EUMETSAT LSA SAF Data

Heatwaves & Drought Monitoring

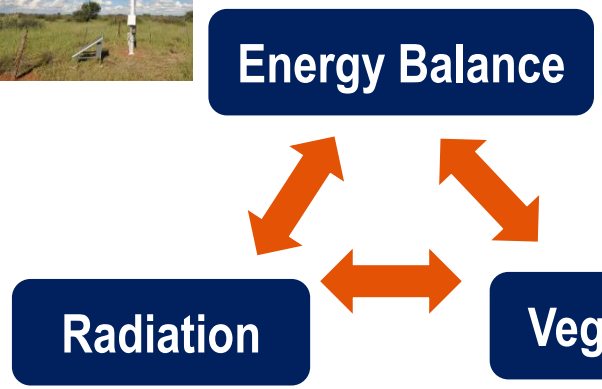
Isabel Trigo

IPMA

Satellite Applications Facility on Land Surface Analysis

EUMETSAT LSA SAF

Near Real Time & Offline Products and Datasets



Observation Sources

Meteosat Second Generation (SEVIRI)

- ✓ 2004 – onwards
  - High temporal frequency (15-min)
- ✓ Meteosat Disc
  - ~5 km (3km at nadir)

Meteosat Third Generation (soon!)

Metop (AVHRR)

- ✓ 2007 – onwards
  - ~ twice-daily
- ✓ Global Coverage
  - 1km

Metop – Second Generation (> 2025)

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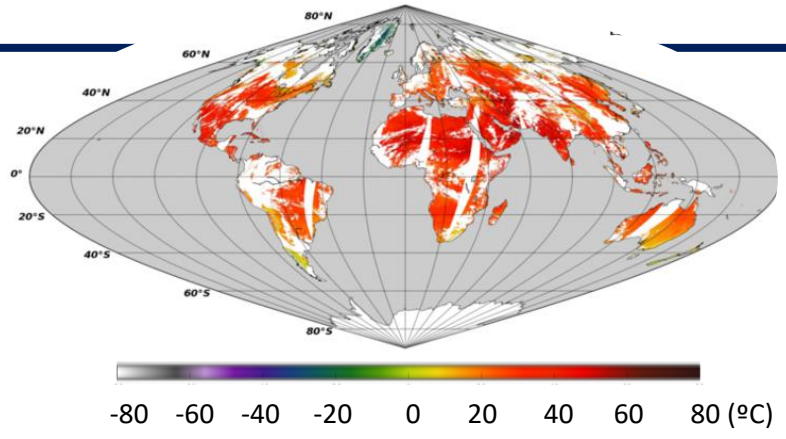
METEO FRANCE · RMI · KING'S College LONDON · KIT · vito · ARSO METEO Slovenian Environment Agency

Heatwaves & Drought

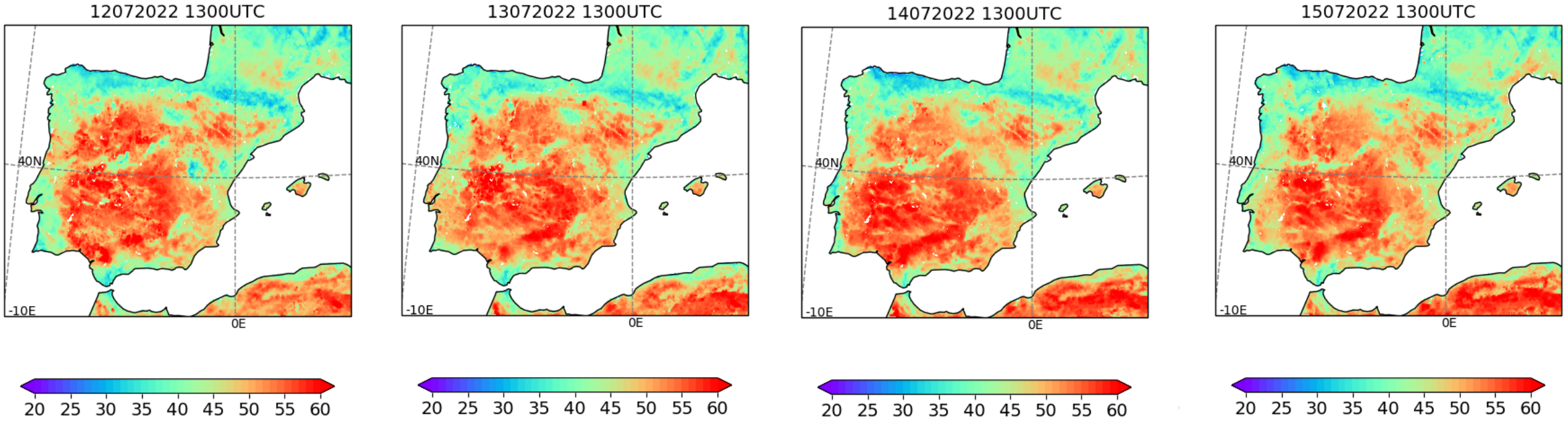
… Leave clear signatures on Surface Variables

- ✓ Land Surface Temperature
  - Clear sky (level 2 product) – MSG and Metop
  - All-sky – from MSG only

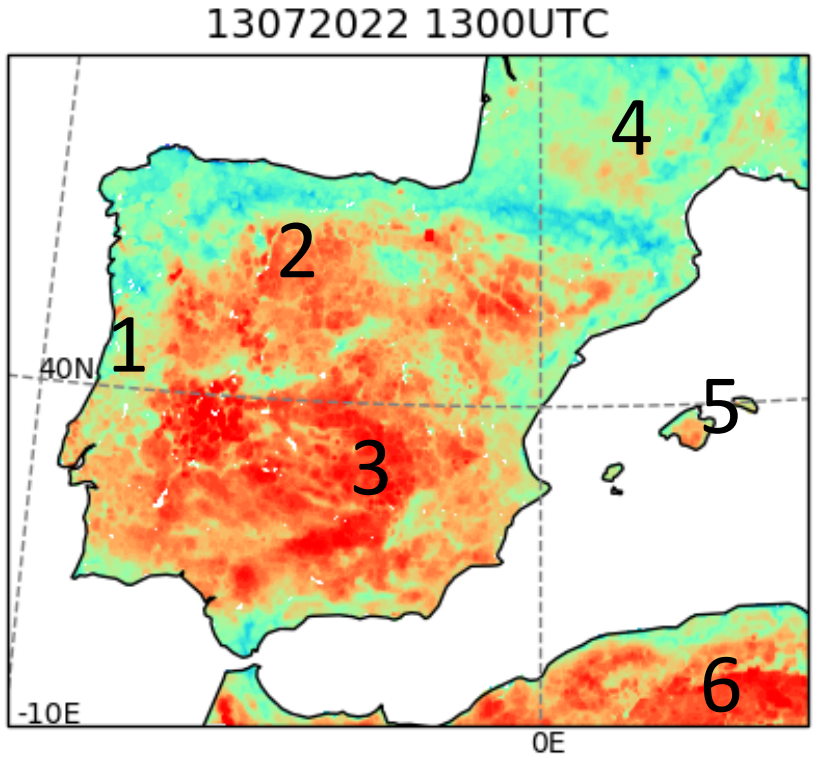


Monitoring LST: up to every 15-min (clear sky only) / 30-min (all-sky)

All-Sky LST, 12 – 15 Jul 2022 (13:00 UTC)



Where are the strongest (positive) anomalies ??



