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## 1. Rationale

Currently, the Kenya Meteorological Service (KMS) runs the Weather Research Forecasting Model – Environmental Modelling System (WRF – EMS) at a resolution of 14kms using the Global Forecasting System (GFS) half degree data. But a more accurate configuration is needed to capture systems at a higher resolution. This can be achieved by improving the “initialization” conditions i.e. a dataset that best represents the underlying conditions. The Land Information System (LIS) dataset and the Visible Infrared Imaging Radiometer Suite (VIIRS) vegetation index provides better representation of land surface states and vegetation cover. Hence, it is expected that initializing WRF-EMS with LIS and VIIRS dataset will provide better and higher resolution (9km) forecasts.

## 4. Earth Observations and Other Inputs

- ▶ CPC MORPH data at 3km resolution
- ▶ Global Forecasting System (GFS) Initial & Lateral boundary data
- ▶ VIIRS - Visible Infrared Imager Radiometer Suite onboard Suomi Satellite (Japan/US)
- ▶ Static NOAA LSM-offline coarser Res. Land Information

## 2. Objectives

- ▶ Incorporate real-time high-resolution soil moisture and temperature data from the SPoRT-LIS into the KMS/EMS model over East Africa
- ▶ Incorporate real-time NOAA/NESDIS VIIRS green vegetation fraction data into the KMS/EMS model over East Africa
- ▶ Validate functionality of the dataset ingestions described above using the Model Evaluation Tool (MET).

