Changes in Seismic Activities in the Aswan Region (A study in Historical Geography Using Geographic Information Systems

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Introduction

At a size of 5.3, it affected November 14, 1981 at the Aswan reserve. This tremblement of terres'est long production of the Kalabsha failure à 60 km near the Haut Barrage. The season of 1981 was held four days ago when the reserve was at a maximum level. The system and the most important part of the system replication are limited to between 15 and 25 kilometres, a long segment of 10 kilometres at the time of the Kalabsha failure. Now, this sector is very active and makes a great profit (Simpson, 1989).

From 1981 to 1987, there was no water in the reserve and there was no access to the water supply system. Between 1982 and 1983, the water rested in the areas with the highest levels of activity in the courtroom due to the increase in the sector, and it was retiring from the original parcours of Nile and the yearly connection between the sector and the Creat in the crue était moins évidente. After the Nile river fortified into 1978, the rapid water supply and the reserve made it easier to advance against the depression of Kalabsha or the poor quality of the product (Simpson & Kebeasy, 1989).

1- The seasons in Egypt.
These Egyptian religious studies were influenced by Sieberg (1932), Gutenberg and Richter (1945), Ibrahim & Marzouk (1979), Ibrahim (1981) and Maamoun (1981). For those concerned with the Lac Nasser sector, the event marked by history (from 2200 BC to 1972) is from 1210 BC. The location is located at 22°N and 32°E and is located near a tent of VII (fig. 2-1).

The table 2-1 monitors that the intensities are assigned, based on historical rapports, and do not match any temperature or space. Due to this, a historical feature concerns the historical characteristics of the system.

Date	Lat. °N	Lon.°E	*I*°.	M.	The place
2200 BC	30.5	31.7	VII	-	Delta
1210 BC	23.6	32.6	VII	-	Abou Semble
600 BC	27.6	33.9	VIII	-	Thebes
28 BC	27.6	33.9	VIII	-	Thebes
320	32.0	30.0	VII	-	Alexandrie
10-1-965	32.0.	30.0	VII	-	Alex.et Le Caire
967	25.5	34.5	VII	-	louxor

26-5-1111	30.0	32.0	VII	-	Le Caire
8-8-1303	29.9	31.0	VIII	-	Alex&Fayum
10-9-1745	30.0	32.0	VII	-	Le Caire
7-8-1847	29.5	30.5	VII	-	Le Caire
12-9-1955	32.2	29.6	VII	6	Alexandrie
31-3-1969	27.6	32.9	IX	6.1	La vallée du Nil
14-11-1981	**23.6**	**32.6**	**VII**	**5.3**	**Aswan**
12-10-1992	29.9	31.0	VIII	5.8	Le Caire

Table 1. History of the trembles of land in Egypt
I° = maximum observation intensity, M = Magnitude on Richter's camera
(, El Sayed, 1995)

The high barrage in Aswan is set up as most large reserves in the world. Because the barrage is not so high that the standards are installed at a distance of 110 metres, the reserve extends to a large area and has a maximum capacity (160 cubic kilometres). the world. The beginning of the year 1981 in Aswan was the product 17 hours ago when the server started to replace it.
we present an analysis of the rapports entering the system and the changes in the water supply in the Aswan reserve.

2. The session of Aswan on November 14, 1981

On November 14, 1981, 11 days ago, a local day, a violent situation in the region. It has a magnitude of 5.3 on Richter's camera, (fig.2-2). This was originally published by three recent sessions on November 11, 12 and 13, 1981 and there was a large number of specific versions that continued to be produced in January 1984. This activity is the beginning of the year. It was cleaned in the market (Kebeasy, 1982), like the original product on January 12, 1982, for 3 days, 41 mn from the mat, local time, with a size of 4.2 on the Richter plate, and the day after 5 Minutes after a new start terre d'une magnitude 4 sur Richter's arrow.

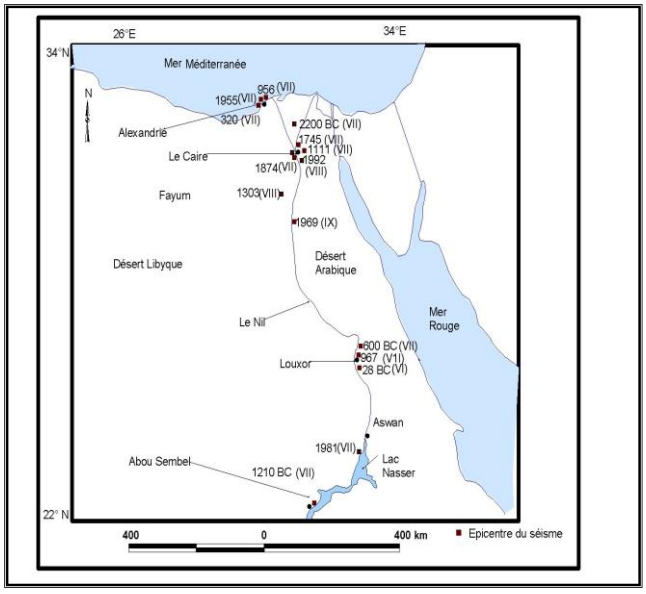

Figure 1. Partition of the trembles of land in Egypt (D'après El Sayed, 1995)

On August 20, 1982 at 15 hours 50 minutes, local time, a maximum of 4.7 hours of production on Richter's market. Pending the day, the séismographe contains 116 séismes (Dessokey, 1985). On February 24, 1983, 2 days ago, 33 days ago, there was a tremblement of 4.3 hours of production at Richter's factory. The Kalabsha telematics station was registered, on February 25, 1983, with 56 trembles from 3.5 to 4 days on the Richter area in the Aswan region.

But the system can be monitored in the Aswan region, and new television stations have been installed in the North African country. They are also connected to the function of the 1982 juillet (fig.2-3) Millieres of micro trembles are registered. Different television stations are located in Montréal, so that the activity is particularly important in the main areas.

