SHALLOW GEOPHYSICAL INVESTIGATION FOR ABU SHAAR AREA IN EASTERN EGYPT

THESIS

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TAREQ FAHMY ABD ELLATIF FARAG

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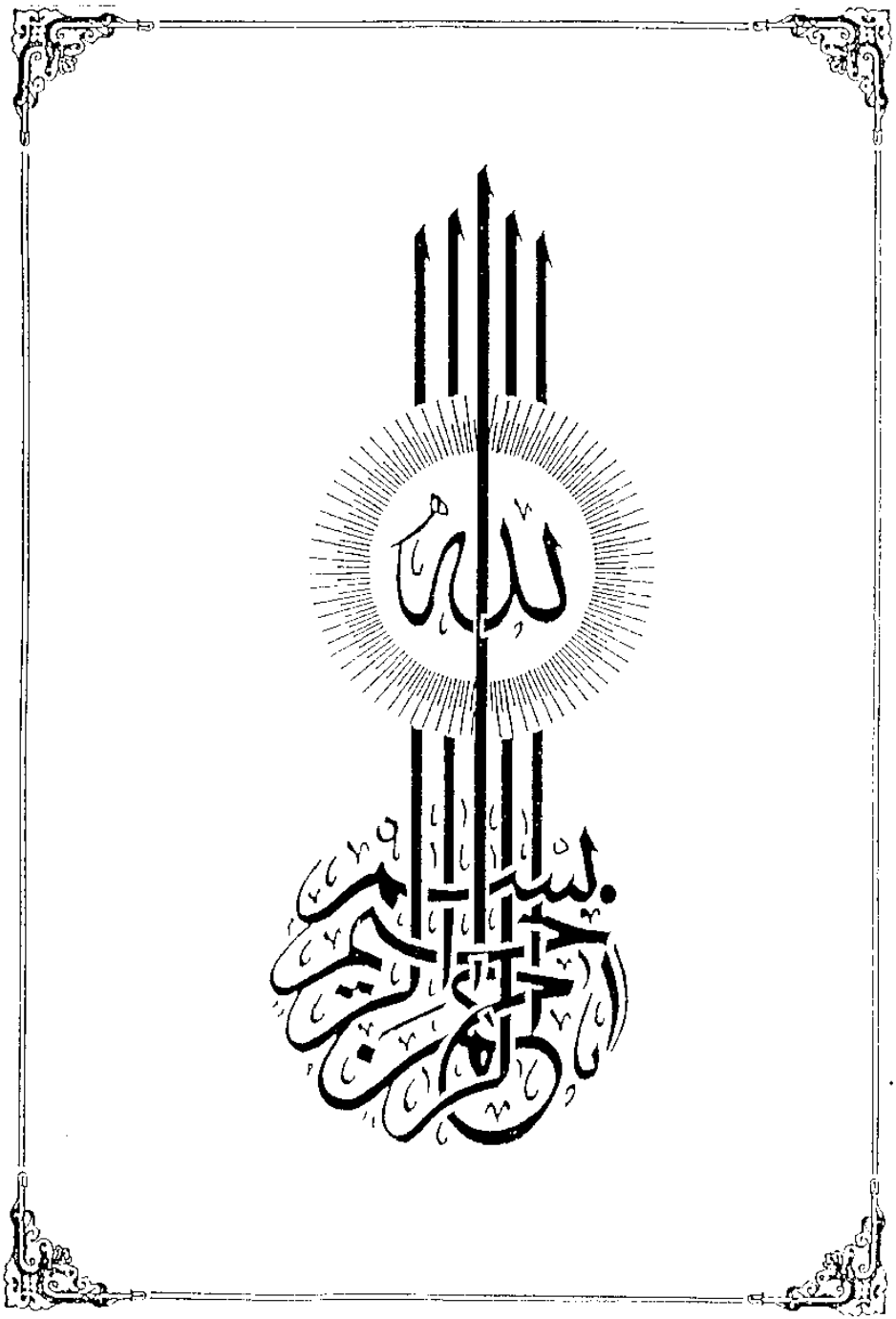
بسم الله الرحمن الرحيم

"وما أوتيتم من العلم إلا قليلا"

صدق الله العظيم

سورة الإسراء - جزء من الآية ٨٥



NOTE

The present thesis is submitted to the faculty of science, Ain Shams University in partial fulfillment for the requirements of Master of Science in Geophysics.

