*This project has received funding from the European Union's Horizon2020-SPACE-2019 innovation action programme under grant agreement No 870373 - SnapEarth*

SnapEarth

# EarthFood security pilot

*www.snapearth.eu*

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# Team

isardSAT®

isardSAT is a recognized expert in satellite missions and processing algorithms since 2006 and an acknowledged expert support laboratory for the European Space Agency (ESA).

isardSAT is part of the consortium that developed Sentinel-6 built by ESA in cooperation with EU, EUMETSAT, NASA and NOAA.

www.isardsat.cat

**Areas of expertise:**

- Altimetry
- EO data processing of L1 data
- Mission calibration

# Problem addressed

Drought is a natural process and **can occur anywhere in the world** as a consequence of lack of precipitations, which result in a water shortage.

With climate change, **drought periods are becoming more intense, long and are expected to occur more often** and to **affect larger areas.**

Every year, about 55 million people are affected by drought (WHO, 2021) and by 2030, around 700 million people will be at risk of being displaced by drought (UNCCD, 2022)

Drought is **one of the major driver of food insecurity**, and it is considered the most serious hazard to livestock and crops in nearly every part of the world.

*Credits: Brendan Cox / Oxfam (2)*

# Problem addressed

Drought is a also a **key precursor of extreme events** such as wildfires and locust invasions, that can exacerbate food insecurity and pose entire communities in threat.

Drought is therefore not only a food security issue. It also has also serious impact on communities, health, economies, energy and the environment.

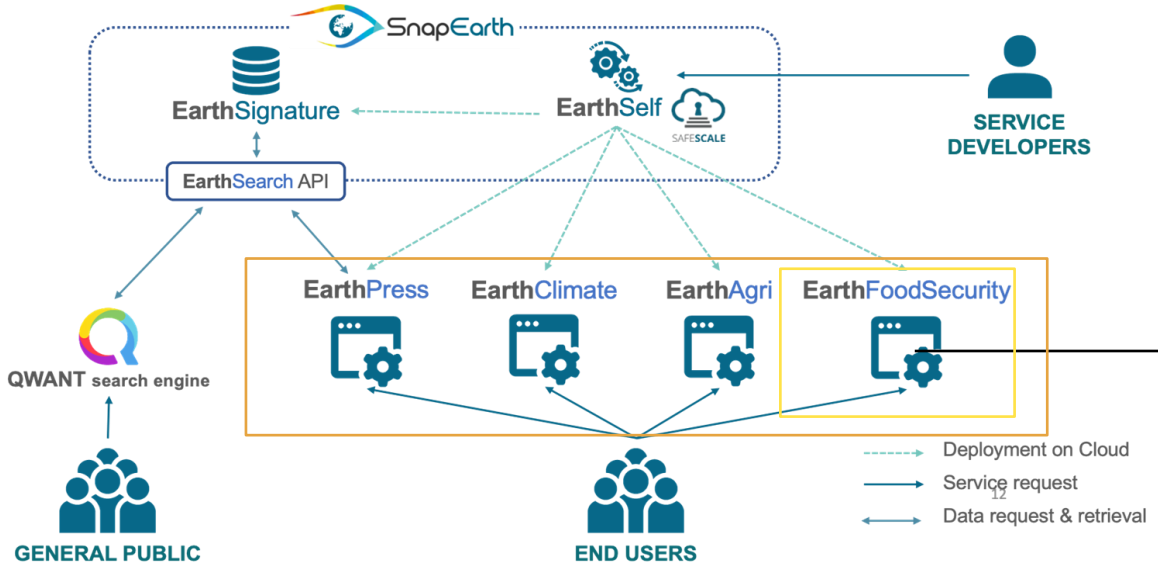
*Credits: National Geographic (1) and Rehman Asad / Alamy (3)*

# EarthFood security platform

Offers an easy to use interface to simplify request for EO-based soil moisture products which include:

