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REVIEW ARTICLE

Geoelectrical exploration in the south Al Qantara Shark area for supplementary irrigation purposes – Sinai – Egypt

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Abstract Sinai development is a goal of successive governments in Egypt. The present study is a geoelectrical exploration to find appropriate solutions of the problems affecting the land of a Research Station in Southeast Al Qantara. This research station is one of the Desert Research Center stations to facilitate the development of desert land for agriculture by introducing applied research. It suffers from some problems which can be summarized in the shortage of irrigation water and water logging. The appropriate solutions of these problems have been delineated by the results of 1D and 2D geoelectrical measurements. Electrical resistivity (ER) revealed the subsurface sedimentary sequences and extension of subsurface layers in the horizontal and vertical directions, especially, the water bearing layer. Additionally it helped to choose the most suitable places to drill productive wells with a good condition.

Contents

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1. Introduction

The continuous introduction of research services and scientific guidance is an important role of development. Many research stations were constructed by the Desert Research Center covering the desert land in Egypt. One of these stations is in south Al Qantara Shark that was installed in northwest Sinai for solving the agriculture problems and is also considered as a productive station. The present study concentrates on the area of this station having length reach to 1600 m and width 850 m in the northwest Sinai that covers an area equals 1360 km^2. It lies east of the Suez Canal between Latitudes 30°47′ and 30°49′N and Longitudes 32°22′ and 32°25′E and serves as a model for the adjacent areas (Fig. 1). This station suffers from a shortage of water supply needed for agriculture in some seasons, especially, the summer season, whereas it depends on one of the El Salam canal tributaries that has a shortage of water. There is one drilled well for human activity lying just south of the study area. Due to the lack of a good drainage system, some patches of water logging appear in low land at the southwest part of the area. Geoelectrical resistivity techniques are used in the present study to deal with the previously mentioned conditions.

The geoelectrical resistivity survey techniques are used to solve many problems related to groundwater assessment, investigation, exploration and salinity. Some uses of this method in groundwater are determination of the thickness, boundaries and depths of different layers of the aquifer (Zohdy, 1989), determination of the boundary line between saline water and freshwater (El Waheidi et al., 1992; Choudhury et al., 2001), exploration of groundwater quality (Barseem, 2011; El Austa, 2000) and detection of the impact of geologic setting on the groundwater occurrence (Barseem et al., 2013). Khaled and Galal (2012) studied the impact of salt water intrusion on the groundwater occurrence. Electrical resistivity imaging surveys are widely used in many environmental and engineering studies, and also have been conducted in water covered areas (Ritz et al., 1999; Seaton and Burbey, 2000; Acworth and Dasey, 2003).

The target of this study was to solve the problems that suppressed development by carrying out geoelectrical measurements. It comprises a grid of Vertical Electrical Soundings

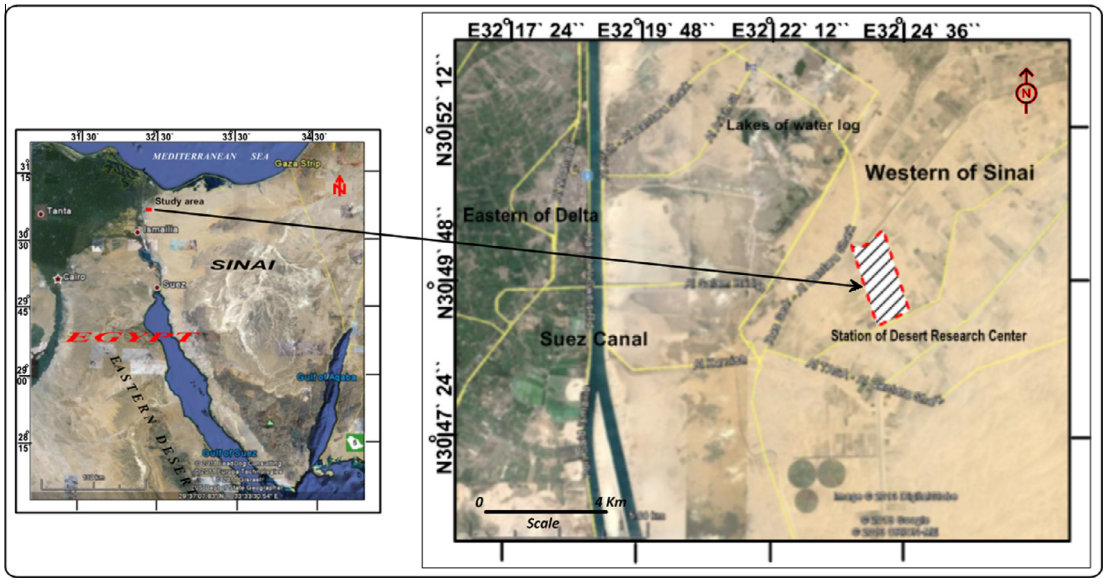

Figure 1 Location map of the Desert Research Center station at Al Qantara Shark.