Geophysical Research Abstracts
Vol. 12, EGU2010-4281, 2010
EGU General Assembly 2010

Topomineralogy of the Siberian diamonds

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Diamond placers are widespread in the modern alluvial deposits and ancient sedimentary collectors of the Siberian craton and can be divided into two major types: 1) related with the rich and famous kimberlites such as Mir and International pipe and 2) with unidentified root source. The lattert are wide spread, industrially significant and in use in the north-east of the Siberian craton. Yet, kimberlites known in the north-east of the Siberian craton have poor diamond concentrations or non-diamondiferous at all. A contradiction occur between high alluvial and extremely-low host diamond content of this region.

Detailed studies of this problem led to the fact that diamonds from the alluvial deposits of the Siberian craton, as well as other diamondiferous regions, show broader spectrum of typomorphic features than diamonds from the known kimberlites. Moreover, some diamond groups are not typical for the phanerozoic kimberlites of Siberia, or do not occur in significant amounts. The foregoing suggests that diamonds from the unknown host rock type occur in the diamond placers of the Siberian craton along with typical kimberlite diamonds.

Based on the detailed studies of the typomorphic features of the alluvial diamonds from Siberian craton 5 parasteresis groups, probably related to different host rock types, were distinguished. Parasteresis is a regular spatial mineral association which are united by single geological process, such as kimberlite indicator minerals and diamonds from kimberlites which differ in genesis but united by the whole kimberlitic process.

Parasteresis 1 (kimberlite-type) involves diamonds which are common for the phanerozoic kimberlites.

Parasteresis 2 (supposed to be lamproitic) includes roundish (cryptolaminar) diamonds of dodecahedron habit, the so called “brazilian” or “ural” types. In Siberian phanerozoic industrial kimberlites the part of such diamonds does not exceed 15%. That is the diamonds which dominate in the placers of the Urals and nearby Eastern Sayan (south-west of the Siberian craton).

Parasteresis 3 (unknown host rock type) includes yellow-orange cuboids (II type according to Orlov’s classification), which occur in kimberlites in small quantities, but most common in the north-east placers of the Siberian craton.

Parasteresis 4 (unknown host rock type) includes diamonds of V and VII types according to Orlov, which are entirely absent in kimberlites.

Parasteresis 5 involves the so called yacutites – microcrystalline substance with the add of lonsdaleite phase, typical for diamonds from impact craters. Comparison of yacutites with diamonds from Popigay astrobleme showed up their complete similarity. This fact is evident for the relation of yacutites to the Popigay astrobleme.

Thus, in the placers of the Siberian craton there are at least three groups of diamonds with the unknown host rock type.

The distribution of the discriminated types of diamonds among the craton is higly uneven. Diamonds of 2,3,4 and 5 parasteresis type (supposed to be from lamprophyres, unknown sources and yacutites) predominate in the north-eastern placers of the Siberian craton, whereas the part of the kimberlitic diamonds is less then a half, in some areas they are completely absent. Early- carboniferous deposits of the Kjutungdinskij graben is the only area where kimberlitic diamonds strongly predominate. That was the case to predict mid-paleozoic kimberlitic field there. In the central part of the province the major role goes to the kimberlitic diamonds associated with the mid-paleozoic kimberlites. Roundish diamonds of the second parasteresis type are in lead on the south of the Siberian craton, and may probably associate with the lamprophyres such as Ingash complex.

Mapping of distribution of the distinguished diamond parasteresises among the Siberian craton reveals the tendency of diamonds hypothetically from lamprophyres and unknown sources to associate with the precambrian

protrusions - Anabar shield, Olenek rise and Eastern Sayan. This allows us to suggest that the diamonds supply of the placers is due to exhumation and outcropping on the surface of precambrian rocks, including diamond placers in the precambrian coastal deposits, which were the major diamond source for the mesozoic and younger placers. Therefore, it may be assumed, that unknown host rocks of the diamonds have precambrian age and could be found only among the shields, what is almost impossible in practice.

Thus, the formation of placers with polygenetic mixture of diamonds from the sources of various type and age is closely connected to the development of precambrian protrusions of the craton.