بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــسـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

AIN SHAMS UNIVERSITY
FACULTY OF SCIENCE

AN ATTEMPT TO EARTHQUAKE PREDICTION USING TECTONO-MAGNETIC STUDIES

A Thesis
Submitted To The Geophysical Department,
Faculty Of Science, Ain Shams University

for
DOCTOR OF PHYLOSOPHY

BY

AHMED SALEH MOHAMED MOUSTAFA
(M. Sc. GEOPHYSICS)

SUPERVISED BY

PROF. DR. : A. S. A. ABU EL-ATA
Prof. of Geophysics,
Geophysics Dpartment,
Faculty of Science,
Ain Shams University

PROF. DR. : A.SCHULT
Prof. of Applied Geophysics,
Iinstitute of Geophysics,
Ludwig Maximilians University
Munich, Germany

PROF. DR. : A.G. HUSSAIN
Prof. of Geophysics and Heead of
Geomagnetic, Geoelectric and
Gravity Department,
National Research Institute of
Astronomy and Geophysics

PROF. DR.: F.M. AHMED
Prof. of Geophysics and Head of
Geomagnetic Laboratory,
National Research Institute of
Astronomy and Geophysics

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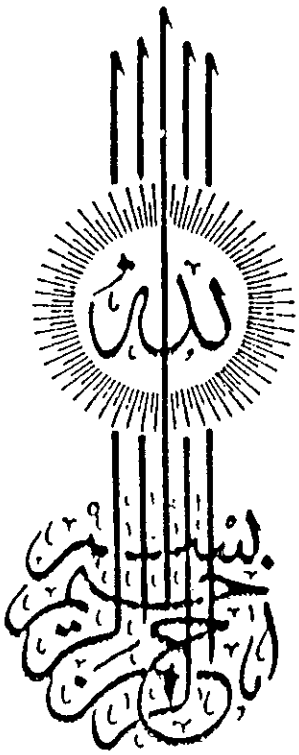

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ .

صَدَقَ اللهُ العَلِيُّ العَظِيمُ
البقرة - ٣٢ -

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ABSTRACT

Ahmed Saleh Mohamed Moustafa. An Attempt to Earthquake Prediction using Tectono-Magnetic Studies. A thesis submitted to the Faculty of Science, Ain Shams University for the degree of Ph. D. of Science in Geophysics, 1997.

The area located in the northern part of Egypt has been studied using the observation and interpreation of tectono-magnetic field changes. Here, a strong magnetic formation within a basaltic rock was chosen as a geomagnetic stress sensor.

First, laboratory measurements are starting by measuring or detecting the magnetic rock properties (natural remanent magnetization (NRM), bulck susceptibility (K), Koenigsbuerger factor (Q factor), declination angle (D) and inclination angle (I) for 200 representative oriented samples collected from the investigated areas (Qatrani, Abu Roash, Abu Zaabal and Wadi Abu Tereifya).

The curie temperatures were measured by the curie balance. The Ms (T) curves for Qatrani, Abu Zaabal and Abu Roash of curie points 510°± 40° C indicated that the present magnetic minerals are Ti-poor titanomagnetites. The curie points of Wadi Abu Tereifya basalt are 300°± 50° and 550°C. The cooling curves showed higher magnetization values than the heating curves. This is characteristic of samples containing titano-maghemite, which inverts to magnetite and ilmenite during the heating process.

The magnetic hystersis properties were observed with a PAR vibration magnetometer, in which the hystersis parameters of the basaltic samples indicate that, most of the magnetite grains of the samples are in the PSD to MD size range.

The microscopic studies of Qatrani, Abu Roash and Abu Zaabal showed that, the volume percentage of the magnetic minerals consists of 2.1, 1.7 and 1 %, respectively of the basalt and the big crystals of magnetite and some ilmenite of fine lamellae are parallel to certain direction. The volume percentage

of magnetite phase of Wadi Abu Tereifyia basalt ranges from 2.8 % to 7.9 % as small crystals of homogenous distribution.

Secondly, measurement apparatus for the stress change of the initial magnetization has been constructed. Some modifications were added to the instrument to measure the remanent and induced magnetizations parallel and perpendicular to the applied stress axis. Uniaxial stress was applied via a long rod using a hydraulic press situated outside the magnetometer. This system makes it possible to change the load while observing the magnetization. This enables the observation of the dynamic response of the magnetization versus stress.

Morover, high stress produces an increase in the magnetization perpendicular to the applied stress axis and a decreaese parallel to the stress axis. The relation between magnetization and stress was determined for the basaltic rocks of the four locations. By using vector addition, the variations of the total magnetization versus stress per 100 bars have been determined for the basaltic bodies of the studied areas. The stress sensitivity of Qatrani, Abu Roash, Abu Zaabal and Wadi Abu Tereifya are 4.8, 2, 4.5 and 9.4 mA/m change at 100 bars, respectively.

The differential total magnetic intensity field with time was observed through 160 magnetic observartion points set up in may 1994 on both sites of the basaltic sheet at Qatrani and 6 October City. Magnetic surveys have been repeated exactly at the same observation points every 6 months until may 1996. To reduce the time dependent variations of the regional magnetic field, the measurements at the observation points were carried out simultaneously with recordings at the base station located within the investigated area.

The changes of the magnetic field between the observation periods were was interpreted as tectono-magnetic field changes. These observed temporal variations of the magneization can be interpreted as stress loading parallel to the regional stress field in the order 70 $\pm$ 30 bar, according to the stress sensitivity of the precursor basalt.

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