



ICPAC CLIMATE PRODUCTS AND SERVICES

by Abebe Tadege

IGAD Climate Prediction and Applications Centre (ICPAC)

B-EPICC Project

workshop on Strengthening Resilience Against Climate Change in Ethiopia
10-12 May 2023, Addis Ababa, Ethiopia

ABOUT IGAD



Governance

- The Assembly of Heads of State and Government
- The Secretariat
- The Council of Ministers
- The Committee of Ambassadors

Divisions

- Agriculture and environment protection
- Economic cooperation and integration
- Peace and security
- Social

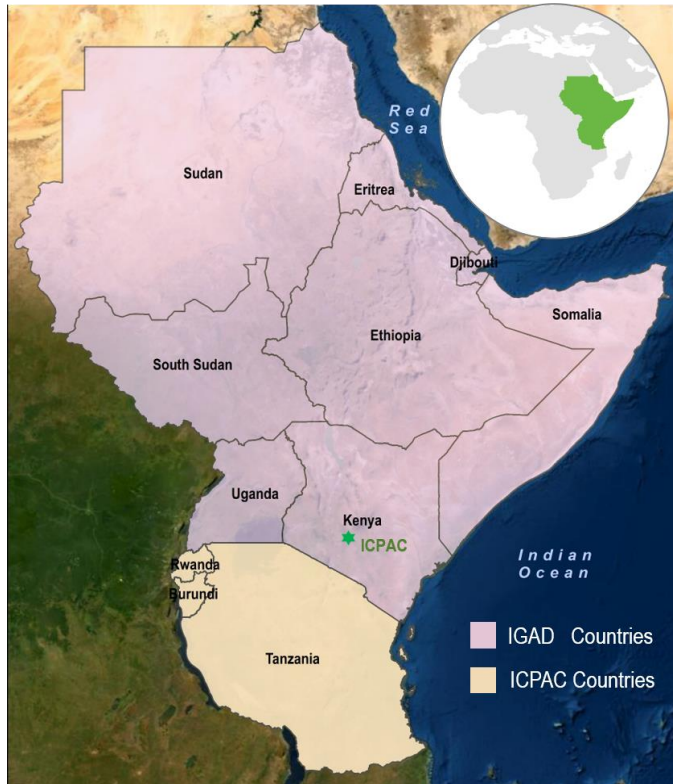
Specialized Institutes

- Conflict Early Warning and Response Mechanism (CWARN)
- IGAD Climate Prediction and Application Center (ICPAC)
- IGAD Center for Pastoral Areas and Livestock Development (ICPALD)
- IGAD Sheikh Technical Veterinary School
- IGAD Center of Excellence in Preventing and Countering Violent Extremism

Programs

- IGAD Drought Disaster Resilience and Sustainability Initiative (IDDRSI)
- Migration Program
- Health Program
- IGAD Security Sector Program
- Land Governance Portal

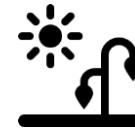
About ICPAC



SERVICE AREAS



Climate
Monitoring and
Forecasting



Disaster
Risk
Management



Water
Resources



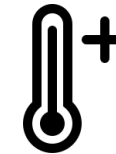
Agriculture and
Food Security



Environmental
Monitoring



Capacity
Development



Climate
Change

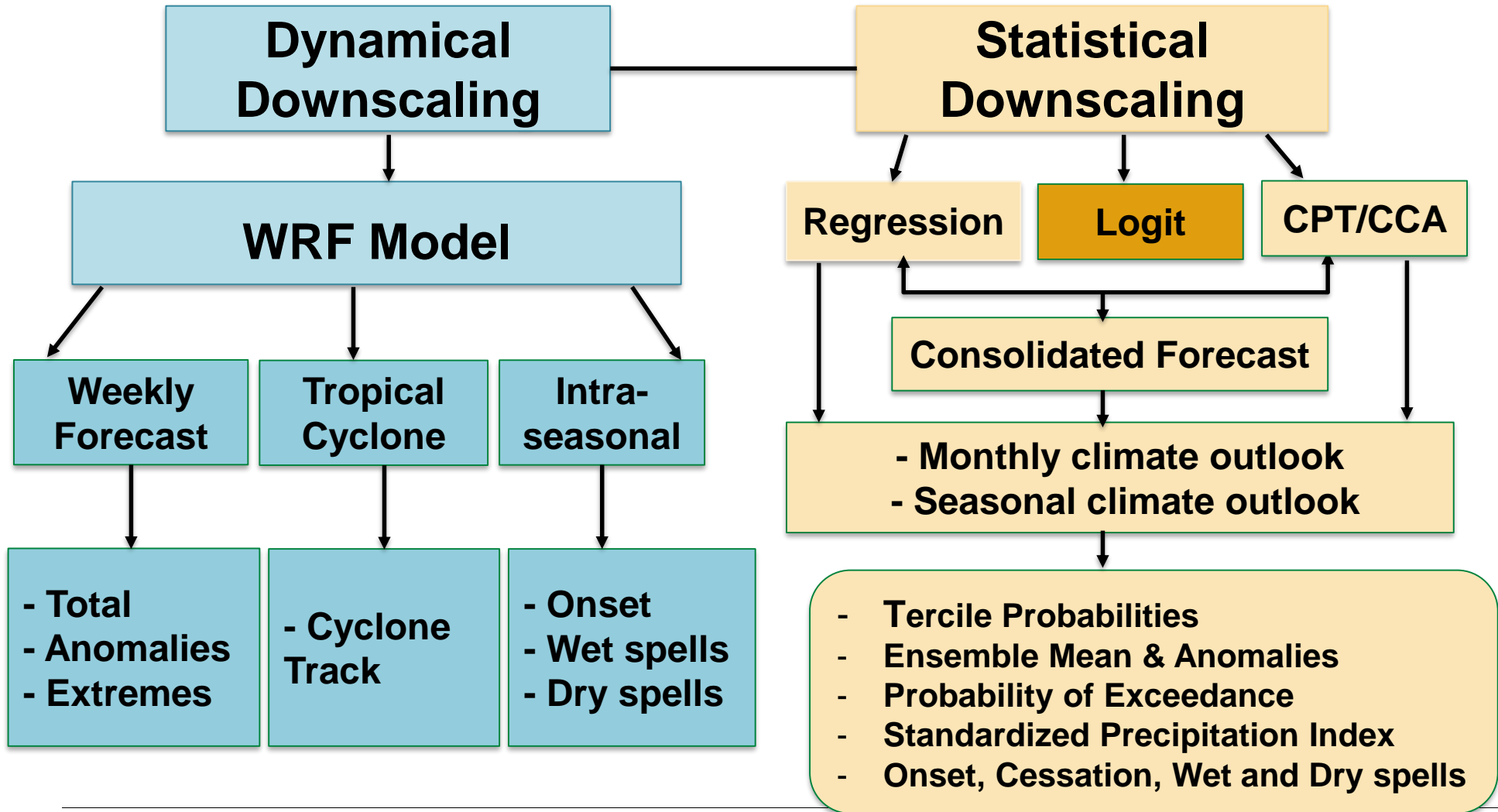


Climate
Information
and Co-
production

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



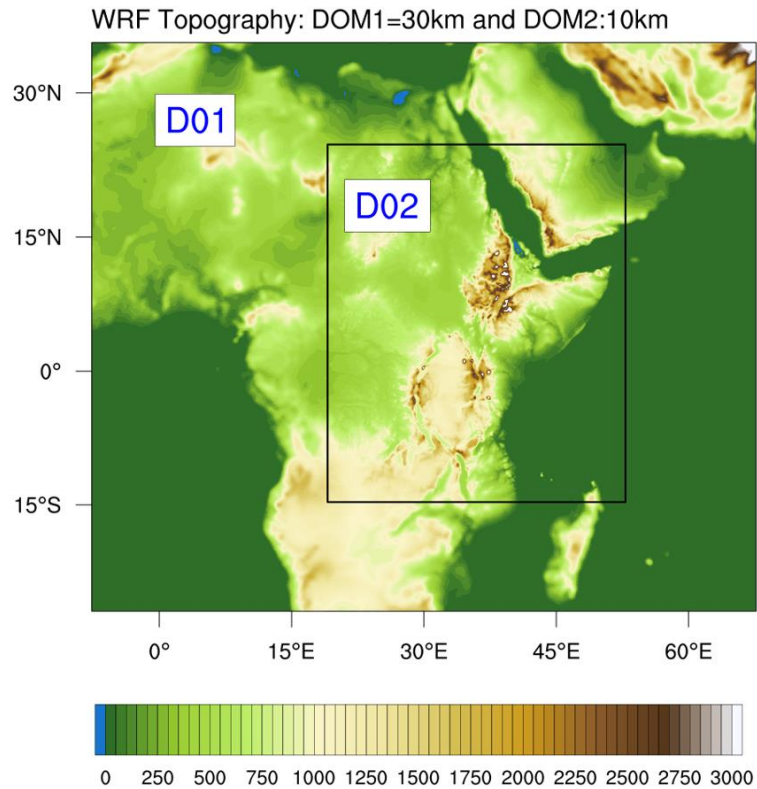
CLIMATE FORECASTING: TECHNIQUES AND PRODUCTS



OPERATIONAL PRODUCTS AND SERVICES

- On shorter time scale, ICPAC provides early warning information every week. Such forecasts are based on the Weather Research and Forecasting (WRF) model runs. The type of early warning information provided are:
 - Rainfall totals, anomalies
 - Extreme rainfall exceeding the 90, 95, and 99 percentiles
 - Average temperature, anomalies
 - Extreme temperatures (experimental heat stress)

