

Results of complex seismological, geophysical and geochemical researches on the territory of the Republic of Dagestan in 2016–2020

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Abstract The work describes the research and development carried out at the DD GS RAS over the past 5 years, mainly of an innovative nature. These developments include the computer program “Construction the transfer function between time series based on the relative amplitudes of coherent harmonics”, invention “Method for reconstructing dynamic processes in the earth’s crust based on seismic observations implemented in computer program “Reconstruction of geodynamic processes based on seismic observations”, SEISMO program, invention “Method for predicting tectonic earthquakes” implemented in the computer program “Detector of deformation anomalies parameters in the earth’s crust based on areal observations of geofields”, computer program “Maps builder of seismic station networks registration capabilities”. Their application provided scientific results of a priority nature, the main of which are the identification of a significant correlation between time series of concentrations and dispersions of hydrogen and helium and the seismic regime of the region, establishment of dominance in atmospheric pressure variations and in the response to them of water levels in wells of semidiurnal harmonic, while in intraday fluctuations of weak seismicity, the 24-hour harmonic dominates, which unambiguously excludes atmospheric pressure from the possible causes of daily variations, correlation of synchronous peaks in the time variation of the intraday harmonics amplitudes in temperature observations in a well with the world’s strongest earthquakes, establishment a fact of weak seismicity modulation by a semidiurnal tidal wave M_2 , detection in variations of weak seismicity along with the daily harmonic S_1 (24h) of stable intraday harmonics S_2 (12h), S_3 (8h) and S_4 (6h). A number of priority results obtained in collaboration with employees of the Siberian Division GS RAS and the Institute of Physics of the Earth RAS are also described.

Keywords Seismic observations, forecast, deformation anomalies, registration capabilities, dispersion, harmonics, modulation.

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