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COMMISSION FOR BASIC SYSTEMS
OPAG on DPFS

MEETING OF THE CBS (DPFS) TASK TEAM ON SURFACE VERIFICATION

GENEVA, SWITZERLAND
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Agenda item : 4.1

ENGLISH ONLY

REPORT ON SURFACE VERIFICATION OF NWP MODEL PRODUCTS THAT ARE USED BY FORECASTERS AT TAZANIA METEOROLOGICAL AGENCY (TMA)

(Submitted by Hamza Kabelwa)

Summary and purpose of document

This document provides background information on the results of the evaluation of NWP models products that are used at TMA by Mr. Chuki Sangalugembe.

Action Proposed

The meeting is invited to take note of the results of the evaluation presented and to consider them and advise for further improvement of surface verification considering TMA as Regional Forecasting Support Centre for Lake Victoria through capacity development.

1. Introduction

Tanzania Meteorological Agency (TMA) as Regional Forecasting Support Centre operates three Limited Area models: Weather Research and Forecasting (WRF), COSMO and Wave Watch III models. However, due to computational constraints, COSMO model is not operated in regular basis. The three models have been installed in the new Computer Cluster at Julius International Airport (JNIA) Meteorological Office and are expected to be operational after the completion of establishing fast Internet link between the Central Forecasting Office and JNIA.

Apart from these that TMA is running, there are other products from other Centers through Severe weather web portals like ECMWF, ALAM, COLA and NCEP. For the wide range forecasts TMA utilizes different products from these Centers. Each model has its own capability in predicting certain weather parameters at different seasons. In this study, TMA needs to assess these model products so as to have an idea, which one is performing better than the other at which environment as a guide during the forecasting process. In doing the verification, TMA recognizes the models differences in physics, horizontal and vertical resolutions, etc. The verification tools used have got no capability of converting all the models in the same conditions.

For the purpose of this study, verification of 24h-accumulated rainfall was done for the months of June, July and August 2012 at JNIA, Pemba, Tanga, Zanzibar and Morogoro stations located in the northern coast of Tanzania.

2. Model verification of 24h-accumulated rainfall during the period of June-August 2012 and Results

The SYNOP data was collected from JNIA, Pemba, Tanga, Zanzibar and Morogoro stations located in the northern coast of Tanzania and quality controlled before verification. Precipitation forecasts from the above-mentioned NWP models were systematically manually (subjectively) collected for verification against observations. Evaluation is carried out based upon comparisons between observations and model forecasts of rainfall, systematic errors, root mean square errors and categorical statistics. The results for mentioned stations are presented below.

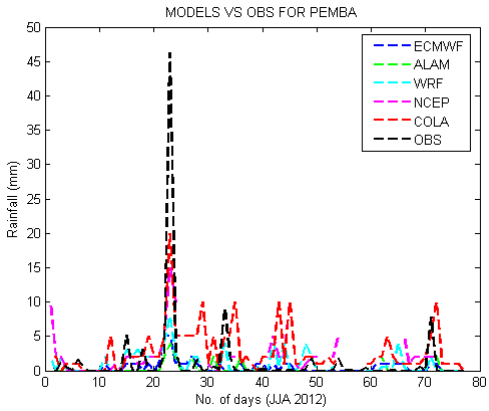

Figure 1. Models comparison against observations at Pemba station

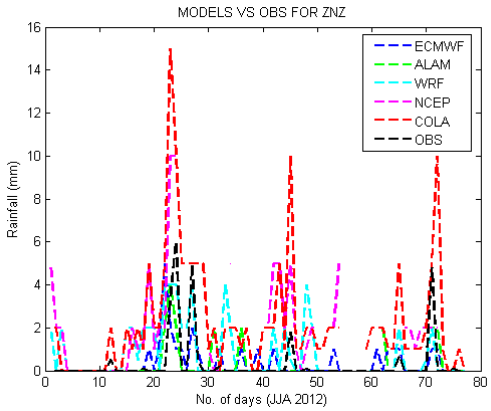

Figure 2. Models comparison against observations at Zanzibar station

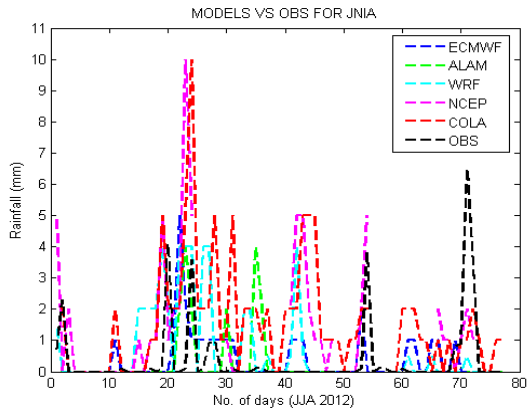

Figure 3. Models comparison against observations at JNIA station

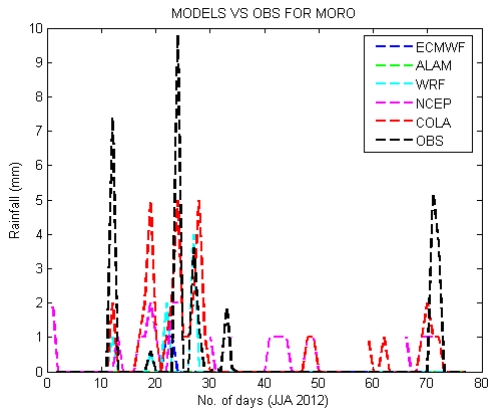

Figure 4. Models comparison against observations at Morogoro station

Table 1. Models comparison in Hit rate and False alarm Percentage of correct scores

NWP - MODEL	Percentage correct (%)	Hit rate (%)	False Alam (%)
ECMWF	60.5	53.1	25.4
ALAM	61.6	44.1	15.4
NCEP	44.4	71.4	79.2
COLA	40.8	69.6	84.2
WRF	70.5	53.7	33.2

5. Observations

During the period of June-August 2012, WRF model was able to forecast rainfall over Northern Coast of Tanzania with higher percentage correct (70.5%) compared to other models, followed by ALAM model (61.6%). The COLA model has higher percentage of False alarm, implying that most of the time it forecast precipitation while in real situation there is no precipitation signal. WRF model has least RMSE value compared to other models (results not shown). With these few observations, WRF rainfall products can be a good guidance for the forecasters during forecasting process.

Concerning the recommendations for this study, more stations and parameters like temperature, pressure and winds need to be added in different seasons of the year for a longer period. Capacity building on model evaluation tools like MET package for WRF model and others is encouraged.