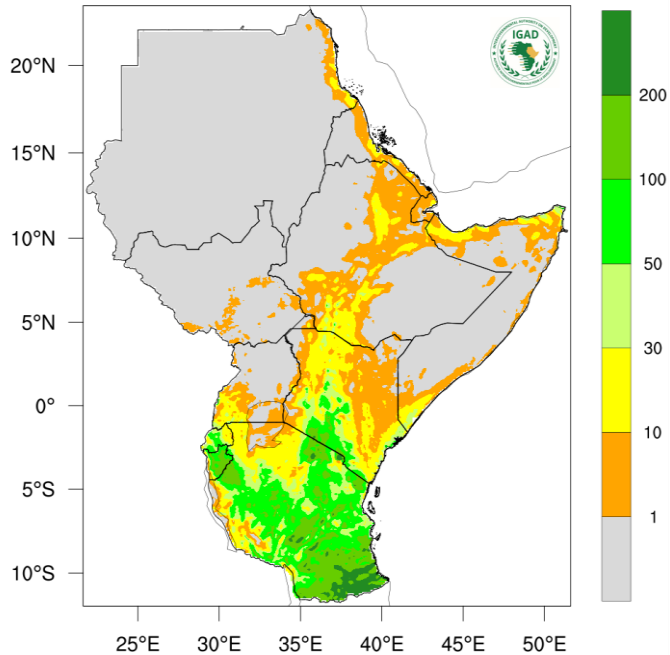
DYNAMICAL DOWNSCALING



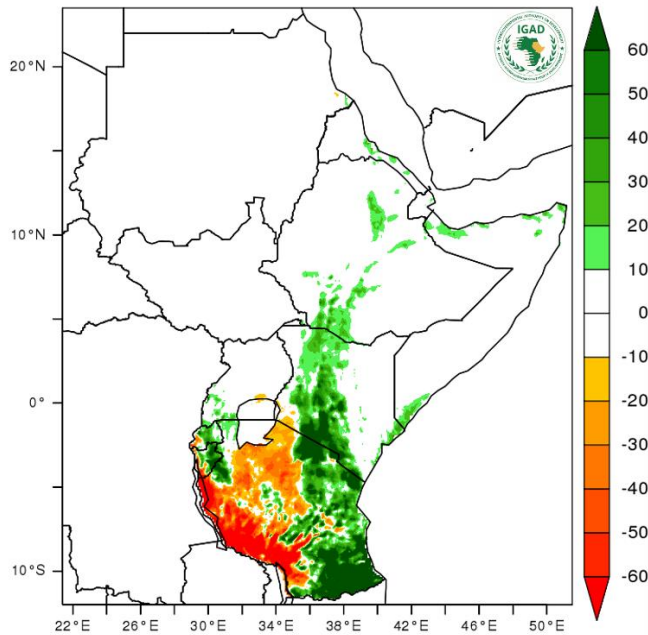
- The dynamical downscaling is based on the Weather Research Forecasting (WRF) Model
- Initial and boundary conditions are from NCEP Climate Forecast System version 2 (**CFSv2**)
- **The model runs:**
 - Every week to produce the weekly forecasts at 10km resolution (Hourly to daily outputs)
 - At the beginning of rainfall season to generate intra-seasonal rainfall characteristics at 30km resolution
 - When tropical cyclone develops in nearby Ocean to track the path of the cyclone

