

Pressure-Temperature-Time-Fluid Path of Permo-Triassic Hida Metamorphic Rocks in Odori-gawa Area, Central Japan

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High-grade metamorphic rocks with ca. 250 Ma peak metamorphic age have been reported widely in East Asia. One typical example is the Dabie-Sulu collision belt between the North China and the South China blocks where coesite-bearing ultrahigh-pressure rocks occur (e.g., Wang and Liou, 1989). However, it is still uncertain whether the eastern extension of the Permo-Triassic orogenic belt continues through Japanese Islands due to the lack of sufficient petrological data on ca. 250 Ma metamorphic rocks (e.g., Hida belt) in Japan. In this study, we thus report new petrological and geochronological data on Hida metamorphic rocks from Odori-gawa area, central Japan, and revise P-T path of this region. The results of this study will be useful for understanding of continental growth history in East and Southeast Asia.

The major lithology of the studied area comprises mafic, granitic, and pelitic gneisses, and crystalline limestone. The highest P-T condition was obtained from garnet-clinopyroxene rocks as 750-850 °C at 0.9-1.2 GPa, which probably corresponds to prograde to peak condition, because textures and mineral assemblages, such as clinopyroxene inclusions in poikiloblastic garnet and garnet + clinopyroxene + plagioclase + quartz assemblage in matrix, suggest their formation during increasing P-T. Nearly consistent P-T conditions were obtained from garnet-hornblende gneiss and amphibolite as 800-830 °C at 0.9 GPa and 770-850 °C at 0.8-0.5 GPa, respectively. These P-T conditions probably correspond to the thermal peak of the studied area. Carbonic fluid inclusions were trapped in quartz inclusions within garnet during prograde stage at P > 0.84 GPa and 800 °C. Retrograde temperatures were obtained from hornblende gneiss and garnet-biotite gneiss as 750-760 °C and 670-750 °C, respectively.

SHRIMP U-Pb dating of zircons in mafic gneisses adopted for P-T calculations and a pelitic gneiss gave three discrete ages; ca. 436 Ma (protolith magmatic age), 253 Ma (prograde stage), and 247 Ma (peak metamorphic stage). The results of this study suggest a clockwise P-T trajectory as follow;

- (1) Prograde metamorphism through the stability field of Ms + St + Qtz at ca. 253 Ma.
- (2) Prograde high-pressure stage (750-850 °C, 0.9-1.2 GPa).
- (3) Granulite-facies high-temperature stage (770-850 °C, 0.8-0.5 GPa) at ca. 247 Ma.
- (4) Retrograde amphibolite-facies stage (705-760 °C).

Keywords: Hida metamorphic rocks, P-T-t path, SHRIMP U-Pb age, Fluid inclusion