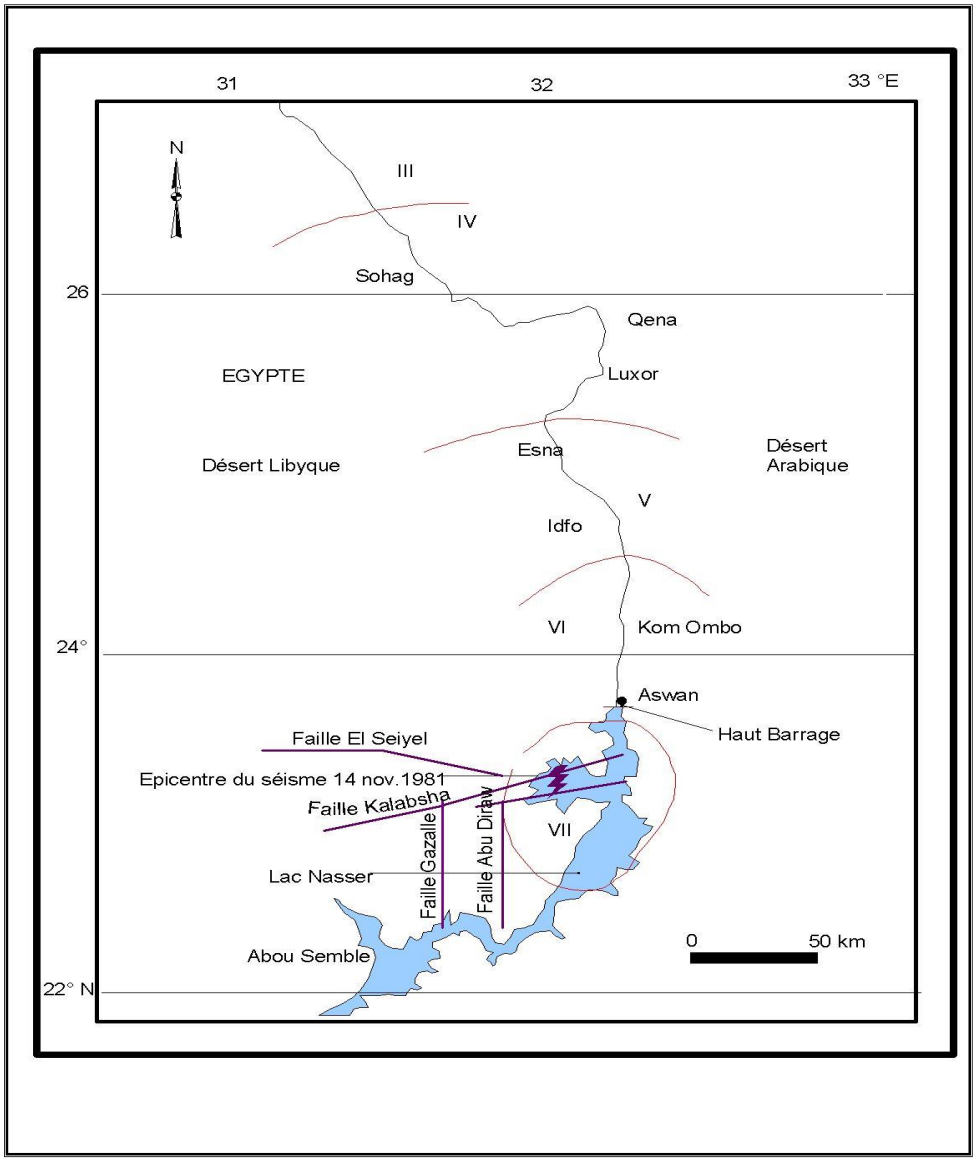

Figure 2. Partition of the intensity of the Aswan season on November 14, 1981 (d'après Kebeasy, 1982)

2-1. Less active zones

This first section extends to Est/Ouest, at a distance of 14 kilometres, the length of the Kalabsha failure. The points on the area are concentrated at a profit interval of 14 to 22 kilometers and 4 to 7 kilometres (Woodward, 1985).

This section is 8 kilometres-long and the third segment of the Kalabsha failure is the largest in the country. In this area, the activity is within 4 to 6 kilometres. Concernant the distribution of points from different sectors in these areas, to observe a progressive reduction in the professions of Ouest- Est.