Soil moisture

Drought index




EarthFoodSecurity

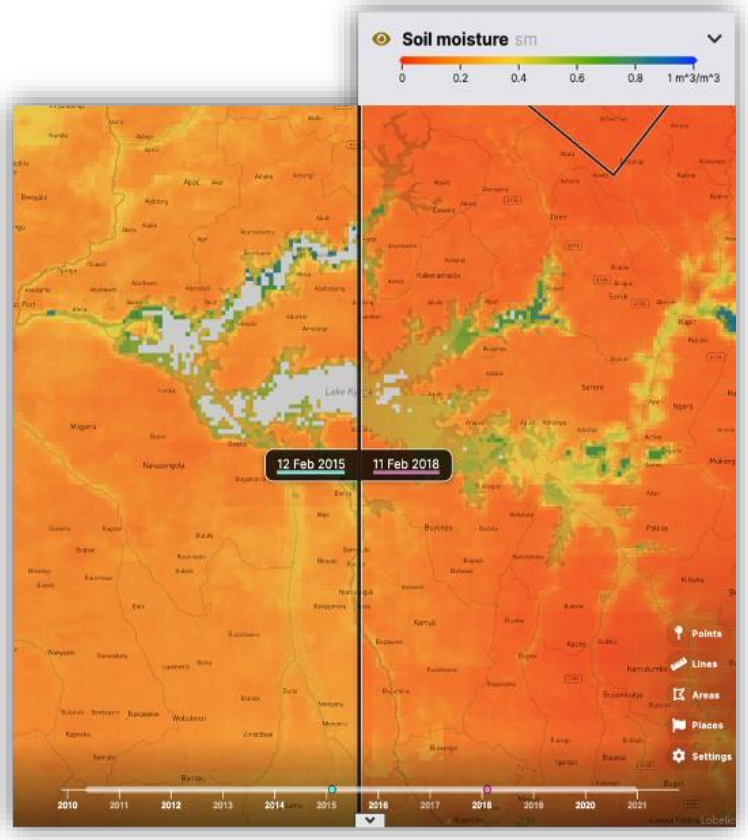
The platform is built on top of the the new cloud infrastructure (EarthSelf) which enable new simplify data access through search engines (Earth signature and Earth Search).

Based on land cover time series maps provided by the EarthSignature service, isardSAT identify changes and impacts in the soil moisture at specific areas of interest.

# EarthFood security platform

| | |
|---|---|
| **Data** | From surface to root-zone from SMOS/SMAP + Sentinel 1, 2, 3 data<br>Dispatch algorithm [1] |
| **Spatial resolution** | 1 km - Global |
| **Temporal coverage** | 2010 - Today |
| **Temporal resolution** | 2/3 days (based on satellite passes) |
| **Characteristics** | L-band MW: weather and light independent |
| **Accessibility** | API |

- **Immediate data retrieval without the need of local calibration**
- Surface and root-zone level information

