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NILE FLOOD 2000 FORECAST

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ABSTRACT:- Solar forcing is of great importance to weather and climate. Right now solar activity is descending into a period of inactivity similar to those happened around 1800 and 1900 A.D. leading to climate change. Solar Wolf-Gleissberg cycles of the order 80-120 years are evident in ENSO related precipitation . Historical Nile floods show 80 year periodicity. Studies of Nile floods during the drops of solar activity in between Wolf- Gleissberg cycles around 1800 and 1900 in conjunction with El Nino ,La Nina, droughts and floods world- wide proved to be a good approach in long –term forecast of those phenomena.

This method was successful in 1997-1998 El Nino prediction and the 1997 low Nile flood and the 1998 destructive flood as well as the 1999 high flood.

It is predicted that the annual discharge of Nile flood 2000 will also be about 95±5 Milliard cubic meters. Additional evidence is coming from the presence of La Nina cold stream in the Pacific

which will be in maximum phase this spring. La Nina usually causes heavy floods over Ethiopia. Thus we have to expect higher than average flood. It is likely that floods and El Nios in the present drop of solar activity will be frequent and somewhat similar to those around 1800 causing flood- drought hazards. It is rather likely 2002 ± 1 year will be a Nino year causing low Nile floods to drought conditions over Ethiopia.

1-INTRODUCTION

The demand for water supply is of increasing concern. Climate variations (e.g. drought and floods) have great economic and social impact. There is a great need to understand the past natural variability of precipitation if we are to detect the future effects of perturbations . Available meteorological records , which are only about a century in length , are not adequate to assess the history of past precipitation variability. For this purpose proxy and extended historical records are needed (Arrigo and Jacoby 1991). Nile flood accurate level records are the longest and can be reflected into future forecasts.

2-EL NINO, NILE AND SUN

Variance spectral analysis of the chronologies and reconstruction of winter precipitation from northwestern New Mexico, USA reveal significant peaks at approximately 2-7 year, 22 year and 80-100 year (Arrigo and Jacoby 1991). The last period has also been detected in ENSO related time series e.g. historical Nile records .

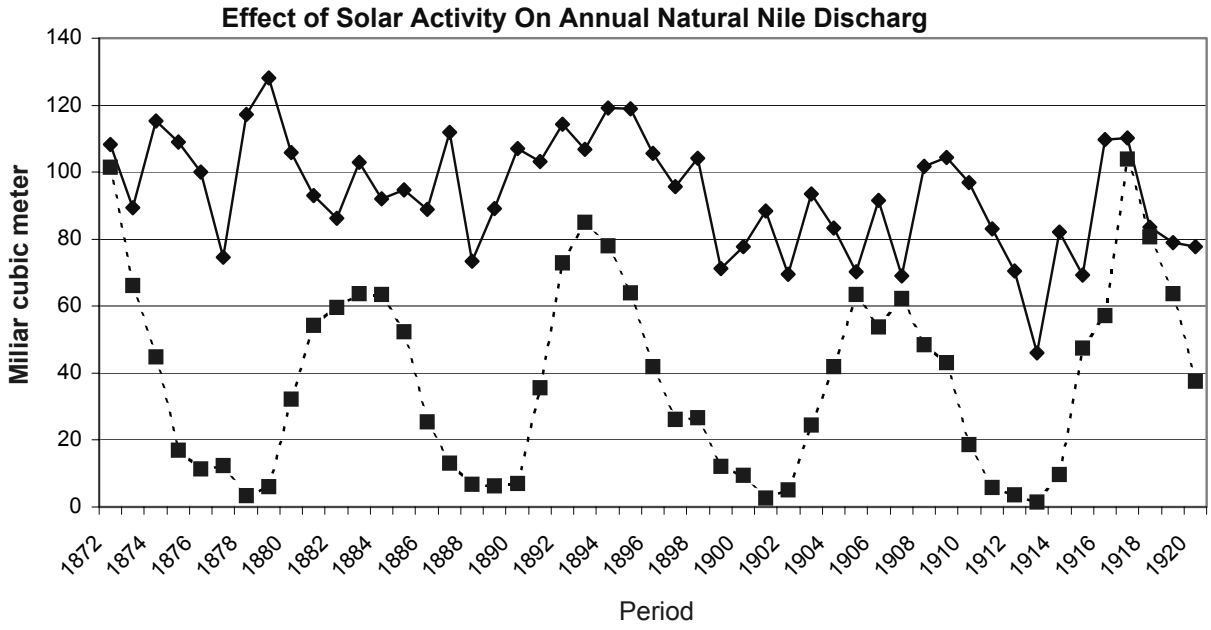

Fig.1 : The effect of solar forcing on natural Nile floods discharge during period of weak solar cycles around 1900. Upper and lower curves represent Nile floods and sunspot cycles respectively. Note that low Nile floods attributed to El Nino events , occurred at sun spot minimum, were followed by destructive to high floods owing to La Nina.

It is most likely that we are just at the beginning of a drop in between two Wolf- Gleissberg cycles like the drops that occurred around 1800 and 1900. Studies of the pattern of El Nios (El Nino and La Nina) during such prolonged drops of solar activity (three to four 12 years solar cycles) and world wide flood- drought hazards during such periods are essential for long term forecast.

