Cairo Univ. Afr. Stud. Rev. 20 (1998): P. 89 - 109

Solar and Lunar Terms in Ethiopian and Equatorial Components of the Nile Water

By

Shahinaz Moustafa Yousef *

ABSTRACT

Records of the Nile over the ages provide a suitable tool for detecting solar and lunar signals on climate. Solar influence has been proved through the existence of 11, 22, 80 cycles on Nile water. The existence of 266 yr. solar cycle is suggested. The 22 yr. Hale magnetic solar cycle is evident only in Equatorial component of the Nile, while very strong periodicities of the order of 2-3.5 years are present at certain times in the Ethiopian component of Nile water.

Lunar and solar semidiurinal tides arise from the orbital characteristics of the moon and sun respectively. The lunar nodal tide induces a 18.6 years quasi-stationary standing atmospheric wave. A luni-solar term of about 19 years is found in Nile Water. This term is time dependant. During the period 1870-1945 this term was the strongest in Nile periodicities.

A 14.8 years cycle was found to be the strongest of all periodicities in Equatorial Nile water and the fourth in strength in maximum flood level during the period (877-1128) AD. This periodicity may be related to the 14-15 year periodicity happened during the time of the prophet Yusof peace be upon him.

I - INTRODUCTI ON

Currie (1991) and references therein listed a multitude of papers reporting evidence for two signals in climate with periods near 19 and 10.5 years. They are identified as induced by the 18.6 year luni - solar constituent tide and a 10 to 11 year variations in the sun's luminosity of the order 0.1 , which Currie estimated

* Astronomy & Meteorology Dept., Faculty of Science-Cairo University

was necessary to produce observed the 0.1-0.4° C variation in American air temperature.

Parameters investigated include drought and flood indices, tree-ring chronologies, rain -gauge data, floods of rivers, air temperature, air pressure, height of sea level, sea surface temperature, fish catches and crop yields. Lunar influences were sometimes confused with solar influences of similar periodicities. Yousef (1993 b) also found that a lunar nodal term of 17.5 years to be the dominant periodicity in Chile 7 (Gab tree) during the Maunder minimum. Murphy (1991) reported very strong 11.1 year periodicity in tree-ring data from a site in Taiwan, and found a significant lagged correlation that can exist between tree-ring indices and the 11 year solar cycle during periods of high solar activity, a feature which is not evident during quiescent periods. Yousef (1993 a) and Yousef and Hady (1993) reported several solar periodicities in trees from several parts of the world.. Yousef and El Raey (1995) also found the above two mentioned periodicities in Nile records during the period 622-1467 AD.

The objective of this work is to carry out a detailed long term time series of Nile data both old and recent to assess relationships among various climatic, terrestrial , solar and Lunar parameters. The originality of this paper comes from the fact that other peoples work studied Nile periodicities for the whole period of record (622-1467) however this paper discovered three Nile cycles in this period and looked for the strongest periodicities during each of the three cycles and for both the Equatorial and Ethiopian components of the Nile..

II - NILE DATA

Records of the annual minima and maxima of Nile levels are available with the exception of some gaps since the first year of Higra (622 AD.) . Such wealth of historical data have been published by Sami (1916) and Tousson (1925).

There are two sources of the Nile water:

a) The Equatorial source which represents supplies by Equatorial rain that is continuous all over the year (about 16% at present).

b) The Ethiopian source which is supplied by summer rain (about 84% at present)

Figure (1a) represents a general flood hydrograph of a river of sharp rise and exponential decay. The points x and y on the curve represent start and end of rain , respectively (from Hoyt and Langbein 1955 cited in Ward 1978). Figure(1 b)represents the Nile flood hydrograph showing the contributions of equatorial (White Nile) and Ethiopian (Atbara and Blue Nile). The minimum Nile level on the hydrograph is denoted by (Min) and represents mainly the Equatorial contribution to the Nile at Aswan. The maximum Nile level or discharge at Aswan (denoted by Max on Fig (l b)) is the sum of both the Equatorial and Ethiopian water.

Equatorial water ≈ Min ; Ethiopian water ≈ Max-Min

III- NIIE CYCLES

Figure (2) a,b, and c are 79 years smoothing of Min level, Ethiopian contribution and the Ratio (Ethiopian / Mim). This filter is chosen to remove cycles of the order of 80 years. It is thus very clear that the levels of Ethiopian and the Equatorial contributions to the Nile are now distinguished into "Major Cycles" in anti coincidence with each other.

Nile Cycle 1 (622-886) AD Nile Cycle 2 (887-1128) AD

Nile Cycle 3 (1129-1467) AD

Nile cycle 3 is double humped with a minimum at 1351.

IV- PERIODICITIES

Throughout the present paper, periodogram computations were carried out using the statgraph procedure (Statgraphics Manual 1986)

Table 1 lists periodicities of solar origin that are detected in Nile water i.e. Equatorial water (Minimum) and Ethiopian water (Maximum-Minimum) during the following periods : 622-1467 , Nile cycle 1 , Nile cycle 2, Nile cycle 3 , (1870-1945) and finally (1870-1988) AD.

Enlargement of the periodogram for frequencies < 0.1 (i.e Periods > 10 years) is given in Figure 3(a,b).

The followings are Nile periodicities attributed to solar influence.

1-THE 266 YEAR PERIODICITY

The first long time span gives us the opportunity to find long term perlodicities. The strongest periodicity for both of the Equatorial and the Ethiopian water is 265.96 yrs. It's harmonics are 132.98 . 88.65. 66.49 yrs i.e. n/2 ,n/3 ,n/4 respectively. The second strongest periodicity in equatorial water is 132.98 yrs.This periodicity is weaker for Ethiopian water. A 137-138 yr. cycle was detected in ocean sediments (Burroughs 1994 and references therein).

It is suggested that the sun has a 266 year cycle.

2-The Wolf- Gleissberg Cycles

A long variation of roughly 80 yr. ,referred to as the Wolf-Gleissberg cycle is seen in sunspot cycle amplitudes, as measured by the annual mean sunspot number,(Gleissberg 1971, Siscoe 1978).

The 80 yr. periodicity (79.81) is the third strongest in the Equatorial water but ,it is still weaker in the Ethiopian water. Such periodicity is also reported by Shaltoot and Tadros (1989) in Max-Min NNile water during the period 1738 - 1914. The strongest periodicity for Nile cycle 3 Ethiopian water is 80.6 yr. and its harmonics:

80.6, 40.3, 26.9, 20.16, 16.12 yr. i.e.

n , n/2 ,n/3 , n/4 , n/5

Table 2 reproduced from Yousef (1995) shows the characteristics of the last three Wolf-Glelssberg cycles as well as the coming one. It indicates that the maxima of the previous two cycles are double humped. The interval between the start of the minimum duration of the cycles 2 and 3 is 79 years . The duration between the start of minima of cycles 3 and 4 . and the interval between the two

maxima of cycles 2 and 3 is 119 years each, while the duration between the secondary maxima of cycles 3 and 4 is 121 years. This explains the 121 year periodicity found in Equatorial water of cycle 3.

