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Upper Triassic hydroexplosive breccia: a possible new diamondiferous formation of Arctic Siberia

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Parent lithologies of peculiar rounded diamonds, which form great placer deposits in the northern Siberian Platform, keep enigmatic. Thus, new kinds of diamondiferous rocks are to be found in the region. Therefore, the forecasting and prospecting for uncommon prospective diamondiferous reservoirs arouses particular interest [1, 2]. The prospective areas are transitional zones between Siberian Platform and Byrranga (Early Kimmerian) and East Taymyr-Olenek (Late Kimmerian) fold belts where diverse igneous rocks of Middle to Late Triassic age are widespread. Some Triassic magmatic formations contain diamond associate minerals [1, 3, 4], these are kimberlite, lamproite, carbonatite, hydroexplosive breccia, variable basic and ultrabasic tuffs and tuffites.

We revealed and studied some peculiar explosion breccia bodies hosted by Triassic volcanic-sedimentary sequences at both Eastern Taymyr (Tsvetkov Cape) and Lena River Mouth area (Angardam-Tasa ridge). At the former site, some fluid-explosion breccia (tuffisite) dikes are studied; at Angardam-Tasa, conformable hydroexplosive lapilli tuffs, xeno-tuffs, and tuffite of basic, ultrabasic, and, possibly, kimberlite composition are hosted by a continuous volcanoclastic sequence. The clastic component is composed to a considerable degree by fragments of intensely altered feldspar-free lithologies, devitrified glass, accretionary lapilli, tuff and autolithic breccia [5]. Foreign clasts take source from various country rocks from Triassic basalts and dolerite to Paleozoic carbonate lithologies; the latter occur normally at 3-4 km deep. Both clasts and cement matter are intensely altered to change to either aggregate of ferriferous phyllosilicates (berthierine, ferroamesite etc), or carbonate.

At both areas, chrome-rich pyrope, picroilmenite, and chrome spinel have been detected in tuffs and breccias. All these trace minerals are similar compositionally to appropriate minerals from kimberlite xenoliths. Breccia and tuffs from the Angardam-Tasa contain diamonds, both diamonds and associate minerals do not show any essential features of a continuous transportation [6].

Inferred from petrographic and geochemical data, we interpret the objects studied as spatially interfered and intensely altered and fragmented products of conduit and submarine facies of basic and kimberlitic volcanism. Diamonds and associate minerals are clastic components as well as fragments of ultramafics. The bodies are similar to volcanoclastic kimberlites, which were described from some kimberlite fields situating at peripheral parts of cratons [7, 8].

The ascertainment of hydroexplosive or fluid explosive origin of diamondiferous bodies from folded sedimentary-volcanoclastic sequences along the northern periphery of the Siberian craton gives a possibility to assume them as source rocks for placer diamonds. The results obtained compel to use new methods to forecast and prospect uncommon diamond-bearing formations.

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