



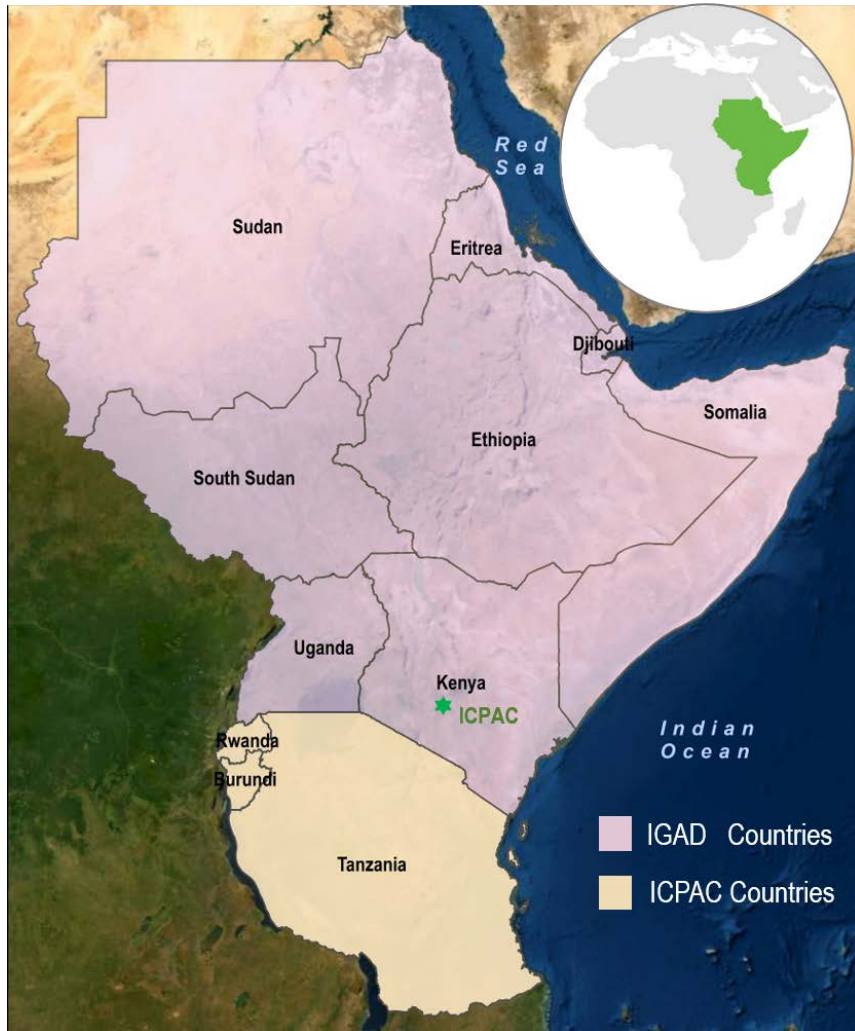
ICPAC PRECIPITATION PREDICTIONS OVER THE GREATER HORN OF AFRICA

6TH NILE BASIN DEVELOPMENT FORUM

**Hussen Seid
Climate Modeling Expert**

IGAD Climate Prediction and Applications Centre (ICPAC)

ABOUT ICPAC



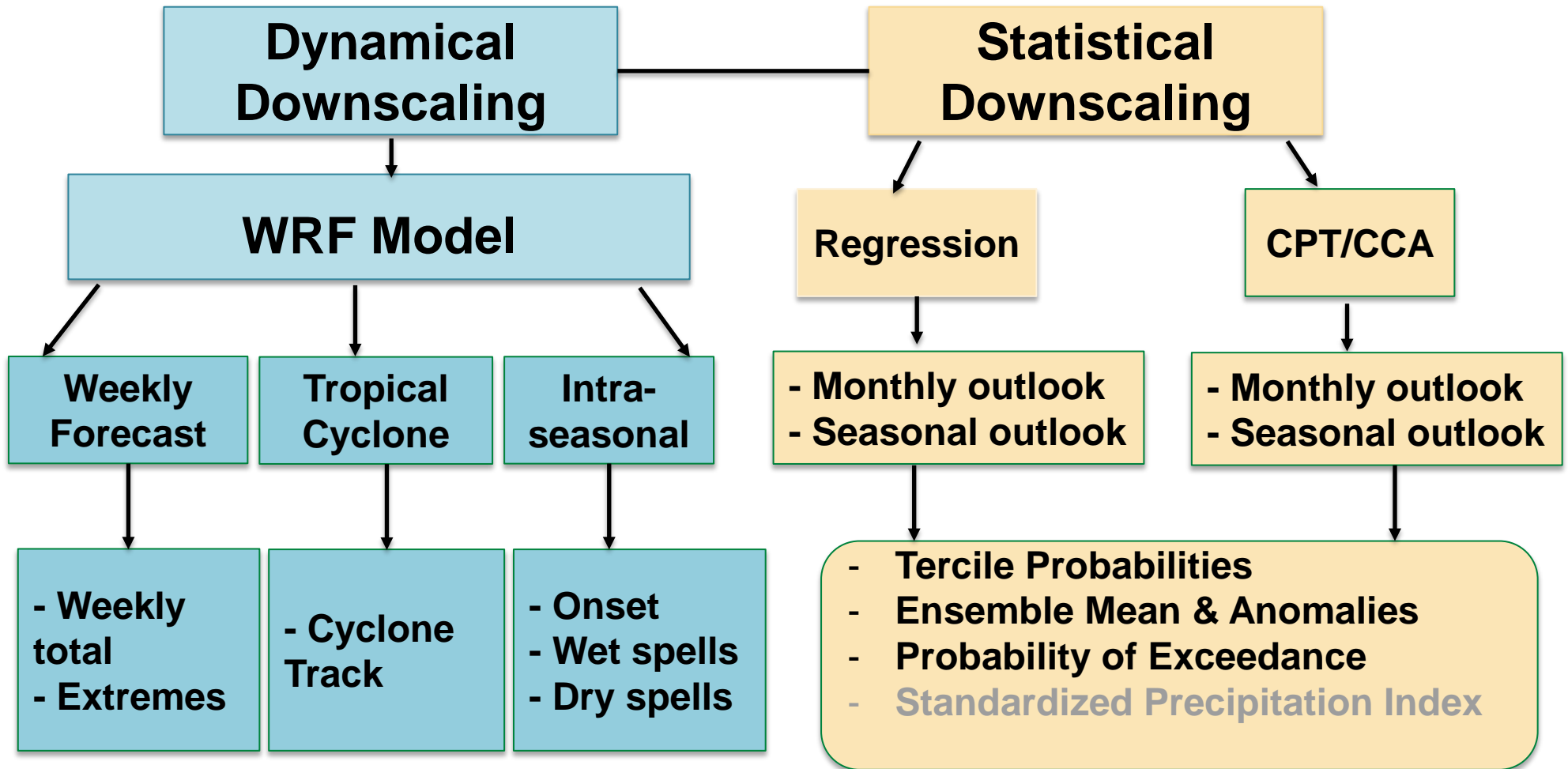
- **BACKGROUND:** Established in **1989** as the Drought Monitoring Centre, Nairobi (DMCN);
- 2007, the Protocol establishing the Centre signed & the name changed to: ***IGAD Climate Prediction and Applications Centre (ICPAC)***
- May 2017 ICPAC was designated a **WMO Regional Climate Centre (WMO-RCC)** for Eastern Africa.
- ICPAC is a member of AUC/NEPAD **Network for Water Centers of Excellence.**
- ICPAC has an Observer Status with the **UNFCCC**

