AfricaGIS 2019
Innovations in **Geospatial Technologies** for **Achieving Sustainable Development Goals** in **Africa**

Kigali Conference and Exhibition Village, Rwanda
18 - 22 November 2019

Land, livestock, crops, water and weather services of the AfriCultuReS project for food security in Africa

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This project has received funding from the European Union's Horizon 2020 Research and Innovation Framework Programme under grant agreement No 774652

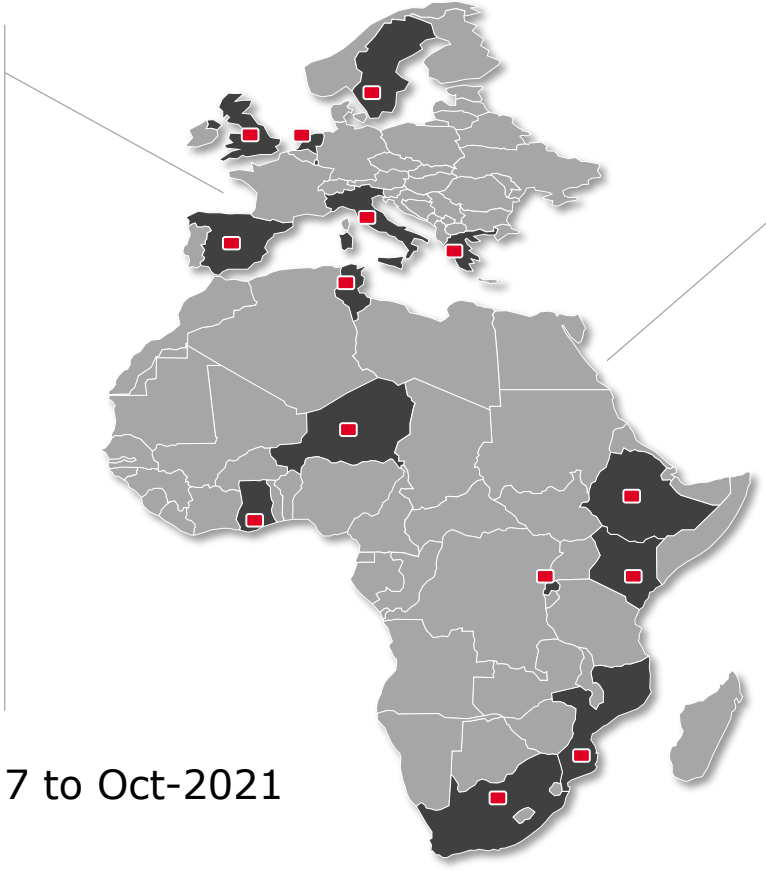
WHAT IS AfriCultuReS?

www.africultures.eu

H2020 - SFS-43-2017 "*EO services for the monitoring of agricultural production in Africa*"

17 Partners | Industry & Academia
50% African + 50% European | Multidisciplinary

- GMV (lead, ES)
- Aristotle University of Thessaloniki (GR)
- DRAXIS Environmental Technologies (GR)
- HCP International (NL)
- Sapienza University of Rome (IT)
- Swedish Meteorological and Hydrological Institute (SE)
- University of Cantabria (ES)
- University of Leeds (UK)
- University of Sheffield (UK)



- Centre Régional AGRHYMET (NE)
- CGIS – University of Rwanda (RW)
- CERSGIS – University of Ghana (GH)
- GeoSAS (ET)
- LocateIT (KE)
- Observatoire du Sahara et du Sahel (TN)
- South African National Space agency (ZA)
- Eduardo Mondlane University (MZ)

8.5M€ | 48 months | Nov-2017 to Oct-2021

AfriCultuReS, a long-term self-sustainable & user-centred initiative in Africa on food security

AfriCultuReS

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SUPPORTED BY…

European Commission | Horizon 2020 European Union funding for Research & Innovation

African Union | NEPAD TRANSFORMING AFRICA | African Development Bank | African Development Fund | GEO GROUP ON EARTH OBSERVATIONS

