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Detection of the subsurface structures and tectonics of Southern Sinai, Egypt using magnetic and gravity data

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ABSTRACT

In this work, we present a reconnaissance study to elucidate and delineate the subsurface structures and tectonics of the southern part of Sinai Peninsula using available geophysical data; including Bouguer gravity, land magnetic and aeromagnetic data. The study area was selected due to its active tectonic situation. The geophysical data were analyzed to provide new information about the tectonic setting and subsurface structures of the study area. The suitable analysis techniques were used in the interpretation of the data, such as reduction to the pole (RTP), low and high pass filtering and forward modeling were applied to process the high resolution aeromagnetic, land magnetic data. Moreover, wave number filtering and sun shading techniques are carried out utilizing three types of filters with varying wavelengths. The quantitative interpretation was performed using two dimensional modelling and analytical signal techniques. The application of these tools discriminated the variable sources of specific depth ranges for the residual and regional anomalies. Three basement cross sections are generated using the 2D-modeling to support and refine the interpreted structures. To reveal the tectonic zones and structures, depth estimations were conducted by applying of the power spectrum, analytical signal and 2D-modeling techniques. It was found that the main tectonics in the study area have NW-SE, NE-SW and E-W trends. The average depth values to the basement complex are widely ranges between 0.5 to 4 km and to basement intrusions 35 m and 500 m.

Key Words: Sinai Peninsula, subsurface structures, aeromagnetic intensity map, gravity map.