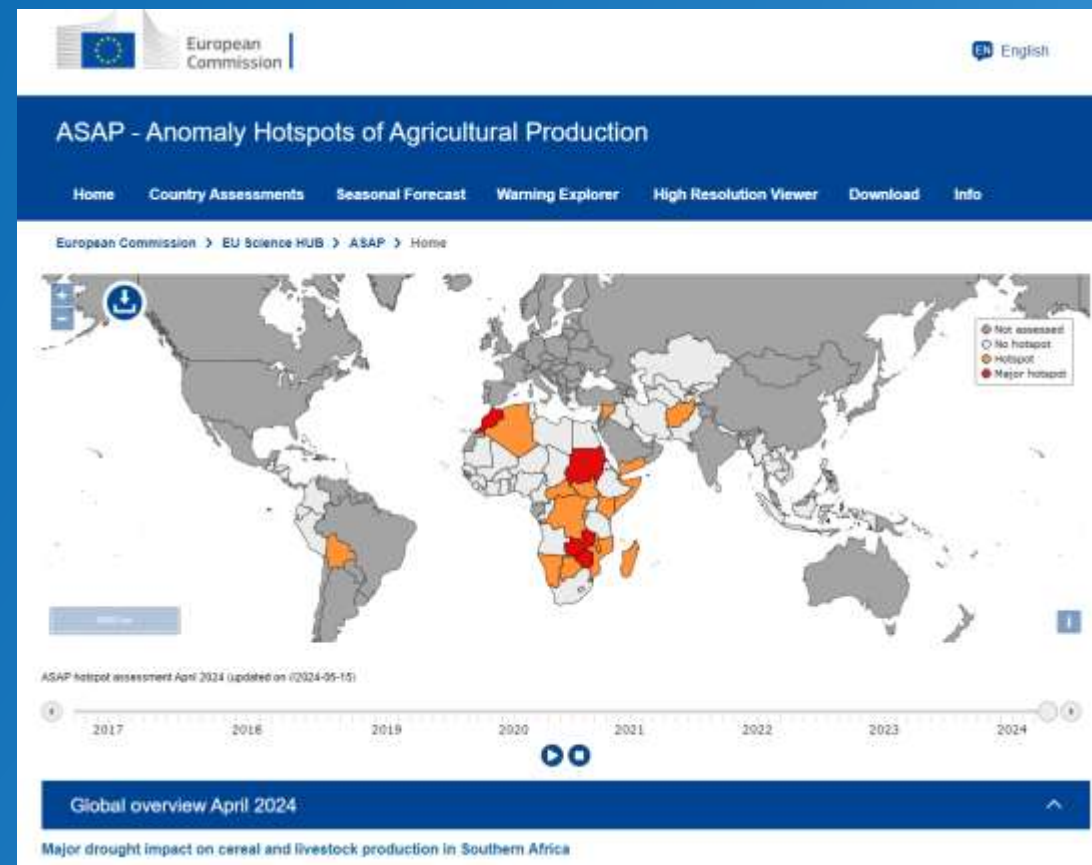


Anomaly hotSpots of Agricultural Production (ASAP)

<https://agricultural-production-hotspots.ec.europa.eu/index.php>

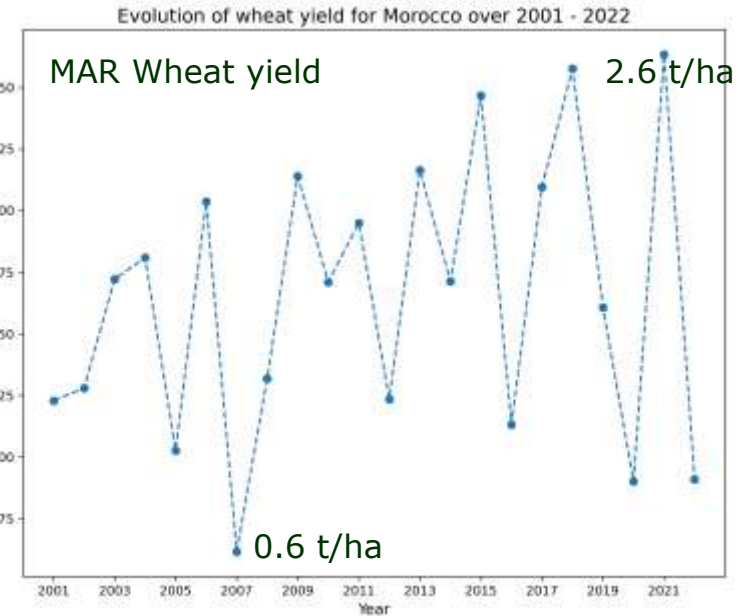
*Hervé Kerdiles EC-JRC
Food Security Unit D5*



ASAP, a global Early Warning System

... to identify **crop production deficits** mainly due to **drought** using satellite and agro-meteo data at GAUL 1 region level

ASAP provides NRT information on crops and rangelands conditions at three different spatial levels: **country, region (sub-national) and field**



1.) Country analysis



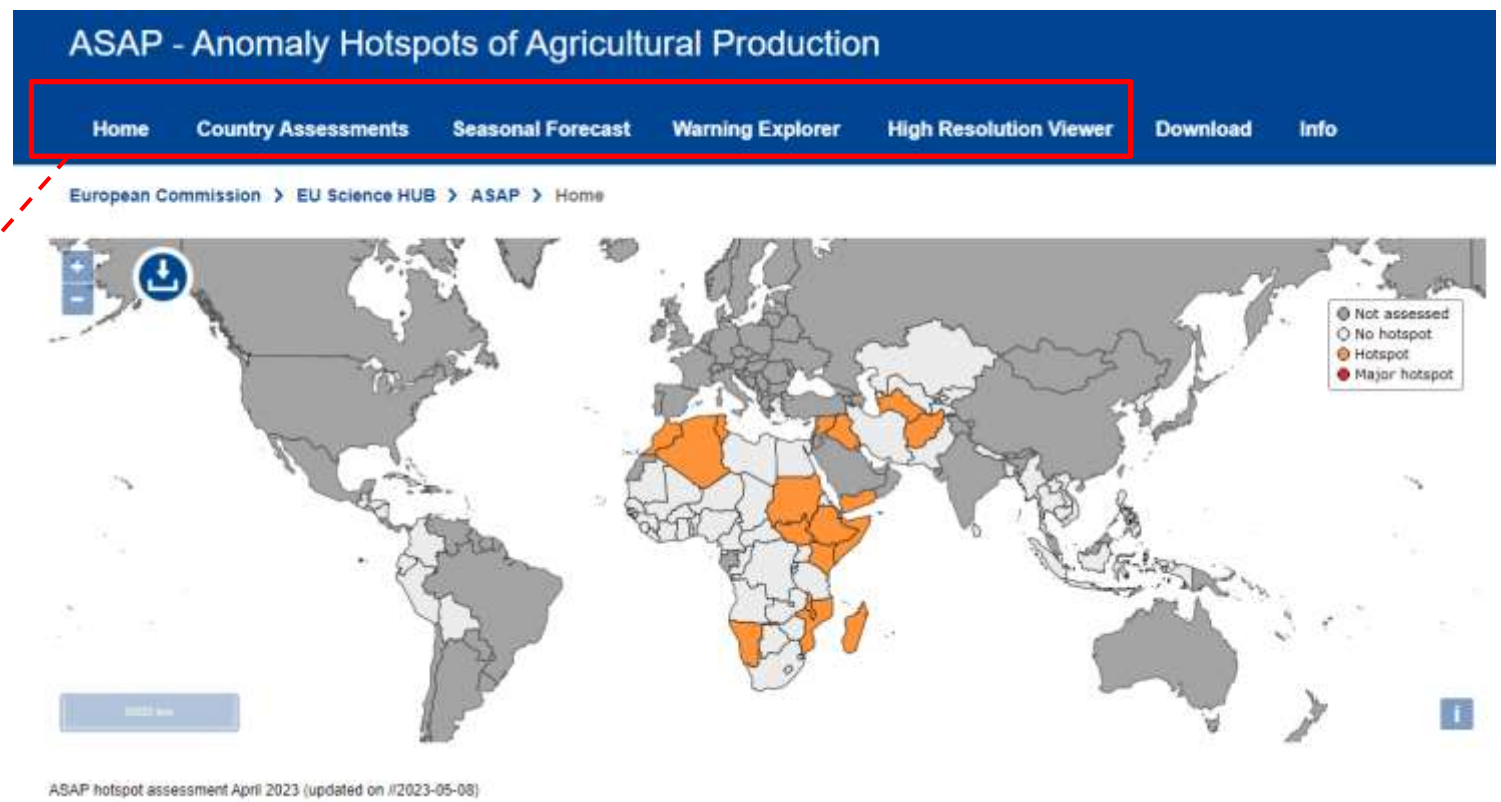
2.) Warning explorer



3.) High Resolution viewer



ASAP information



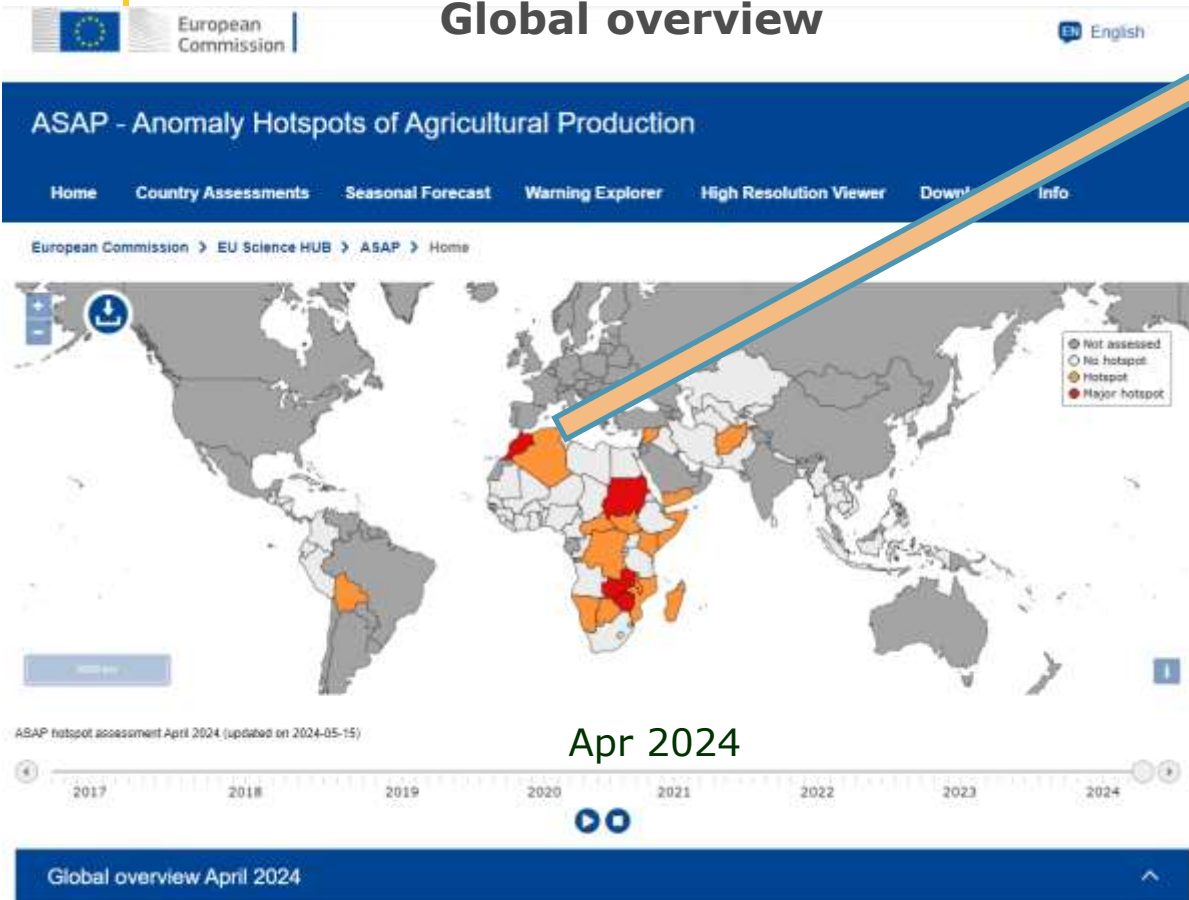
3 main “platforms” or information levels

Information level	Information provided	Targeted audience
Country assessment	Monthly summary for 81 countries	Decision makers, policy analysts
Region level with Warning Explorer	Explore meteo & RS (low resolution) indicators & automatic warnings at region level every 10 days	Agricultural analysts
Field level with High Resolution Viewer	Explore field level with 10m Sentinel imagery	Agricultural analysts with RS knowledge

+ Seasonal forecast of rainfall (monthly timestep for next 6 months)