Slido.com
#LSASAF_Products

1 West Coast

2 Northern Iberia

3 Southern Iberia

4 Southern France

5 Balearic Islands

6 Northern Africa

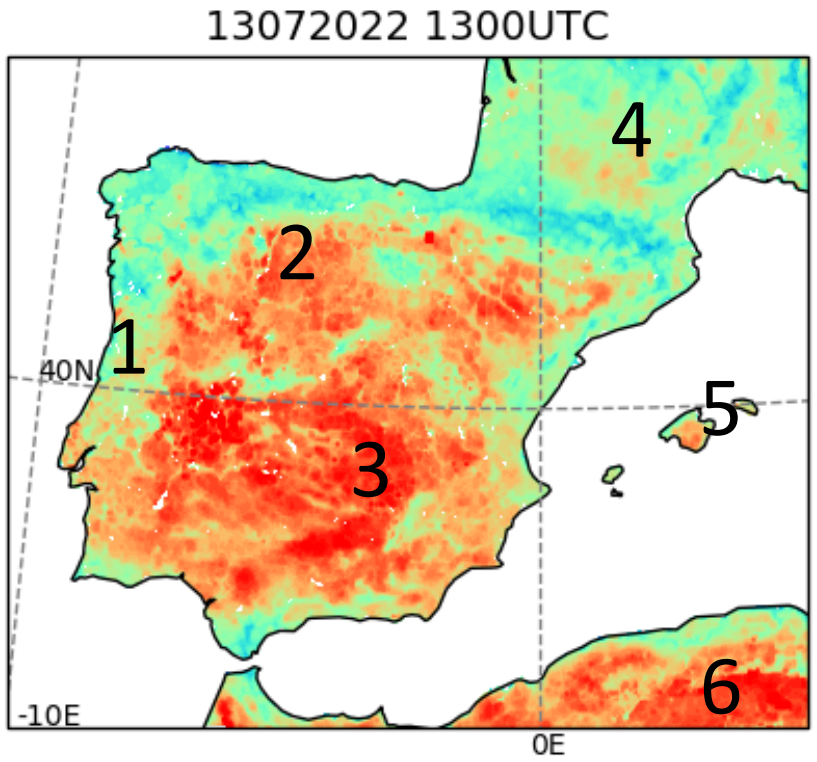
slido

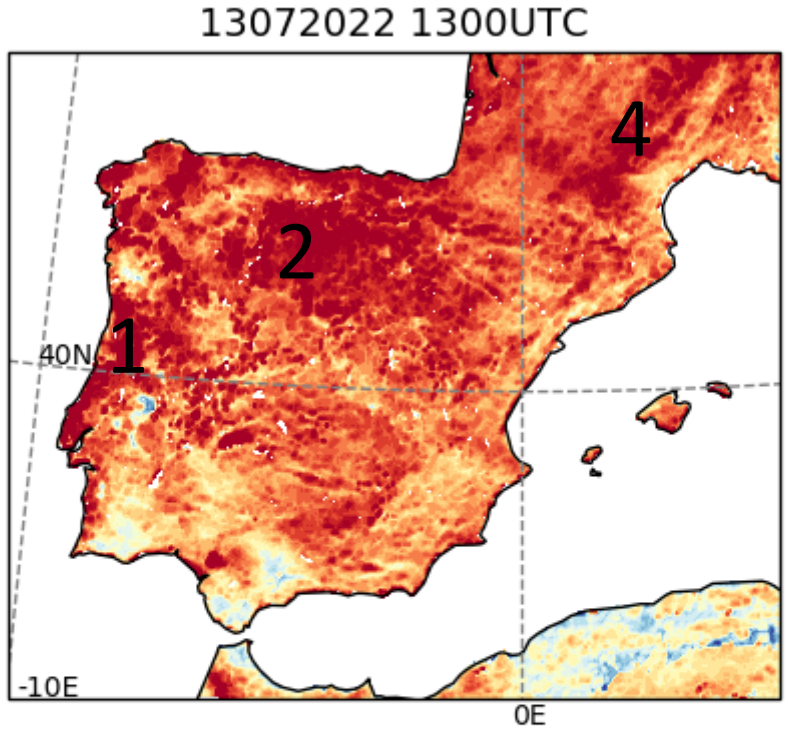
https://app.sli.do/event/6pFLQyN1nBfocZkKbzEbmo

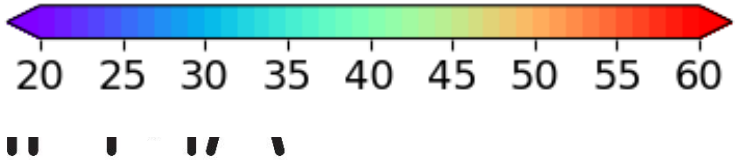
Where are the strongest (positive) anomalies ?

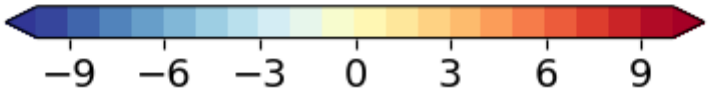
ⓘ Start presenting to display the poll results on this slide.

Where are the strongest (positive) anomalies ??









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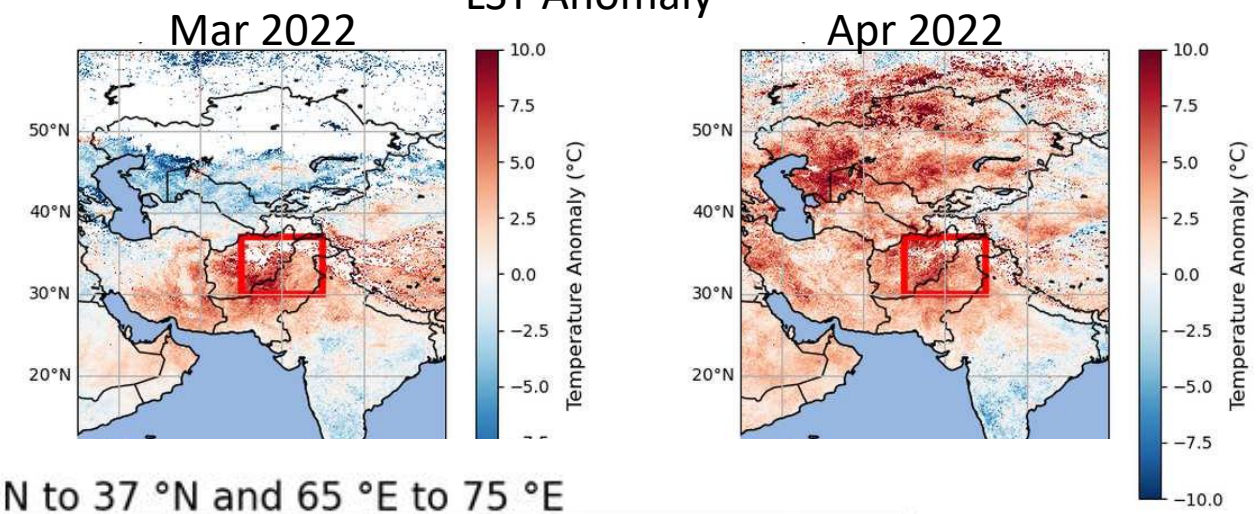
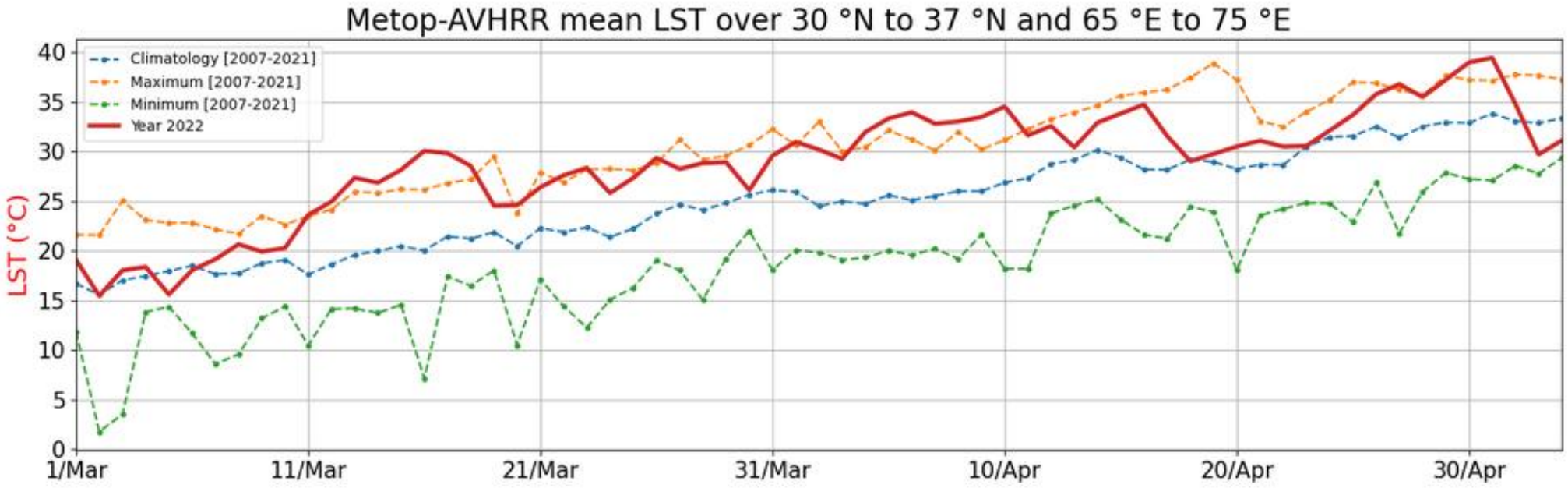
South Asia 2022 Heatwave

Land Surface Temperature

- ✓ AVHRR/Metop
- ✓ Daytime overpasses
- ✓ Mar – Apr (2008 – 2022)

LST Anomaly





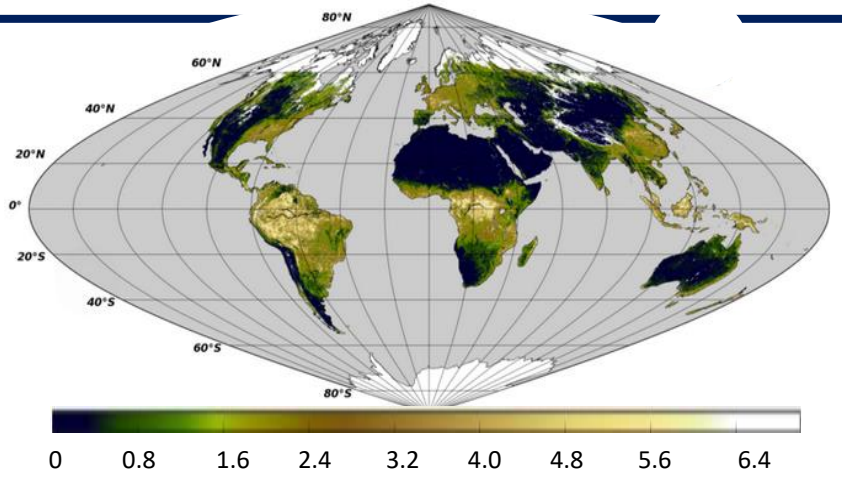
https://landsaf.ipma.pt/en/news/news/monitoring-the-south-asia-2022-heatwave/

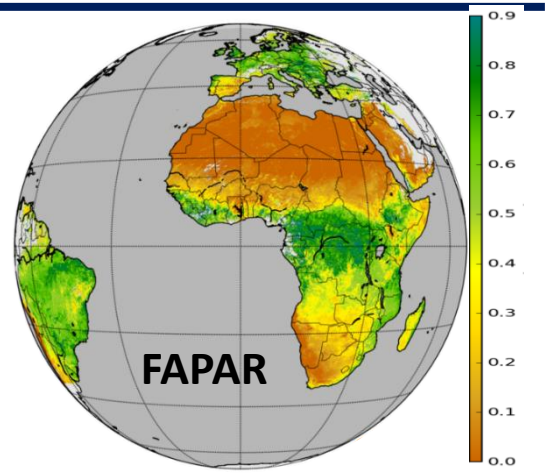
Heatwaves & Drought

… Leave clear signatures on Surface Variables

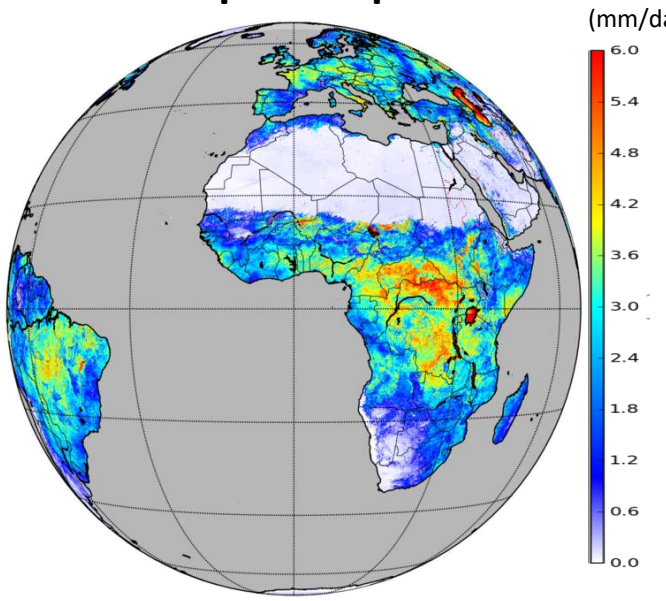
- ✓ Vegetation State (MSG & Metop)
- ✓ Vegetation Stress (MSG)
- ✓ Primary Production (MSG)