## 5. Results

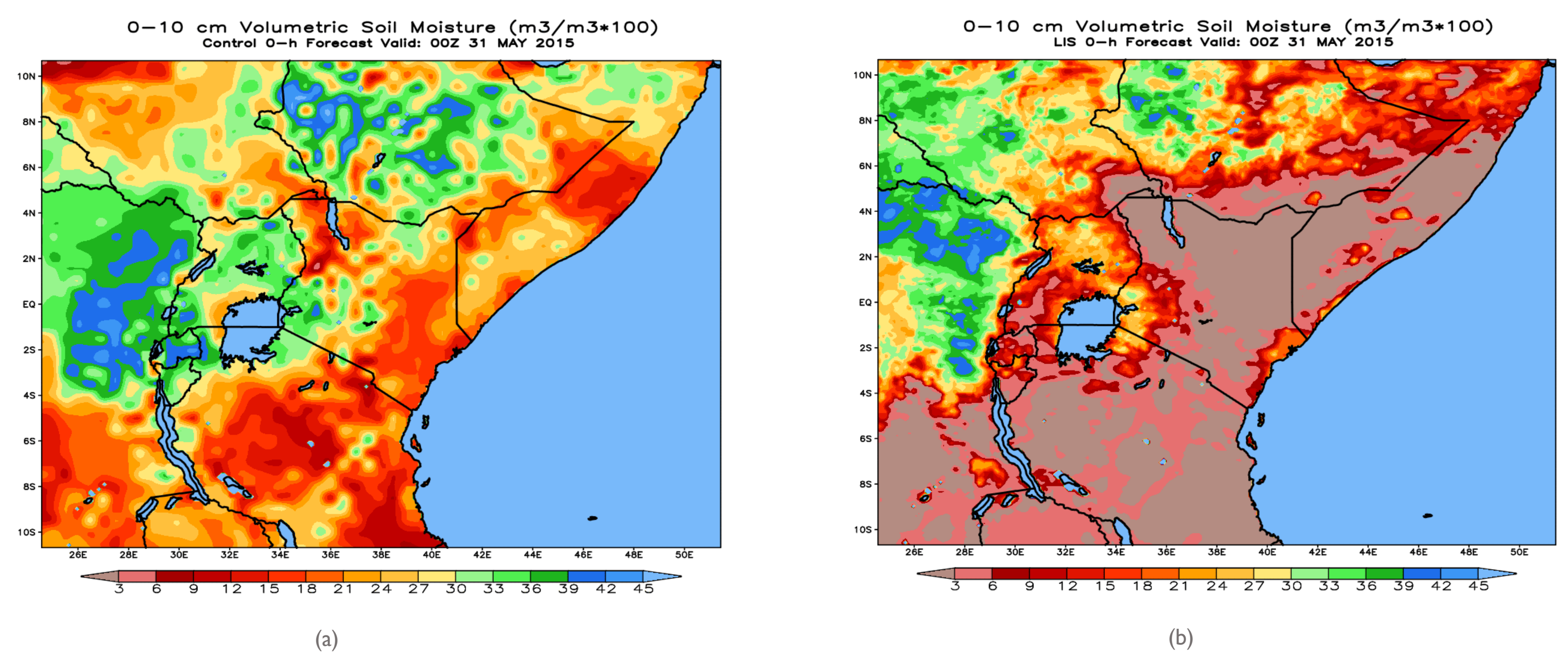


Figure 1: 31<sup>st</sup> May simulations output from the control (WRF-GFS) (a) and WRF-LIS (b) for surface moisture

