# IMPACT ORIGIN OF RABIGA KUL LAKE, EAST OF THE EUROPEAN PART OF RUSSIA

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**Introduction:** Recently, the structure of the late Quaternary (Holocene - late Pleistocene, up to 50 thousand years) age causes an increased interest of researchers. There is an assumption that the development of modern human civilization correlates with climate changes on Earth in this period, which, in turn, can be related to the consequences of the fall of space bodies and the cooling of the climate ("impact winters"). Impact structures in the modern relief are manifested in the form of lakes with a relatively isometric shape and the presence of finds of a specific metallic substance of cosmic origin: micrometeorites, magnetite microspheres with a specific well developed dendritic surface structures, vitreous globules with microcraters, etc. One of the similar new objects of the impact structure is Rabiga Kul Lake [1], located at the confluence of the largest rivers in Europe - the Volga and the Kama. Its geographical coordinates are: 54° 58' 42" Northern latitude and 49° 00' 48" Eastern longitude.

**Object of study:** Rabiga Kul lake is located on the left bank of the Volga River and has an isometric shape with a small shaft of 0.6-1.2 m high. At present, the lake diameter is 125 m, the depth is 2.5 m, the water mirror area is 12 000 $m^2$. The ring-shaped crater along the crest of the shaft is less isometric: its diameter in the latitudinal direction is 520 m, and in the meridian direction - 380 m; the depth of the lake basin is 23-37 m, the area is 200 000 $m^2$. According to the ratio of the average diameter and the average depth of the crater, Rabig Kul Lake corresponds to typical impact craters, which is a geomorphological argument in favor of classifying the structure under investigation as a similar object. The crater, which is similar in size to Rabig Kul Lake, can exist in the relief for not more than 1 million years, and the life expectancy of lakes is usually 10-15 thousand years, i.e. Falls on the impact event known in the late Dryas (12.8 thousand years ago), which is recorded in North America, Western Europe and the Middle East [2, 3].

**Methods & Results:** In the Quaternary sediments near Rabiga Kul Lake, objects of cosmic dust were found: magnetite microspheres, fused particles, chondrules, etc. In this paper we used data from 500 microprobe analyzes of 18 samples taken around the perimeter of the lake and 30 samples from 3 wells from depth to 1 m. A large number of native metals (Fe, Ni, Zn, Cu, W, Al), as well as intermetal ides (FeCr, CuNiZn, CuFeAl), carbon microspheres and iron carbides were found in the samples. The latter may indicate a restorative environment typical of space objects. In addition to intermetal ides, other objects characteristic of impact structures-magnetite microspheres, fused grains of quartz, ilmenite, chrome spinel, magnetite, and titanomagnetite are found in the studied samples. There is every reason to say that the detected particles have a meteorite origin, that is, they are either microscopic parts of the meteorite body or products of its processing during flight in the atmosphere.

**Conclusions:** The isometric shape of Rabiga Kul Lake, the ratio of the diameter and depth of the crater, and the presence of a cosmic substance suggest its impact formation in the late Dryas. Using microprobe analysis, it was possible to detect native metals (iron, nickel, tungsten, zinc) among microparticles up to 20 nm in size, magnetite microspheres, wustite, troilite, intermetal ides similar to those found by the known astroblems of the Earth. According to the characteristic set of geodata, it is possible to discover new lakes of impact genesis in the north of Eurasia.

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**References:** [1] Sungatullin R.Kh. et al. 2016. *Geomorphology*, 1: 64-72. [2] Israde-Alcántara I. et al. 2012. *PNAS Early Edition.* 738–747. [3] Wittke J.H. et al. 2013. *PNAS Early Edition.* 2088–2097.