



Deep structure of the Pyatigorsk volcanic center (Northern Caucasus)

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Pyatigorsk laccoliths show a perceptible circular arrangement of tectonic and petro-geochemical features that also manifested in specific properties of a hydrothermal system of the Caucasian Mineral Waters and can be described as direct and natural elements of a higher order system, namely, the fluid-magmatic system of the Pyatigorsk volcanic center.

It has been shown that mentioned arrangement may be approximated by a system of concentric isolines forming an isometric shape with the center located approximately 10 km west from the top of the Mount Beshtau positioned over the crust-mantle boundary inflection zone, and concentration of hydro-carbonates in the center of the anomalous area is six times more than this concentration at the periphery. On the basis of petro-geochemical and geological studies the hydrothermal system with obvious features of juvenile origin has been outlined. An average lifespan of this system is estimated to be at least several millions of years.

The results of geophysical studies at the Beshtau laccolith (Pyatigorsk volcanic center) which were carried out in 2011 using the method of low-frequency microseismic sounding are presented. Vertical geophysical profile down to a depth of 30 km using a modified algorithm for processing the original data that improved the results of the transcripts and outlines the deep geological structure in more detail in the subsequent interpretation are presented and discussed.

Thus, relationship of hydro-chemical properties of the Caucasian Mineral Waters with respect to structural and petro-geochemical features of Pyatigorsk volcanic center and its fluid-magmatic system structure has been discovered. Affiliation of the Caucasian Mineral Waters with a hydrothermal element of this system has been proved to be correct.

New data on the deep structure of the Beshtau laccolith were obtained, and their combined interpretation with previous results obtained in geological, geophysical and petro-geochemical studies has been performed.