AfriCultuReS is envisaged to be a **GEO** (**GEOGLAM, AfriGEOSS, EuroGEOSS**), **Copernicus** and **GMES & Africa** contributing action

AfriCultuReS partners are **heavily involved in GEO, Copernicus and GMES & Africa**

GEO | Copernicus | GMES AND AFRICA

AfriCultuReS

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GOAL & OBJECTIVES

AfriCultuReS: Enhancing Food Security in
African Agri**Cultu**ral Systems with the Support of **Re**mote **S**ensing

To provide a **Decision Support System** to support **improved decision making** in the field of **food security in Africa**

1. To **IMPROVE** crop and grassland **monitoring**
2. To predict **UPCOMING THREATS** through risks assessment
3. To turn **OPERATIONAL** new monitoring and forecasting methods in Africa
4. To deliver a **USER-FRIENDLY SERVICES PLATFORM**
5. To **BUILD CAPACITY**

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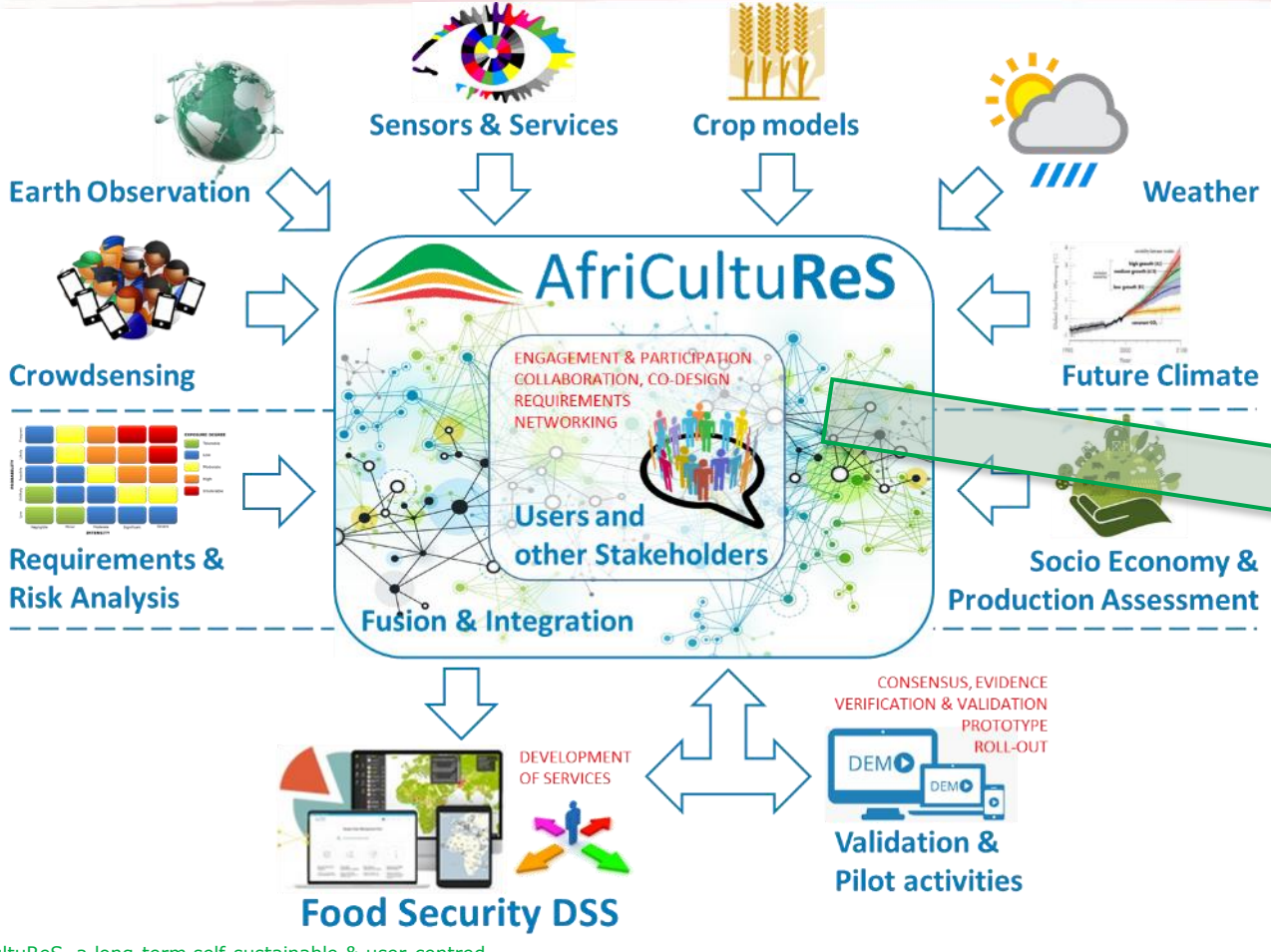
CONCEPT



