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

The Nature of the Microtremors and their Application for Seismic Microzonation in Egypt.

A Thesis

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by

Saud Abdel Hady Abdalla
(M. Sc. Geophysics)

Supervised by

Ass. Prof. A. M. A. Helal
Ass. Prof. Of Geophysics,
Geophysics Dept.,
Faculty of Science,
Ain Shams University

Prof. M. M. Dessoky
Prof. Of Seismology,
Seismology Dept.,
National Research Institute of
Astronomy and Geophysics

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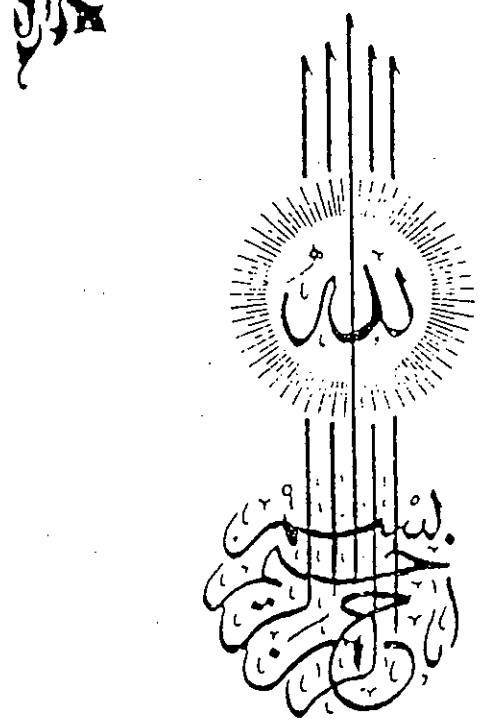

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ .

صدق الله العظيم
البقرة - ٣٢ -

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ABSTRACT

The most important aspects of the microtremors is their random behavior. Surface waves are the main constituting waves of the microtremors caused by either natural and/or artificial sources. The microtremor waves are decreasing in amplitude with depth and also at nighttimes .

As being an important aspect of its nature, the stability of the microtremors is studied for the northern Naser-Lake area. The microtremors observations are traced for a time period lasting for six years (1989 up to 1995). The time histories of the microtremors observations in each station site are transformed into frequency domain and the obtained spectra are investigated.

Based on being either stable or unstable, the stations of Aswan Telemetry Network are categorized into two classes A and B. Class A stations have stable (stationary) spectra, while those of class B are characterised by unstable spectra; i.e. their spectra change with time.

Class A includes the station sites of KSR, MAN, NMR, AHD, GAL, KRM, KUR and WAL. Whereas SKD, WKL and NAL stations are belonging to class B.

The relation between the lithological conditions and the amplification level of each of Aswan network station sites, are investigated. Eight earthquakes are selected from the records of Aswan network, 7 of them are local events while the eighth is a regional one. The qualitative description of the time histories of these earthquakes at some of Aswan network stations are used to investigate the relation

between the amplitude level at each station site and the existing lithology beneath the site.

The station site of GAL is found to have the largest amplification effect on the studied earthquakes. This could be attributed to the large elevation of GAL site, which in turn means a larger subsoil thickness. Whereas the sites of MAN and KUR stations are found to have the least amplification effect. Concerning KUR site, this might be explained to be due to the smaller elevation it has. Which in turn gives no chance for the multiple reflection effect of the subsoil layers to be effective. While MAN site has, almostly, null thickness for the subsoil column because the mother rocks (granites) are exposed on the surface.

If these results were correlated to the microtremors results obtained, we would find that the microtremors are behaving in the same manner. Where they show lower amplification levels at KUR, MAN and relatively higher levels at GAL station site.

This confirms the conclusions reached by many other authors that the subsoil column beneath the recording site affects both of microtremors and earthquakes. Which leads us to a trial of comparing the spectra of phenomena, earthquakes and microtremors.

Comparison between both of microtremors and earthquakes is investigated using 8 local events recorded by the stations of class A. The main and 3 aftershocks of Oct. 12, 1992 earthquake as recorded by Aswan network stations, are used as well. The Fourier spectra of these events are compared to the microtremors spectrum at each of these station sites.

A fairly well correlation was found between the spectra of the local events and the microtremors spectra obtained at the same sites.

Where the earthquakes spectra at each station site show the same predominant frequencies as those of the microtremors recorded at the same station. Whereas regional events showed poor matching to the microtremors spectra.

Using the same events, the earthquake waveforms were separated into two segments representing the primary (P-) and Secondary and surface waves (S-).

The spectral comparison between microtremors and each segment of the used local events showed that the microtremors are more comparable to the S- waves segment.

A microtremors-based microzonation has been performed in the epicentral area of Oct. 1992 earthquake (Saud, 1994). The obtained results reveal the existence of 3 zones each of them is characterized by a certain spectral response. Zone (I) covering the cultivated stripe along the Nile valley is the most important of them due to its economic importance. Zone (I) is characterized by the prevalence of 3.75 Hz as the predominant frequency of the microtremors among all of the measuring sites. An attempt to extrapolate this zone (I) is discussed in this article, where extrapolating zone (I) showed that it could be extended to involve the stripe from 28 ~ 30.3° N and 30 ~ 31.8° E.

This theoretical extrapolation means treating such zone as one seismic zone but we should be aware of the epicentral distances.