

LSA SAF Products for Fire Forecast and Monitoring

Célia Gouveia
18th October 2022

Earth Observation Products for Wildfires Monitoring and Forecast 2022

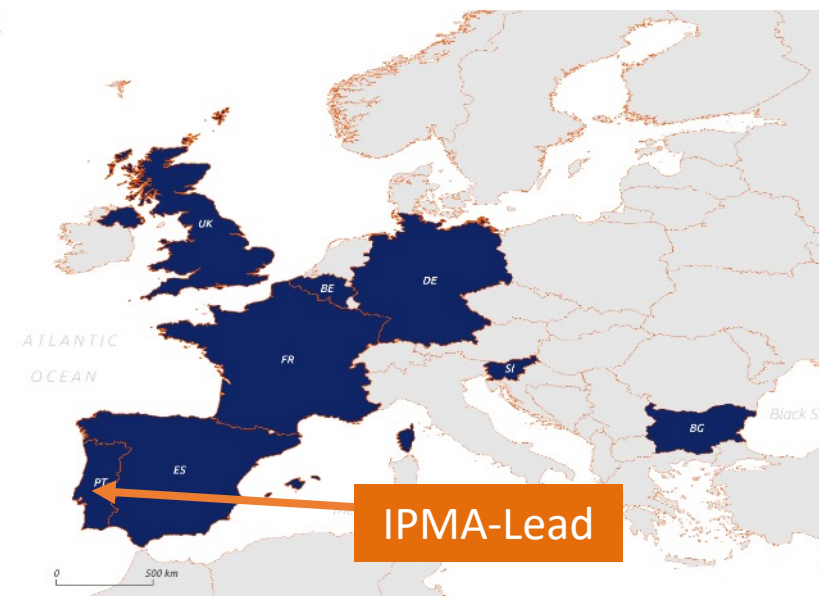
18 -20 October 2022

LSA-SAF Objective

Satellite Products related to Land Surfaces & Land-Atmosphere interactions

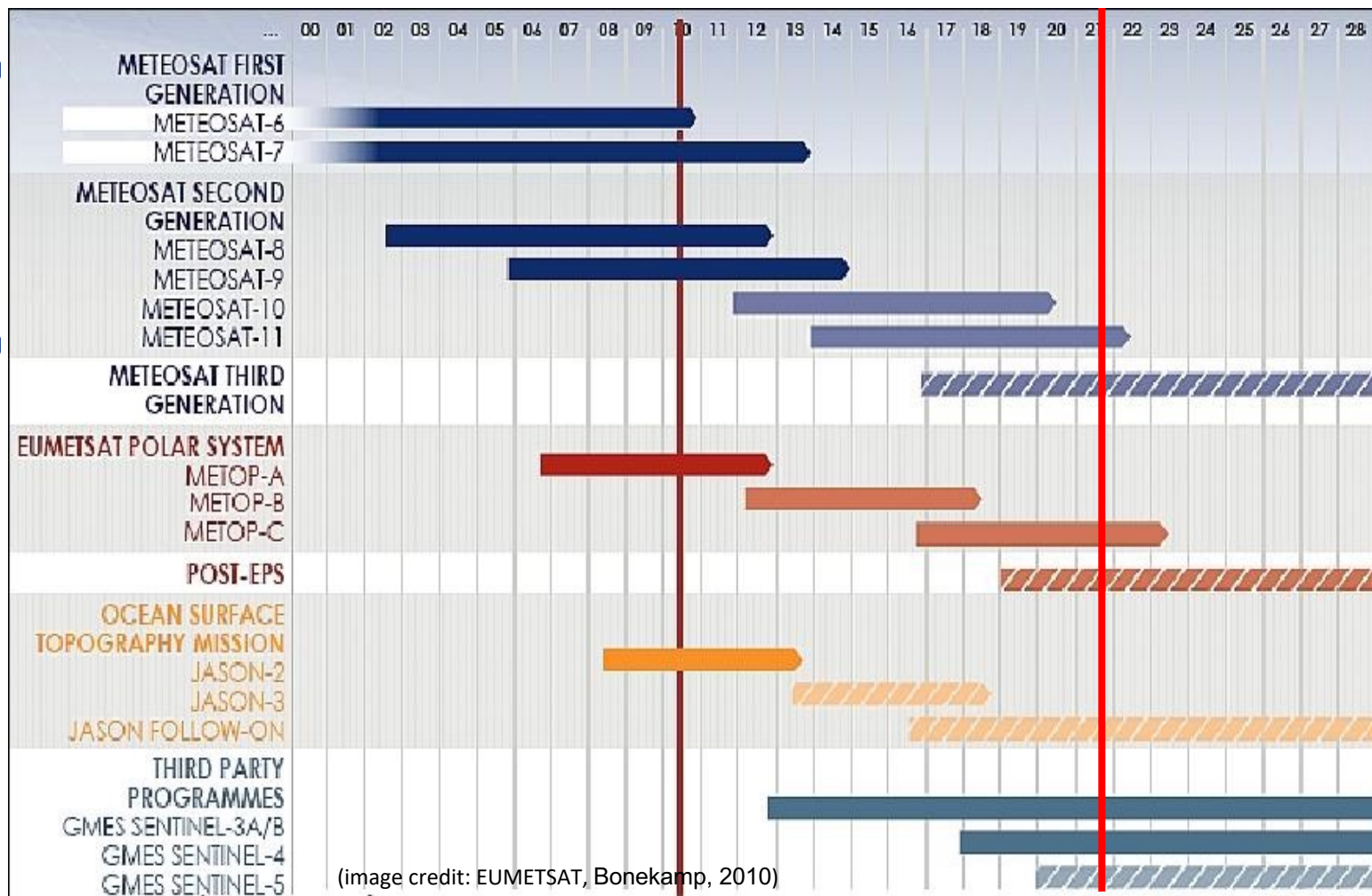
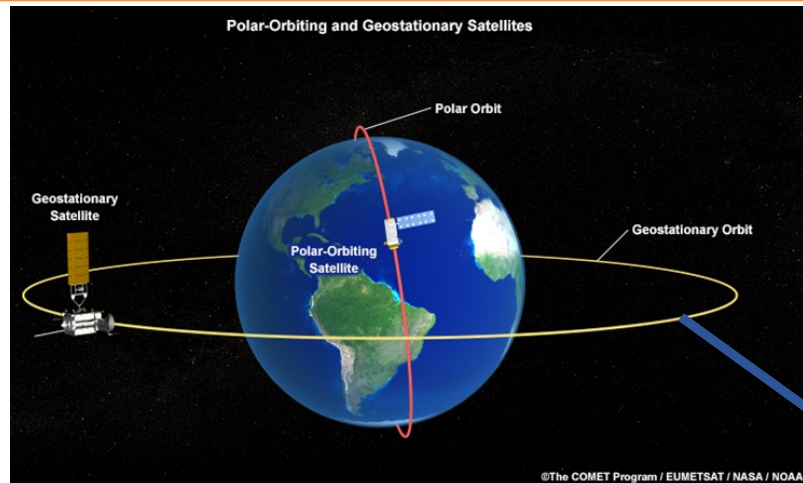
- Focusing primarily EUMETSAT satellites
- Maintain (& improve!) the service for current missions
- Ensure transition to Next Generation of EUM satellites: MTG & EPS-SG
- NRT & Off-line production of Land surface variables (EUMETCast, ftp & Website)
- Helpdesk User Support Service (helpdesk.landsaf@ipma.pt)

LSA SAF Consortium



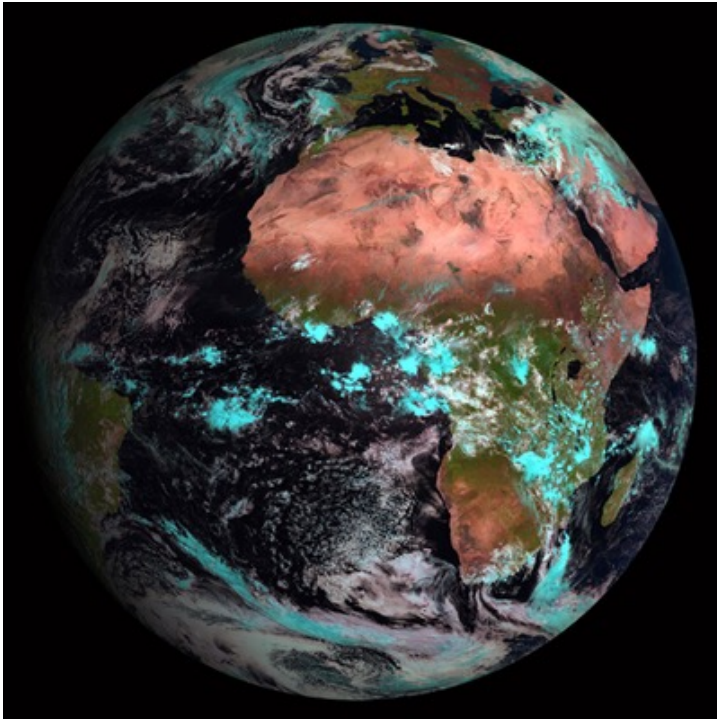
IPMA	(Portugal) – Leading Institution
MF	(France)
RMI	(Belgium)
IDL	(Univ Lisbon)
KCL	(King's College London)
KIT	(Karlsruhe Inst Technology)
UV	(Univ Valencia)
VITO	(Flemish Inst Technological Res)
ARSO	(Slovenian Env Agency)
NIMH	(Bulgarian Inst Met and Hyd)

EUMETSAT space segment

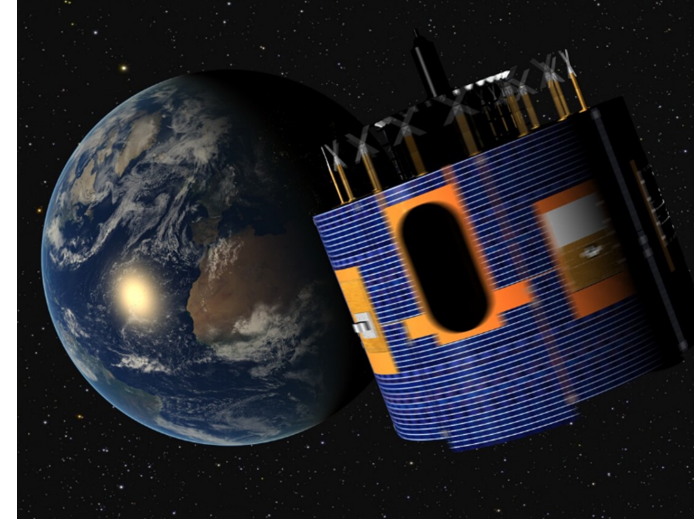


Meteosat Second Generation

- Geostationary orbit
- Nominal sub-satellite point at 0° long



Main focus of LSA SAF until present



Spinning Enhanced Visible and Infrared Imager (SEVIRI)

- explore 96 observations /day (every 15 min) ...
- 12 channels ...
- at 3 km at nadir

SURFACE RADIATION BUDGET

DSSF: ↓Surface Short-wave Flux

DSLW: ↓Surface Long-wave Flux

LST: Land Surface Temperature

AL: Albedo

WILDFIRES

FRP: Fire Radiative Power

FRM: Fire Risk Map

VEGETATION STATE

FVC: Fraction Vegetation Cover

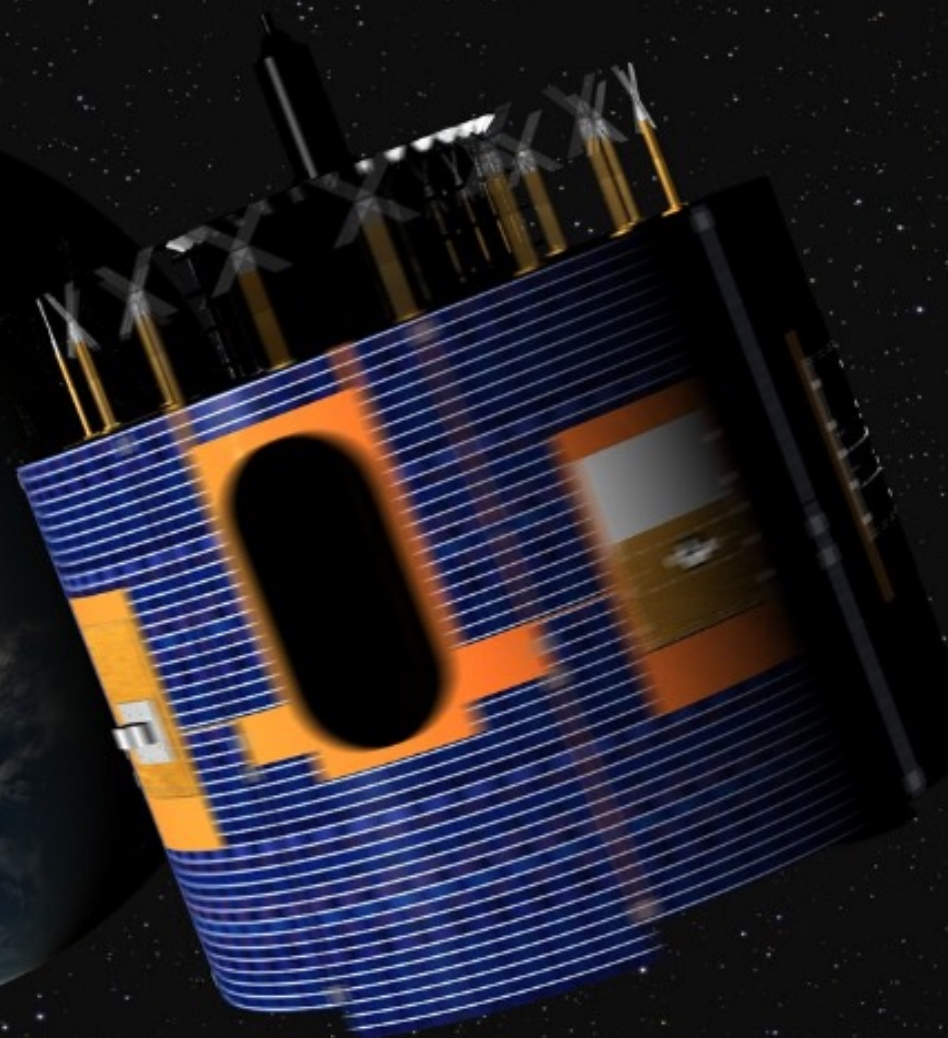
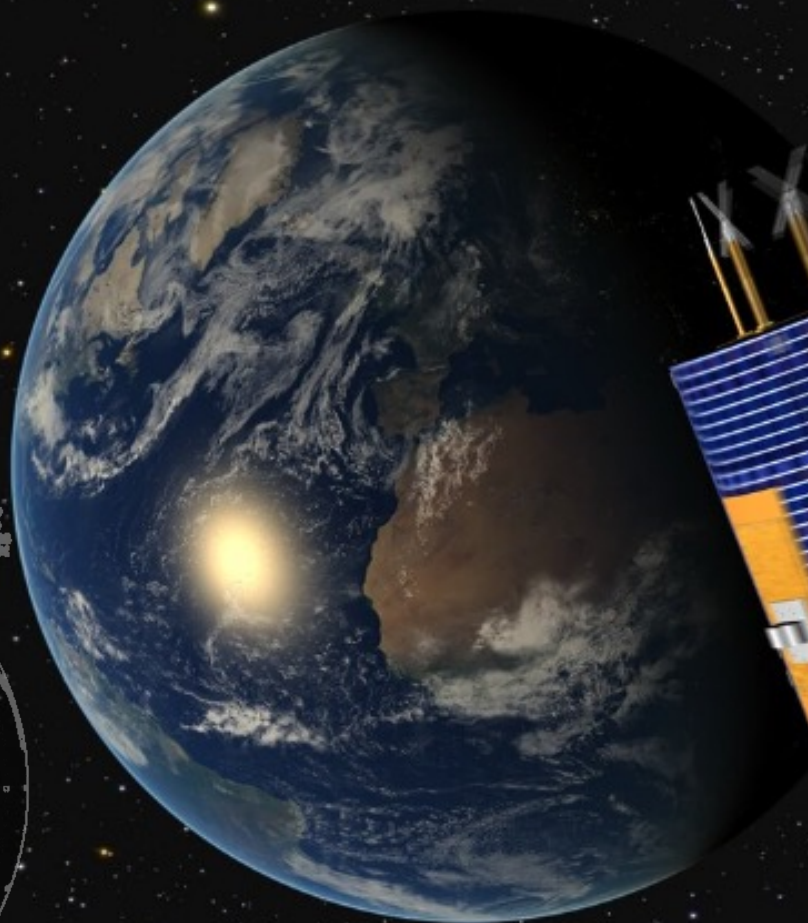
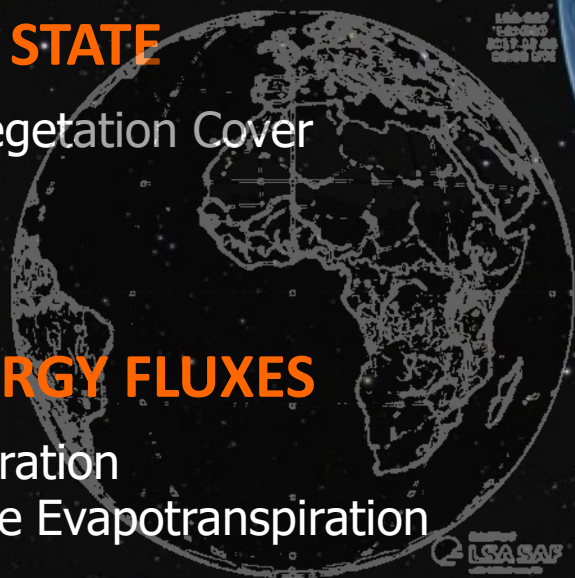
fAPAR