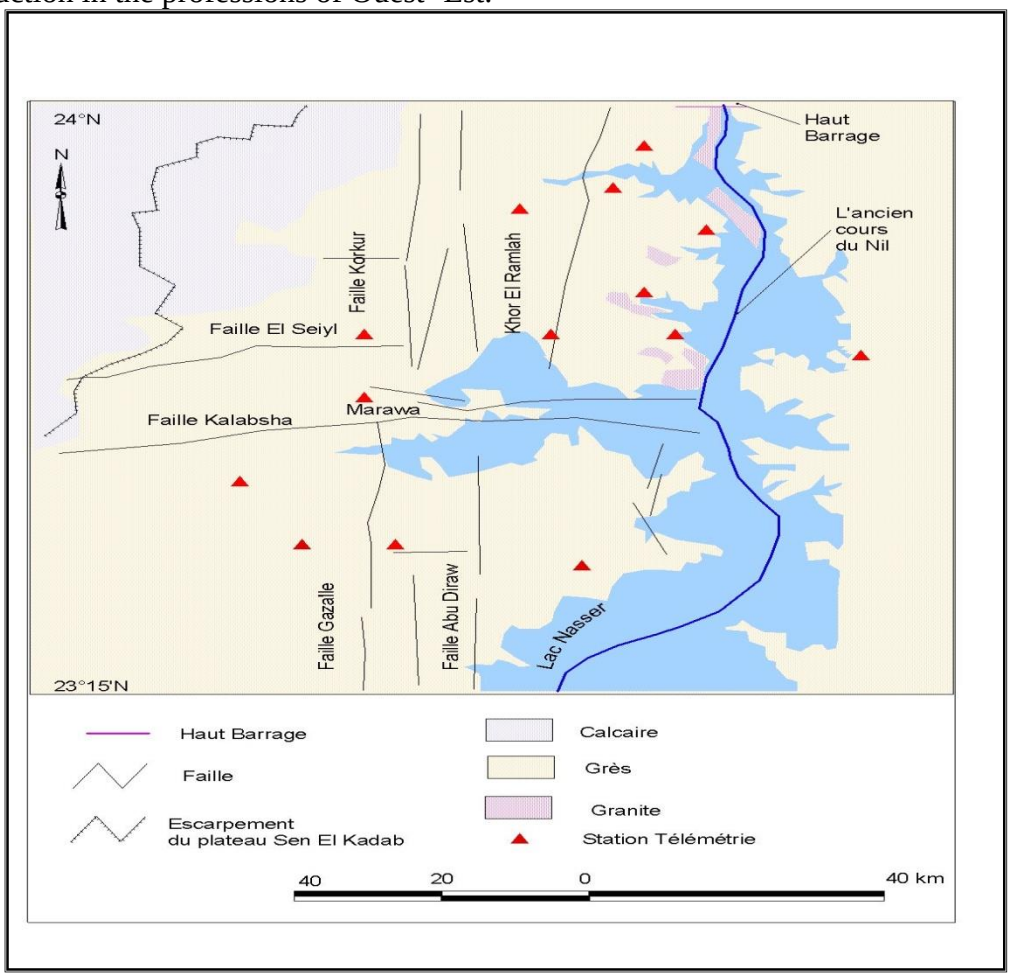

Figure 3. Localisation of the mobile phones in the Nord part of Lac Nasser (Dessokey, 1985)

The square troisième is located in the square oued Korkur in the North/Ouest du Lac, environ 15 kilometers near the high barrage of Aswan. This section shows the features of these features.

The results of the radio measurements and the following fonts are displayed:

The first and most effective area will be activated in one direction: Ouest Sud-Ouest, Est Nord-Est. The distribution in the temps in which a correct correction of the system with the fluctuations saisonnières du niveau d'eau du lac. The date of November 14, 1981 included a product on the failed Kalabsha sous du Jbel Marawa (Kebeasy, 1987). On November 14, 1981, a period of time in this area was not registered in the Aswan region. The manque raison continues to données pendant les premières periods of remplissage du réservoir, it is not possible to determiner exactement and detecter les faibles seismes. The first seismographs installed in the Aswan sector by the Russes do not have the capacity of the registrar that allows the seismographs to be installed in the most limited areas. The stations' installations were installed before 1981, 20 years ago,

5 years ago, located at the Hilwan institution in the Kalabsha region. (Ibrahim, 1981). Large trembles of the terrestrial development are more frequemment in the Aswan region .

When the exact period of activation of the device does not last, it is possible to know that a certain activity will be effective when the product appears before the server after the refill is available and before the tremblement of this November 14, 1981.

The tremblements of the terre that ont suivi the tremblement of the terre on November 14, 1981 (Kebeasy, 1987) and the live activity continued until 1989 in the main sector of the sector and in North du Lac Nasser. (Annexe 2).

2-2. Les facteurs provoquant la séismicité à Aswan

Aswan appartient à une région qui situant à l'abri des activités sismiques**.** Elle se situe entre la formation granitique du désert arabique et la formation de calcaire et de sable consolidée du désert libyque. De plus, à ce potentiel séismo-tectonique, se couple un contexte géologique favorable à la propagation et à l'amplification des ondes séismiques (Hemdan, 1984).

2-2-1. The technology and characteristics of the Lac Nasser region

The long window lit by the Nil River and the East, the Lac is in the main contact between the granits précambriens (fig. 2-4). On the other hand, the Lac covers the grès of Nubie placed on the granite of Precambrien. The composition ranges from 50 to 400 m (Issawi, 1968)
With the roches dures and compactes, the séismes ont to effet the créer of the fissures, the car ces roches deviennent cassable du fait de leur rigidité. The geological structure is different in intensity of events. This forte intensity is also associated with the areas of the hot spots (sable and argile). A l'opposé, note that it is effective in intensity in the areas of more solid (green) roches.

There are many systems of failure that are dominant in the sector: the failure of North-Sud are very important and affect the formation of Nubie. The system is likely to fail due to its normal failure rate and will extend beyond 300 kilometres.

2-2-2. The geological context of Kalabsha

The Kalabsha region is located at latitudes 23°20’ and 23° 58’ N, and longitudes 32° 00’ and 32° 50’ E (fig.2- 4). The Kalabsha region is a relative plane with many slopes that prolong the kilometre-sized dimensions. The area’s altitude is effective and enters 138 and 150 m. The occidental part and the september part have general planes around the North part.

The socle affleure in the Nord and the Nord-Est du plateau Sin El kadab. The topography of this section consists of three distinct geomorphological parties:

1- Plaine de Nubie
2- the plate on Sen El Kada
3- Plateau of Sen El Kadab

The plain of Nubie, with an environment of 20,000 km², is located near the plateau of Sin El Kadab. The average relief and altitude range between 138 and 174 m, while the altitude in Jbel Marawa is 274 m in the calculator (Issawi, 1978). For their part, the plain is limited to the amount of food used. It is covered by the lacquer's pendant during periods of inconvenience or the lacquer's pendant is more than 174 square metres.

The area of this area is repaired by the granite surface on an environmental protection device at 400 m. The composition of the Nubie couvre the granitique roche - the precambrien area - and its composition of the grès and the schiste (Shawa, 1987).