MISSION: Foster climate services and knowledge to enhance community resilience for prosperity in the Greater Horn of Africa

WMO- World Meteorological Organization
AUC – Africa Union Commission
NEPAD- New Partnership for Africa's Development
UNFCCC- United Nations Framework Convention on Climate Change



PRECIPITATION PREDICTION APPROACHS AND PRODUCTS AT ICPAC

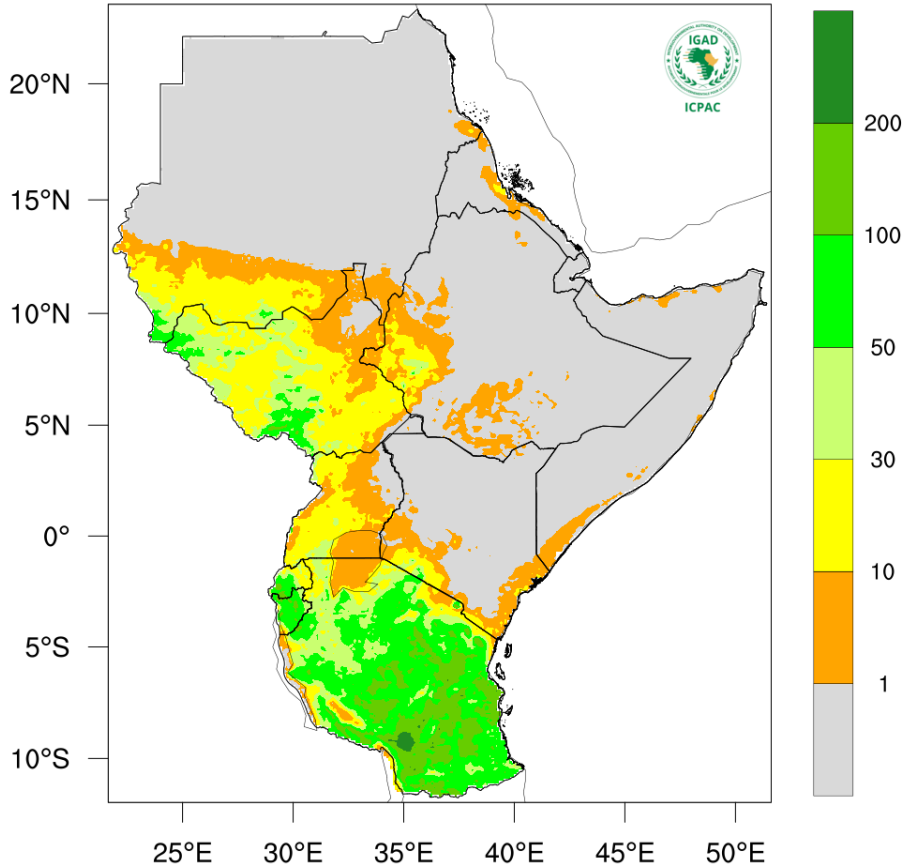


DYNAMICAL DOWNSCALING FORECASTING

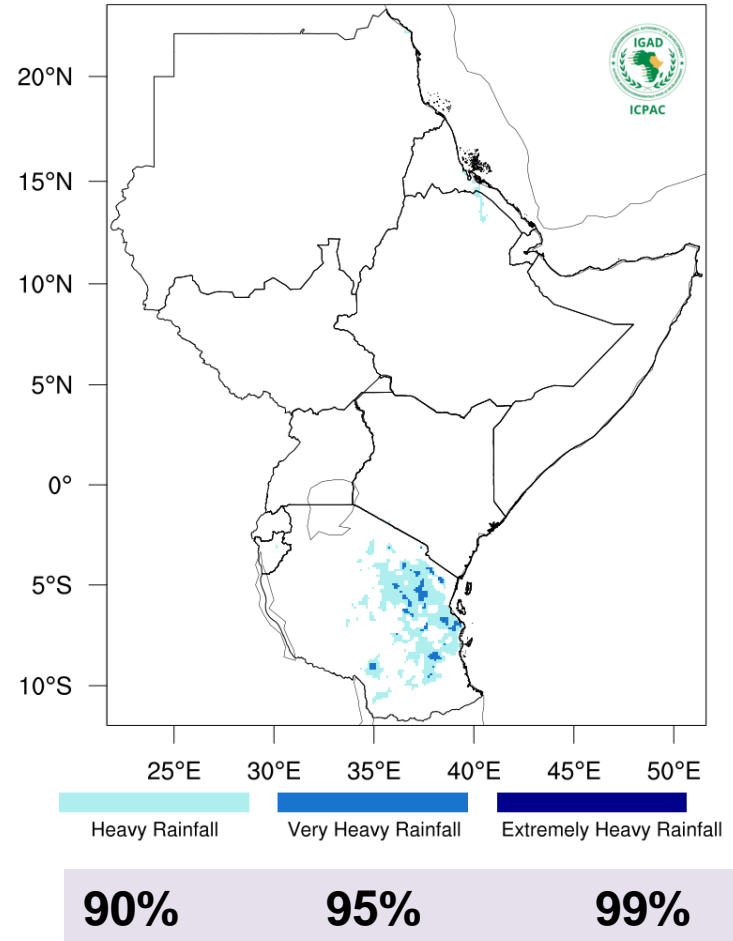
- The dynamical downscaling is based on the Weather Research Forecasting (WRF) Model
- Initial and boundary conditions are from Climate Forecast System version 2 (**CFSv2**)
- The model runs:
 - Every week to produce the weekly forecasts
 - At the beginning of rainfall season to generate intra-seasonal rainfall characteristics
 - When tropical cyclone develops in nearby Ocean to track the path of the cyclone