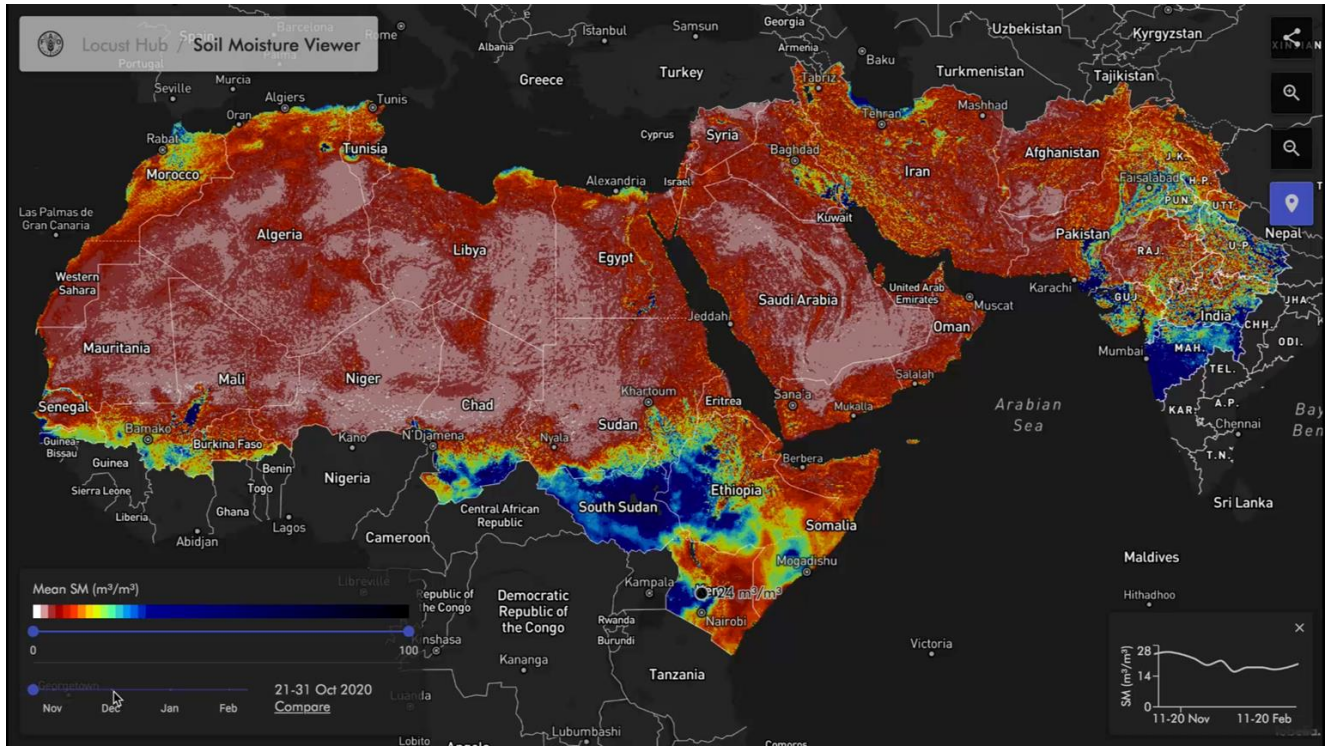



*High resolution soil moisture, disaggregation with SMOS/SMAP in combination with thermal/optical data S3/MODIS (Merlin et al. 2013, Stefan et al. 2021*

# Successful applications

isardSAT's Soil moisture information helps FAO to **anticipate potential locust outbreaks by 2 to 3 months** and act accordingly.

