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Integrated Geophysical and Geological Studies to Investigate the Subsurface Structures and Groundwater Quality Around Moghra Lake, Northwestern Desert, Egypt

M. Abdelazeem[1]*, S. A. S. Araffa[1], Z. E. Salem[2], M. S. Fathy[2] and **M. Saleh[3]**
[1]National Research Institute of Astronomy and Geophysics NRIAG, Egypt
[2]Tanta University, Egypt
[3]Academy of Science, Egypt

The Egyptian Government has launched a national project to cultivate 1.5 million Acres in different desert areas that will be irrigated mainly from groundwater. About 150 thousand Acres are restricted around Moghra Lake, north Western Desert of Egypt. Geophysical, hydrogeological and stratigraphical studies are integrated to assessment the groundwater quality of the Miocene Moghra aquifer in the studied area. Stratigraphically, the Moghra Lake is cut into the clastic-dominated sediments of the lower Miocene Moghra Formation. Detailed investigations of different surface and subsurface stratigraphic sections of the lower Miocene succession have been carried out to recognize lithology, sedimentary structures, lithofacies and depositional environment of the Moghra aquifer. The transitional depositional environments could be subdivided into tide-dominated estuary, open shelf and tide-dominated delta. The highly vertical and lateral variations in the sedimentary facies of the different environments caused the heterogeneity characters of the Moghra aquifer. Geophysically, a detailed high resolution land magnetic survey has been conducted with station spacing two kilometers in order to calculate the depth to basement which in turn gives the thickness of the sedimentary cover and reveal the controlling structures. The reduced to pole map has been subjected to various filters to detect linear and nonlinear magnetic contacts in the area that may affect the flow of the water aquifer. Depths to such sources are estimated using different techniques for confirmation. The estimated depths range from 600m to 3200m. Moreover, a total of 11 VES stations of AB/2 ranging from 1-500 m to delineate the upper surface of the aquifer. Also, determining the water quality from the resistivity values of VES stations. Furthermore the chemical analyses of 20 water samples were used to investigate groundwater suitability for irrigation purposes on the basis of standard guidelines. According to TDS and TH values water was classified as very hard and saline. pH, PI, SAR, RSC, CR andIWQ categorized the groundwater samples as medium quality for irrigation purposes. Based on the results from the above analysis, an integrated model is presented summarizing the possible future plane for use of groundwater as a source for irrigation and human use.

Biography:

Maha Abdelazeem received her B.Sc. (1990) and M.Sc. (1993) from Cairo University in Geophysics, potential field interpretation. In 2001, she received her Ph.D. in potential field inversion and interpretation. She has a diploma in laser environmental application from Cairo University. She is now an associate Professor at (NRIAG). She was a visiting scientist for institutes in Germany, Slovakia, Hungary, and Crete. Currently, she is the PI for national development project in the northwestern desert of Egypt financed by the Egyptian academy of science.Her main research interests include mathematicalmodeling and inversion, programming and algorithm design, and regularizing solutions.