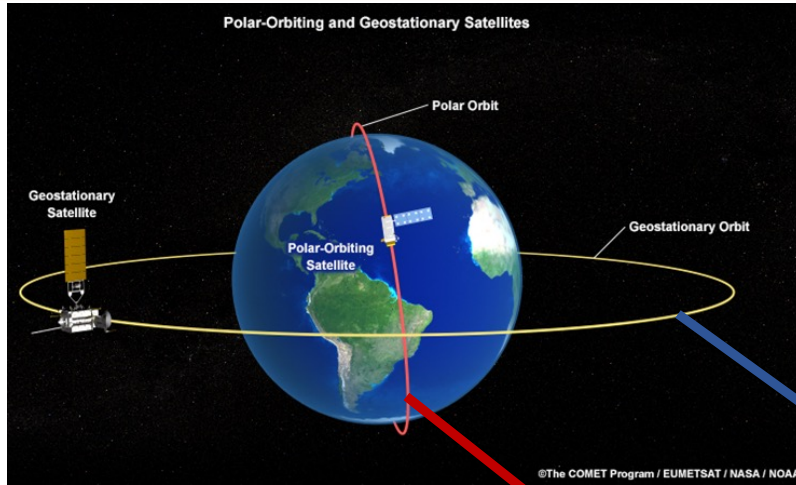
LAI

SURFACE ENERGY FLUXES

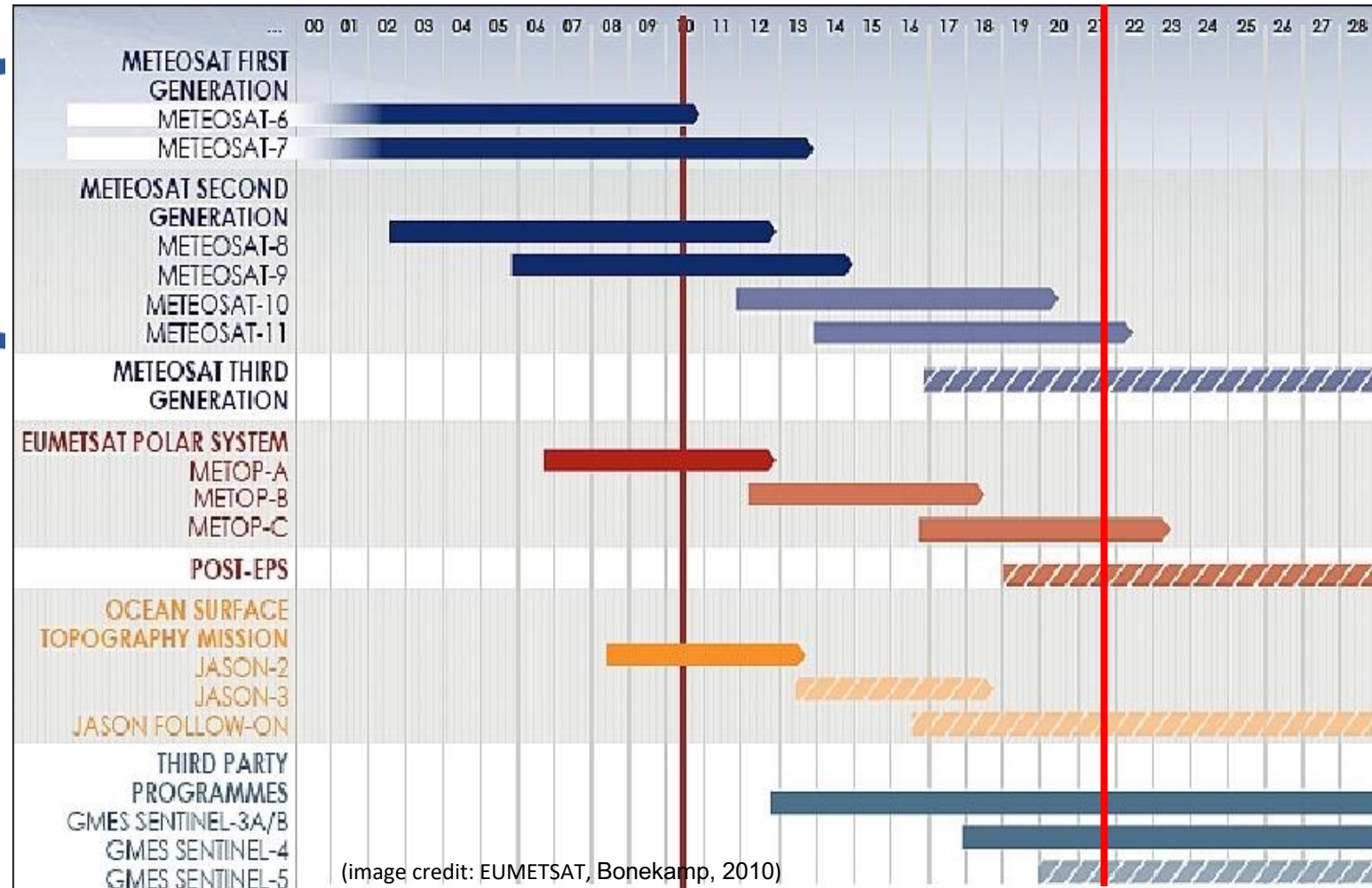
ET: Evapotranspiration

ETREF: Reference Evapotranspiration





EUMETSAT space segment



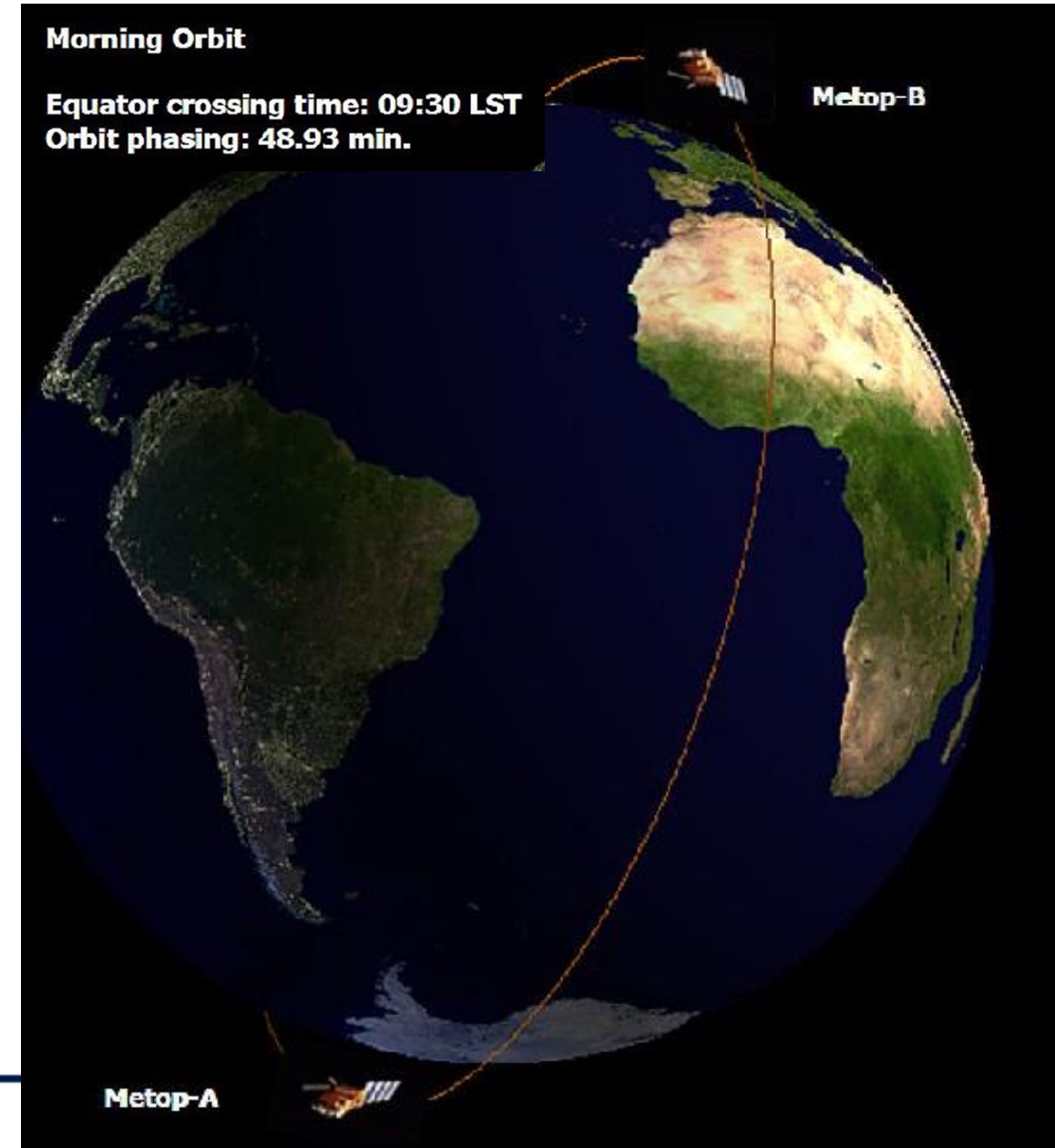
Metop (EUM Polar-Orbiter)

Advanced Very High-Resolution Radiometer (AVHRR)

- 5 channels
- 2 observations/day GLOBAL
- c.a. 1 km at sub-satellite point

Metop (Polar-Orbit) – Payload:

- AVHRR
- HIRS
- AMSU-A



SURFACE RADIATION BUDGET

EPS LST: Land Surface Temperature

EPS AL: Albedo

VEGETATION STATE

FVC: Fraction Vegetation Cover

fAPAR

LAI

NDVI



Climate Data Records

MSG/SEVIRI-based

Reprocessed from 2004 onwards using

- the latest product algorithms – in line with “Near Real Time” products
- recalibrated level 1.5 SEVIRI data

EPS/AVHRR-based

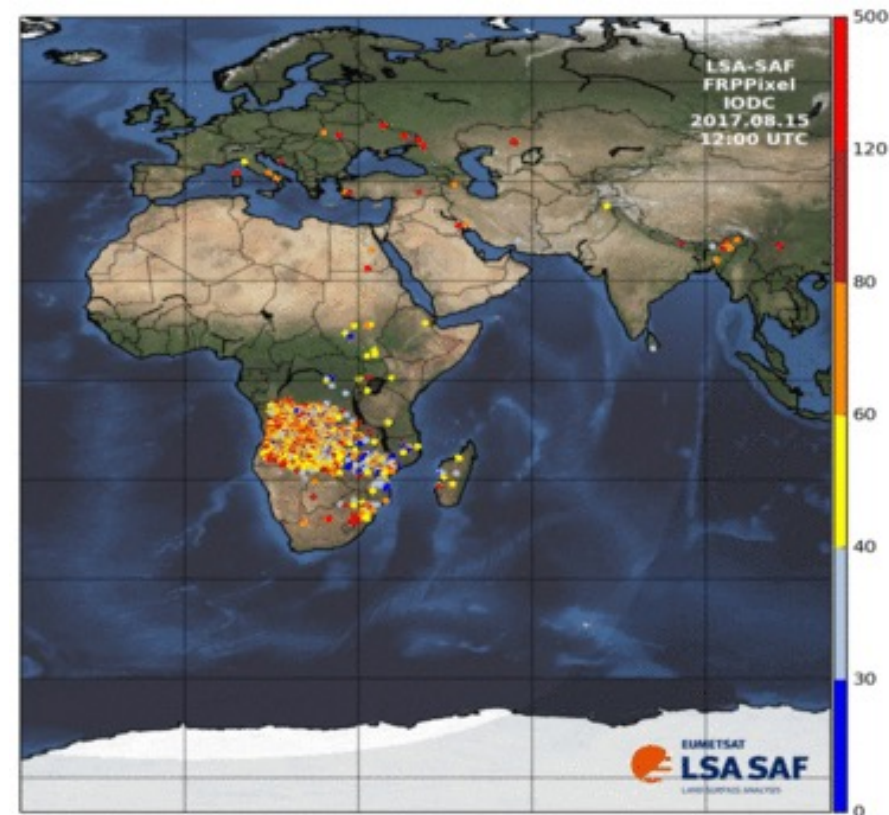
Reprocessed from 2007 onwards using

- the latest product algorithms – in line with “Near Real Time” products
- level 1b AVHRR data

Atmospheric Fields: ERA-5

Product Generation, Archiving & Distribution for Indian Ocean Data Coverage (IODC)

- To be continued under a best effort basis, i.e., distributed as “Demo Products” ...
- ... to limit the number reviews.