3-THE 55 YEAR PERIODICITY

The second strongest periodicity in Ethiopian water during the period (622-1420) AD. is 55.56 yr. It is also present at a reduced rate in Equatorial water . For Nile cycle 1(622-886) ,the 52.8 yr. is the strongest in Minimum (Equatorial) and Maximum Nile water. This periodicity is near the 51 yr. solar periodicity reported by Kane and Trivedi (1985) and 51.2 solar periodicity found by Yousef and Hady (1993) for the period 1749-1952 . The last two papers also found that solar periodicities do vary over different intervals of time. Burroughs (1994) and references therein reported strong 53 yr. cycle in historical Nile water.

4-THE 22 YEAR HALE SOLAR MAGNETIC PERIODICITY

The solar magnetic field reverses sign every 11 years and hence, returns to its original polarity every 22 years. The Nile periodicity around 22 years is only found in Equatorial water. It was reported by Shaltoot and Tadros (1989) as 22.2 years in Minimum Nile levels during the period (622-1470). These periodicities are to be compared to the 22 yr. magnetic solar cycle which is found to correlate better with atmospheric phenomena than the 11 year solar cycle (Herman and Goldberg 1978).

Why the 22 year cycle makes its effect only in equatorial water and not in Ethiopian Water remains a puzzle.

5-THE 11 YEAR CYCLE

kane and Trivedi (1985) and Yousef and Hady (1993) have carried out detailed periodicity of sunspot number. Although the strongest periodicity is around 11 years, other periodicities exist at 12.7 , 11.8 , 10.0 , 9.6 and 9.27 years. These periodicities are time dependant. Reports of periodicities in Nile water around these solar periodicities is given in Table 1., A fact that proves the solar

influence on Nile water. .During the period 1870 -1945, Nile periodicities were 12.7 and 9.5 yr. in excellent agreement with those of Kane and Trivedi (1985).

In the case of the third Nile cycle , the 11.0 year is the second strongest in minimum water while, it is the fourth in strength for Ethiopian water.

V-CROSS CORRELATION BETWEEN SUNSPOT NUMBER R AND NILE LEVELS

In the following section, the cross correlations between some of the above mentioned solar periodicities and the two components of Nile water are to be discussed.

It is noticed that cross correlation function between the sunspot number and either of the Equatorial and Ethiopian water shows periodicities that varies in strength and sign from one period to another as shown in Figure (4). In particular , the Roda (Min) (i.e Equatorial levels) shows an 11 year cyclicity with negative correlation in the period (1825-1902),while the Ethiopian water shows 11 year cyclicity with a positive correlation. No distinguished time lag between the two variables has been observed in both cases (Fig 4 a & b).

On the other hand, during the period (1903-1987), the cross correlation function between sunspot number and natural river discharge (in million cubic meters) shows cyclicity with positive correlation for the minimum and negative correlation for the Ethiopian water (Fig 4 c, d).

Thus it is clear that the Equatorial water correlation with sunspot number changed sign from negative during the period (1825-1902) i.e during Wolf-Gleissberg cycle 2 in Table 2, to positive dependence during the period (1903-1987) i.e during Wolf-Gleissberg cycle 3 in Table 2,. On the other hand the Ethiopian rain changed sign from positive to negative during the same intervals.

Figure (4 e) represents the cross correlation between Equatorial and Ethiopian water. It is noticed that they are negatively correlated. The correlatibn coefficient at zero lag is -0.53. At about (10 years the correlation coefficient drops to zero ,then the two variable become positively correlated.

VI-CROSS-CORRELATION BETWEEN EQUATORIAL AND ETHIOPIAN WATER

On considering the cross- corelation between the Equatorial and the Ethiopian whole set of data with lag of 300 years , (figure 5), a very clear cycle is shown with the following remarks:

a- The two variables are negatively correlated , at zero lag the correlation coefficient is - 0.8.

b-It changes from negative to positive correlations gradually over a cycle of 133 years (average) reaching zero lag at about 80 years average delay.

c- A fundamental cycle of (266(l) year exists between two successive maxirna. This very cycle is found to be the strongest both for Equatorial and Ethiopian water for the whole set of data.

VII -LUMI -SOLAR. TERM

lunar and solar semidiurinal tides arise from the orbital characteristics of the moon and sun respectively. They are responsible for a double wave that acts upon the atmosphere and ocean on the near side of the earth and upon the earth itself to pull it away from its fluid envelop .The tidal force of the moon upon high altitudes is greatest at the nodal epochs, and the tide raising force of the sun on the earth is only about half that of the moon. Currie (1981) proposed that the lunar nodal tide induces an 18.6 years quasi-stationary standing atmospheric wave.

The 18.6 lunar nodal year term is also evident in the Chilean trees (Yousef and Khaleel 1994) in agreement with Currie (1983) who detected 18.6 years from analysis of tree-ring chronology from the Patagonian Andes in southern America. Yousef(1993 b) also found that a lunar nodal year of 17.5 years to be the dominant periodicity in Chile 7 (Gab tree) during the Maunder minimum, while a very strong 11.23 yr. periodicity persisted during the Medieval Maximum and a rather weak 10 year signal during both the Maunder and Spörer minima. During the Spörer minimum (1450-1540 AD), a period of solar inactivity, the strongest solar

periodicity was the Hale magnetic 22.5 yr.

Table 3 lists Nile periodicities attributed to Luni-Solar term during the same intervals given in Table 1.

The presence of the 18.86 yr periodicity indicates the lunar 1influence on Minimum Equatorial water during Nile cycle 1. It is noted that during Nile Cycle 2 (887-1128) denoted by II in Table 3.

Recently, during the period (1870-1945), the strongest periodicity in Equatorial water and in the total annual discharge is 19.0 years. It is the second strongest in the Maximum flood level as well as in Ethiopia ,in agreement with Negm et al, (1989).This periodicity is of no solar origin . It is close to the Lunar nodal year of 18.6.years. We may thus stress the lunar effect on precipitation contributing to the Nile which was much stronger than solar influence during that period. The Luni-Solar term is nonstationary with respect to time and geography ,(Currie 1991) .

It is worth to mention that Sami (1916) and references therein mention that there is a cycle of 16-19 yr. in Nile water as well as in precipitation. Al -Maqrizi more than 600 years ago studied solar and lunar tides in relation to Nile floods (Kamil 1966).

Burroughs (1994) wrote that as far of the Genesis story is concerned ,there seems to be no evidence of a 14-year cycle which could be linked with the seven years of plenty and the seven years of dearth in Nile water. His statement is stimulating however it is not completely right because previous studies looked for periodicities only during the interval (622-1467). It is our privilege that this long time series is divided into three Nile cycles. As a consequence, the 14-8 year cycle was found to be the strongest in Equatorial water in Nile cycle 2 (887-1128). as well as the fourth in strength in maximum flood level during the same period. Moreover, cross-correlation between Ethiopian and Equatorial water in the case of Nile cycle 2 indicates that at zero lag, the correlation coefficient is -0.74 and that there exists a 15 year cycle (Yousef and El Rae 1995). This means that the period (887-1128) may have been similar in some way to the time of the prophet Yusof

which in my estimate is around (2250-2100 BC) as it was proved that Young Ibraheem witnessed the 1st of April 2470 BC total solar eclipse at Babel (Yousef 1993 c) which was on the border of the eclipse totality zone (Yousef 1999).