Info level 1: Hotspot analysis

Global overview



Apr 2024

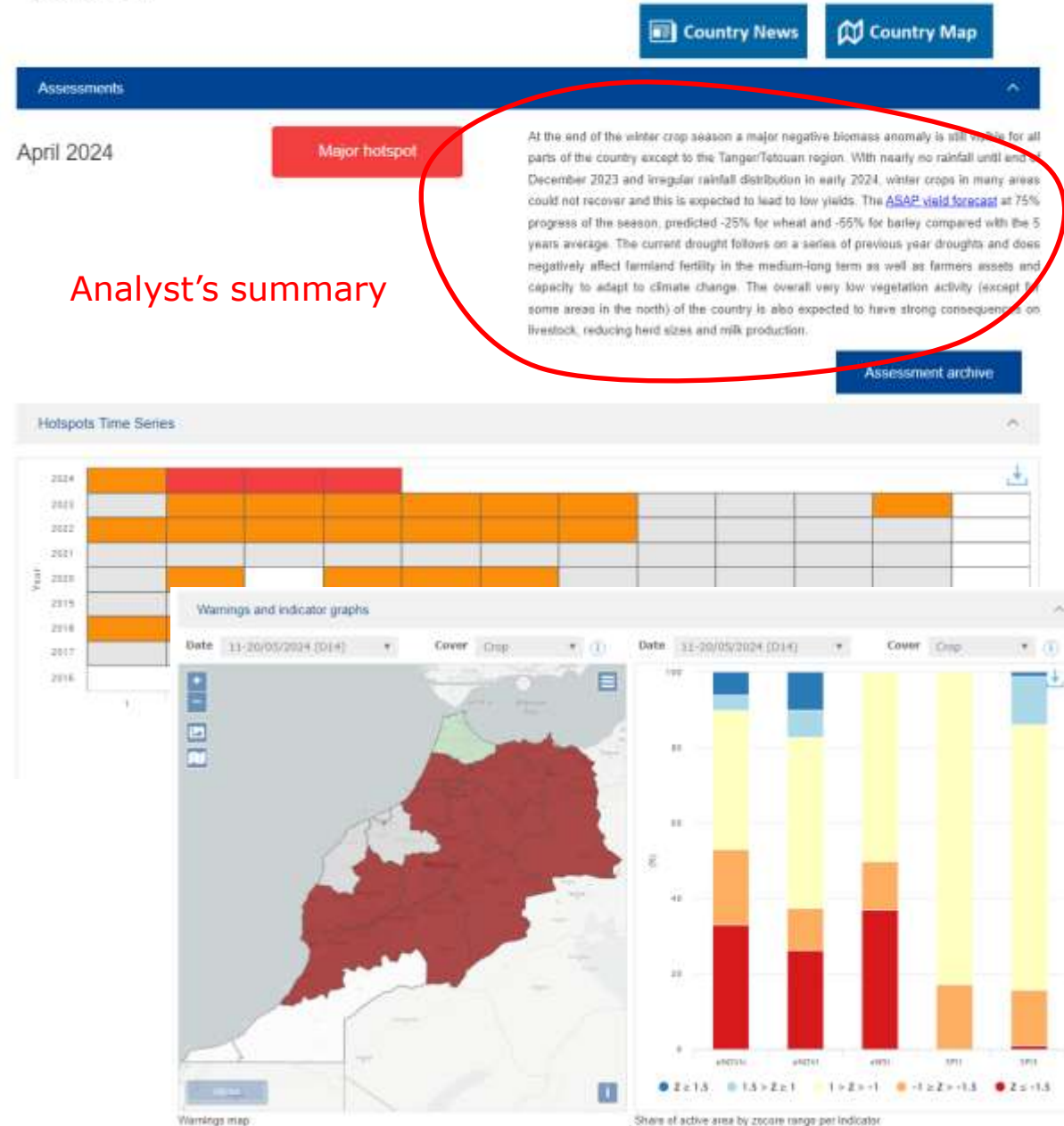
Country level monitoring

Every month based on expert analysis for 81 countries

Mainly for decision makers, policy analysts...

Country assessments

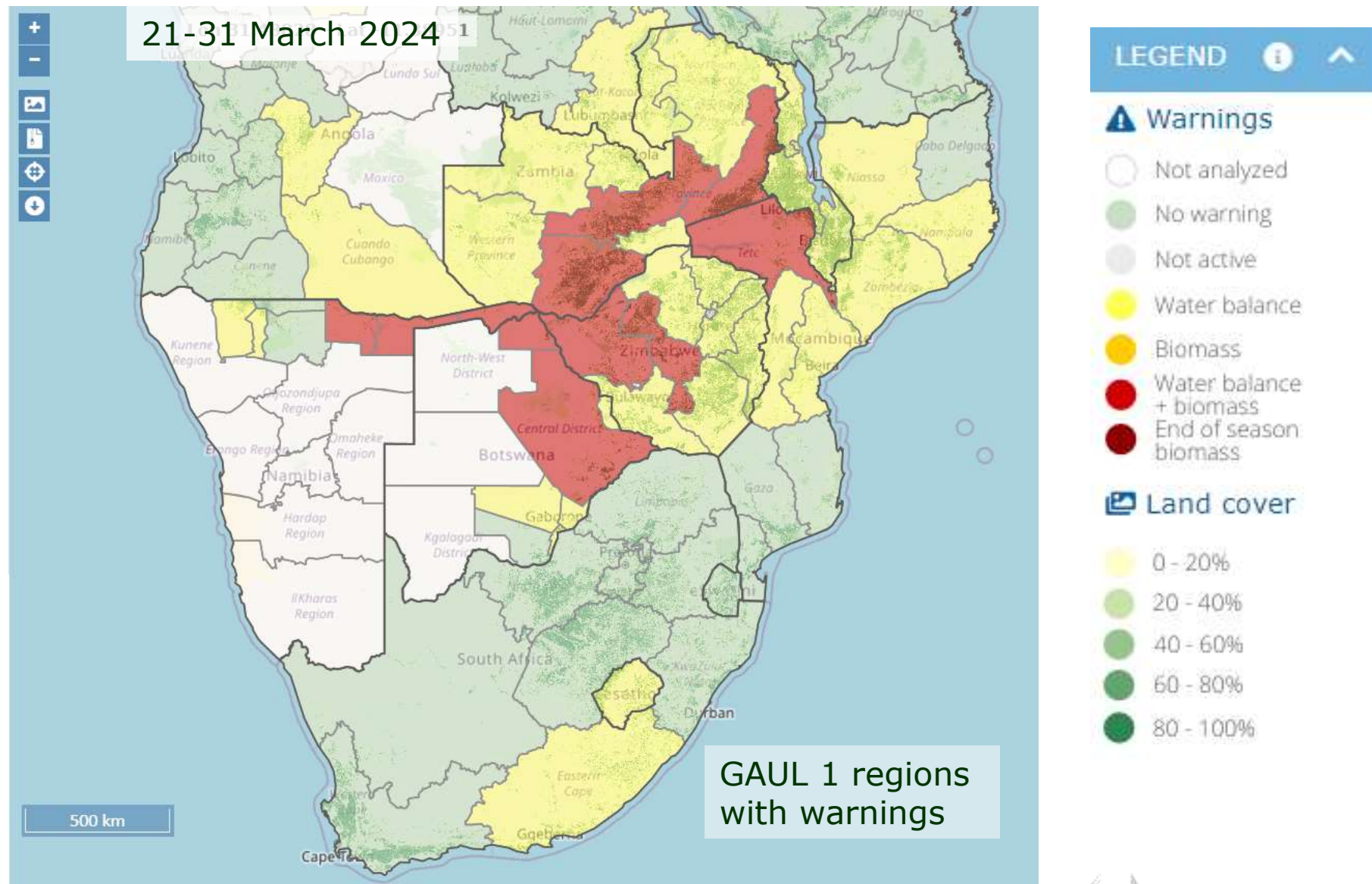
Morocco



Info level 2: Warning Explorer

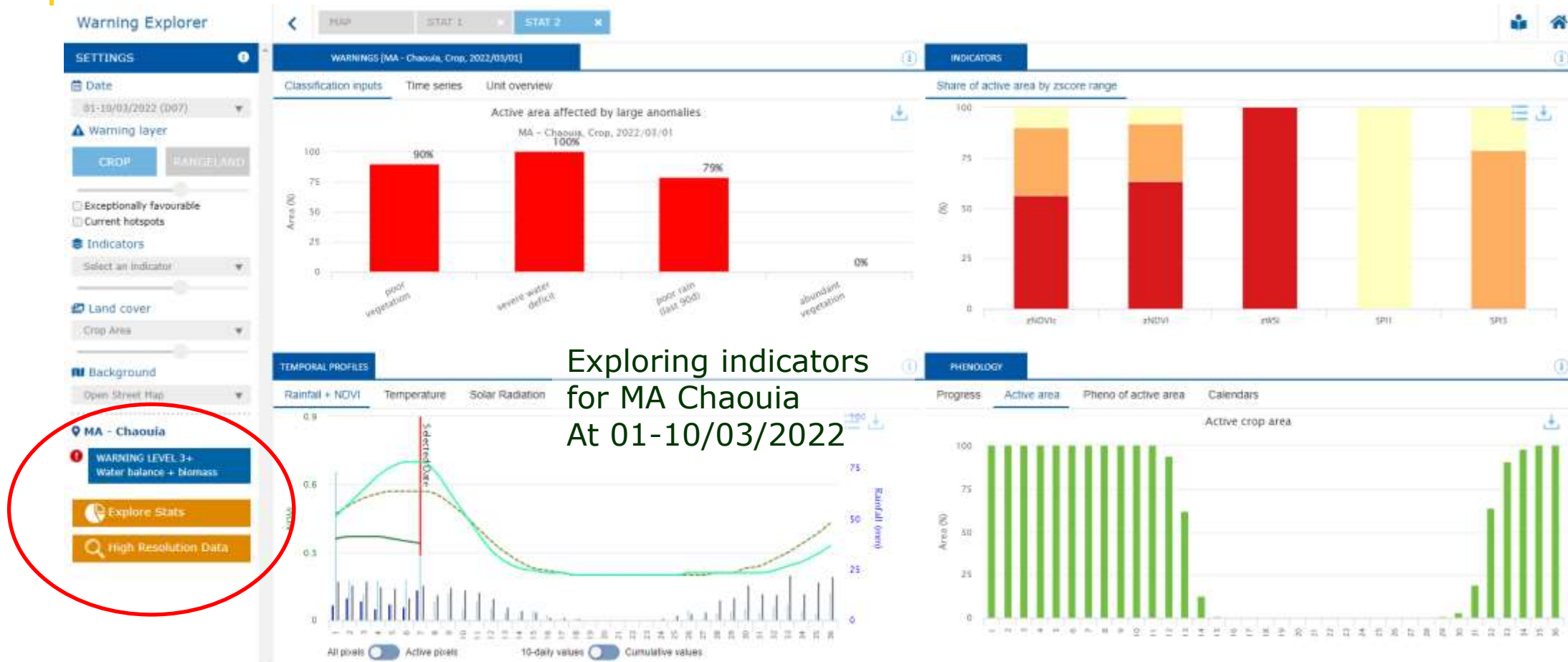
Explore meteo & biomass indicators (@ 1 km to 0.25 deg) at **province level** (cropland / rangeland); analyze automatic warnings assigned by system to decide if country should be classified as hotspot

Indicators & warnings generated automatically every 10 days at province level (not crop specific, mean phenology)
Mainly for agriculture analysts



Info level 2: Warning Explorer

Explore meteo & biomass indicators (@ 1 km to 0.25 deg) at province level; analyze automatic warnings e.g. to decide if country should be classified as hotspot

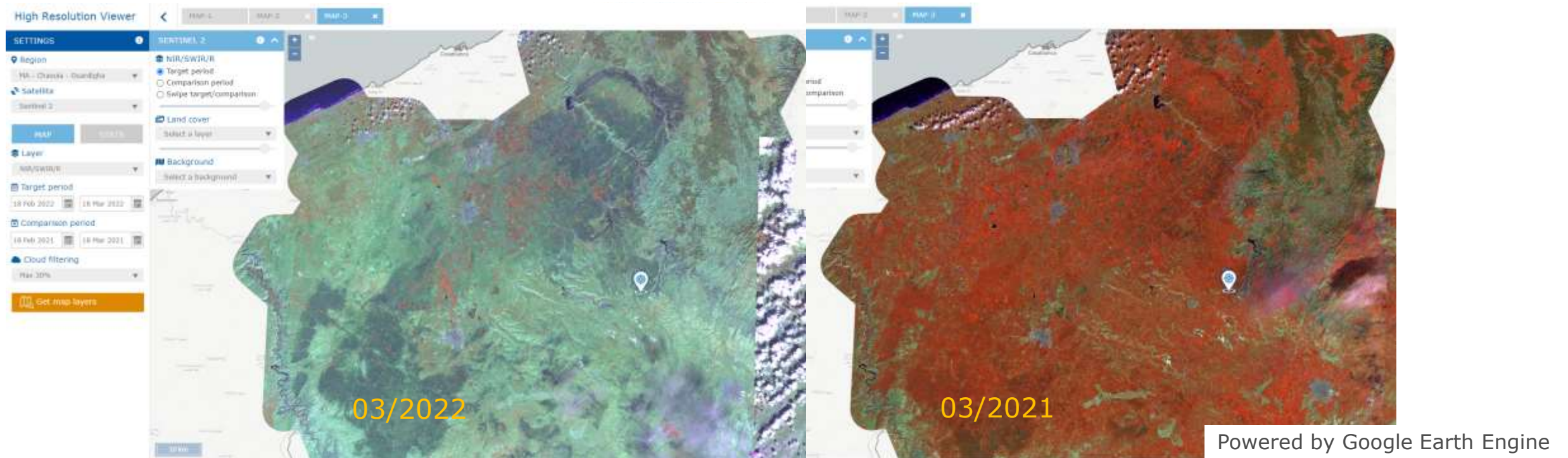


Exploring indicators for MA Chaouia At 01-10/03/2022

Indicators & warnings generated automatically every 10 days at province level
Mainly for agriculture analysts

Info level 3: High Resolution Viewer

Tool to zoom at field level (10 m resolution) anywhere on the globe to compare 2 dates
Allows detecting poor biomass, flooding, burning, clearing, snow presence etc...



