

# Satellite Data for Early Warning for the Eastern Africa Region

By

**Viola Otieno, July Ouma & Zachary Atheru**  
ICPAC

*EOAfrica Webinar – 15th March 2022*



## Overview of ICPAC

A description of who we are.

## Products & Services

Our services and products that we issue on regular basis.

## Systems

Platforms that are available to the public and can be accessed for free.

- ICPAC – IGAD Climate Prediction and Applications Centre is a specialized Institution of IGAD
- Regional Climate Centre designated by World Meteorological Organization (WMO)
- Climate services to 11 Eastern Africa countries
- Observer Status with UNFCCC
- IGAD Disaster Operations Centre launched in Oct 2021





**Climate  
Forecasting**



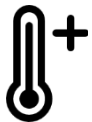
**Disaster Risk  
Management**



**Water Resources**



**Agriculture and  
Food Security**



**Climate Change**



**Climate Information  
and Co-production**



**Environmental  
Monitoring**



**Capacity Development**



[www.icpac.net](http://www.icpac.net)





## DISASTER OPERATIONS CENTER Situation Room



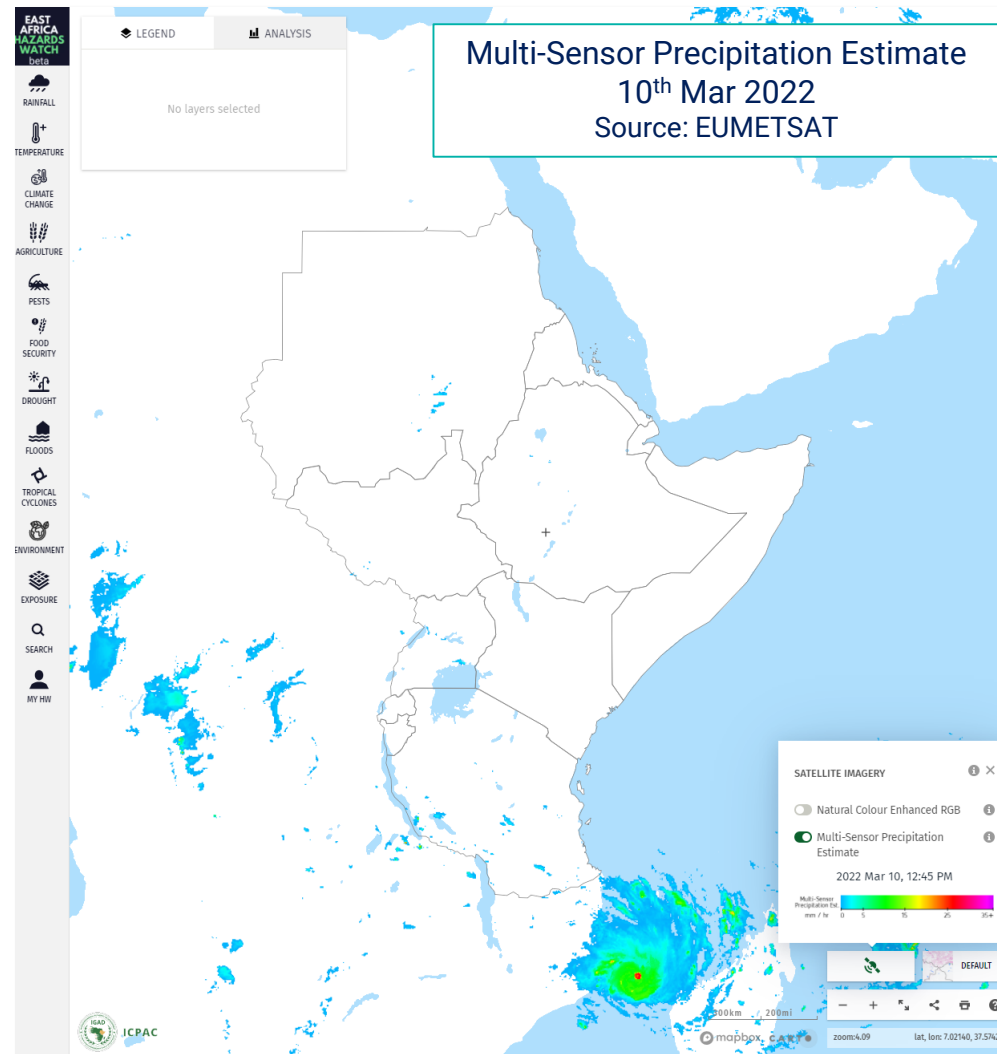
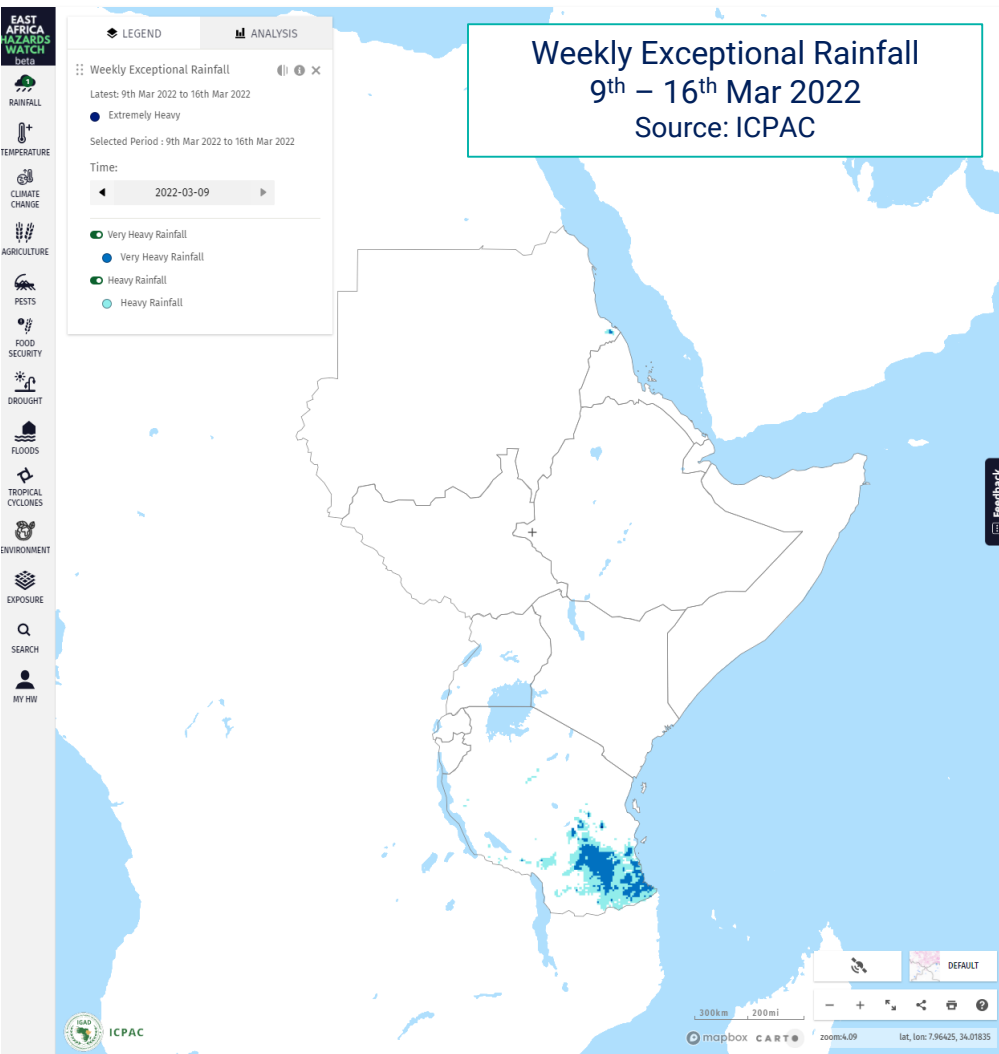
- Opened Oct 2021
- Objective: provide people-centred multi-hazard early warning information and strengthening early action in the IGAD region
- Core functions of IDOC:
  - Monitor major hazards and issue early warning information for the region
  - Coordination with national focal institutions on early action
  - Rapid mapping of affected areas and impacts of disasters
  - Strengthen capacity to anticipate risk & support AU early warning situation room

