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Integrated geoelectrical and hydrogeological studies on Wadi Qena, Egypt

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ABSTRACT

The study of ground water resources in the arid regions has a great importance to the scarcity of water resources. So, the present work aims to identify the main aquifers in south Wadi Qena area. Wadi Qena is a wide valley in western desert and extending southwards for some 170 km from the South Galala Plateau to its broad fanning delta located on the Nile Valley plain east of Qena town. Fifty-four Vertical Electrical Soundings (VES) were measured in the study area by using AB/2 ranging from 1.5 to 1000 m. The quantitative interpretations of the field curves exhibited four geoelectrical successions and each succession is formed of seven geoelectrical units and there are two main water-bearing units act as aquifers, where the third geoelectrical unit appears in the south of the study area act as Quaternary aquifer and the sixth geoelectrical unit appears in the north of the study area act as Nubian aquifers. Ten water samples have been analyzed for different water quality parameters. The results reveal that TDS values are more than 1000 ppm where groundwater becomes unsuitable for drinking and other domestic uses and could be used for irrigation and some industrial activities under certain precautions.

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1. Introduction

The population density in Egypt is concentrated in the Nile Valley and Delta, which represents 10% of the land of Egypt while it decreases in Desert parts of Egypt. The existence of groundwater potentialities permit to the execution of reclamation projects. Therefore, the study of groundwater resources in the arid regions of the western desert has a great importance to the scarcity of water resources.

Wadi Qena is a wide valley extending southwards for some 170 km from the South Galala Plateau to its broad fanning delta

located on the Nile Valley plain, east of Qena town. The width of Wadi Qena ranges from 30 km to less than 5 km. The wadi is characterized by many ridges and high terraces with their longer axes parallel to the main course. These features represent several stages in the down-cutting of the wadi. They are mostly covered by fine silt and capped by dark desert-varnished gravels. A measure of the large sediment load carried by the Qena River during its active history is given by the area of its delta (600 km²), which may have extended also to the silt deposits west of the Nile there (Issawi, 1983). The study area lies in the southern part of wadi Qena between Latitudes 26°15'00" and 27°14'00"N and Longitudes 32°41'00" and 33°08'00"E (Fig. 1).

The present work deals with the use of geoelectrical and hydrogeological methods to study groundwater aquifer in the southern part of Wadi Qena area located in the Eastern Desert.

1.1. Geological setting

Several geologic, hydrogeological and geophysical studies were carried out by many authors such as Said (1981), Abu El-Ella (2004), Elewa et al. (2006), Elmalt (2008), El-Shami (1988),



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