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GIS-technologies as a mechanism to study geological structures

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Specialized GIS-technologies allow creating multi-parameter models, completing multi-criteria optimisation tasks, and issues of geological profile forecasts using miscellaneous data. Pictorial and attributive geological and geophysical information collected to create GIS database is supplemented by the ERS (Earth's Remote Sensing) data, air spectrometry, space images, and topographic data.

Among the important tasks are as follows: a unification of initial geological, geophysical and other types of information on a tectonic position, rock classification and stratigraphic scale; topographic bases (various projectures, scales); the levels of detail and exhaustibility; colors and symbols of legends; data structures and their correlation; units of measurement of physical quantities, and attribute systems of descriptions.

Methods of the geological environment investigation using GIS-technology are based on a principle of the research target analogy with a standard. A similarity ratio is quantitative estimate. A geological forecast model is formed by structuring of geological information based on detailed analysis and aggregation of geological and formal knowledge bases on standard targets. Development of a bank of models of the analyzed geological structures of various range, ore-bearing features described by numerous prospecting indicators is the way to aggregate geological knowledge.

The south terrain of the Valerianovskaya structure-facies zone (SFZ) of the Torgai paleo-rift structure covered with thick Mesozoic and Cenozoic rocks up to 2,000m is considered a so-called training ground for the development of GIS-technology. Parameters of known magnetite deposits located in the north of the SFZ (Sarybaiskoye, Sokolovskoye, etc.) are used to create the standard model.

A meaning of the job implemented involves the following:

- A goal-seeking nature of the research being performed and integration of the geological, geo-physical and other data (in many cases, efforts of the Earth scientists are odd, thus, solving only local tasks);

- Development of specialized GIS-technology that ensures creating multi-parameter models, completing multi-criteria optimisation tasks, and issues of geological profile forecasts using miscellaneous data;

- Application of the modern approach to the geological, petrological and genetic modeling of the targets in the geological zone under survey; determination of the structural and tectonic position of the Valerianovskaya SFZ and its relations to the mineralization;

- A possibility to apply the GIS created for the region as a desk (local) system integrated to the regional or national bank of geospatial information with a corporate access via local and global networks.