- 30 countries served
- 16 million km2



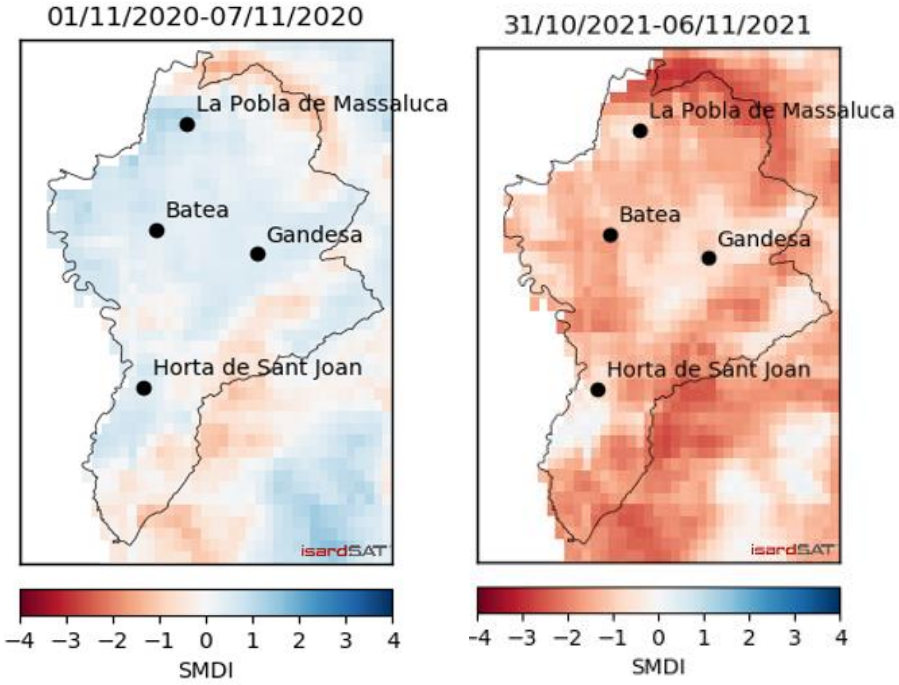

https://locust-hub-hqfao.hub.arcgis.com/pages/lobelia-viewer

Food and Agriculture Organization of the United Nations

# Successful applications

Lobelia provides weekly surface soil moisture information to the Observatori Sequera Terra Alta.

The information is used to issue irrigation recommendations to local vineyards in Alt Penedès and Terra Alta.




http://www.obsebre.es/php/hidrologia/agrometeorologia/butlleti_TA_20211108.html

# Fields of application

Agriculture

Crop yield insurance

Forest management

Risk insurance

Fires prediction

Plague prevention

Wetland monitoring

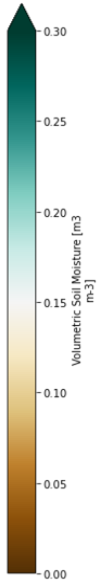
Hydrological modelling

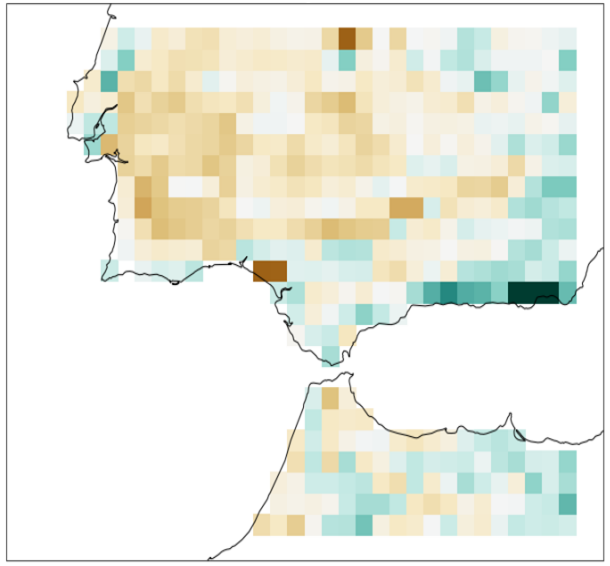
# Comparison against open products

Different type of datasets are available to monitor soil moisture.

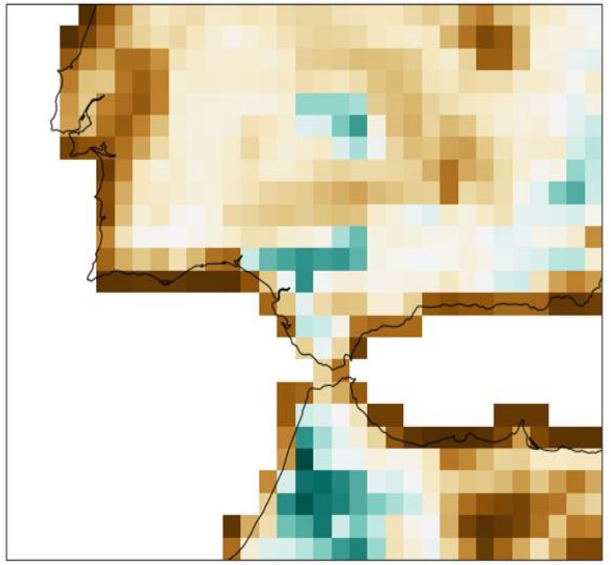
However, the open-access ones have low resolution and low accuracy (fig. 1 and 2).