Field level monitoring (crop specific) with global coverage

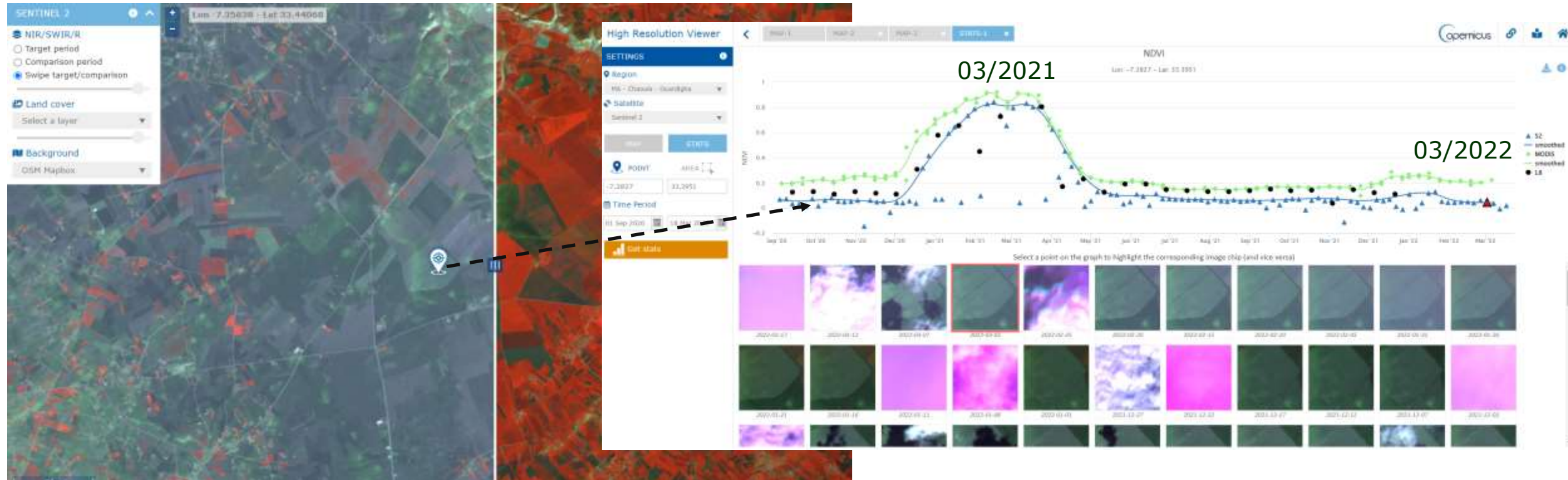
New image every 5 days (for S2), 8 days (L8-L9), 12 days (S1)

Mainly for agriculture analysts with basic remote sensing knowledge

Info level 3: High Resolution Viewer

Select a point and obtain its S2, L8 & MODIS NDVI profile + small image chips

Can also compare S2 NDVI distributions on an area at 2 dates



Field level monitoring for any point on Earth

With revisit frequency of 5 days (S2), 8 days (L8) to 12 days (S1)

Mainly agriculture analysts with basic remote sensing knowledge

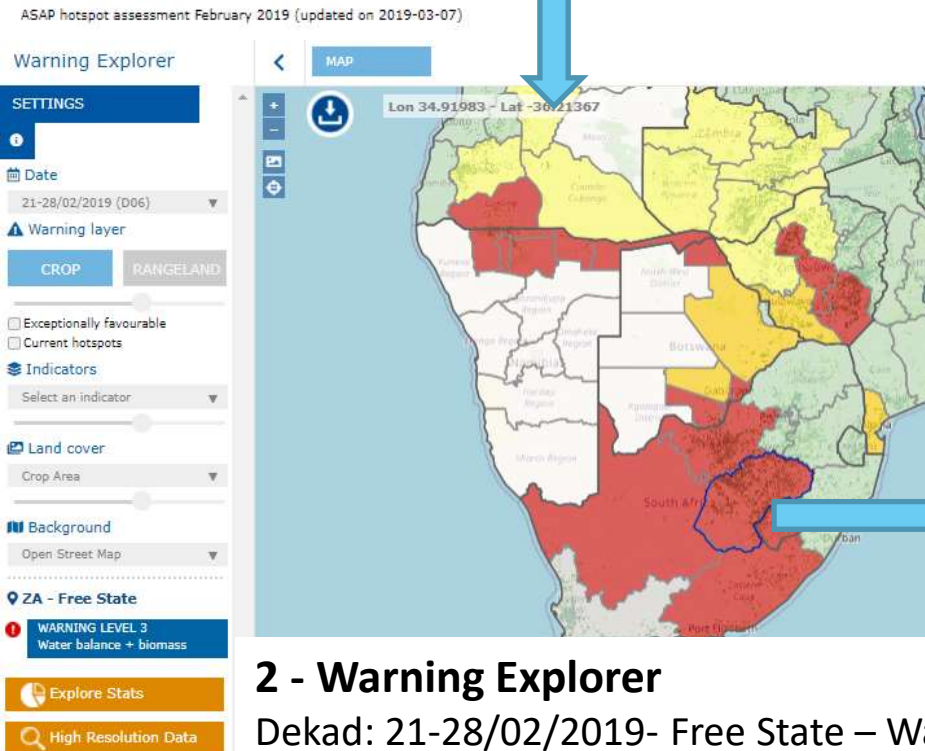
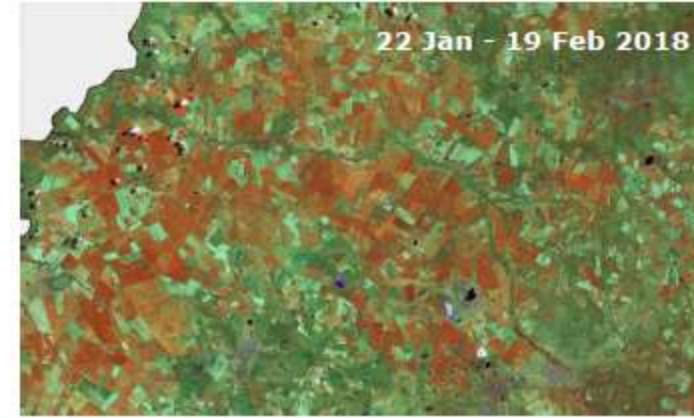
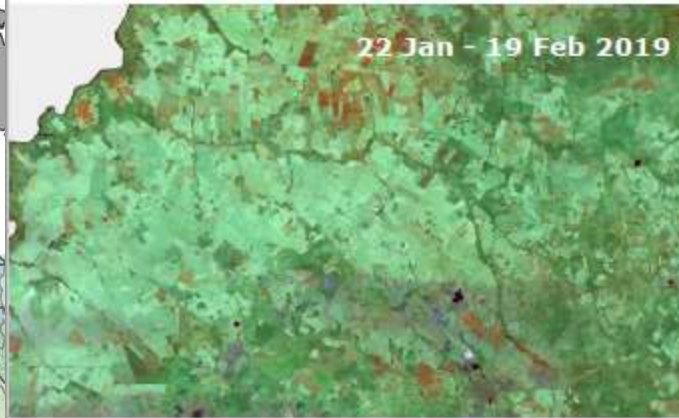
Drought monitoring at multiple scales – South Africa 02/2019



1 - National level hotspot

South Africa classified as hotspot - Feb 2019 assessment

3 - High resolution viewer – Free State

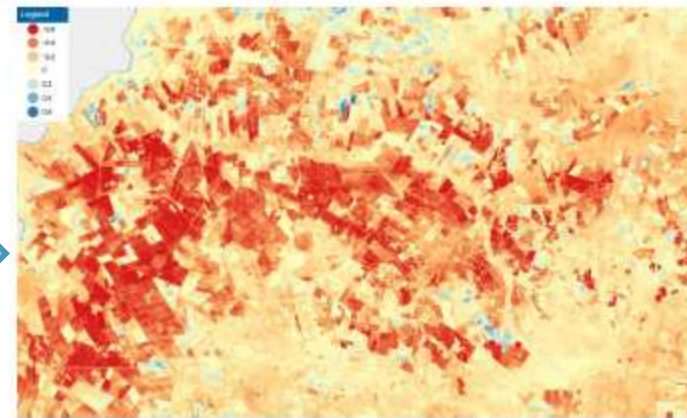


2 - Warning Explorer

Dekad: 21-28/02/2019- Free State – Warning 3

Water balance and biomass deficit identified on >25% of active cropland area

NDVI Difference

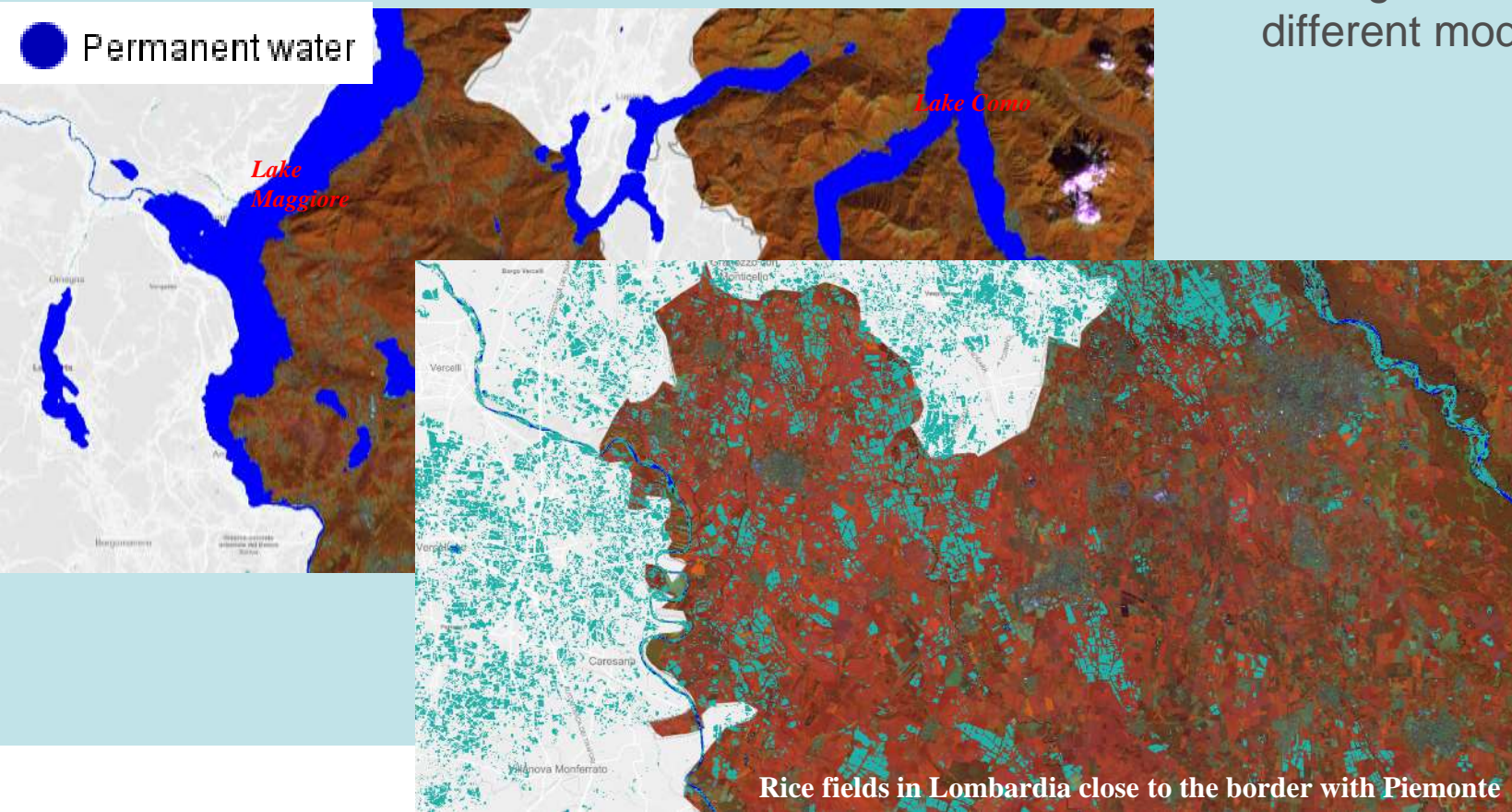


Strong negative NDVI anomalies in 2019. Crop failure and decrease in planted area

Extra info: surface water, Seasonal rainfall forecast

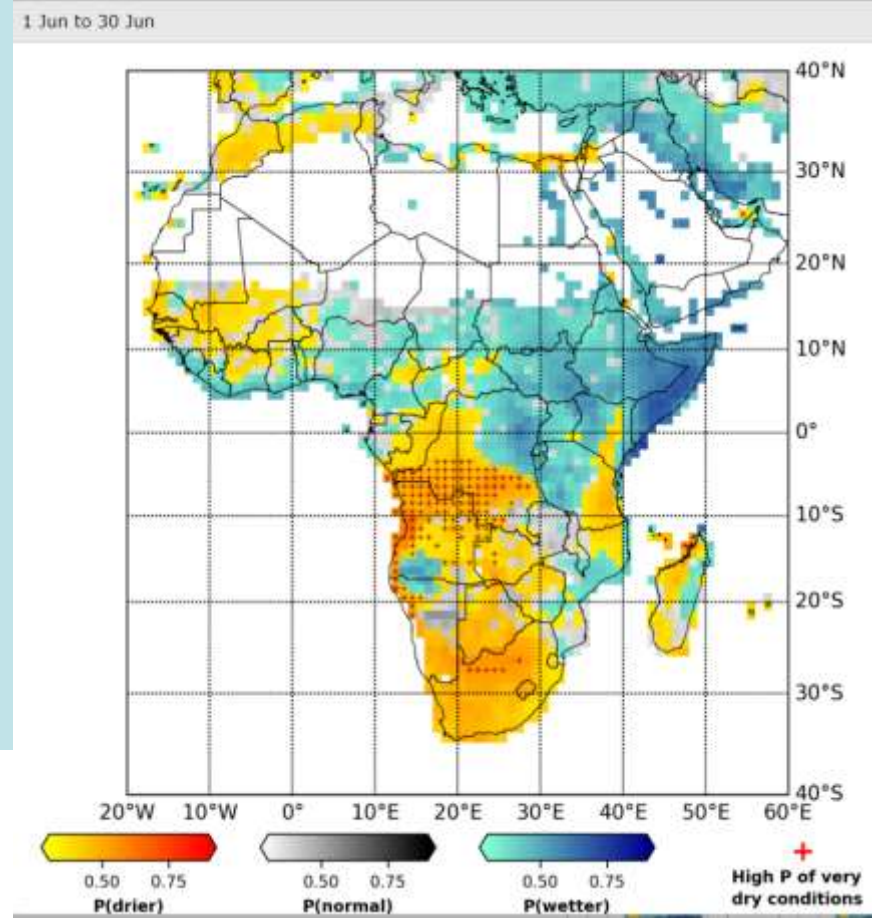
- Temporary water occurrence >50%
- Permanent water

The frequency with which water returns from years to year expressed as a percentage: 0 – 100%.



