

ADVANCED GRAVIMAGNETIC STUDIES



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Scientific interests:

- development of digital methods for interpretation of gravity and magnetic fields and numerical processing of geophysical data;
- borehole gravity data interpretation;
- interpretation of the regional gravity field;
- UAV magnetic survey data processing and postprocessing;
- interpretation of a full tensor gradient data (FTG);
- development the technique for the interpretation of complicated X-ray powder diffraction patterns of clay mineral.

Course Goal

The goal of this course is to promote the use of modern technologies and advanced methods in gravimagnetic studies to academic and oil and gas industry specialists.

Course Description:

It is undeniable that being familiar with global gravity and magnetic databases is essential for applied geophysicists, as well as for research specialists. The first subject of the course will be practical studies involving online resources, such as global relief models, gravity, and magnetic fields. A complex analysis of this data (free air and Bouguer reductions) allows us to obtain easily important preliminary information of rock density distribution in the region we are studying.

The second course topic is the analytical approximation of gravity and magnetic fields employing integral representations (developed by V.N. Strahov) and source-wise represented functions.

Advantages of using these techniques in magnetic data processing will be demonstrated using several examples:

1. Preliminary processing of 3D data that was received with the help of UAV, their rejection and linkage of measurement made on different levels.

2. Interpretation of the 3D data through fast inversion algorithms based on the DEXP and Euler deconvolution techniques. In this case, inversion results become more accurate and robust.

The third course subject addresses the issues of uniqueness and stability of solutions of inverse problems of gravimetry and magnetometry. Using tests and real case studies of inversion, there will be a discussion of ways of regularization of inverse problems, their advantages and disadvantages.

The concluding subject will be an introduction to the problems of gravity field monitoring for environmental purposes and the effective production of hydrocarbons, using practical and model examples.

