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New computer technology for geological problems solving

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Developed by our team of geoinformation system INTEGRO able to store and visualize geological map (scanned and vectorized), geophysical and geochemical data, primary geological data, aerial and satellite images, borehole data, three-dimensional data. It is intended for solving problems of geological map construction, forecasting mineral resources, study of the deep structure of the Earth, etc.

For the joint visual analysis of the various information types, the system is multi-window and is equipped by the synchronization mechanism in different windows. This mechanism works when there is the visualization of three-dimensional objects too, and also in that case when localization of the data does not coincide (for example, the surface data, the section data, and the drill information). There are tools allowing user to change spatial localization (to represent the two-dimensional data, for example seismic section, as a three-dimensional objects).

For the vector data the correct topology checking and overlay operations are supported. It is possible to keep not only intralayer, but also interlayer topology while editing. There are implemented procedures of a fast binding and transformation of raster and vector maps by affine and piecewise-affine transformations. The comprehensive set of cartographic projections is supported. There is a block for information transform from vector to grid.

There is a block that provides work with well information. You can work with geological and geophysical information about a single well or group of wells, considering them in the projection to a section or in the three-dimensional space. Also there is a forecast block which is able to processing two-dimensional and three-dimensional information.

The system includes a gravimetric and magnetometric information processing block. In this block there

are modules for correlation and spectral analysis, the separation of the field into its components, detection of weak anomalies, and so on. The system also contains the modules designed for solving various assignment formulations of gravimetric and magnetometric direct and inverse problems and also modules of analytical extension of potential fields.

Technology for three-dimensional modeling of the territory is created. It based on implemented system tools. To create a three-dimensional model geological map, well data, seismic profiles, gravity and magnetic information are used.

The main advantages of GIS INTEGRO:

- It has multi-windows user interface that supports data synchronization of the different windows that allows user to conduct visual analysis and data integration (including various spatial localization data);
- It supports possibility of information binding and re-projection, contains a wide set of projections;
- The system contains cartographical objects editor that allows geologists to edit maps in a habitual mode (in usual style registration, without transfer to arc-node representation) jointly in different layers;
- There is a style converter with the most popular GIS;
- There are the tools for geological maps vectorization;
- There is transfer information supporting from the vector form into a grid;
- It contains a block for geophysical information processing and a forecasting block;
- On the basis of the created tools the technology of the territory three-dimensional modeling is developed.