Rice fields in Lombardia close to the border with Piemonte

Seasonal rainfall forecast from Copernicus Climate Change Service (C3S) for the next 6 months from different models (with skill to compare forecast with climatology)



Other layers: cropland & rangeland masks, Bing aerial

ASAP adaptations to Regional Centres

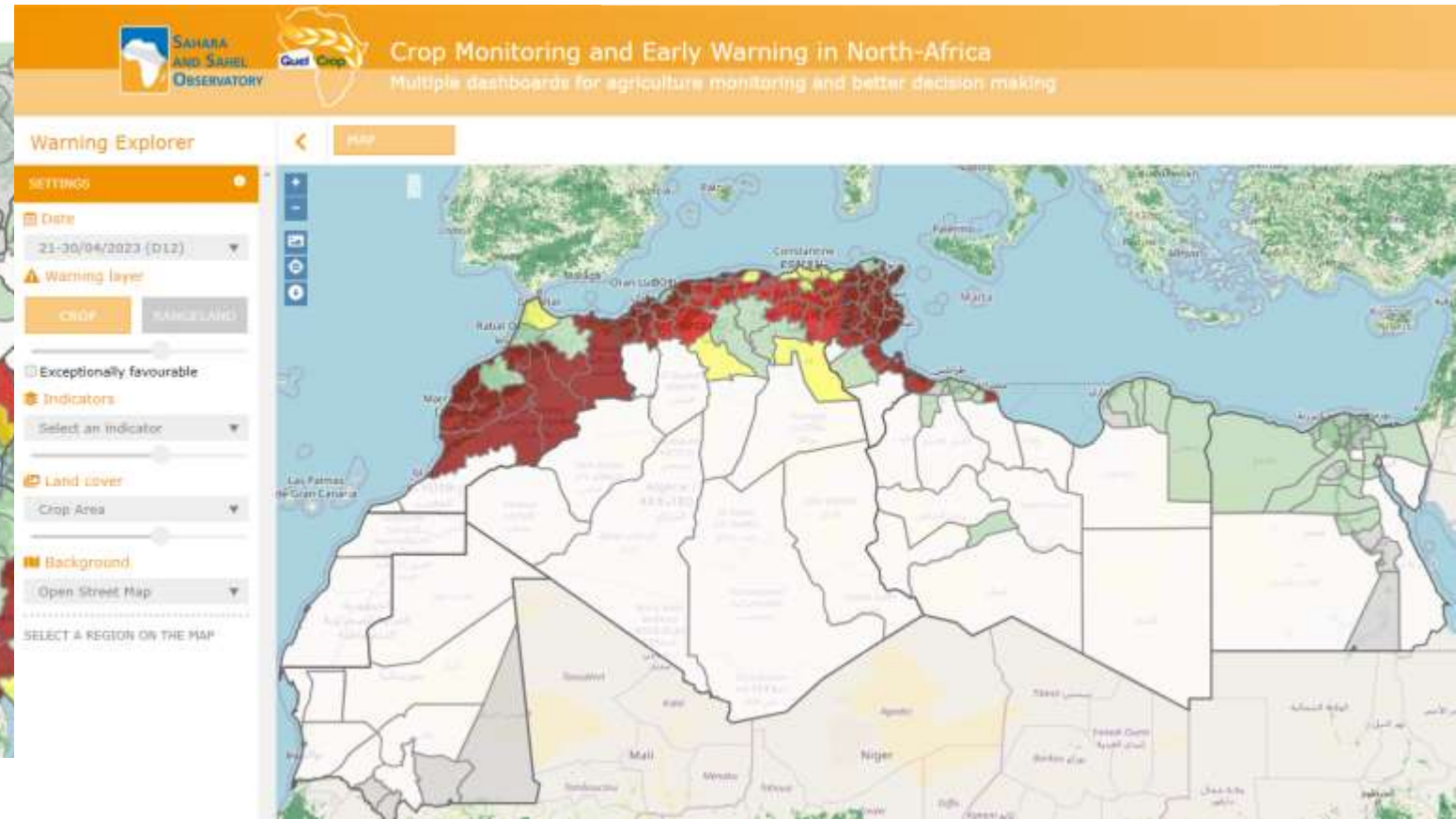
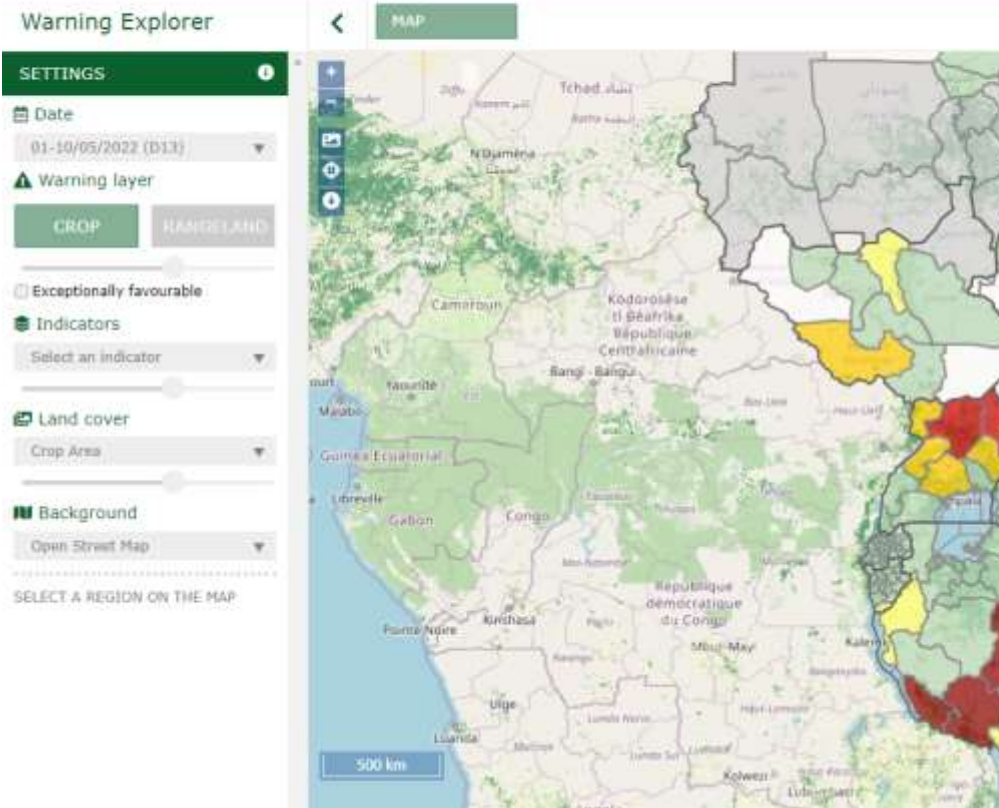
ICPAC, March 2021

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

<https://eahazardswatch.icpac.net/map/ea/>

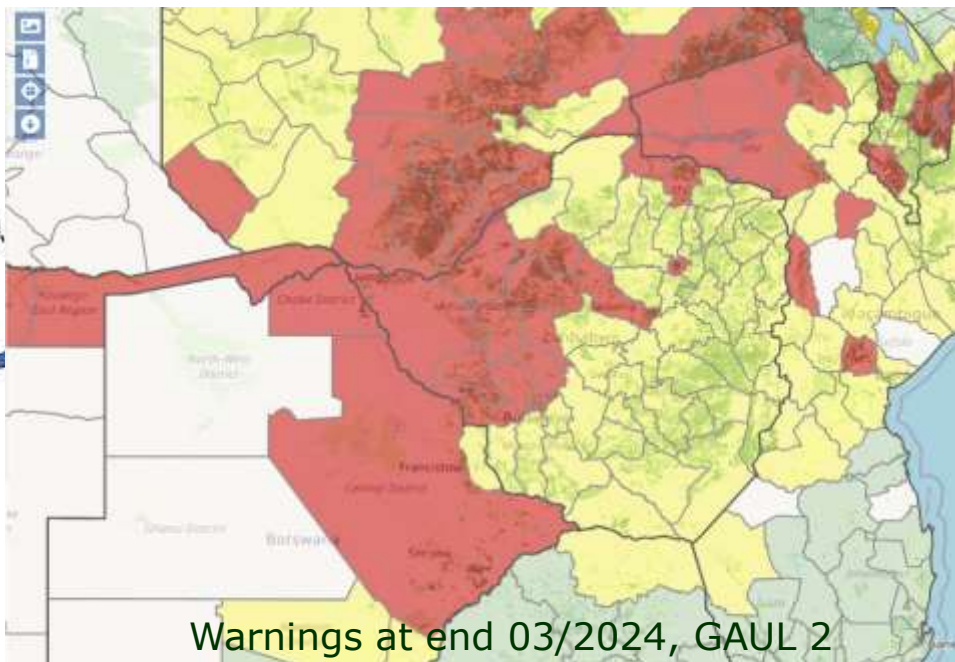
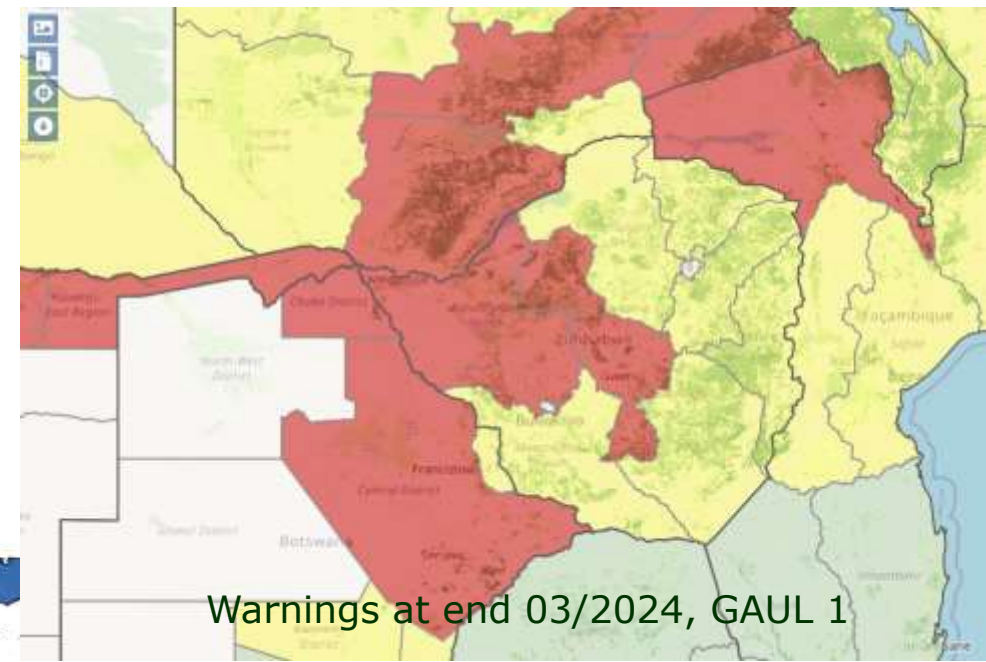
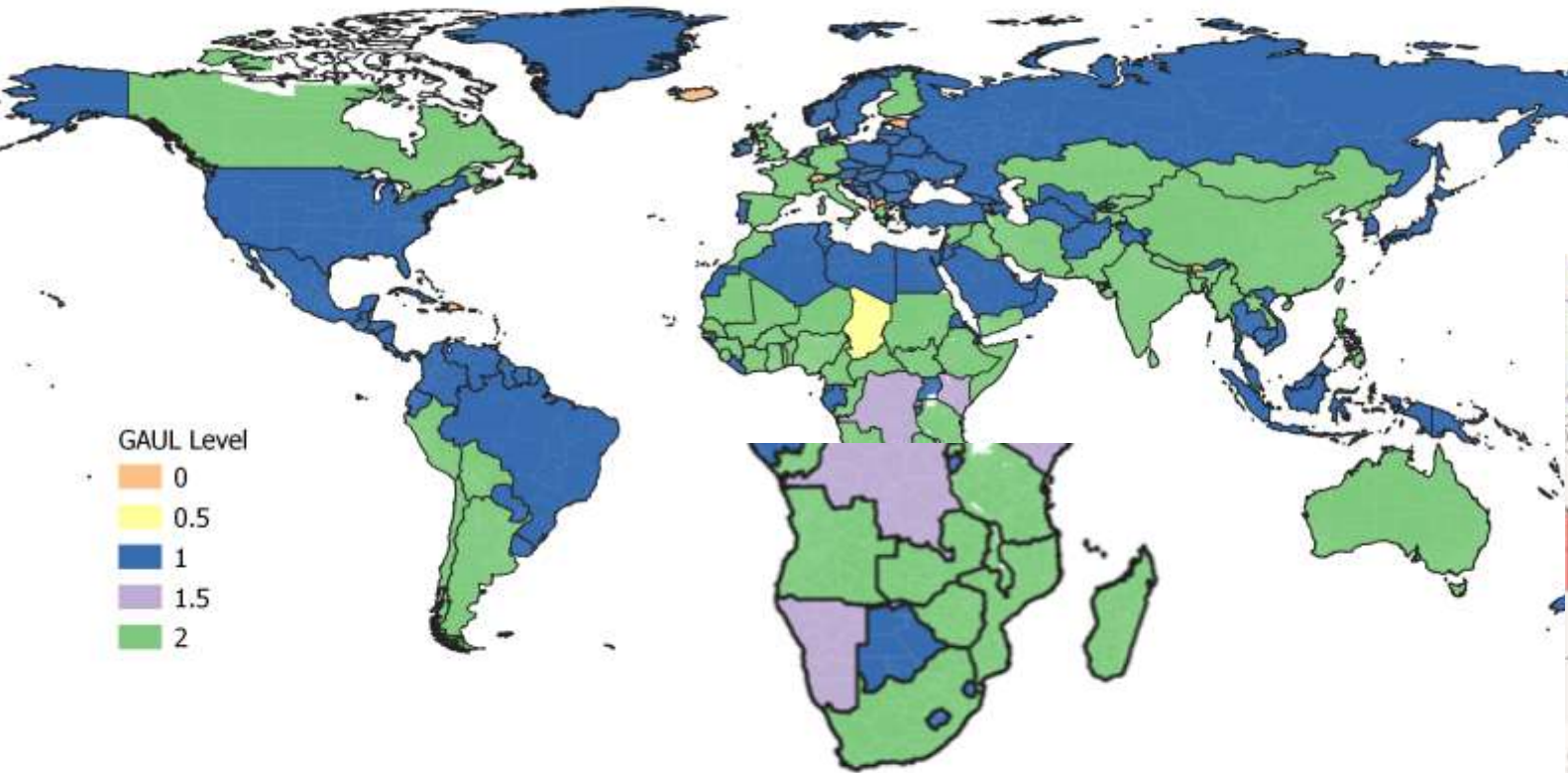
OSS Guetcrop, April 2022

