A Geophysical Study for Delineating the Subsurface Minerals at El Qusier Area, Central Eastern Desert, Egypt.

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Abstract : The Red Sea Mountains have been famous for their ore deposits since ancient times. Also, petrographic analysis and previous potential field surveys indicated large unexplored accumulations of ore minerals in the area. Therefore, the main goal of the presented study is to contribute to the discovery of hitherto unknown ore mineral deposits in the Red Sea region. To achieve this goal, we used two geophysical techniques: land magnetic survey and magnetotelluric data. A high-resolution land magnetic survey has been acquired using two proton magnetometers, one instrument used as a base station for the diurnal correction and the other used to measure the magnetic field along the study area. Two hundred eighty land magnetic stations were measured over a mesh-like area with a 500m spacing interval. The necessary reductions concerning daily variation, regional gradient and time observation were applied. Then, the total intensity anomaly map was constructed and transformed into the reduced magnetic pole (RTP). The magnetic interpretation was carried out using the analytical signal as well as regional–residual separation is carried out using the power spectrum. Also, the tilt derivative method (TDR) technique is applied to delineate the structure and hidden anomalies. Data analysis has been performed using trend analysis and Euler deconvolution. The results indicate that magnetic contacts are not the dominant geological feature of the study area. The magnetotleruric survey consisted of two profiles with a total of 8 broadband measurement points with a duration of about 24 hours crossing a wadi um Gheig approximately 50 km south of El Quseir. Collected data have been inverted to the electrical resistivity model using the 3D modular 3D inversion technique ModEM. The model revealed a non-conductive body in its central part, probably corresponding to a dolerite dyke, with which possible ore mineralization could be related.

Keywords : magnetic survey, magnetotelluric, mineralization, 3d modeling
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