From the section behind Kalabsha, there are several directions that fail, in Est-Ouest and Nord-Sud. When the session took place on November 14, 1981, and the special sessions that were connected, the active failure caused the Kalabsha failure. This can be used to put Kalabsha on the Sin El Kadab plate (fig.2-4) past the Jbel Marawa. In this area, it is the development of a large park in the oriental city of Jbel Marawa in the form of more tracés parallèles, in one direction Est - Ouest.

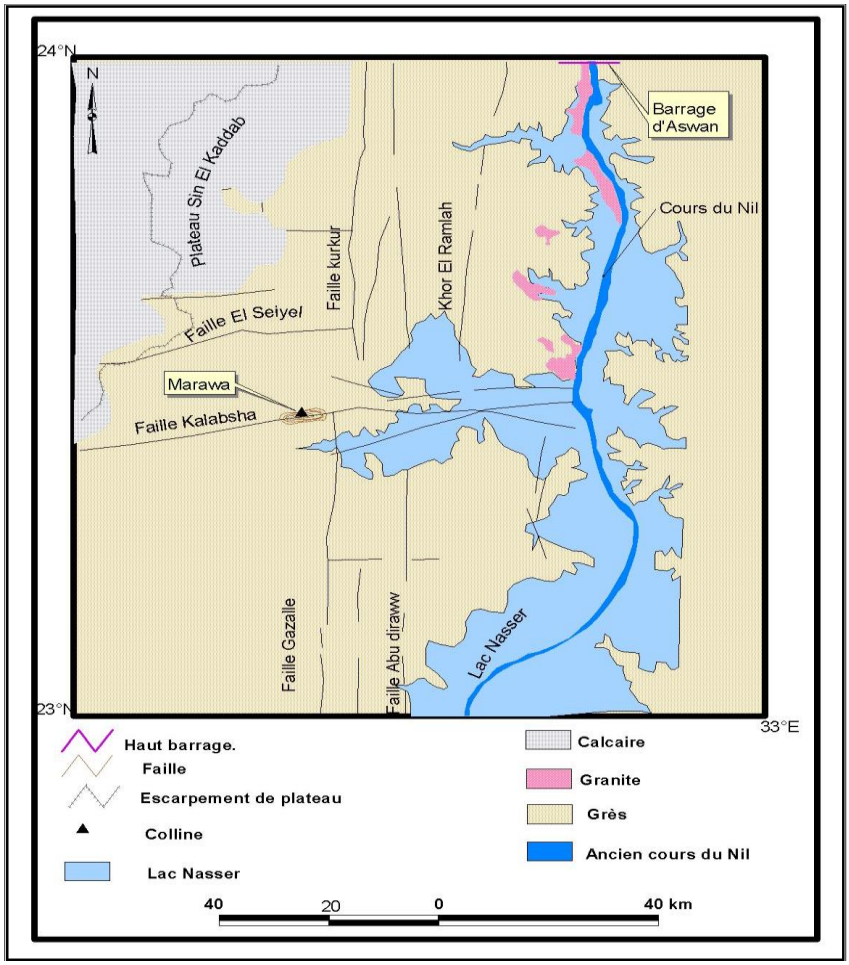

Figure-4. Geographic card of the occidental part of the Lake Nasser reserve (Zone Kalabsha). (après la carte geologique 1/ 50 000, 1987)

The Egyptian geological service (1981) confirmed that the Kalabsha approximative failure was 300 kilometers long. The failure is caused by removing silicone cement or ferrous oxide cement and this cement is more resistant to the erosion of the Nubie grès.

2-2-3. The village of water and the establishment of Lac Nasser

When installing all installations inside the tank and the system in Aswan, it is necessary to compare the relationship between the tank and water and the tank amplifier. The Aswan reserve is located on a relative terrain plate. After all, the storage periods are limited, the amount of water in the reserve is limited to the Nile environment.
The table is connected (2) to the changes in the neighborhood of Lacca from 1966 to 1998.

The changes in the water provider in the reserve are available in major changes in the lac superficie. The location in Aswan is located mainly in the Kalabsha area located on the reserve (fig. 2-5). This area is available to replace the previous day when the water in the reserve reached 165 meters in 1974.
From 1975 to 1985, the reserve area in the Kalabsha area changed sensitivity. The most important changes in the history of 1981 and the present successive period pendant the periods in the depression of Abu Riheiwa in North du Jbel Marawa (fig. 2-6). The elimination of fresh water in the depression has been affected by the formation of more people who are close to the roche affleurements.

Année	Hauteur d'eau (m)		Année	Hauteur d'eau (m)		Année	Hauteur d'eau (m)		Année	Hauteur d'eau (m)
1966	141		1974	171		1982	172		1990	168
1967	151		1975	176		1983	169		1991	169
1968	156		1976	177		1984	166		1992	170
1969	161		1977	177		1985	164		1993	174
1970	164		1978	178		1986	162		1994	177
1971	167		1979	177		1987	158		1995	176
1972	165		1980	176		1988	168		1996	178
1973	166		1981	176		1989	169		1997	178
									1998	181,4

Tableau 2-2. Changes in the Lac for the period 1966-1998. (D'Autorité du Lac Nasser, 2000)