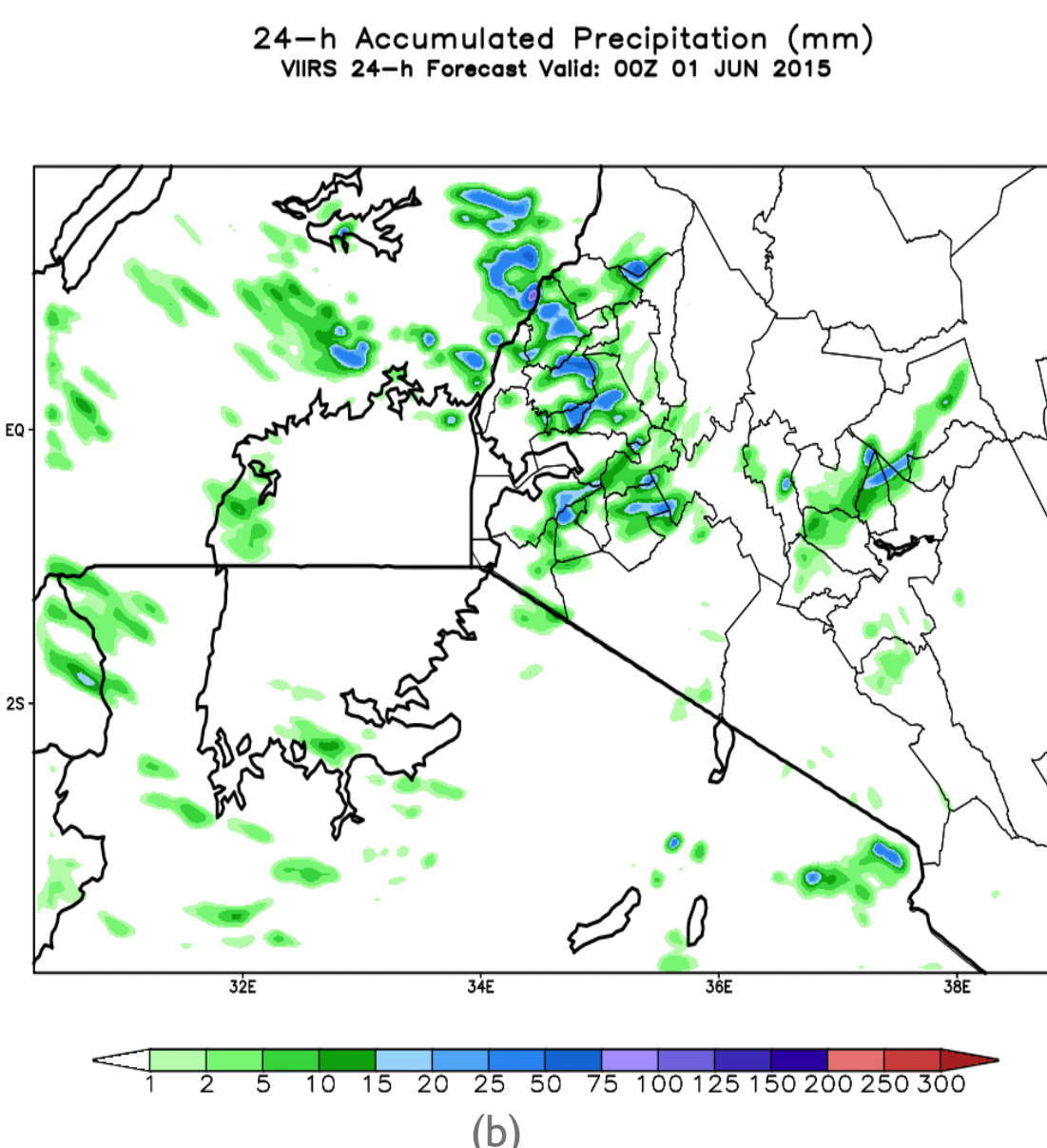
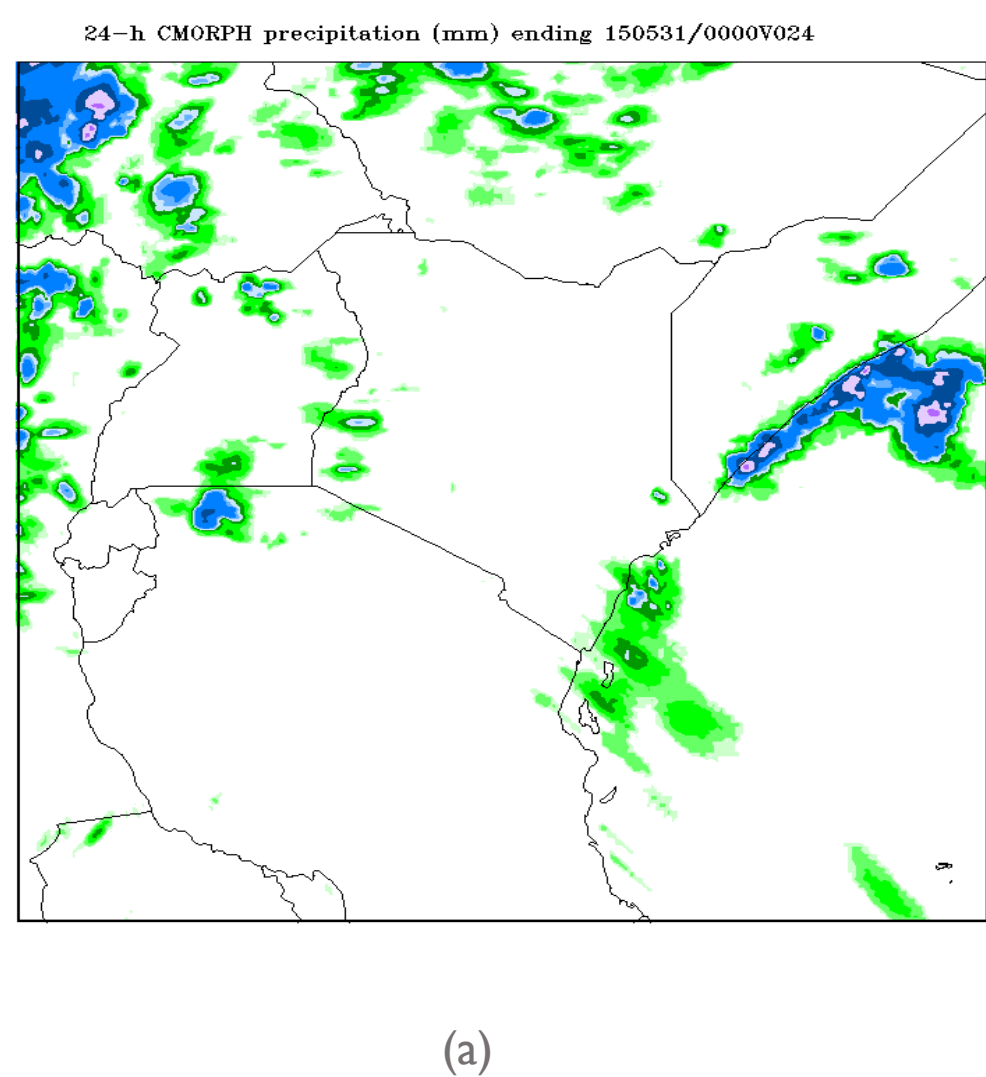


