



Xenoliths of Phl- Ol breccia and lamproite- like dykes in Udachnaya pipe

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Several xenoliths of the unusual fine grained essentially Phl-Ol rocks there were found in the Udachnaya Vostochnaya kimberlite pipe. There two varieties. The fist type ids composed mainly from Phl, and Ol and Chromites with Phl-Ol, Chromite while the other contain more ilmenites and phlogopites and rare. Among the xenocrysts the rounding Ol xenocrysts and mantle xenoliths including dunite, sheared peridotites, Mg- ilmenites, prevail. In the second type Ol –pyroxenites and xenocrysts of low Cr garnets occur (surrounded by thick kelyphite). The first type contain Ol (Fe#~15), Na -Ti-rich kersutite and low. In intergranular space Sr -apitite, Ba celestine as well as barites. Sulfides are pyrotites . chalcopyrite, pentlandite. Such a mineralogy are typical of the lamproite but the bulk rock composition gives relatively low Na (1.3%) and K (2.8%) and Al₂O₃ contents with ~32% of MgO and 11 % Fe due to abundant Ol xenocrysts. This allow to interpreted rock Ol breccia cemented by the lamprorite magma. the Ol xenocryst are zonal with Mg - rich cores 8-10% and Fe(14%) rims.

The Chromite xenocrysts and phenocrsts show 50 -22 % Cr₂O₃ compositional range. and pressure range 5.0 -2.0 GPa

The second type represent the zonal rocks with the Cpx outer xone the essentially Phl zone and then fine grained material of Phl. Ol, Cr-low Cpx, and ilmenites. Variation o Cpx from the contact to the inner part show an essential increase of Fe (4 - 7 %) TiO₂ And Al₂O₃ as well as CaO suggesting the crystallization differentiation of magma. Starting parameters of the xenocrysts crystallization of the Ilm-Phl-Ol rock refer to the basement of the lithosphere beneath Udachnaya ~6.0 -5.5 GPa. But the final stage of crystallization was near Moho 1.2 -1.5 GPa according to Cpx barometry Ashchepkov et al ., 2011. and T 1100-1250 oC. The Ol-Chr sample possibly was crystallizing upper. The trace elements were measured by the LAM ICP MS method in IGM SD RAS using Finnigan ELEMENT with the YAG Nd 266 Laser Probe laser system (analyst S.V. Palessky).

The Cpx from the contact zone from the last sample show the incline REE pattern with LREE to 100 and hump near Pr. The incompatible element (IK) are more plat near 70 C1 with depression in Nb -Ta. The REE patterns for phlogopite are more inclined. Phls as well as bulk rock demonstrate inflected in Gd patterns consisting from two highly inclined parts suggesting mixing of two highly evolved liquids. Spiderdiagrams show continuous PhlL enrichment in IK (smaller in HFSE and Pb) and extremely high Ba, Rb (1000C1). The Cr- low garnet megacryst show elevated LREE and high HREE and moderate enrichment in IK.

Phl-Ol rocks represent the last stage dyke stage of H₂O rich melts evolution close to kimberlite II which produced Phl metasomatism in the lithosphere base (Ashchepkov et al., 2012, 2013). RBRF grant 11-05-00060.