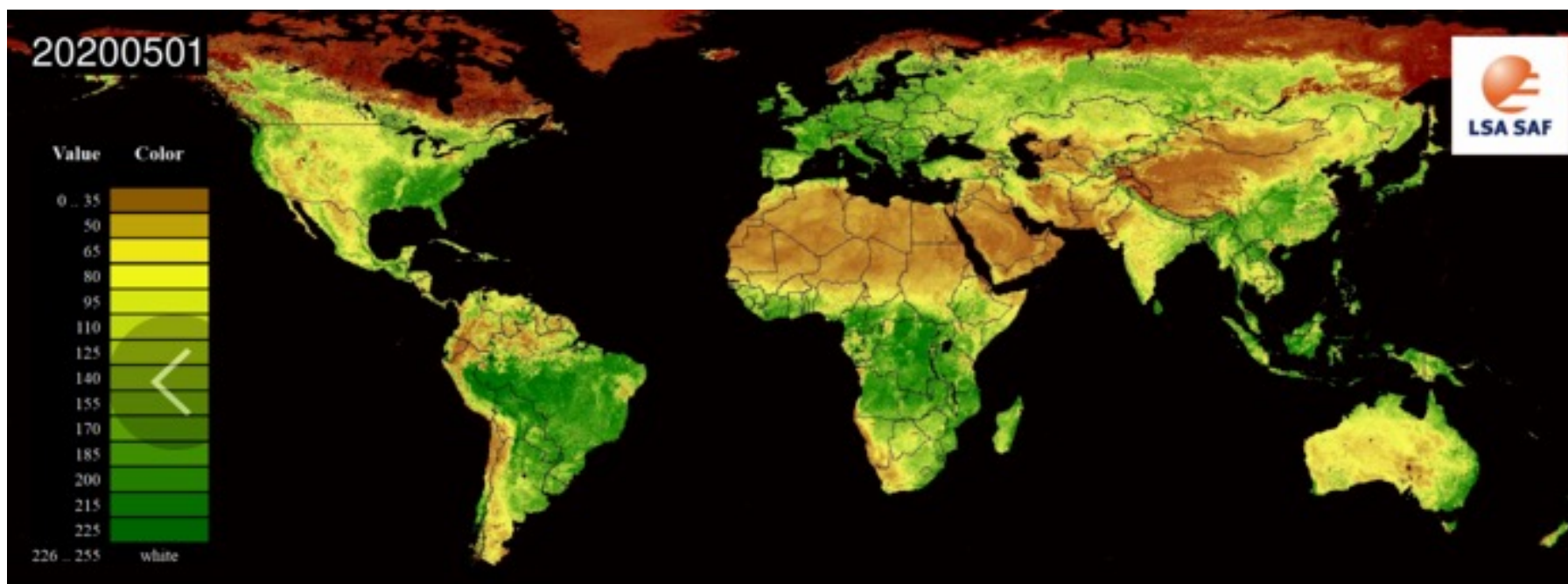
LSA-SAF (EPS Products)



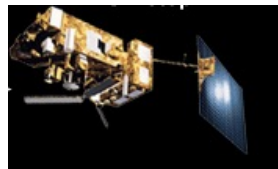
NDVI

10 days

2007 - Present



LSA-SAF (EPS Products)

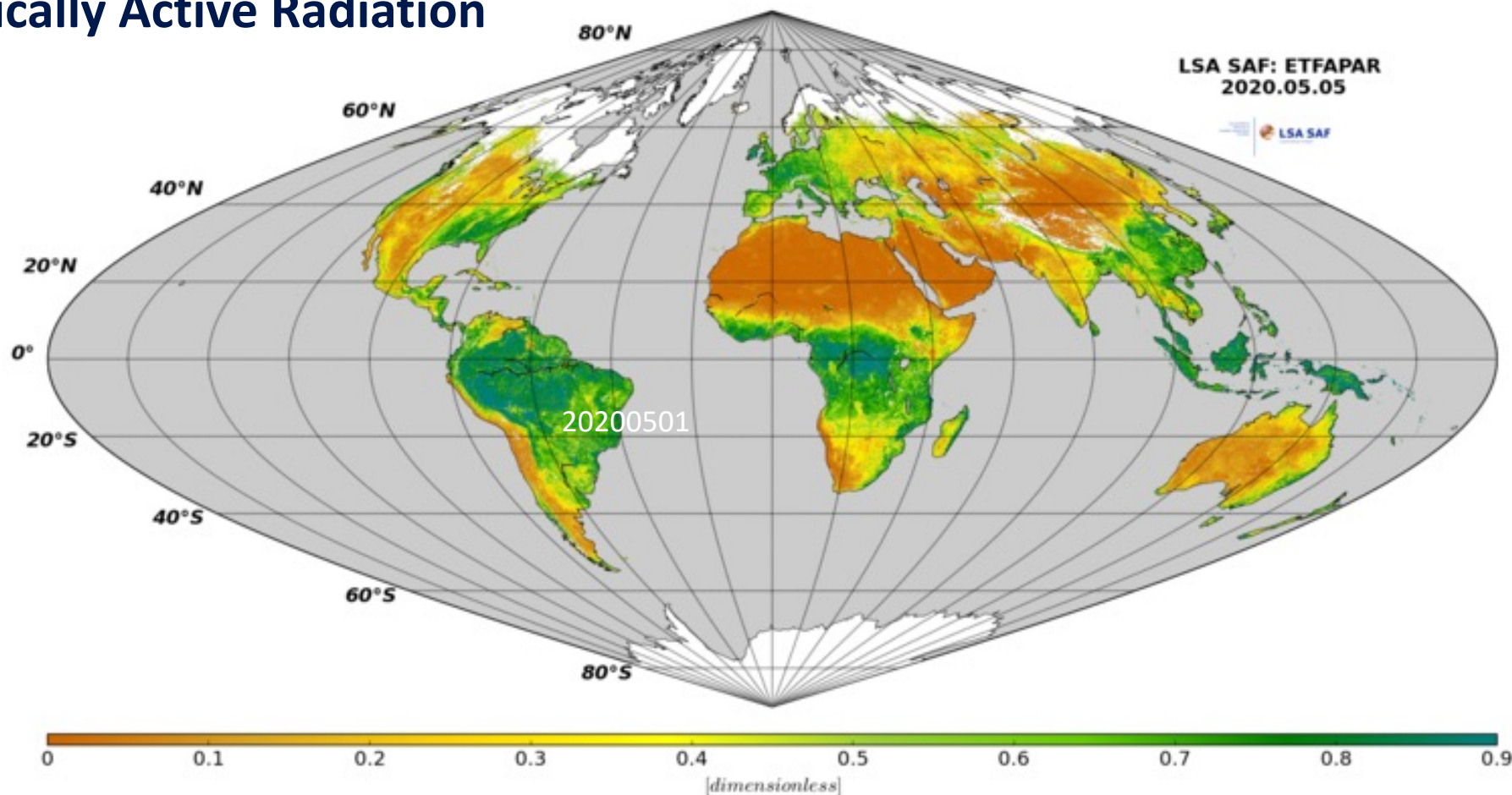


Fraction of Photosynthetically Active Radiation (fAPAR)

Daily/10 days since 2007

Fraction of radiation in the PAR region ($0.4 \mu\text{m} - 0.7 \mu\text{m}$) absorbed by the green parts of the canopy for the photosynthesis – indicator of the presence and productivity of alive elements of the canopy.

Depends canopy structure, Leaf and soil optical properties, Irradiance conditions

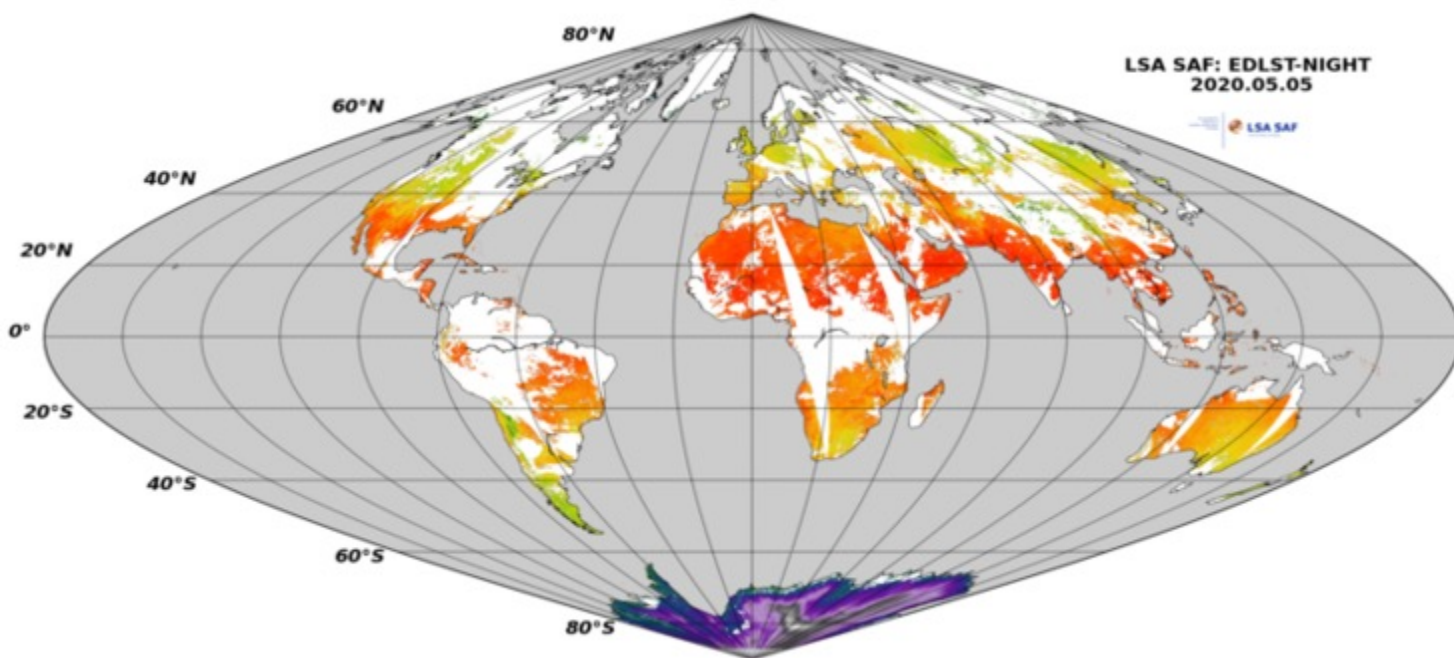
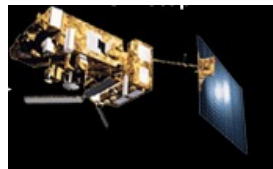


LSA-SAF (EPS Products)

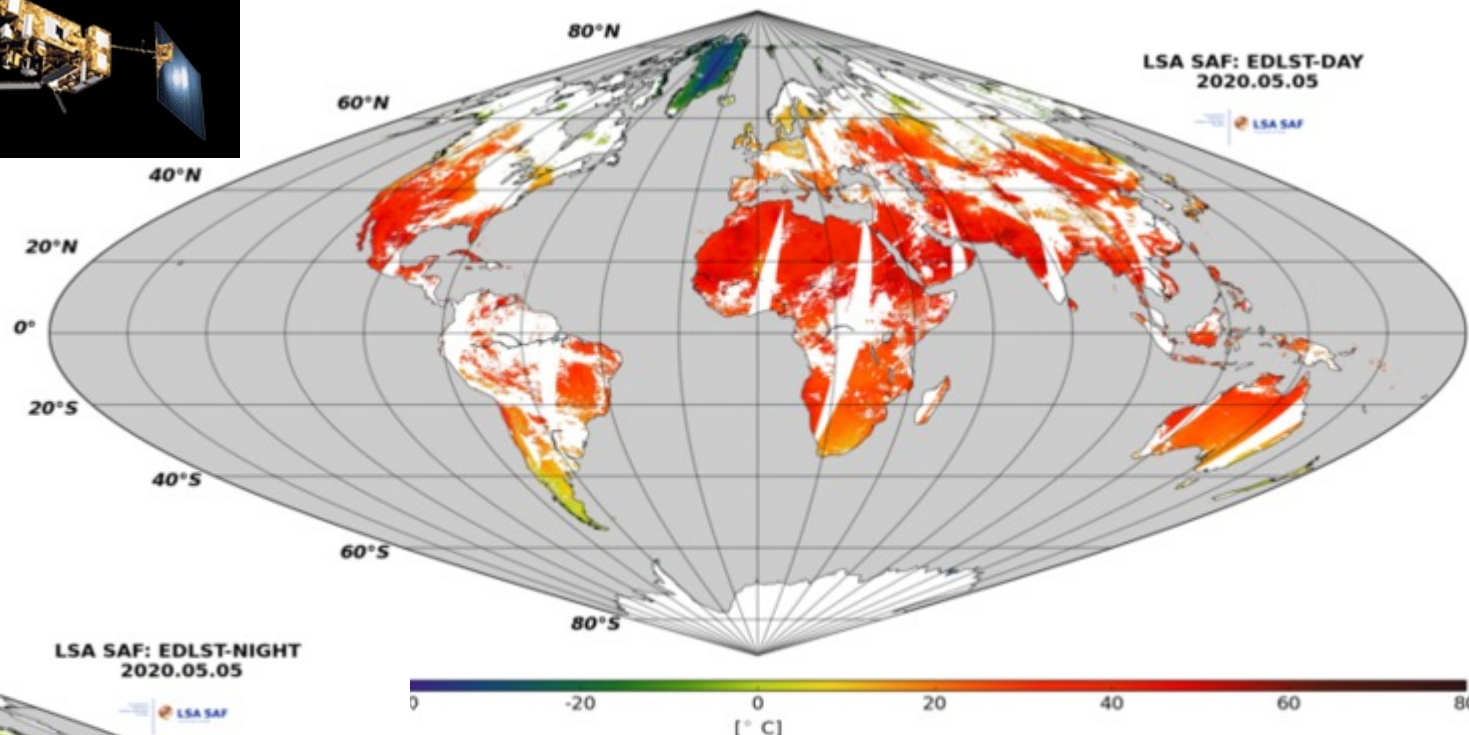
LST

Daily: Day and Night

2007-2020 (will be available begin 2021)



