



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



MONA MAGHRABY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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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

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Approval Sheet

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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.
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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. Ataq 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. Ataq 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 V_p/V_s (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 V_p/V_s ratio is computed at ~ 1.82 , which is considered relatively a high ratio. This noticed V_p/V_s 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.

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