August 2018

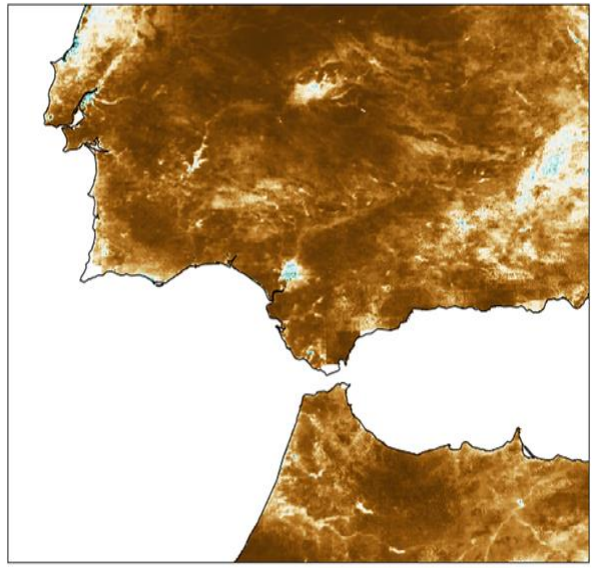


***ESA CCI*** ***-*** *25-km*



***ERA-5*** *– 25km*

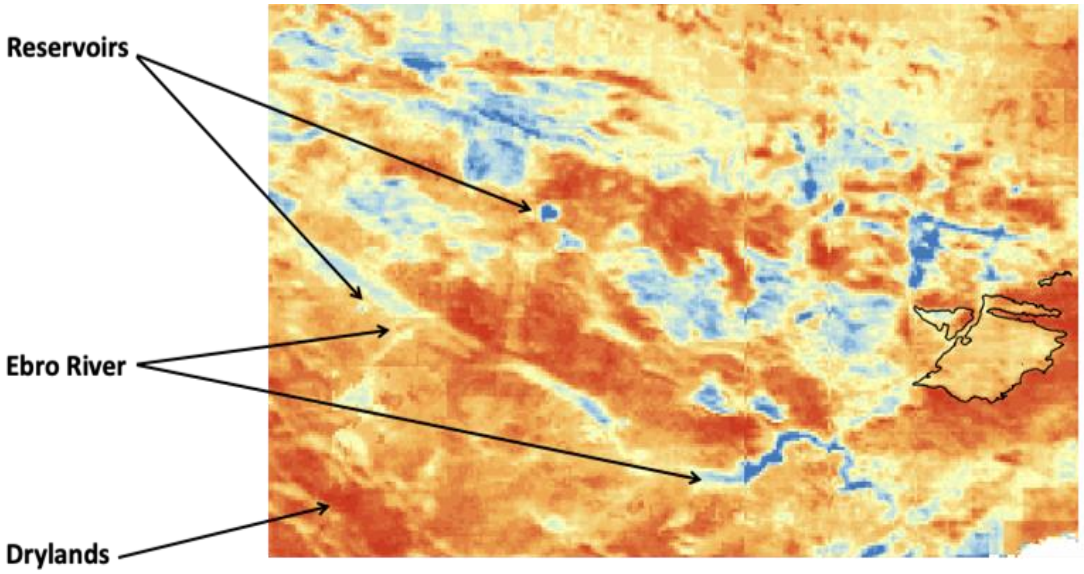


*isardSAT -* ***1-km***

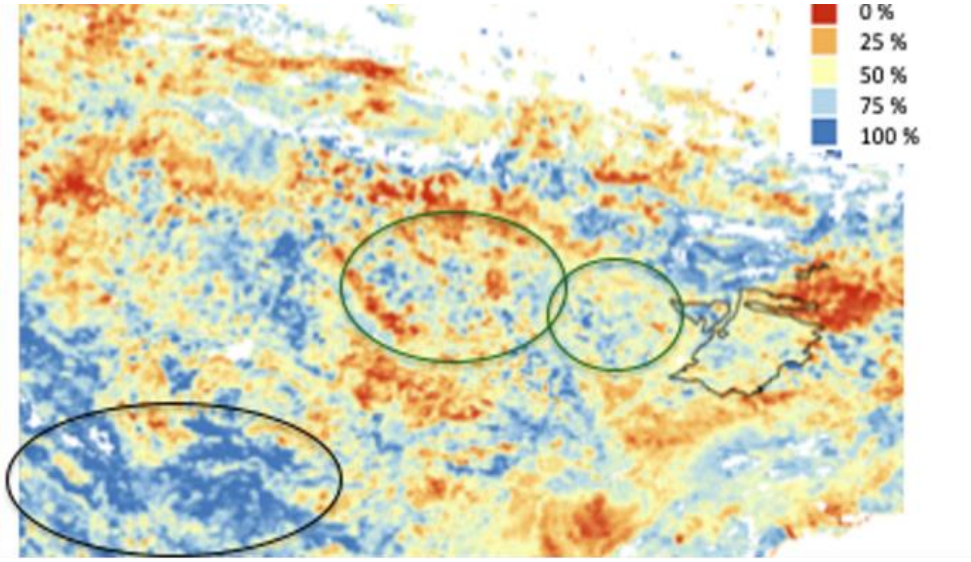
isardSAT Soil moisture (Fig 3) offers superior quality compared to open-access products, including the capability to detect water basins and irrigated districts.

# Comparison against open products

Optimal performace also in semi—arid regions.




*IsardSAT SM based on L-band MW (SMOS and SMAP) – August 2017*




*Copernicus SM based on Sentinel-1 SAR – August 2017*

The quality of the product is clearly visible in its sensitivity to basins, rivers and irrigation districts in dry regions.