During the period (887-1128), according to Ibn Iyas cited in Sami (1916), the years (1064-1070) were drought years both in Ethiopia and hence Egypt. The years (1045-1052) were drought years in Chile and were followed by droughts in (1059-1066) in British Colombia (Yousef and El Rae 1995). This is an indication of world-wide migration of 8 years of droughts.

VIII-SHORT TERM PERIODICITIES

It is noticed that apart from the above mentioned periodicities, there are other strong periodicities e.g.

1) During the interval 1870-1945,.The strongest periodicity in Maximum flood discharge and in Ethiopian component is 2.71 years while, the 2.37 yr. periodicity is the third in strength in both Maximum and Ethiopian water.

2) In the case of Nile cycle I ,the strongest periodicity for Ethiopian water is 2.91 years

3) The 3.31 and 3.13 years are the strongest and the second strongest for Ethiopian water during the second Nile cycle. In the case of Nile cycle 2, The strongest periodicities are 14.8, 10.09 and 3.31 yr. for Minimum, Maximum and Ethiopian water respectively.

It is worth mentioning that there are seven solar periodicities of varying strength between 2-3.5 years (Yousef and El Rae 1995).

These short periodicities of the order of 2-3.5 yr. have special implications and may be due to periodicities in the sun and are stronger in Ethiopian Water. Tree-rings also show such short term periodicities (Yousef 1994).

Studies of pressure fields in winter over the North Atlantic for the period 1871-1974 produced marked peaks at 2.2,3.4,5 and 11 years (Burroughs 1994 and references therein). Variations of varves thickness (i.e. annual deposite of clay and

slit in lakes) which reflect changes in temperature. rainfall, evaporation and storminess from various lakes in the European part of the former USSR indicate periodicities in the range 2 to 3 .5 to 6 and 10 to 12 years (Burroughs 1994 and references therein).

TABLE 1

SOLAR PERIODICITIES FOUND IN NILE WATER

PERIOD	PERIODICITY											
622-1467												
Equatorial	226	133			79.8	55.7	22.2	12.5	11.9	10.9	9.1	8.1
Ethiopian	226	133		88.7	79.8			12.9	12.1	10.9	9.1	8.6
NILE CYCLE I 622-886 AD												
Equatorial				88		52.8	22	12.6	11.5	10.6	8.8	
Ethiopian						52.8		12.6			8.9	
NILE CYCLE 2 887-1128 AD												
Equatorial							22.2		11.7	10.6		8.2
Ethiopian					80.6						8.9	
NILE CYCLE 3 1229-1467 AD												
Equatorial			121		80.6			12.7	11.0	10.1	9.0	
Ethiopian								12.7	11.0	10.1	9.0	
1870 - 1945												
Equatorial								12.7			9.5	
Ethiopian								12.7			9.5	
1870 - 1988												
Equatorial									11.9	10.0		
Ethiopian											9.1	

TABLE 2

CHARESTERISTICS OF SOME RECENT SOLAR-WOLF-GLEISSBERG CYCLES

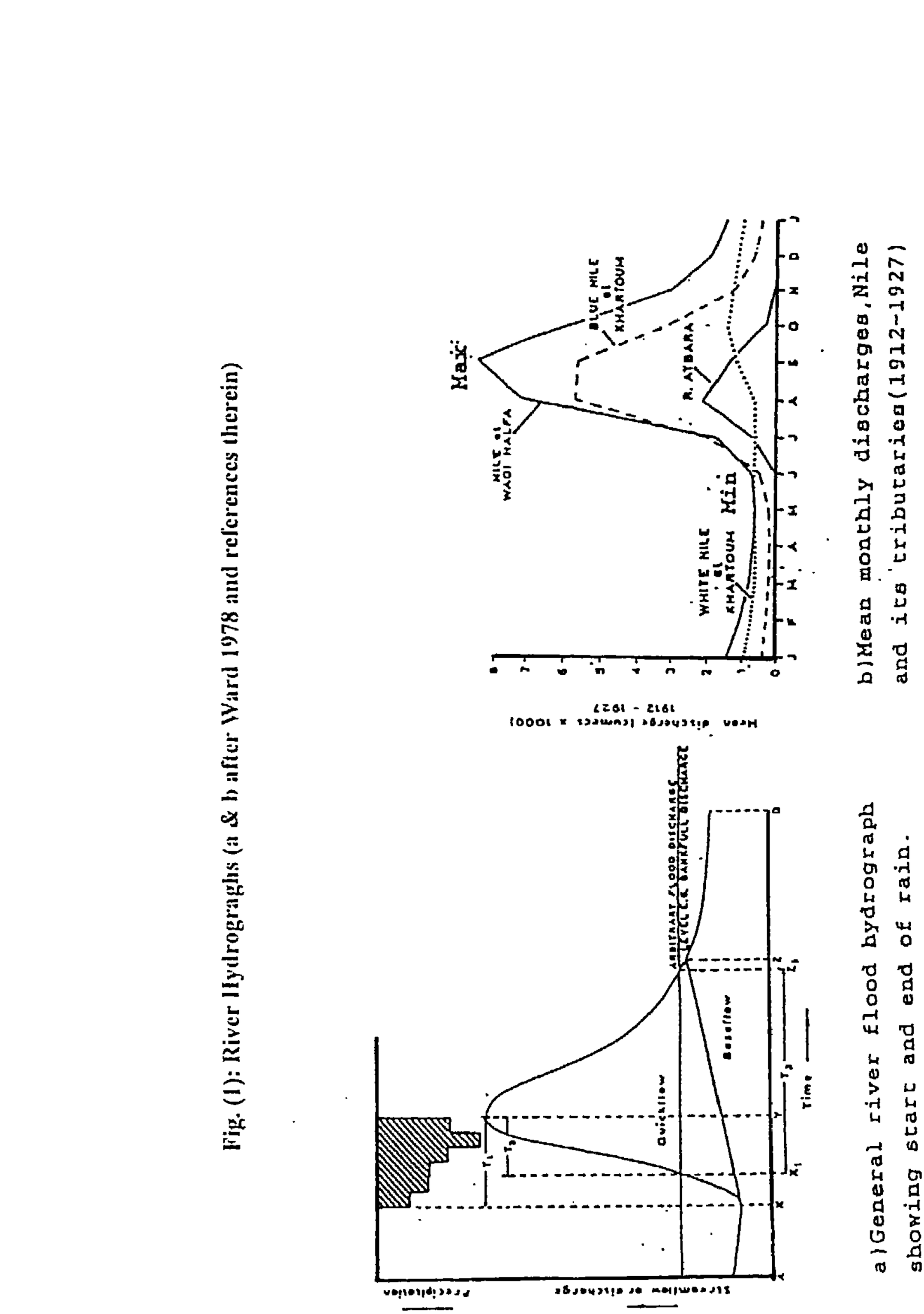
CYCLE	1	2	3	4
DURATION OF MIN		21797-1823	1877-1913	1997-2032
SMOOTHED MIN		1810-1811	1901	2009
SMOOTHED MAX	1779-1780	1838-1840	1957-1958	
SECONDARY MAX		1860	1981	

