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Whole rock compositions of the Horoman peridotite complex-revisited

PROF. EIICHI TAKAZAWA, PHD, YUMETO KOGURE AND HITOMI KIMURA

Niigata University

Presenting Author: takazawa@geo.sc.niigata-u.ac.jp

Takazawa, Frey et al. [1] reported whole rock major and trace element compositions of peridotites from a 140 m section in the Lower Zone of the Horoman Peridotite (HP), Hokkaido, Japan. Trace element composition of the most fertile plagioclase lherzolite is equivalent to that of DMM [2]. Spinel lherzolite and harburgite are depleted in moderately incompatible elements associated with enrichment in highly incompatible elements. To understand more comprehensive compositional variations in the HP we studied whole rock major and trace element compositions of peridotites from a 263 m continuous section (Fumo section) in the Upper Zone of the HP and compare the compositions between the Upper and Lower Zones. Fumo section is characterized by frequent occurrence of extremely fertile plagioclase lherzolite. In particular, where many thin mafic layers with a thickness of several centimeters are observed, there are more fertile plagioclase lherzolite than the primitive upper mantle [3] suggesting refertilization of wallrock peridoite by mafic layers or basaltic melt. In the whole rock composition of thin mafic layers, positive anomalies of Sr and Eu are observed in the chondrite normalized trace element pattern similar to the Type II mafic granulite in the HP [4]. It is possible that these mafic layers formed in the shallow upper mantle. In the layered sequence with abundant fertile plagioclase lherzolite, the patch-like aggregates of plagioclase reported by Takahashi [5] are also distributed suggesting incipient melting during uplift from the upper mantle to the crust. Although it is unclear when the fertile plagioclase lherzolite and mafic layers formed in the Upper Zone of the HP one possibility is a re-fertilization event due to a mixing of peridotite and mafic melt about 1.2Ga [6]. To constrain this possibility, it requires to study Re-Os isotopic composition of the fertile peridotites in the Upper Zone of the HP.

[1] Takazawa et al. (2000) GCA, 64, 695-716. [2] Workman and Hart (2005) EPSL, 231, 53-72. [3] McDonough and Sun (1995) Chem. Geol. 120, 223–253. [4] Takazawa et al. (1999) J. Petrol., 40, 1827-1851. [5] Takahashi (2001) J. Petrol., 42, 39-54. [6] Saal et al. (2001) J. Petrol., 42, 25-37.