AIN SHAMS UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF GEOPHYSICS

EOELECTRIC AND HYDROGEOLOGIC STUDIES ON THE QUATERNARY AQUIFER IN THE NILE VALLEY IN ASYUT AND SOHAG GOVERNORATES, EGYPT

THESIS

Submitted for the

Ph.D. Degree in Science (Geophysics)

To

Faculty of Science - Ain shams University

By

ABDEL MONAIM ABOUL FETOH ESSAM EL DIN
(M.Sc., in Hydro-geophysics)

Supervised By

Prof.Dr. MAHDY ABDEL RAHMAN
Prof. of Geophysics
Department of Geophysics
Ain Shams University

Dr. FATMA ABDEL RAHMAN ATTIA
Director of Research Institute
For Groundwater, Water
Research Center

Dr. SALAH EL DEEN MOUSA
Lecturer of Geophysics
Department of Geophysics
Ain Shams University

1994

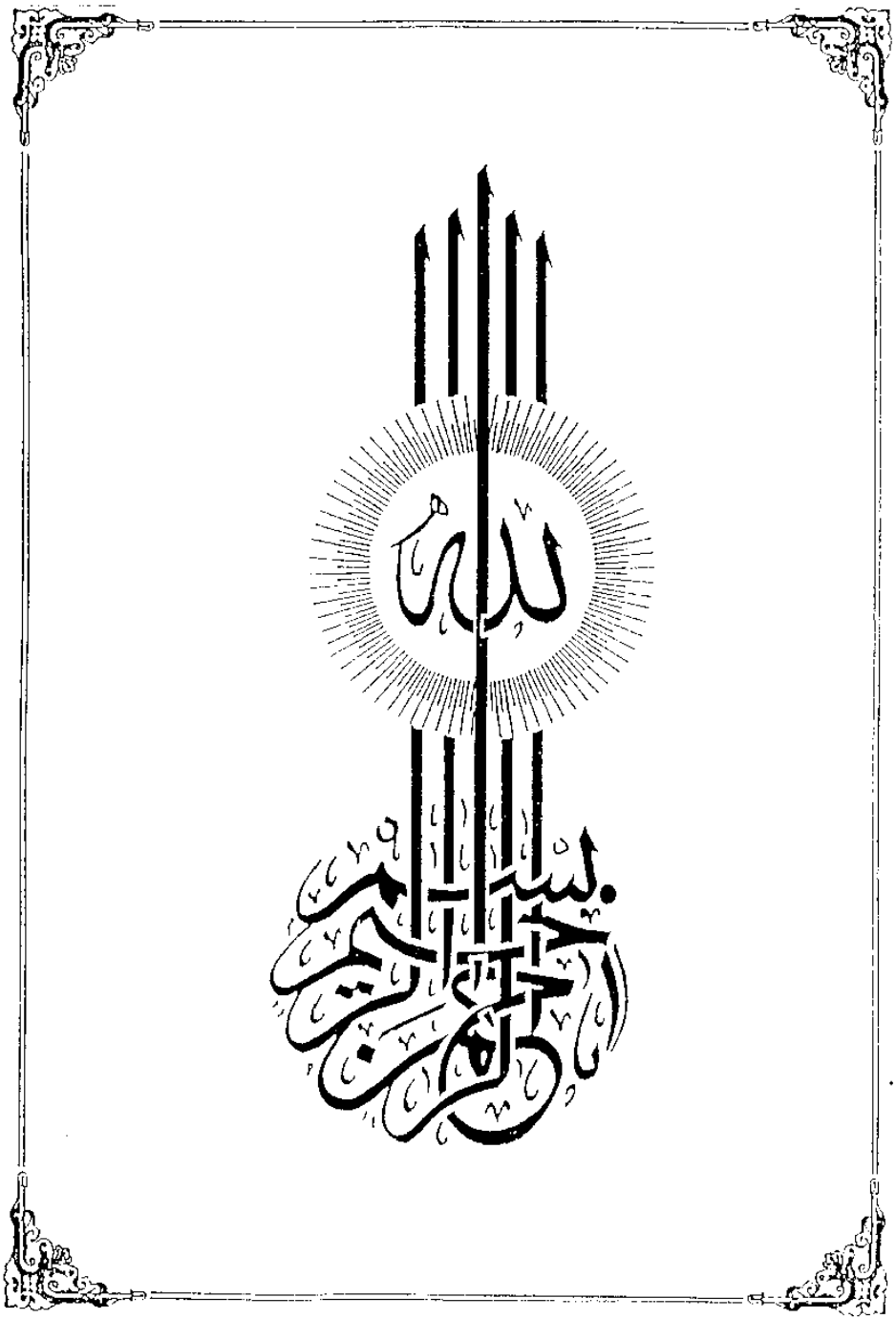
ACKNOWLEDGMENT

I present my sincere gratitude and deep thanks to Prof. Dr. Mahdy Abdel Rahman, Professor of Geophysics, Faculty of Science, Ain Shams University, for his interest, continuous encouragement and direct supervision.