TABLE 3

LUNI-SOLAR NODAL PERIODICITIES DETECTED IN NILE WATER

PERIOD	PERIODICITIES						
622-1467							
EQUATORIAL			17.73	16.98			14.78
ETHIOPIAN				16.98	15.65	15.06	15.54
NILE CYCLE 1 622-886 AD							
EQUATORIAL		18.86					14.67
ETHIOPIAN				16.6			
NILE CYCLE 2 887-1128 AD							
EQUATORIAL		18.5					14.8*
ETHIOPIAN	20.18						14.8
NILE CYCLE 3 1229-1467							
EQUATORIAL	20.16			16.13			
ETHIOPIAN	20.16						14.3
1870 - 1645							
EQUATORIAL		19.0*					
ETHIOPIAN		19.0					
1870 - 1988							
EQUATORIAL				16.85			
ETHIOPIAN							

* strongest periodicity



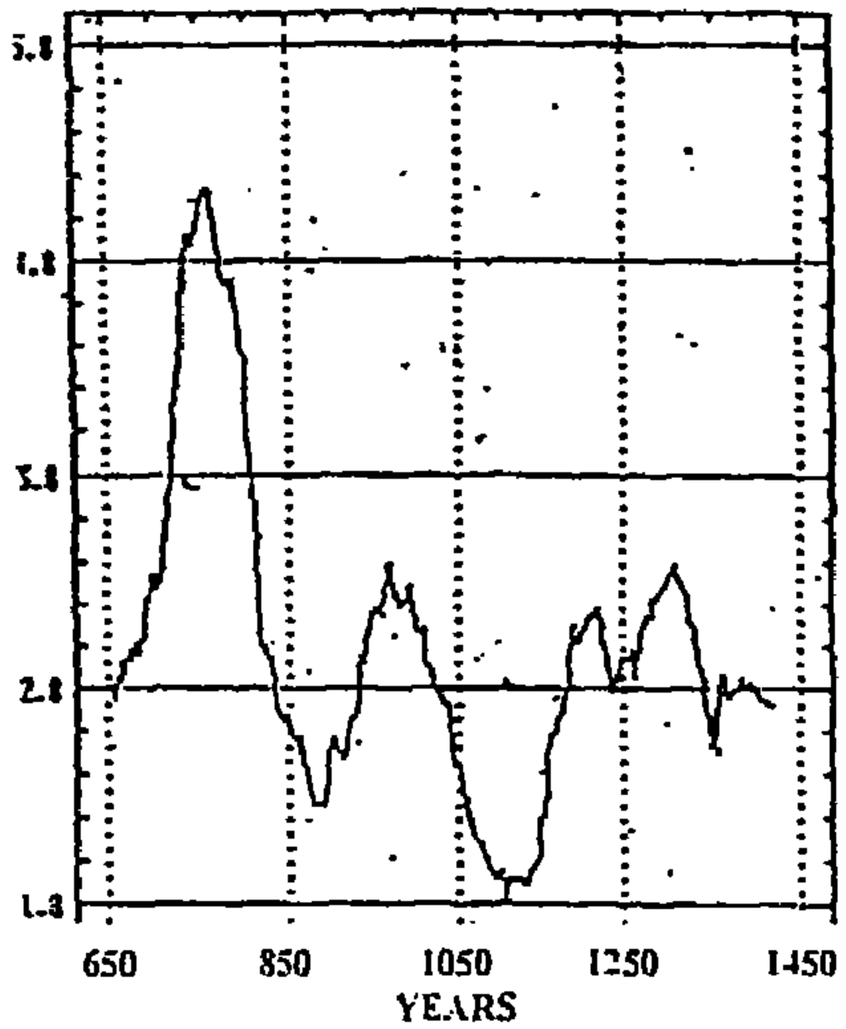
b)Mean monthly discharges, Nile and its tributaries(1912-1927)

a)General river flood hydrograph showing start and end of rain.

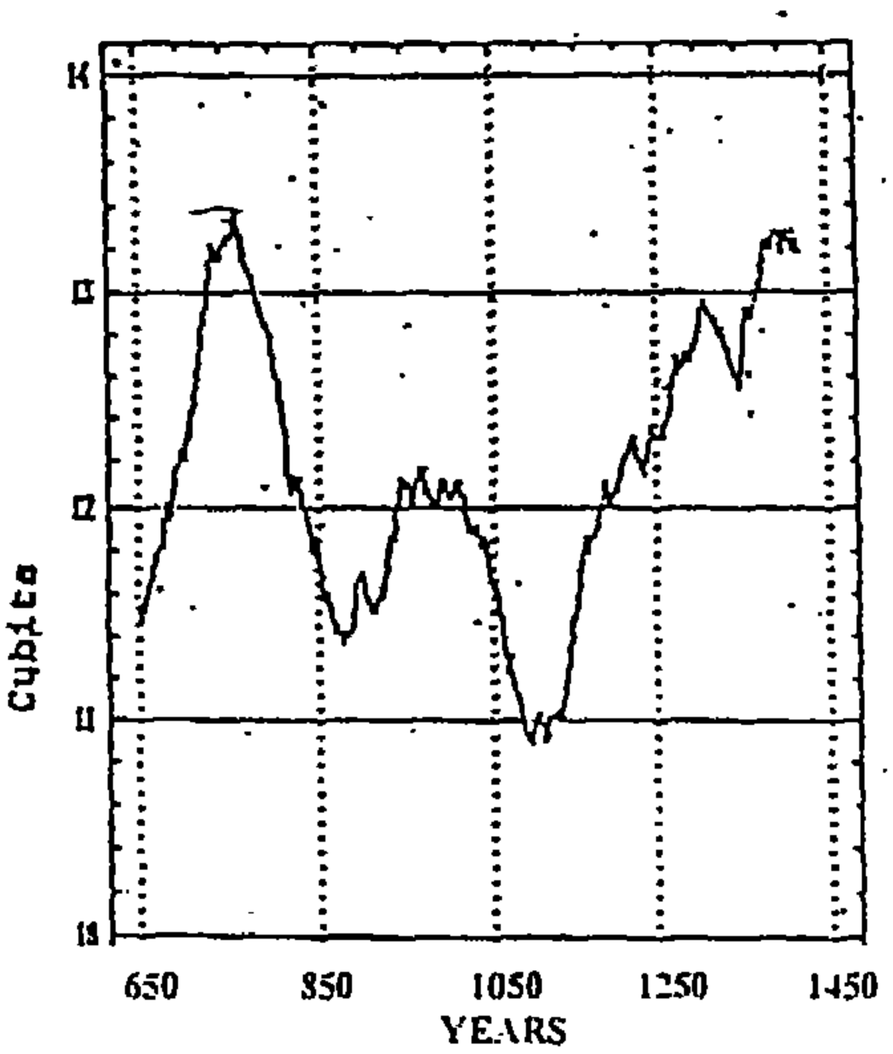
Fig. (1): River Hydrographs (a & b after Ward 1978 and references therein)

Fig 2 :79 years smoothed Nile hydrographs showing Nile cycles.

c)Ratio (Ethiopian/Equatorial).



b)Ethiopian water.



a)Equatorial (Hin) water.