DETERMINISTIC WEEKLY FORECASTS

Total Rainfall (mm) for 23 - 30 Mar 2021

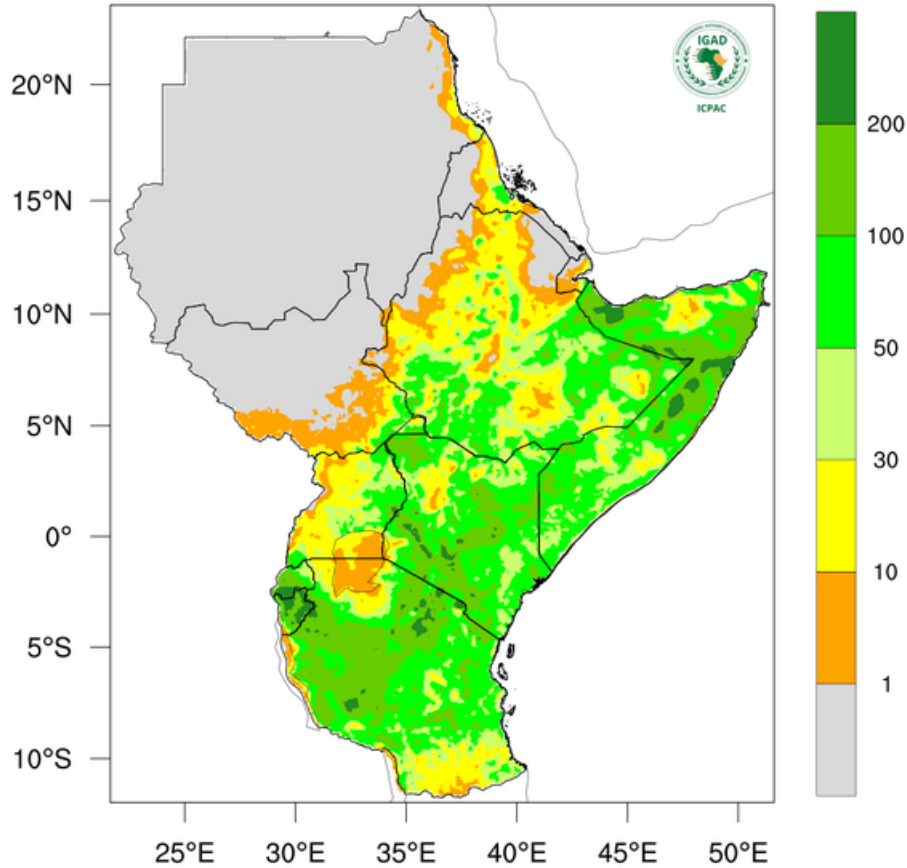


Exceptional Rainfall for 23 - 30 Mar 2021

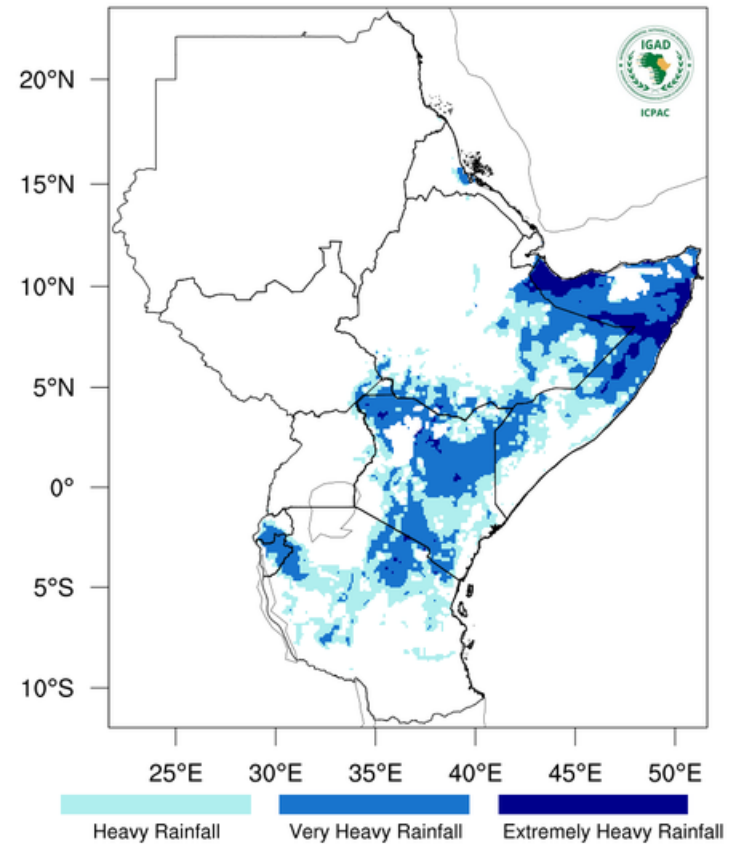


DETERMINISTIC WEEKLY FORECASTS

Total Rainfall (mm) for 24 Nov-01 Dec 2020



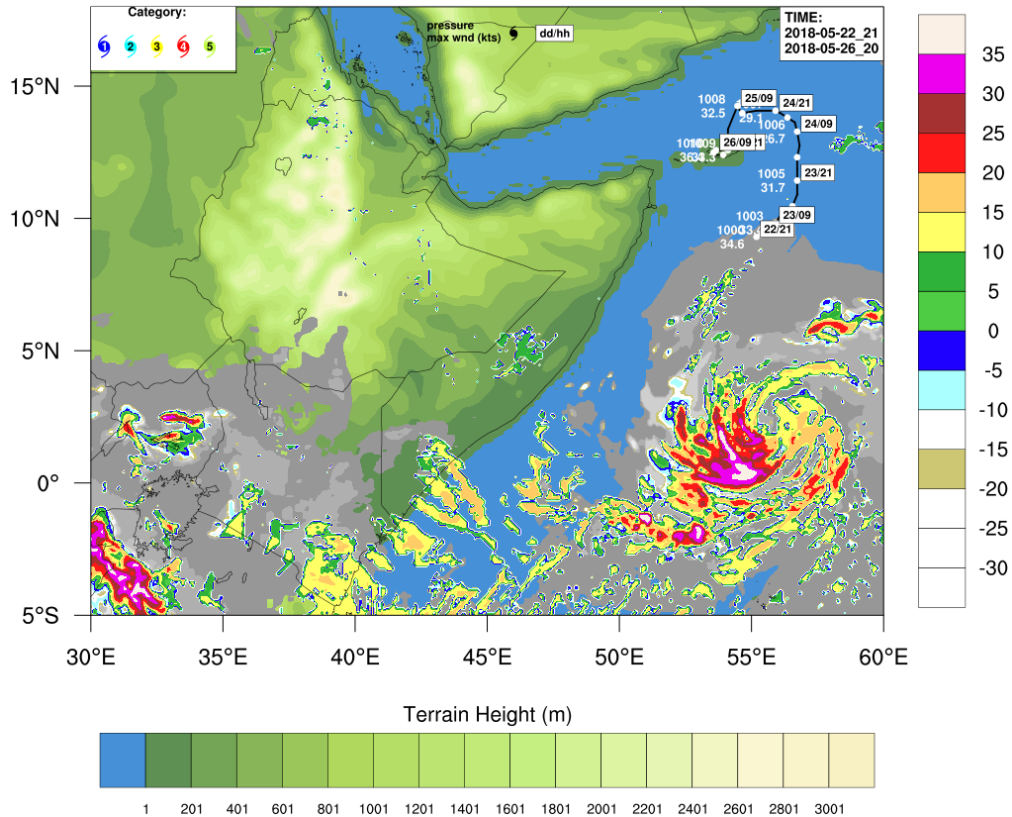
Exceptional Rainfall for 24 Nov-01 Dec 2020



