Regional network of seismological observations on the territory of Dagestan: state and development prospects

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Abstract The territory of Dagestan is one of the seismically active regions of the European part of Russia. Both in the historical past and in recent years, strong and destructive earthquakes have occurred in this region. For example, the area of the Sulak cascade of hydroelectric power stations is one of the most dangerous in Dagestan, both in seismic and environmental terms. Over the past 53 years, there have been 4 strong earthquakes with devastating consequences (1970, 1974, 1975, 1999 years). The most powerful of them was the earthquake of May 14, 1970 with M=6.6. The epicenter of the main shock was at a distance of 15–20 km from the Chirkey hydroelectric power station dam, which was then under construction. This implies the relevance of a detailed study of the seismic regime features in Dagestan and adjacent areas. The article discusses the unified integrated system of seismological observations functioning in the Dagestan Branch of the GS RAS (DB) and provides information about the equipment for these observations. Some priority results obtained using innovative data processing methods developed in the DB are described. The results obtained according to the catalog of the Eastern Caucasus are compared with the results for other regions of the world with denser networks of seismic stations. On this basis, arguments are presented in favor of the need for a significant condensing of the region seismic network. To increase the information content of geophysical observations, the implementation and use of our patented hardware developments, including a gravity gradiometer and a variometer, an inclinometer, a hydraulic level, an extensometer, etc., are proposed. In particular, the expediency of implementing a broadband resonant seismoacoustic receiver developed in the DB is shown. It is proposed to supplement seismic stations with such receivers to increase their information content.

Keywords Seismic activity, regional network, digital seismic station, geochemical and hydrogeodynamic observations, earthquake precursors, data processing methods, geophysical equipment.

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