Metamorphic history of the Suo metamorphic rocks inferred from two-stage garnet in pelitic schist

*Shunsuke Endo[1], Maki Ito[1]

1. Department of Earth Science, Interdisciplinary Faculty of Science and Engineering, Shimane University

Pelitic schist is the main lithology in coherent-type high-P/T metamorphic complexes such as the Sanbagawa and Suo metamorphic belts in SW Japan, and analyses of its subduction-exhumation records are important to constrain the thermal regime of subduction channels as well as spatial-temporal changes of force balance acting on the subduction interface. Since pelitic schist is generally subjected to high-strain ductile deformation and strong recrystallization during exhumation, subduction-stage records are only preserved within rigid minerals such as garnet. Here we report detailed petrological data on garnet-bearing pelitic schist from the Nichinan area in the Chugoku Mountains, where high-grade part of the Jurassic Suo metamorphic rocks is exposed. Detailed microstructural observations reveal that two stages of garnet growth punctuated by a garnet dissolution stage are common in the Nichinan pelitic schist. Euhedral garnet grains consist of a resorbed core and an overgrown rim. The garnet core preserves growth zoning and contains inclusions of quartz, rutile, zircon, phengite and box-shaped paragonite + clinozoisite aggregates (possible pseudomorph after lawsonite). Zr-in-rutile thermometry and pseudosection modelling (with garnet isopleths) reveal that the garnet core grew in the lawsonite stability field from ~1.8 GPa, 470℃ to ~1.6 GPa, 500℃. The garnet rim formed synchronous with the growth of titanite and albite porphyroblasts at ~0.8 GPa and 500℃. These microstructures and P-T evolution are very similar to those of pelitic schist in the eclogite unit of the Sanbagawa metamorphic belt. Onset of highly oblique subduction and shear heating at crustal levels may account for the decompression heating and Barrovian-type overprint during exhumation of coherent-type high-P/T metamorphic complexes, and this process largely obliterates subduction-stage high-P/T records.

Keywords: garnet, pelitic schist, Suo metamorphic rocks

