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K-alkaline rocks and lamproites of Tomtor massif

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Tomtor massif of the largest volcano-plutonic deep alkaline-carbonatite massifs world central type. Area of massif occupy 240 km2 and carbonatites stock is 40 km2. The super large deposit of Nb, TR, Y, Sc, Sr ,REE (Frolov et al. 2001)is found within the massif. The numerical publication are devoted to the ore mineralization there. But the geological struc-ture of the massif and the chemistry of its constituting rocks are not well understood. We obtained new ages based on U-Pb zircon and mica Ar-Ar method (Kotov, Vladykin et al. 2014 Vladykin et al. 2015). The massif was created in 2 stages: 700 and 400 Ma. We (Vla-dykin et al 1998) found rocks of lamproite series and proposed a new scheme of magmatism and the ore.genesis (Vladykin 2007, 2009). Biotite - pyroxenite, peridotite originated in first stage and then intruded iolites, nepheline and alkali syenite. Syenites occupy 70% of -massif and contain 12-13% K2O and 2-4% Na2O showing the K-alkaline-ultramafic nature of Tomtor volcano-plutonic massif (Vladykin 2009). The first stage was accomplished by nelsonitov calcite, dolomite and ankerite carbonatites.

Second stage (400Ma) volcanics picrite - lamproite veins and eruptive breccias meli-lite, melanephelinites, tinguaites appered. These rocks are cut by carbonatites of second stage. It was finished by intensive explosive eruption of a silicate (lamproite) tuffs lavobrec-cia kimberlite formed Ebelyakhdiamondiferous placer, melilite rocks in diatremes (feeders), as well as carbonate-phosphate (kamaforite) explosive tuffs with siderite ores. This carbona-tite complex is preserved within the subsidence caldera. Tuff eruption in conjunction with gas and hydrothermal activity determined its rare metal mineralization. These rocks contain to: Nb- 21%, TR-15%, Y-1.5%, Sc-1%, Zr- 0,5% Zn-, Sr-6%, Ti-8%, Ba-4%, V - 8000 ppm, Be- 300 ppm, Ga- 80 ppm, Cr- 1200ppm, Ni- 230 ppm, Mo- 145 ppm, Pb- 4300 ppm, Th- 1500 ppm, U-193 ppm.

Picrite - olivine (rare leucite) lamproite and formed volcanic flows, sills, dikes and breccia diatremes having total thickness up to 300 m. (Vladykin, Torbeeva 2005) Lamproites composed of faceted olivine crystals, elongated mica (20 to 50%) and pyroxenes and subor-dinate perovskite, chromite and magnetite. Lamproites are subjected to intense carbona-tion.

Leucite lamproites are composed of rounded discharge leucite (substituted by car-bonate) graines, "plastered" by mica secretions and fine pyroxene grains and sometimes sanidines. Phlogopite - annite micas of phlogopite lamproite contains to TiO_2 (4-8%) and Cr (up to 1000 ppm). Pyroxenes are diopsides and K prevail in sanidines. There are now Eu anomalies they reveal spectra similar to Australian Ol= lamproites.

Isotopic studies (Pokrovsky 2001, Vladykin 2006) indicate mantle originof silicate rocks. and ores excluding secondary redeposition (Vladykin 2009). RFBR grant 15-05-01005.