Setting up a **CO-DESIGNED** & **USERS CENTRED**

- ✓ *interoperable,*
- ✓ *sharable,*
- ✓ *replicable,*
- ✓ *re-usable and*
- ✓ *discoverable*
- ✓ *open*

pool of **analytical geospatial services** on food security in Africa

AfriCultuReS, a long-term self-sustainable & user-centred initiative in Africa on food security

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USER REQUIREMENTS

Emphasizing **CO-DESIGN** & **CO-DEVELOPMENT**

- ✓ **Users Exercises** – definition of first batch of **needs by African partners** (Nov, 2017)
- ✓ **Users and Advisory Board(s)** enrichment, validation and expert advice (Pretoria - Nov, 2018)
- ✓ **Users Workshops** – **led by African** partners with support from the Univ. of Sheffield (Sep-Oct 2019)

- ✓ **3 iterations -** Test, Validation & Demo

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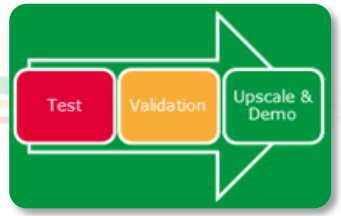
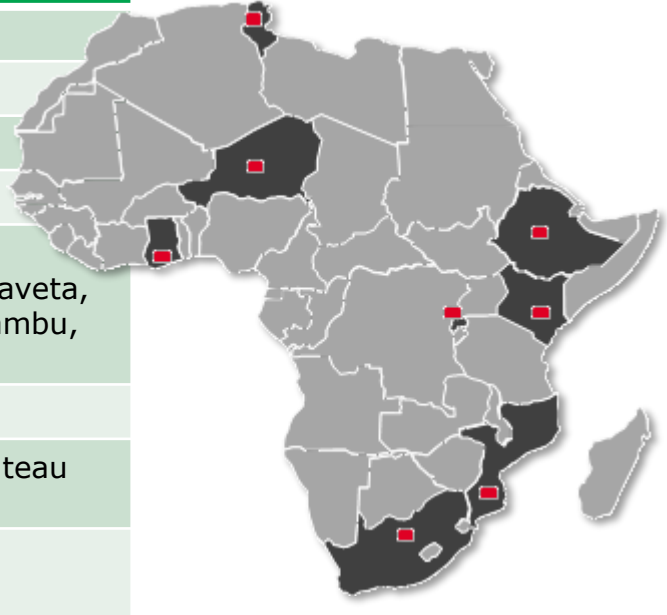
WHERE?



Eight pilot countries + a **transboundary basin**, representative of the **diversity of food production** in Africa (climate, culture, main crops, pastoralism..)