WEEKLY RAINFALL PRODUCTS

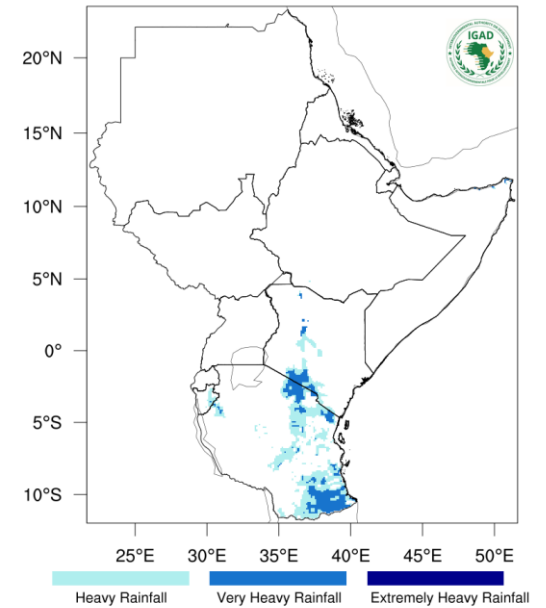
Total Rainfall (mm) for 20-27 Dec 2022



Rainfall Anomalies for 20-27 Dec 2022

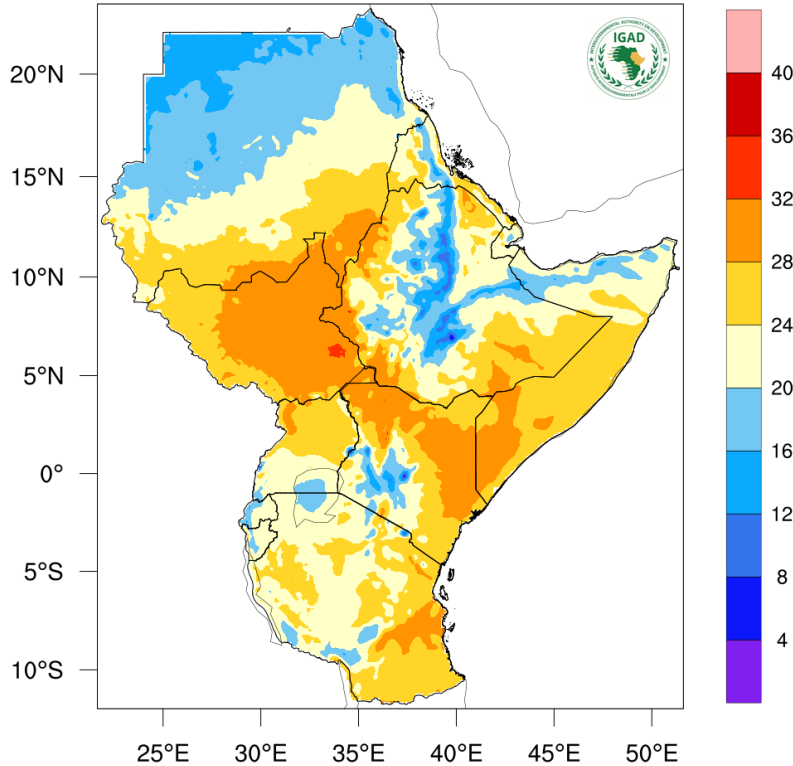


Exceptional Rainfall for 20-27 Dec 2022

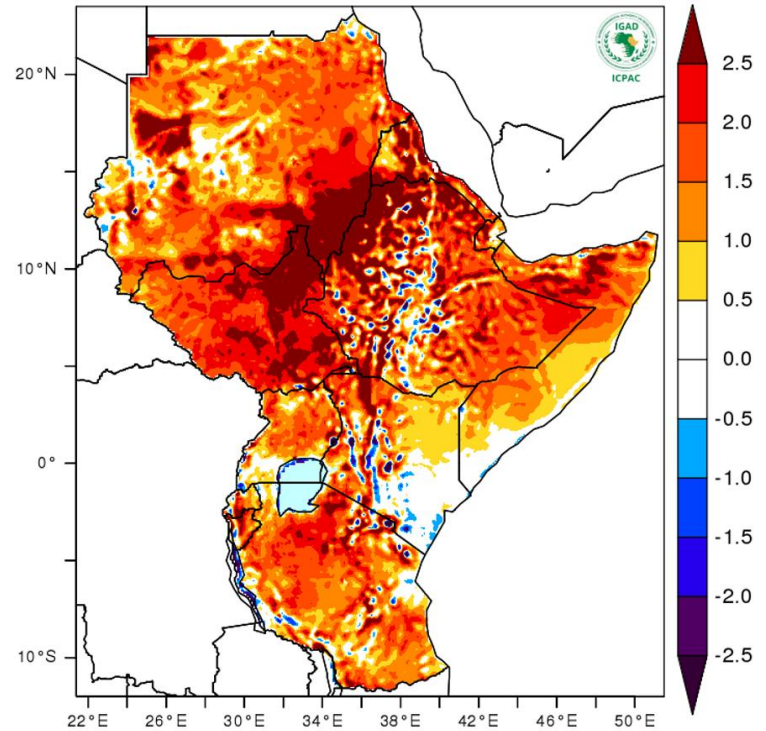


WEEKLY TEMPERATURE PRODUCTS

Mean Temperature (C) for 07-14 Feb 2023

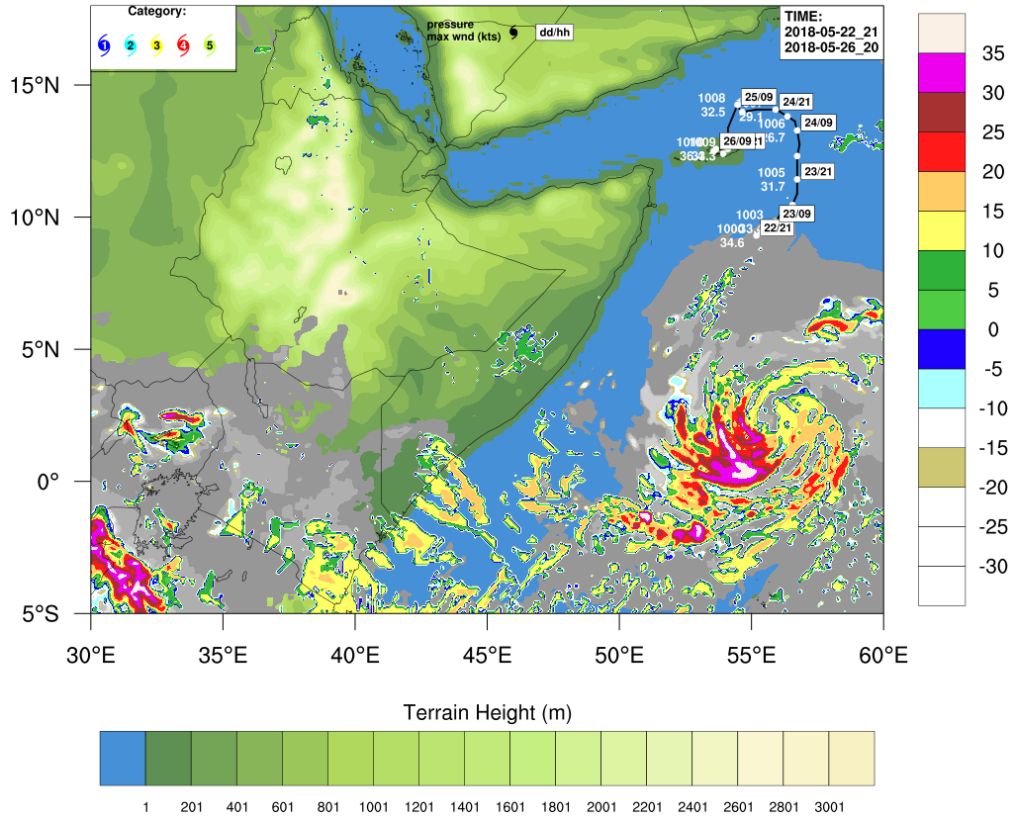


Temperature Anomalies for 07-14 Feb 2023

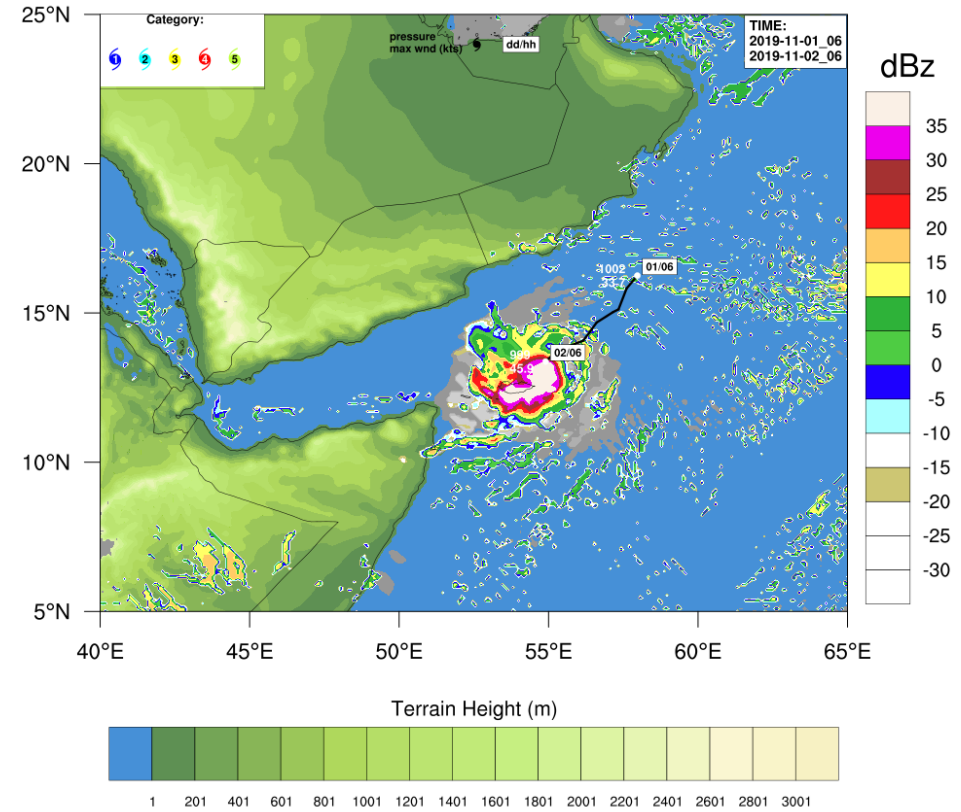


TROPICAL CYCLONE FORECAST

Makunu over Indian Ocean in 2018



KYARR over Arabian Sea in 2019



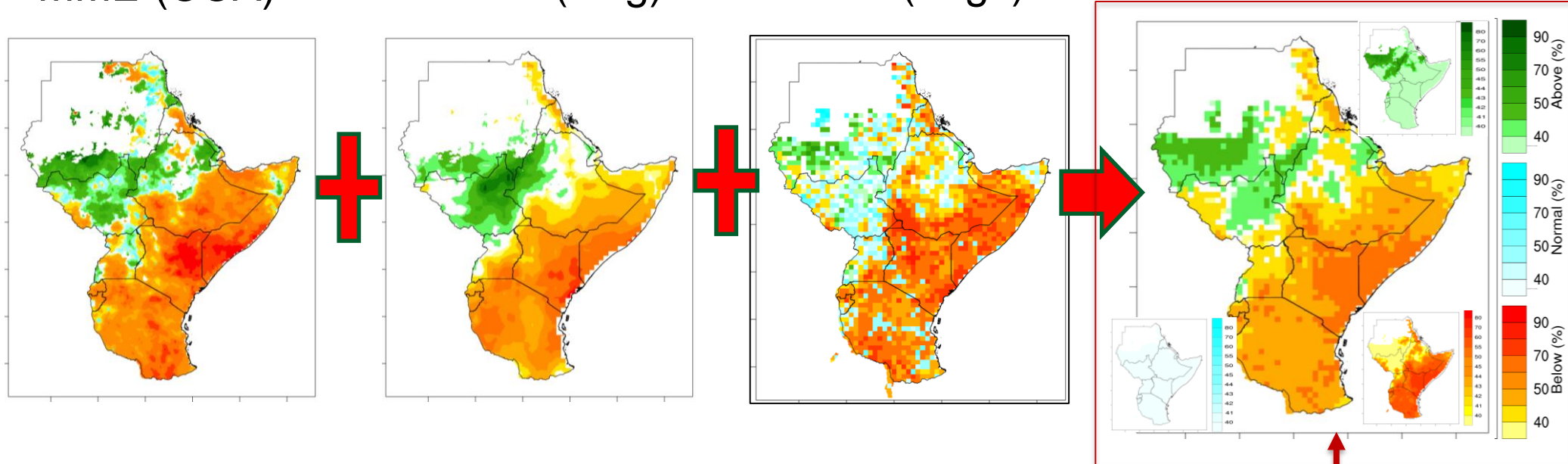
INPUTS FOR CONSOLIDATED OBJECTIVE FORECAST

MME (CCA)