<http://guetcrop.oss-online.org/>



ASAP at GAUL 2 level

ASAP warnings (and indicators) are available at sub-national level (GAUL 2) currently for 62 countries (to support the Integrated Food Security Phase Classification (IPC) analysis)



Take home message

- Global, free and online access
- Easy access to EO data (in particular S2, S1, Landsat data) on the cloud
- Need crop analyst to check automatic warnings
- Limited adaptations for regional centres (ICPAC, OSS...)
- New functionalities depending on results of ongoing research projects e.g. collaboration with University of Valencia on yield forecasting at country level with Machine Learning

Feedback and suggestions welcome

Examples of analysis with ASAP

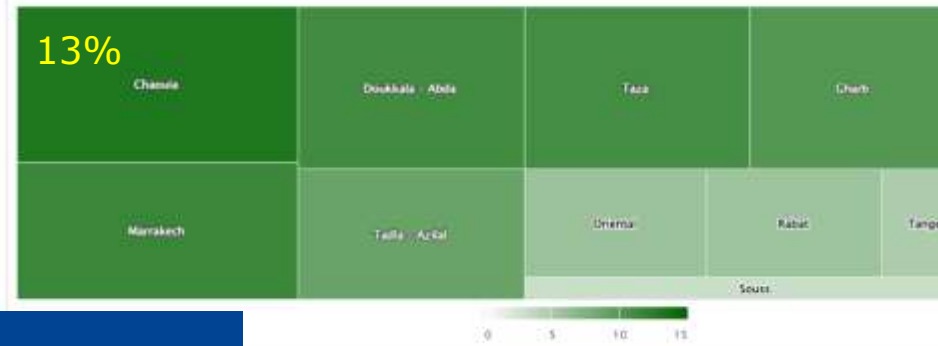
- Morocco 2022 & 2024 droughts (Chaouia 03/2022 vs 03/2021: <https://mars.jrc.ec.europa.eu/asap/s/d897dff7>)
- Tunisia 2023 drought (Siliaana 04/2023 vs 04/2022: <https://mars.jrc.ec.europa.eu/asap/s/09bae31e>)
- Pakistan floods 2022 (Sindh end 08/2022 vs 08/2021 <https://mars.jrc.ec.europa.eu/asap/s/8acf2ae7> & end 09/2022 <https://mars.jrc.ec.europa.eu/asap/s/6eca661a>)
- Mozambique flood caused by Idai storm, March 2019 (<https://mars.jrc.ec.europa.eu/asap/s/63edae1d>)
- Some limitations with ASAP

Use of ASAP indicators

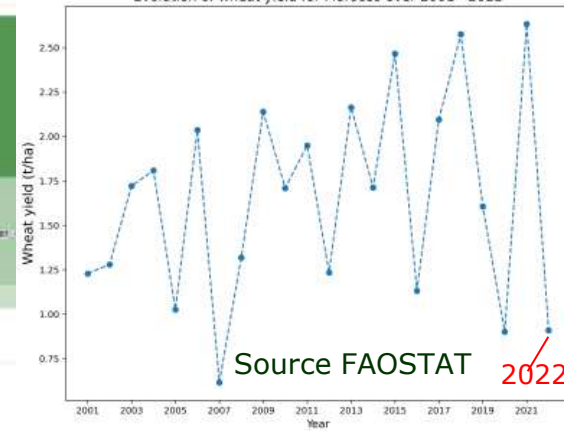
Download indicators (see **Download** tab) at Gaul 1 level to compare the current season with the previous ones (since 1991 or 2002)

Country assessment page: identify main producing regions

Share of national cereal production by subnational units



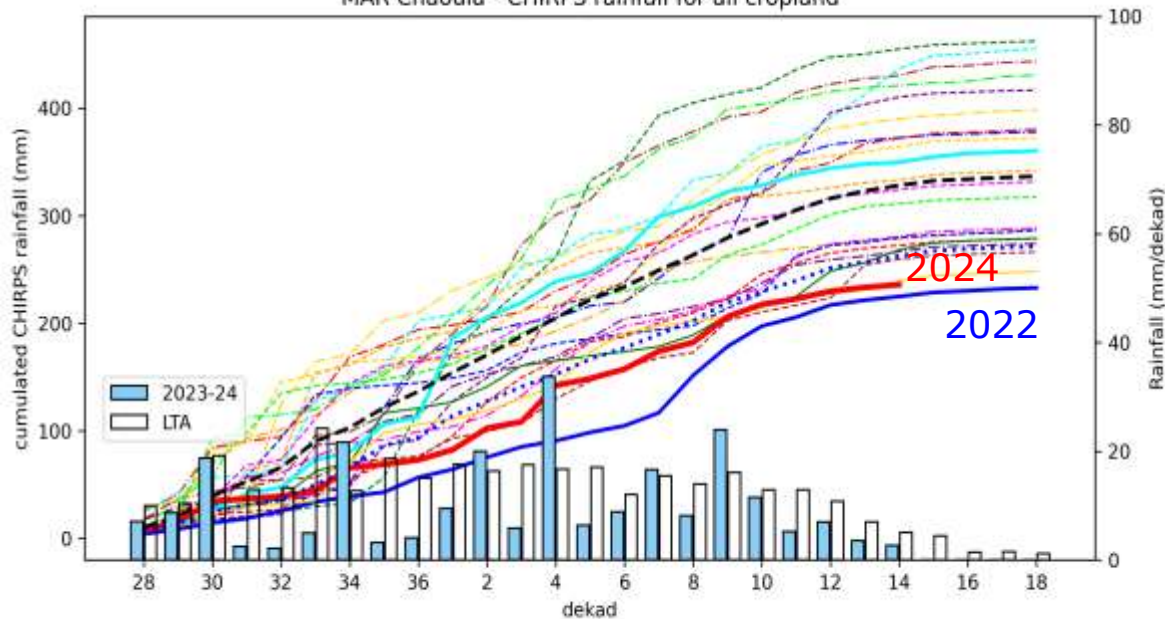
Evolution of wheat yield for Morocco over 2001 - 2022



ASAP - Anomaly Hotspots of Agricultural Production

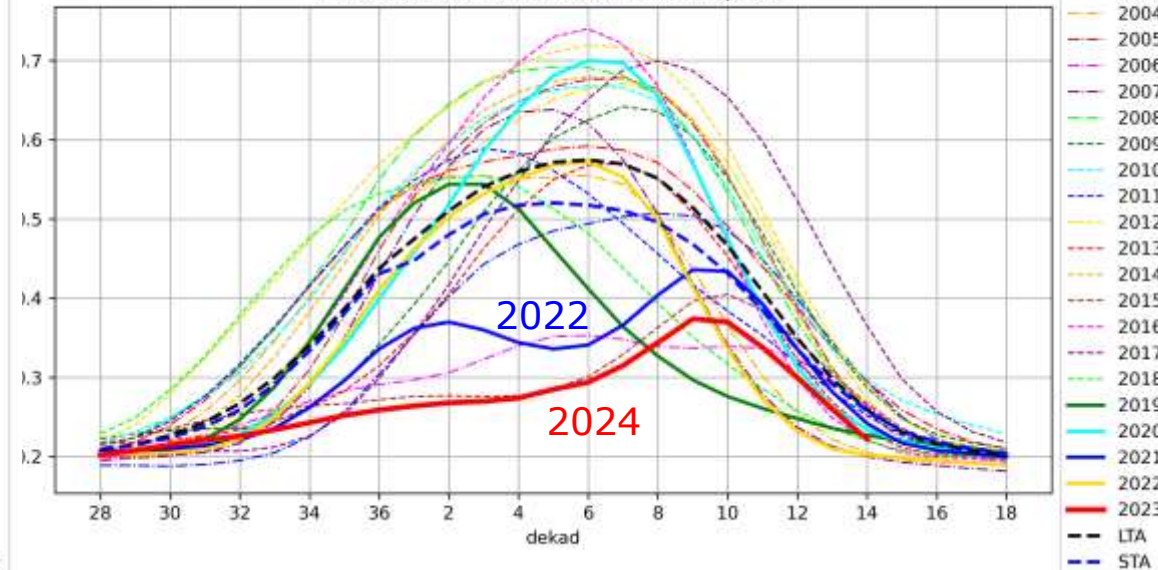
Home Country Assessments Seasonal Forecast Warning Explorer High Resolution Viewer **Download** Info