Figure (1) illustrates natural Nile river discharges in relation to sunspot cycles during the previous drop of solar activity. Low floods attributed to El Nino events occurred in coincidence with solar cycles minimum.. Following El Nino, high to destructive floods occurred and could be attributed to La Nina. In 1877 El Nino, droughts occurred in North east of China, India and Ethiopia among other countries which are teleconnected. In 1878 destructive floods followed. Those informations and my forecast of the minimum of solar cycle lead me to the successful forecast in January 1996 that 1997±1 will be a Nino year causing droughts in the above mentioned countries to be followed by destructive floods. Details are given in Yousef (1996a,b,1998) and Yousef and Osman (1999).

3- SUCCESSFUL EARLIER FORCASTS OF NILE FLOODS

Given below is a list of successful forecasts of several Nile floods as well as preliminary prediction of the coming flood.

1994 : Predicted flood monthly maximum = 23131 million cubic meters (Yousef and El Rae 1994).

Actual flood monthly maximum = 22885 million cubic meters

Predicted Annual discharge at Aswan =88 Milliard cubic meters.

1996: warning to Egyptian authorities in 1995 and 1996 to be ready with the Toshka canal (Yousef 1995).

1997 : low Nile flood and El Nino Prediction(Yousef 1996 a.b)

1998:Destructive Nile flood(Yousef 1996 a,b)

1999:Very high flood (Yousef 1998).

2000: high flood (Yousef 1999) about 95±5 Milliard cubic meters.

Successful predictions of 1994 Nile flood was made with only 1% error . Based on the lowest monthly discharge (Min)arriving at Aswan , the following model was used (Yousef and El Rae 1994).

Ln R = 11.71- 1.1762 ln Min Corr coef = -0.89

Where R = (Maximum- Minimum) monthly discharge in million cubic meters arriving Aswan.
Similar model was essentially found using historical maximum and Minimum Nile levels records at Roda for the period (622-1351) (Yousef and El Rae 1995).

4-PREDICTION OF LA NINA 2000

Eighteen months tropical Pacific sea surface temperature SST predictions with a coupled general circulation model has been developed at the center for Ocean and Atmospheric studies. Forecasts are fairly consistent in calling for continued cooling in the eastern Pacific through winter 1999-2000 and spring 2000. The tropical pacific is forecasted to return to near normal during the summer and fall of 2000. Moderate La NI/a conditions are forecasted for winter 1999-2000 and La Nina intensifies during spring 2000(Kirtman and Shukla Dec 1999).
El Nino caused droughts in south Africa and Mozambique, while the present destructive floods in both countries can be attributed to La Nina which is in progress.. According to Kousky (2000),there has been a shift in the probability distribution function due to La Nina resulting in an increased probability (compared to the normal probability) of flooding along the Nile.

5-PREDICTION OF NILE FLOOD 2000

Studies of droughts in some parts of the world at the drops in between two Wolf- Gleissberg cycles around 1800 and 1900 indicate that those that occurred as precursors at the beginning of the first drop occurred at the end of the second drop and re-happened now again as precursors in the present drop(e.g. droughts in British Colombia and Morroco). Thus it seems likely that present Nile floods will be similar to those that occurred during the period of solar activity drop around 1800. Yousef (1998) estimated the annual discharge of river Nile around 1800 using El Gabarty's historical notes on the condition of the Nile.
The following table gives a comparison between Nile discharges around 1800 and the present discharges in milliard cubic meters.

Year	Discharge	Year	Discharge
1799	70	1997	80
1800	110	1998	120
1801	120	1999	110
1802	100	2000	95±5
1803	**52**		
1804	**<52**		
1805	**84**		

Owing to the presence of La Nina, It is very likely that Ethiopia will experience higher than normal precipitation and we have to expect high than average flood this year.
There is a possibility that El Nino will occur in 2001-2002 as happened in 1803-1804 causing droughts in Ethiopia and other teleconnected countries.

6-PASSIFIC DECADAL OSCILLATIONS PDO

Now scientists are saying there's another system forming in the Pacific that's much larger and could have dramatic impact on U.S weather for several years. The phenomenon is called Pacific Decadal Oscillation (PDO) , identified by warmer than normal ocean water in a sort of a horseshoe shape with a wedge of cool water pushing inside.
It has been developed slowly but surely and affect the jet stream and might mean above averaged rainfall in the northwest and low rainfall in the south part of the U.S. PDOs grow and shrink over a course of 20-30 years. In my opinion, there is a connection between the development of the decadal oscillations and the sun being at the beginning of solar activity drop in between two solar Wolf-Gleissberg cycles. In other words, the PDO is solar force driven. While the current PDO will mostly be felt in U.S, it may have been involved in the deadly flooding that hit Venezuela in the past year and devastating wind storms that hit Europe in December 1999. It is going to be drier in the U.S that people will refer to El Nino as he good old days.

The PDO will make drought caused by El Nino severer and floods due to La Nina more violent, It is assumed that Wet years in El Sahel nowadays are enhanced due to La Nina and PDO (Kousky 2000).
The question is : Will the PDO affect precipitation in Nile basin ? , This is very likely , because 1998 Nile flood was destructive and 1999 was very high .
It is suggested that PDO's existed during the previous solar activity drops in between solar Wolf-Gleissberg cycles around 1800 and 1900 as severe droughts and severe floods were frequent then.

7-CONCLUSIONS

Owing to the presence of stream of water in the Pacific Ocean (La Nina)and from comparisons of the pattern of Nile floods at the drop in between two Wolf- Gleissberg cycles around 1800, it is most probable that Nile flood 2000 will be (95±5 MCM) with God's will.
The presence of Pacific Decadal Oscillations PDO of estimated duration about 30 years may be connected to the drop of solar forcing which is expected to last about the same order of years.

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