Region	Countries	Pilot Sites
North Medit. Africa	Tunisia	Jendouba, Kairouan, Médenine, Nabeul
Sahel	Niger	Sahel
Gulf of Guinea	Ghana	Northern Savannaah
Great Horn of Africa	Ethiopia	Aba Gawudi and Derba watersheds
East African Highlands	Kenya	14 Counties: Bungoma, Kericho, Laikipia, Machakos, Nakuru, Nandi, Narok, Taita Taveta, Tana River, Trans Nzoia, Uasin Gishu, Kiambu, Kisumu, and Vihiga
Lake Victoria Basin	Burundi, Kenya, Rwanda, Tanzania and Uganda	
Equatorial Central Africa	Rwanda	Eastern Savannah (lowlands), Central plateau and North-western highlands
Southern Africa	Mozambique South Africa	Limpopo and Umbeluzi basins (MZ) Free State and KwaZulu-Natal (ZA)



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AFRICULTURES SERVICES

Seven services groups:

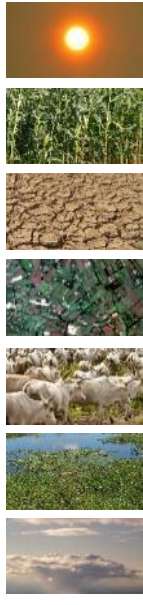
- ✓ AfriCRS-S1 Climate Services
- ✓ AfriCRS-S2 Crop Services
- ✓ AfriCRS-S3 Drought Services
- ✓ AfriCRS-S4 Land Services
- ✓ AfriCRS-S5 Livestock Services
- ✓ AfriCRS-S6 Water Services
- ✓ AfriCRS-S7 Weather Services

Level of application:

- ✓ mapping
- ✓ monitoring
- ✓ forecasting
- ✓ warning

Level of scale:

- ✓ Coarse (pan-African)
- ✓ Medium (national)
- ✓ High (local)



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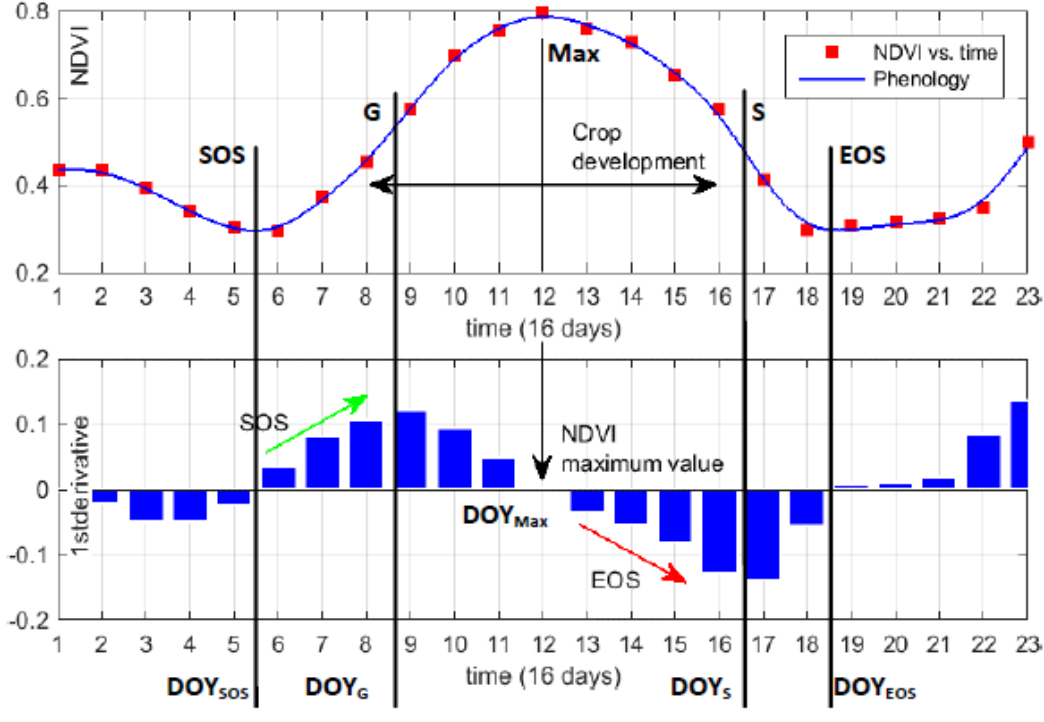
CROP SERVICES: crop phenology

- ✓ **Vegetation development phenological stages:**

1. Start Of Season (SOS)
2. End Of Season (EOS)
3. The maturity
4. The harvesting

- Assessed through time-series of NDVI data over a specific site
- The phenological function is analysed to retrieve the phenological metrics for each pixel.