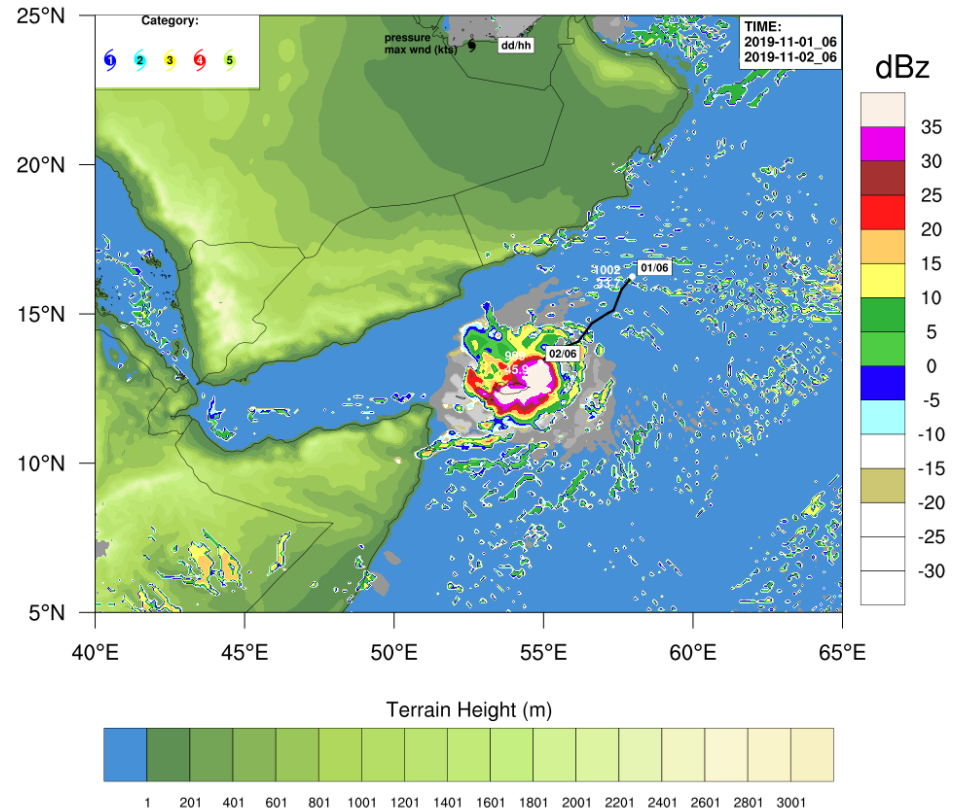
90% **95%** **99%**

TROPICAL CYCLONE FORECAST

Makunu over Indian Ocean in 2018



KYARR over Arabian Sea in 2019

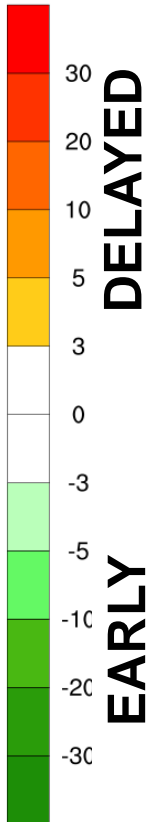
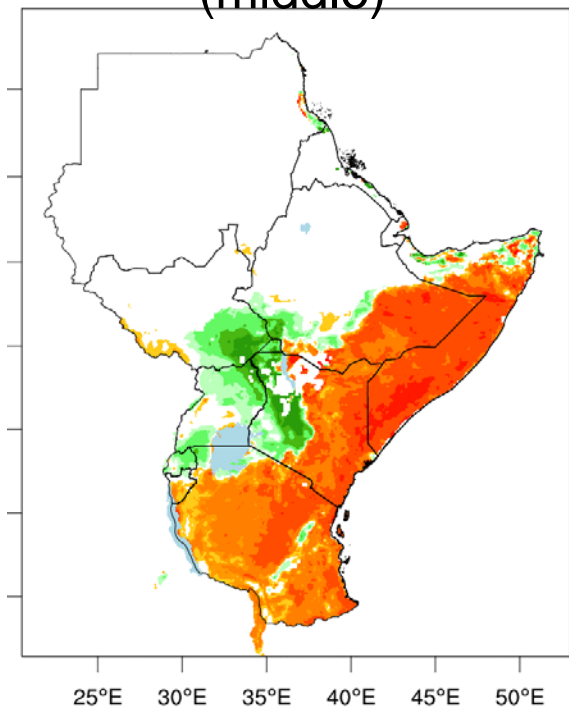
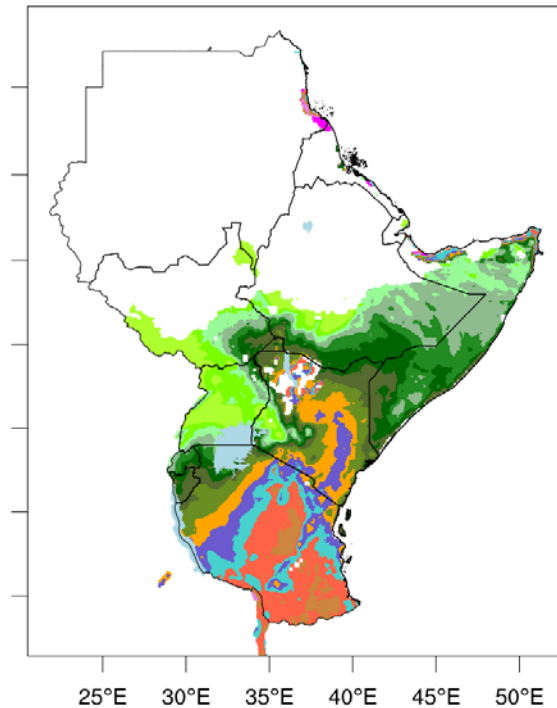