- Suite of geospatial early warning applications called the East Africa Watch
- Support integrated multi-hazard early warning
  - East Africa **Drought** Watch
  - East Africa **Agriculture** Watch
  - East Africa **Forest** Watch
  - East Africa **Hazards** Watch

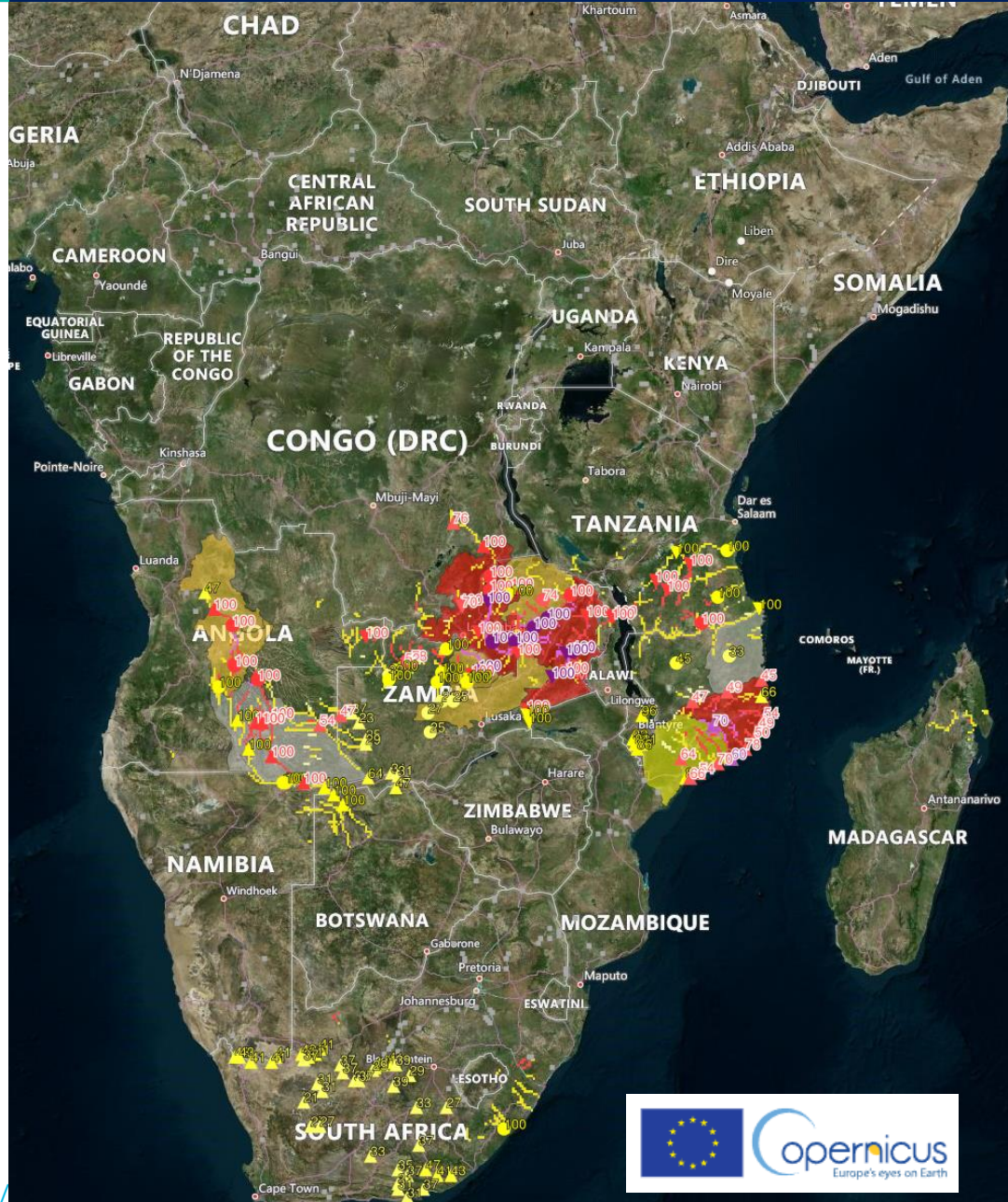
# Satellite & Nowcasting Products for Early Warning in the IGAD Disaster Operations Centre (IDOC)