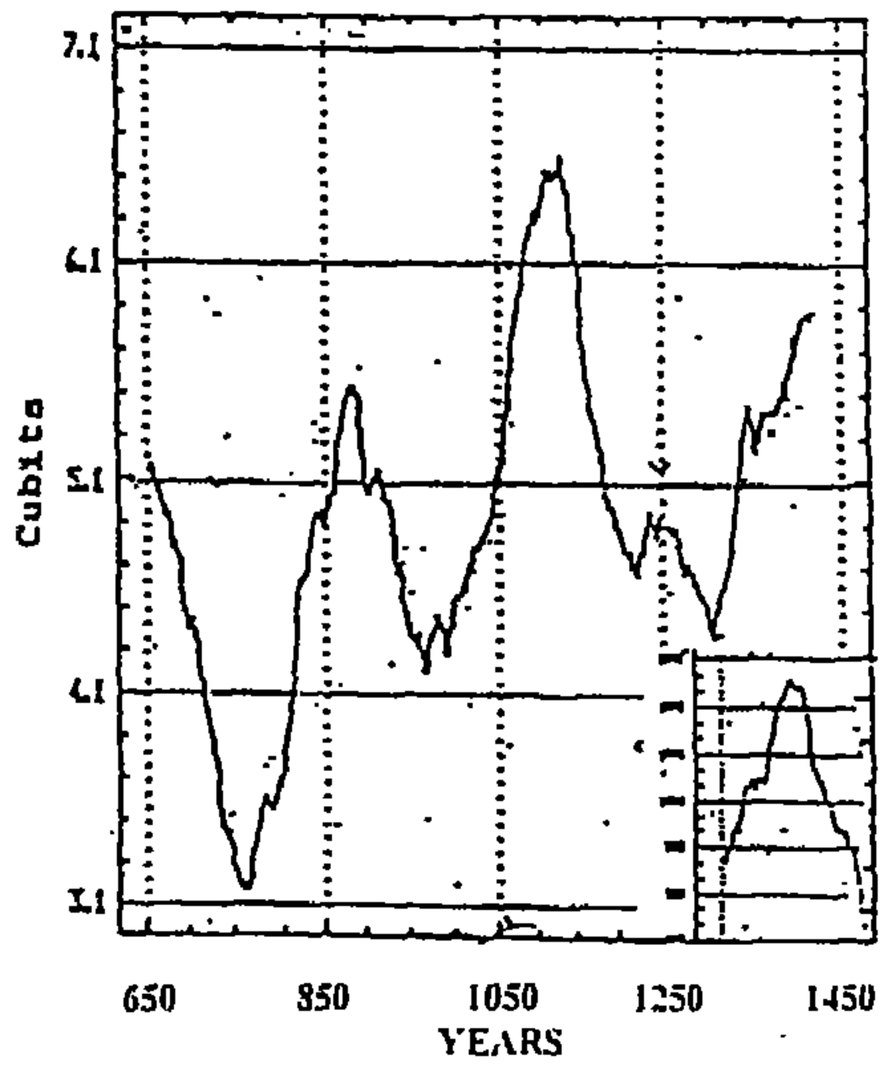
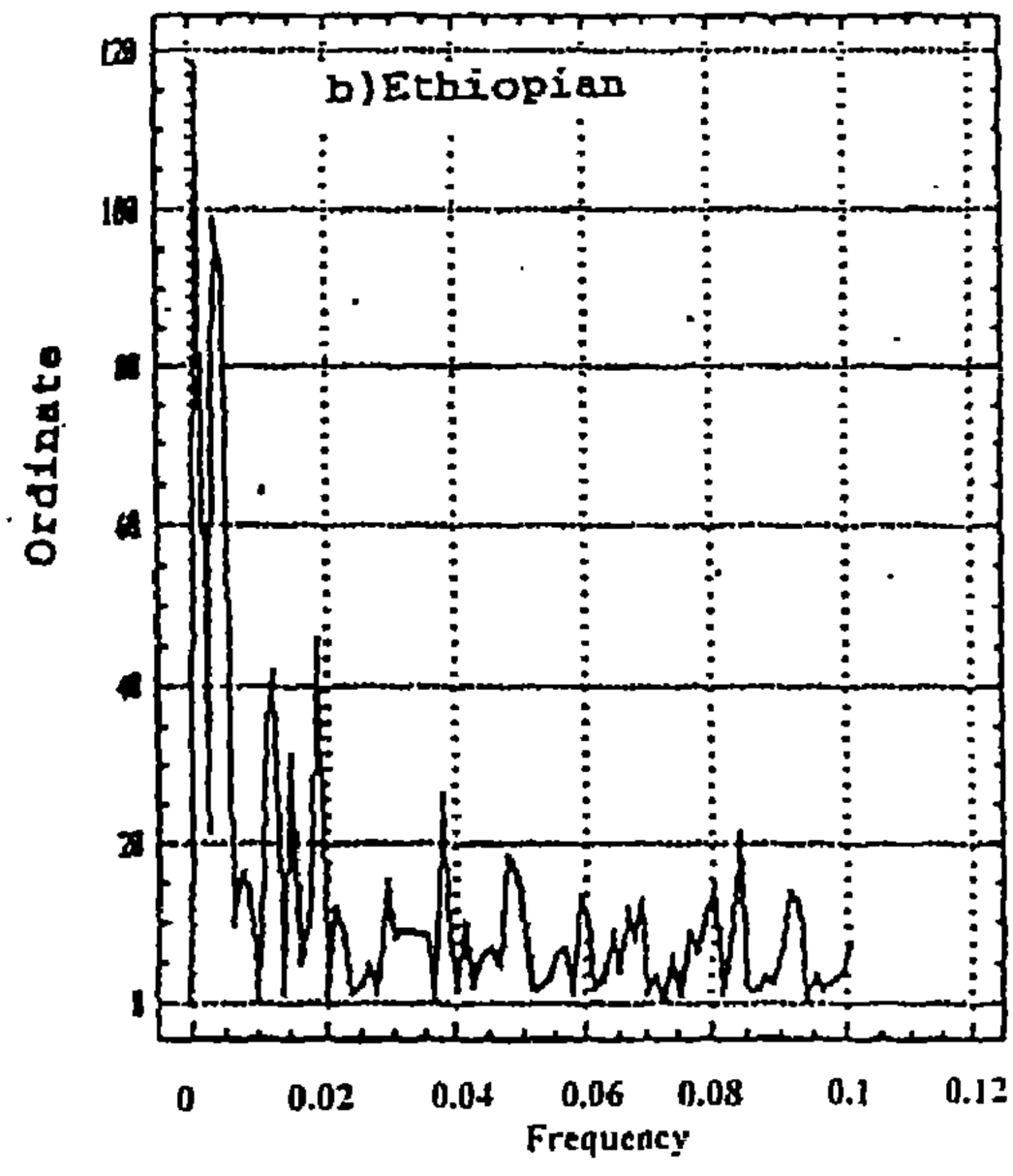


Fig (3) : Enlarged sections of Nile water periodograms presented in for periods > 10 years