LSA SAF: EDLST-NIGHT
2020.05.05

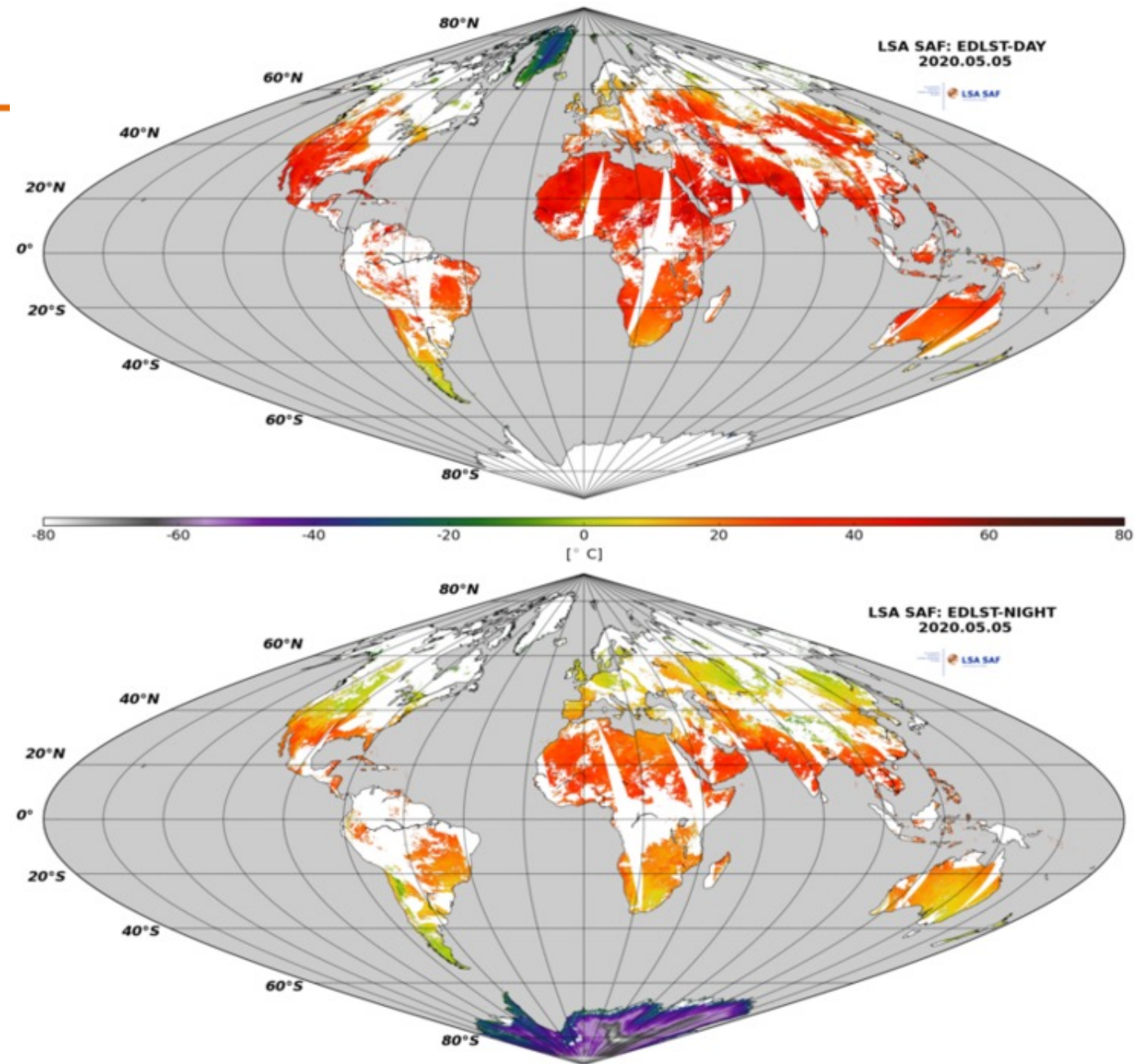


LSA SAF: EDLST-DAY
2020.05.05



The **EDLST (EPS Daily Land Surface Temperature)** provides a day-time and night-time retrievals of LST based on clear-sky measurements from the Advanced Very High Resolution Radiometer (AVHRR) on-board EUMETSAT polar system satellites, the METOP series.

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LSA-SAF (MSG Products)

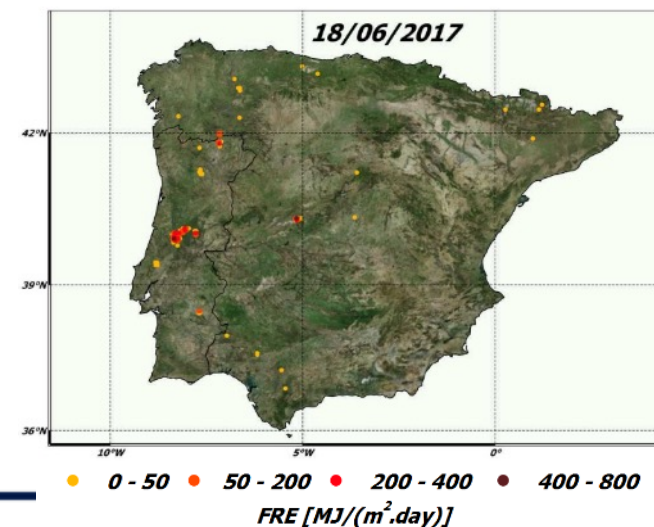
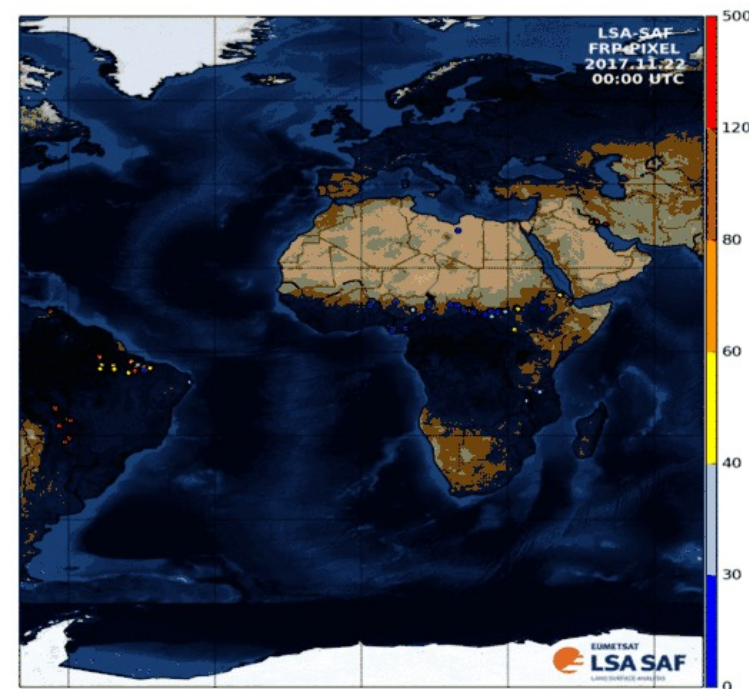


Fire Radiative Power (FRP)

The product records information on the location, timing and fire radiative power (**FRP**, in **MWatt**) of landscape fires detected every **15 minutes** across the full **Meteosat Disk** at the native spatial resolution of the SEVIRI sensor.

Integrating FRP over the lifetime of a fire provides an estimate of the total **Fire Radiative Energy (FRE)** released (proportional to the total amount of biomass burned).

Wildfires in Iberia: Portugal in June 2017.
Several very intense hot-spots (64 casualties).

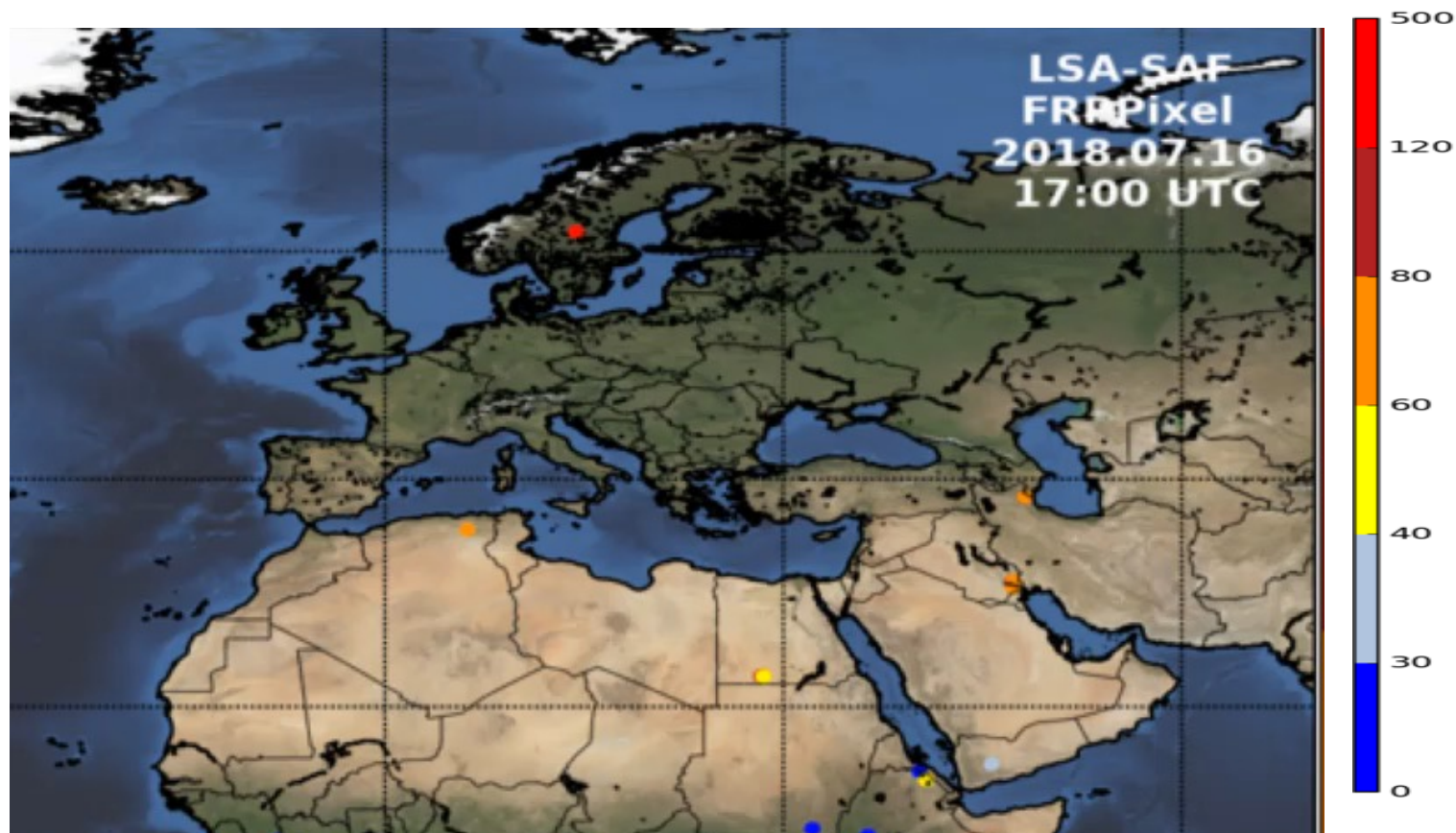


LSA-SAF (MSG Products)



Fire Radiative Power (FRP)

Wildfires in Sweden : 16th July 2018.



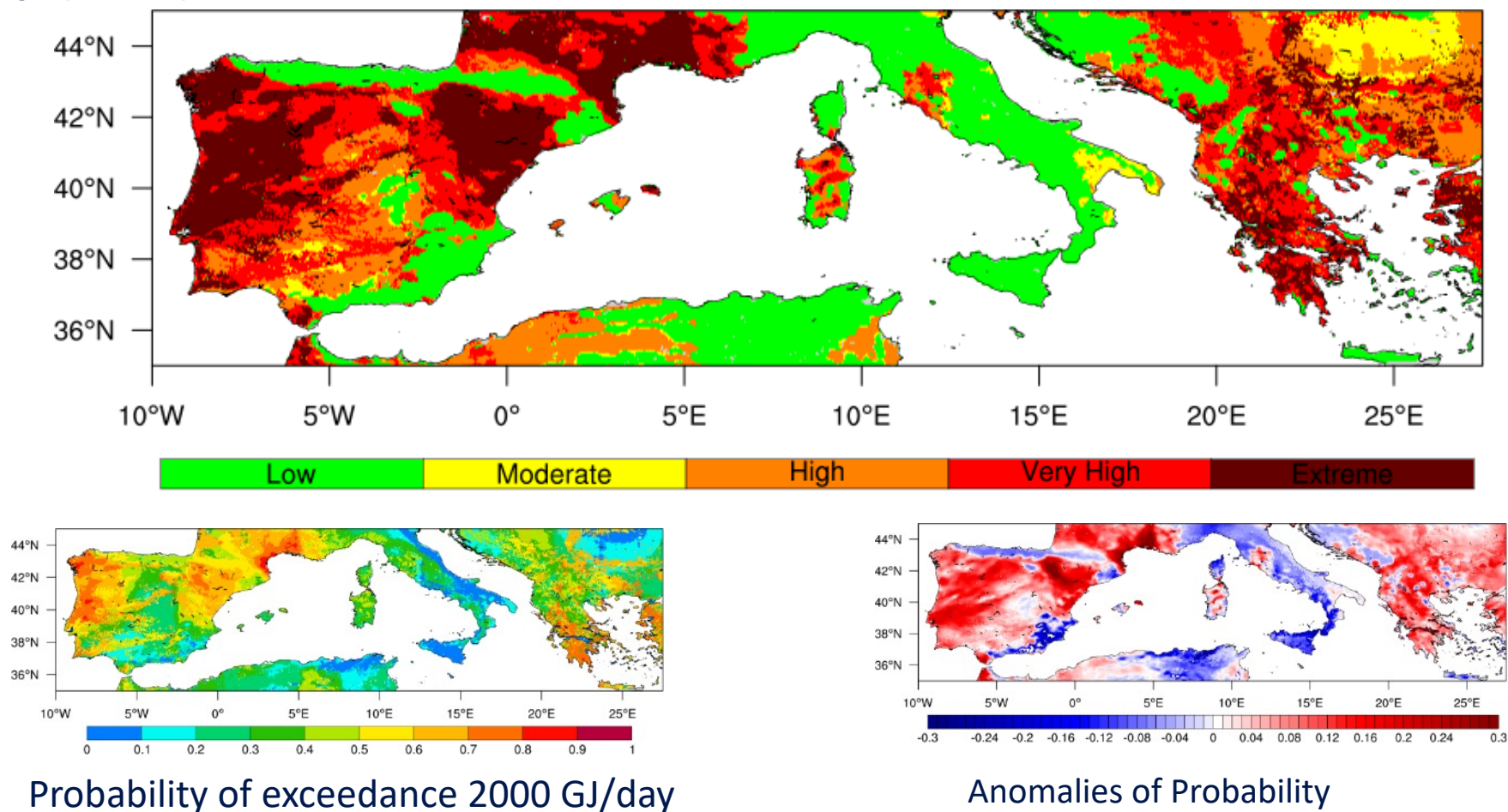
LSA-SAF (MSG Products)



Mediterranean Europe

5 days of forecasted risk

Fire Risk Map (FRM)