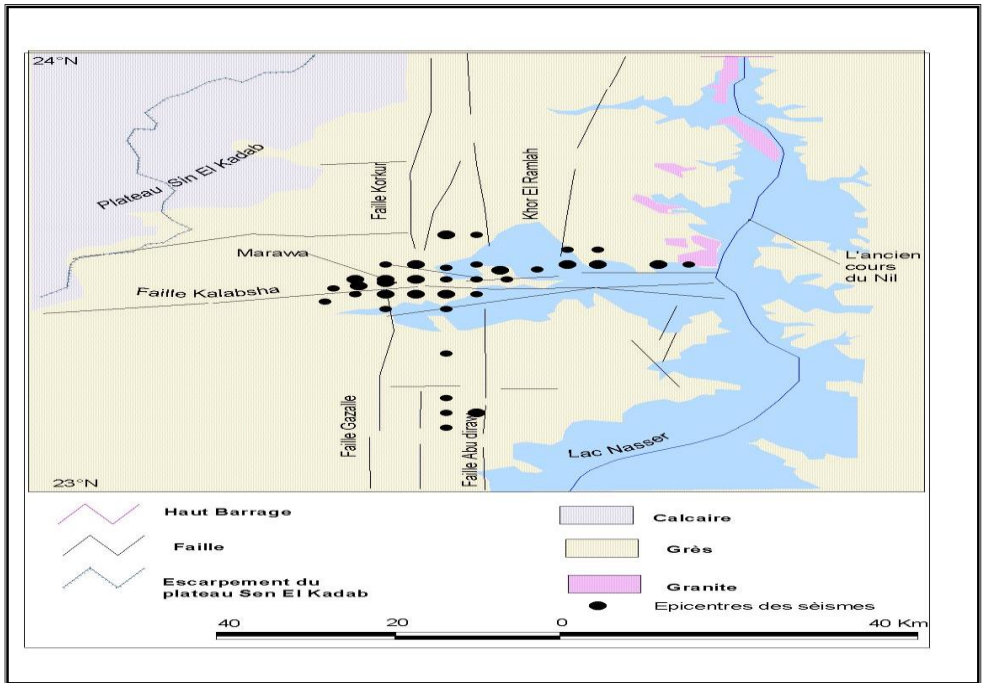

Figure 2-5. The northern part of Lac Nasser and the Aswan sector are registered with the land télémétré. (Zone of Kalabsha)
(Simpson, Gharib and Kebeasy, 1989)

In the opinion of the rare precipitations and the absence of the entire Tributary from the Nile, the nearby southern rains have more profits from close access to the reserve points. The professors of the houses in the Nasser Montrent lake that live in the surrounding areas in the village before the remplissage of the lake is located in a professor at a distance of 105 m (Boulos, 1987). The home is home to the home of the people who live in a sensitive area. At a maximum distance of 180 metres, the waterproofing system does not exceed 15 metres.

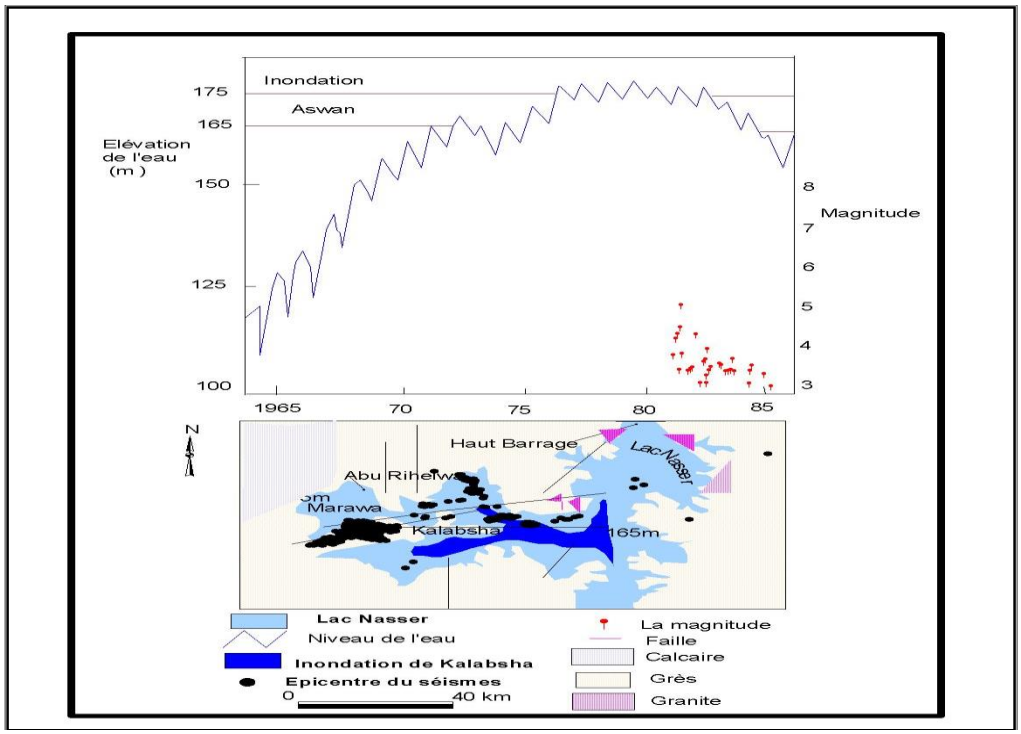

Figure 6. Enhancement of the water in the Nasser lake (1964-1986) and more important terrestrial trembles after the development of the Kalabsha and Marawa area (165m). (Simpson et al., 1989)

The water surface in the reserve is 75 m, the ground, the porosité is not 30%, has a complete surface area in the Nasser lake. If the pressure is higher, the hydraulic tension increases after the grès soit saturé. (Boulos, 1987). Selon Campy and Macaire (2003), The matériaux consists of various variables that are highly variable, point-blank variables and rare components that are 100% viable in the desert. The roof of the roof has a variety of high-quality functions and the response to the comparison between the roof and the water is more complex than that for homogeneous matériaux that extends to the global development of these markets directly to the roof to the roof. The interstitial presence of water in a constant state of affairs on its stability.

2-3. The changes in the water supply in the lake and the environment

The variations in the timing of the system in Aswan and the changes in the water supply in the reservoir that are installed in the figure (2-7). The tremblement of the terre on November 14, 1981 was the first product to be imported after the maximum level of saisonnier water had reached it. The activity activities were significant in August 1982, December - January 1983 and June 1987. There was also a general reduction in the activity activity due to the beginning of November 1981. Participation on November 14 in Jbel Marawa (fig. 2-4).

