

The results of joint EM data interpretation: paleovalley exploration case study

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SUMMARY

Since 2015, students of Faculty of Geology of Lomonosov Moscow State University during their field training courses have been conducting the research of paleovalleys located near "Aleksandrovka" fieldcamp in the Kaluga Region. The data of VES-IP (vertical electrical soundings with induced polarization), time-domain electromagnetic soundings (TDEM) and audio-magnetotellurics (AMT) were currently obtained along 6 lines with length from 3 to 30 km. The space between sites varies from 35 - 70 m (for TDEM) to 210 m (for AMT). There are three systems of paleovalleys in the area C₁tl-bb, C₂az and N.

The results of the joint interpretation of EM data along lines across different types of paleovalley are presented.

Interpretation of apparent resistivity curves obtained for layered geological section, allows defining some parameters, which have a narrow range of equivalence. They are different for direct current methods (VES) and low-frequency induction methods (TDEM, AMT). If the geological section consists of alternation of thin layers with different resistivity, in order to satisfy the observed data of both groups of methods, it is necessary to set, in addition to the resistivity of the layer, its anisotropy or to increase the number of layers.

The possibilities and advantages of joint interpretation of apparent resistivity curves for VES and TDEM using special version of IPI 2 Win software (A. Bobachev) are shown.

The upper part of the resistivity image obtained from joint interpretation VES and TDEM data was used as the starting model for 2D inversion of AMT data.

Thus, the joint interpretation of the TDEM and VES curves makes the range of possible equivalent resistivity models considerably narrower and allows obtaining new and more reliable information about the resistivity structures than using each of the data of the methods separately. Involving AMT data to the interpretation allows increasing depth of investigation.

Keywords: VES, TDEM, AMT, joint interpretation, paleovalley
