

Geological factors of formation of radon containing water, Tskaltubo resort, Georgia

A. OKROSTSVARIDZE^{1*}, K. ACIMIDZE²,
D. BLUASHVILI³, S. GOGOLADZE¹

¹Institute of Earth Sciences, Ilia state University,
Nutsubidze st 77, 0177 Tbilisi, Georgia
(*correspondence: okrostsvari@gmail.com)

²Tbilisi State University, Faculty Natural Sciences, 0179
Tbilisi, Georgia;

³Georgian Technical University, Faculty of Mining and
Geology, 0160 Tbilisi, Georgia

Tskaltubo is a world-renowned balneological resort located in western Georgia. The main therapeutic feature of this resort is the unique radon containing springs, where the radon concentration varies between 40 Bq/m³ and 100 Bq/m³. The flow rate is 13-15 million liters per day, the temperature varies from +330C to +350 C, that allows its use without preheating. General mineralization of spring water amount on average 0.7-0.8 g/l. Geological factors contributing to the water formation have been subject of discussion over a long period of time [1].

Tskaltubo is located in depression (80-120 m a.s.l.) and is surrounded by karstic Cretaceous limestones of 600-800 m high (Samguruli ridge). These formations are intruded by gabbroic dykes, part of which is outcropped in Tskaltubo depression and are highly expected to be the barriers along which the groundwaters find their way to the surface.

The Tskaltubo area has been studied by remote sensing (ASTER) and high concentrations of U and Th have been revealed into the Samguruli ridge. Geological studies show, that the tectonic fault zones developed into the limestones are enriched in U and Th (U – 200-300 g/t, Th – 250-400 g/t) [2].

To sum up, the formation of the radon containing Tskaltubo springs take place deep into the limestone bedrock, where it enrich in radon gas - U and Th decay product. The preheating of spring waters (up to +350C) take place on the way they reach the surface because of the short half-life of Rn222 (3.8 days) ending at stable isotopes of lead (Pb206), when an important amount of heat energy release into the water.