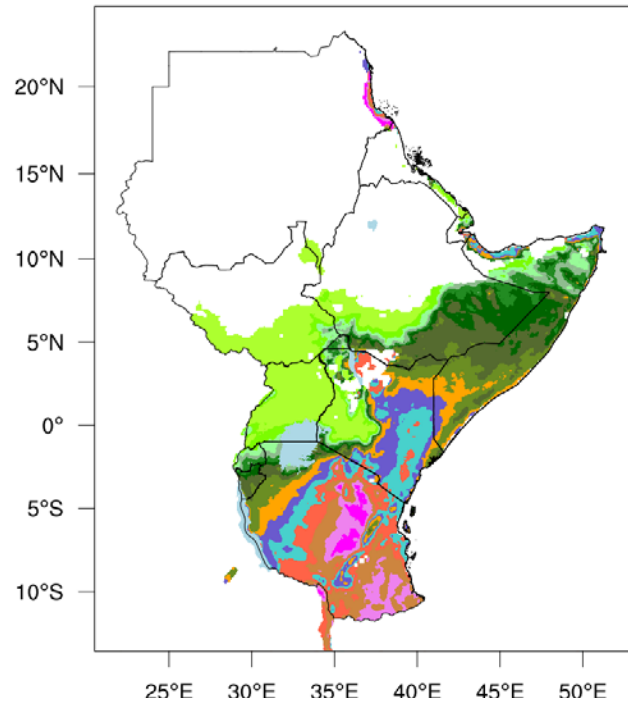


ONSET OF OND-2020 RAINY SEASON

Predicted Onset dates for OND-2020

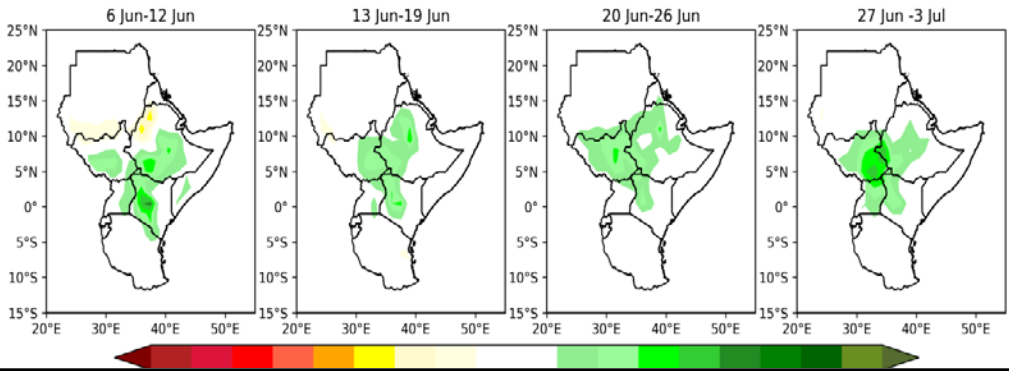
Climatology of Onset dates (1981-2010)

Difference between predicted onset (left panel) and climatology (middle)

