بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

Ain Shams University
Faculty of Science
Geology Department

Structural geology and Seismotectonics of Wadi Hagul Area, East of New Cairo, Egypt

A Thesis
Submitted in Partial Fulfilment of the Requirements for the Degree of Master of Science in Geology

By
Khaled Saad Azbawy Mohammed
B.SC. in Geology, 2013 Al-Azhar University

Supervised by

Prof. Dr. Mahmoud Samy Mohamed Yousif
Professor of structure geology, Faculty of science, Ain Shams University

Prof. Dr. Ahmed Sayed Abu Elata
Professor of applied geophysics, Faculty of Science, Ain Shams University

Prof. Dr. Ahmed Hosny Ali
Professor of Seismology, National Research Institute of Astronomy and Geophysics, NRIAG

Ain Shams University
Faculty of Science
Geology Department
2020

Ain Shams University
Faculty of Science
Geology Department

Structural geology and Seismotectonics of Wadi Hagul Area, East of New Cairo, Egypt

A Thesis
Submitted in Partial Fulfilment of the Requirements for the Degree of Master of Science in Geology

By
Khaled Saad Azbawy Mohammed
B.SC. in Geology, 2013 Al-Azhar University

Supervised by

Prof. Dr. Mahmoud Samy Mohamed Yousif
Professor of structure geology, Faculty of science, Ain Shams University

Prof. Dr. Ahmed Sayed Abu Elata
Professor of applied geophysics, Faculty of Science, Ain Shams University

Prof. Dr. Ahmed Hosny Ali
Professor of Seismology, National Research Institute of Astronomy and Geophysics, NRIAG

Ain Shams University
Faculty of Science
Geology Department
2020

Approval Sheet

Structural geology and Seismotectonics of Wadi Hagul Area, East of New Cairo, Egypt

By

Khaled Saad Azbawy Mohammed

Supervisors: Approved

Prof. Dr. Mahmoud Samy Mohamed Yousif ……

Professor of Structure Geology, Faculty of science, Ain Shams University

Prof. Dr. Ahmed Sayed Abu Elata ……..

Professor of Applied Geophysics, Faculty of Science, Ain Shams University

Prof. Dr. Ahmed Hosny Ali ……

Professor of Seismology, National Research Institute of Astronomy and Geophysics, NRIAG

Chairman of Geology Department

Dr. Karim W. Abdelmalik

……

Note

The present thesis is submitted to the Faculty of Science, Ain Shams University in partial fulfilment of the requirements for the Degree of Master of Science in Geology, besides the research work materialized in this thesis, the candidate attended eleven post-graduate courses for one academic year in the following topics:

1. Field Geology.
2. Geostatistics.
3. Sedimentary Petrology.
4. Sedimentation.
5. Advanced Structural Geology.
6. Geotectonics.
7. Advanced Lithostratigraphy.
8. Biostratigraphy.
9. Photogeology.
10. Geomorphology.
11. English Language.

In addition, the author passed the final exam of these courses held in September 2015.

Chairman of Geology Department

Dr. Karim W. Abdelmalik

…….

Faculty of Science
Geology Department

Name: Khaled Saad Azbawy Mohammed

Scientific Degree: M.Sc.

Department: Geology

Faculty: Science

University: Al-Azhar

Graduation Year: 2013

Year of Grant: 2020

Abstract

In the present study, by utilizing remote sensing data of Landsat 8 satellite, and applying several digital processing and enhancement techniques, the different rock units and the lineaments trends in the wadi Hagul area have been studied.

The results obtained from the Landsat 8 data interpretation showed the surface distribution of the rocks, where the central part of the study area contains the older rocks, while the northern and southern parts contain the younger rocks. Based on the lineaments extracted and the structural mapping, the study area represents a structurally high area between Wadi Ghowiba basin at the south and the Cairo-Suez basin at the north and as well as the Gulf of Suez rift basin at the east.

Two main trends are easily recognized and traced, where the E-W trend is more common and considered as the northern termination of G. Ataqa and G.Abu-Treifiya El Nuqra block, and deforms the central and southern parts of this major cuesta The NW-SE (300° and 315°) striking faults are considered, as the common Gulf trend and it's shaping Wadi Hagul area, as a low land between G. Ataqa and G.Abu-Treifiya El Nuqra fault blocks. A third trend is directed NE-SW, to complete the surface structural trends of the concerned area.

Also by using tele-seismic earthquakes recorded by Hagul seismic station and applying the powerful receiver function technique and joint inversion of surface wave dispersion, the crust and uppermost mantle structure of Wadi Hagul area is investigated. In addition, the characteristics of the Moho discontinuity and the rock properties of the crust as represented by computing the Vp/Vs (velocity of primary and secondary waves) ratio beneath the study area are discussed.

The obtained Receiver function and joint inversion results revealed that, the crustal thickness (or the Moho Depth) beneath the Hagul area is detected at ~ 34 km and the average Vp/Vs ratio is computed at~ 1.82, which is considered relatively a high ratio. This noticed Vp/Vs high ratio may be due to the effect of the sedimentary column covering the crust, which is characterized by low shear wave velocity. In addition, this ratio may be due to the existing of geologic structures (faults or folds) in the shallow crust of Wadi Hagul area.

The crust under Hagul area is characterized by low velocity zone at a very shallow depth (1-3 km), representing the sedimentary cover and intense geological structures and intersection of faults area.

At a depth of ~ 34 km, the shear wave velocity gradient detected the Moho discontinuity under the Hagul area, which is a gradational interface within a zone of 2 km thickness. This velocity gradient (4.3 - 4.5 km/s) indicates the influence of the Gulf of Suez rift system on the lower crust of the study area.

When considering the dipping of the Moho interface beneath the study area, results of different oriented receiver functions (computed from varying directions around Hagul seismic station) showed a flat Moho interface without any observed significant dipping.

When comparing results with the other previous studies that have been conducted on a very near area (the Kattamia area), it is found a similarity in the results, where both of them revealed a flat Moho interface beneath this region. Thus, our results verify a non-undulated Moho discontinuity beneath that area and indicate that, the Hagul and its near vicinity areas have been tectonically affected by a similar old tectonic phenomenon that is the Gulf of Suez rift system.

Acknowledgments

First and foremost, praises and thanks to Allah, the lord of all creatures who tough man the whole science and the names of all things.

I would like to express my sincere gratitude to my advisors Prof. Dr. Mahmoud Samy Youssif, Prof. Dr. Ahmed Sayed Abu Alata, and Prof. Dr, Ahmed Hosny for their continuous support of my M.Sc. study and research, for their patience, motivation, enthusiasm, encouragement and immense knowledge. Their guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better advisors and mentors for my M.Sc. study.

I express my science thanks to the National Research Institute of Astronomy and Geophysics (NRIAG) and the head of the Seismology Department of NRIAG for providing the seismic data used in this study.

I am extremely grateful to my parents for their love, prayers, caring and sacrifices for educating and preparing me for my future. I am very much thankful for their love, understanding, prayers and continuing support to complete this research work. Also I express my thanks to my wife, brother and sisters.

Tables of contents

Chapter II Remote Sensing