

Ain Shams University
Faculty of Science
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**STANDARDIZATION OF AIRBORNE GAMMA-RAY
SPECTROMETRIC SURVEY DATA CORPORATED WITH
AIRBORNE MAGNETIC DATA OF GABAL GHARAMUL AND ITS
SURROUNDING, NORTHERN EASTERN DESERT, EGYPT**

Thesis

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By

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ABSTRACT

The present thesis deals essentially with applying standardization of the airborne gamma-ray spectrometric data of Gabal Gharamul area and its surrounding, North Eastern Desert, Egypt. It was done through carrying out ground survey using portable gamma ray spectrometer along certain airborne profiles, to reach mathematical relation between the ground and airborne gamma-ray spectrometric data. Such relation used in standardizing the airborne gamma-ray spectrometric data of the surveyed area. The results of the standardization of the airborne gamma ray spectrometric data showed that there are three linear relations with zero intercept between the ground data and the airborne data for potassium, equivalent uranium and equivalent thorium. The resultant equations will applied to the airborne data to determine the ground data.

The interesting false colour composite images were produced after standardization for some selected combinations from the various radiometric parameters. Application of composite image technique has been developed to interpret qualitatively airborne gamma-ray spectrometric survey data. The integrated results gained from these methods were illustrated “interpreted radio spectrometric zonation” map (IRSZ). The IRSZ map shows thirteen zones.

The statistical data for each zone (Minimum “Min”, Maximum “Max”, Mean “X”, Standard Deviation “S”, $X+S$, $X+2S$ and $X+3S$) were calculated. The way followed for

defining significant eU, eTh and K anomalies is based on identifying those areas where eU, eTh and K values are equal or exceed three standard deviations above the mean together with a local enrichment of their ratios. The uranium composite image map has been examined and produces an identical five uranium leads, which showed spatial correlation with some of the mapped lithologies in the surveyed G. Gharamul area, Northern Eastern Desert, Egypt.

The airborne magnetic data has been analyzed by various techniques. These techniques include the reduction to the north magnetic pole (RTP), isolation of the regional and residual magnetic components using Gaussian filtering technique and determination of magnetic sources depth using power spectrum, analytical signal and source parameter imaging "SPI" techniques. The integration of all these techniques has been resulted in the construction of the interpreted magnetic basement tectonic map for the study area. This map shows that most of deep major faults have NW-SE trend in the majority of the study area except in some areas in the central west and east have trend NE-SW. Additionally, Shallow lineaments have minor trends for lineation at all direction which may be indication that the area is highly dissected. Shallow faults displayed on basement tectonic map supported by surface geological map. Correlative study of the interpreted magnetic basement structural maps shows that, the major faults which are demonstrated on the regional map are also well-developed on the residual map.

Conversion of the airborne multi-channel gamma-ray and magnetic surveys-conducted over the studied area-to a common image format, made it possible to display and manipulate these originally non-imaged data by standard digital image processing technique..

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