DYNAMIC EFFECT OF TRAPS ON KIMBERLITES: IDENTIFICATION OF KIMBERLITE KLIPPEN

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Vigorous dynamic activity of trap bodies was reported for the Alakit-Markha kimberlite field (Yakutia). This activity is illustrated by the displacement of the Lower and Upper Paleozoic blocks of sedimentary rocks and kimberlites, both horizontal and vertical. The amplitude of these displacements depends upon the morphology of trap bodies, their thickness, and is equal to 180 m and more (the full thickness of sill) vertically and several hundreds meter along strike.

Firstly, along-strike displacement (to 250 m) of the sheet of Lower Paleozoic sedimentary rocks with a captured segment of kimberlite body was recorded for the Podtrappovaya pipe. Since, the blocks of kimberlite rocks mechanically separated from their parental bodies are called as "kimberlite klippe".

There are two types of klippen depending on the dynamic force of trap bodies: those located close to parental body, and those displaced at a significant distance. Discovery of a klippe is a direct search sign that proves the occurrence of its root part nearby. However, it is rather difficult to reconstruct the trace of separated block displacement and to define the most probable position of its root.

To date, three large klippen have been found within the Alakit-Markha kimberlite field. Their parental bodies are the Podtrappovaya, Yubileinaya, and Alakit pipes.

All the blocks of separated kimberlites are stratiform bodies which size is likely dictated by the different power of intruded trap sills.

The Alakit pipe and its kimberlite klippe are located in the upper streams of Alakit River. Both belong to the SW group of bodies of the Alakit-Markha kimberlite field and tend to ore-bearing zone of the North-East deep fault.

The upper part of pipe and the rocks of the separated block are composed of brown middle-coarse grained xenic tuff-breccias with the traces of trap dynamic effect that are exhibited in their strong mylonitization and folding, so that even schistose zones are formed. These transformations plus erosion processes essentially changed kimberlite rocks of the klippe.

To solve the problem whether the klippe relates to the one of it surrounding kimberlite pipes, there can be used a criterion for the individuality of chemical composition and physical properties of any statistic population of kimberlite indicator minerals for each their primary source. Compositional study of garnet, picroilmenite, Cr-spinel from the pipe and nearest klippe was carried out using the technique of partial microprobe analysis by "Geol 50A" microprobe analyzer in the Institute of Geology, Yakutian Scientific Centre, SB RAS. High portion of low-Cr garnets is typical of both the pipe and klippe (30.2 and 40.8 %, respectively). Most klippe garnets are almandines from crystalline basement rocks. The portion of the garnets of dunite-harzburgite and diamond assemblages is rather high, as well. Somewhat part of garnets from both bodies is represented by lherzolite assemblage garnets.

In the MgO-TiO_2 diagram the compositional points of picroilmenites from our considered bodies form a single field. Comparison of such characteristics as mean MgO, Cr_2O_3, TiO_2 contents, their extreme

values, and dispersion of separations promotes to relate these picroilmenite assemblages to one and the same source.

While correlating the chemical composition of pipe and klippe kimberlite breccias, the widest variations of major oxides (SiO_2, MgO, CaO, CO_2, etc.) should be noted. The reason for this is the presence of host rock xenogenic matter in the samples analyzed. Elevated Al_2O_3, CaO, CO_2, and K_2O contents are reported for most samples of pipe and klippe kimberlites due to the hybrid composition of host rocks.

As a whole, the study of kimberlites from the pipe and its adjacent klippe confirmed that the rocks of those bodies are similar. The nearly equal portion of heavy separation minerals and the ratio of main indicator minerals (pyrope, ilmenite, Cr-spinel), plus high share of diamond assemblage garnets and similar composition of garnets and ilmenites are typical of both rock groups. Thus, the aforesaid materials suggest that the parental body of separated kimberlite block is the Alakit pipe.

Taking into consideration the cited material and earlier obtained data we recommended the mineralogical criteria for the identification of peculiar kimberlite bodies. Compositional features of indicator minerals also serve as a reliable base to correlate the sampling haloes and primary sources.