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The phlogopite – ilmenite mantle xenoliths from Obnajennaya kimberlite pipe – geochemical features and connection with kimberlites

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The mantle xenoliths from upper-Jurassic Obnajennaya kimberlite pipe (Kuoika field, Yakutia) were studied. The complex association of phlogopite-ilmenite (Phl-Ilm)-containing rocks ($\sim$ 7-10% of total number xenoliths) is observed with a ferrious composition of minerals. Three groups among them were identified:
1. Phl-Ilm hyperbasites ($\leq$ 35% Phl). In some rocks of this group garnet is widely developed. The age of garnet rocks is 604-502 Ma (determined by the 40Ar/39Ar method in phlogopite). The REE distribution in garnets corresponds to increasing from La to Yb in accordance with the garnet-basalt melt distribution coefficients, called "normal" [Burgess, Harte, 2004], which may indicate equilibrium with the melts. In the bulk rock analyses for the Phl-Ilm hyperbasites, the maximum of Nb + Ta and Ti are noted in diagramme, that is completely uncharacteristic for kimberlites.
2. Group I-mica with porphyritic phlogopite of two generations (30 - 70% Phl). Apparently, the early intrusive phases were altered by phlogopite metasomatism under the influence of potassium-enriched and volatile melts. The age of rocks without garnet dates 870-850 Ma, correlating with the disintegration of the Rodinia supercontinent and the Upper Proterozoic plume rising [Kuz'min et al., 2011].
3. Deformed group II-mica with amphibole (40-60% Phl). The phlogopite forms curved large plates, amphibole (K-richterite and magnesio-cathophorite) is represented by rosette secretions. The phlogopite was dated to 167 Ma, corresponding to the age of the Kuoika field kimberlites [Sun et al., 2014]. The geochemical characteristics for these samples are characterized by similarity to kimberlites (minimum Ti, Zr + Hf). Probably, this group is associated with the formation of kimberlite rocks, the data obtained correspond to the age of recrystallization of mica during deformation and loss of argon.

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