Hydrogeochemistry of the Blue Lake - One of the Deepest Karst Lakes in the World

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The object of the investigation was the Blue Lake (Tserik-Kel) in the Kabardino-Balkaria Republic of the Russian Federation – the object of the world significance with unique characteristics. It is the deepest (279 m) karst lake-spring of Russia.

The basin of the lake is located in the limestones of the Upper Jurassic and Lower Cretaceous. The hydrochemistry of the lake has not been practically studied.

The comprehensive research of the lake was carried out, more than 1,350 measurements of various indicators of the water of the lake and the river, flowing from it, were made during the expedition combined with the Russian Geographical Society. It is established that the waters of the Blue Lake have a predominantly sulfate-calcium chemical composition with a salinity of 931.90 mg/L to 1002.04 mg/L, pH 8. The sulfate content varies from 509.7 (at the bottom) to 577.0 mg/Dm^3 (on the surface). This is probably due to the dissolution of gypsum contained in the rocks and, possibly, the oxidation of hydrogen sulphide.

The oxidation-reduction potential of lake waters varies from -197 to +75 V, which is associated with periodic releases of hydrogen sulfide from the deep parts of the lake. The temperature over the entire depth is constant – 9°C. This indicates that the main source of nourishment is at the bottom of the lake.

Discharge of water comes from a deep-lying aquifer, and as the waters rise in the lake, they are saturated with sulphates during the dissolution of rocks. This does not exclude the possibility of discharging the overlying aquifers in the form of local sources.

The carried out researches have shown that the lake was formed due to powerful discharge of underground water strikes on the surface. Hydrochemical data show that karst processes are quite active at the present time.

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