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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MONA MAGHRABY

Ain Shams University
Faculty of Science
Geology Department

Structural study of fault damage zones in the area between Wadi Baba and Wadi Araba (eastern side of the Suez rift)

A Thesis submitted for the degree of Doctor of Philosophy in Geology

By

Hany Sobhy Sayed Hassan

(B. Sc., Faculty of Science, Ain Shams University, 2003)
(M.Sc. in Geology, Faculty of Science, Ain Shams University, 2011)

To

Geology Department
Faculty of Science, Ain Shams University

Supervised by

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2020

Ain Shams University
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Approval Sheet

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2020

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ABSTRACT

The present work is based on detailed outcrop studies of damage zones of selected normal faults which dissect the Nubia Sandstone in the area extending between Wadi Baba in the north to Gebel Ekma in the south in the eastern side of the Gulf of Suez rift. 17 normal faults with different displacements have been studied in order to define the fault-damage zone geometry within the Nubia Sandstone. These faults represent the three main fault orientations of the rift, NNW-SSE (rift-parallel), NNE-SSW (rift-oblique), and E-W (cross faults). The studied faults have been measured in 9 stations that contain 15 scanlines (5 stations with 12 scanlines in Baba-Sidri area and 4 stations with 3 scanlines in Ekma Block).

The fault-damage zones investigation in the study area led to deep understanding of: 1- The relationship between the deformation in the damage zones and the regional stress field and the strain due to fault displacement where rift-parallel faults have structures in their damage zones aligned parallel to the rift whereas rift-oblique faults have structures in their damage zones oriented in two main directions, parallel to the fault itself and parallel to the rift. 2- The width and type of the fault-damage zones are controlled by many factors such as competency contrast between the two sides of the fault, lithology, the major stress affecting the area, strain resulting from the fault displacement, the thickness of the sandstone beds, and the amount of fault displacement. 3- The geometry and width of fault core in the Nubia Sandstone are controlled by factors such as the fault displacement and the vertical lithologic variations. Minor faults within the Nubia Sandstone have no clear displacement and their cores are represented

by white powdered sandstone (cataclasite). 4- There is a direct proportional relationship between the width of the fault core and the fault displacement of minor normal faults but for faults with displacement equal to or exceeding 100 meters, the relationship between the width of the fault core and the fault displacement is not linear. 5- The deformation bands in the fault-damage zones have three types; cataclastic deformation bands (compacted shear deformation bands), pure-shear enhanced compaction bands and slip deformation bands. These deformation bands exist in two conjugate sets, parallel and conjugate to the fault. They change in width along strike of the fault and vertically. According to thin-section study, deformation bands are formed by cataclasis of sandstone where sand grains are fractured into fine-grained angular material (ultracataclasite). Such ultracataclasite will act as baffles to fluid flow across the fault.

Key words: Fault-damage zone, deformation bands, fractures, fault-propagation fold, Gulf of Suez

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