بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

Geomechanical properties of Upper Cretaceous-Eocene carbonates forming the foundations of El Galala City, El Galala El Bahariya, Egypt

Thesis Submitted to Faculty of Science, Ain Shams University for partial fulfillment
M. Sc. Degree in Science (Geology)

By

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B. Sc. in Geology, Ain Shams University

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الخواص الجيوميكانيكية لصخور الطباشيري العلوي-الايوسين الجيرية المكونة لطبقات الاساس لمدينة الجلالة، الجلالة البحرية، مصر.

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مــن

احمد محمد عبد الوهاب الشقر

بكالوريوس العلوم في الجيولوجيا

تحت إشراف

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Approval sheet

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To

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Note

The present thesis is submitted to the Faculty of Science, Ain Shams University, in partial fulfillment of the requirements for the degree of Master of Science in Geology.

In addition to the research work materialized in this thesis, the candidate has attended the following post-graduate courses for one year in the following topics:

1. **Advanced Structural Geology**
2. **Geotectonic**
3. **Advanced Lithostratigraphy**
4. **Biostratigraphy**
5. **Geomorphology**
6. **Remote Sensing**
7. **Sedimentation**
8. **Sedimentary Petrology**
9. **Field Geology**
10. **Geostatistics**

He successfully passed the final examination in these courses.

In fulfillment of language requirement of the degree, he also passed the final examination of course in the English language.

Head of Geology Department

Dr. Karim Wageh Abdelmalik

Key Words

1. **Geomechanical of rocks**
2. **Minerology**
3. **El Galala El Bahariya**
4. **Strength**
5. **Rock Failure**
6. **Solubility Potentiality**

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CHAPTER I

Introduction and Methodology

Engineering geology is the basic science that is concerning with the investigation, study and providing geological solutions for the engineering problems, which may arise as the result of the interaction between geologic conditions under the engineering projects. Most subsurface, and even some surface, engineering projects cannot be carried out adequately without the essential role of geological studies **(EI-Ramli, 1985).**

1.1 Location of Study Area

The Upper Cretaceous- Eocene carbonate rocks that forming the cap unit of the eastern part of El Galala El Bahariya plateau (Northern Galala) are selected to be the target of the present study, where there exist many investment projects, such as El Galala city that is currently constructed on the top surface of this plateau.

El Galala El Bahariya is a high flat topped plateau and is one of the most impressive topographical features in the northern part of the Eastern Desert **(Abd-Elshafy and El-Azeam, 2010)**.

The study area is one of the most promising areas for investment and urbanization as well as industrial developments in Egypt. Since late seventies, Egypt has planned to construct new settlements within an ambitious program to construct new communities to redistribute population and economic activities and creating job opportunities.

The study area is located in the northwestern part of Gulf of Suez, which includes the eastern edge of El Galala El Bahariya plateau. The study area is defined by Latitudes 29°15′ and 29°35′ N and Longitudes 32°15′ and 32°35′E **(Fig 1.1).**

1.2 Accessibility

El Galala El Bahariya lies to the southeast of Cairo region, anyone can reach this area directly by Ain-Sukhna- Zaffrana road. This coast road runs parallel to the shoreline, where El Galala El Bahariya plateau exists to the west as the Gulf of Suez

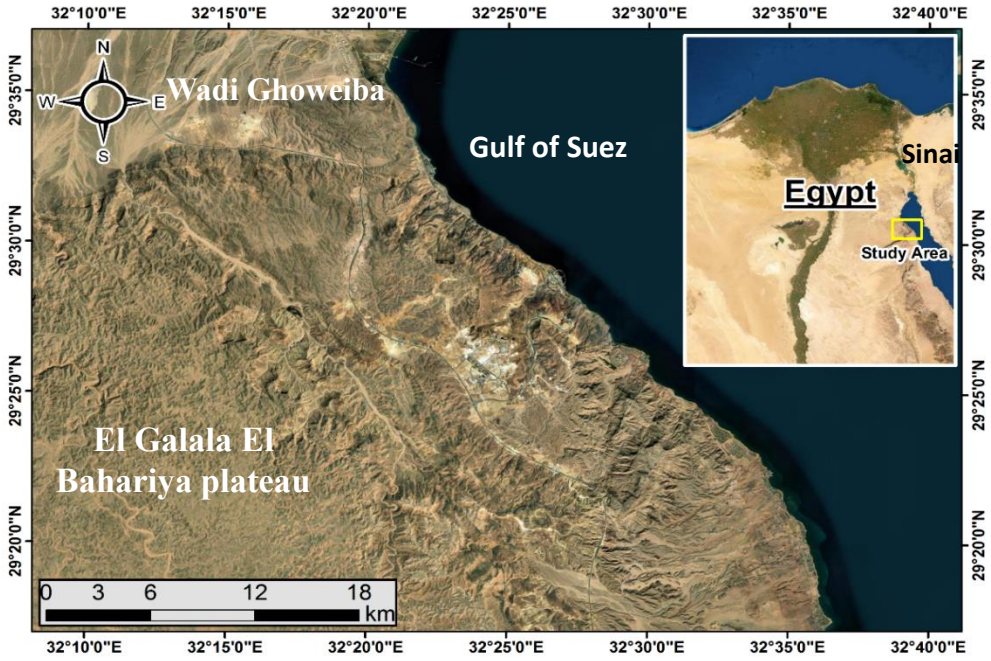
exists to the east. This road is fairly accessible. New Galala road constructed ascending El Galala El Bahariya from north to south that facilitated the present study and sampling process. Coastal and new Galala road are connected in the middle latitude of El Galala El Bahariya plateau by a NE oriented pumping stations road.