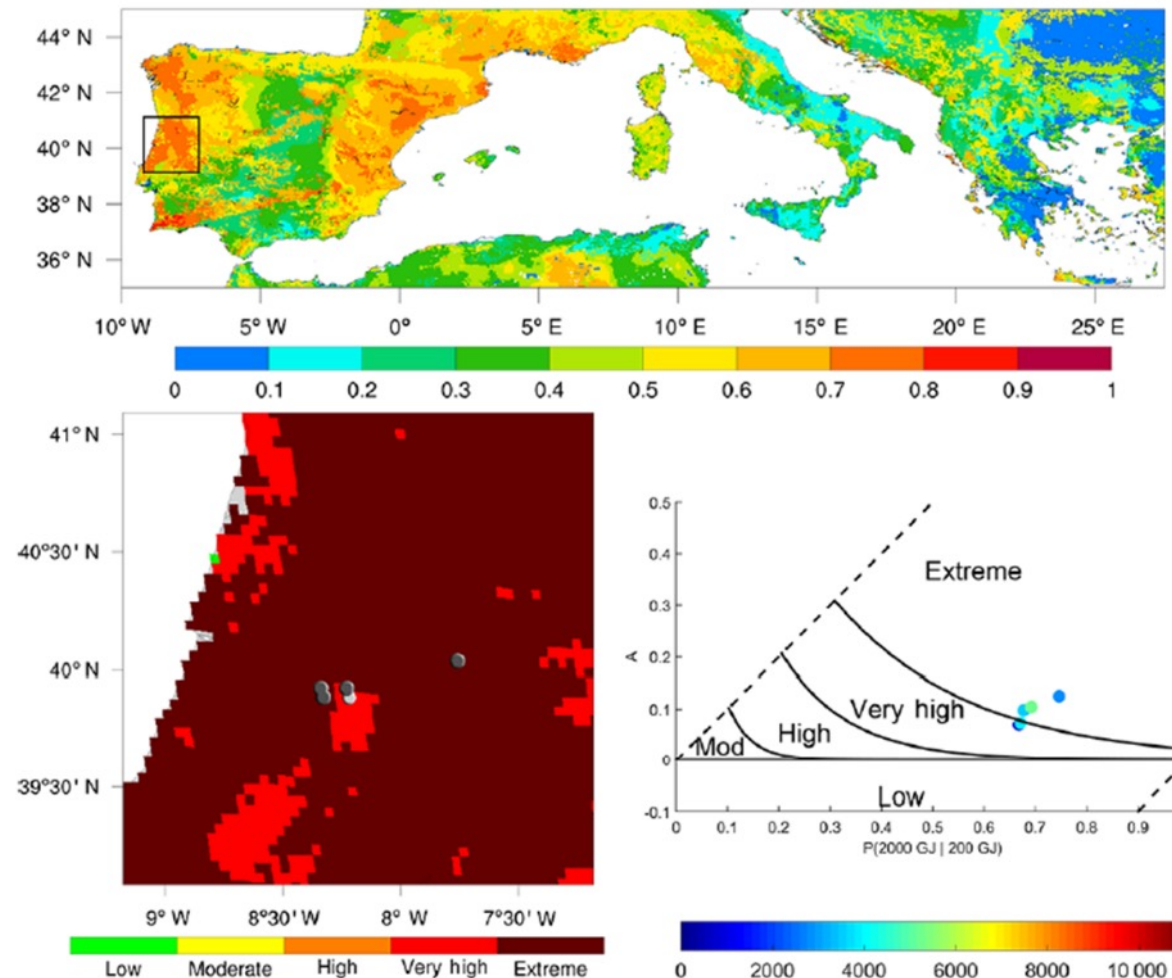
LSA-SAF (MSG Products)



Fire Risk Map (FRM)

Applications: Pedrogão Fire (Portugal)
18th June 2017

High Probability of exceedance and low
anomalies of probability



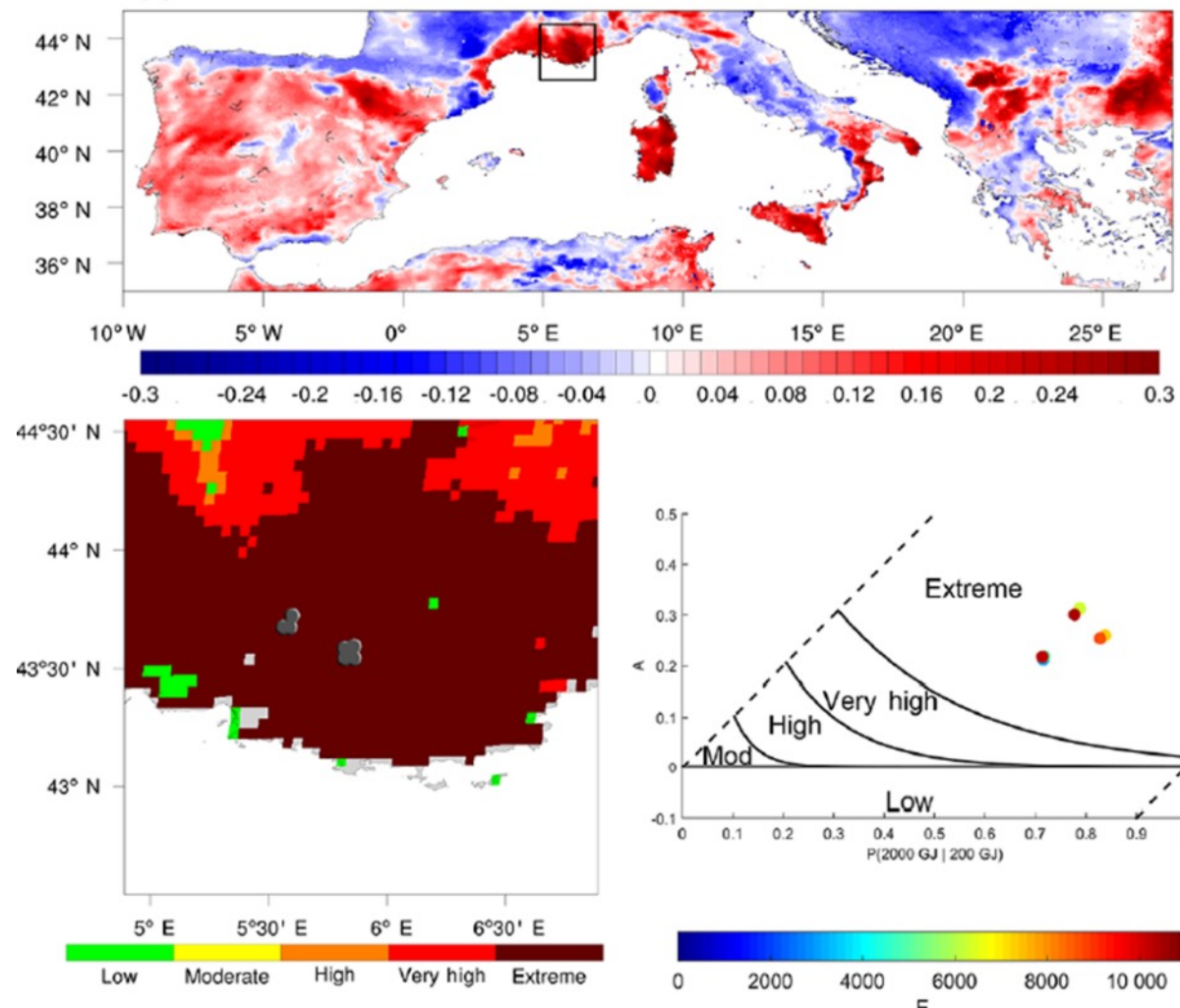
LSA-SAF (MSG Products)



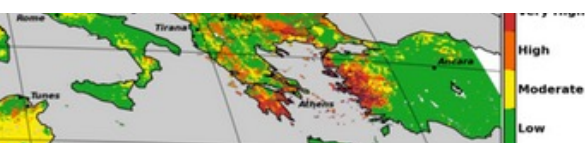
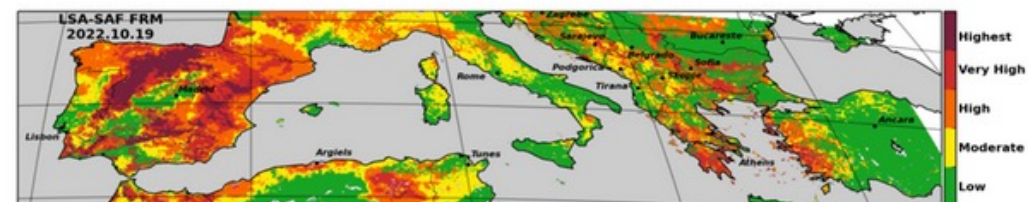
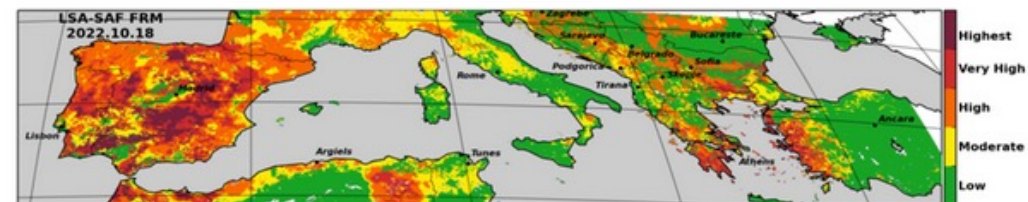
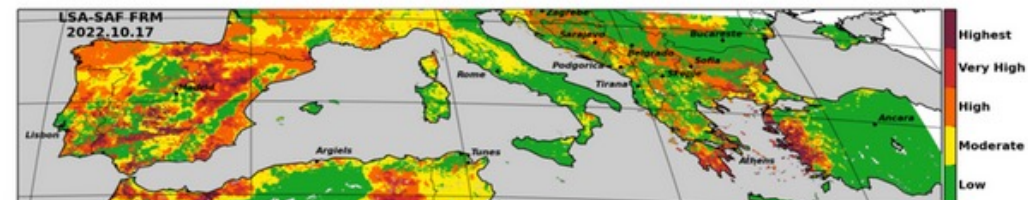
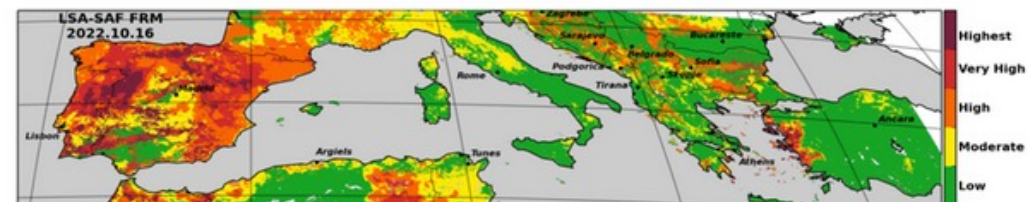
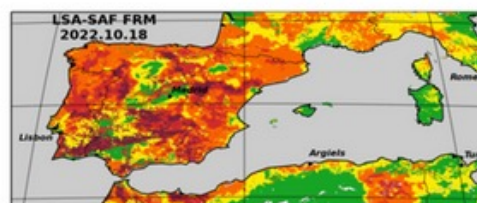
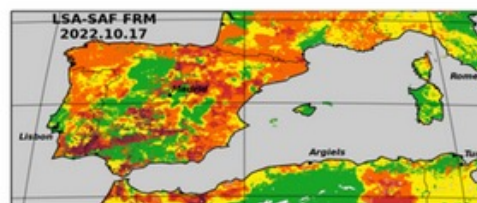
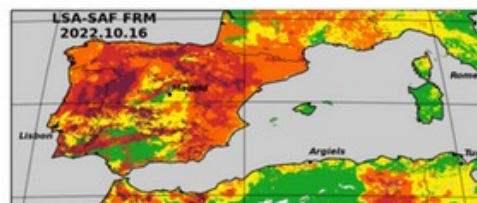
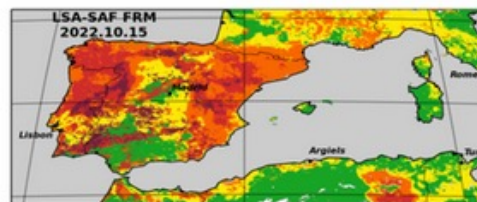
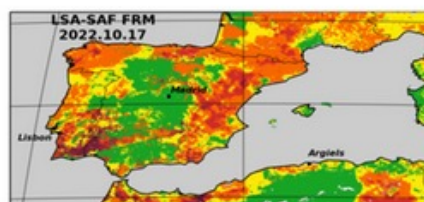
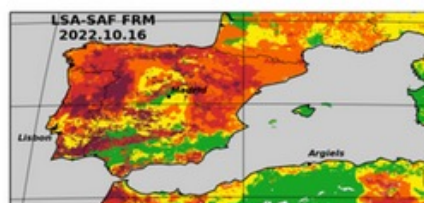
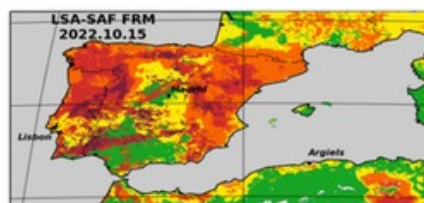
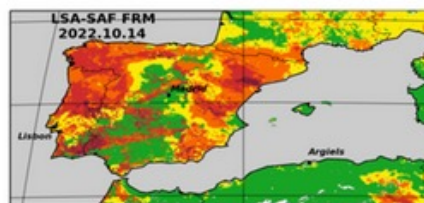
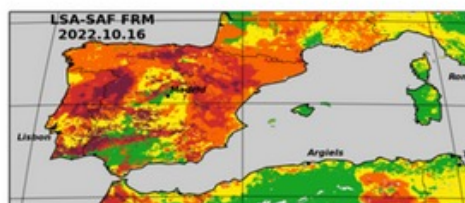
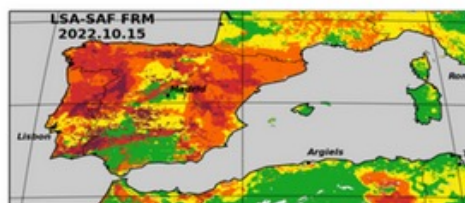
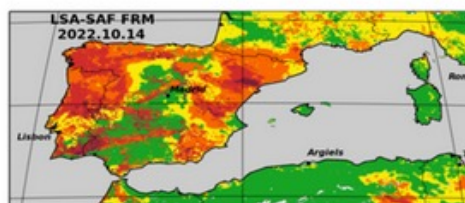
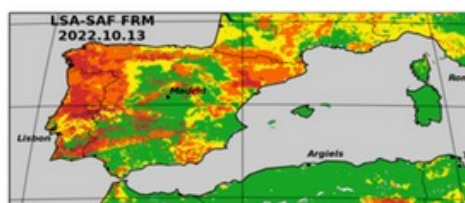
Fire Risk Map (FRM)

Applications: Marselha Fire (France)
25th June 2017

High anomalies of probability and high
probability of exceedance



Near Real Time Product Daily Forecast for 5 days



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[World](#)

Calamity: Extreme heat causing devastating wildfires across the country – Portugal

Posted on 16 August 2022.

Portugal has been under waves of extreme heat and severe drought, which continues to cause wildfires outbreaks throughout the country.

Starting August 6, intense fires have spread throughout Serra da Estrela, central Portugal, including the municipalities of Guarda, Manteigas and Covilhã.