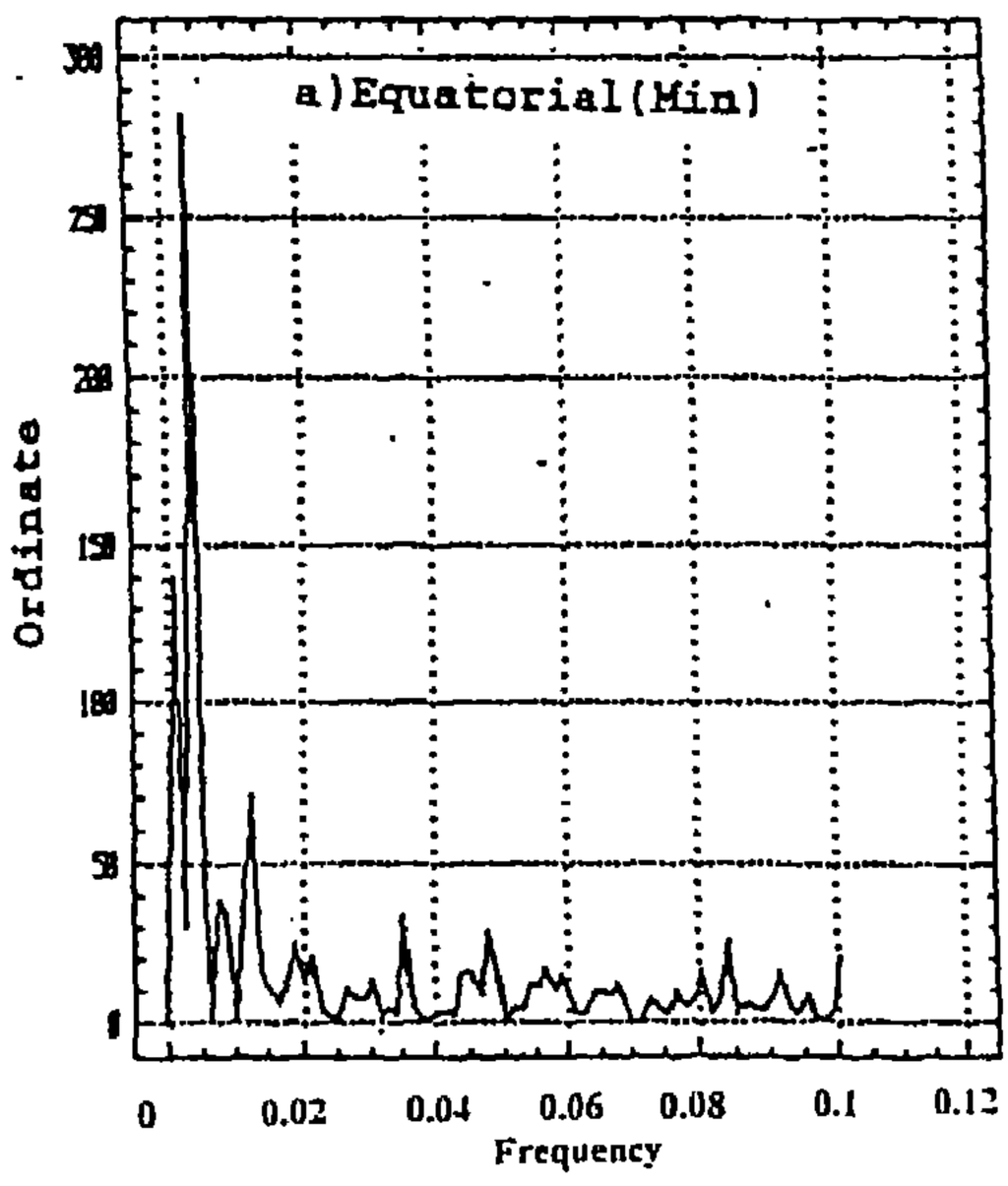
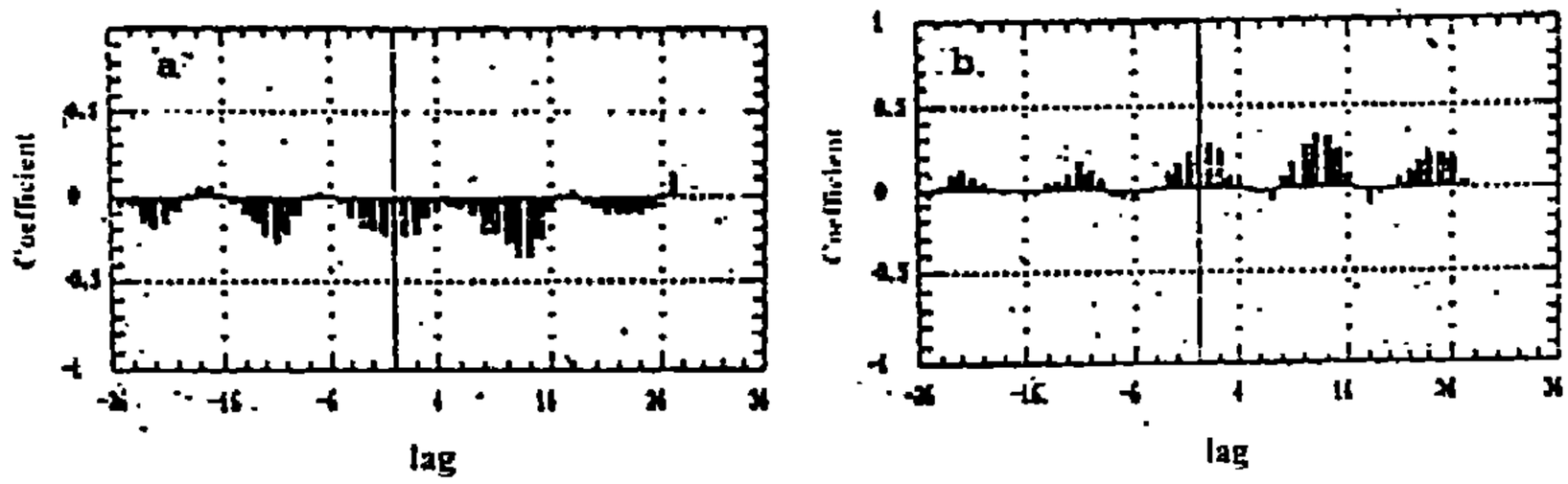


Fig 4: Cross-Correlation Functions.