MAR Chaouia - CHIRPS rainfall for all cropland

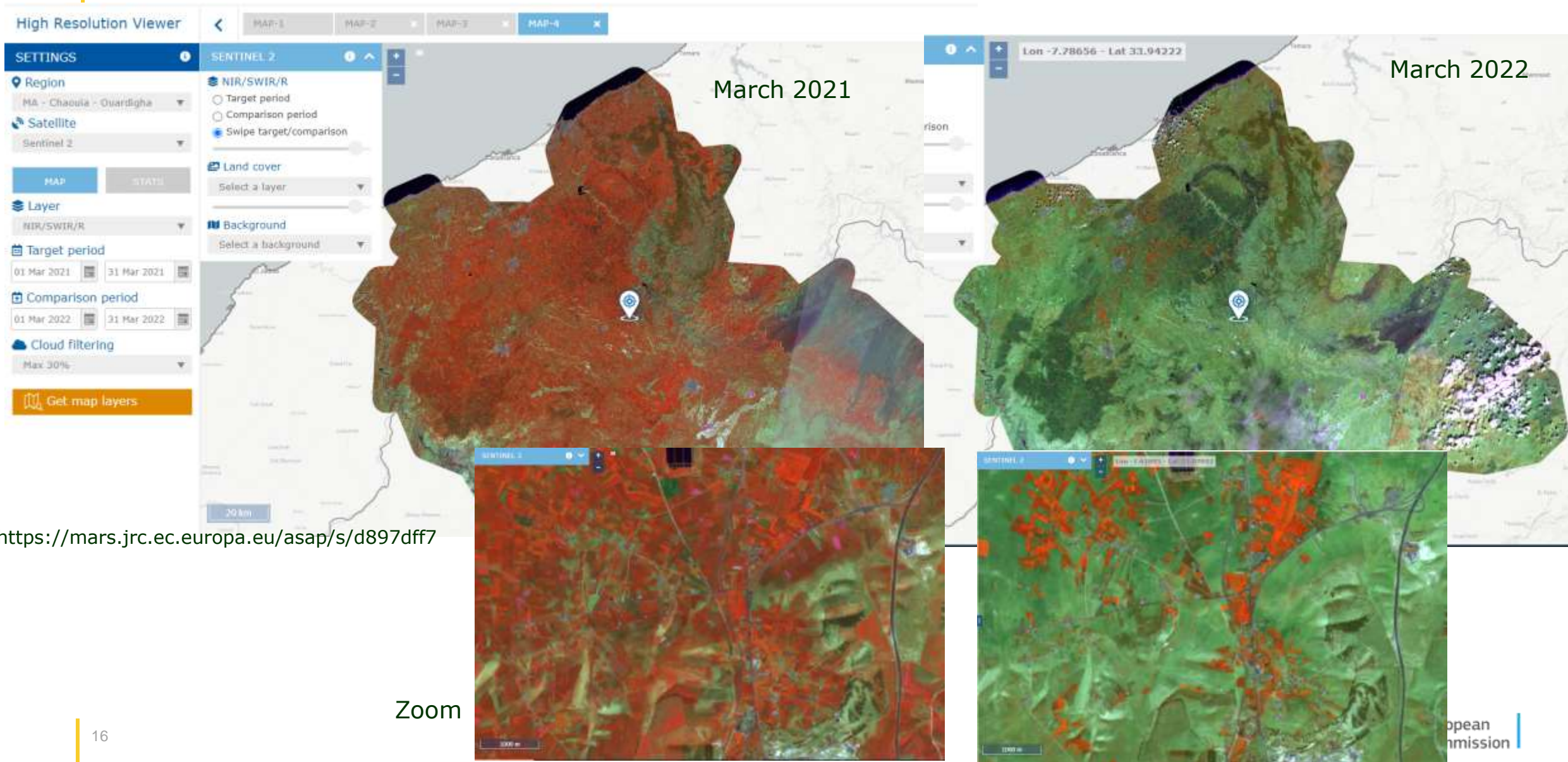


- Cumulated rainfall
- 2001-2002
- 2002-2003
- 2003-2004
- 2004-2005
- 2005-2006
- 2006-2007
- 2007-2008
- 2008-2009
- 2009-2010
- 2010-2011
- 2011-2012
- 2012-2013
- 2013-2014
- 2014-2015
- 2015-2016
- 2016-2017
- 2017-2018
- 2018-2019
- 2019-2020
- 2020-2021
- 2021-2022
- 2022-2023
- 2023-2024
- LTA 00/01-22/23
- STA 18/19-22/23

MAR Chaouia - MODIS NDVI for all cropland

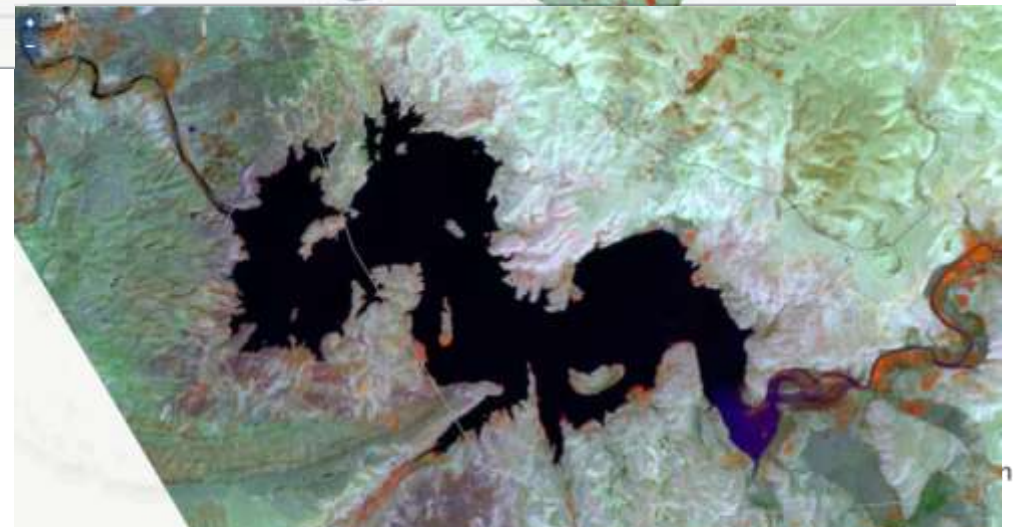
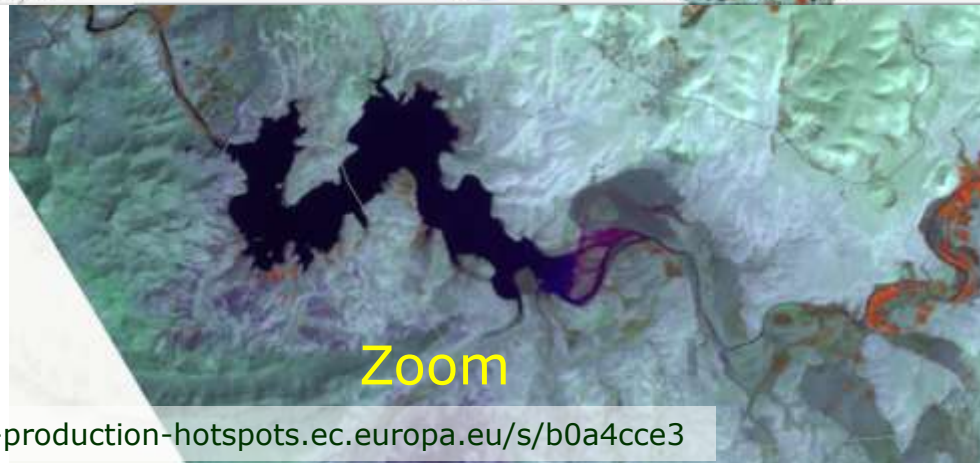
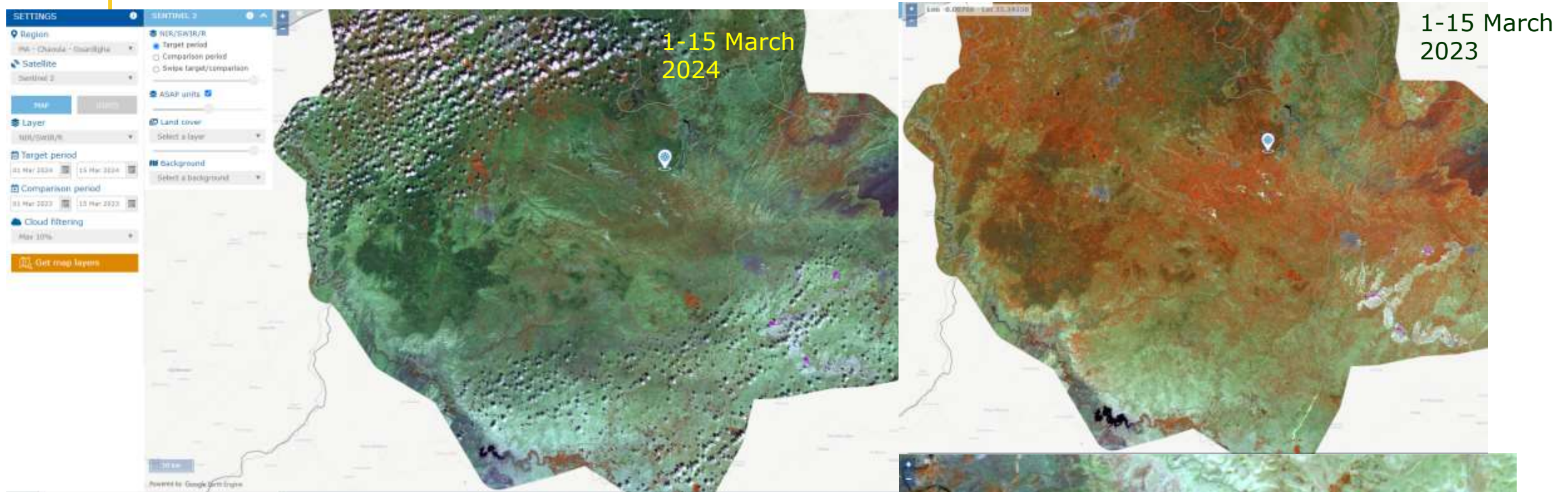


Confirmation by HR Viewer: Morocco Chaouia 03/2022 vs 03/2021

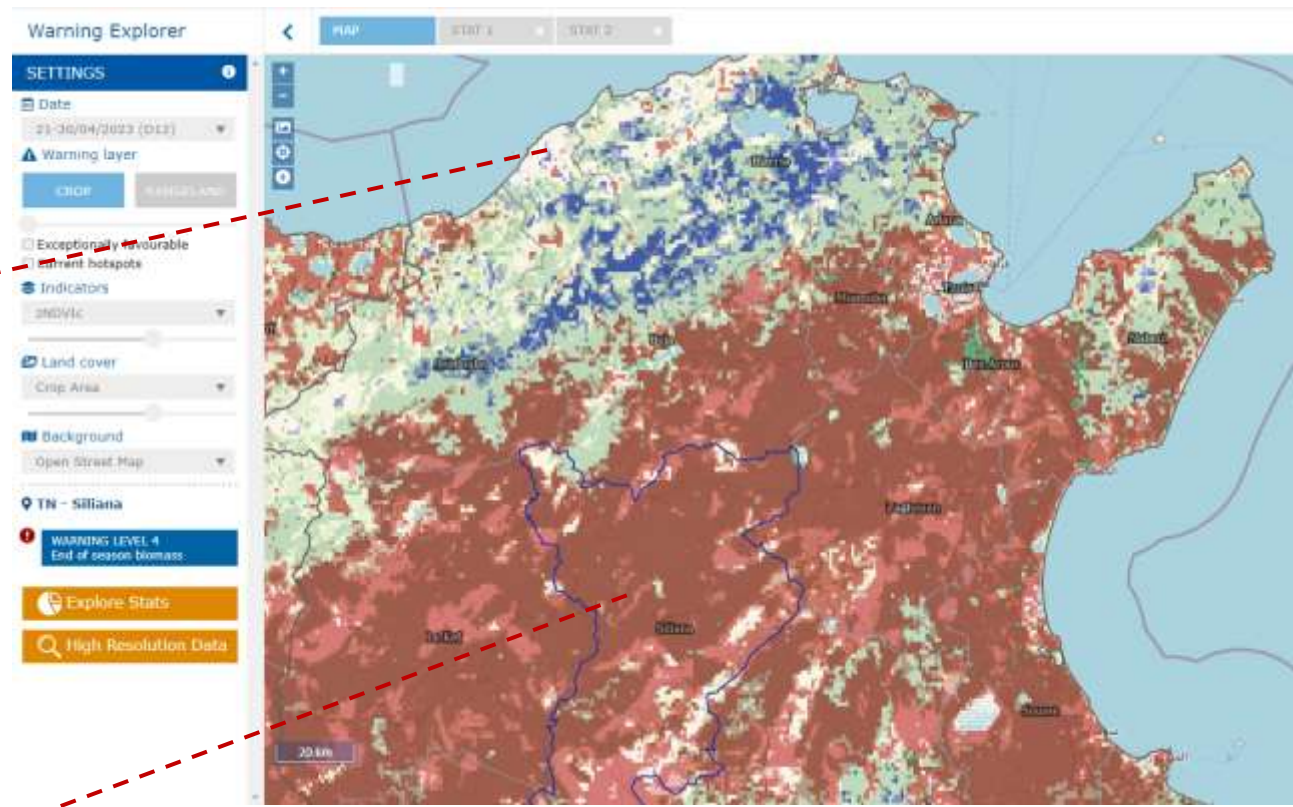


<https://mars.jrc.ec.europa.eu/asap/s/d897dff7>

Comparison Morocco Chaouia 03/2024 vs 03/2023

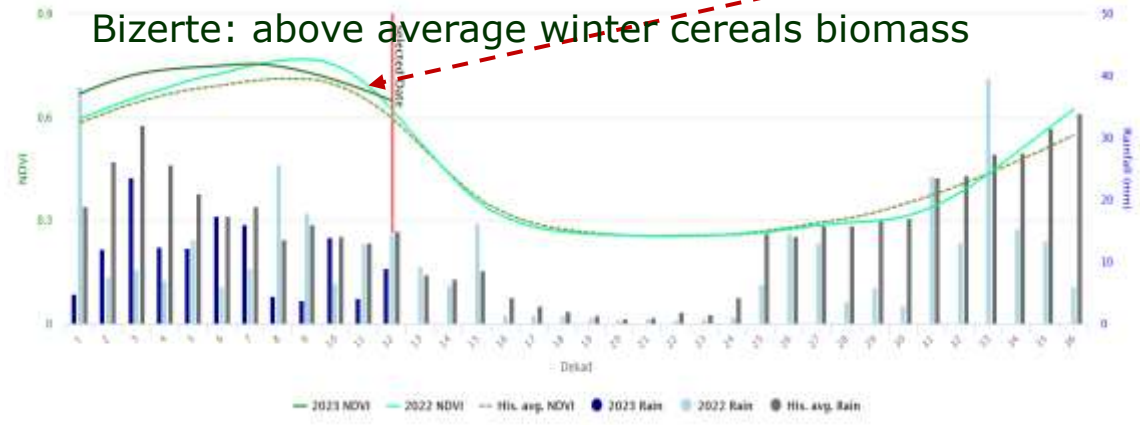


Tunisia 2023 with ASAP Warning Explorer



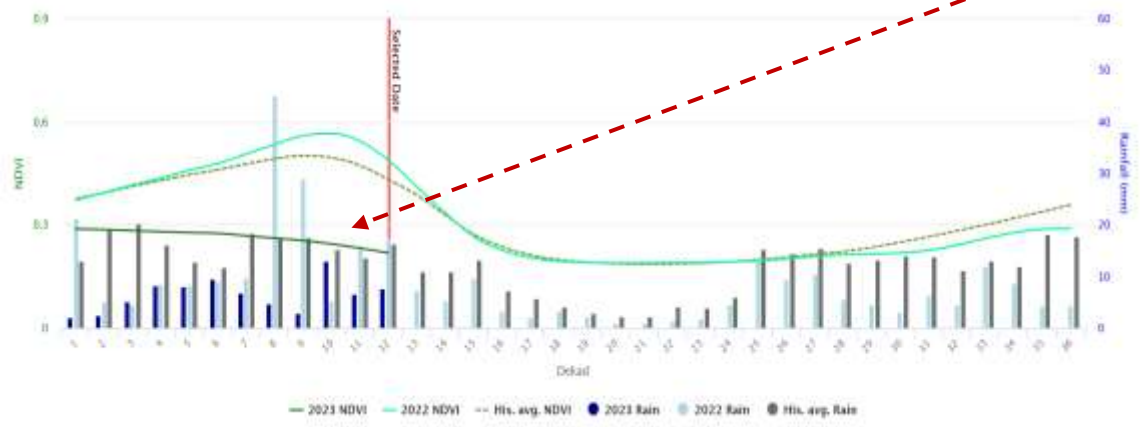
NDVI-Rainfall, all Crop, Tunisia-Bizerte, 2023-04-21

