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Aillikites and alkali picrites of Beloziminsky carbonatite massif, East Sayan mountains

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A complex of HFSE – mainly Ta, Nb, REE, P, Th, U associated with the Beloziminsky carbonatite massif (BCM) in East Sayan. The major concentrators are late ijolite-urtites melteigites and carbonatites. Alkali picrites (AP) - melilities and ailikites were intruded in several stages. AP rock affinity including melilitites and aillikites relates to the most ancient of their manifestations but they also cut ijolite-urtites of the latest stage. Primordial primitive melts were considered - 645 (666) million (Travin et al , 2002), within the array and at a distance of 10-15 km (the pipe "Yuzhnaya"). Phlogopite from carbonatite ankerite dates back to 645±6 Ma (40Ar/39Ar) (Doroshkevich et al., 2016; 2017).
Bulk rock of 20 samples of AP was analyzed by XRF and ICP MS and electronic microscope TESCAN MIRA3. 87 AP samples were analized by gamma-spectrometry determined U, Th, K, and divided to > 10 groups.
Primitive rocks of Yuzhnaya contains abundant xenocrystic olivine (dunite fragments) (Fe#Ol=11-16%) in intergrowths with sulfides, Cr-spinel (20-25% $Cr2O_3$), Cr-diopside and a significant amount of phlogopite cemented by intergranular kaersutite and diopside-hedenbergite, apatite etc. Other AP compiled by variations of carbonates, phlogopite, pyroxene (diopside), amphibole; olivine, mellite, Ti - magnetite with Na and Nb; common Ta-Nb oxides, pyrochlore, Sr-REE apatite, zircon. Sulphides represented by pyrrhotite, chalcopyrite, galenitea, sphalerite and other rare minerals.
The separation of Th-K and Th-U and REE patterns of PK is mainly due to TRE variations determined by the amounts of zircon, Apatite, pyrochlore, Ti-magnetite and phlogopite.
in samples
Variations of CO_3- SiO_2 in AP are somolr to aillikites of Labrador (Tappe e t al., 2007) and other locations. BCM alkali picrites of are more fractionated and enriched in REE and TRE with high CO_2, H_2O. The REE patterns (La/Ybn = 7 to 12; La - 100/PM) separated to groups: 1 - the most primitive rounded REE spectra of aillikites meet 1% melting of primitive mantle (PM) with unfractionated HFSE Zr, Hf, Ta, U, but pronounced Sr, Pb picks; 2 – close to 1 -st REE spectra with minima HFSE and LILE, 3 - with sharply elevated REE (La- 8000- 2000/PM), and lowered HFSE (Ta»Nb; Zr»Hf); 4 - intermediate group with La-1000-500/PM group and fractionated HFSE; 5 - enriched LILE with low REE (La -10/PM), flattened spectra and enrichment of Rb, Cs, Zr, Na, Nb and Th-U deficit. Primitive AP (Fe# = 14 –16 and) were formed by melting metasomatized and carbonatized mantle (carbonate inclusions in olivine) (Andreeva, 2014). Immiscibility splitting of carbonatite and silicate magma is not confirmed due to the presence of near-continuous bulk compositions. Formation of carbonatite massifs along the periphery of Siberian craton corresponds to enrichment of mantle due to subduction melts-fluids and melting by plume during breakup of Rodinia, formation of dike Nersinky complex and a series of carbonatite alkaline massifs (Gladkochub et al., 2010).
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