Figure 2: 24-hr CMORPH precipitation output (a) and WRF-VIIRS precipitation simulation output (b) over the KEN domain for 01 Jun, 2015

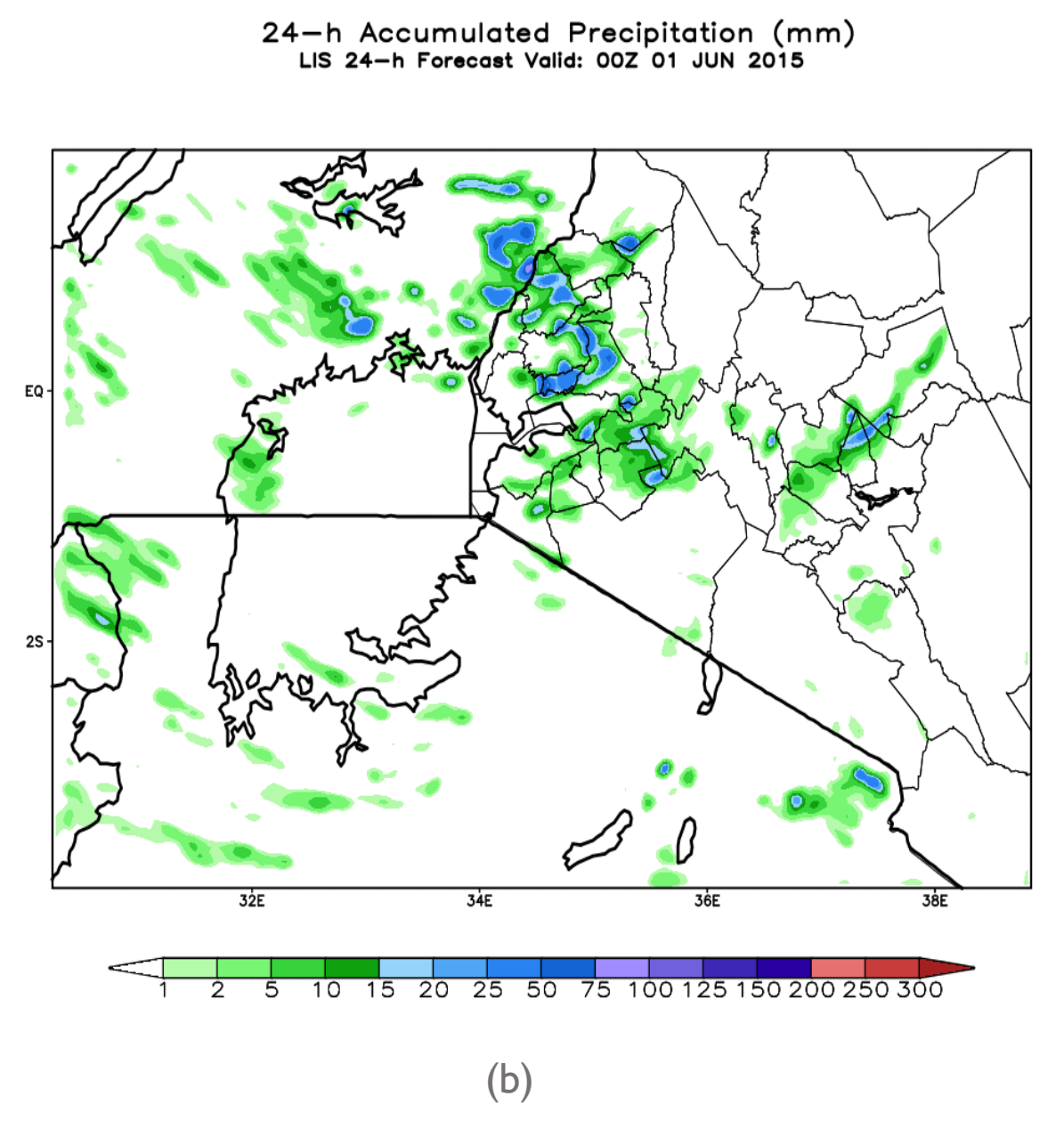