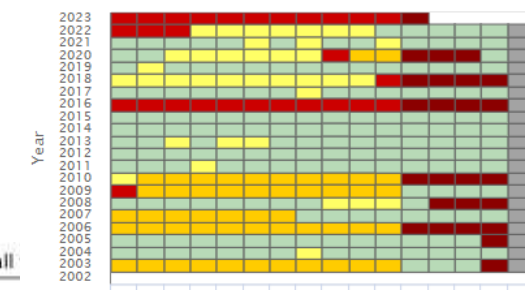
Bizerte: above average winter cereals biomass



NDVI-Rainfall, all Crop, Tunisia-Siliana, 2023-04-21

Siliana (and most governorates) poor winter cereals biomass

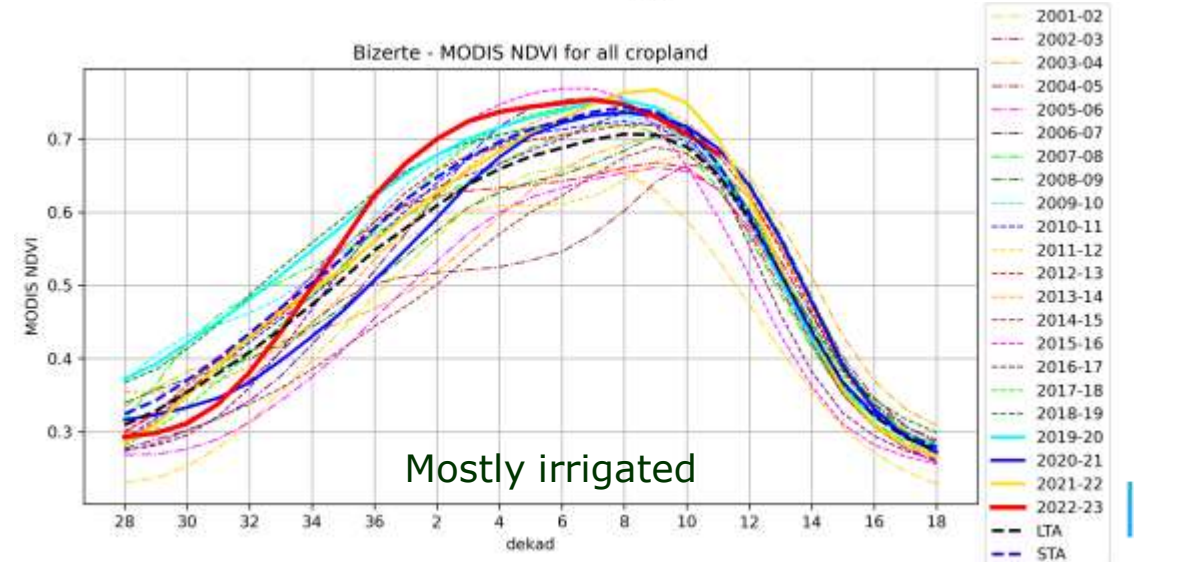
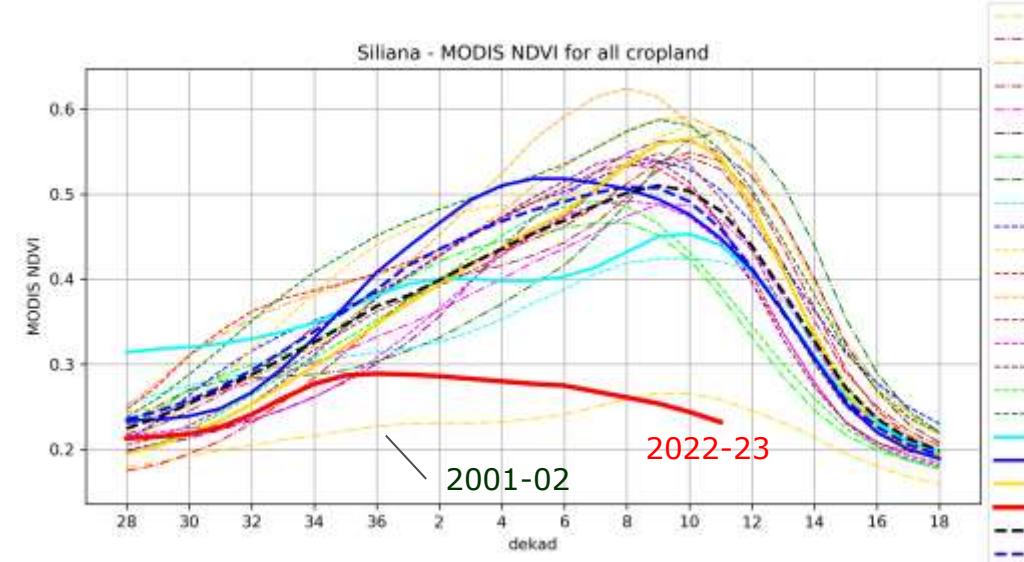
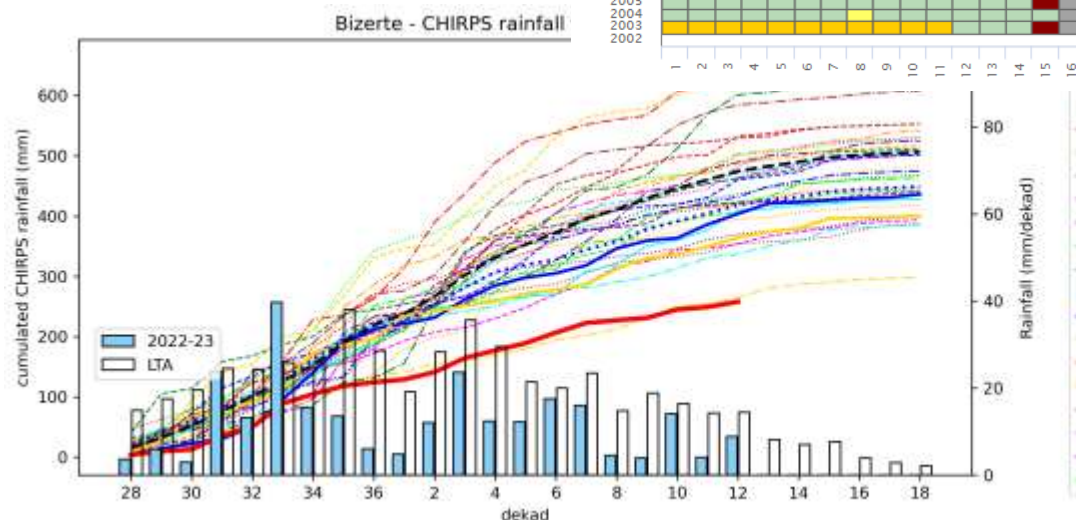
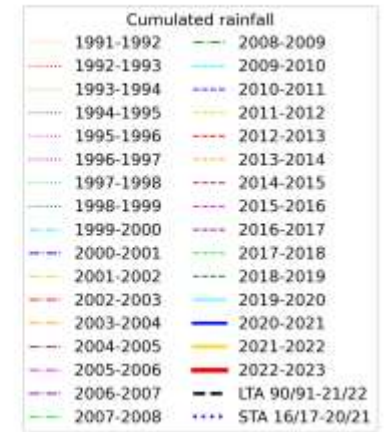
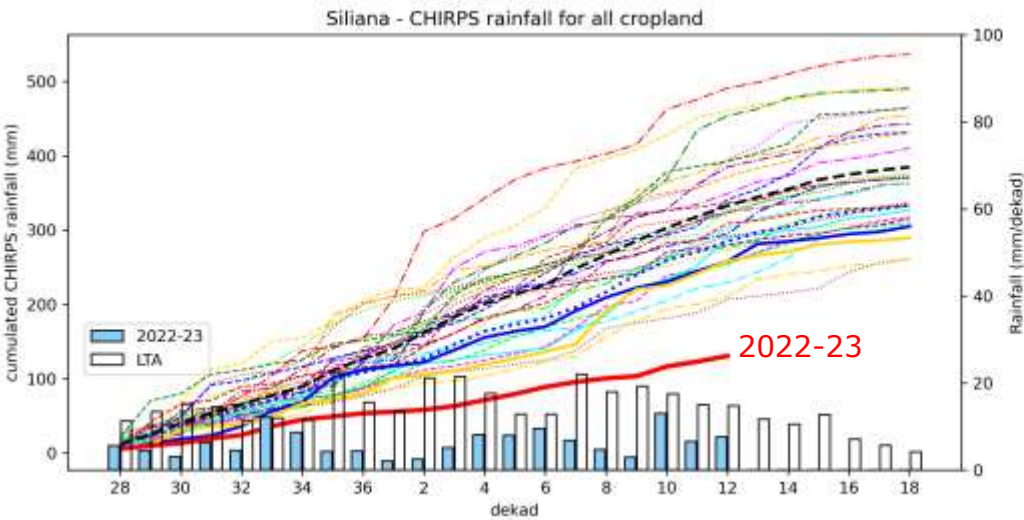




Tunisia 2023 with ASAP indicators downloaded

2023 driest [Oct-Apr] season since 1991-1992

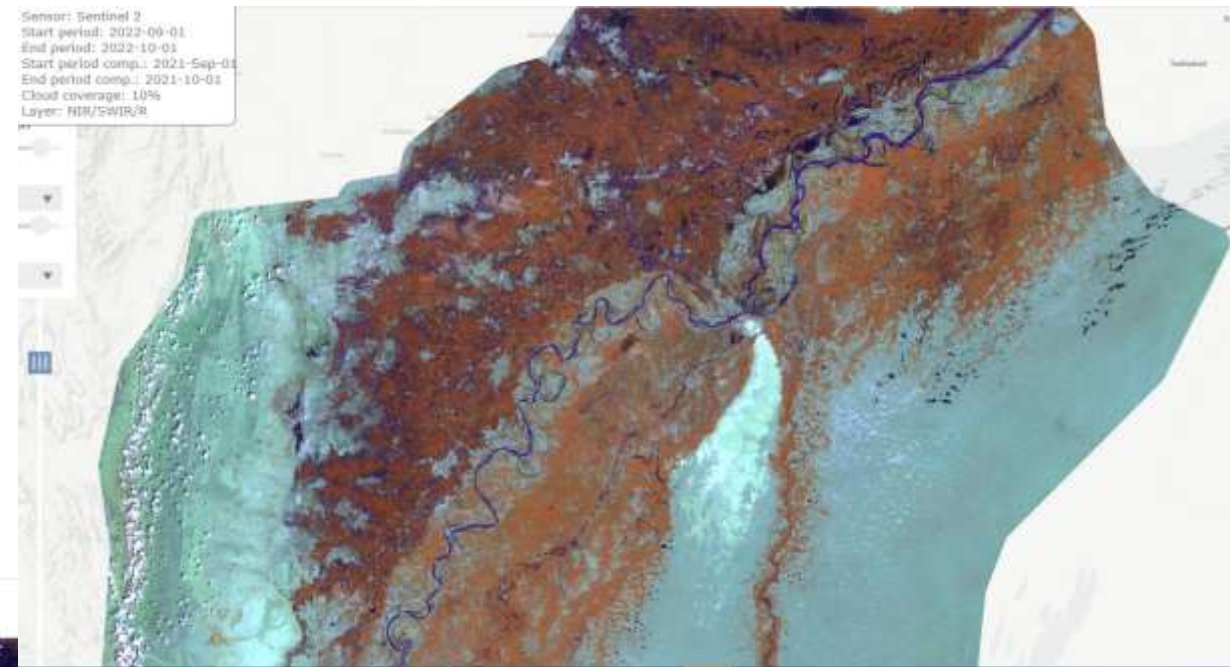
NB: Short Term Avg (STA) < Long Term Avg (LTA) season rainfall