MME (Reg)

MME (Logit)

CCA+Regr+Logit

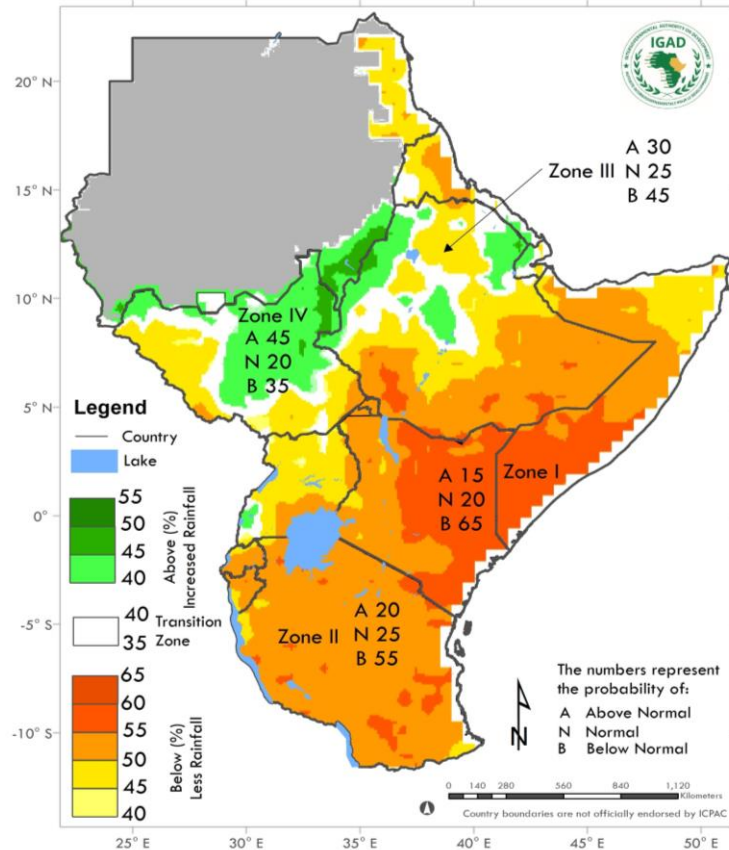


Objective Forecast = (eReg + CCA+Logit)/3

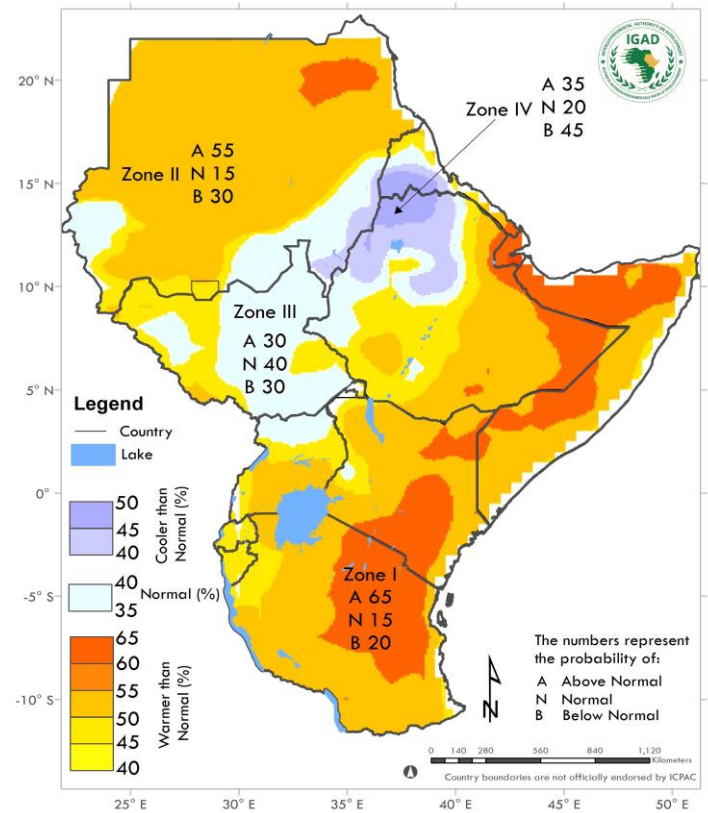
PRIMARY PRODUCTS AT GHACOFs

- Tercile rainfall and temperature probability forecasts are the main products at the Greater Horn of Africa Climate Outlook Forums;