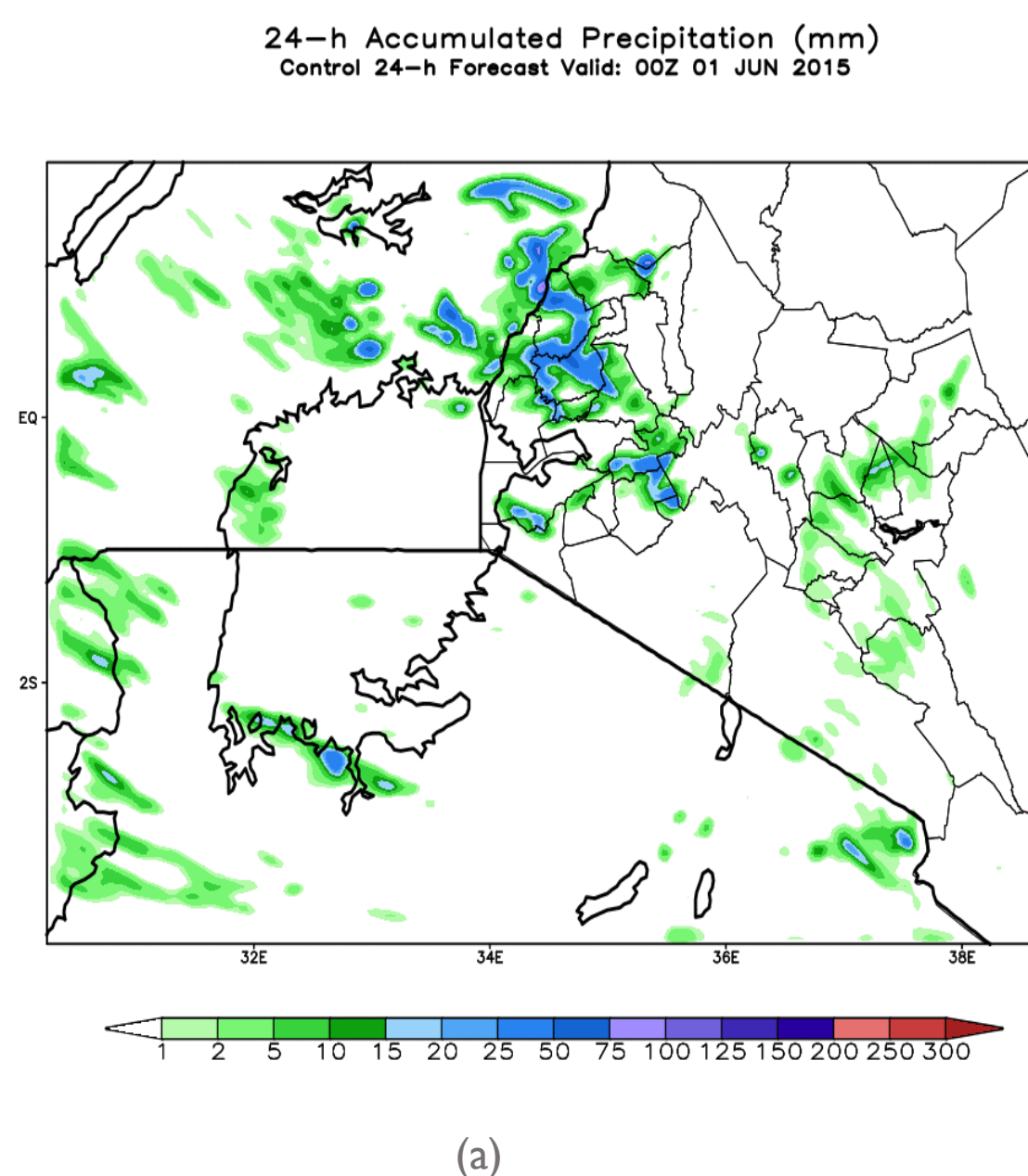


Figure 3: 24-hr precipitation output from the control WRF-GFS (a) and WRF-LIS 24-hr precipitation simulation output (b) over the KEN domain for 01 Jun, 2015