Pakistan floods 2022

Sindh End August 2022 vs 2021
<https://mars.jrc.ec.europa.eu/asap/s/760bee82>

Sensor: Sentinel 2
Start period: 2022-08-01
End period: 2022-10-01
Start period comp.: 2021-08-01
End period comp.: 2021-10-01
Cloud coverage: 10%
Layer: NIR/SWIR/R



European Commission > EU Science HUB > ASAP > High Resolution Viewer

High Resolution Viewer

MAP-1 | MAP-2 | MAP-3

SETTINGS

Region: PK - Sindh

Satellite: Sentinel 2

MAP | STATS

Layer: NIR/SWIR/R

Target period: 15 Aug 2022 - 01 Sep 2022

Comparison period: 15 Aug 2021 - 01 Sep 2021

Cloud filtering: Max 10%

Get map layers

SENTINEL 2

NIR/SWIR/R

Target period

Comparison period

Swipe target/comparison

Land cover

Select a layer

Background

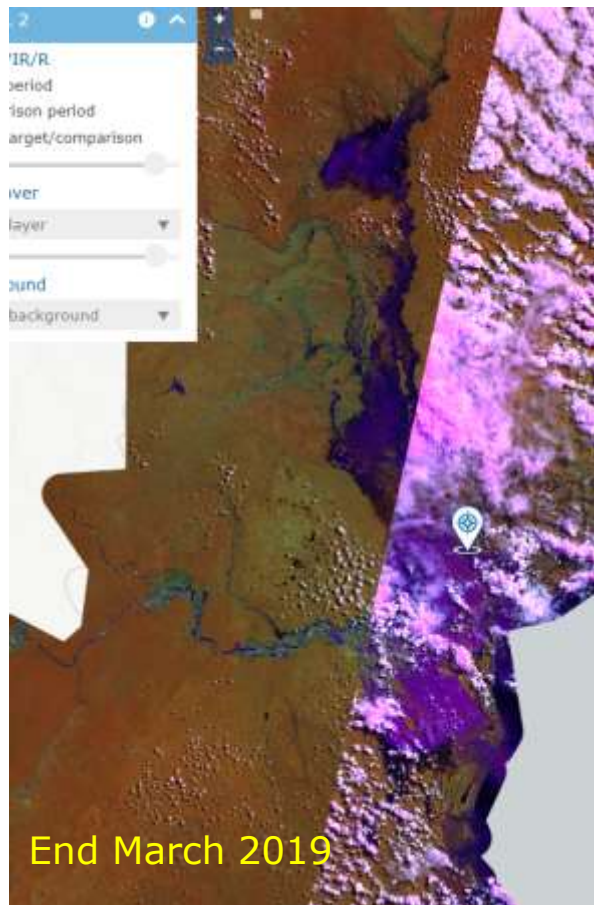
Select a background

30 km

Only very large floods, with water remaining for several days/weeks, can be easily detected

Mozambique – Flood caused by Idai tropical storm, end 03/2019

Interest of SAR S1 data when floods occur during the rainy season



SETTINGS

Region: MZ - Sofala

Satellite: Sentinel 1

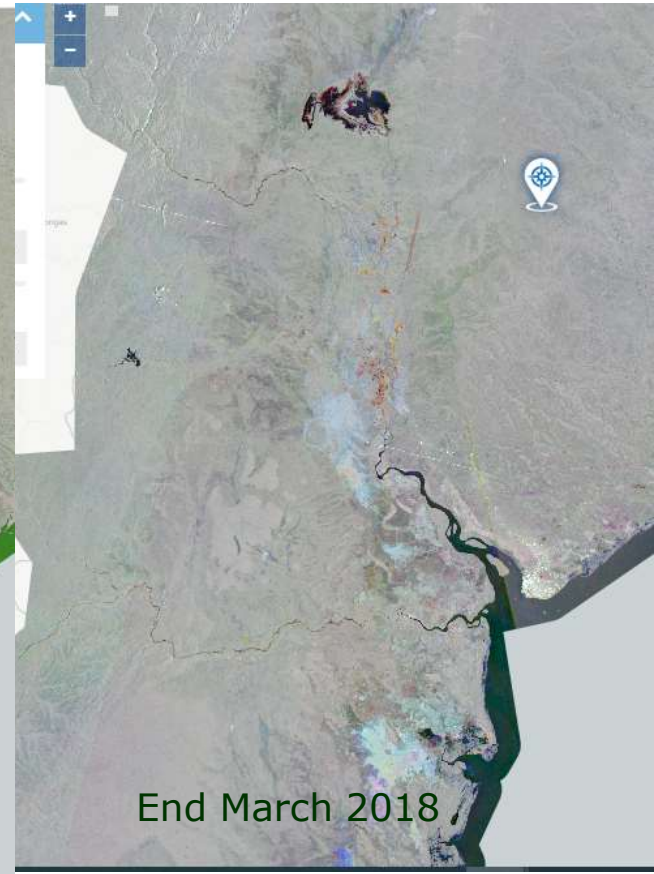
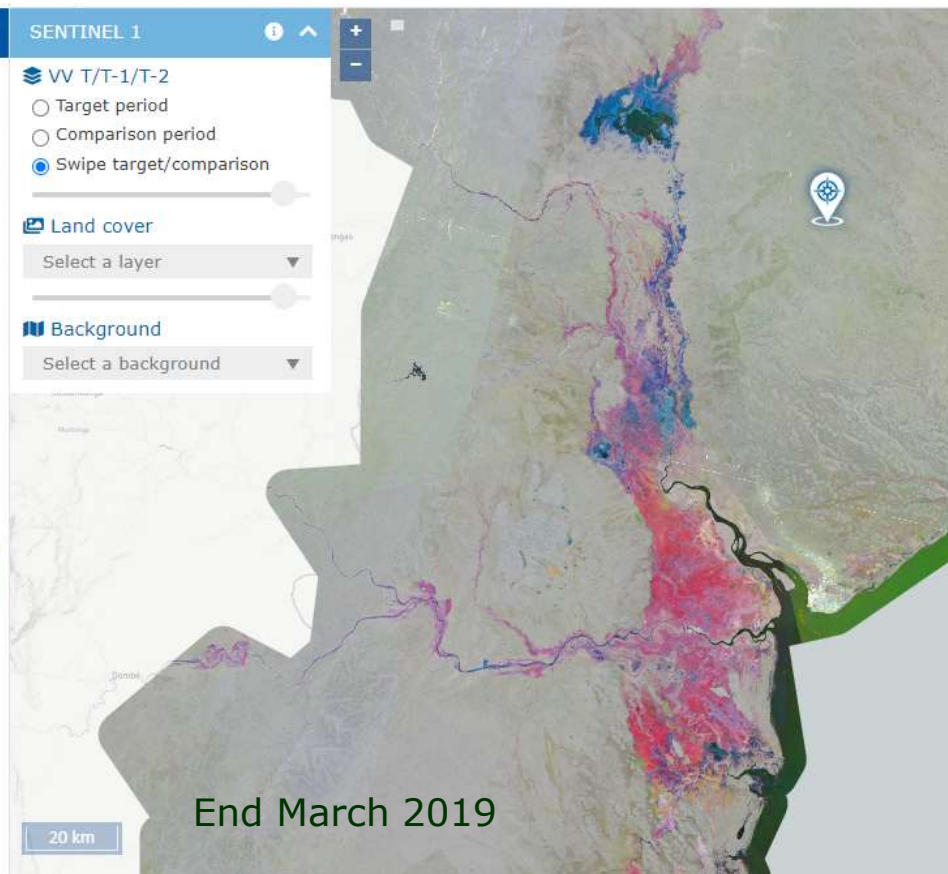
MAP | STATS

Layer: VV T/T-1/T-2

Target period: 20 Mar 2019 - 01 Apr 2019

Comparison period: 20 Mar 2018 - 01 Apr 2018

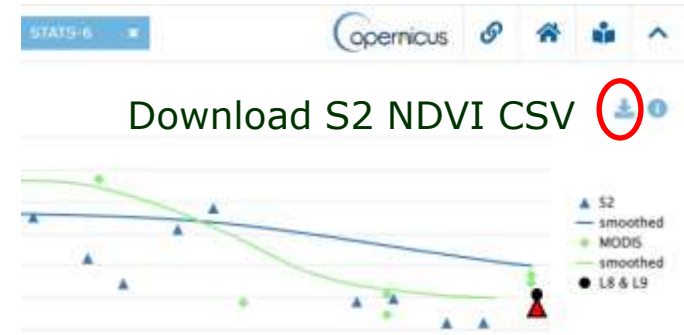
Get map layers



S1 data: VV Sigma0 at end March/mid March/early March in R/G/B
<https://mars.jrc.ec.europa.eu/asap/s/63edae1d>

Monitoring single fields / crops with S2 data

Select single fields of arable crop e.g. on Google Earth imagery
Download CSV file of NDVI data (Modis, S2) over n years (as from 2017) in STATS tab of HR Viewer

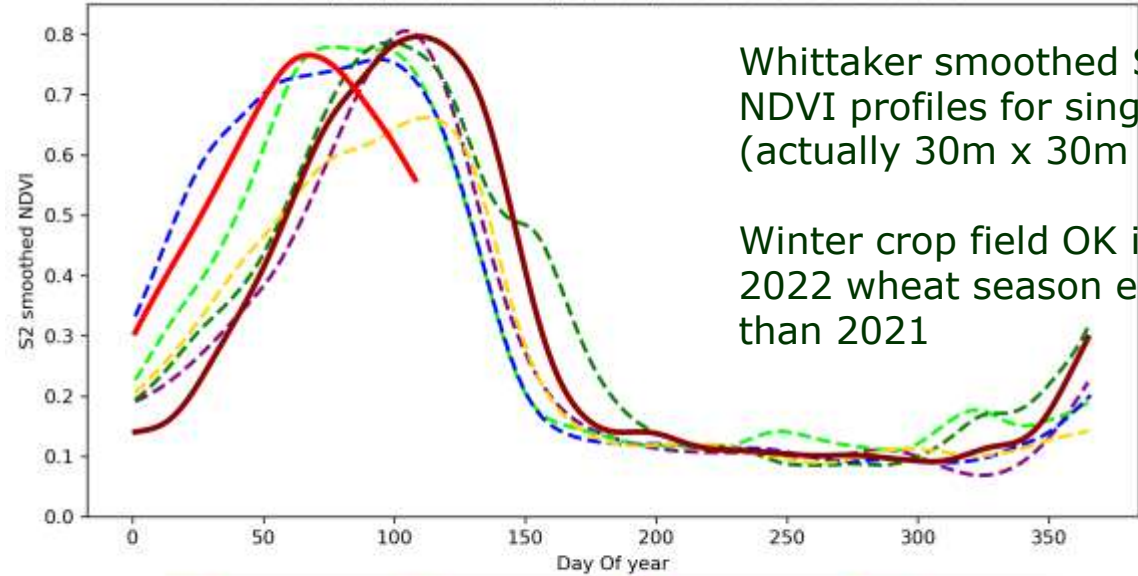


Example of Beja, TUN



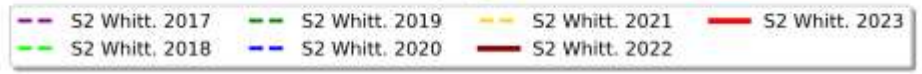


Point P19 (cropland) from Beja (TUN) with lat 36.683 and lon 9.317

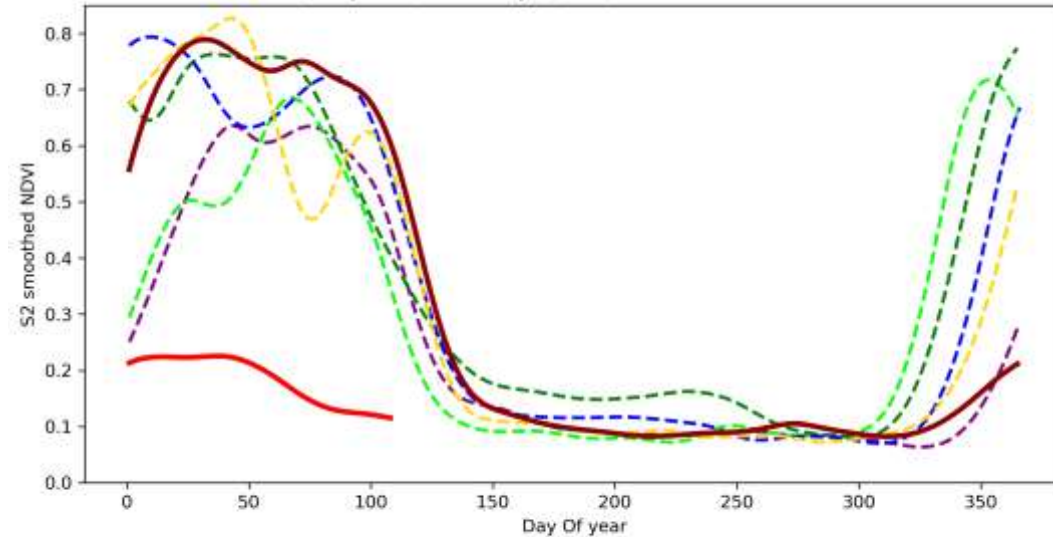


Whittaker smoothed S2 NDVI profiles for single fields (actually 30m x 30m area)

Winter crop field OK in 2022
2022 wheat season earlier than 2021



Point P27 (cropland) from Beja (TUN) with lat 36.522 and lon 9.452



Failed crop in 2023