Rainfall



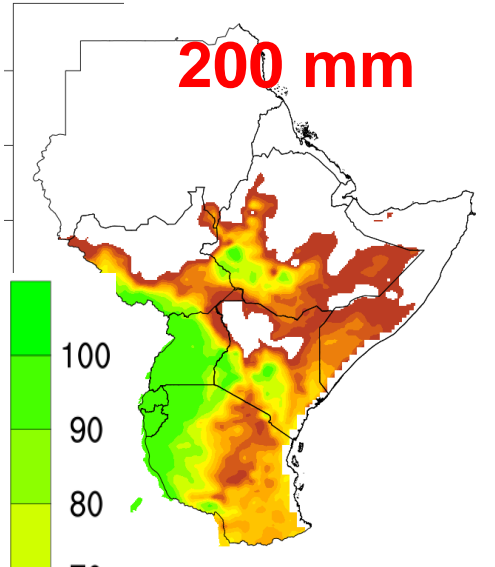
Temperature



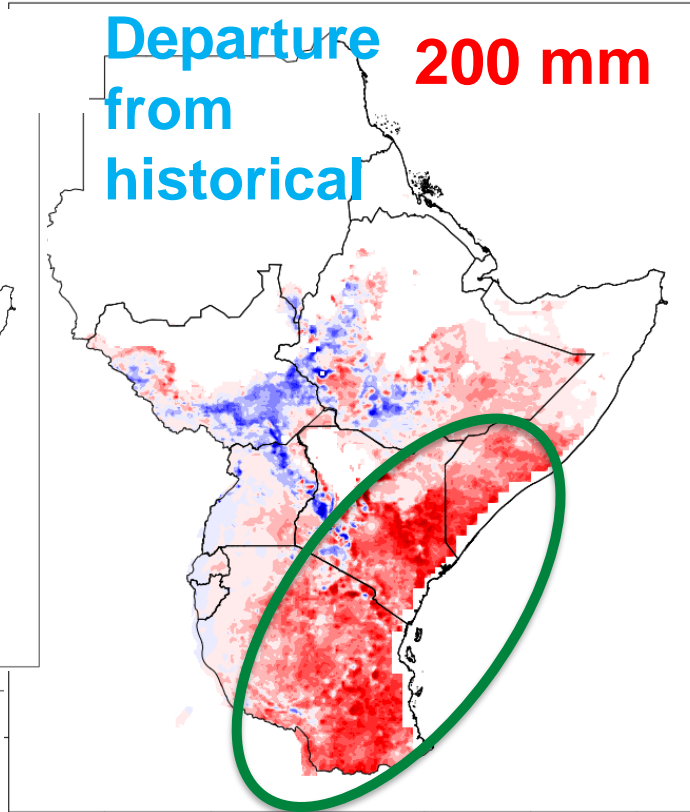
PROBABILITY OF EXCEEDANCE FOR OND 2022 RAINFALL

Predicted

200 mm

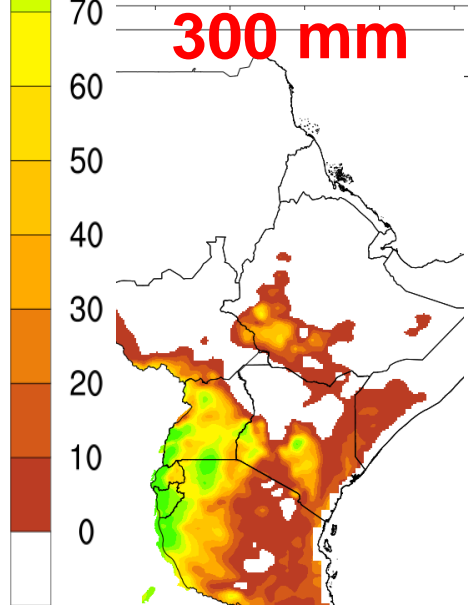


Departure from historical **200 mm**

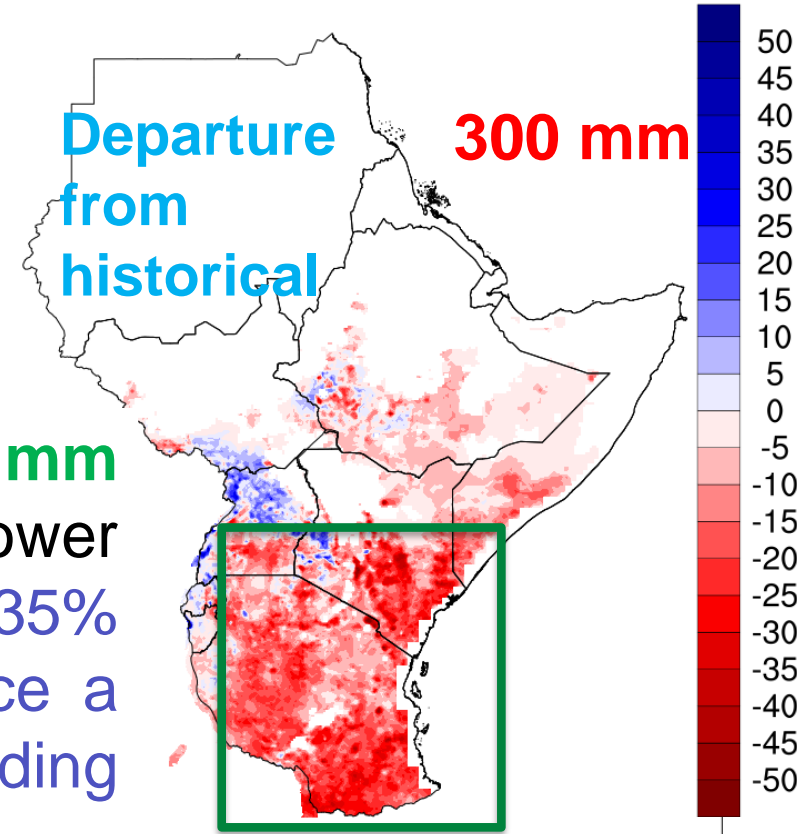


Predicted probability of exceeding 200 mm is lower than historical values over eastern GHA (by up to 30%); thus reduced chance of exceeding 200 mm OND rain

300 mm



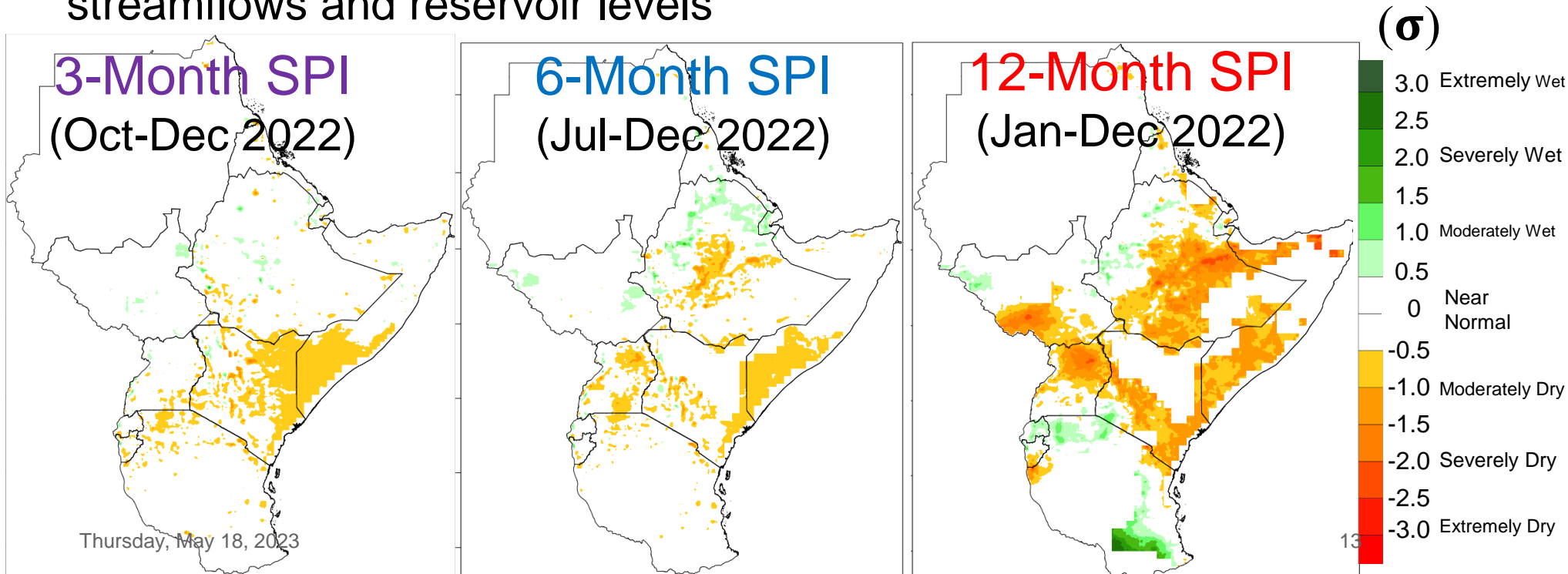
Departure from historical **300 mm**



The chance of getting **300 mm** or more during OND is lower than historical by up to 35% over southern sector; Hence a reduced chance of exceeding 300 mm

STANDARDIZED PRECIPITATION INDEX (SPI) FORECAST ENDING ON 31 DECEMBER 2022

- SPI is precipitation-based drought index (WMO 2012). It measures departures from zero in standard deviation units
- **3-month SPI** reflects short to medium-term moisture status or reservoir levels
- **6-month SPI** indicates medium-term trends in rainfall (can be associated with anomalous streamflows)
- **12-month SPI** is a cumulative trend of droughts/wetness & can be tied to streamflows and reservoir levels