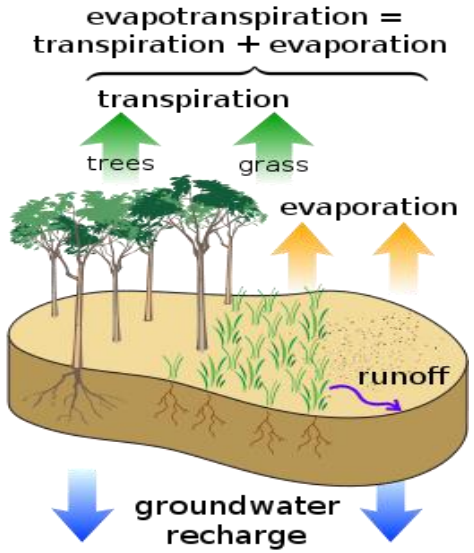
LAI (Leaf Area Index)



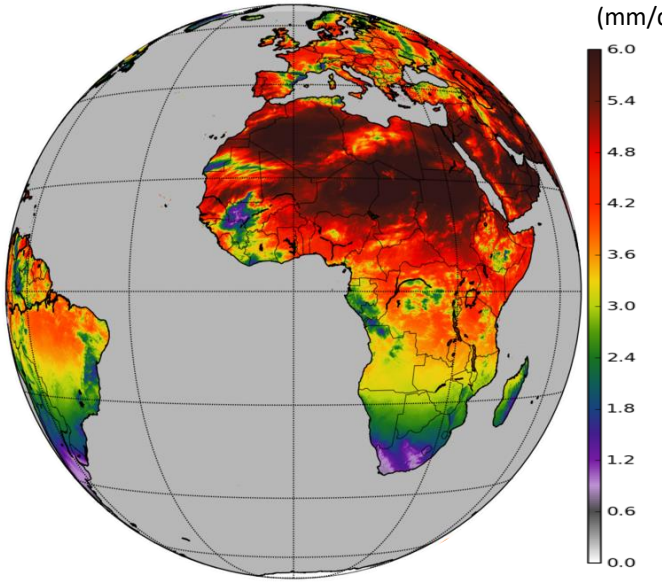


Evapotranspiration





Reference Evapotranspiration

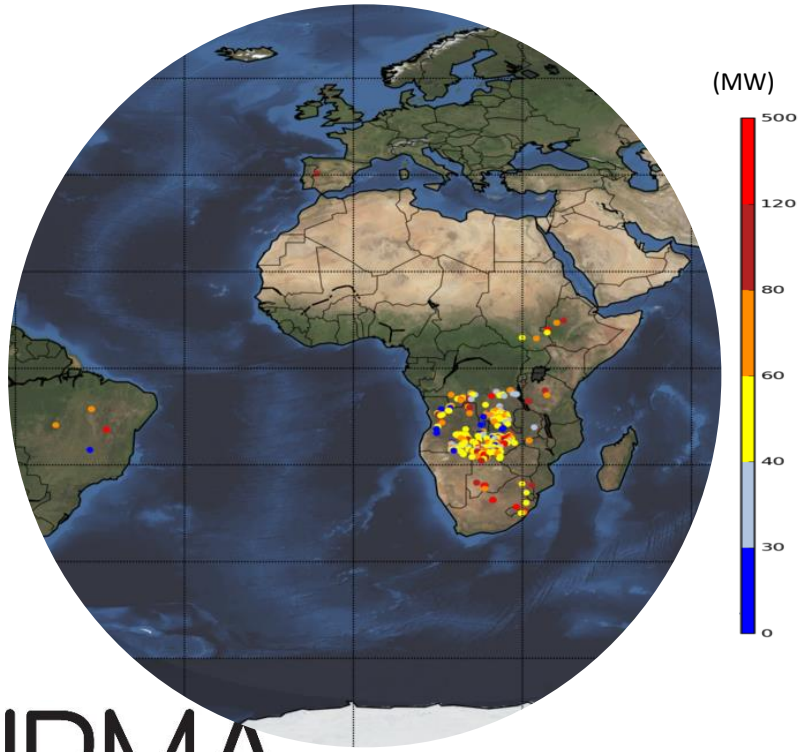


Heatwaves & Drought

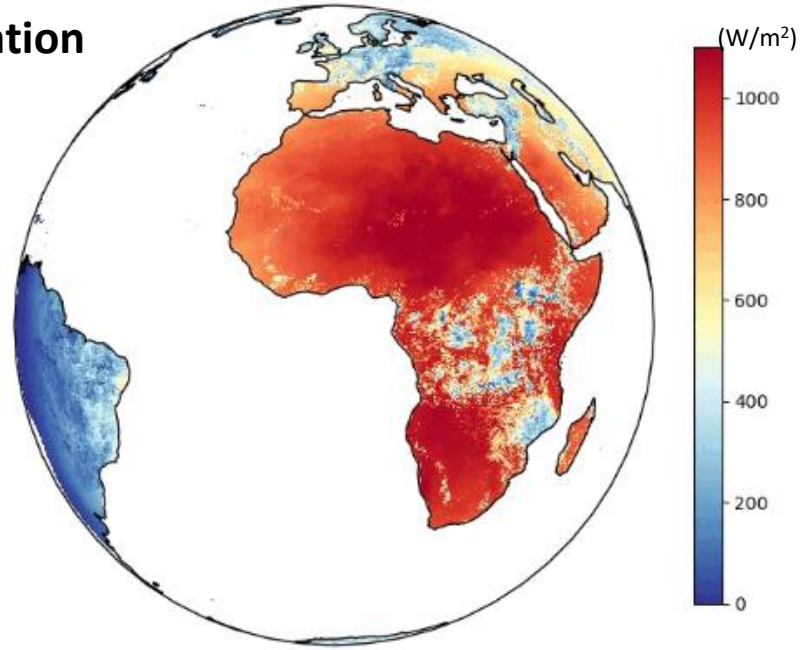
… Associated with (above average)

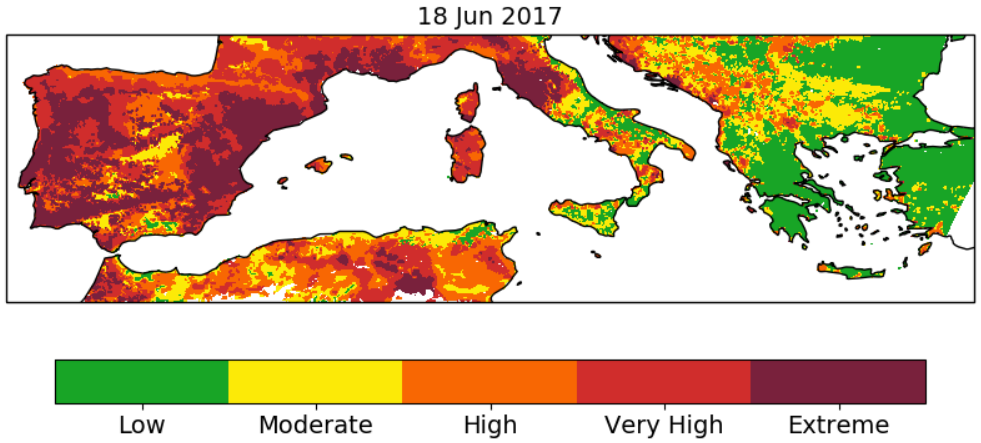
- ✓ Solar Radiation Downwelling Fluxes
- ✓ Fire Risk
- ✓ Fire Radiative Power

FRP



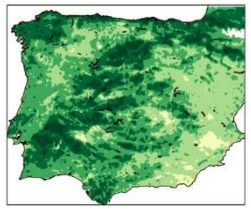
Solar Radiation



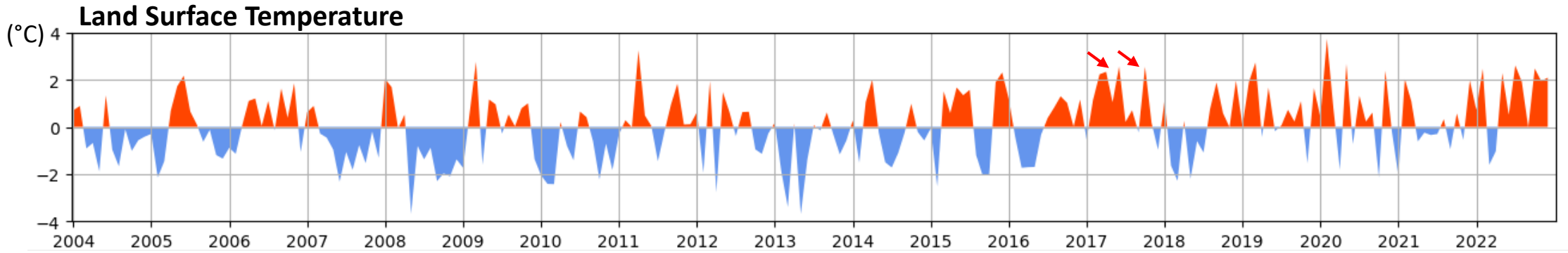


1 Jun 2023)

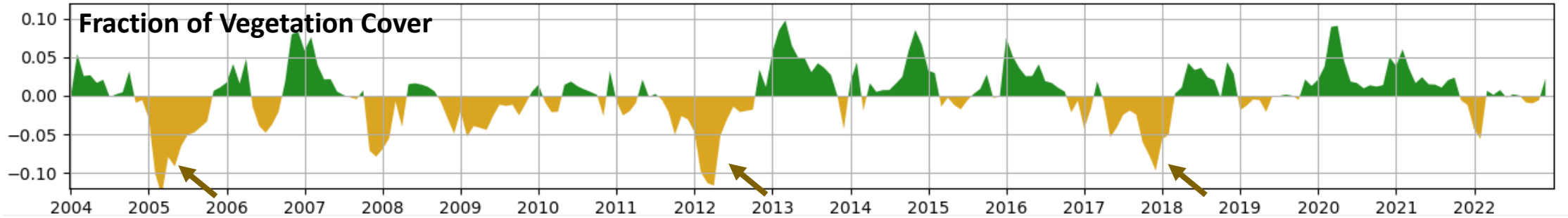
Co-variability of Land Surface Variables



