Geophysical Fields and Seismicity of the Tersko-Caspian Bending

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ABSTRACT

One of the relevant indicators of the deep structure of the Tersko-Caspian bending are geophysical fields. In an abnormal gravitational field, the regional regularity of the geological structure is expressed by the specific negative values of gravity, the magnetic field of the region is weakly differentially characterized by the positive values of anomalies. Discontinuous disturbances in the magnetic and gravitational fields are displayed by a number of signs, which include large gradients of the gravitational and magnetic fields, bands of intense positive magnetic and gravitational anomalies, chains of gravity maximums, chains of rounded positive magnetic anomalies, a sharp change in the general nature of magnetic and gravitational fields and etc. [1-2; 4].

The territory of the central part of the Tersko-Caspian bending is a region of high seismic activity. Earthquakes were recorded here, mainly due to the intensive development of oil and gas fields. Long-term development of deposits led to disturbances in the equilibrium state of the geological environment with a significant change in reservoir conditions and, accordingly, to the development of dangerous geodynamic processes [3]. The investigation of seismicity and fault tectonics of the region is based on the analysis of the magnetic fields gravitational interpretation results using modern computer technology for statistical and spectral-correlation analysis of data "Cascade 3D". The results of processing geophysical data were compared with the epicenters of earthquakes in the studied region, which made it possible to observe the spatial pattern of dispersion of the centers of earthquakes.

A comparative analysis of geophysical fields with the epicenters of strong earthquakes shows that the epicenters of seismic activity are located to a greater extent in the regions of regional and local minima, which are mainly confined to highly gradient zones of the gravity field. When comparing the transformants of the magnetic field and the epicenters of earthquakes, it was found that they gravitate to regions of positive magnetic anomalies.

According to the analysis results and interpretation of digital geophysical data, tectonic areas corresponding to the fault zones of the study area were identified. The areas of course and intersection of discontinuous disturbances characterize high modern geodynamic activity. The confinement of earthquake epicenters to the gradient zones of regional and local minima of gravity is noted. The recieved results of geophysical fields interpretation using innovative computer technology allowed us to study the spatial pattern of dispersion of the epicenters and hypocenters of earthquakes in the studying area. According to the results of a comparative analysis of the transformants of geophysical fields and maps of epicenters and hypocenters of earthquakes it was found that the earthquake hypocenters placed on the transformations of the gravitational field randomly gravitate to the maxima of gravity, and epicenters from 11 and above classes are definitely concentrated in the tracing zones of the axes of gravity anomalies fields corresponding to deep faults.

In contrast to the transform of the gravitational field with the epicenters of earthquakes of different energies, the transform of the magnetic field is less informative, however, it is noted that the epicenters fit more in the regions of positive maxima of magnetic anomalies. As a result, the analysis results of a comprehensive

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interpretation of regional digital geophysical data of the studied area and earthquake maps, shows that the epicenters of earthquakes of different energies - from 11 and above classes are located in zones of deep faults.

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