On Tuesday, the smoke from the huge wildfires in Serra da Estrela enveloped skyscrapers in Madrid 400 km (250 miles) away, in Spain, it was reported.

Serra da Estrela, Portugal's largest natural protected area, is enduring the largest blaze in the country since 2018, reported the Institute for the Conservation of Nature and Forests.

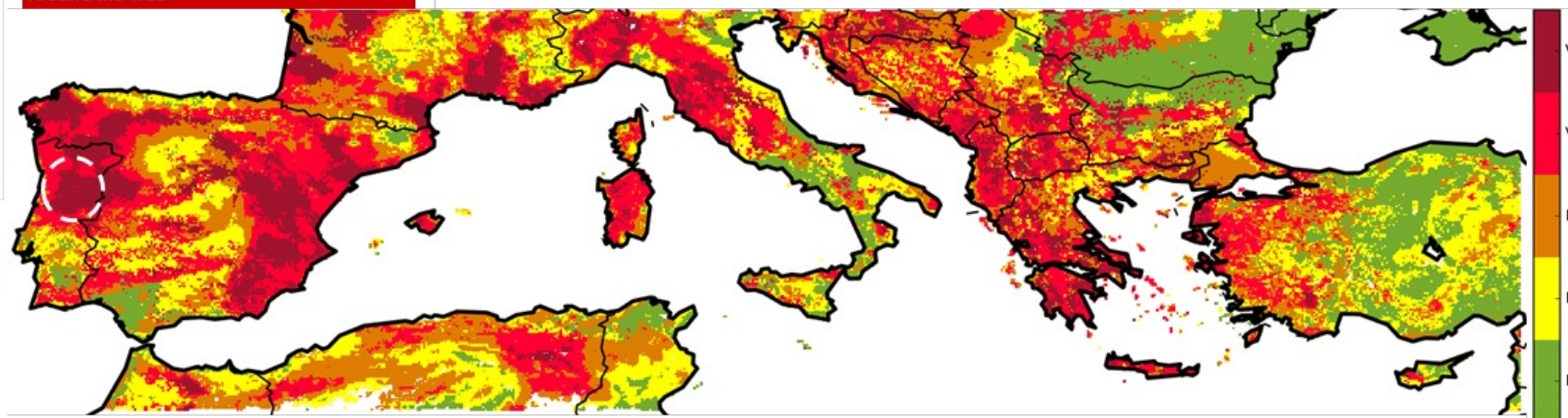


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Around the Web

06/08/2022



WORLD, MIDDLE EAST

Morocco puts out forest fires in 3 provinces

Firefighters struggle to extinguish wildfires in other regions

Khalid Mejdoup | 24.08.2022



World

Climate activists occupy
Finance Ministry
building in Germany

France faces massive
national strike on
Tuesday

Azerbaijan slams
Armenia for attempts to
evade commitments on
Zangezur corridor

20/08/2022

RABAT, Morocco

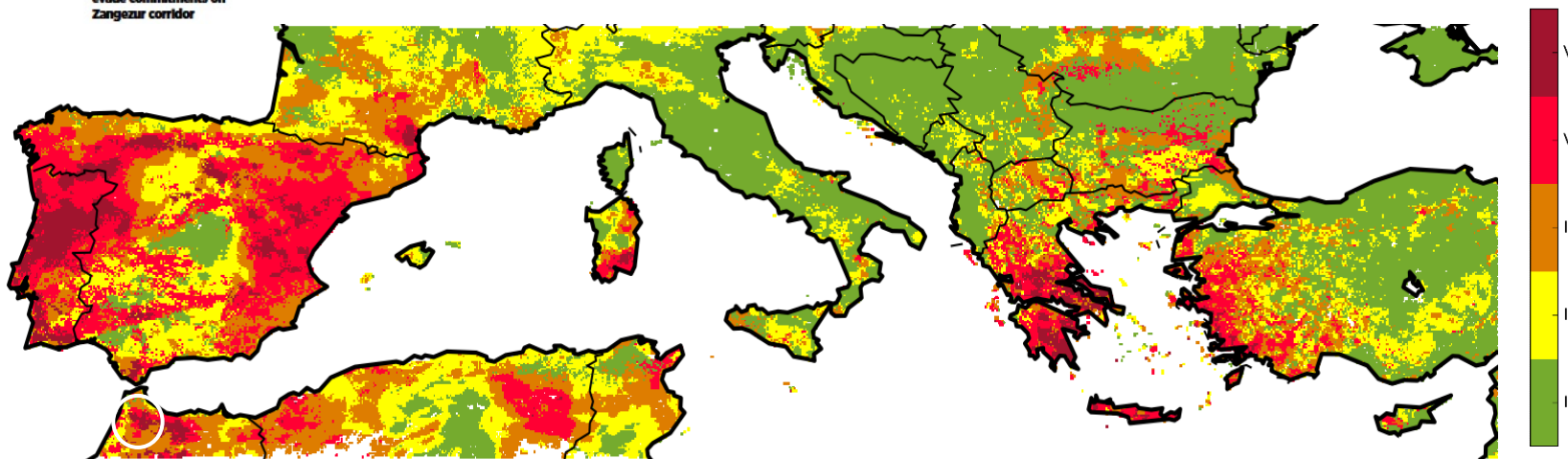
Moroccan authorities said on Wednesday that forest fires that broke out in three provinces had been brought under control.

A firefighter in the northern province of Ifrane told Anadolu Agency that rescue teams managed to extinguish the fires that erupted on Monday in Jabal Askar in the province before they spread to the provinces of El Hajeb and Azrou.

"Efforts continued unstopped for three days to contain the flames," he added on condition of anonymity because he was not authorized to speak to the media.

Moroccan authorities had to evacuate a summer camp for more than 500 children in the Samim area near Azrou as the fires approached the Ifrane Airport before the flames were brought under control.

Meanwhile, local authorities are still struggling to extinguish forest fires in the provinces of Taounate and Hoceima, which have been raging for four days.





Theodore

August 15, 2022

August bridge displaced thousands of people in Alicante, Zaragoza and Ourense due to fires.



OPINION

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Despite a truce imposed by the heatwave across most of the country since Friday, several fires in Alicante, Castellón, Zaragoza and Ourense burned more than 10,000 hectares over the weekend and forced firefighters to evacuate thousands of people. On Sunday, however, firefighters in Zamora brought after more than 28 days of work, the most devastating this year and one of the worst

On Saturday, authorities declared a fire in Anón de Moncayo, Zaragoza, which has so hectares and forced emergency services to evacuate all residents of that town, as we urbanization and residents of Alcalá de Moncayo, Vera de Moncayo, El Buste, Ambe

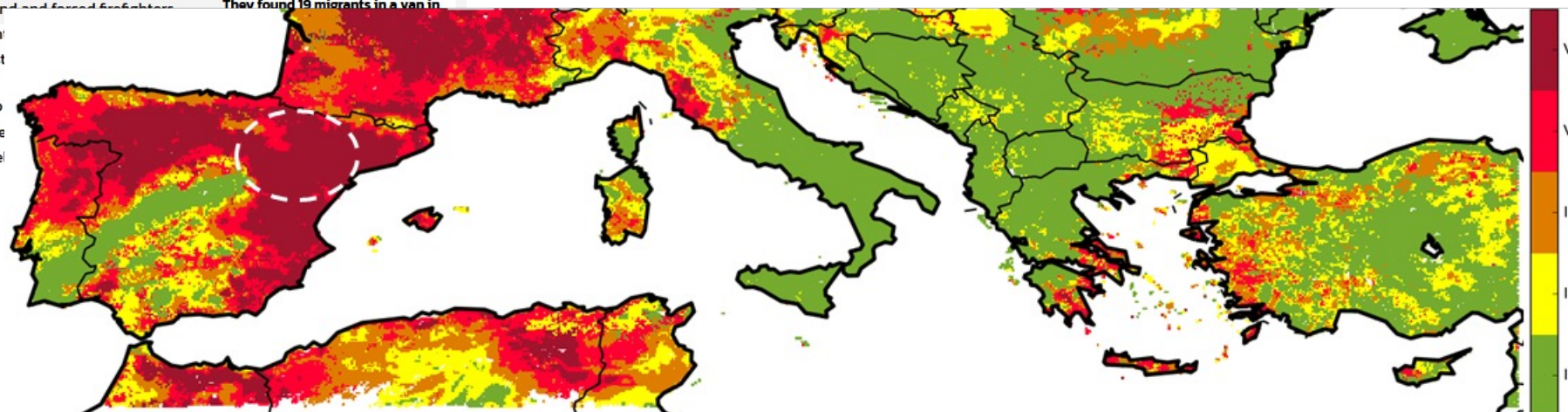
Latest

"Influencers" by Darien: A Human Tragedy Broadcasting on TikTok

October 17, 2022

They found 19 migrants in a van in

13/08/2022



July 18, 2022 4:54 AM
Agence France-Presse

France on Alert as Forest Fires Rage in Scorching Southwest Europe

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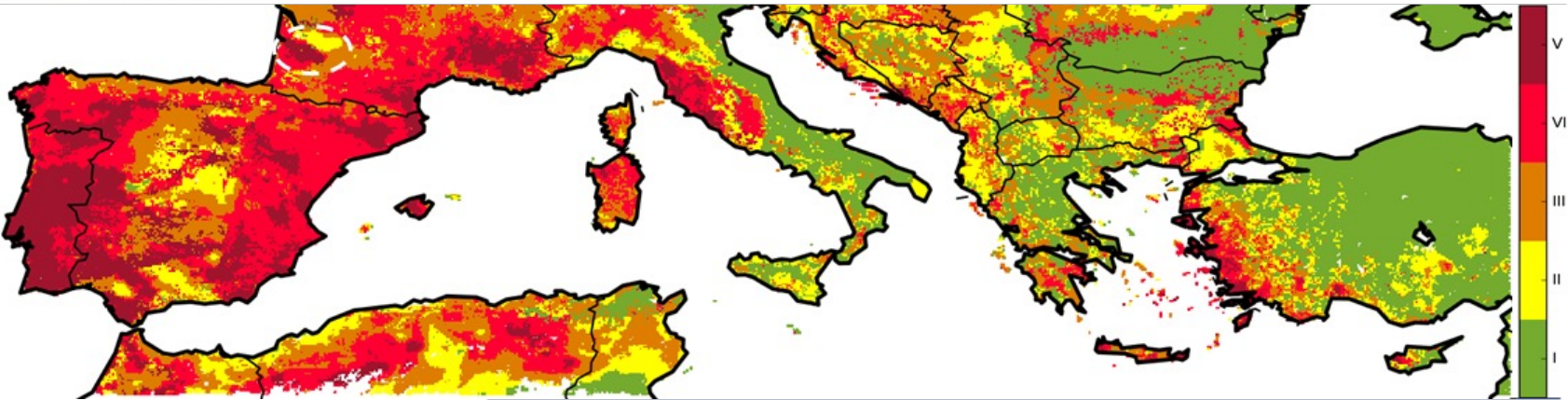


12/07/2022

This photo provided by the fire brigade of the Gironde region Sunday July 17, 2022

France was on high alert on Monday as the peak of a period of extreme heat across the country, while wildfires raging in parts of southwest France were beginning to abate.

Forecasters have put 15 French departments on the highest alert for extreme temperatures as neighboring Britain was poised for a similar heatwave this coming week.



EPS – Second Generation

- Metop-SG A1 to be launched in 2024
 - ✓ Visible Infrared Imager (20 channels; 500m)
 - ✓ 3MI – Multi-spectral, Multi-angle, Multi-polarization
 - ✓ Sentinel-5 (UVNS)
 - ✓ IASI-SG,

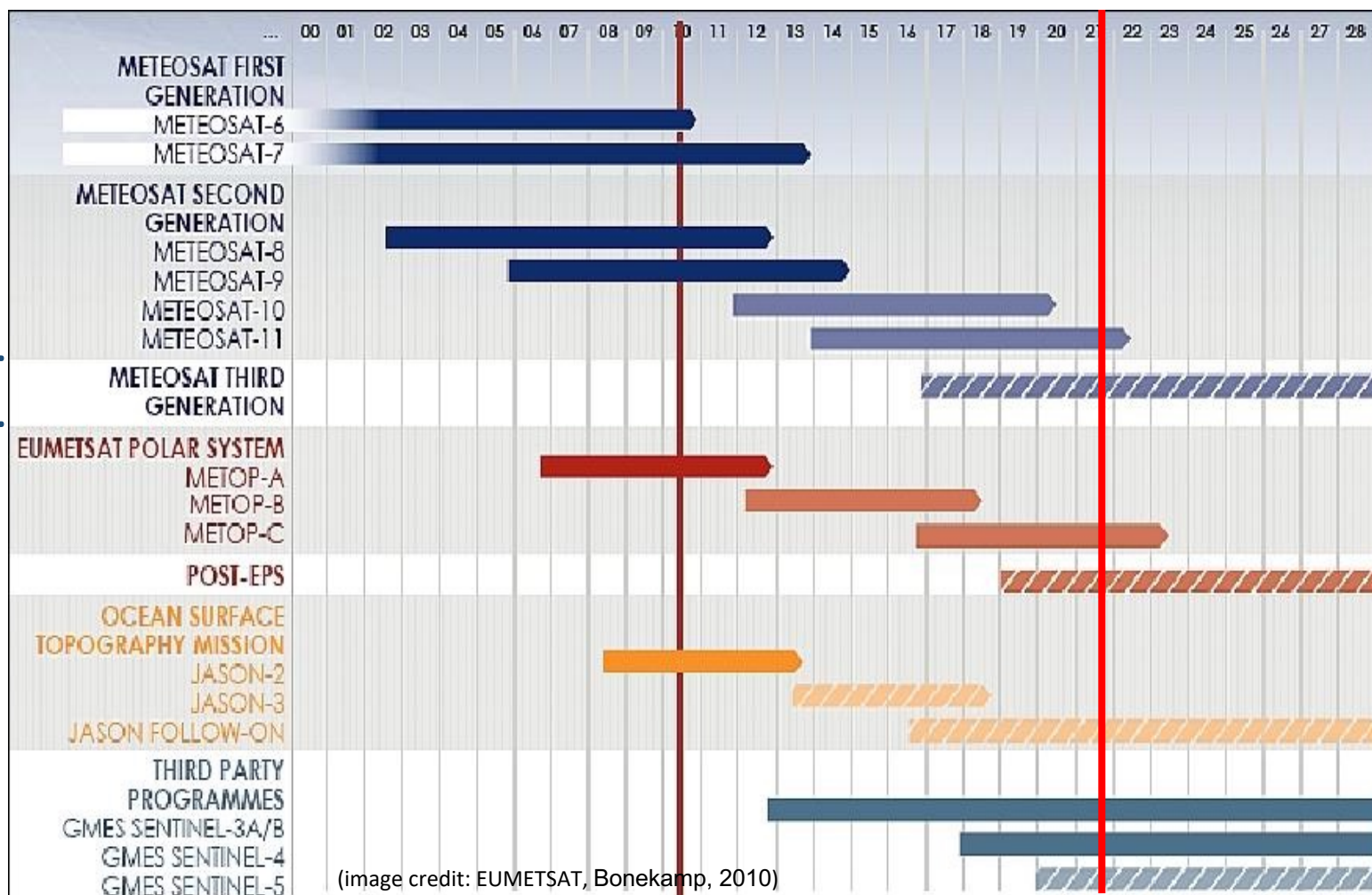
EPS – Second Generation

- Metop-SG B1 to be launched in 2024/2025
 - ✓ Microwave Imager Radiometer (MWI)
 - ✓ Ice Cloud Imager (ICI)
 - ✓ Scatterometer (SCA)
 - ✓ ...