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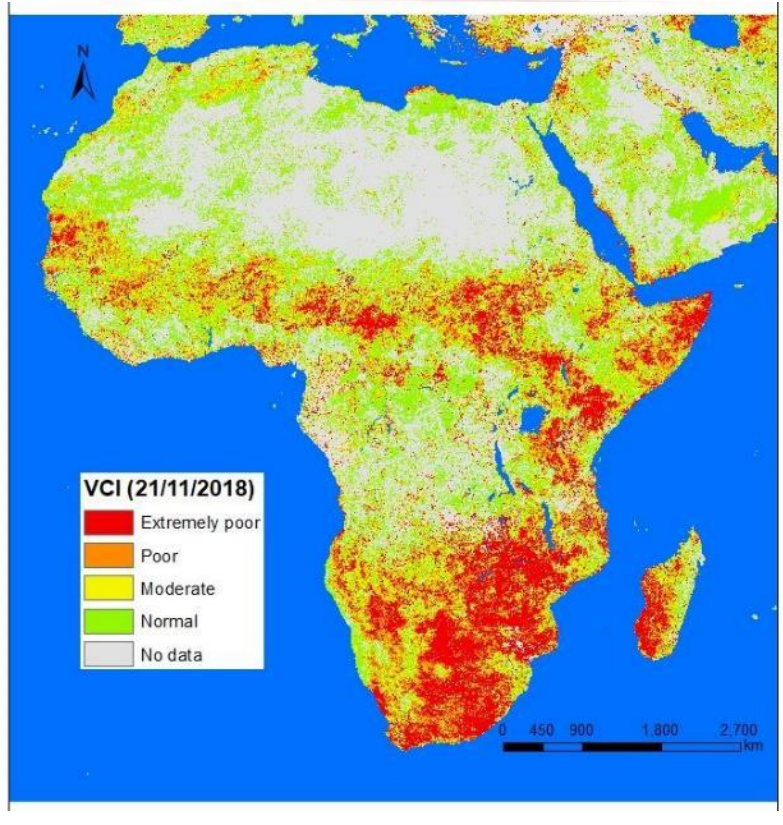
CROP SERVICES: crop condition

- ✓ **Is provided by the Vegetation Condition Index from Copernicus Land Services**

- VCI compares the current NDVI to the range of values observed in the same period in previous years

- VCI classes of veg. condition:
  - 0.7-1: normal
  - 0.5-0.7: moderate
  - 0.3-0.5: poor
  - <0.3 extremely poor



VCI map at coarse resolution over Africa

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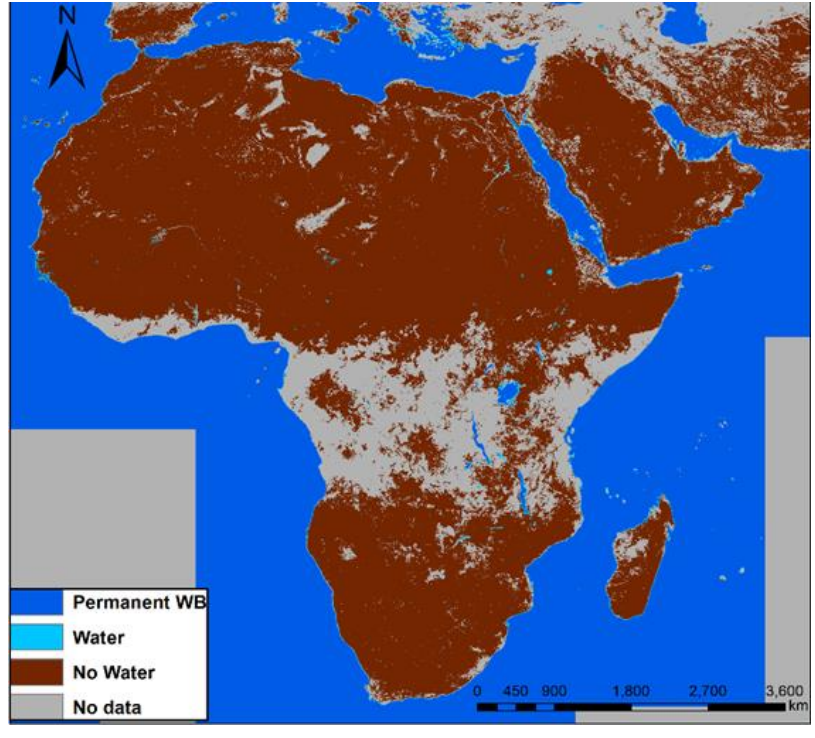
WATER SERVICES: water bodies mapping

