

Pumpellyite-bearing retrograde mineral assemblage of the Yunotani eclogite and the areal extension of eclogite-facies metamorphism in the Omi area, Japan

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Paleozoic glaucophane-bearing eclogites occur as mafic layers within a unit of paragonite- and garnet-bearing pelitic schist of the Omi Schists in the Yunotani valley, Omi area, Hida Mountains. Previous studies suggested a so-called 'hairpin'-type metamorphic evolution in which the epidote-blueschist-to-eclogite prograde mineral assemblage was recrystallized in the epidote-blueschist-facies. Our new observations, however, found retrograde pumpellyite coexisting with secondary glaucophane. The calculated phase diagram suggests that the pumpellyite + glaucophane assemblage is stable at a low temperature and pressure portion of the lawsonite-glaucophane stability. This is the second example of the occurrence of pumpellyite + glaucophane mineral assemblage in the Hida Mountains; the assemblage has been known only in the Kuzuryu area. The inferred retrograde pressure-temperature (P-T) path after the eclogite-facies metamorphism is similar to that of Paleozoic garnet-glaucophane schist with relict eclogite-facies mineral inclusions of the Osayama serpentinite mé lange, Chugoku Mountains. These retrograde paths after eclogite-facies metamorphism in both Omi and Osayama requires a significant cooling and hydration during the exhumation history.

We have also examined the areal extension of eclogite-facies metamorphism in the Omi area using mineral assemblages of the pelitic schists. Previous studies of the Yunotani Valley revealed that the eclogite-hosted pelitic schist was characterized by the mineral assemblage garnet + paragonite + phengite ± ferroglaucophane + rutile + quartz. Our new exploration in the Kanayamadani Valley, located about 3 km south-east of the Yunotani Valley, confirmed abundant paragonite- and garnet-bearing pelitic schist. The calculated stability of the mineral assemblage in a P-T pseudosection overlaps with a P-T condition of the Yunotani eclogites. This supports the previous prediction of the areal extension of 'Eclogitic Unit' ; our study revealed that the Eclogitic Unit extends at least 3 km from the Yunotani to the Kanayamadani Valley.

Keywords: Yunotani eclogites, blueschist-facies, pumpellyite, Omi Schists, Renge metamorphic belt, Late Paleozoic