Meteosat Third Generation

- MTG-I1 to be launched in 2023
 - ✓ Imager (16 channels; 1-2 km; 10-minute)
 - ✓ Lightning Imager
- MTG-S1 to be launched in 2023/2024
 - ✓ Infrared Sounder ($0.754/0.625 \text{ cm}^{-1}$; 30-60 minute)
 - ✓ Sentinel-4 (UV-VIS-NIR)

EUMETSAT space segment

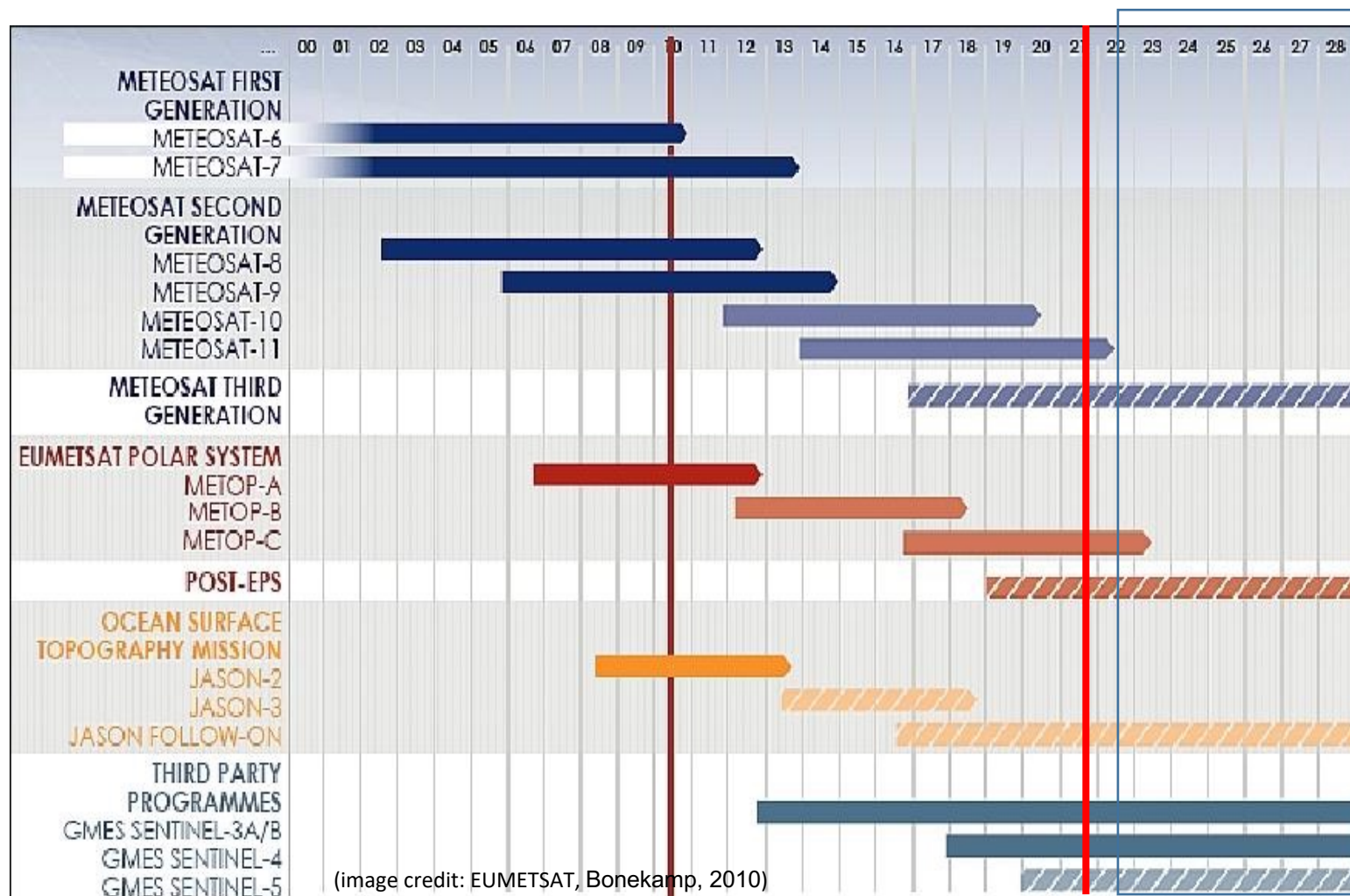


(image credit: EUMETSAT, Bonekamp, 2010)

New Products (High resolution)

Burnt Area
FRP

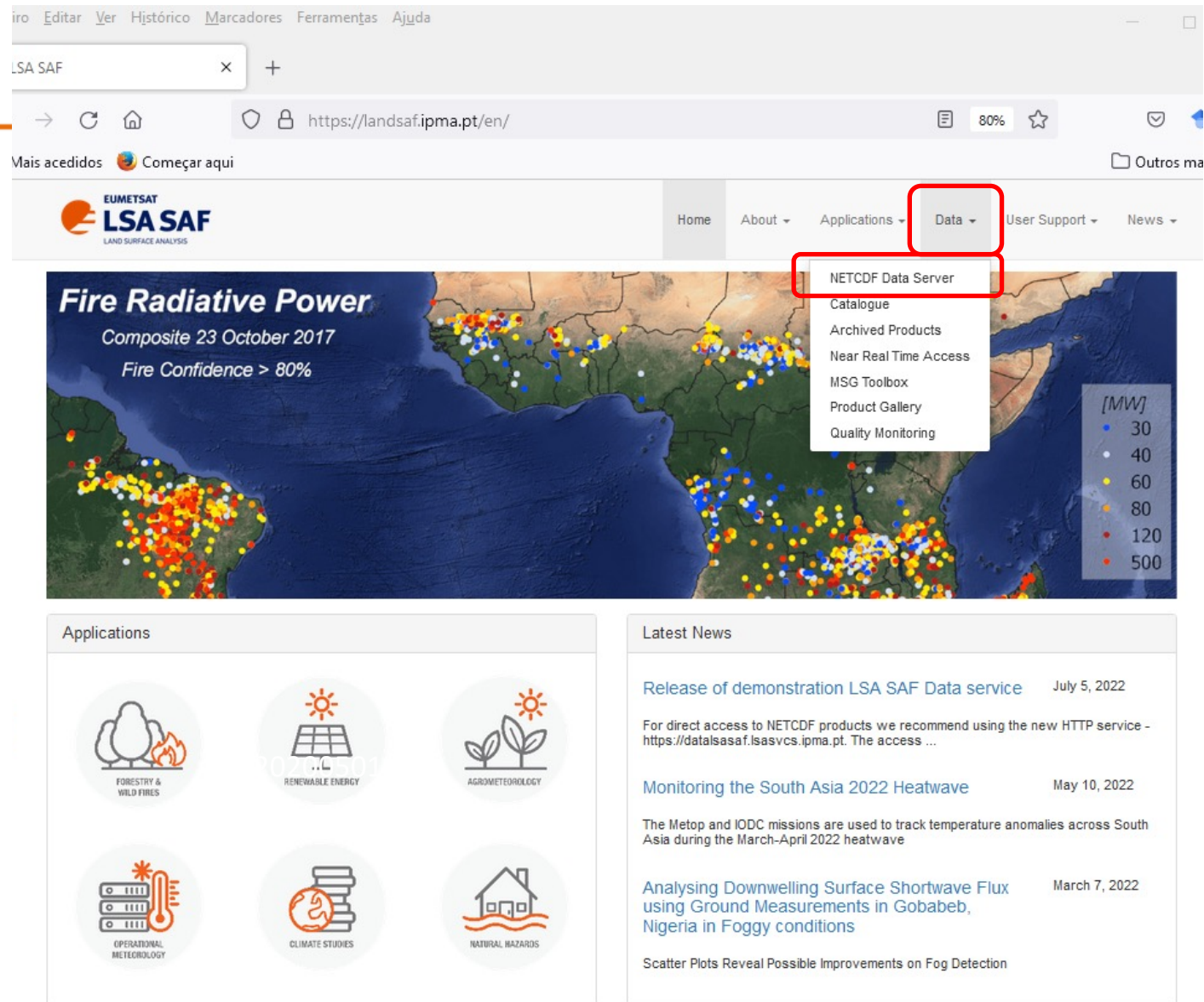
EUMETSAT space segment



How to access LSA-SAF data

LSA-SAF <https://landsaf.ipma.pt/en/>

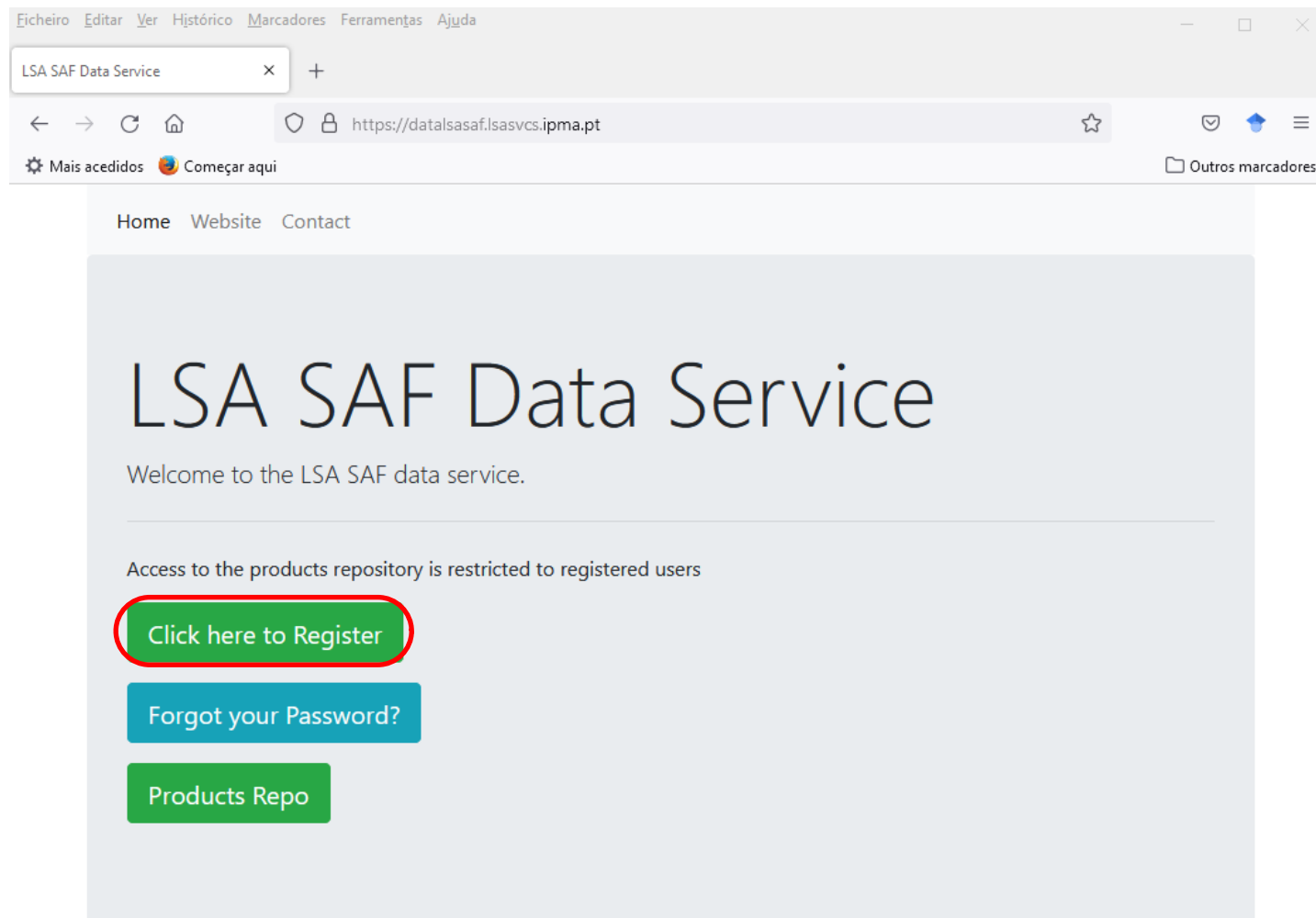
→ Data → NETCDF Data Server



The screenshot shows the LSA-SAF website interface. The top navigation bar includes links for Home, About, Applications, Data, User Support, and News. The 'Data' link is highlighted with a red box. A dropdown menu is open under 'Data', showing options: NETCDF Data Server, Catalogue, Archived Products, Near Real Time Access, MSG Toolbox, Product Gallery, and Quality Monitoring. The 'NETCDF Data Server' option is also highlighted with a red box. Below the navigation bar, there is a large map titled 'Fire Radiative Power' showing a composite for 23 October 2017 with a fire confidence greater than 80%. The map displays fire hotspots over Africa and Europe, with a color scale for radiative power in MW ranging from 30 to 500. Below the map, there are two sections: 'Applications' and 'Latest News'. The 'Applications' section features icons for Forestry & Wild Fires, Renewable Energy, Agrometeorology, Operational Meteorology, Climate Studies, and Natural Hazards. The 'Latest News' section lists recent updates, including the release of the demonstration LSA SAF Data service, monitoring of the South Asia 2022 Heatwave, and analysis of downwelling surface shortwave flux using ground measurements in Gobabeb, Nigeria.

