Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS31-P02 Room:Convention Hall Time:May 24 17:15-18:30

Petrological nature and origin of ultramafic complex in the basal part of the Salahi mantle section, the Oman ophiolite

NOMOTO, Yuki[1]*, TAKAZAWA, Eiichi[1]

[1]Faculty of Science, Niigata University

The Salahi (Hilti) mantle section located in the northern Oman ophiolite is mainly composed of harzburgite and dunite, but the ultramafic complex in the southwestern part of the Salahi mantle section is mainly composed of dunite and pyroxenite. This study clarifies petrological nature of the ultramafic complex and examines the origin of this complex using their rock textures and mineral compositions.

Peridotites in the ultramafic complex in the basal part of the Salahi mantle section have the equigranular texture with coarse-grained to very coarse-grained (grain diameter greater than 1cm), and the grain boundary is intricate like a labyrinth.

The spinel Cr# of harzburgites in the basal part of the mantle section ranges from 55 to 72, and is most frequent in the range of 64-66, and then the second peak in the 70-72. Harzburgites with high Cr# spinel (Cr# greater than 70) are abundant in this area, so we speculate the presence of highly refractory zone (HRZ, hereafter) that has been reported from the northern Fizh block (Kanke and Takazawa, 2006). Also the spinel Cr# of dunites in this area ranges from 61 to 84, and is most frequent in the range of 76-82, so highly refractory dunites are also abundant as well as the harzburgites. This indicates that during oceanic thrusting stage a large volume of fluid infiltrated into the mantle section from the base, and then voluminous dunites were made by flux melting of residual harzburgite. Dunites with very coarse-grained texture also support this hypothesis.

Moreover, two types of dunites can be classified on the basis of compositional relationship between harzburgite and dunite that are nearby each other in the field, that is increase or decrease in Fo of olivine with the increase of spinel Cr# from harzburgite to dunite. The distribution of these two types is separated clearly in the field. The former is found in the central part of the ultramafic complex, while the latter occurs in the periphery of the ultramafic complex. This indicates that a large amount of fluid infiltrated into the central part of the ultramafic complex, so flux melting caused dissolution of not only orthopyroxene but also a small amount of olivine forming dunites with high Fo olivine. On the other hand, dunites with low Fo olivine associated with pyroxenite may have formed by fractional crystallization of olivine and pyroxene from a partial melt in the periphery of the ultramafic complex.

The HRZ has been detected in the northern part of the Fizh mantle section, indicating a large volume of melt/fluid infiltrated into paleo-ridge segment end region during oceanic thrusting stage (Kanke and Takazawa, 2006). We consider that the ultramafic complex in the southwestern part of the Salahi mantle section is also a kind of HRZ. Moreover, the southern part of the Salahi block has been considered as a paleo-ridge segment end similar to the northern part of the Fizh block (Miyashita et al., 2003; Monnier et al., 2006). Our study suspects that highly refractory harzburgites was closely related to the segment end region during oceanic thrusting. Previous study showed that clinopyroxene-rich harzburgites or lherzolite tend to occur at the basal part of paleo-ridge segment end region (Takazawa et al., 2003; Monnier et al., 2006). Flux melting of such fertile peridotite produces relatively larger amount of partial melt resulted in a large porosity in residual peridotite. Large porosity can enhance further infiltration of fluid into residual peridotite. This positive feedback system may explain the formation of HRZ at a paleo-ridge segment end region.

Keywords: Oman ophiolite, mantle section, highly refractory zone, spinel, peridotite, pyroxenite