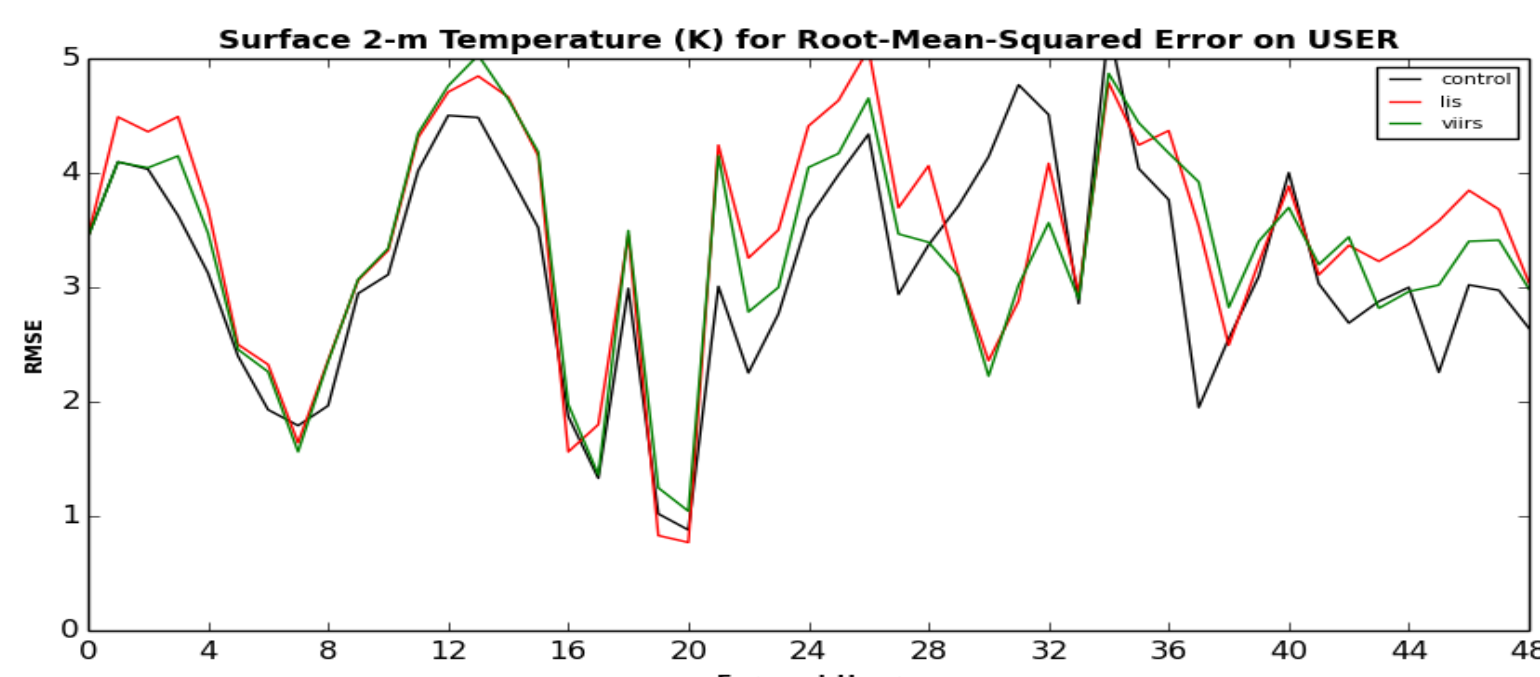


Figure 4: RMSE outputs for the control (WRF-GFS), LIS (WRF-LIS), and VIIRS (WRF-VIIRS)