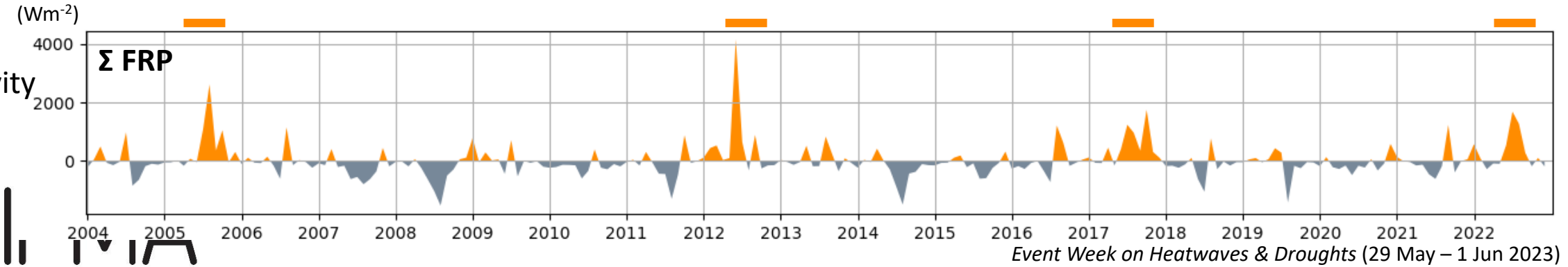
Monthly Anomalies Land Surface Temperature, Vegetation Cover & Fire
Iberian Peninsula 2004-2022



Vegetation



Fire Activity

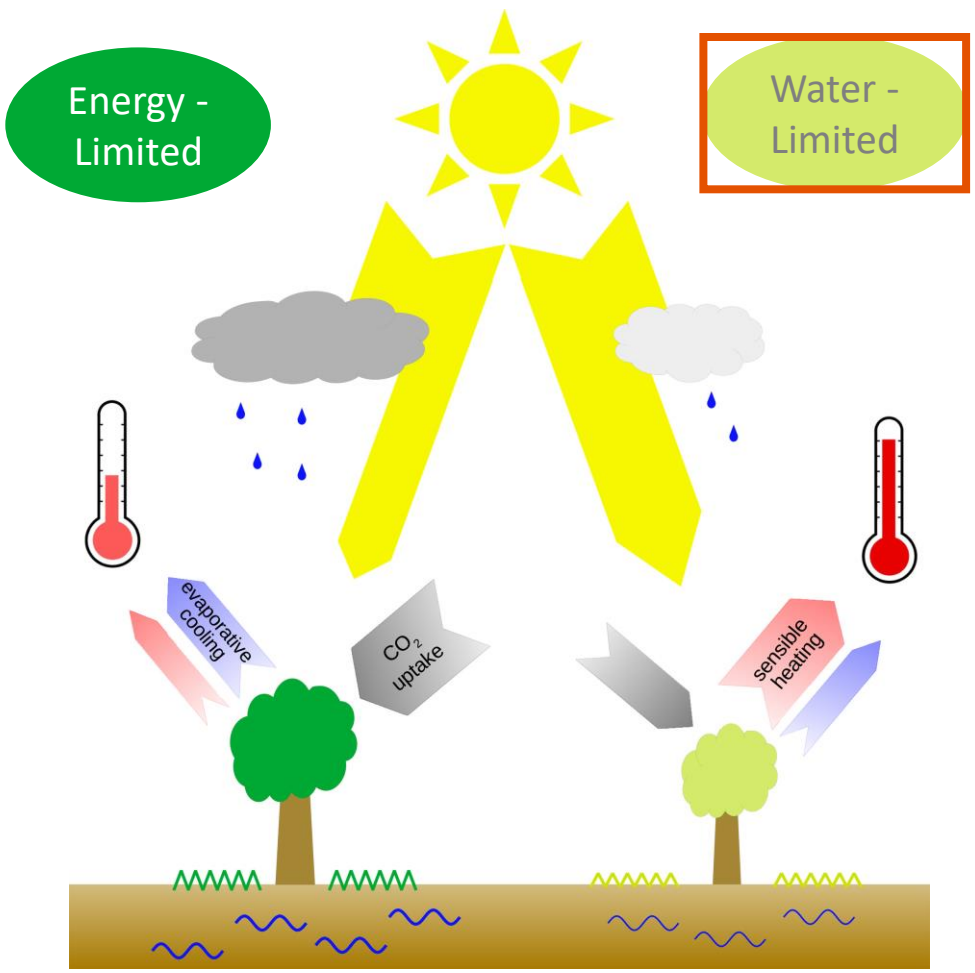


Satellite Observations & Land Surface Processes

Co-variability of Land Surface Variables is linked to underlying feedback mechanisms

Wet Conditions:
Evaporation and plant transpiration driven by available (solar) energy…
… Evaporative cooling limits surface temperature…
… Solar radiation promotes vegetation growth.

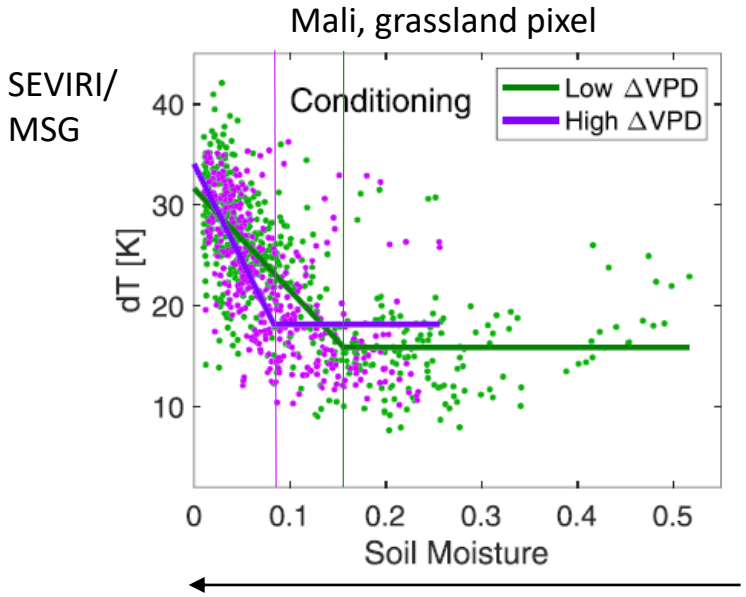
Under Limited Water availability:
Plants control water loss, limiting ET (and CO2 uptake) …
… Reducing evaportive cooling (increasing LST) …
… Further contributing for vegetation thermal stress & decay.



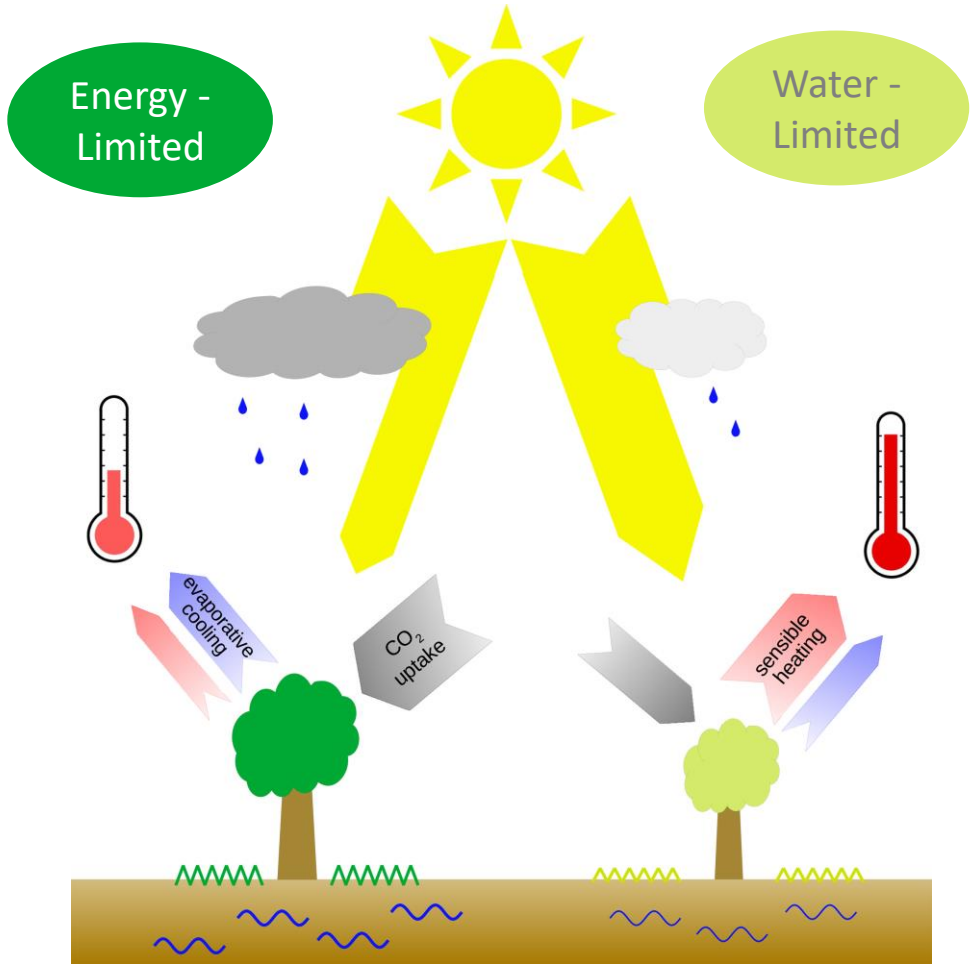
Source: Orth (2021) in AGU Advances

Satellite Observations & Land Surface Processes

LST daily Amplitude & Soil Moisture – may be used to identify changes in evaporative regimes:



(Drydown over 10-12 days; See more in Feldman et al. 2019 in *Water Resources Res.*)



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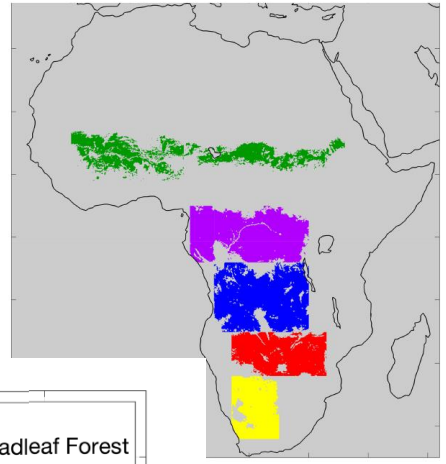
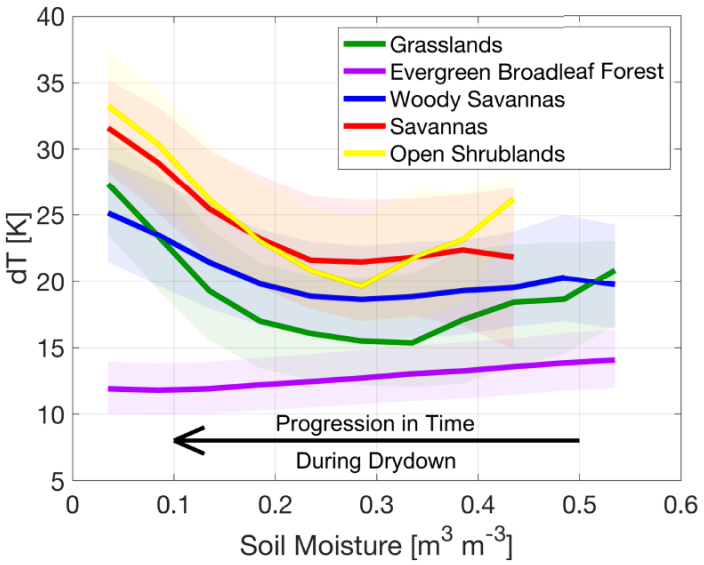
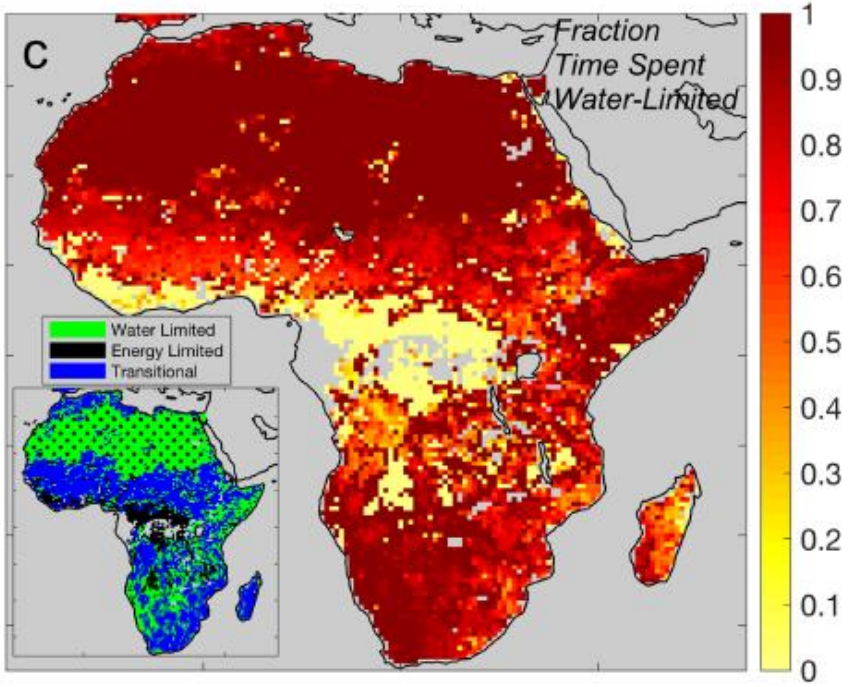
Satellite Observations & Land Surface Processes





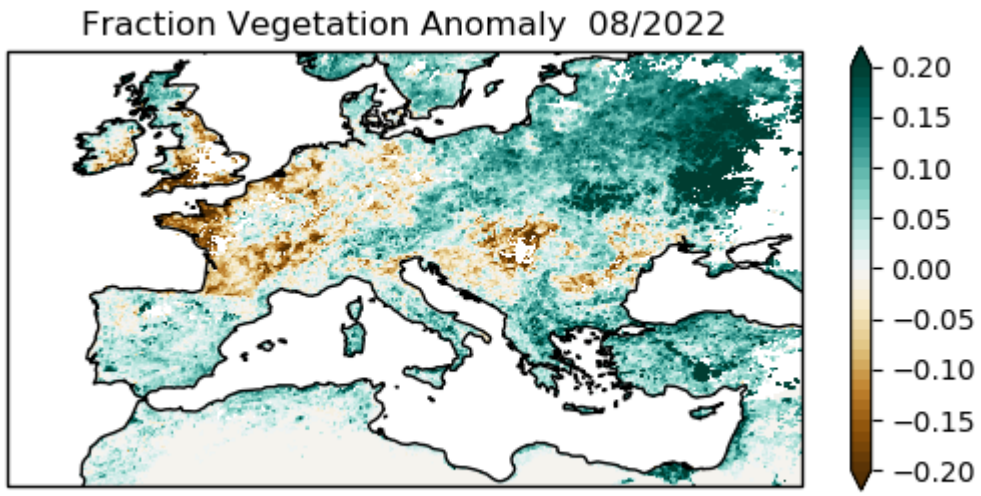
Fraction of time spent in **Water-Limited** Regime:
SM < "Critical SM"

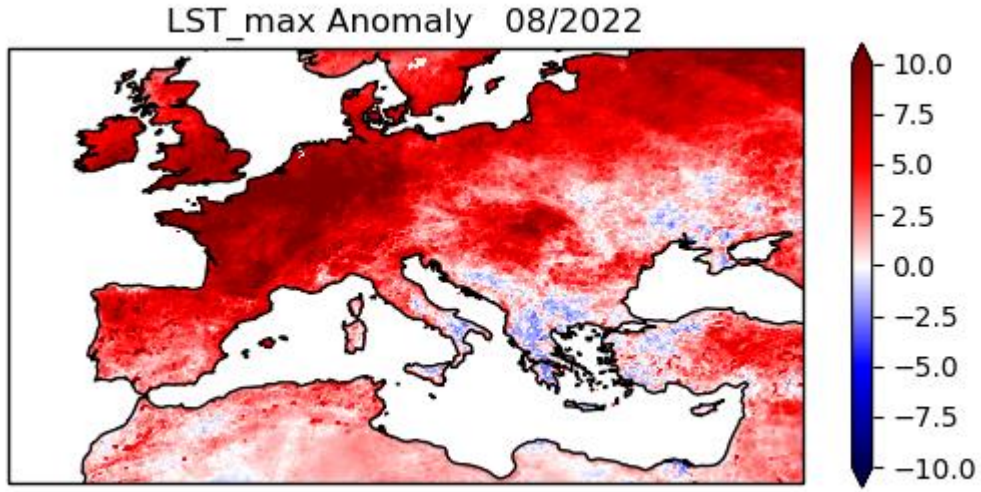


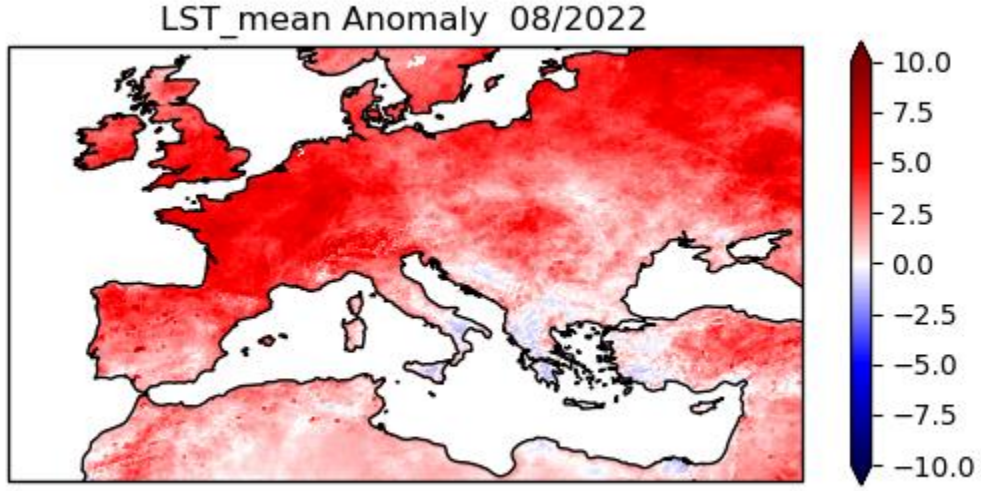
Feldman et al. (2019) in Water Resources Res.,
https://doi.org/10.1029/2019WR025874