- Short range forecast and Nowcasting



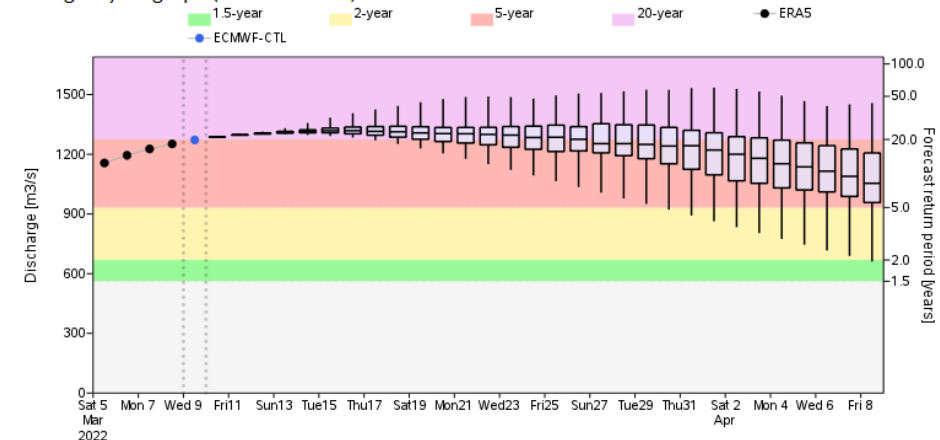




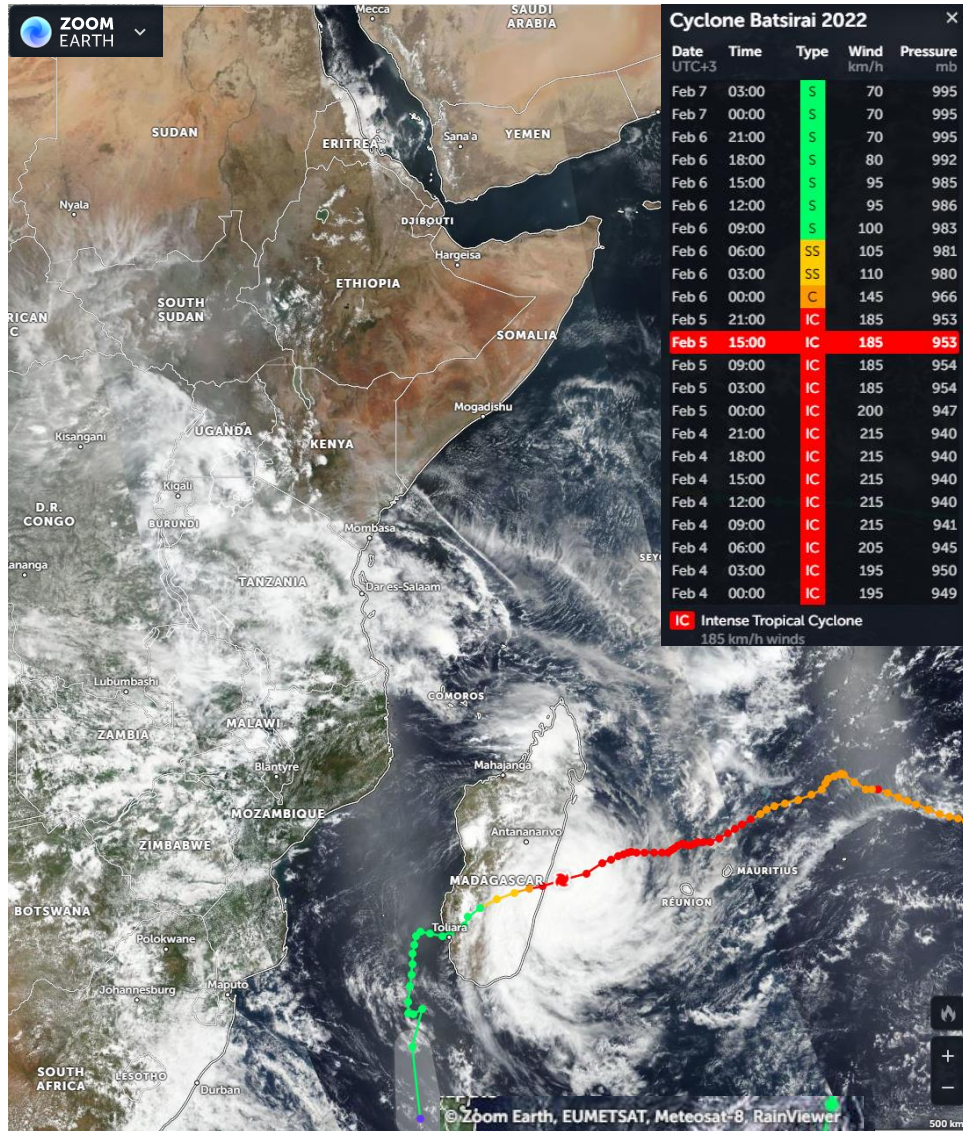
- Global Flood Awareness System (GloFAS)
- GloFAS is an automated satellite-based monitoring system for floods in near real-time.
- We use this at DOC-Situation Room to monitor floods in Africa and produce a continental watch bulletin.