The figure (2-8) displays the temperature variation in the reserve and other daily fluctuations. The changes in the system's health are detected by the store during the day and during a period during the day (the period is covered by the operation of the store at the end of the day Simpson, Gharib, and Kebeasy (1989) the largest trembles) de It is indicated in the figure (2-8).

From the previous section and the figure (2-9 A and B) we present a price tag on the relationship between the changes in the water supply in the Nasser lake and the system:

-November 1981:

The next session was announced on November 14, 1981, four days ago after the complete replacement of the reserve on November 10, 1981. The device was not used to evaluate the device by using a local instrument. at the beginning of the season.

-August - September 1982:

The largest tremblement of the terre that s’est product depuis the tremblement of the terre de November - December 1981; It costs 4.69 on Richter's production and the product was released on August 20, 1982 in Jbel Marawa, in the same section on the beginning of November 1981. It has been six different types of drinks for 9 days, and the water supply remains at the end of September. The minimum amount of water used on August 11, 1982, 9 days before the beginning of the day on August 20.

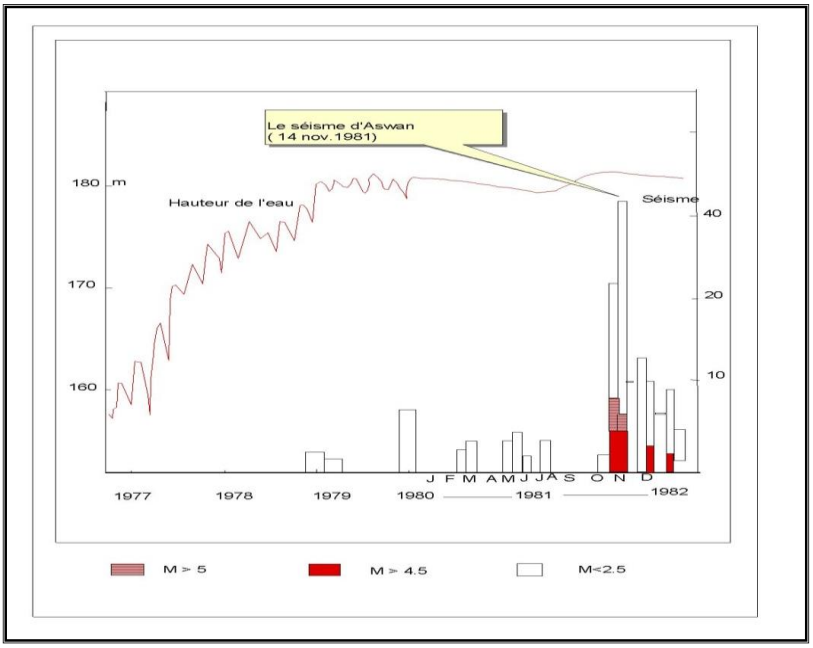

Figure 7. Correlation into the water area in the Aswan reserve and the early seasons and after the Grand Séisme of Aswan on November 14, 1981.
(Simpson et al., 1989)

- November 1982 - March 1983

The problems with the registration of waterproof bands at the end of the year 1982 include difficulties in the localization of different types of people until the month of September and November. The recordings on the séismogrammes are still visible. The new water bottle is at maximum November 13, 9 days before the start of the session. A tremblement of 4.2 hours on Richter's product was released at the end of this period (February 24, 1983).

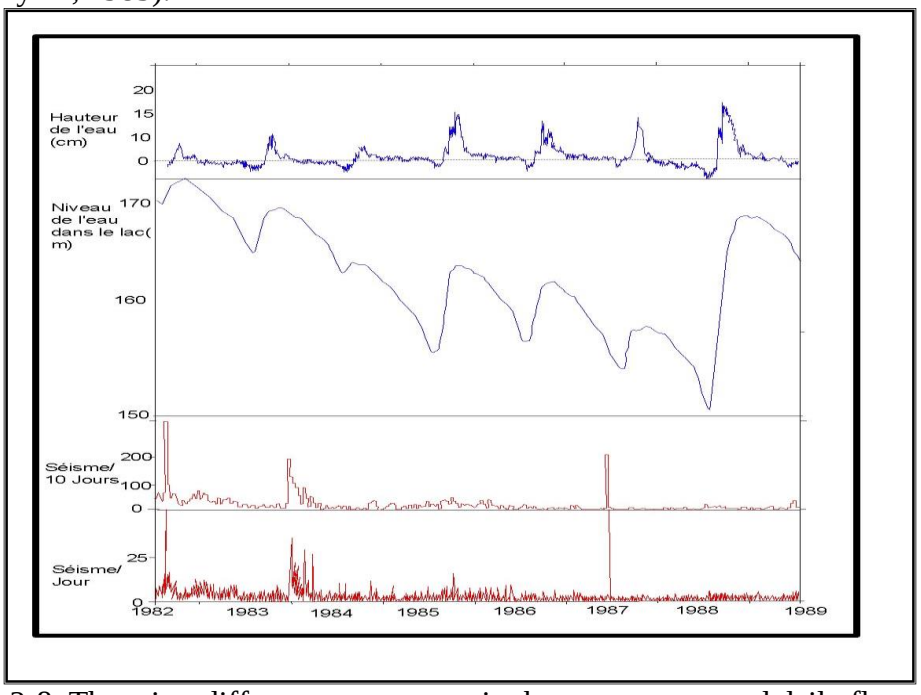

Figure 2-8. There is a different temperature in the reserve area and daily fluctuations and detector numbers for the storage area during the day and during the day. (D'après Simpson, Ghrib, and Kebeasy 1989)

-December 1983 - March 1984

The special activities started at the end of 1983 at the established facilities in the Nord-East of Jbel Marawa. This moment, there is enough space to enter the area to enter the depression of Abou Riheiwa and to the whole area in the Marawa area.
At the end of this period, there are 3.4 digits of trembles on Richter's plate that produce products pendant to the mineral crête de la crue de février. The fresh water is available on December 10th, and the next day is December 22nd, 12 days later.