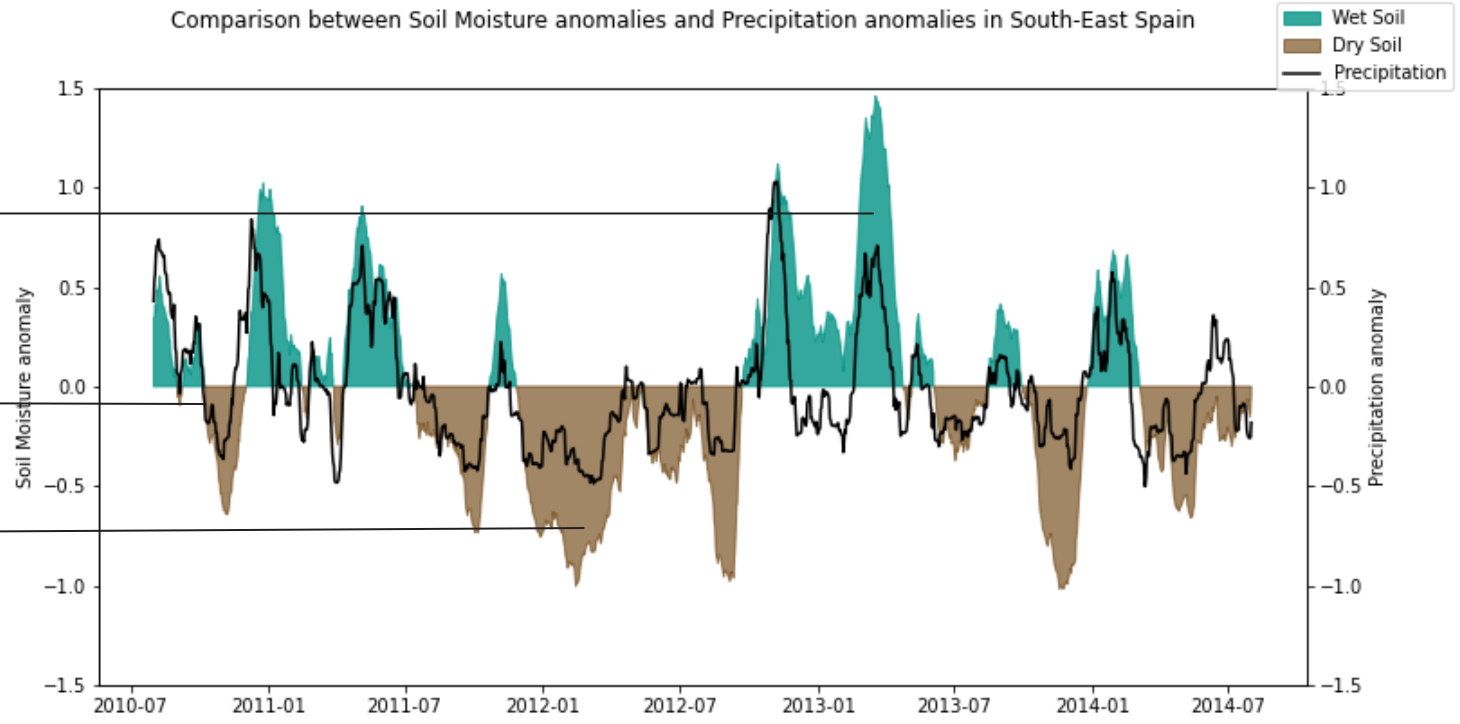
# Comparison against open products

isardSAT soil moisture correlates very well with observed precipitations.

Wet soil

Precipitations

Dry soil

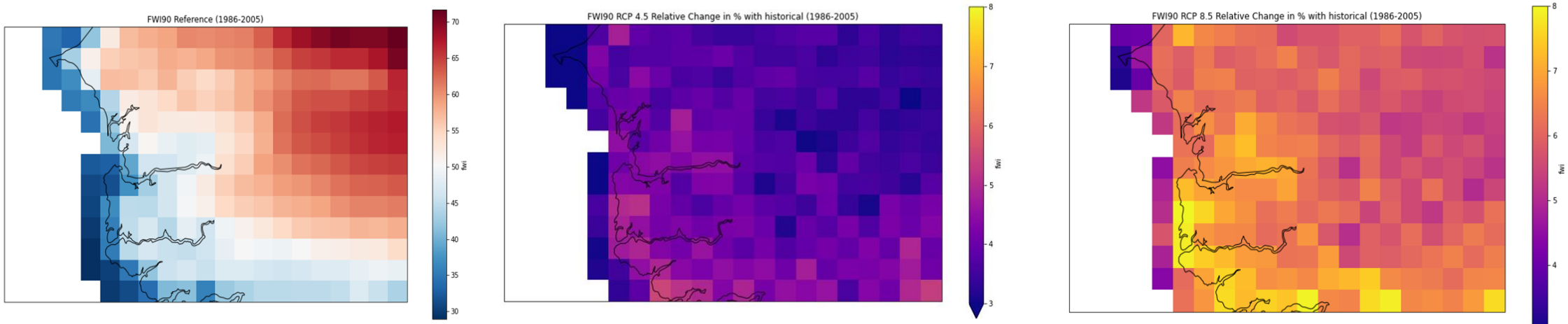


# Fire Weather Index

Currently the most used Fire index around the world, forecasting from 1 to 10 days in advance the fire danger level using numerical weather predictions.

Inputs: temperature, wind speed, relative humidity at noon time; and accumulated precipitation during earlier 24-h

**Our approach**: Analyse the evolution of fire risk with respect to land classes (provided by EarthSelf) and compare this product with burned areas in the past.



