Petrogenesis of corundum-bearing mafic rock from the Horoman Complex: implications for P-T history of the peridotite

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The corundum-bearing mafic rock, which belongs to the Type II mafic rock of Takazawa et al. (1999), within the Horoman peridotite, Hokkaido, was petrologically examined in detail to obtain the P-T paths of the mafic rock as well as of the peridotite. Only the corundum-bearing mafic rock preserves, at least partly, the high-pressure mineralogy among all other mafic rocks documented from the Horoman complex, which have been completely recrystallized at low pressures.

Conspicuous mantle heterogeneity in terms of mafic rocks including eclogite and/or pyroxenite within peridotite is observed in many orogenic lherzolite massifs. The mafic layers are sometimes concordant with foliation of the peridotite and frequently exhibit folding and boudinage due to plastic deformation. Their origins are still controversial (e.g., Allegre & Turcotte, 1986; Garrido & Bodinier, 1999; Takazawa et al., 1999). Melting of heterogeneous mantle relatively rich in mafic rock components including pyroxenite/eclogite will be complex, with near-solidus melts developing at different temperatures according to different lithologies. Migration and reaction of such melt with more refractory wall-rock is a process of re-fertilization in which phases approach homogeneity in major elements but not in refractory elements e.g. Cr and Ni contents. The refertilized mantle also remains modally heterogeneous (Yaxley & Green, 1998). Such refertilized and inhomogeneous mantle is capable of yielding more voluminous and compositionally diverse magma than normal mantle (e.g., Hofmann & White, 1982; Hauri, 1996; Takahashi et al., 1998). The origins of mafic layers in peridotite are, therefore, very important not only for mantle heterogeneity but also for the magma genesis.

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In the presentation, we will also present preliminary high P-T experimental result of an aluminous mafic composition.