Metasomatic features in the mantle xenoliths from Obnajennaya kimberlite pipe – the mineral composition evidence

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The modal metasomatic alteration for lithosphere mantle may be investigated using mantle xenoliths from kimberlite pipes. The mantle xenoliths from upper-Jurassic Obnajennaya kimberlite pipe (Kuoika field, Yakutia) were studied. Three main xenoliths groups in Obnajennaya pipe were distinguished based on the petrographic and geochemical features:

1. Sp, Sp-Grt, Grt harzburgites - lherzolites, Sp, Sp-Grt, Grt olivine websterites and Sp, Sp-Grt, Grt websterite (so-called magnesium group - about 80 % from xenoliths). The high magnesium mineral composition, high estimated temperature (1250 - 1500°C) for exsolution pyroxene megacrystals, presence of sulphide globules and distribution curves for rare earth elements in garnets (La-Yb increasing) are to assume the crystallisation from melt.

The 10% magnesium mantle xenoliths are observed the secondary metasomatic phlogopite and amphibole (pargasite). The clinopyroxene distribution curves demonstrate the wide range of values and altered samples show higher content HFSE group elements that primary clinopyroxene. The increasing of HFSE and rare earth element concentrations can also be traced by the amphibole chemical composition. The $^{40}Ar/^{39}Ar$ dating of phlogopite from was result 1639 ± 5 Ma nearly corresponding to the time of Siberian craton accretion Thus during Siberian craton accretion (about 1.7 Ga) the melts-fluids enriching Nb + Ta and REE impacted on lithosphere mantle under Kuoika field.

2. Eclogites and Grt clinopyroxenites with similar mineral composition (about 10-15% xenoliths). The high δO^{18} for garnet and clinopyroxene (5.7–5.8‰) allows to assume subduction genesis.

3. Phl-Ilm rocks characterizing ferrous mineral composition (~ 10 % xenoliths). This group are charactetrized are ferrous mineral composition. The $^{40}Ar/^{39}Ar$ phlogopite dating resulted to 800-500 Ma, signed the potassium and titanium metasomatic fluide – melt influenced.

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