STRUCTURAL ANALYSIS AND TECTONICS OF A SEGMENT OF THE HAMMAM FARAUN AREA, SINAI PENINSULA

BY
MAMDOUH M. ABDEEN
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NOTE

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

Besides the research work materialized in this thesis, the candidate has attended ten, one-semester, post - graduate courses in the following topics:

1. Structural Geology.
2. Geotectonics.
3. Mapping and Field Geology.
4. Photogeology.
5. Geomorphology.
6. Stratigraphy.
7. Sedimentary Petrology.
8. Petrophysics.
9. Formation Evaluation.
10. Laboratory Techniques.

He successfully passed the final examinations in these courses.

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

Prof. Dr. Soliman M. Soliman

Chairman of the Department of Geology

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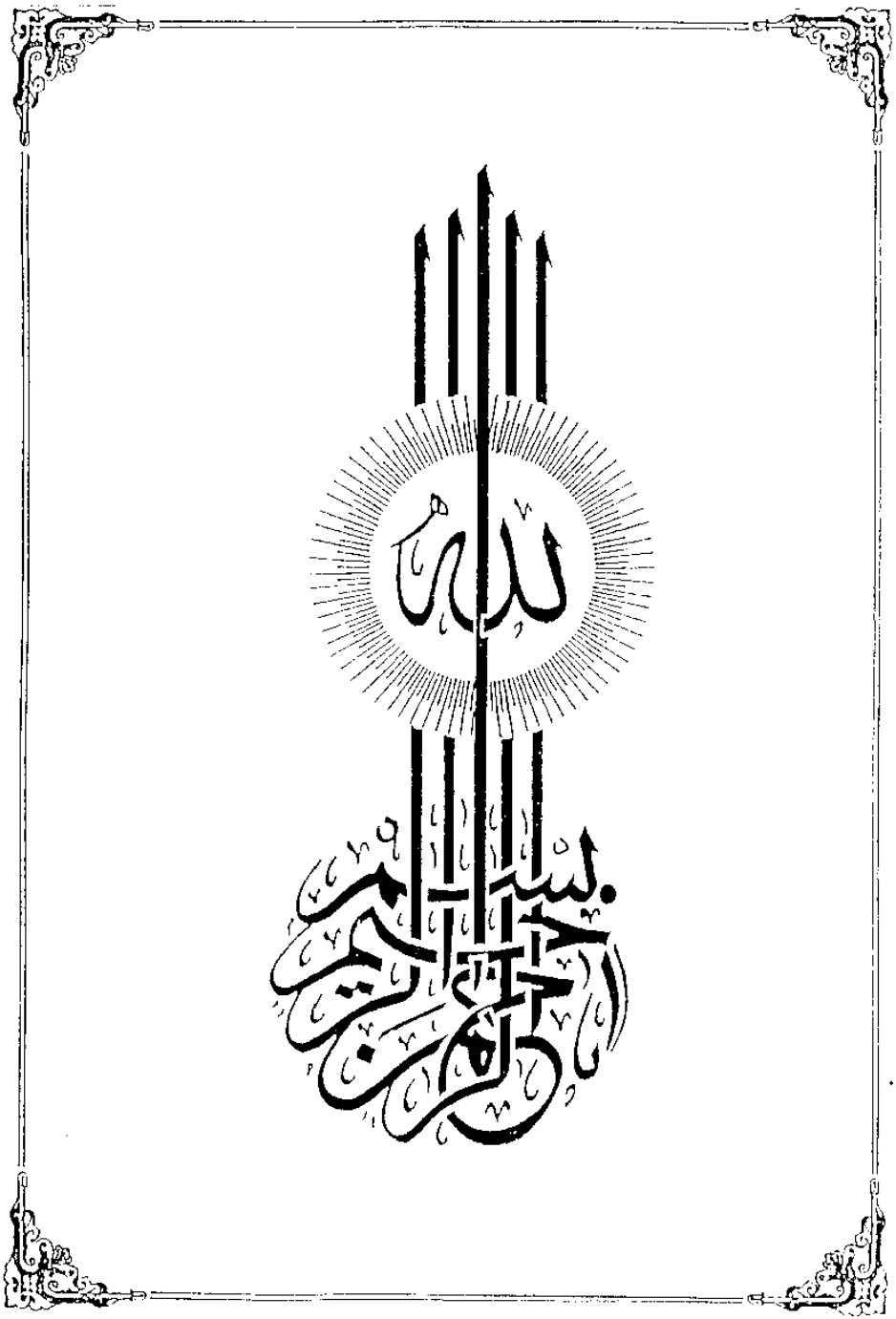

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ABSTRACT

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Field mapping of a large segment of the Hammam Faraun block indicates that it has a predominant northeast direction of dip. Pre-Miocene sedimentary rocks are about 2000 metres thick and are unconformably overlain by a 386 meters thick Lower Miocene clastic section.

This area is highly dissected by faults oriented northwest, north-northwest, east-west to west-northwest, and north-south to north-northeast. The angles of dip of 72 faults indicate that the northwest and north-northwest faults dip 60^{o}-90^{o} while the north-south to north-northeast faults generally dip at an angle less than 60^{o}. Slickensides indicate that the northwest faults are normal or right-lateral diagonal-slip, the north-northwest faults are only normal; and the north-south to north-northeast faults are normal, right-lateral diagonal-slip, or left - lateral diagonal-slip.

The area is divided into eight subareas (sub-blocks), each has a characteristic structural style and dip direction(s). These are the Wadi Nukhul subarea, Gebel Matulla subarea, Gebel Sarbut El Gamal subarea, Wadi Taiyba subarea, Gebel Hammam Faraun - Gebel Thal subarea, Gebel Abu Ideimat subarea, North-central subarea, and the Easternmost subarea.

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The rift bounding fault has segments oriented north-northwest, northwest, and north-northeast. The northwest and north-northwest fault segments of the rift bounding fault are listric. The downthrown sides are rotated and dip toward these fault segments. Small blocks bounded by such faults form rollover anticlines and have collapsed crests. Southwest dip direction exists on the upthrown sides of major faults and is caused by the drag on these faults.

Gliding on the lowermost horizontal segment of a listric normal fault perhaps exists in the eastern part of the Gebel Matulla subarea. The downthrown block was not rotated and is bounded by monoclines at its boundaries with the neighbouring rotated blocks. A hung block existed close to the eastern fault boundary of the Gebel Matulla subarea and apparently collapsed by a spoon-like antithetic fault.

The onset of the structural deformation in the area was marked by the Oligo-Miocene magmatic event. Northeast extension affected the area forming the north-northwest oriented faults and rejuvenated a northwest oriented , pre-existing fault at the westernmost side of the area. This fault has a predominant dip-slip movement and a subordinate right-lateral strike-slip movement. The latter perhaps caused

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east-west to east-southeast - west-northwest directed extension that probably formed the north-south to north-northeast oriented faults.

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