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Numerical Models performance over Nile Basin

By

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Thesis
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STATEMENT

The dissertation submitted to Cairo University for the degree of Master philosophy in Meteorology.
The work included in this thesis was carried out by the author, at Faculty of Science, Cairo University.

No part of this thesis has been submitted for a degree or a qualification at any other university institution.

Abstract

The Nile River is the longest river in the world Dominates the northern part of the African continent. It is the second longest river in the world, being about 6700 Km long. The Nile Basin area is estimated to be about 2,900,000 Km². Over this great spatial extension, climate, flora and fauna vary, just as do the races, civilization, languages and habits.

The Nile has two main sources, they are called "main" sources they are other having relativity little yield at present, as compared to the two main once. These are:

1- The Equatorial Lake Plateau.
2- The Ethiopia Plateau.

The mean annual rainfall pattern demonstrates quite clearly that climate boundaries bear little relationship to political boundaries. Also, rainfall pattern shows large spatial and temporal variability. The result of temporal variability is that no single time period is really representative of the long-term rainfall climate because of the strength of the long term variability.

In the present work two limited area models will be employed in the rainfall season 2008, to verify the predicted amount with the amount calculated by NFC (satellite).

The results indicated some index for forecasting rainfall over some location and it also show the sensitive of the model for different locations. More studies are recommended to improve the performance of the models and the system can provide reliable weather forecast.

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Main Conclusions

The main conclusions extracted out of this thesis can be stated as follows:

1- There is wide variability in rainfall along the Nile Basin during wet season.

2- The numerical model MM5 proved an accuracy of about 25% along the three stations.

3- The first day forecast proved not to be the best one for both models.

4- The Model tuning should be important in improving forecast quality.

5- The Result indicated that it is difficult to recommend single model for this short forecast ensemble model is mainly much better to be employed.

Briefing

(ITCZ)… Intertropical Convergence Zone

Cb cloud… convective cloud

hPa…scale of pressure hectopascale

(CFCs)…chloroflurocarbons

(IPCC) … Intergovernmental Panel on Climate Change

(SCOPE)… the Scientific Committee on Problems of the Environment

(ICSU)… International Council of Scientific Unions

(WMO)… World Meteorological Organization

(UNEP)… United Nations Environment program

(ENSO)… El Nino-Southern Oscillation

(NFS)… The Nile Forecast System

(AOGCMs)… Atmosphere-Ocean General Circulation Models

(GCM)…General circulation model

(ESP)… Extended Streamflow Prediction

(PDUS)… Primary Data User System

(LAN)… local area network

(GUI)… graphical user interface

(MSG)… Meteosat Second Generation

(ESA)… European Space Agency

(IR)… infrared radiation

(PDUS)… Primary Data User System

(CCD)… cold cloud duration

(NC)… The Nile Climatological

(ENSAP)… The Eastern Nile Subsidiary Action Program

(FPEW)… The Flood Preparedness and Early Warning

(IDEN)… Integrated Development of the Eastern Nile

(NWP)… Numerical Weather Prediction

(SST)…Sea Surface Temperature

(NCEP)… National Centers for Environmental Prediction

(BCs)… Boundary Conditions

(LAMs)… Limited Area Models

Contents

List of Table