- The service detects areas covered by inland water at 10-day period
- Medium and coarse spatial resolution from Copernicus Land Services data
- High resolution: automatic detection using Sentinel-1 per dekad time-series with automatic thresholding using textural features and the Otsu method



WB map at coarse resolution over Africa

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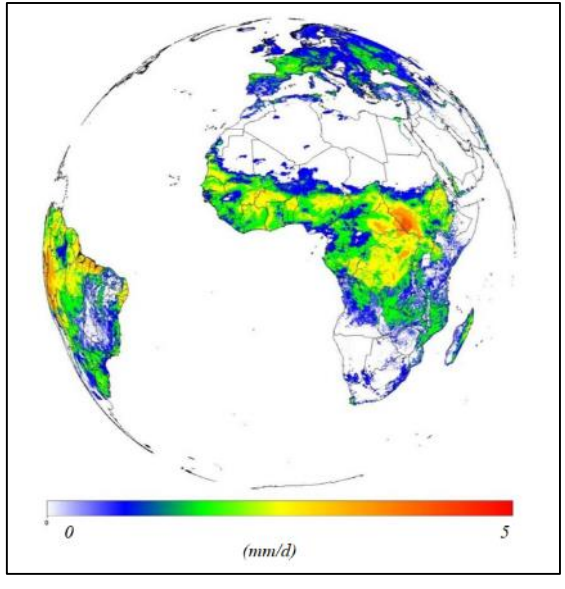
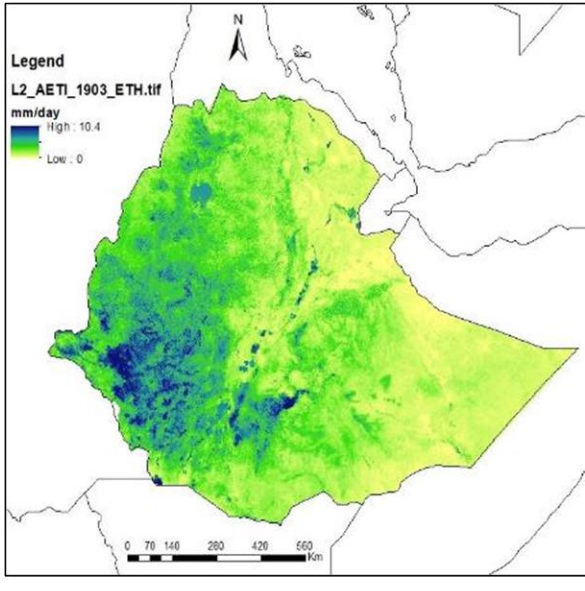
WATER SERVICES: water consumption

- ✓ **Provides estimations of actual evapotranspiration (ETa)**

- Coarse resolution from the Copernicus Global Land service (3km)
- Medium resolution from the NASA EOS MODIS Land service MOD16A (500m)
- High resolution from the FAO/WaPOR AETI (100m)



Coarse res. ETa (30/01/2019)



