

112--/2

THE STRUCTURAL IMPLICATION OF SOME OF THE SEDIMENTARY BASINS
IN THE NORTHERN EASTERN PART OF THE WESTERN DESERT
USING GEOPHYSICAL DATA.

THESIS

SUBMITTED FOR THE PARTIAL FULFILMENT OF THE
REQUIREMENT FOR THE DEGREE OF
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IN
GEOLOGY
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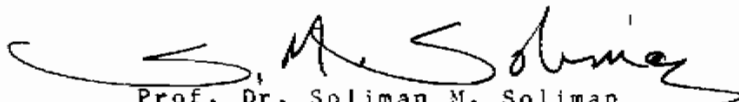
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The present thesis is submitted to the Faculty of Science Ain Shams University in partial fulfilment for the requirements of the M.Sc. degree in "Applied Geophysics". Beside the research work materialized in this thesis, the candidate has attended ten post-graduate courses for one academic year in the following topics:

- Geophysical Methods
- Geophysical Prospecting
- Applied Geophysics
- Field Geology and Surveying
- Structural Geology
- Geomorphology
- Geotectonics
- Photogeology
- Sampling
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CONTENTS

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Subject	Page
ABSTRACT	i-iii
CHAPTER I	
INTRODUCTION	1
CHAPTER II	
PREVIOUS WORK	4
II.1. Introduction	4
II.2. Topography and Geomorphology	6
II.3. Surface Geology	9
II.4. Subsurface Stratigraphy	11
II.5. Structure	28
II.6. Geologic History	33
II.7. Previous Geophysical Work	35
CHAPTER III	
SEISMIC ANALYSIS	40
III.1. Introduction	40
III.2. Seismic Data	42
III.3. Velocity Data	42
III.4. Geoseismic Characteristics	52
III.5. Seismic Aquisition and Processing	54
III.6. Seismic Interpretation	55

A. Time Maps	56
B. Depth Maps	65
C. Isopach Maps	71
CHAPTER IV	
GRAVITY DEPTH COMPUTATION USING	85
SPECTRAL ANALYSIS TECHNIQUE	
IV.1. Introduction	85
IV.2. Basic Principles	86
IV.3. Method of Spectral Analysis	89
IV.4. Results of Spectral Analysis	91
CHAPTER V	
GRAVITY METHOD	112
V.1. Isolation of Gravity Anomalies	113
V.2. Qualitative Interpretation of Gravity Data	116
V.3. Discussion of Gravity Interpretation Map	123
CHAPTER VI	
SEISMIC AND GRAVITY TREND ANALYSIS	127
- Discussion	128
CHAPTER VII	
CONCLUSIONS	139
REFERENCES	145

7/

LIST OF FIGURES.

Fig.No.		Page
1	Location map of the studied area.	5
2	Geomorphologic map of the studied area.	8
3	Generalized column of subsurface stratigraphy of the North Western Desert.	12
4	Composite Log of BAX-1 well.	24
5	Composite Log of NWD 310-1 well.	25
6	Composite Log of SHALTUT-1 well.	26
7	Composite Log of AEB-1x well.	27
8	Shot-Point Location map of the studied area	43
9	Velocity survey and Sonic data of BAX-1 well	45
10	Velocity survey and Sonic data of SHALTUT well	46
11	Velocity survey and Sonic data of AEB-1 well	47
12	Average velocity map to top Qatrani Formation	48
13	Average velocity map to top Abu Hash Formation	49
14	Average velocity map to top Alamein Formation	50
15	Seismic line (i)	61

16	Seismic line (23)	61
17	Seismic line (5)	62
18	Depth model of line (1)	63
19	Depth model of line (23)	63
20	Depth model of line (5)	64
21	Alamein Formation Isopach map	73
22	Kharita Formation Isopach map	74
23	Bahariya Formation Isopach map	75
24	Abu Roash Formation Isopach map	76
25	Isopach map between Alamein and Abu Roash Tops	79
26	Khoman Formation Isopach map	80
27	Gindi Formation Isopach map	81
28	Qatrani Formation Isopach map	82
29	Isopach map between Abu Roash and Qatrani Tops	83
30	Spectral energy plot of profile A-A'	93
31	Spectral energy plot of profile B-B'	94
32	Spectral energy plot of profile C-C'	96
33	Spectral energy plot of profile D-D'	98
34	Spectral energy plot of profile E-E'	99
35	Spectral energy plot of profile F-F'	100
36	Spectral energy plot of profile G-G'	102

