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MONA MAGHRABY

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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Faculty of Science

Geophysics Department

"GEOPHYSICAL PROSPECTING STUDIES TO SPECIFY THE RADIOACTIVE POTENTIALITIES AT MAKHRAG EL-EBEL AREA, SOUTH GABAL MONQUL, NORTH EASTERN DESERT, EGYPT"

A Thesis Submitted to
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for the degree of

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By

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Haitham Fathy Ahmad Hammam

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ABSTRACT

Makhrag El-Ebel area is situated in the northern part of the Eastern Desert of Egypt. It lies between latitudes 27°48'54.25''N and 27°49'28.20''N and longitudes 33° 3'31.73''E and 33° 4'8.90''E, located at about about 40 Km south west of Ras Gharib city.

The geology of the studied area is a part of the northern portion of the Late-Precambrian Arabian-Nubian Shield. It represents a part of the late Proterozoic Arabian-Nubian Shield, which in turn constitute a part of the larger Pan African Belt.

The basement rocks of Makhrag El Ebel area represent part of the Pan African belt. They comprise Dokhan volcanics which distinguished into (basic and acidic volcanic), younger granite, dolerite dykes, quartz and barite veins and wadi sediments.

Detailed ground geophysical surveys (Gamma-ray spectrometric and magnetic) were carried out on the same grid lines to delineate the structural framework and to define the radiometric anomalous zones in the study areas. In addition to Self-Potential (SP) profiles were selected to follow the radiometric anomalous zones at deeper depths.

The total-count radiometric contour map shows that, the radioactivity of the study area ranges from 3.52 Ur over Wadi sediments, basaltic andesite and dacite to 67.3 Ur over younger granite in the southern part of the study area. The (eU) radiometric map of the study area can be divided into two levels. The first level changes in values from 1.3 ppm to 3.81 ppm, locates mainly in the south and

central part over basaltic andesite and dacite trends to the EW direction. The second level changes in value from (4 to 52.87 ppm) represents the highest values and is associated with younger granite rocks, at the south part of the study area.

The equivalent thorium (eTh) map shows that the values varying from 2.04 ppm to 64.23 ppm, with an average value of about 9.23 ppm. The lowest values (2.04 ppm to 6.71 ppm) are located at the northern and western central parts of the study area. The intermediate values varying from (6.71 ppm to 10.75 ppm) are located in scattered zones in wadi deposits in the central part and also in the north eastern part due to granite wash, and it`s weathering products. While, the highest values (11 to 50 ppm) recorded over the Southern part of the study area which is associated with younger granite rocks. The Potassium (K) map shows that the values varying from 0.83 % to 6.3 %, with an average value of about 2.55 %. The highest values are located at the southern parts of the study area. Meanwhile, the lowest values are situated at the middle and northern parts of the study area.

A uranium composite image map was constructed to identify and outline the uranium anomalous zones. These maps indicate that uranium anomalous zones are displayed as bright white color areas, coinciding with the Younger granite, in the southern part in the study area so that, younger granite is considered a promising target for uranium exploration in the study area.

Through the application of the two-dimensional power spectrum technique, two main average magnetic interfaces for shallow and deep magnetic sources are 35 m and 70 m. These depths were used to discriminate the shallow and deep sources of magnetic anomalies and produced the residual and regional magnetic component maps. Also, Euler Deconvolution, and Source Parameter Image (SPI) techniques were applied to ground magnetic data to deduce the depths, contacts, dyke or sill and faults. These maps showed that N-S, E-W, NW, NNE and WNW directions. represented the important trends in the study area.

The constructed SP colored contour map of the surveyed area exhibits a wide range of amplitudes varies from -147.2 to +123.2 mV. The high negative amplitudes (from about -44.2 to -147.2 mV) can be related to strong surface mineralizations or shallow depth to top of the ore bodies, associated with mine of copper and barite mineralization associated with quartz and barite veins in the younger granite rocks. In terms of the scattered moderate negative SP amplitudes (- 8.4 to - 44.2 mV) all in the northern eastern and north western of mapped area, they can be related to ground water, as confirmed from the field observations. The relatively weak negative SP values could be related to clay or poor conductive materials within the drainage lines, while the positive SP values are mainly associated with the resistant un-mineralized granite and wadi sediments in the SP surveyed area.

The obtained results from the selected SP anomalies deduced that:

The calculated depths to centers of the selected SP anomalies are shallow, varying from 8.7 to 15.3 m and averaging about 12 m, the half-widths of the anomalous bodies range between 12.6 m and 17.6 m, with a mean value of 15.6 m. and the polarization angles (θ), which reflect the dips of the anomalies, range from 6º to 16º to North and East directions.

The Integration between geophysical results confirmed a strong relationship between high negatively Self-Potential and anomalous zone in spectrometry related to the NE-SW and E-W trends in regional basement tectonic map in the study area.

Key words: Gabal Monqul, Makhrag El-Ebel, Ground Spectrometric, Ground Magnetic, Self-Potential.

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