Metasomatic features of mantle xenolithes from Obnajennaya kimberlite pipe

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

[1] Vinogradov Institute of Geochemistry SB RAS, 664033 Irkutsk, Russia

(*correspondence Kalashnikova@igc.irk.ru)

The upper-Jurassic Obnajennaya kimberlite pipe is located in the Kuoika field on the north-east of Siberian craton. The xenoliths from this pipe were subdivided into three groups. The group of coarse-grained Sp, Sp-Grt, Grt harzburgites, lherzolites and olivine websterites (so-called magnesium group) occupies the most of about 75-80%. In pyroxenites (olivine websterites and websterites) late metasomatic alteration of pyroxene appear in phlogopite + amphibole fine-grained aggregate crystallization. The magnesium group of rocks is characterized by wide variations in chemical compositions (MgO - 25-40 wt.%; SiO_2 - 35-50 wt.%; CaO - 1-10 wt.%).

For Obnajennaya pipe xenoliths, the most depleted harzburgites and lherzolites of the magnesium group match up with spinel harzburgites and garnet granular peridotites from Udachnaya pipe [1-3] and the restites obtained by experimental melting [4] which could suggested their residue origin. This hypothesis is supported by narrow variations in the composition of olivine (Mg # -91-92; NiO - 0.35-0.45 wt.%) and orthopyroxene (Mg # - 92-93) for peridotites. The chemical composition of olivines coincides with the “mantle trend” of olivines from the lithospheric mantle [5]. The oxygen isotopic composition $\delta^{18}O$ of olivines from samples of the magnesian group corresponds to the interval of mantle values (5.1-5.4). Subsequently these rocks were metasomatised with Cpx formation and the processes could be repeated [6-8]. The most depleted samples with a low content of Cpx (up to 10-15%) show with a decrease in the normalized PGE from Os and Ir (higher than PM) to Pt, Pd and Re. Also the trace element distribution in garnet and clinopyroxene from magnesium group of Obnajennaya pipe looks like that for deformed lherzolite from Udachnaya pipe for which the metasomatic hypothesis is assumed.

[1] Doucet et al. (2012), EPSL 359-360, 206-218; [2] Agashev et al. (2013), Lithos 160-161, 201-215; [3] Solov'eva (2007), Doklady 413, 238-243; [4] Herzberg (2010), EPSL 292, 79-88; [5] Bussweiler et al. (2015), Lithos 220, 238-252; [6] Howarth et al. (2014), Lithos 184-185, 209-224; [7] Pernet-Fisher et al. (2015), Lithos 218-219, 141-154; [8] Ionov et al. (2015), EPSL 428, 108-119.