>> Open/Close GloFAS Forecast images

Discharge Hydrograph (ECMWF-ENS)



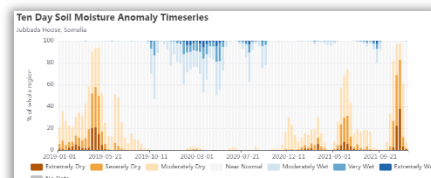
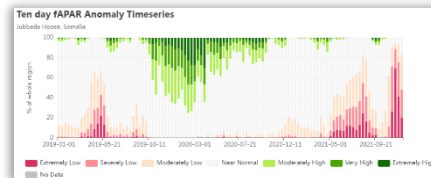
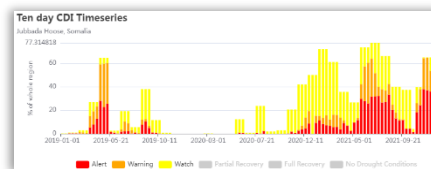
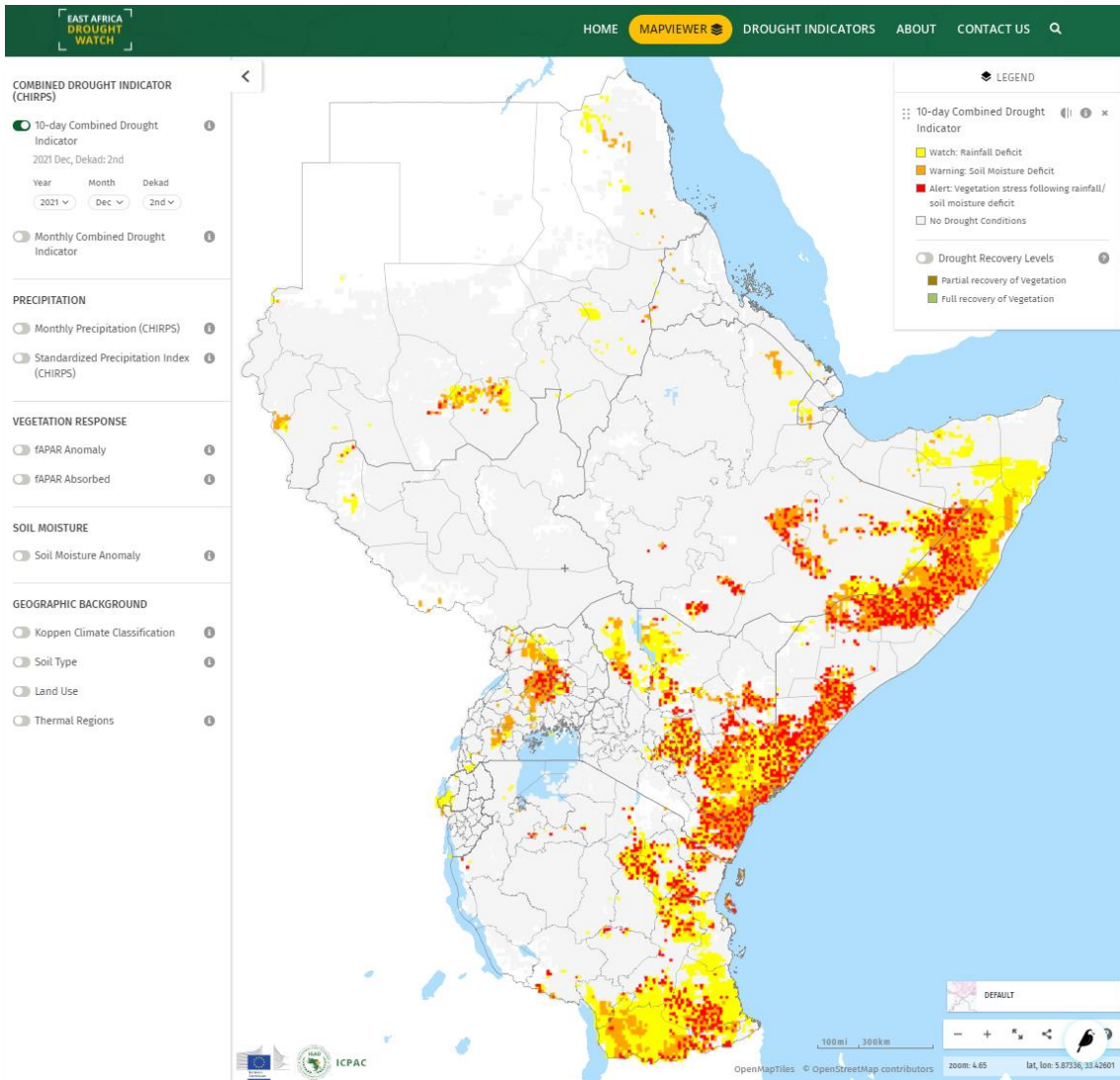




- Near-real-time monitoring (Every 30 minutes)
- **Use Case:** Monitor cyclones over the region; most recent over Madagascar and the impact on the region



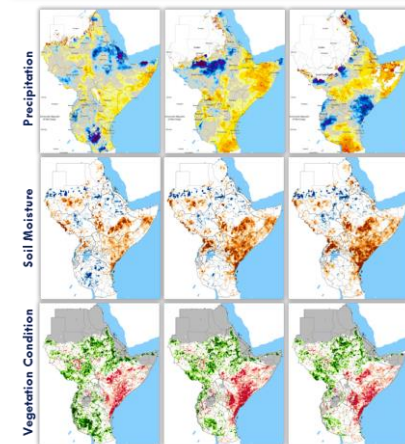
# East Africa Drought Watch



**Population exposed in affected areas**

Category	Population	% of whole region
Warning	166,430	25.22 %
Watch	41,450	6.28 %
Alert	263,275	39.89 %