How to access LSA-SAF data

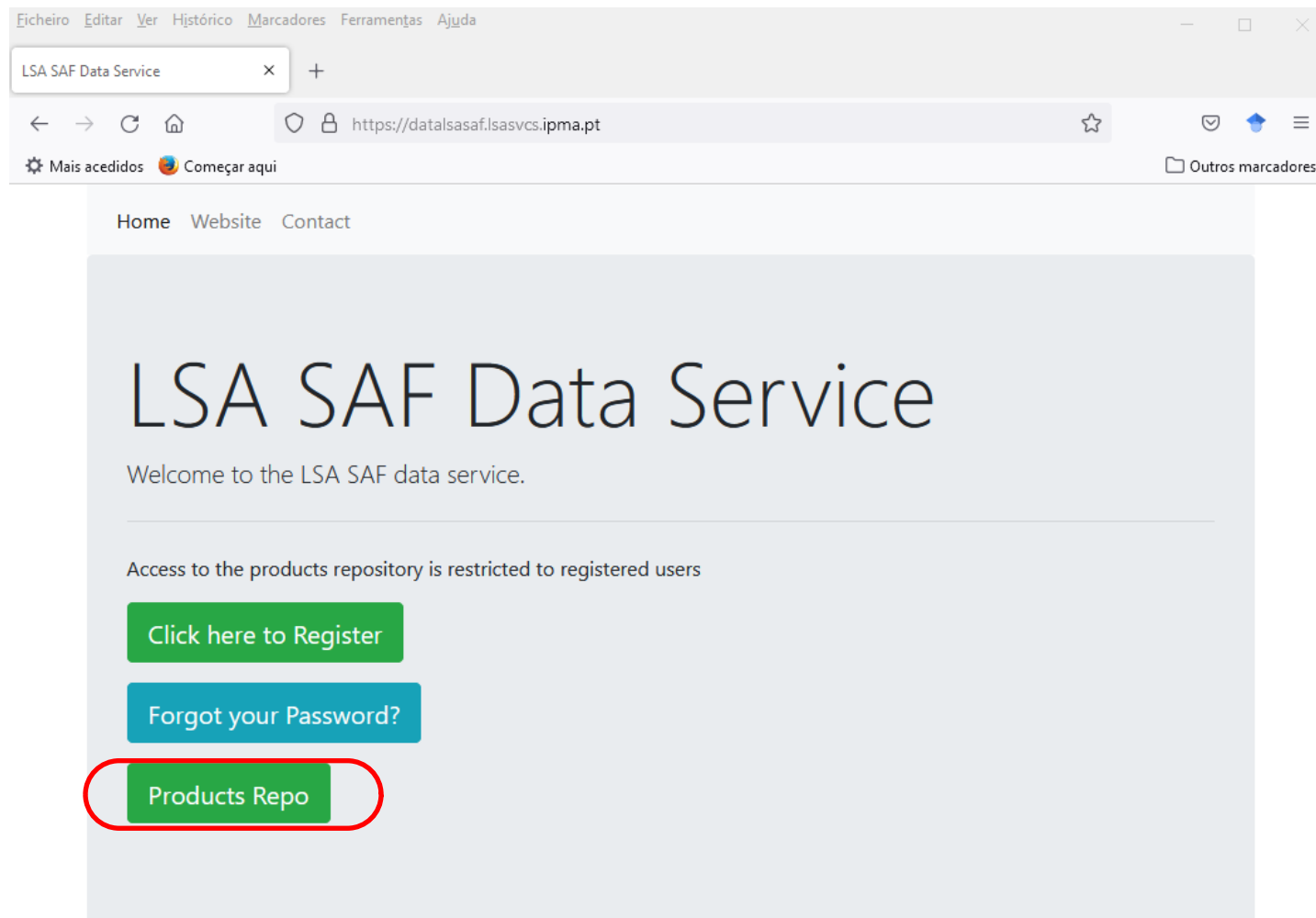
- Users must be registered
- Login with provided credentials



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How to access LSA-SAF data

→ Products Repo →

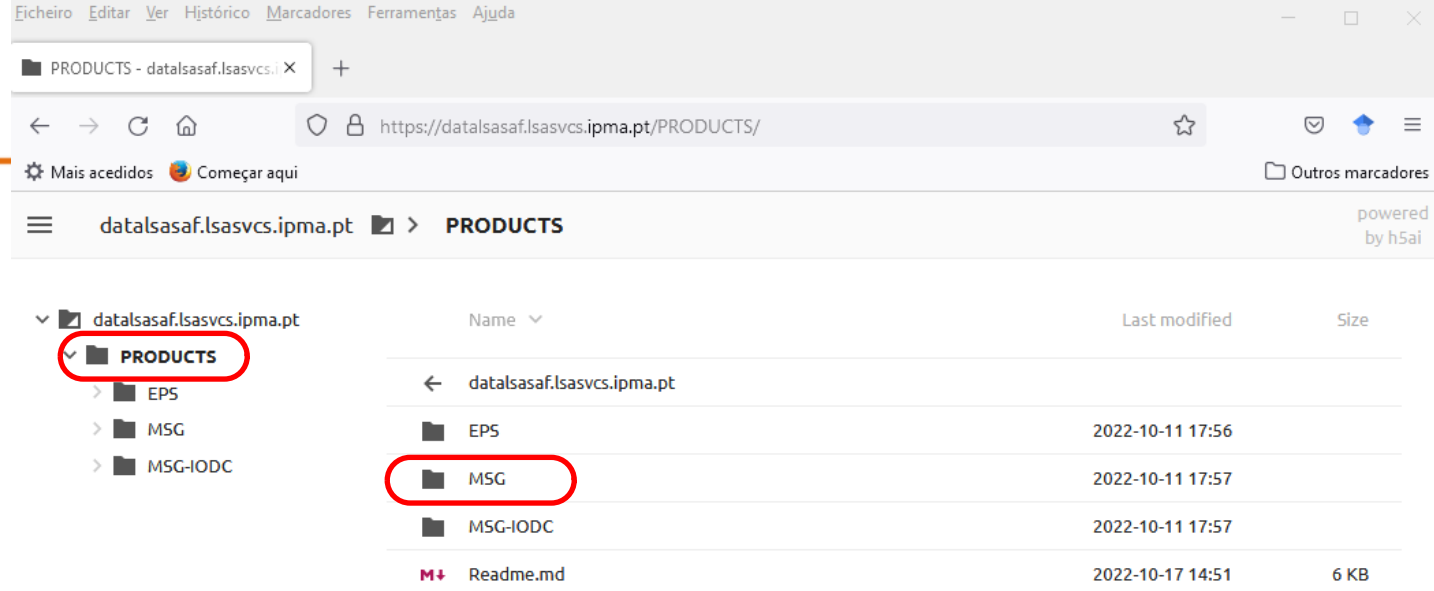


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How to access LSA-SAF data

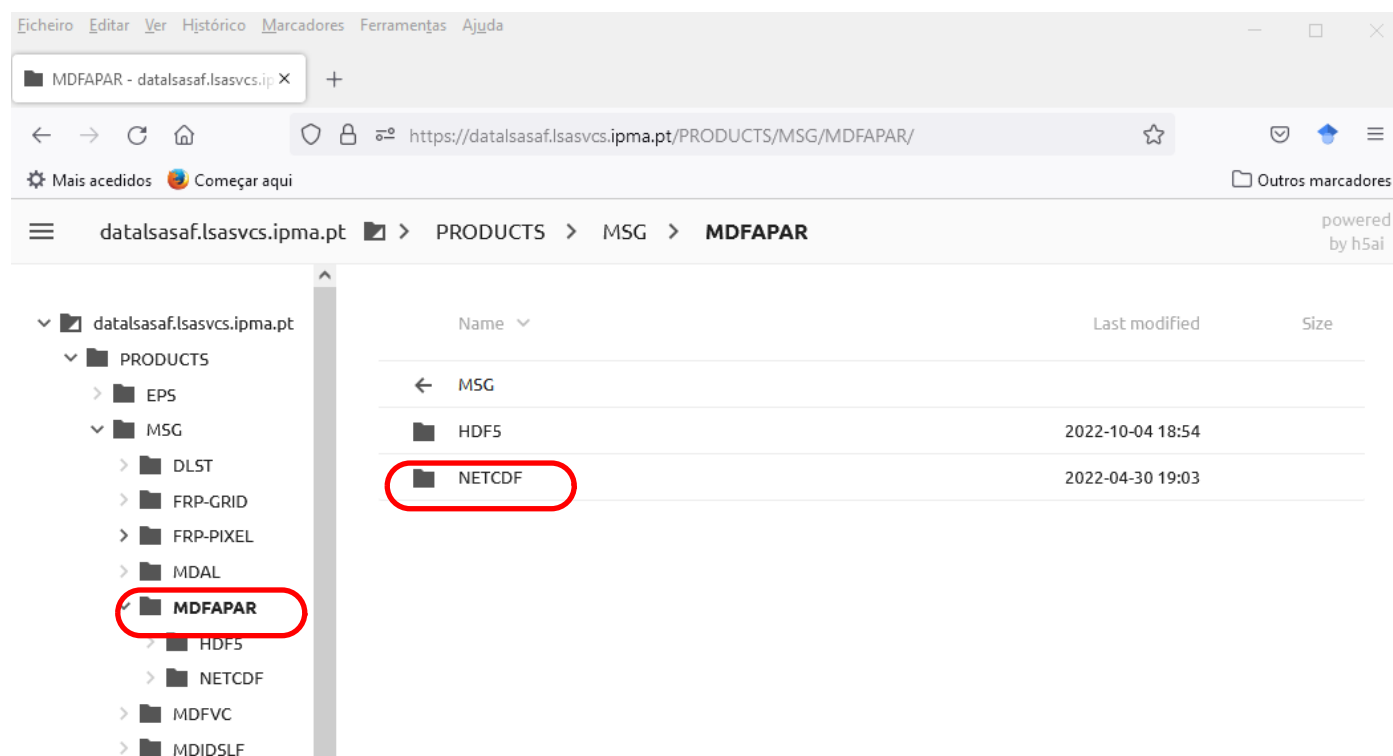
→ Products Repo → Products →
→ MSG → Products →

→ MDFAPAR → NETCDF →



The screenshot shows a web browser window with the URL <https://datalsasaf.lsasvcs.ipma.pt/PRODUCTS/>. The breadcrumb navigation shows **PRODUCTS**. The left sidebar shows a tree view with **PRODUCTS** selected. The main table lists the following items:

Name	Last modified	Size
← datalsasaf.lsasvcs.ipma.pt		
EPS	2022-10-11 17:56	
MSG	2022-10-11 17:57	
MSG-IODC	2022-10-11 17:57	
Readme.md	2022-10-17 14:51	6 KB

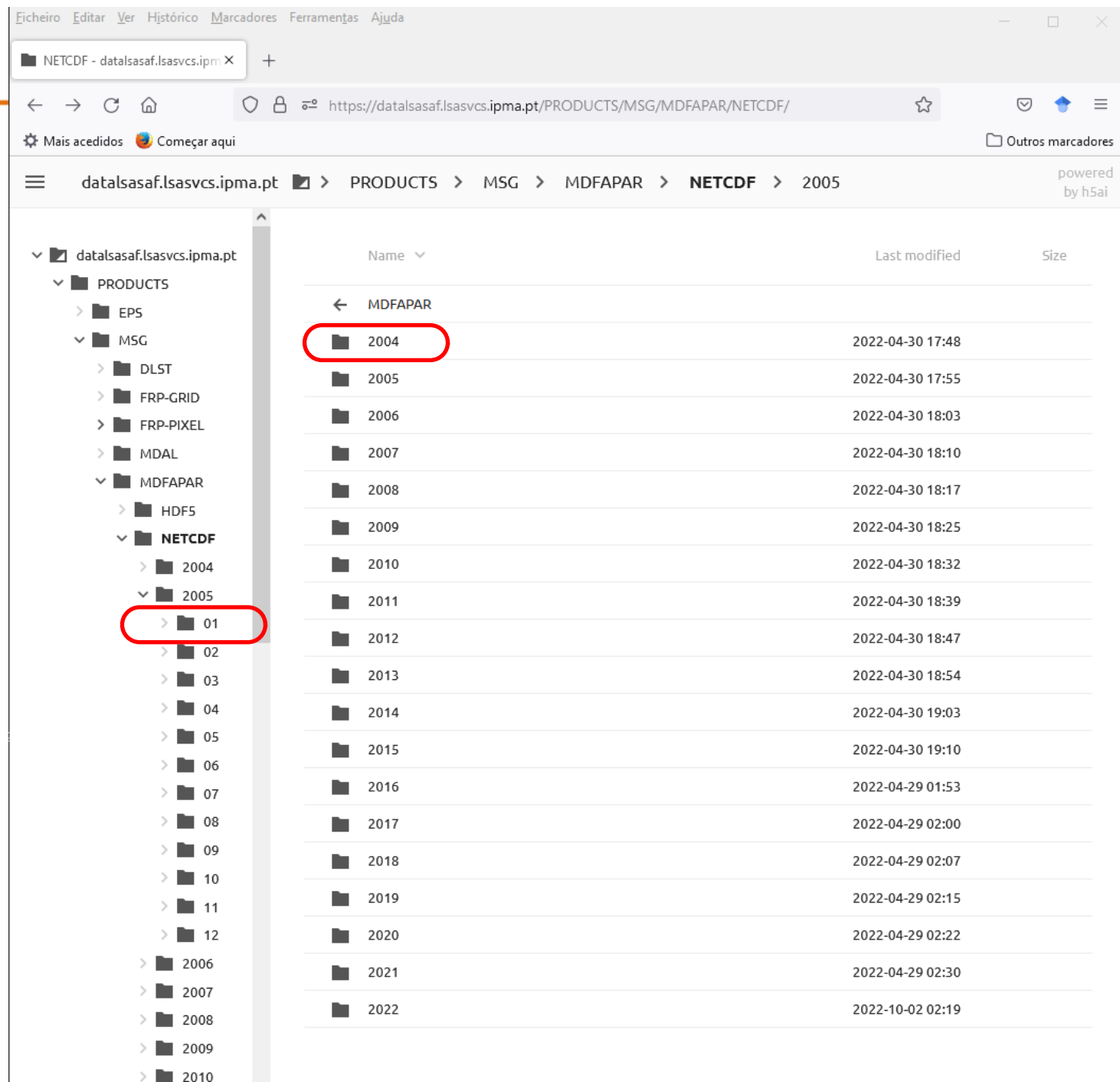


The screenshot shows a web browser window with the URL <https://datalsasaf.lsasvcs.ipma.pt/PRODUCTS/MSG/MDFAPAR/>. The breadcrumb navigation shows **PRODUCTS > MSG > MDFAPAR**. The left sidebar shows a tree view with **MDFAPAR** selected. The main table lists the following items:

Name	Last modified	Size
← MSG		
HDF5	2022-10-04 18:54	
NETCDF	2022-04-30 19:03	

How to access LSA-SAF data

- Select year→
- Select month→



The screenshot shows a web browser window with the URL <https://datasasaf.lsasvcs.ipma.pt/PRODUCTS/MSG/MDFAPAR/NETCDF/>. The breadcrumb navigation path is: **PRODUCTS** > **MSG** > **MDFAPAR** > **NETCDF** > **2005**. The left sidebar shows a tree view of the data structure, with the path **PRODUCTS** > **MSG** > **MDFAPAR** > **NETCDF** > **2005** > **01** highlighted by a red circle. The main content area shows a list of years from 2004 to 2022, with the year **2004** highlighted by a red circle. The table below lists the years and their last modified dates.

Name	Last modified	Size
← MDFAPAR		
2004	2022-04-30 17:48	
2005	2022-04-30 17:55	
2006	2022-04-30 18:03	
2007	2022-04-30 18:10	
2008	2022-04-30 18:17	
2009	2022-04-30 18:25	
2010	2022-04-30 18:32	
2011	2022-04-30 18:39	
2012	2022-04-30 18:47	
2013	2022-04-30 18:54	
2014	2022-04-30 19:03	
2015	2022-04-30 19:10	
2016	2022-04-29 01:53	
2017	2022-04-29 02:00	
2018	2022-04-29 02:07	
2019	2022-04-29 02:15	
2020	2022-04-29 02:22	
2021	2022-04-29 02:30	
2022	2022-10-02 02:19	

Thank you for your attention!

QUESTIONS?
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