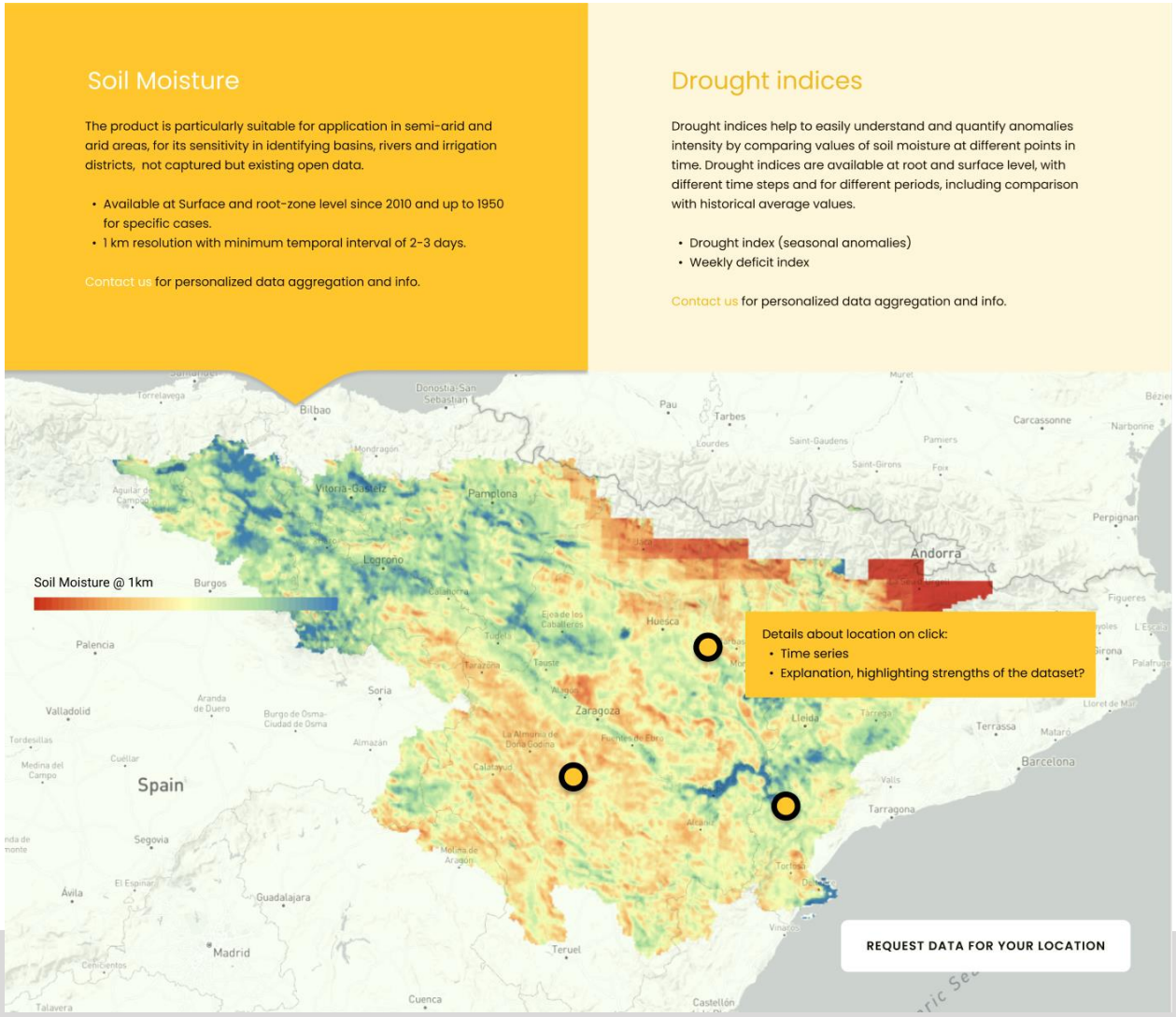

*Gambia – FWI (1986 – 2005) in Fig 1 and average relative change of the projection of FWI over 2100 in Fig 2 and Fig 3.*

# Mockup & link

**Build your personalized request.**

Through a simple form you can build your personalized request and dedicated person will reach out, and help you define the best solution for you.

https://earthfoodsecurity.isardsat.cat/



# Contacts

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# Thank you

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