Europe – Summer 2022

Monthly Anomalies
August 2022

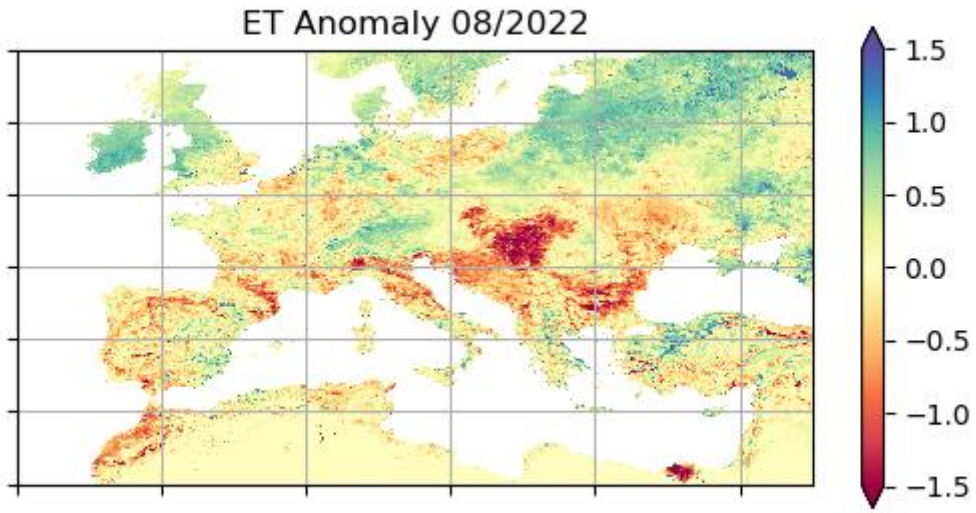


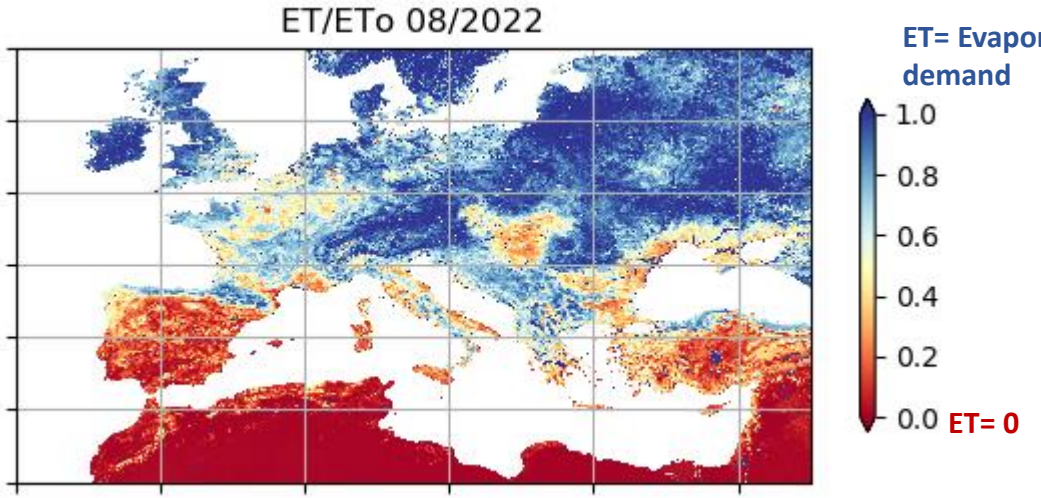




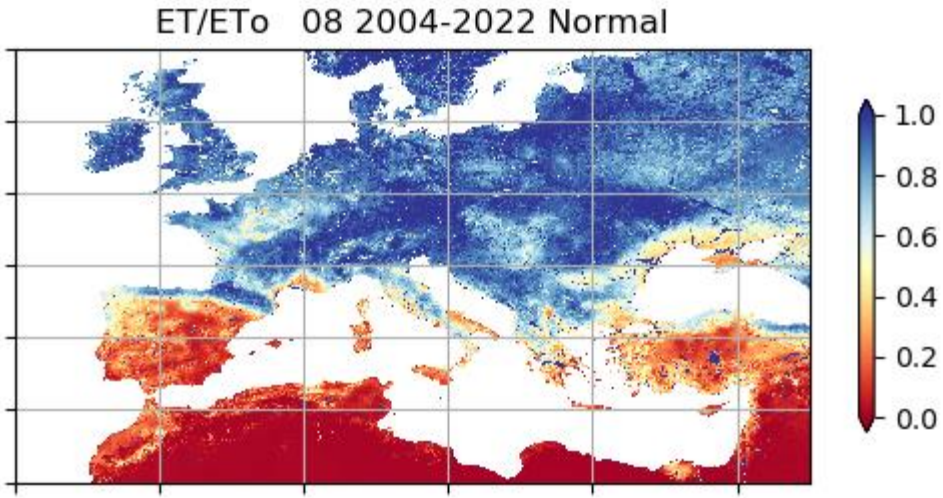
Europe – Summer 2022

August 2022: Assessing Water Stress

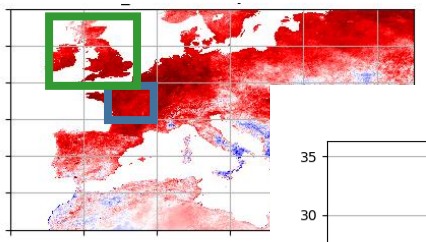




ET/Evaporative demand



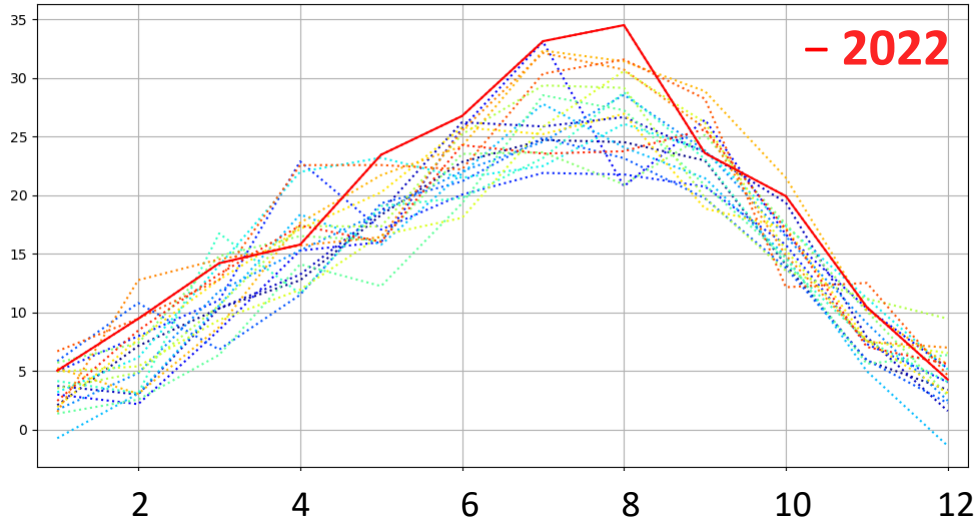
Annual Cycles of LST_Max and Fraction Green Vegetation