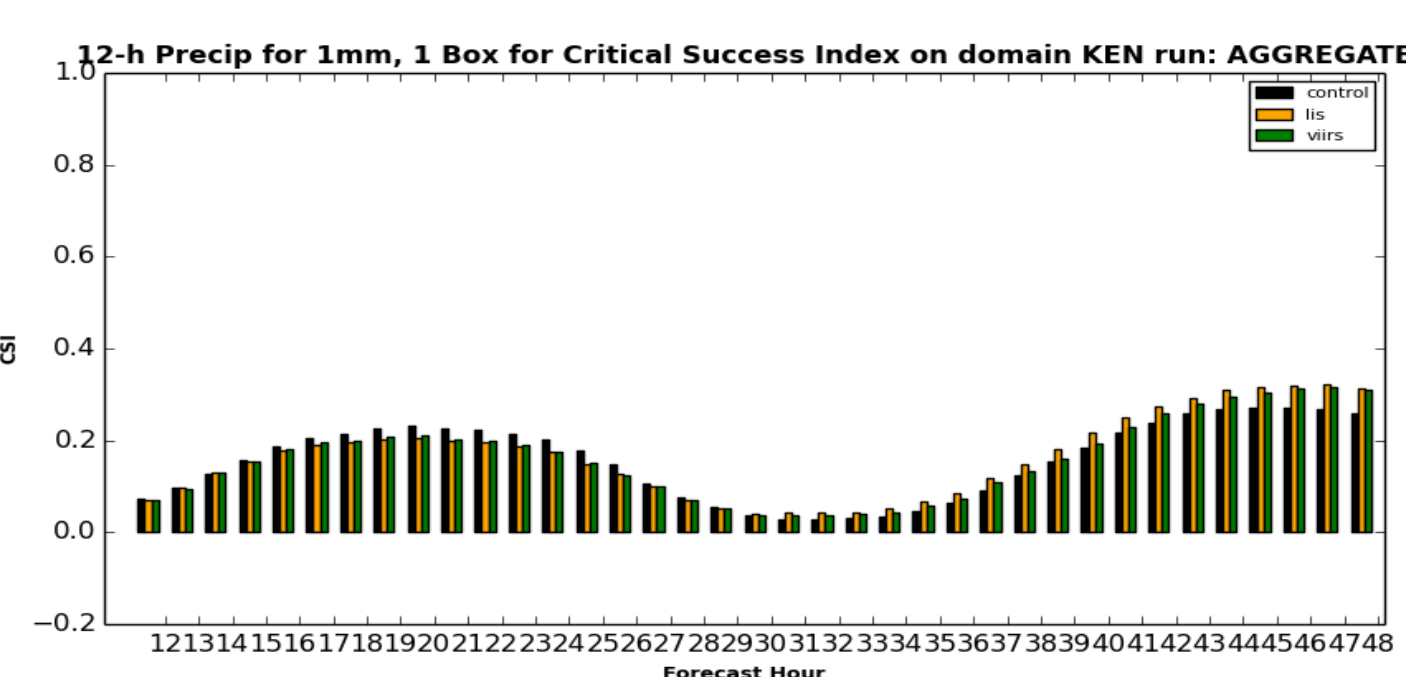


Figure 5: Critical success index output for the three runs in a 48-hr forecast showing that the control has a lesser rate of false hits in the first 29 hours and WRF-LIS improves forecasts in 30 to 47 hours forecasts. WRF-VIIRS compares well with WRF-LIS

## 6. Outcomes/Anticipated Impacts

- ▶ Improved accuracy of forecasts
- ▶ Capacity building for KMS staff
  - 2 weeks training on the MET tool
  - 3 day training of the KMS staff on the project's methodology
- ▶ More cooperation between organizations
  - SERVIR: Sharing forecast data for Frost and Flood Modelling projects
  - Collaboration with NASA to improve EA forecasts

## 3. Approach/Project Activities

- ▶ Control and Experiment configuration on two domains: the East Africa expanse and the Lake Victoria region, herein referred to as KEN. The model domains consisted of an outer domain over Eastern Africa with 12-km horizontal grid spacing, and an inner nested domain at 4-km
- ▶ Control (WRF run with GFS) and Experiments (LIS and VIIRS) runs.
- ▶ Verification of WRF using the MET Tool

## 7. Project Partners

- ▶ National Aeronautics and Space Administration
- ▶ United States Agency for International Development
- ▶ Regional Centre for Mapping of Resources for Development
- ▶ SERVIR Eastern and Southern Africa

## 8. Project End Users

- ▶ Red Cross
- ▶ National Disaster Operational Centre
- ▶ Government of Kenya