Total population estimate for area: 659,968



- Continuous monitoring of drought conditions across 11 countries
- Drought indicator available every 10 days
- Satellite, model and station data
- Combined drought indicator: -
  - Precipitation anomalies (CHIRPS)
  - Soil moisture anomalies (LISFlood model)
  - Vegetation anomalies (MODIS)
- Adaptation of the Global Drought Observatory (GDO & EDO) customized to the region
- What can you do on the system:
  - Generate drought report
  - View/download drought related indicators
- **Use Case:** Used by technical experts in Somalia to inform the state of emergency on drought declared in Nov 2021
- **GHACOF, Humanitarian agencies**

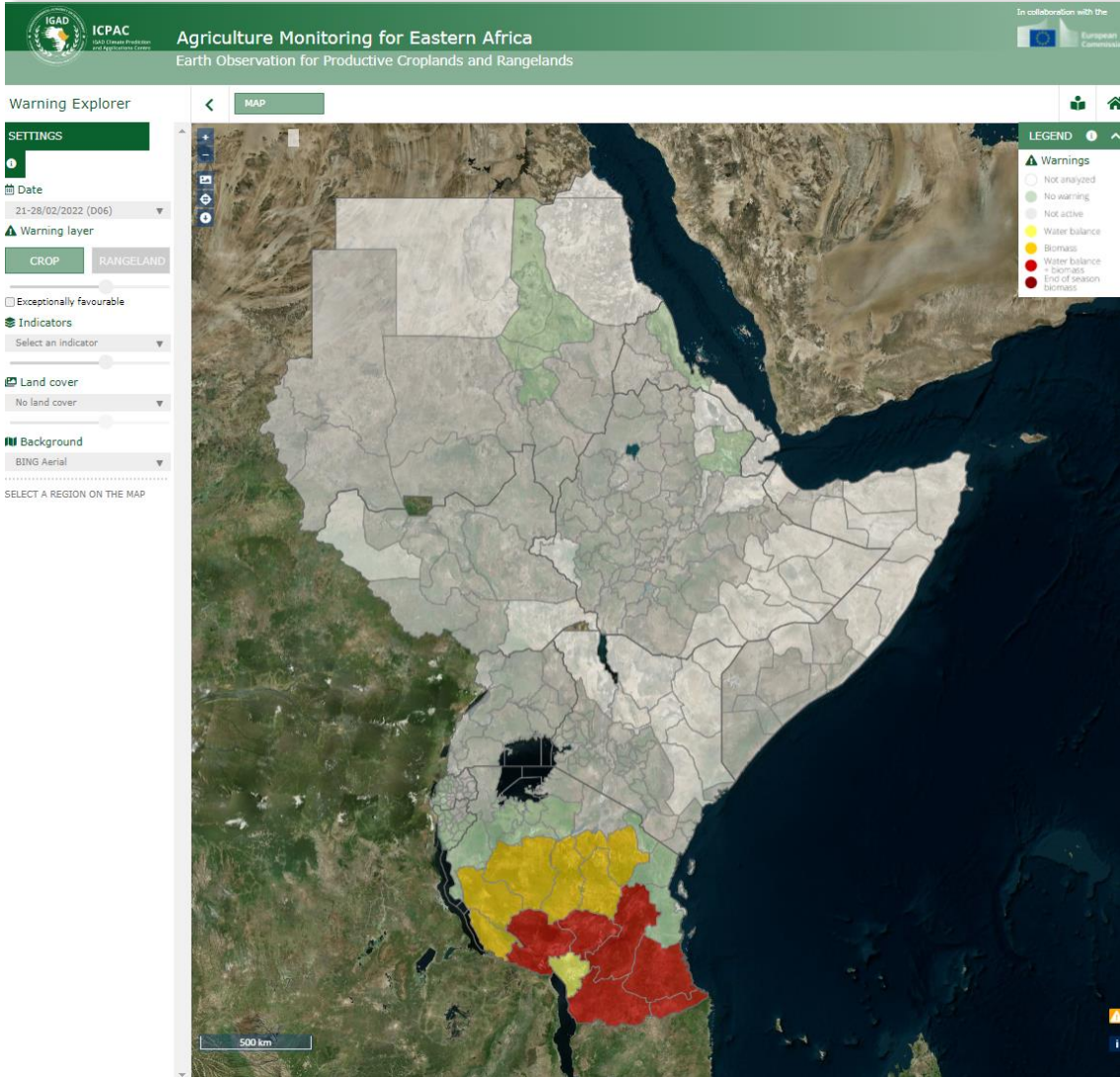
<https://droughtwatch.icpac.net/>



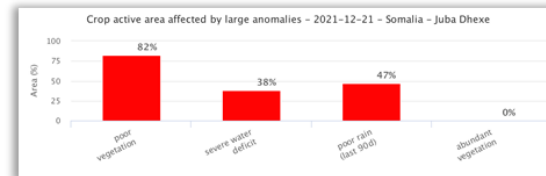
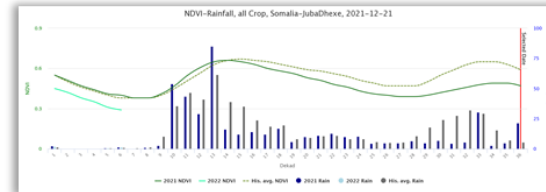
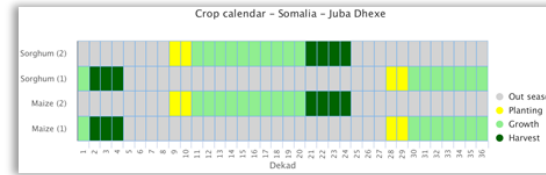
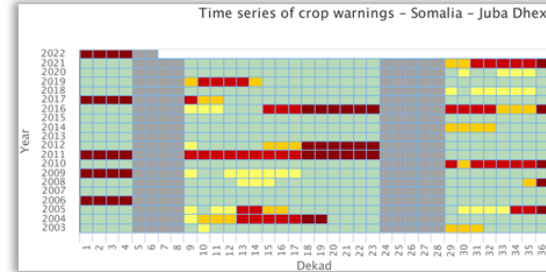


# East Africa Agriculture Watch

www.eumetsat.int



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



- Continuous monitoring of crop areas and rangeland conditions
- Satellite and weather data
- Warning layer every 10 days – per admin1 level
- Data:
  - Precipitation (CHIRPS)
  - Water Satisfaction Index
  - Vegetation (NDVI – SPOT/PROBAV \*MODIS)
  - Temperature
- **Use Case: GHACOF, Regional Crop Monitor, National analysis**
- **Past seasonal impact analysis**