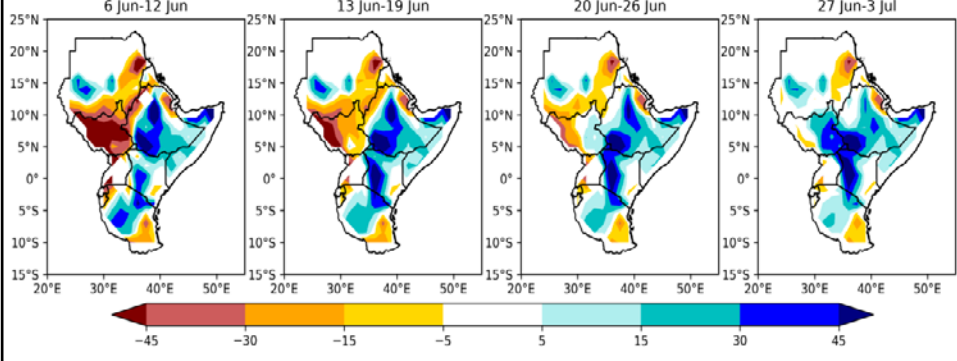


EXAMPLE OF OTHER SUB-SEASONAL PRODUCTS FROM S2S MODELS

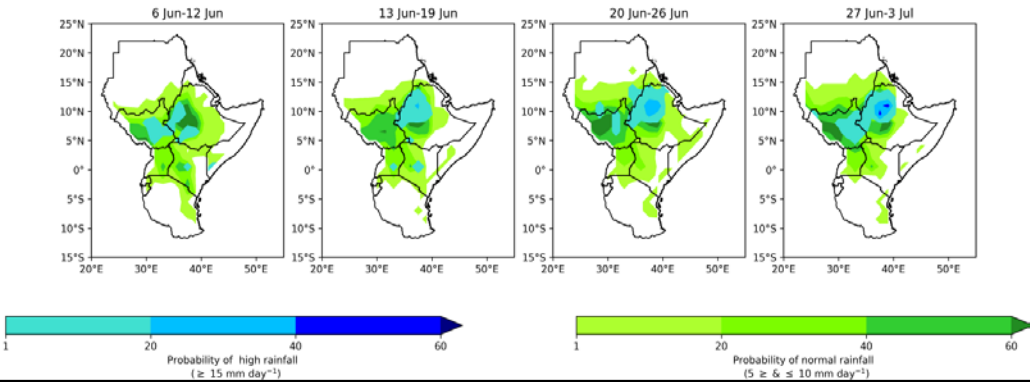
ECMWF Weekly Precipitation Anomaly



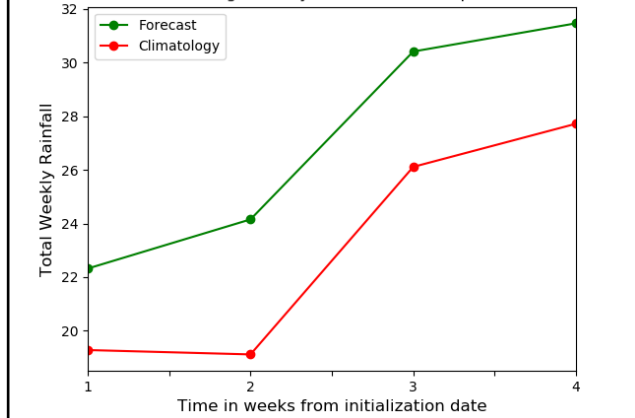
ECMWF Weekly Soil Moisture Anomaly



ECMWF Weekly Probability of Exceedance



Average weekly rainfall over Ethiopia

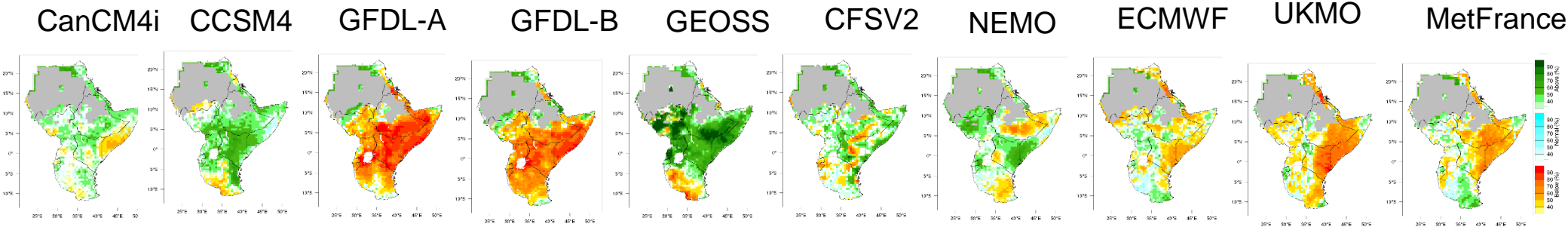


STATISTICAL DOWNSCALED FORECASTING

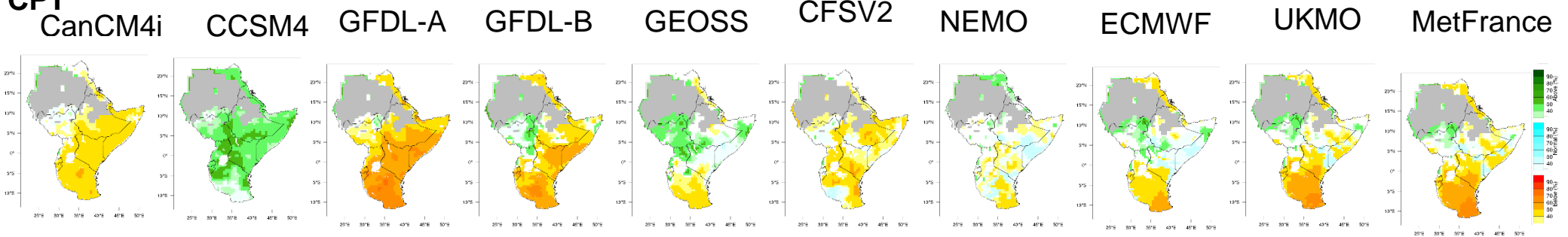
- Statistical downscaling is based on 10 GCM model outputs (7 NMME & 3 C3S) and processed every month
- Two statistical approaches used:
 - Climate Predictability Tool (CPT) using Canonical Correlation Analysis (CCA), accounting for large-scale features (ENSO)
 - Grid-point linear regression based on R, which accounts the model dynamics and large-scale features
- Equal-weighted averages used to develop consolidated objective forecasts