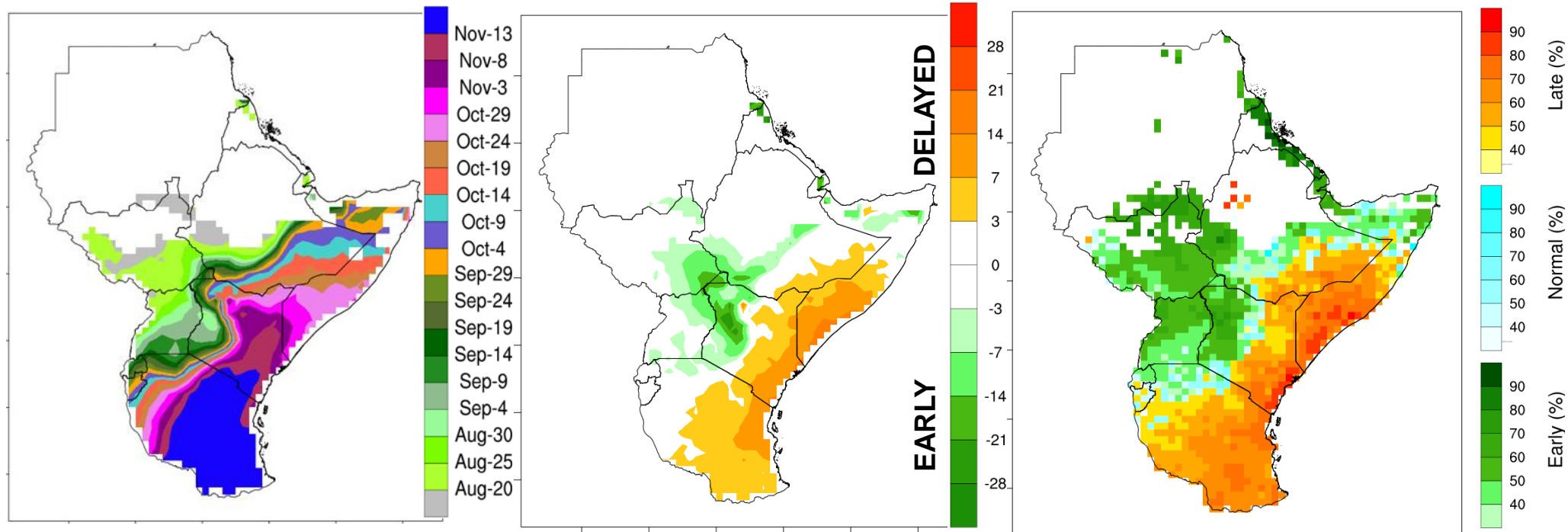


ONSET OF OND 2022 SEASON

ONSET DATES

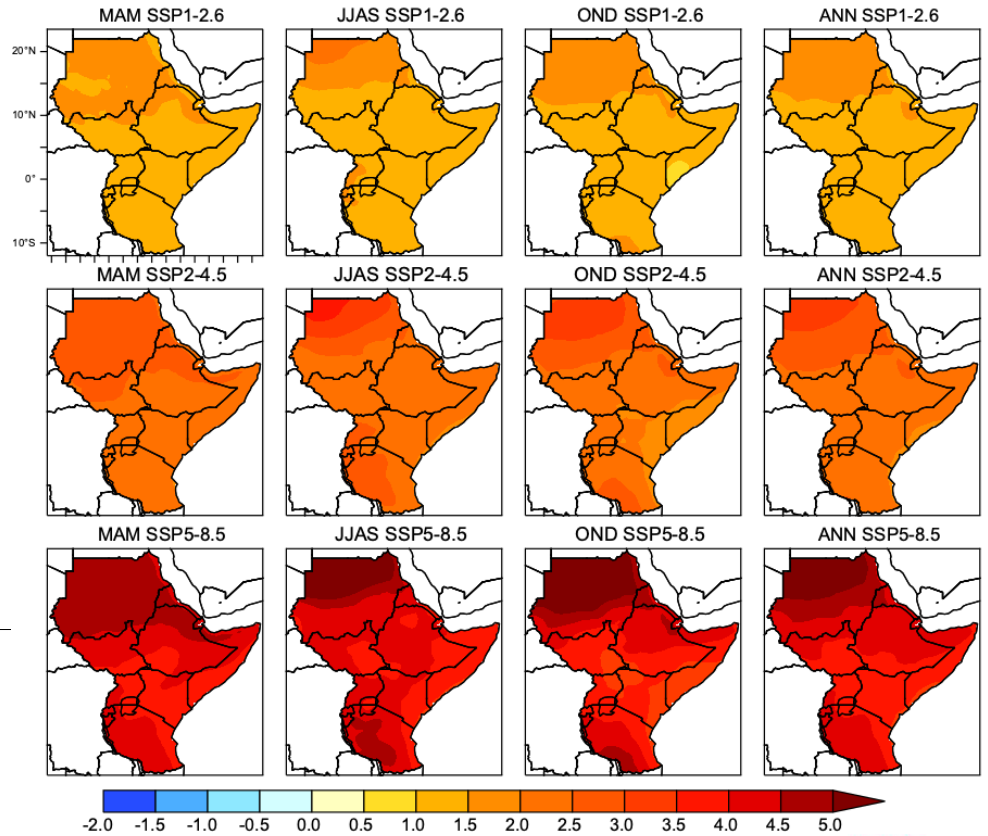
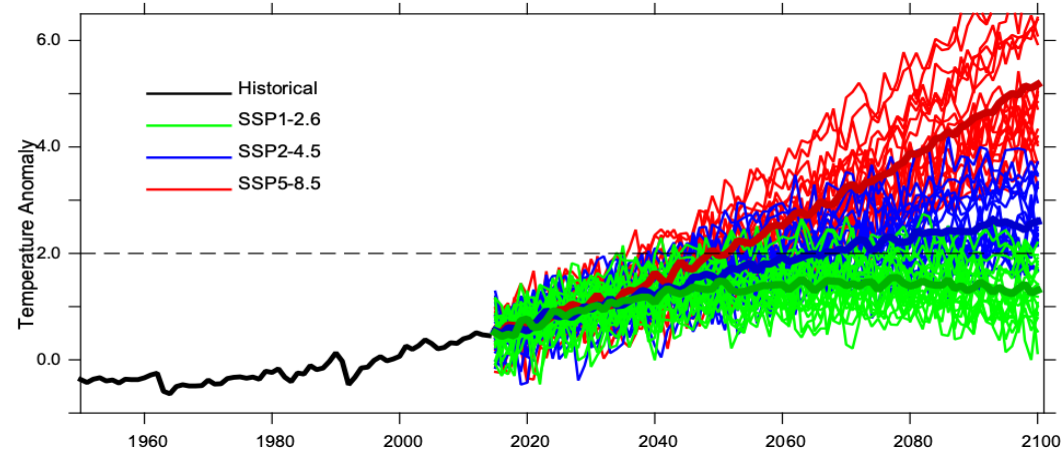
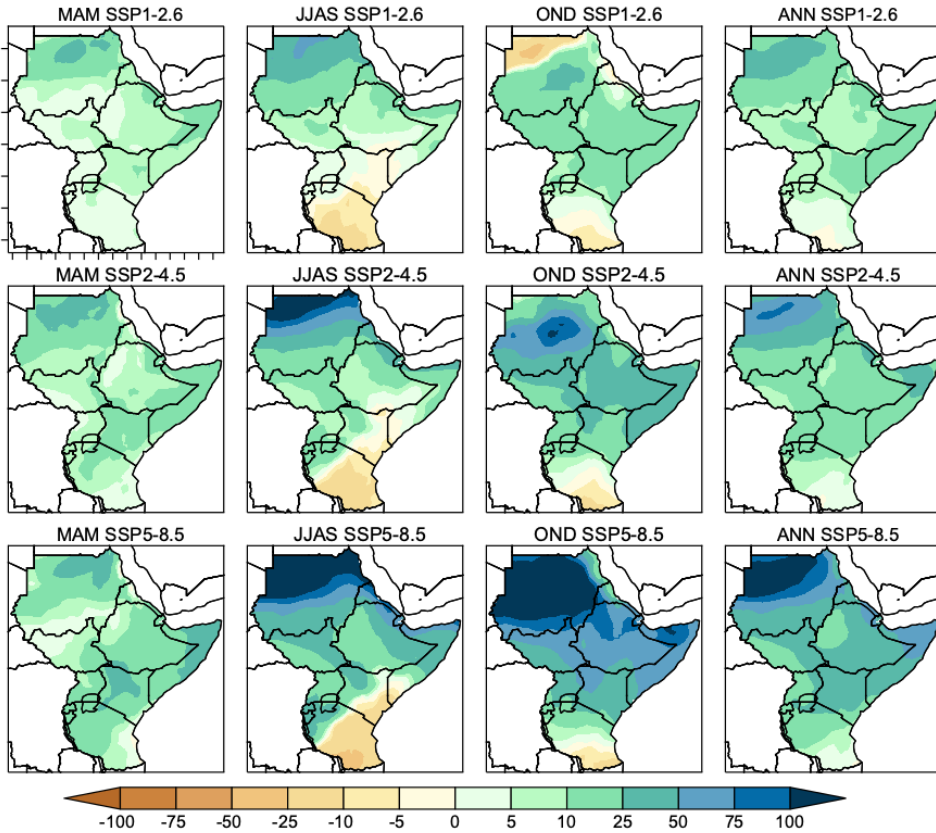
ONSET ANOMALY

ONSET PROBABILITY



- Delayed onset favored over eastern Kenya, south eastern Ethiopia, southern Somalia and Tanzania
- High chances for early onset over western Kenya, Uganda, south Sudan, South western Ethiopia, and northern Somalia (continuing JJAS season)

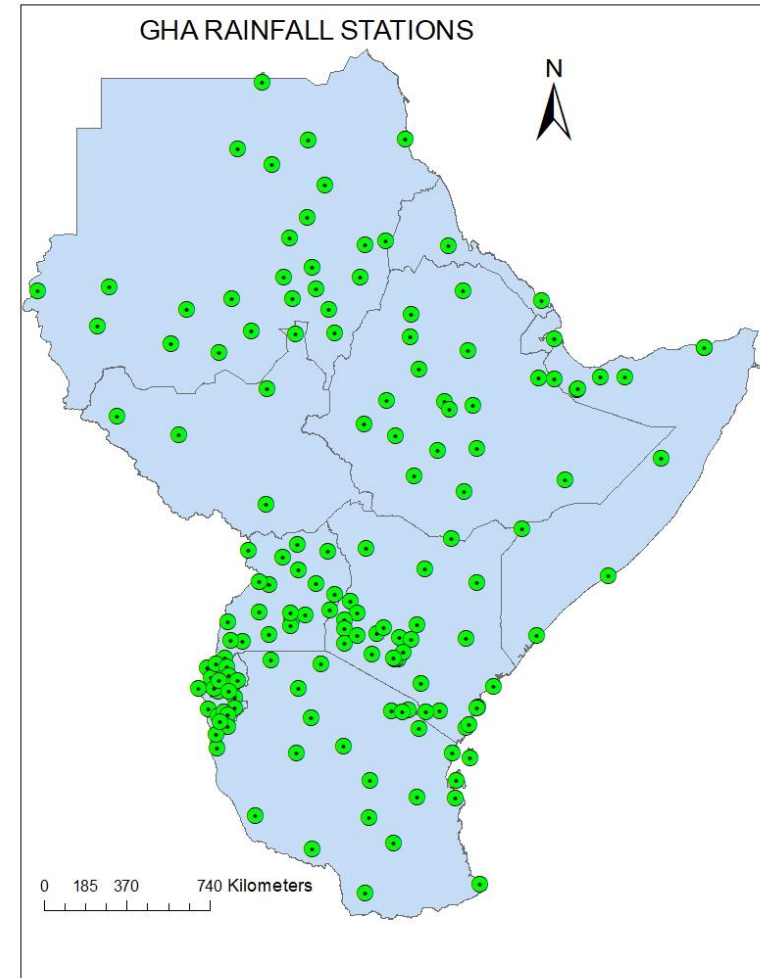
CLIMATE CHANGE PRODUCTS AND INFORMATION (CMIP6)