**TroFMIS** | IGAD | GMES AND AFRICA | African Union | European Union

Eastern Africa | Kenya | Kakamega

**Analysis**  
Forest Canopy Density

Forest Canopy Density is the proportion of an area in the field/ground that is covered by the crown of trees and is expressed in percentage of the total area. It also describes the forest floor covered by the vertical projection of the tree crowns, in terms of densities arranging from Dense Canopy, Open Canopy and Moderate Dense Canopy

Forest Canopy Density 2020

Category	Value (H/a)
Non Forest	0
Moderate	~11
Open	~12
Dense	~14

Forest Canopy Density 2020

**Legend: Forest Canopy Density Landsat 2020**

- Dense
- Open
- Moderate
- Non Forest

Opacity: [Slider]

Analysis | Compare | Layer | Docs

Leaflet | Map data (c) OpenStreetMap contributors, CC-BY-SA, Imagery (c) Mapbox

**Analysis**

- Forest Canopy Density
- Forest Canopy Change
- Carbon Flux
- Forest Disturbance - Radar
- Forest Surveillance - Radar

Mt. Kenya Forest

Select year: start year

Data Platform: select data platform

Cached Results:

Generate

- LandSAT and Sentinel 1 & 2
- Cloud computing for data manipulation

<http://eaforestwatch.icpac.net/#/dashboard>





- Follow up with ACMAD and SAWS regarding operationalization of RARS Station at ICPAC to improve NWP products
- Link with NWCSAF to access products for use in the IGAD Disaster Operations Centre situation room



Thank you!  
Questions are welcome.



**ICPAC**

[www.icpac.net](http://www.icpac.net)