37	Spectral energy plot of profile H-H'	103
38	Schematic representation of Griffin's method	114
39	Frequency % of Top Qatrani Formation Trends	131
40	Frequency % of Top Abu Roash Formation Trends	131
41	Frequency % of Top Alamein Formation Trends	131
42	Frequency % of Residual gravity map (r=5km)	132
43	Frequency % of Bouguer gravity map	132

71

LIST OF TABLES

NO.		Page
1	Previous Geophysical work	36
2	Comparative Depth estimation from Gravity and Seismic data (Long Profile)	105
3	Comparative Depth estimation from Gravity and Seismic data (Short Profile)	107-110
4	Trend analysis of seismically constructed tops	129
5	Trend analysis of gravity data	130
6	Summary of Tectonic trends affecting the studied area	133

4

LIST OF PLATES IN POCKET

NO.

- I Top Qatrani Formation Two-way Time map
- II Top Abu Roash Formation Two-way Time map
- III Top Alamein Formation Two-way Time map
- IV Top Qatrani Formation depth map
- V Top Abu Roash Formation depth map
- VI Top Alamein Formation depth map
- VII Spectral Analysis Profiles map
- VIII Bouguer Gravity map
- IX Regional Gravity map ($r=2$ km)
- X Residual Gravity map ($r=2$ km)
- XI Regional Gravity map ($r=5$ km)
- XII Residual Gravity map ($r=5$ km)
- XIII Interpreted Gravity map

ABSTRACT

The studied area is located in the northeastern portion of the Western Desert and covers a surface area of about 5220 km². It lies between Latitudes 30° 30' - 31° 00' N and Longitudes 29° 00' - 30° 00' E. No prominent physiographic features are observed in this area. The surface geology of this area is not considered of complex nature. This area is covered mainly by Pliocene-Quaternary sediments.

This study is based on interpretation of seismic and gravity data. In order to analyse the tectonic evolution of the studied area ; three average velocity maps , three time maps and three equivalent depth maps were constructed for three selected tops. From these maps , it is to be noted that there are minor changes in the physical properties within the Cretaceous and remarkable changes between Cretaceous and Oligocene times. Isolation of gravity anomalies into regional and residual components was done using Griffin's method , taking into consideration the depth results of spectral analysis technique.

5/

Trend analysis was performed for the three seismically constructed structure depth maps ; on tops of Qatrani Formation , Abu Roash Formation and Alamein Formation ; gravity Bouguer map and the residual gravity map. The trend analysis frequency diagrams show three major tectonic trends ; N-S , E-W and WNW ; and three minor trends ; ENE , NW and NNE.

Depth determination for the deep-seated as well as the shallower sources was carried out for gravity data by using the spectral analysis technique. This technique was applied for (8) long gravity profiles as well as (46) short profiles. Results of this technique revealed more than one depth level for the sources of the gravity anomalies. The depth to basement ; as derived from spectral analysis ; within the studied area ranges between 4.5 km and 6.5 km. It is to be noted that there is a good correlation between depth values ; obtained from spectral analysis of gravity anomalies ; and depths obtained from seismic data.

The interpreted gravity map was constructed by using the integrated previous information. This map represents the tectonics of nearly deep-seated rocks. It reflects four major sets of faults which are distributed as follows :

1- The ENE system of faults which is located in the north-central portion of the studied area and bound the coastal ridge and coastal basin.

2/

2- The WNW system of faults which cut across the south-western portion of the investigated area. This system of faults bound the Alamein-Wadi El Natrun uplifted structure.

3- The NNE system of faults which is located in the southeastern portion of the studied area and bounds the easterly basin.

4- The fourth system of faults represented by a group of faults of varying trends as N-S , E-W and NW-SE which dissect the major structure.

31

CHAPTER I

INTRODUCTION

5/