High res. water consumption over Ethiopia (21-30/01/2019)

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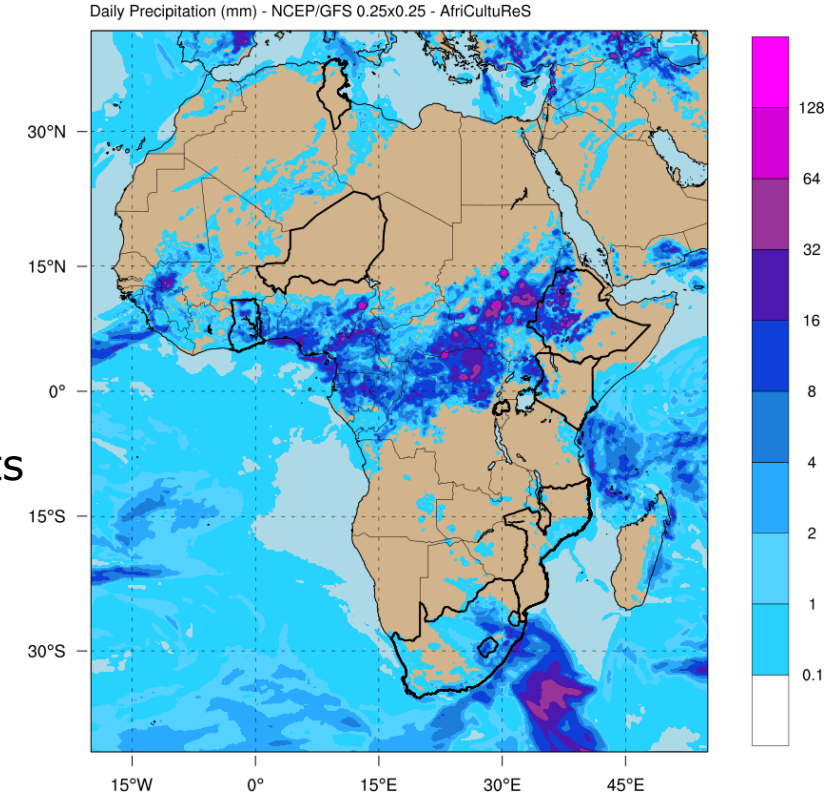
DROUGHT SERVICES

- ✓ **Short term – seasonal drought forecast (near future)**
- ✓ **Drought monitoring and early warning (current conditions)**

- ✓ **Based on the analysis of:**

- Meteorological drought, indicating precipitation deficits
- Agricultural drought, indicating soil dryness and impacts on crop condition

- ✓ **Indices:** SPEI, SWACI, VCI



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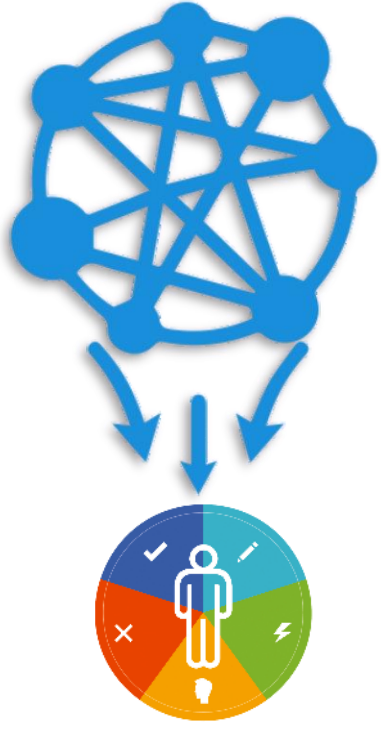
AfriCultuReS: improving food security

- ✓ **Crop products will feed early warning systems for crop yield failure**
- ✓ **Water services will help identify the water availability as well as water use**
- ✓ **Drought prediction will help plan ahead and mitigate its impacts.**



Our target key sectors:

- ✓ **Public sector**
- ✓ **Agribusiness sector**
- ✓ **Financial sector**
- ✓ **Academic sector**

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