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Fluid-magmatic systems and volcanic centers in Northern Caucasus

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The fluid-magmatic activity within modern and Holocene volcanic centers of The Greater Caucasus is considered. Results of complimentary geological and geophysical studies carried out in the Elbrus volcanic area and the Pyatigorsk volcanic center are presented.

The deep magmatic source and the peripheral magmatic chamber of the Elbrus volcano are outlined via comparative analysis of geological and experimental geophysical data (microgravity studies, magneto-telluric sounding, temperature variations measured in carbonaceous mineral waters). It has been determined that the peripheral magmatic chamber and the deep magmatic source are located at depths of 0–7 and 20–30 km below sea level, respectively, and the geothermal gradient beneath the volcano is 100°C/km. In this study, analysis of processes of modern heat outflux produced by carbonaceous springs in the Elbrus volcanic center is carried out with respect to updated information about spatial configuration of deep fluid-magmatic structures. It has been shown, that observed degradation and the rate of melting for the glaciers on the volcano's eastern slope are related both to climatic variations and endogenic heat flux.

In the area of Caucasus Mineral Waters (Pyatigorsk volcanic center) the annular zonality of structural, petro-geochemical, geothermal, and hydrochemical features has been found. The likelihood of existence of peripheral magmatic source at depth of 9 – 15 km is suggested.

The relation between hydro-chemical properties of Caucasus Mineral Waters and structural as well as petrologic and geochemical features of the fluid-magmatic system of the Pyatigorsk volcanic center is determined and discussed.