Chromian spinels and olivines in a contact-metamorphosed peridotite-sediment system from Nagasawa, Shimane Prefecture SW Japan.

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We describe some unusual metaperidotites that form a mega-block in thermally metamorphosed sediments adjacent to a granitic intrusion in the Nagasawa area, Shimane prefecture SW Japan, to investigate mobility of elements in a peridotite-sediment-fluid system (Matsumoto et al., 2017). The critical mineral assemblage of the metaperidotite is olivine + talc + antigorite, indicating a univariant reaction at ~500 °C. The metaperidotites contain chromian spinels as well as up to 5% of sulfides (pyrrhotite and pentlandite with limited solid solutions) that form composite grains with magnetite. The host sediments contain detrital chromian spinels. The olivines in the metaperidotites have low contents of NiO (0.1–0.2 wt%), almost irrespective of variable Fo contents (85–92). The chromian spinels in the metaperidotites have high values of Cr# (0.9–1.0) [Cr# = Cr/(Cr + Al]], and low values of Mg# (~0.2) [Mg# = Mg/(Mg + Fe^{2+}]] and Y_{Fe} (<0.3) [$Y_{Fe} = Fe^{3+}/(Fe^{3+} + Cr + Al)$]]. They contain appreciable amounts of ZnO (~1 wt%) and low contents of CoO and NiO. The detrital chromian spinels in the metasediments have intermediate values of Cr# (0.4–0.8) and low values of Mg# (~0) and Y_{Fe} (~0), but they have high contents of ZnO (up to 10 wt%). The olivines in the peridotites contain inclusions of high-Cr# chromian spinel rather than magnetite. The peculiar characteristics of the Nagasawa metaperidotites and hornfelses resulted from a contact metamorphic event at ~500 °C that was accompanied by interactions between peridotite and sediment that were facilitated by circulating hydrothermal fluids. The mobile zinc in these fluids was possibly derived from the sediments.

[1] Matsumoto et al. (2017): Ore Geology Reviews, 91, 682-694.