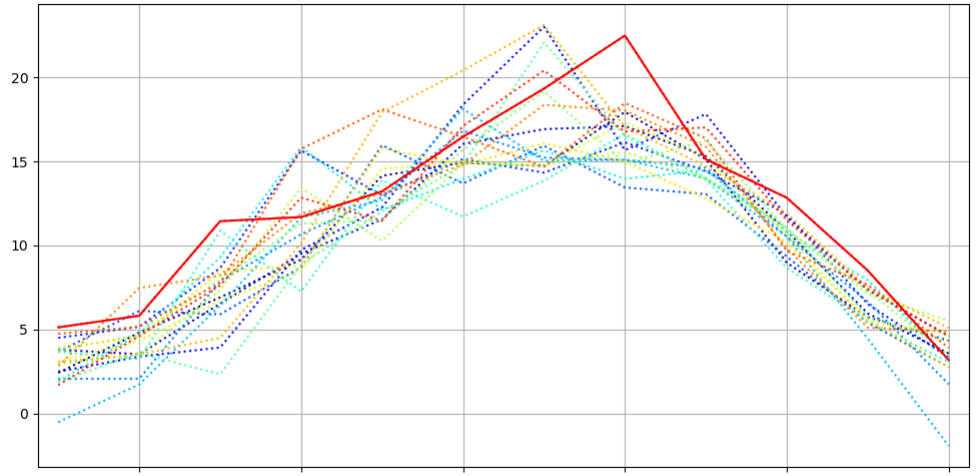
Monthly averages
2004 – 2022

Maximum LST

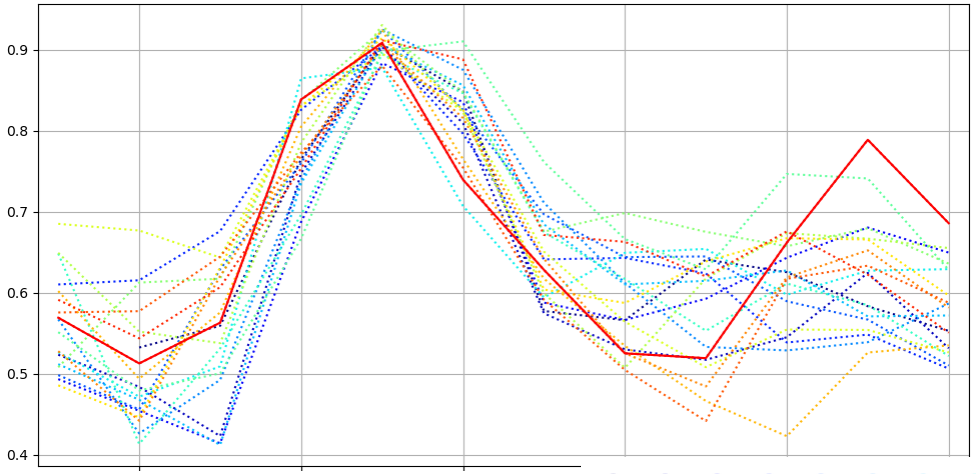
France

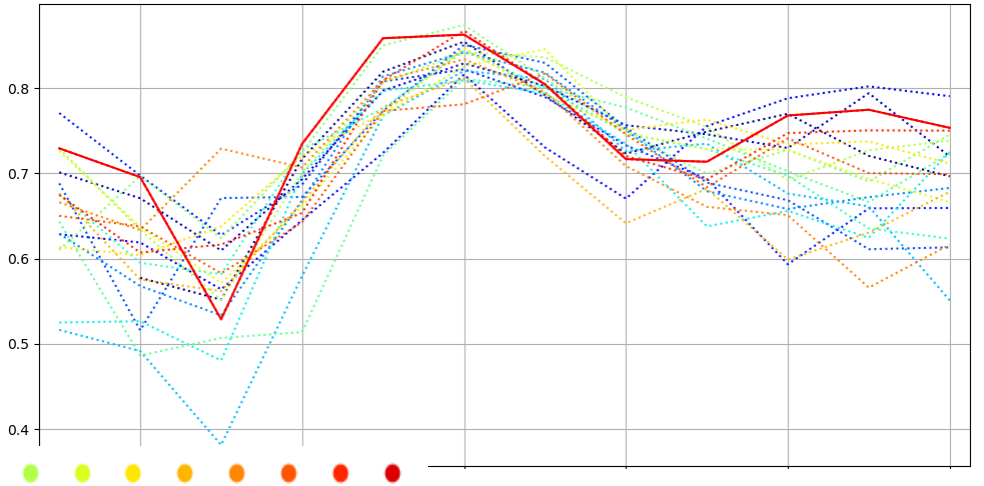


Bristish Isles



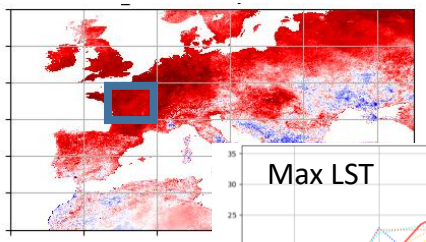
Fraction Vegetation Cover



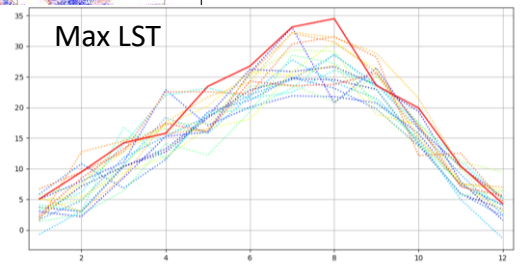


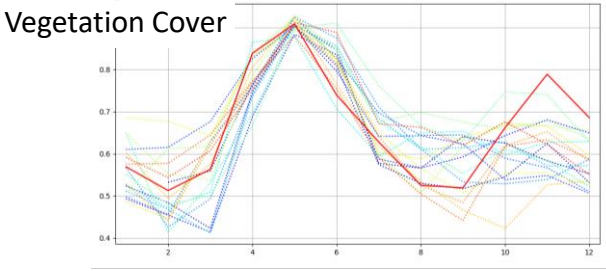
2023)