TERCILE CATEGORY RAINFALL PROBABILITIES

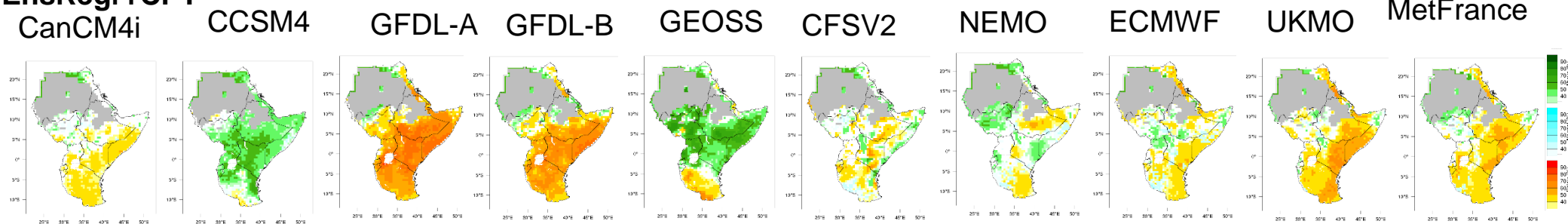
EnsRegr



CPT



EnsRegr+CPT



CORRELATION OF ENSEMBLE MEAN

EnsRegr (Raw)

CanCM4i

CCSM4

GFDL-A

GFDL-B

GEOSS

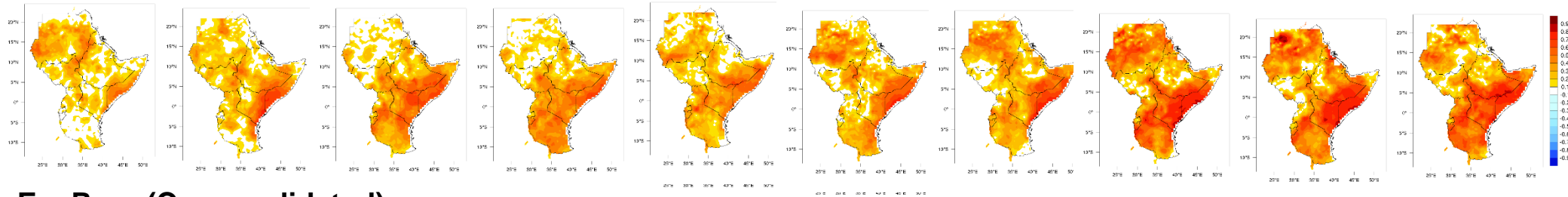
CFSV2

NEMO

ECMWF

UKMO

MetFrance



EnsRegr (Cross validated)

CanCM4i

CCSM4

GFDL-A

GFDL-B

GEOSS

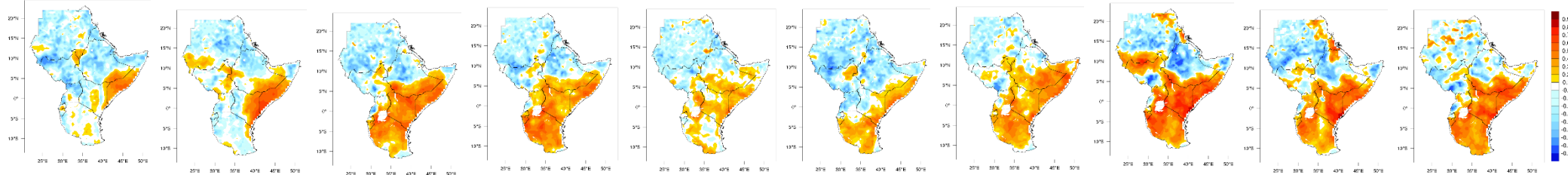
CFSV2

NEMO

ECMWF

UKMO

MetFrance



CPT (Cross validated)

CanCM4i

CCSM4

GFDL-A

GFDL-B

GEOSS

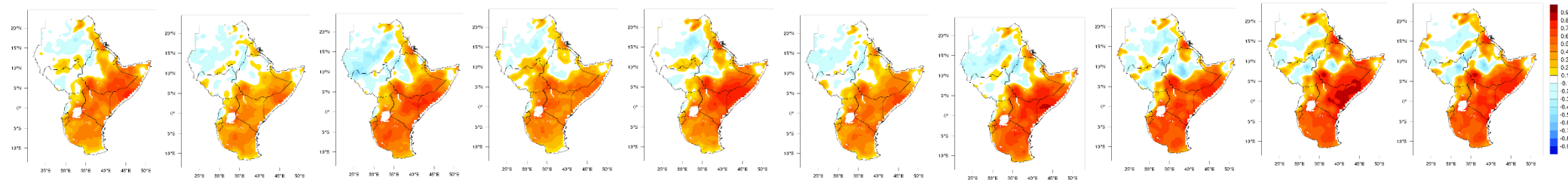
CFSV2

NEMO

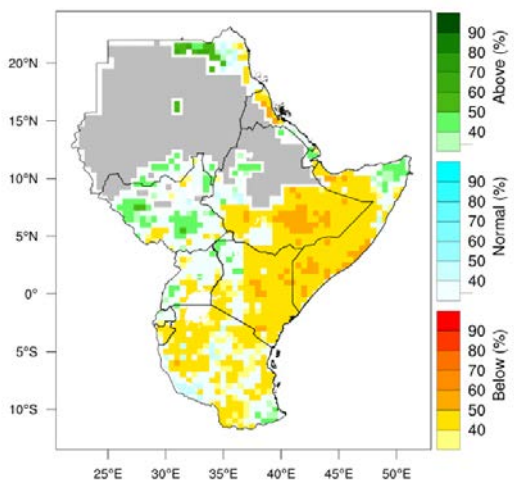
ECMWF

UKMO

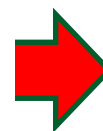
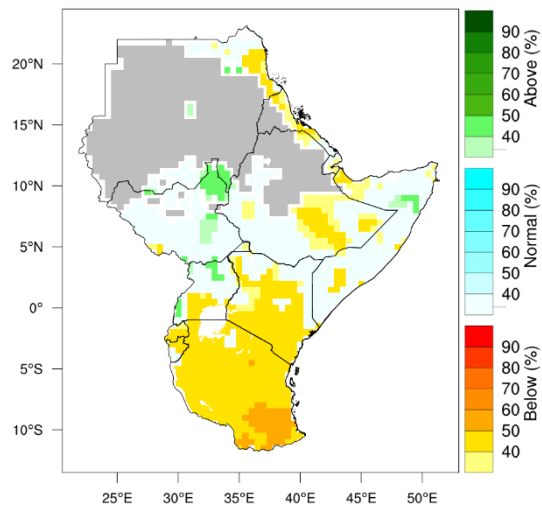
MetFrance