Beside attended ten post graduate courses for one academic year in the following topics :-

1- Field Geology and Geologic Maps
2- Statistical Geology and Computer
3- Potential Theory
4- Electric Methods
5- Magnetic Methods
6- Gravemetric Methods
7- Basement Complex
8- Sedimentary Basins
9- Structural Geology
10- Geotectonics

He has successfully passed the final examination of thesis courses, besided an English language course

Prof. Dr. A. M. Sabri

Head of Geophysics Department

Faculty of Science

Ain Shams University

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Shallow Geophysical Investigation For Abu Shaar Area In Eastern Egypt

ABSTRACT

Abu Shaar area is located at the southern part of Esh El-Mellaha range and to the north of Hurghada City in the Gulf of Suez province. It has been studied using the available geophysical data (land gravity, land magnetic and electrical resistivity). The applied geophysical data are used for determining the expected subsurface geological features, as well as the foundations and properties of the water-bearing rock units in the area under investigation.

Gravity data are interpreted starting by the residual - regional separation, accordingly the residual gravity anomalies clarify the sharp gravity maxima (shallow - seated masses) and the regional gravity anomalies reveal the broad gravity minima (deep - seated masses). However, the residual anomalies are concentrated in the northern part of the area, while the regional ones are localized in the southern part. Moreover, Linsser's technique (1967) is applied on the Bouguer gravity anomaly map to specify the fault elements dissecting the overlaying sedimentary section at consecutive depths (1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5 , 5.0 Kms), and then determining the prevailing trends of faulting that affect the study area at these depths.

Therefore, the present major tectonic elements are mainly directed NNW-SSE, NW-SE, NNE-SSW and NE-SW arranged in decreasing orders. Also; the depths to the near - surface basaltic intrusions and the deep - seated basement complex are determined using spectral analysis technique (Treitel, 1971). They are ranged between 1.4 Km for the first and 3.41 Km for the second.

Magnetic data acquired at the study area are corrected to remove the effect of daily variations. This is achieved by correlating the field data with those at Misallat base station. By this way the total intensity magnetic map is

obtained and reduced to the magnetic pole to remove the expected magnetic anomalies due to the inclination of the measured normal magnetic field. Also; residualizing the magnetic anomalies is executed on the reduced to the magnetic pole data. The depth to the basement complex is then determined by using Piatinsky (1960) and Treitel spectral analysis (1971) methods. The resulted weighted values of the depths to the basement complex are ranged between 1.4 Km and 3.2 Km. Afterward the basement tectonic elements are then established using the basement relief maps derived from gravity and magnetic interpretations. They are predominantly trending ENE - WSW crossing the Gulf shore.

Sixteen vertical electrical sounding stations are measured along the eastern and southern parts of Gebel Abu Shaar El-Qibli. Qualitative interpretation of the obtained resistivity data is achieved through the establishment of the Iso - resistivity contour maps for AB/2 = 1, 10, 20, 30, 40, 60, 80, 100, 140, 200 and 300 m., as well as the pseudo - electric cross sections and the lithofacies distribution maps for the interpreted layers. Also, quantitative interpretation is done through the analysis of the field curves in terms of electric layers of specified thicknesses and resistivities using Zohdy's method (1989), then constructing the geo - electric cross section along the layout of the electric profiles. The quantitative interpretation reveals the presence of four geoelectric layers. These layers are varied in their resistivities and rock constituents from high resistivity gravels for the first layer, to low - intermediate resistivity clayey sands for the second layer, to medium resistivity marly sands for the third layer, to high resistivity marly limestone for the fourth layer.

However, the third layer reflects the main water aquifer of the study area. It is ranged in depth from 10 m to 47m and in thickness from 18 m to 84 m. It is believed that, the contained water is originated from the rain fall on Gebel Abu Shaar and stored in the aquifer that trapped by a subsurface barrier located at the western part of the study area.

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