-November – December 1984
The annual change in the age of l'eau in 1984 is of significant importance to previous years, and the maximum age of age is not in jamais since December 1975. The age of the age is commencing on November 20 October, and a mine augmentation It will be announced on November 13.
The hypocentres for these events are in the exact location in North-East of Jbel Marawa.
A tremblement of the territory near North-east of Marawa came on June 15, 1987, on 3.7 June at Richter's door more than that, on June 5, it was available to increase the life of the family The water in the lake, for 3 centimetres Next month, next June, 8 centimeters after the day, just before the activities begin June 15. The water bottle in this period has the largest tooth for 16 years. There is no change in the health of daily activities with changes in the life of the water pendant this year.
The activity continues to be very effective since the diminution of the l'eau niveau from 1985 to 1988, but there is no increase in the size of the maximum saisonniers of the l'eau niveau in this period. Between 1985 and 1988, it was a major increase in activity pendant to the millie of the year, before the period of minimums of life in the water. The value of the activity is the constant relative decline throughout as long as 1986

June - July 1989
The increase of the system's activity in July 1989 is the focus of the simulation with the technology's activity in June 1987. The increase of the system's activity in 1989 is a product on approximation of the same time intervals. At the end of the year 1989, the most important activities that were arranged in a complete refill of the lake that had a certain pressure on the area and therefore a limit to the freedom of movement of the beds of the room, favored a fairly stable one. or even A stable operation to complete the development of the system activities in the region since 1989.

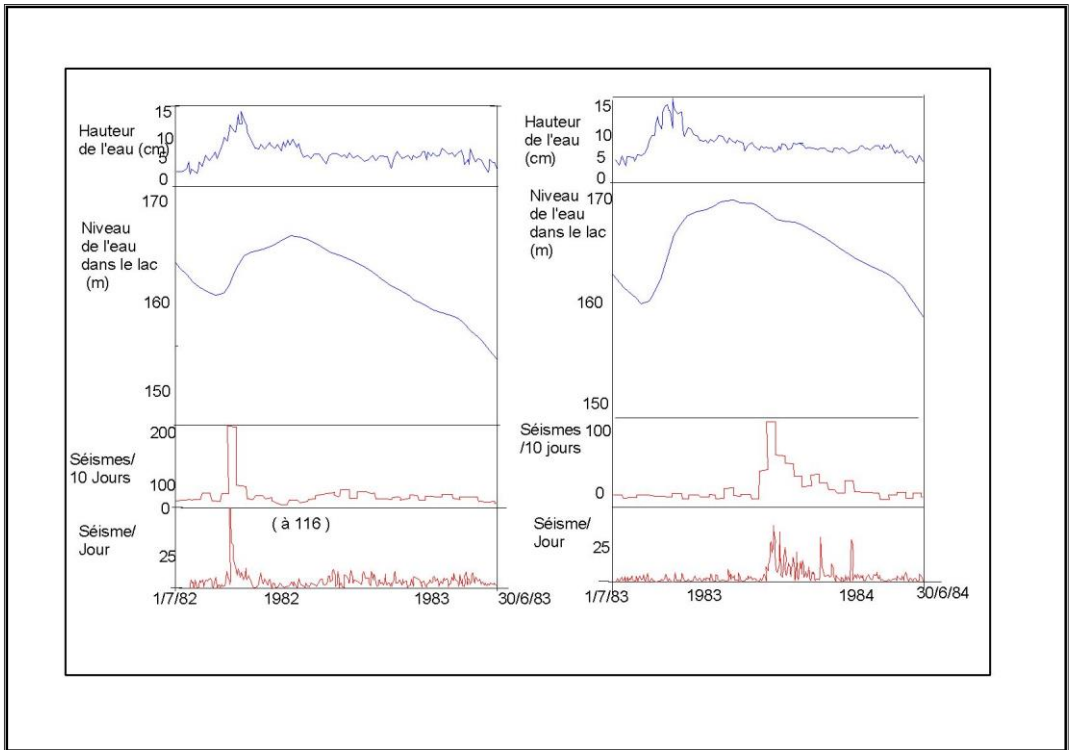

Fig. 9-A-Two graphs of seismicity in August 1982 and December 1983-February 1984(Simpson et al., 1989.

Conciliation:

The November 14, 1981 earthquake is the largest seismic event in the Aswan region in recorded history. Limited instrumental data suggest that small earthquakes may have occurred in the area during the previous 5 years. However, the epicenters of such events are unknown. Thus, the 1981 earthquake and the associated seismicity represent a sudden increase in regional seismicity.

The November 1981 earthquake was concentrated along a 15-kilometer portion of the eastern end of the Kalabsha fault at depths of 15 to 20 kilometers. Several subzones of shallower earthquake activity (depths of 0 to 10 kilometers) are observed east of the 1981 epicenter along the Kalabsha fault. .

The November 1981 earthquake occurred just after the seasonal maximum of the water level in the reservoir. Earthquake activity was observed shortly after the seasonal maximum of the water level in 1981, 1982, 1983 and 1984.