Very grateful appreciation and deep thanks are expressed to Dr. Fatma Attia, Director of Research Institute For Groundwater, For her direct supervision, valuable help and continuous encouragement.

Deep thanks and sincere gratitude to Dr. Salah El Deen Abd Wahab Mousa, Department of Geophysics, Faculty of Science, Ain Shams University, for his direct supervision, great help, guidance and continuous encouragement.

Deep thanks to prof. Dr. Kamal Hefny and the staff of the Research Institute For Groundwater For their sincere cooperation.



ABSTRACT

The study area includes most of Asyut and Sohag governorates. It is part of the Nile Valley, which is striking in the NW-SE direction and lies between longitudes 30° 30' and 32° 00 E and latitudes 26° 00 N and 27° 30' N. 106 vertical Electrical Soundings (VESes) were carried out in the study area. They were distributed in 16 profiles crossing the Nile Valley. Among these profiles, only eight geoelectric sections are carefully discussed to detect the geometery and geoelectric characteristics of the Quaternary aquifer. Interpretation of the sounding curves and comparison with the available drilled wells are used to detect the aquifer geometery. The thickness of the Quaternary aquifer in the study area ranges between 160 and 310 m, in which the maximum thicknesses are detected around Manfalut and Tima cities. Another 30 VESes were carried out in Wadi El- Asyuti to assest regarding water potentiality. The thickness of Wadi El-Asuyti aquifer ranges between 80 and 275 m. Generally the Nile Valley aquifer is characterized by its medium to high potentiality, while, Wadi El-Asyuti aquifer is characterized by its low potentiality.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

PREFACE

Water is becoming more and more a critical resource. In many places water is deteriorating both in quantity and quality, creating important questions for the communities involved : Will there be enough water to sustain our future needs ? Is its quality adequate for the uses ? Is the water being used efficiently, and with a minimum waste ?

The answer to these questions dictates that, we know some basic things about the water supply, the quality of water, and its geographical and temporal distribution. Exploration for groundwater is one of the important works to answer such questions. Among field investigations, for groundwater exploration one can depend on geoelectrical surveys as a tool Geoelectrical survey is one of the cheapest tools applied in the field of groundwater investigation. One can distinguish two types of resistivity measurements. In the first, known as geoelectric profiling or mapping, the electrodes and probes are shifted without changing their relative configurations. This gives us an idea about the surface variation of resistance values within a certain depth. In the second method, known as geoelectric sounding, the position of the electrodes are changed with respect to a fixed point (known as the sounding point). In this way, the measured

resistance values at the surface reflect the vertical distribution of resistivity values in a geoelectrical section. In this research, the resistivity sounding, (Schlumberger array has been applied). The geoelectrical field survey gives us some knowledge about surface and structural geology of the study area and few about the lithology of the formations. These data are needed essentially to support and emphasize the interpretation of the field measurements. Money and effort can be saved by using this method of exploration through the reduction of the amount of executional work (drilling of bore holes). Hydrogeological information are also needed to give a complete picture about the aquifer.

CHAPTER I

CHAPTER 1

INTRODUCTION AND PREVIOUS GEOPHYSICAL STUDIES

This work deals with a region in Upper Egypt, extending between Assiut and Sohag, as shwon in figure (1).

1.1. General setting of the study area

The study area includes most of the area of Asyut and Sohag governorates. This area is part of the Nile Valley striking in the NW-SE direction. It lies between longitudes 30° 30\ and 32° 00 E and latitudes 26° 00 and 27° 30\ N (Fig. 1). It covers a total length of about 200 km. The width of the valley in the area varies from 16 km to 25 km and increases at the areas, which are characterized by the presence of wadis.

1.2. Climate

The climate in the study area is arid and can be explained through many items. These items include temperature, evaporation and evapotranspiration, relative humidity, wind velocity, and rainfall.

The average maximum mean temperature is recorded during July and equals 30°C; while the minimum is recorded during January and equals 12°C. Temperature is considered as the main factor affecting the degree of evaporation.