Annual Cycles: Evapotranspiration & Water Stress

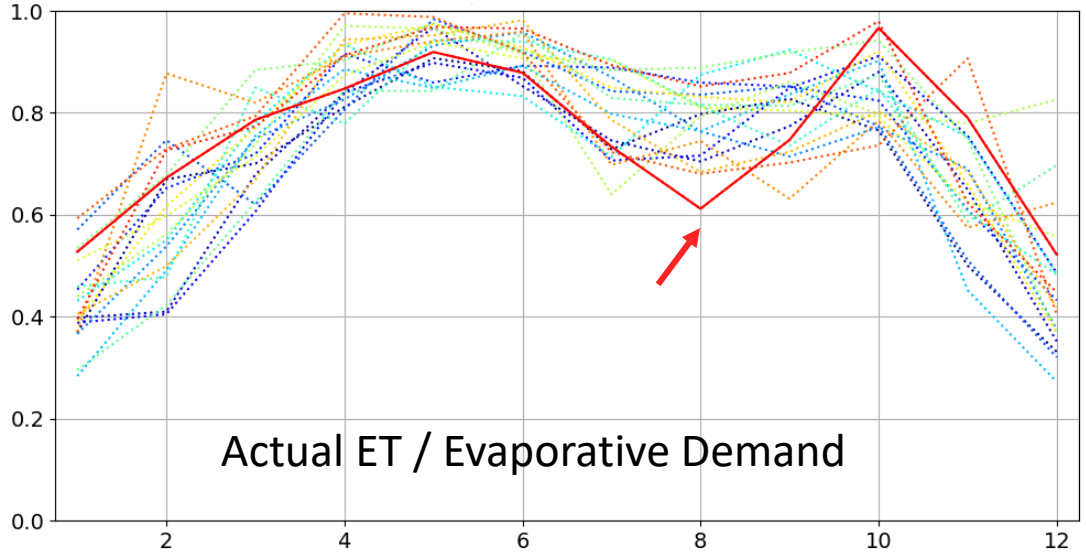


France: Monthly averages 2004 – 2022

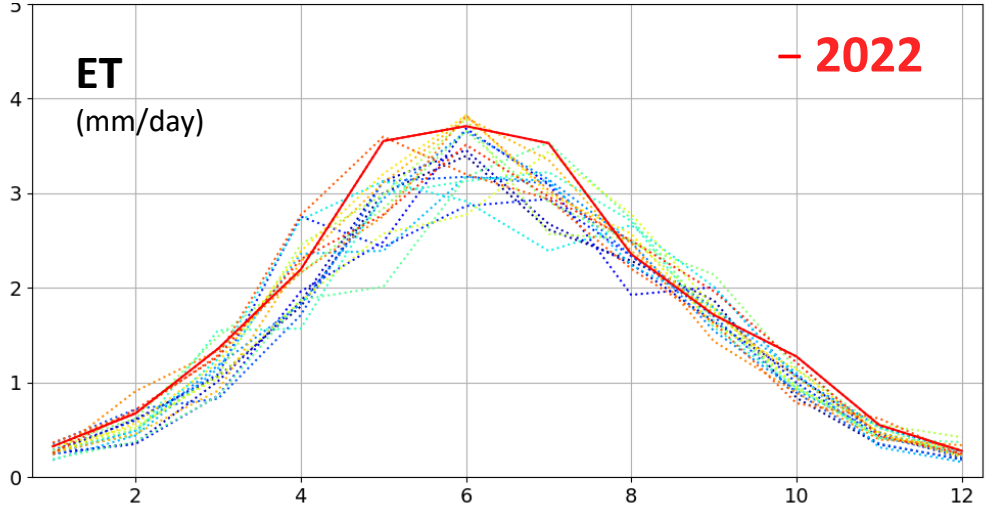


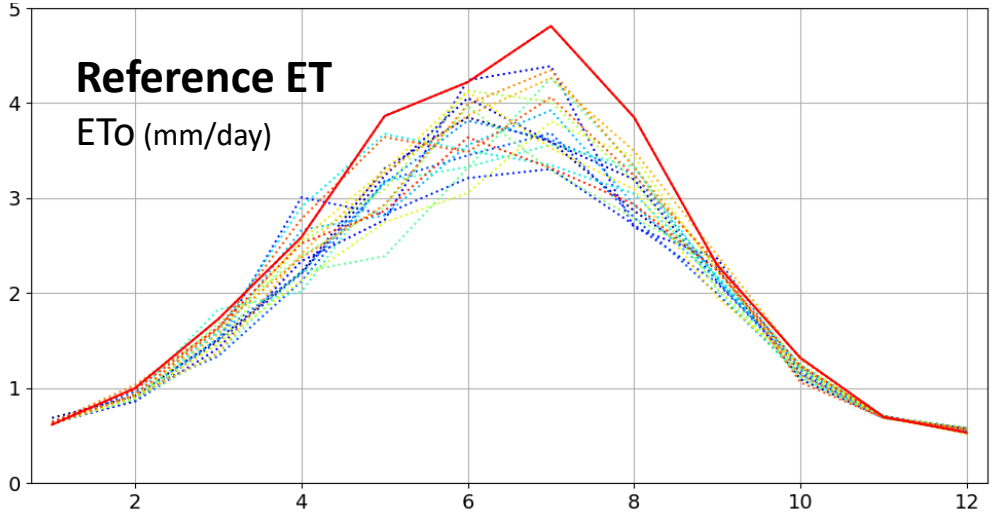


ET/ ETo



Aug 2022

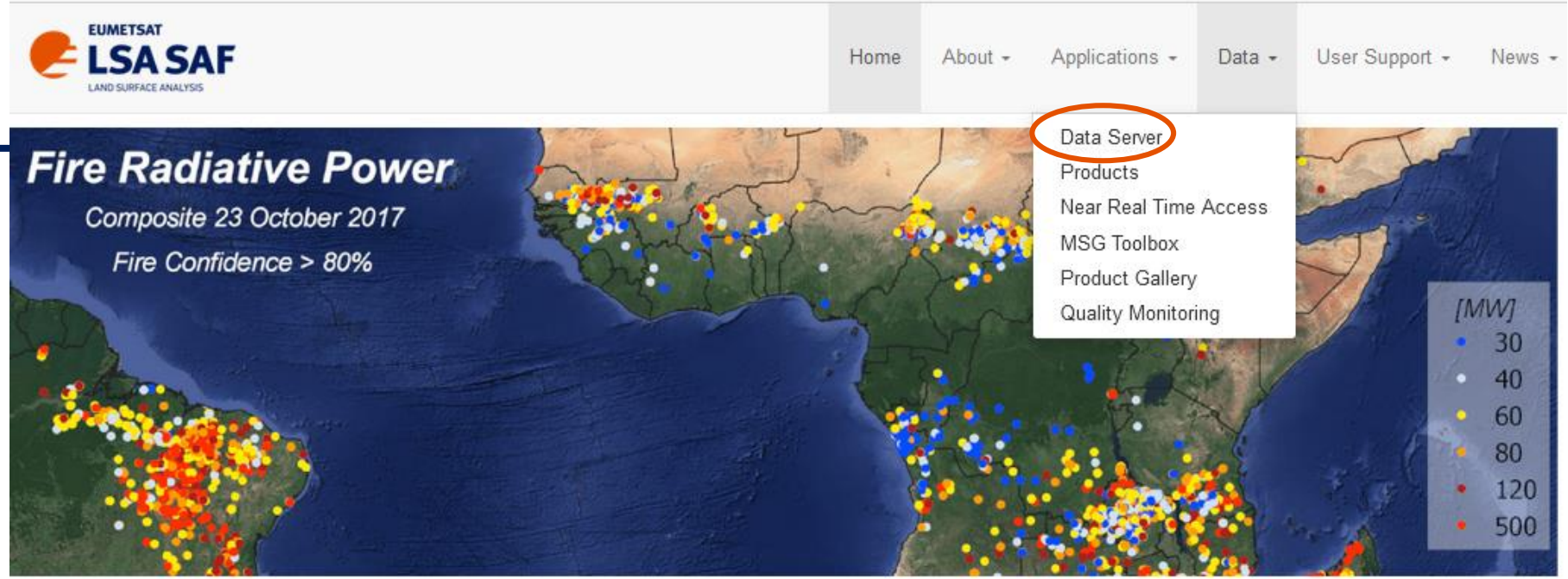




http://lsa-saf.eumetsat.int

Or

https://landsaf.ipma.pt/en/



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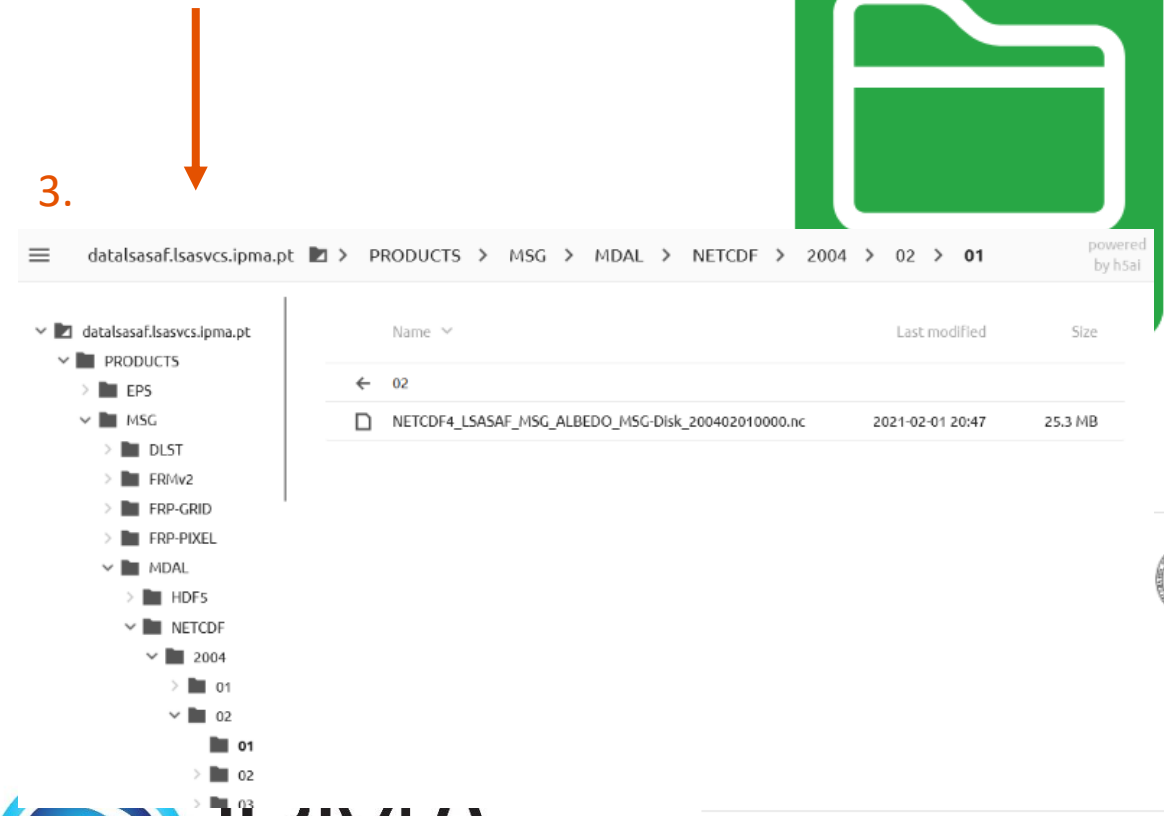
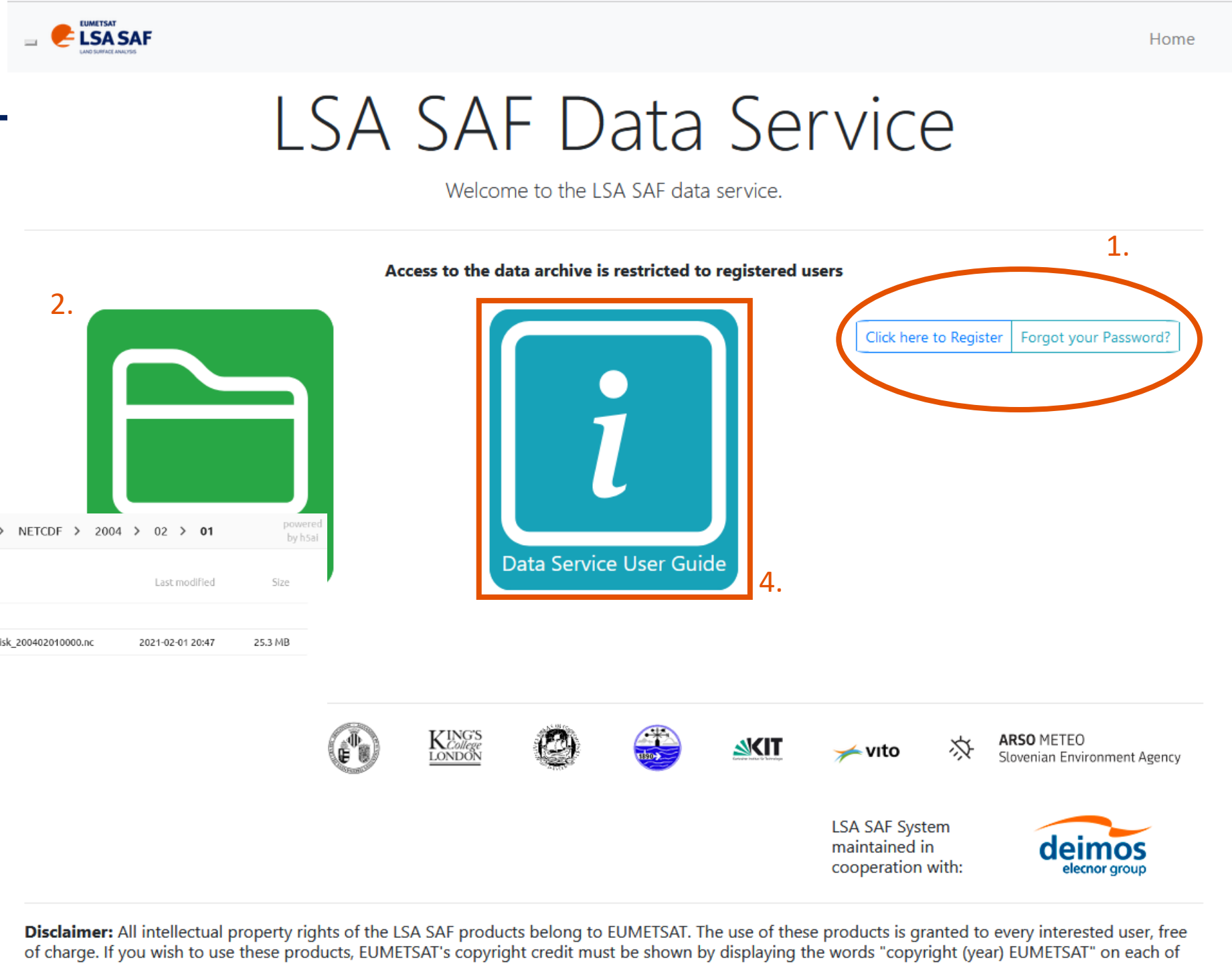
1. **User registration/recover password**

2. **Browse the data archive (needs credentials)**

3. **Navigate the data archive Download individual files**





EUMETSAT LSA SAF
LAND SURFACE ANALYSIS

Welcome to the LSA SAF Data Service User Guide

- **Data service home page:** https://datalsasaf.lsasvcs.ipma.pt/
  - Recommended browse the data archive and direct download of files via the web browser.
- **WebDAV:** https://datalsasafwd.lsasvcs.ipma.pt/
  - Recommended for direct access in windows/linux WebDAV.
- **THREDDS Data Server:** https://thredds.lsasvcs.ipma.pt/ ***Demonstration service***
  - Recommended to access regions/points (only NetCDF is supported) via OpenDAP service.

- Access to the data archive is **restricted to registered users**:
  - How to register
  - If you forgot your password
  - How to delete the account:
    - email helpdesk.landsaf@ipma.pt requesting your account to be deleted
- **Data archive Access**:
  - Browse the data archive
  - wget examples
  - THREDDS Data Server
    - OpenDAP ipython notebook examples
  - WebDAV
    - WebDAV ipython notebook examples

Python notebooks examples to access data via OpenDAP
https://gitlab.com/helpdesk.landsaf/lsasaf_data_access/-/tree/main/examples/thredds

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http://lsa-saf.eumetsat.int

Enjoy our data!

Please, send us your feedback to:

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