Projected mean rainfall and temperature changes over GHA by end of the century for different seasons (MAM, JJAS, OND & Annual) and different emission scenarios (RCP2.6, RCP4.5, and RCP8.5)

OBSERVED CLIMATE DATASETS

- Currently ICPAC receives data from 136 active weather stations + 9 AWS (Somalia)
- Gridded (merging station and satellite) dataset is available at high resolution(5x5km)
- Support to MS regarding data management, Climsoft/CDT, data libraries and maprooms
 - Climate Data Management System(CDMS): Climsoft
 - Data Tools: CDT/GeoCLIM and ArcGIS
- A draft regional data sharing protocol is signed with NMHSs to allow sharing of more data

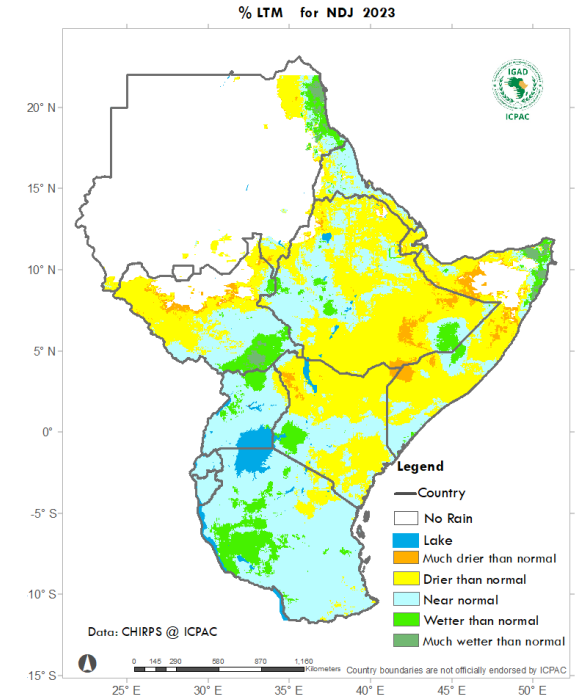
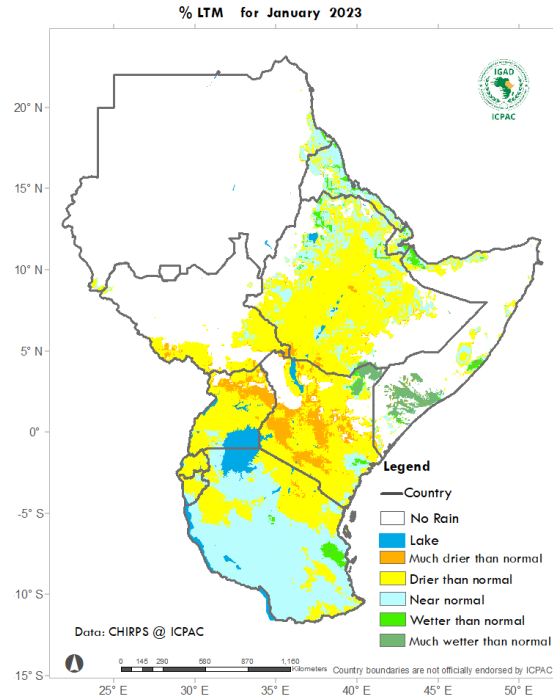
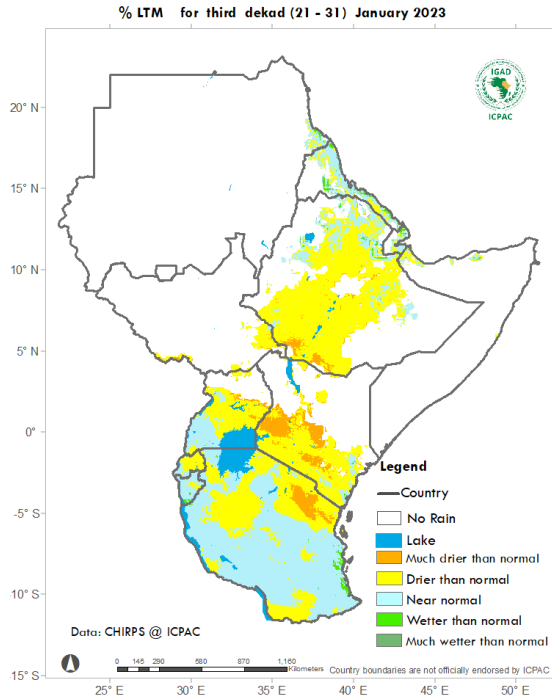


LATEST CLIMATE MONITORING PRODUCTS

21-31 January 2023

January 2023

November 2022-January 2023



SATELLITE DATA RECEIVING STATION INSTALLED AT ICPAC

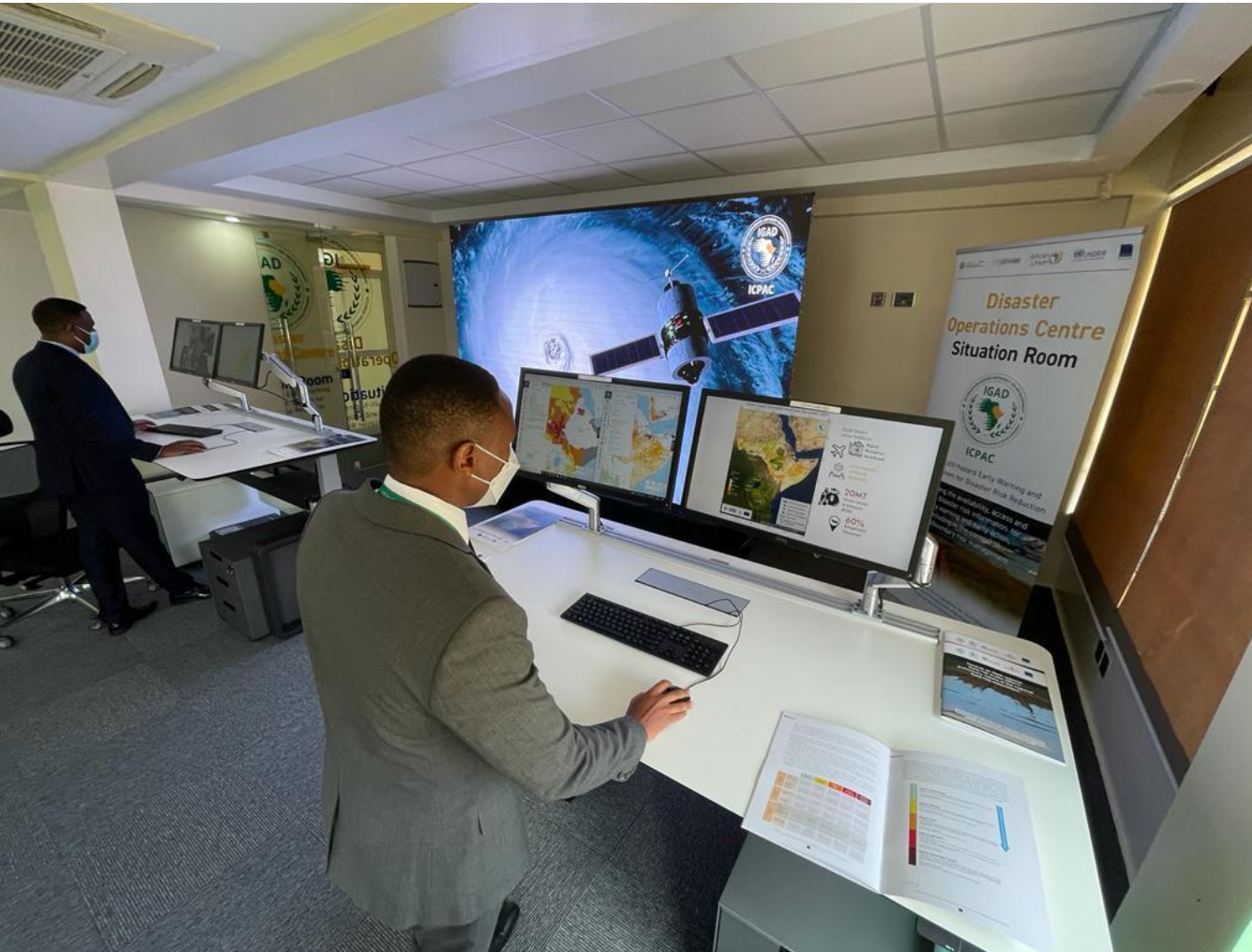
- Part of EU-funded SAWIDRA programme implemented through the AFDB ClimDev Special Fund (CDSF)
- Antenna tracking all polar orbiting meteorological satellites (NOAA, EUMETSAT's METOP, CMA FenYun)
- Key to the Numerical Weather Prediction in the region