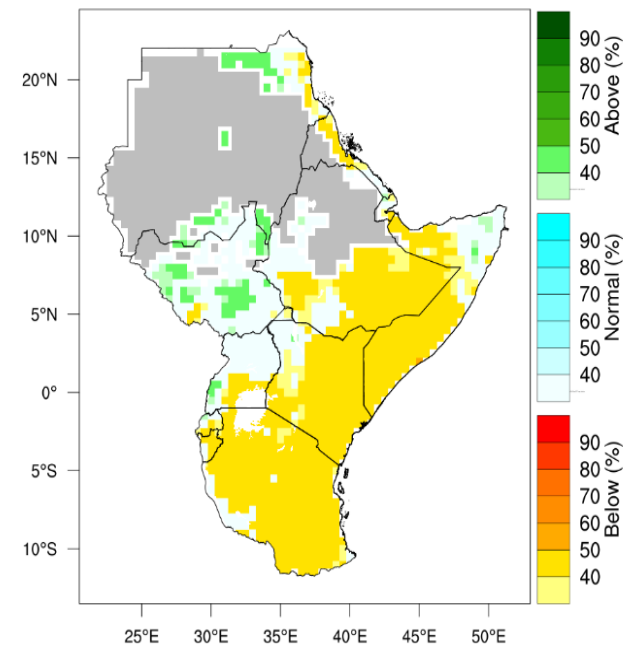
MME (ENSREGR)



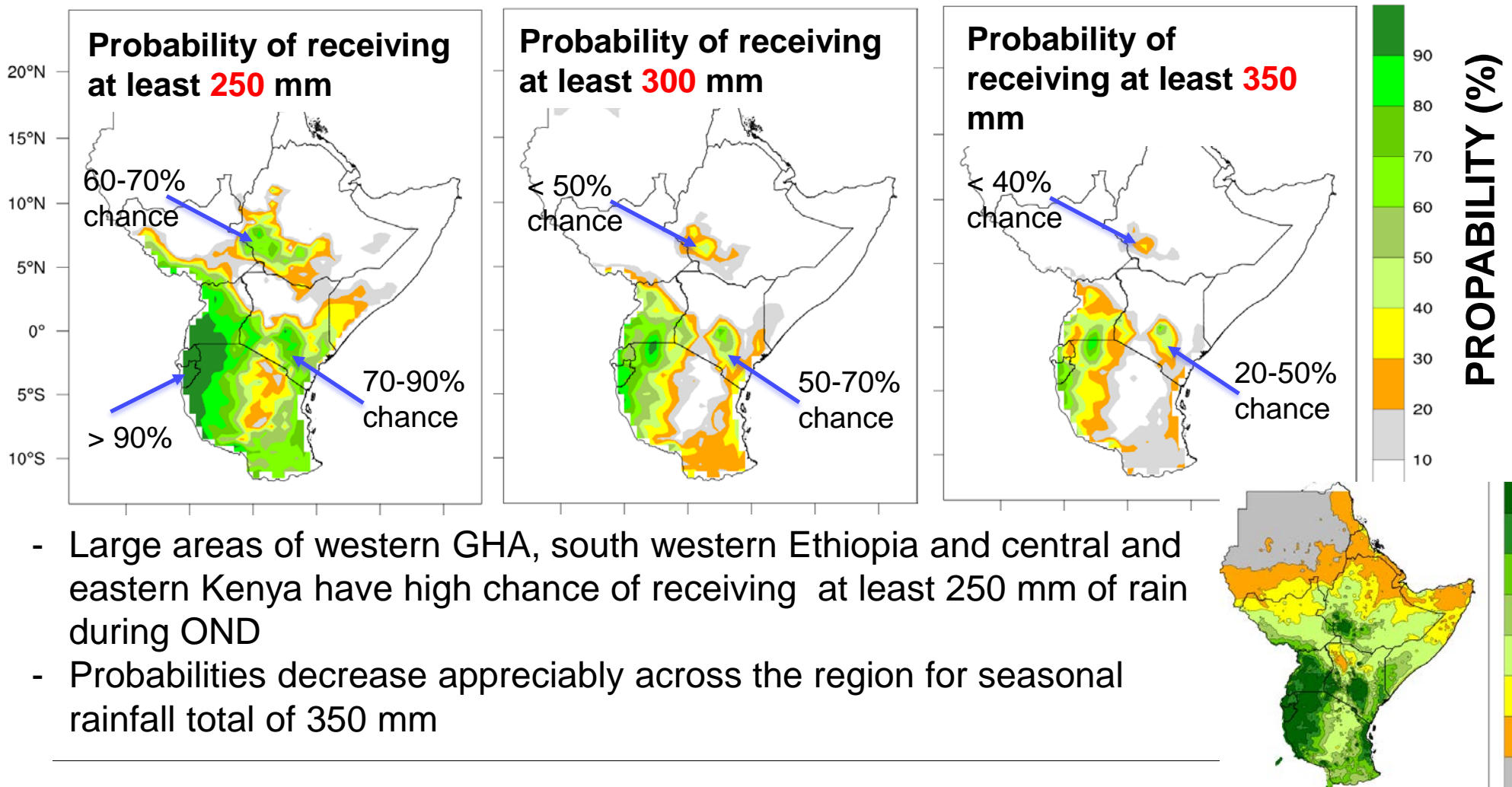
MME (CP)



MME(ENSREGR+CP)



CHANCES OF OND RAINFALL EXCEEDING 250,300,350 MM



- Large areas of western GHA, south western Ethiopia and central and eastern Kenya have high chance of receiving at least 250 mm of rain during OND
- Probabilities decrease appreciably across the region for seasonal rainfall total of 350 mm

<https://www.icpac.net/>



ICPAC
IGAD Climate Prediction
and Applications Centre

RCC SUBSCRIBE LANGUAGE  SEARCH  [CONTACT US](#)

SERVICES

PRODUCTS

MEDIA

PUBLICATIONS

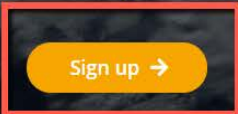
EVENTS

ABOUT US

DATA CENTER

Delivering Climate Services to Eastern Africa

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ICPAC

Thank you