1.3 Geomorphology

The geomorphological features that occurred in and around El Galala El Bahariya were studied by several workers **(Sadek, 1926 ; Aly, 1999 ; El-Behiry et al., 2006 and Sakr, 2019).**

The eastern side of El Galala El Bahariya plateau is represented by a nearly vertical cliff side that ends gently with narrow pediments that overlooks shoreline. From the north, the plateau is bounded by wadi Ghoweiba plain, and from south by wadi Araba plain. Wadi Ghoweiba represents one of the most known drainage basin in the North-Eastern Desert **(Fig 1.1).**

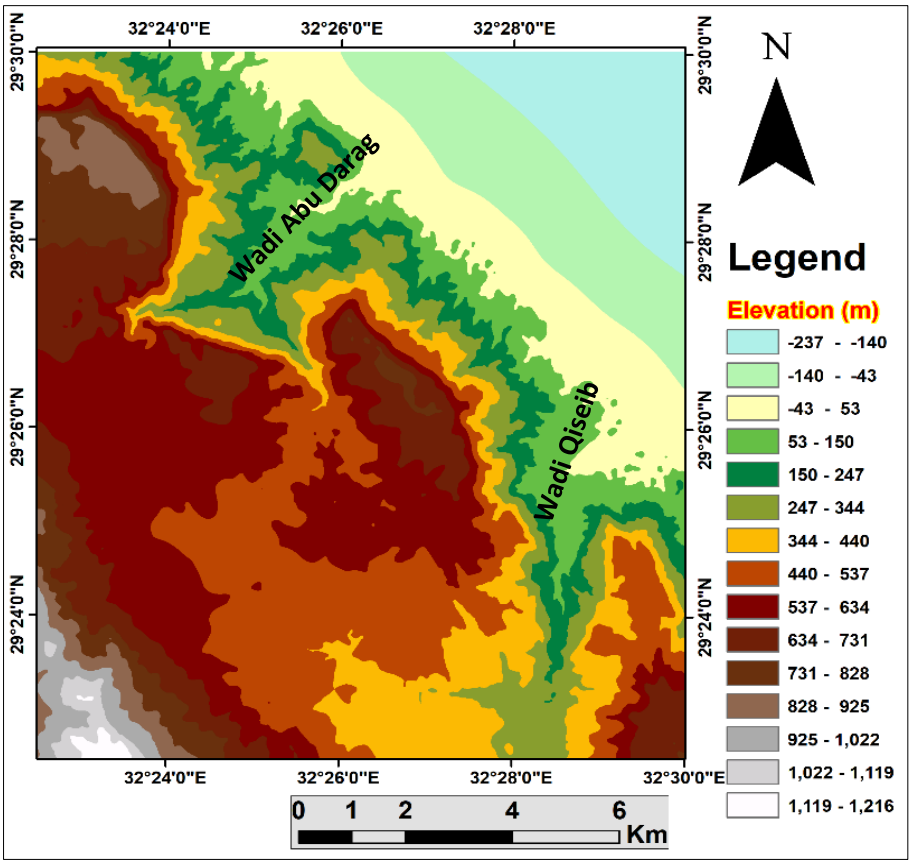
El Galala El Bahariya plateau overlooks the Gulf of Suez rising 977 m above sea level at Gebel Umm Russeies, and is dissected by some wadis, runs from west to east. El Galala El-Bahariya plateau is capped by hard Eocene carbonate beds that are characterized by karst features with different sizes.



(Fig 1.1) Location map of the study area

By using Arc GIS 1.5 software, topographic contour map on a scale of (1: 25.000) were converted to a Digital Elevation Model (DEM) covering mainly the eastern part of El Galala El Bahariya plateau. It shows an increasing in the elevation from sea level (to the east) to the highest area on the top of the plateau attaining more than 1000 m. There are two wadies that dissected this part of the plateau and drain the water and weathering products from the plateau body into the east where the Gulf of Suez basin **(Fig 1.2).**

From the DEM, a slope map was constructed to clarify the variation in the slope angles from gentle slope parts to steep slopes parts (cliffs). The map indicates that there is a common cliff in the middle part of the map that have a high slope angle while the other parts have constant gentle slope angles **(Fig 1.3).**



(Fig 1.2) Digital Elevation Model (DEM) of the eastern part of El Galala El Bahariya plateau showing the dissecting wades.