

Information-statistical methods for geophysical field interpretation

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Terrain correction by forward modeling gives an exact solution only in the case of well-known geological-petrophysical section. For other cases correlation between observed field (U) and elevation of observation points (H) may be used. Local deviations from $U = f(H)$ linear dependence mark the presence of underground inhomogeneity; factors of $U = f(H)$ regression equation contain the information on average physical properties of relief forming rocks. For example, the developed method of effective magnetization determination by magnetic survey data shows that the Precambrian basement of Sinai and southern Israel has low magnetization. This finding puts in question the previous calculation of the thickness of sedimentary cover according to the depth of magnetic basement, and outlines the new directions of oil-and-gas prospecting in the region.

An identical approach was applied for density determination and statistical reduction of gravity anomalies. Such reduction allowed to reveal the SW-NE chain of positive anomalies trending from southern Sinai to southwestern Israel.

The author developed also logical-informational algorithms for the detection of hidden concentric structures and intersection nodes of linear structures. These algorithms permit to compute the information quantities on existing peculiarities of a given strike.

The similar algorithm was developed for hidden target revealing by its set of prescribed indicators. The algorithm is based on the special summation of information contained in different fields. As a result, random noises and extraneous signals are eliminated, and the presence of desired class target is emphasized.