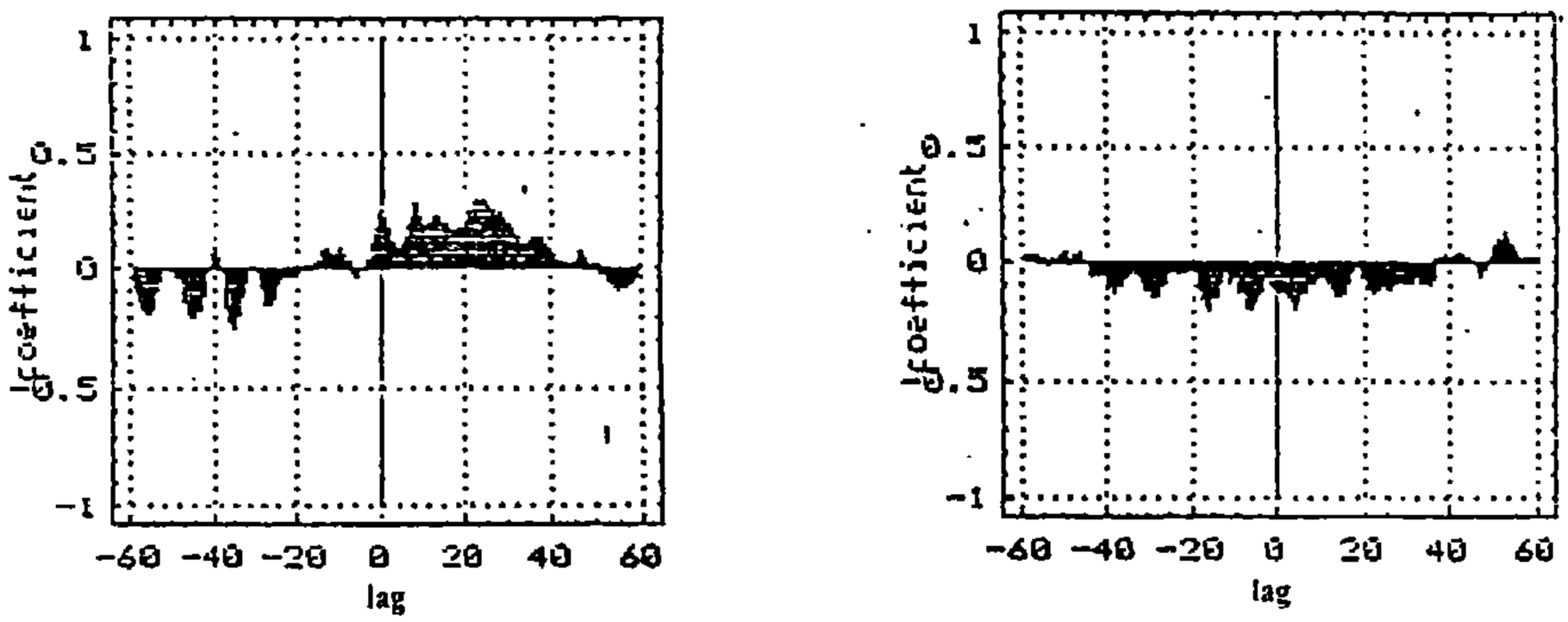
a,c between sunspot number and Minimum Nile water

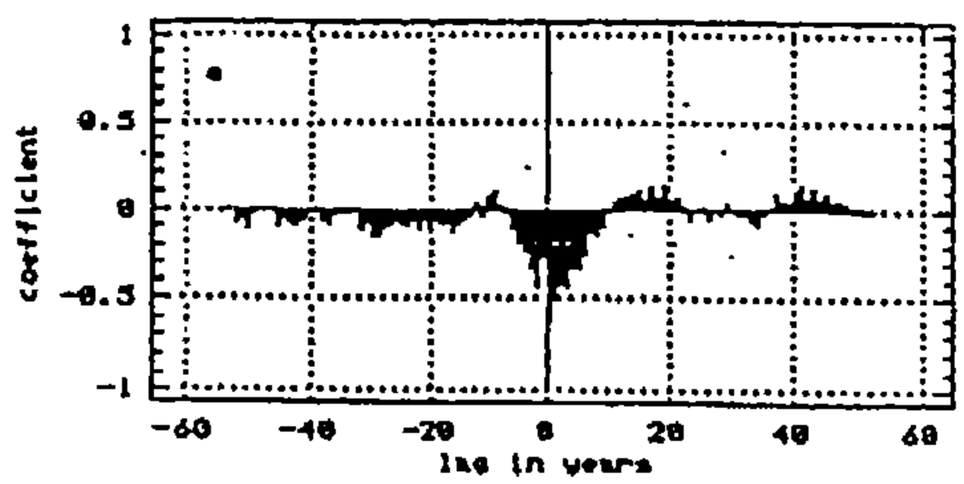
b,d between sunspot number and Ethiopian water.

Roda level (1825-1902)



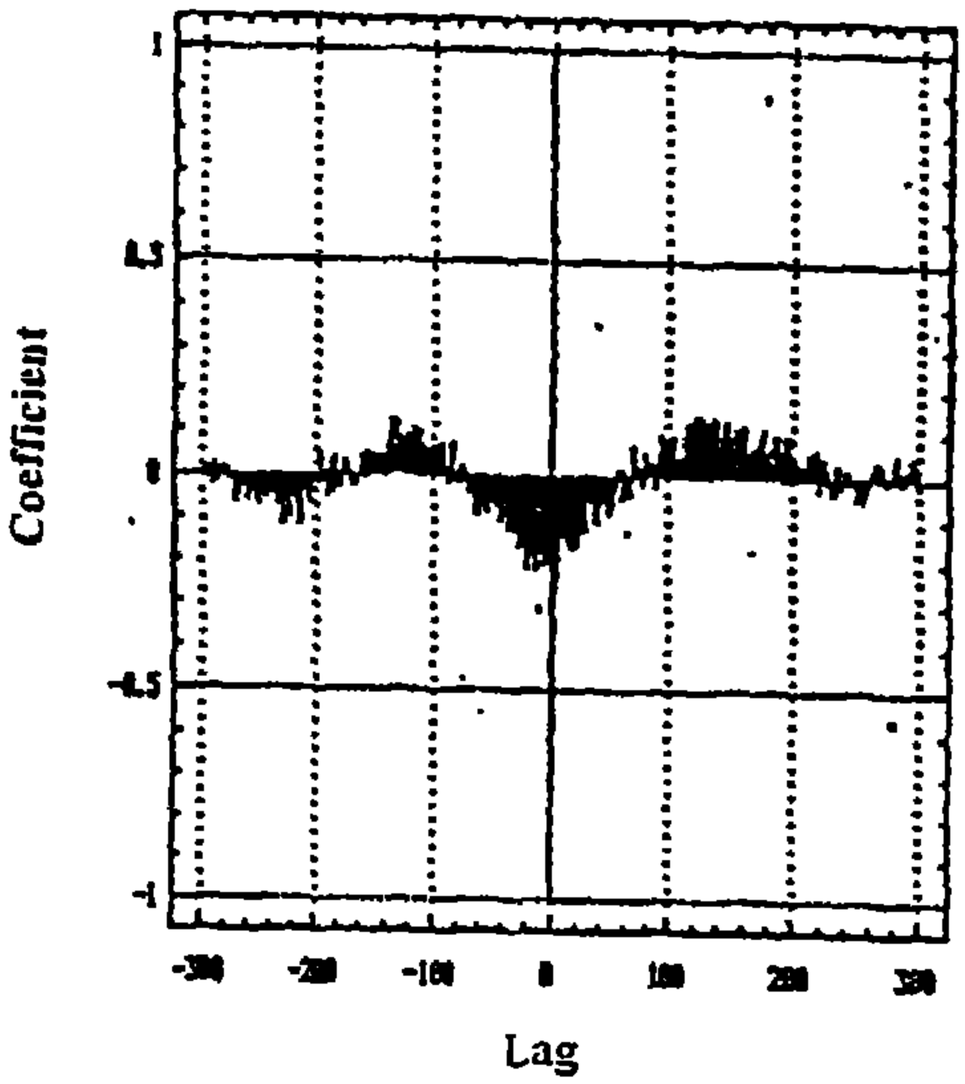
Natural river disharge (Aswan 1903-1987)





e)Cross-Correlation between Equatorial(Min)and Ethiopian discharge downstream Aswan(1870-1973)

Fig (5) : Cross-correlation between Ethiopian and Equatorial water for the whole set of data.