DISASTER OPERATION CENTRE (DOC)



Disaster Risk
Management

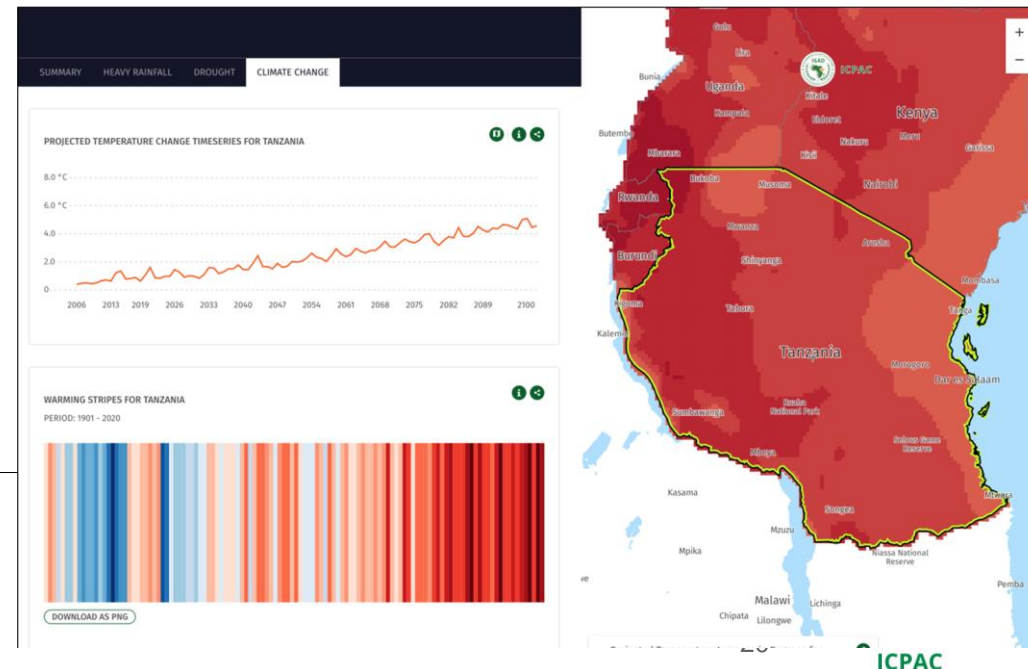
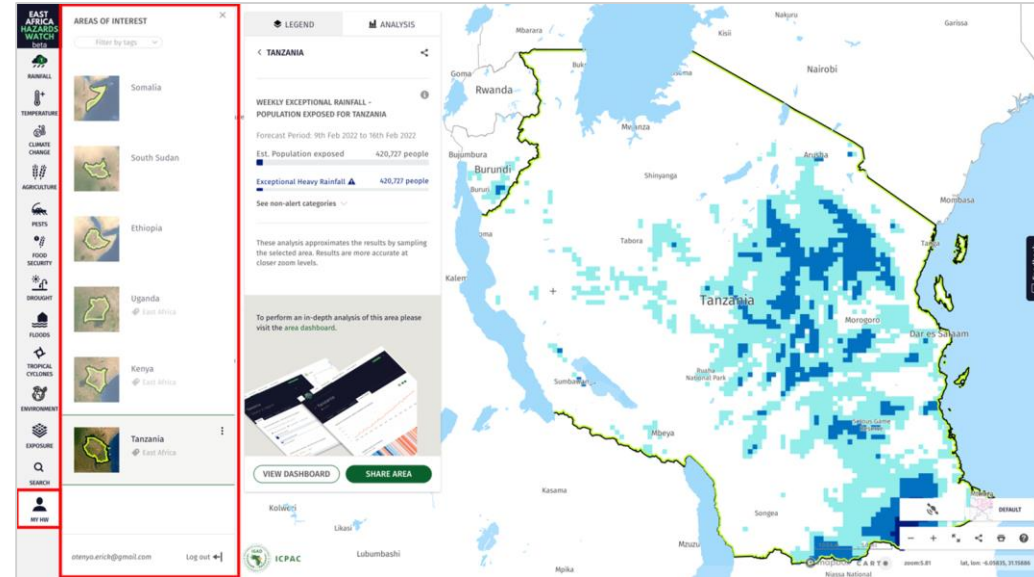


Disaster Situation Room

- One of the 3 situation rooms in Africa together with AU and ACMAD
- Hazard Monitoring
- Coordinate early action
- Rapid mapping of affected areas
- Capacity building
- Support African Union Situation Room

EAST AFRICA HAZARD WATCH

- Automated Multi-sectoral Risk Analysis, Alert Emailing, Products Visualization
- Areas of Interest Email Update system on East Africa Hazards Watch
 - Select an area and receive automated periodic updates for different hazards

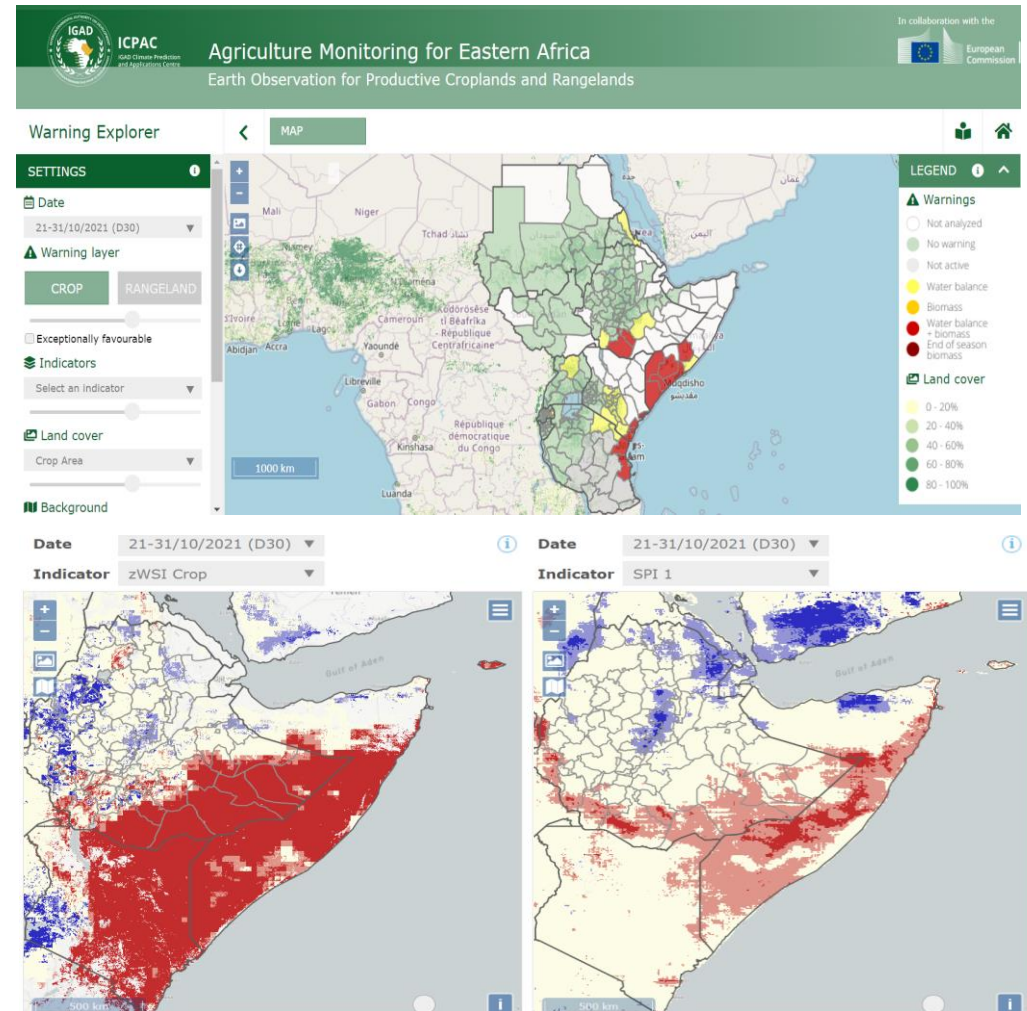


<https://eahazardswatch.icpac.net>

AGRICULTURE HOTSPOTS SYSTEM

Crop and Rangeland Monitoring

- **East Africa Agriculture Hotspots** in a nutshell: a complete platform to explore and analyze EO-derived data for agriculture and rangeland monitoring
- **Warnings updated every 10 days in near real time**





Thank you