Recent research progress of the Horoman peridotite and its significance for the mantle processes: an overview

Masaaki Obata[1], Shoji Arai[2], Kiyoaki Niida[3], Kazuhito Ozawa[4], Eiichi Takazawa[5]

[1] Earth and Planetary Sci., Kyoto Univ, [2] Dept. Earch Sci., Kanazawa Univ., [3] Earth and Planetary Sci., Hokkaido Univ, [4] ISEI, [5] Geology Dept., Niigata Univ.

The Horoman peridotite is a representative orogenic peridotite, Hokkaido, Japan. Much research progress has been made in recent years through many researchers' efforts on this mantle peridotite and is now well known world wide for the detailed studies and research advances made through a large numbers of publications of many authors. Why so many people have been working intensively on this specific peridotite. There are good many reasons for this. An overview is made on what has been clarified and what problems remains unsolved as an introduction of this symposium session.

Ultramafic bodies occurring in orogenic zones and xenolithes carried by basaltic lavas are important mantle samples for understanding the mantle processes. In particular ultramafic bodies in orogenic zones are important because they provide with direct information about spatial structure of mantle heterogeneities.

Recent progress of analytical method and analytical accuracy reveal detailed structure of the upper mantle heterogeneities which cannot be explained by any simple, single-stage processes. There is a gradual realization among researchers that such complexities are historical products of long-lasted upper mantle processes in the earth's history. The interest is how much of the process and history of the upper mantle can be resolved through the analysis of the observed structure.

The Horoman peridotite emplaced in the Hidaka metamorphic belt is a representative fresh body of Japan. Much progress has been made in petrologic, structural and geochemical studies. The fourth International Workshop on Orogenic Lherzolite and Mantle Processes is scheduled to be held in Samani Town located nearby the Horoman peridotite in 2002. We will review the resent research progress of the Horoman peridotite; and see how much progress has been made and what problems are remained to be unsolved.

Important research progress of the Horoman peridotite may be summarized as follows: (1) The characterization of the layered structure (Niida, 1974, 1984; Obata and Nagahara, 1987, Takazawa et al, 2000), (2) recognition of three peridotite suites (Takahashi, 1991), (3) the study of pyroxene spinel symplectite (Takahashi and Arai, 1989, Morishita et al, 1995, Obata et al. 1997), (4) metasomatism and modeling (Takahashi, et al., 1989, Takazawa et al., 1992, Matsukage and Arai, 1996), (5) isotope geochemistry and age determination (Yoshikawa, et al, 1993, Takazawa et al, 1999, Yoshikawa and Nakamura, 1999, (6) Whole rock and pyroxene trace element analysis and modeling (Takazawa et al, 1996, Yoshikawa and Nakamura, 2000), (7) analysis of rock deformation and modeling (Niida, 1975, Takizawa, 1997, Toramaru, 1997), (8) analyses of P-T path and thermal history (Ozawa and Takahashi, 1995, Ozawa, 1997), (9) characterization of mafic layers and modeling (Shiotani and Niida, 1997, Takazawa et al, 1999), (10) A discovery of corundum in mafic layers (Morishita, 1999).