



New data on kimberlite and lamproite magmatism in diamondiferous areas in the Western Urals

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Rare potassic alkaline-ultrabasic rocks were first studied in the western slope of the Middle Urals (Perm Region) in the multiphase Blagodatsky Massif. They are represented by olivine-sanidine lamproite and kimberlite. Based on materials of bore-hole sections of up to ~ 500 m deep and trenches (~ 3.5 m x 2 km), it was identified that thin alkaline-ultrabasic rock bodies consist of pipe-like, vein and dyke intrusions. Alkaline-ultrabasic rocks are associated in the massive with PZ2 essexite-dolerite, trachydolerite and V2 trachybasalt. Rock contacts between one another and with terrigenous rocks (V2) and sandstone (D1) are tectonic or intrusive.

Kimberlite is of specific mineral composition. It is characterized by the presence not only of three generations of olivine, but also altered melilite, sanidine, leucite that suggests that these rocks are transitional between kimberlite and lamproite. According to the classification of R.H. Mitchell (1995), similar rocks are an extreme member of Group II kimberlites. Such kimberlites are known in the Kroonstad area, South Africa (Besterskraal North, Voorspoed Mine) (G.H. Howarth, E. Michael et al., 2011).

Chemical composition of the rocks varies widely due to superimposed transformations expressed in chloritization, silicification, carbonatization, micatization, hematitization, leucoxenization, albitization. Distribution of rare elements and rare earth elements in alkaline-ultrabasic rocks are similar to those in kimberlites of the Timan and the Arkhangelsk diamondiferous province.

Accessory minerals are rare pyrope of Iherzolite paragenesis, diopside, chrome-spinelide, picroilmenite and large zircons similar to those of kimberlite. Single diamonds of dodecahedroid shape have been found in bulk samples. They are typical of alluvial diamond occurrences and deposits of the Urals.

Isotopic dating of zircons (SRIMP-II) yields the age of the alkaline-ultrabasic rocks corresponding to the Middle Paleozoic (D2-C1) and shows that these occurrences are confined to the tectonomagmatic stage of kimberlite magmatism of the East European platform.

Thus, such formations could be a bedrock source of diamonds in the western slope of the Urals.