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Full Length Article

Analysis and interpretation of aeromagnetic data for Wadi Zeidun area, Central Eastern Desert, Egypt

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ABSTRACT

The current study is mainly concerned with the analysis and interpretation of the available aeromagnetic data using different advanced processing techniques, to map the subsurface structural framework and depth estimation of these structures of the Wadi Zeidun area, Central Eastern Desert. The visual inspection of the RTP aeromagnetic map defines a rapid change in the subsurface geologic conditions in the form of the lithological characters and tectonic inferences. The shallow sources can be separated from those of deeper causatives, using power spectrum transformation tool. Two methods for locating magnetic sources, Source Parameter Image and Analytical Signal to identifying the properties of their sources indicated that, the depth calculation from the used tools ranges between 900 and 3000 m as the average ranges. Also, the comparative study among the 2D magnetic modelling was established by two profiles constructing. The mapped basement tectonic map is affected by a set of faults trending mainly in the N-S, NE-SW, NW-SE and ENE-WSW direction.

1. Introduction

The study area is located at the Central Eastern Desert of Egypt between latitude 25° 30′ to 26° 00′ N and longitude 32° 50′ to 33° 30′ E. The area looks like a triangle: its vertex is in the direction of the Red Sea and its base is at the Nile River direction. This area occupied 2286 Km^2 and bounded by Qena from the North, Luxor from the West and Idfu from the South and the Red Sea from the East (Fig. 1).

This paper discusses some of the guidelines used in analyzing the high resolution aeromagnetic data and illustrates some of the techniques and software tools used for reducing, processing and interpretation such magnetic data for structural (deep-seated and shallow-seated) and tectonic features. So, the main goal of this works is to analyze magnetic anomaly data to identify possible subsurface structural pattern of the study area. Our pattern recognition criteria is based on the reduced to the pole (RTP) and Power spectrum curve used in Regional-Residual separation. As well as, the quantitative interpretation used Source Parameter Image and Analytical Signal as depth estimation tools, beside 2-D magnetic interactive modelling package running on Geosoft program [1].

2. Geological outline

The Eastern Desert of Egypt is approximates a triangular area bounded by the Red Sea and the Nile River valley from the east and west respectively, with its base as the Egyptian-Sudanese border.

The belt of basement rocks of the Eastern Desert of Egypt divided into northern, central and southern domains according to the percentages of gneisses, granites, serpentinites [2]. The study area consider a part of the Central Eastern Desert.

The general geology of the investigated area (Fig. 2) is a portion of the Qena Quadrangle map published by the Egyptian Geological Survey and Mining Authority (EGSMA) [3]. The area is covered by sediments from Cenozoic and Mesozoic. The overlain sediments are represented by Quaternary deposits, Pliocene fresh water deposits of Nile valley, Eocene thick marine limestone with cherty and minor clay beds, Paleocene calcareous facies deposits and upper cretaceous phosphate and carbonate rocks.

Tectonically the central part of the Eastern Desert of Egypt appears to be affected by different tectonic elements. The systems

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Fig. 1. Location map of the study area.

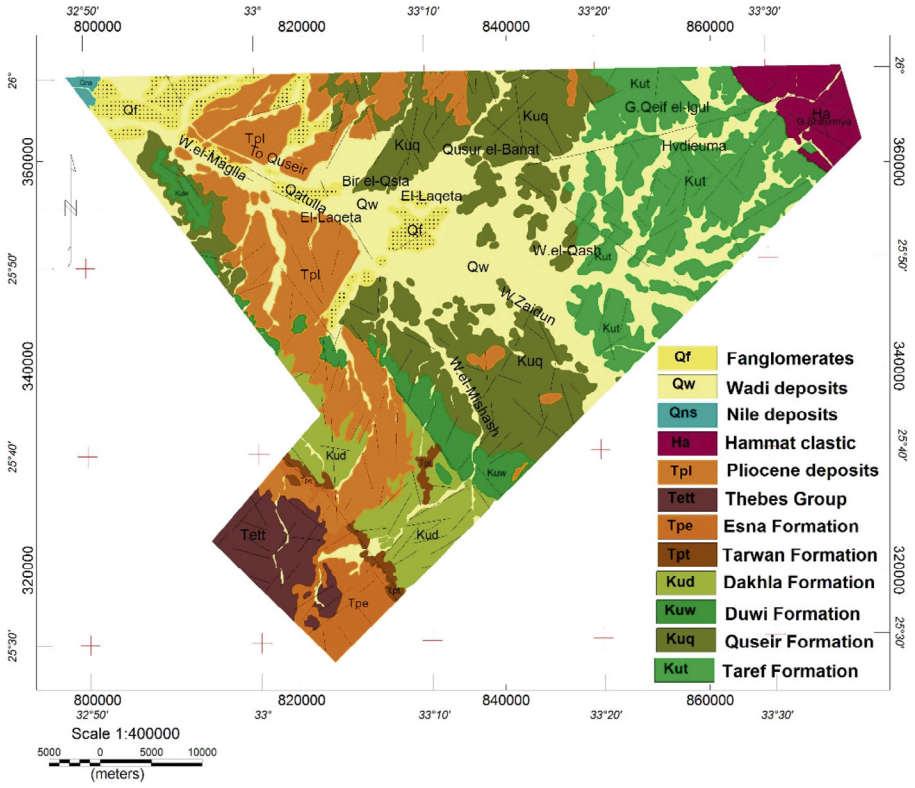

Fig. 2. Generalized Geologic Map of Wadi Zeidun (After the Egyptian Geological Survey and Mining Authority "EGSMA", 1978).

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