Geochemical features of peridotite xenolith from Obnazhennaya kimberlite pipe - cumulates or residues?

T.V. KALASHNIKOVA [1*], L.V. SOLOV'EVA[1], S.I. KOSTROVITSKY [1], J. SUN [2]

[1] Vinogradov Institute of Geochemistry Siberian Branch of Russian Academy of Sciences, 664033 Irkutsk, Russia (*correspondence Kalashnikova@igc.irk.ru)

[2] College of Geosciences, China University of Petroleum, Beijing, China

This study concerns the geochemical characteristics of mantle xenoliths from the upper-Jurassic Obnazhennaya kimberlite pipe (Kuoika field, Yakutian kimberlite province, the north-east of Siberian craton). The so-called magnesian xenolith group (Sp, Sp-Grt, Grt lherzolites, olivine websterites and websterites) was distinguished, the rocks of the group are assumed to be of the same genesis based on transitions in modal mineral composition and a change in the composition of minerals. The chemical composition (CaO, MgO) of most depleted harzburgites, as well as part of the lherzolites of the magnesian group coincide with the restites obtained by experimental melting, which suggested their residue origin. Narrow variations in the composition of olivine (Mg # - 91-92; NiO - 0.35-0.45 wt.%) and orthopyroxene (Mg # - 92-93) for Obnazhennaya peridotites also support this hypothesis. In terms of chemical composition, olivines coincide with the “mantle trend” of olivines from the lithospheric mantle. Nevertheless, garnets from the peridotites consistently change their composition in the direction of decreasing Cr_2O_3, CaO and Mg # values from Grt, Sp-Grt lherzolites to Grt websterites. The garnet composition from Obnazhennaya peridotites differs from Udachnaya peridotites, for which the residue hypothesis assumed. They are similar in composition to garnets from Beni-Bousera garnet pyroxenites, as well as to garnets from deformed lherzolites of the Udachnaya pipe, which suggests crystallization of garnets from the melt and the effect of metasomatic processes. The formation of orogenic massifs is a multi-stage process, many authors suggest that pyroxenite veins in mafic complexes are cumulative in origin and show signs of metasomatic processes (in particular, enrichment with aluminum, calcium and chromium, increased REE concentrations in garnet). So peridotite cumulative origin and further metasomatic transformations were suggested.