₆). 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-Al₂SiO₅-quartz-plagioclase geobarometer applied to rim inclusions yields 7.2kbar±0.9kbar for an assumed temperature of 650 °C.

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