High-Cr chromitite and dunite from Omi, SW Japan: Origin of meta serpentinite associated with Renghe high-pressure schists

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In the Omi area, Hida Mountains, ophiolitic ultramafic rocks occur in close association with high-grade high-P metamorphic rocks (glaucophane eclogite, paragonite-bearing garnet amphibolite, etc.) of the late Paleozoic Renghe metamorphic belt. Although ultramafic rocks are extensively metamorphosed and serpentinized, primary characteristics are preserved in the core of zoned chromin spinel from metamorphosed chormitite and dunite. Chromian spinel shows distinct chemical zoning in Mg#, and is more iron rich (Mg# = 0.43-0.20) than that in common ophiolitic peridotite. Core shows high Cr# (0.70-0.77) and low Fe3+ (~0.15) and TiO2 (~0.14 wt.%), and contains pargasitic amphibole (containing up to 3.8 wt.% Na20) as primary inclusion. Cr# and Fe3+# increase remarkably towards the rim from the transition zone between core and ferritchromite rim (up to 0.99 Cr# and 0.45 Fe3+#). The compositional gradients in regard to Mg-Fe2+ and Al-Fe3+ and substitutions of zoned chromian spinel may be related to subsolidus cation redistribution between spinel and adjacent mafic minerals during Renghe metamorphism. Chemistry (high Cr# and low Fe3+# and Ti) and the presence of primary hydrous mineral inclusions at the core of chromian spinel in the Omi serpentinite strongly suggest that they are originally mantle wedge. Prograde metamorphism of high-grade high-P rocks is accompanied by the release of large amount of H2O-rich fluid, which may cause hydration of the overlying mantle wedge. In the Renghe metamorphic belt, serpentinized supra-subduction zone mantle likely plays an important role in the exhumation of high-grade high-P schists.