Generally, the damage to buildings was low in 1981. There were no major concrete buildings in Aswan. Most of the buildings are made of silt and traditional materials, consisting of one or two floors maximum. Currently, if an earthquake of 5.3 on the Richter scale affects Aswan, the damage will be greater than the previous ones because of the growth of the population and constructions (buildings, hotels on the Nile islands, and the various establishments)

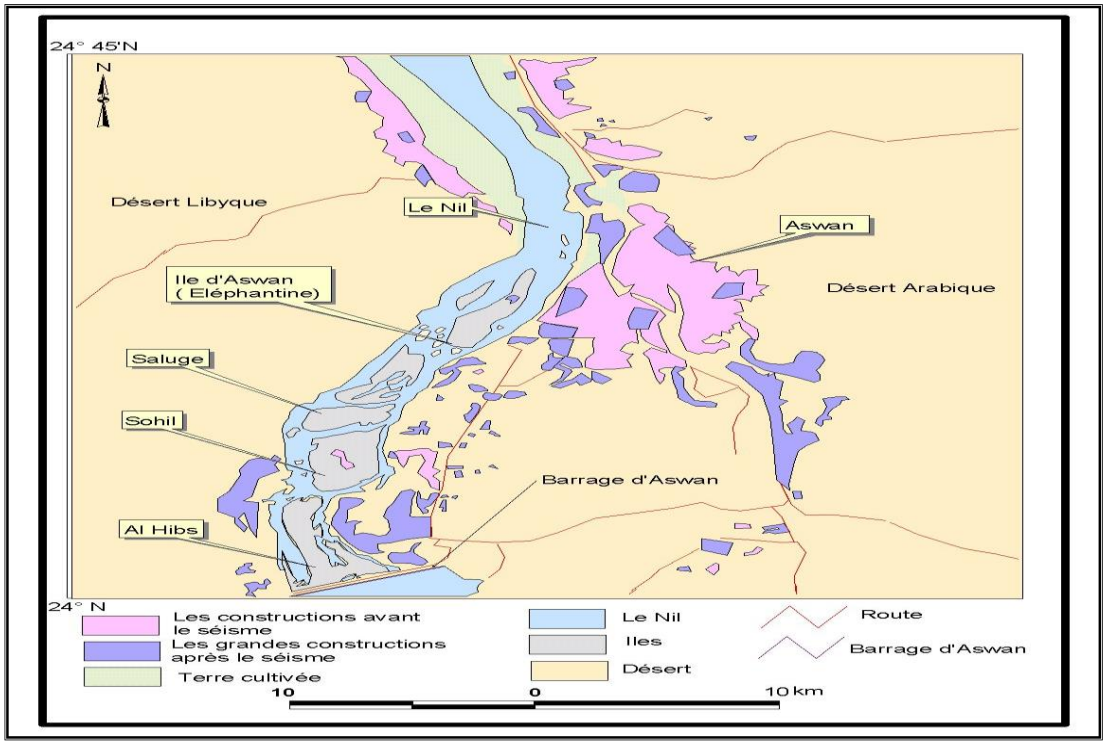

Figure 7. Map showing settlements before and after the November 14, 1981 earthquake in Aswan
(1/25,000 topographic maps)

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References:

-ABDEL TAWAB S. (1989): *Engineering geology of some area in the greater Cairo*, PH.D. Faculty of Science, Ain-Shams University.216 p.

-ATTIA M. & HABIB M. (1970): Mechanical composition and mineralogy of the Nubia sandstone in west Mowhoub area southwestern desert; *Bull.* Desert Inst. Egypt, *vol.20*, pp 151-176.

-ATTIA M. (1954): Deposits in the Nile Valley and the Delta, *Bulletin of the Egyptian Geographical society, vol* 72, pp 91-105.

-ATTIA M. (1955): *Topography, Geology and iron-ore deposits of the district east of Aswan;* Geol. Survey. Egypt, Govt. Press, Cairo, 247p.

-BALL, J. (1907): *A description of the first or Aswan Cataract of the Nile*. Ph.D,B. Se, F.G.S. National Printing Department, Cairo. pp 154-161.

-BECK J. (1976): Weight- induced stresses and the recent seismicity at Lake Oroville, California: *Bulletin of the Seismological Society of Amrica,* vol. 66 no.4, pp 1121-1131.

DESSOKEY M., **KEBEASY M. & HASEAB H.** (1985): Preliminary estimation of seismic hazard in the Aswan Lake Area in Egypt, *ACTA GEOPHYSICA POLONICA Vol. XXXIII, no.3.*

-EL ARABY H. & SULTAN M. (2000): Integrated seismic risk map of Egypt.*The Geological Survey of Egypt and Mining Authority, vol.71, n°1*, Cairo pp53-66.

-EL SAYED A. WAHLSTRÖM R. (1996): Distribution of the Energy Release, *b*-Values and Seismic Hazard in Egypt. *Journal of the International Society for the Prevention Mitigation of the Natural Hazards, vol.13,* pp133-150.

EL SHAZLY E. (1982): the effete of the earthquake in the Aswan area. *Geological Survey of Egypt*. Government Press, pp 15- 72

-EL SHAZLY M & SHATA A. (1977): Geology and groundwater condition of Toushka basin area, Egypt, utilizing Landsat satellite images; *remote sensing centre, Acad. Sci. res. And Tech.*, Cairo, Egypt, 73 p.

-SIMPSON D. & NEGMATULLAEV S. (1981): Induced seismicity at Nurek Reservoir, *Bull. Seismol.Soc.Am .vol*, 71, pp 1561-1586.

-SIMPSON D. GHARIB A. & KEBEASY, R. (1989): Induced seismicity and changes in water level at Aswan reservoir, Egypt. *Gerlands Beitr zur Geophysik, Vol.99 n*°3, pp191-204.

-SIMPSON D., ALY A. &KEBEASY R.M. (1989): Induced Seismisity and change in water level at Aswan Reservoir. *Gerlands Beitrage Zur Geophysik* special Issue on Induced Seismicity 84p

-SIMPSON D., KEBEASY R., NICHOLSON c, MAAMUN R. ALBERT R., IBRAHIM E., MEGAHED A., GHARIB A, & HUSSAIN A. (1987): Aswan telemetered seismograph network, *J. Geodynamics., 7*, pp195-203.