IX-CONCLUSION

Solar influence on the two components of the Nile water , namely the Equatorial and Ethiopian , has been proved through the existence of the 80 , 22 and 11 year cycles.

Cross correlations between the Equatorial and Ethiopian components for the period 622-1467 AD.,Fig (5) proves that:

a-The two variables are negatively correlated , at zero lag the correlation coefficient is - 0.8. b-It changes from negative to positive correlations gradually over a cycle of 133 years (average) reaching zero lag at about 80 years average delay.

The 133 yr .= 80 yr. + 53 yr.

= Wolf- Gleissberg cycle + 53 solar cycle

In other words the 133 yr. cycle is the sum of two solar cycles , the 80 yr.Wolf-

Gleissberg cycle and the 51-53 yr. cycle. The 133 yr cycle is the second strongest in Equatorial water (622-1420), while the 80 solar cycle is strong in Equatorial water and the 53 yr. cycle is the strongest in Equatorial in cycle I and in Maximum flood water cycle I.

Negative cross corelation between the Equatorial and Ethiopian componets occur during the 80 cycle that change to positive correlation over the following 53 years.

c- A fundamental cycle of (266(l) year exists between two successive maxima.

The existence of a 266 year solar episode is thus proposed.

Cross correlations between each of the Equatorial and Ethiopian components and sunspot number indicates the 11 yr. cyclicity in the two components and that at a given time one of them is positively correlated with the sun while the other is negatively correlated. The situation reverses for each the Wolf-Gleissberg of the order of about 80 years.

The 22 year solar Hale magnetic cycle influence only Equatorial water, While periodicities of the order of 2 -3 years are very strong in Ethiopian water. This remains an open question.

Luni-Solar term is evident in Nile Water . It can be of a value of 18.86 yr. at times. It is time dependant. At a certain time domain , this term can have the strongest influence on Nile water.

lunar and solar semidiurinal tides arise from the orbital characteristics of the moon and sun respectively. The lunar nodal tide induces an 18.6 years quasi-stationary standing atmospheric wave, The distribution of the maxima of solar and lunar gravitational tidal forces on the atmosphere and waters of the earth is very important. These tidal forces lead to the formation of blocking anti cyclones and to changes in the character of the atmospheric circulation (Yavorskiy 1977 cited in Kocharov 1990). Droughts appear in the zone of such

anti- cyclones ,with considerably increased precipitation observed around its

periphery. The width of zone of maximum tidal effects amounts to 300-500 km. in longitude , When the atmospheric tides are formed over regions of precipitation formation ,e.g. above an ocean, the droughts may be manifested over very large territories (Yavorskiy 1977 and Kocharov 1990).

During the interval (887-1128). the strongest periodicity in Equatorial water and the fourth in strength of maximum flood level was the 14.8 yr. periodicity. According to Burroughts(1994), the Nile periodicity during the time of the prophet Yusof was 14 years. Finding the 14 yr. cycle in Nile water may imply that the period (887-1128 AD) was similar in some respects to the (2250-2100 BC) interval. This is supported by the fact that during the AD period 8 years of droughts appeared in several parts of the world.

It was found from studies of proxy data from Chile that the strongest solar periodicities is time-variable, it was 11.23 during the very strong activity that persisted during the Medieval maximum (1135-1280 AD). During periods of solar inactivity, e.g. the Spörer minimum (1450-1540 AD), the strongest solar periodicity was the Hale magnetic 22.5 yr., while during the Mauder minimum (1645-1715), the luni-solar nodal term of 17.5 yr. was the dominant periodicity (Yousef 1994).

The balance between the contributions of the two sources of the Nile and their inverse dependency on solar activity is a mercy from God the Almighty

"AND WE DESCEND FROM HEAVENS A MEASURED AMOUNT OF WATER THEN WE DWELT IT IN THE EARTH"

Surat Al Mominoon 18"

The Holy Quran

x- Acknowledgement

I would like to thank my mother Mrs. Ikram El-Attar for without her help it would have been impossible to carry out this research.

REFERENCES

Burroughs,William James 1994: Weather Cycles.Real or Imaginary?. Cambridge University Press. Great Britain.

Currie,R.G. 1981: .J.Geophys. Res 86 11005

Currie,R.G. 1983: Geophys. Res. Lett.,10,1092

Currie, R.G 1991: Ann Geophysicae 9 , 71

Gleissberg ,w.1971 : Solar Physics ,21 ,240.

Herman, J.R.and Goldberg, R.A.1978: Sun ,Weather and Climate. Dover publications,Inc. New York.

Kamil,Abd ul-Aziz, 1966, Bulletin De La Societe De Geographie D'Egypte.Tome XXXIX ,1

Kane,R.P. and Trivedi N.B. 1985: J.Geomagnetic ,Geoelctric. 37,1071.

Kocharov G.E.1990 :Methods of Dendchronology, E . R.Cook and L.A.Kairiukstis (eds) , 289.

Murphy,J.o.,1991.: Proc.Australian Astronomical Association ASA 9,(2)330

Negm,A.M.,Attia, B.Bland owais,T.M.1989: International Seminar on Climatic Fluctuations and water management. Cairo Egypt.

Sami,A.1916: The Nile Calender.Egyptian Government Publications.

Shaltoot,H.A. and Tadros,H.T.Y.1989: Mausam, 393

Siscoe,G.L.,1978 : Nature, 276,348.

statgraphics 1986: Users Guide

Toussoun ,Prince omar,1925.Memoire sur les Anciennes Branches Du Nil,Epoque Arab.Hem . Bulletin De L'Institut D'Egypte.

Ward,Roy.1978: Floods,A geographical perspective Focal Problems in Geography Series,The Macmillan Press LTD,Lpndon and Basing stoke.

Yousef, Shahinaz Mustafa,.1993 a: Tree-Ring Chronology From British Colombia. Bulletin of the Faculty of Science of Cairo university ,61,247.

Yousef, Shahinaz Mustafa,.1993 b: Solar Periodicities During The Medieval Maxima, Maunder and Spörer Minima . Bulletin of the Faculty of Science of Cairo university ,61,323.

Yousef, Shahinaz Mustafa,.1993 c: Solar Eclipse In Dating The Prophet Ibraheem. Bulletin of the Faculty of Science of Cairo university ,61, 237.

Yousef. Shahinaz Mustafa. and Hady A.. 1993: A search for Indications Of Solar Activity From Tree-Rings . Bulletin of the Faculty of Science of Cairo university.61 ,261.

Yousef. S.M. and Khaleel. N.1994 : Latitudinal effect on Precipitation and its Relation To Solar Activity. In Water In The Arab World conference, organized by the Egyptian Geographical Society. 26-28 Nov.

Yousef. Shahinaz Mustafa, and El Racy M.1995: Major Solar Episodes Reconstructed Using Records of The River Nile, Tree-Ring Indices and Sunspots. Bulletin De L'Institut D'Egypte. Tomes LXXIV, p 76.

Yousef, Shahinaz Mustafa..1995:.The Downturn Of Solar Activity During The Forthcoming Three Cycles. Bulletin of the Faculty of Science of Cairo university ,65, 185.

Yousef, Shahlnaz~Mustafa..1999: Romanian Astronomical Journal ,In Press.