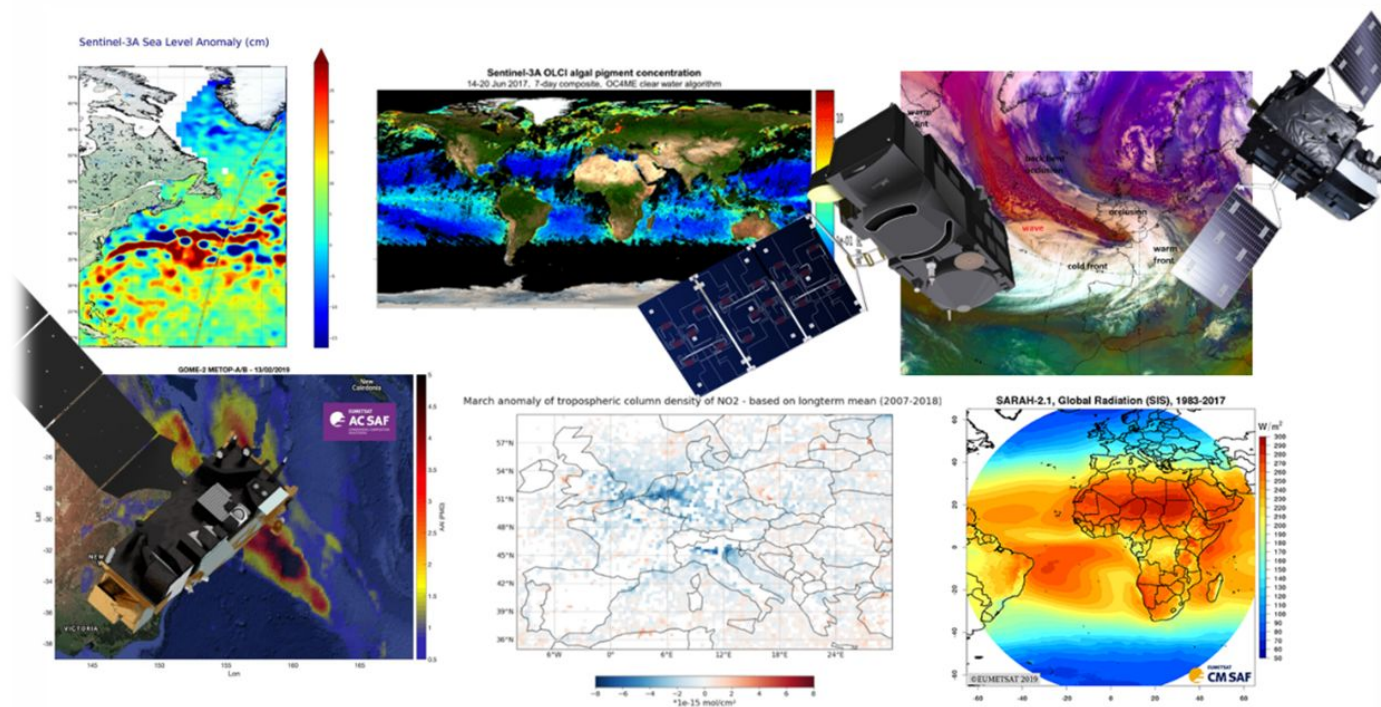




Welcome to the 28th short online course in the series

The session will begin at 12 UTC

copernicus.eumetsat.int



If you have technical issues, please send a message in the chat box to **Support**.

For **Q&A**: go to Slido.com – event code: **#EUMSC28**



Fire Danger Near Real Time Monitoring in the Mediterranean region - Series of online short courses

20 April 2022

Carla Barroso, Federico Fierli, EUMETSAT
Celia Gouveia, IPMA-LSA SAF





Who is who: EUMETSAT - Copernicus

copernicus.eumetsat.int



EUMETSAT - from 1986

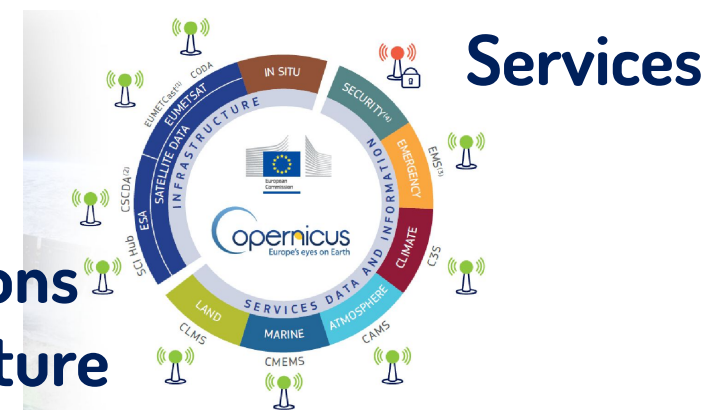
Monitoring weather and climate from space

Maintain satellites

Distribute data ensure uptake

Build know/how

**Observations
Infrastructure**

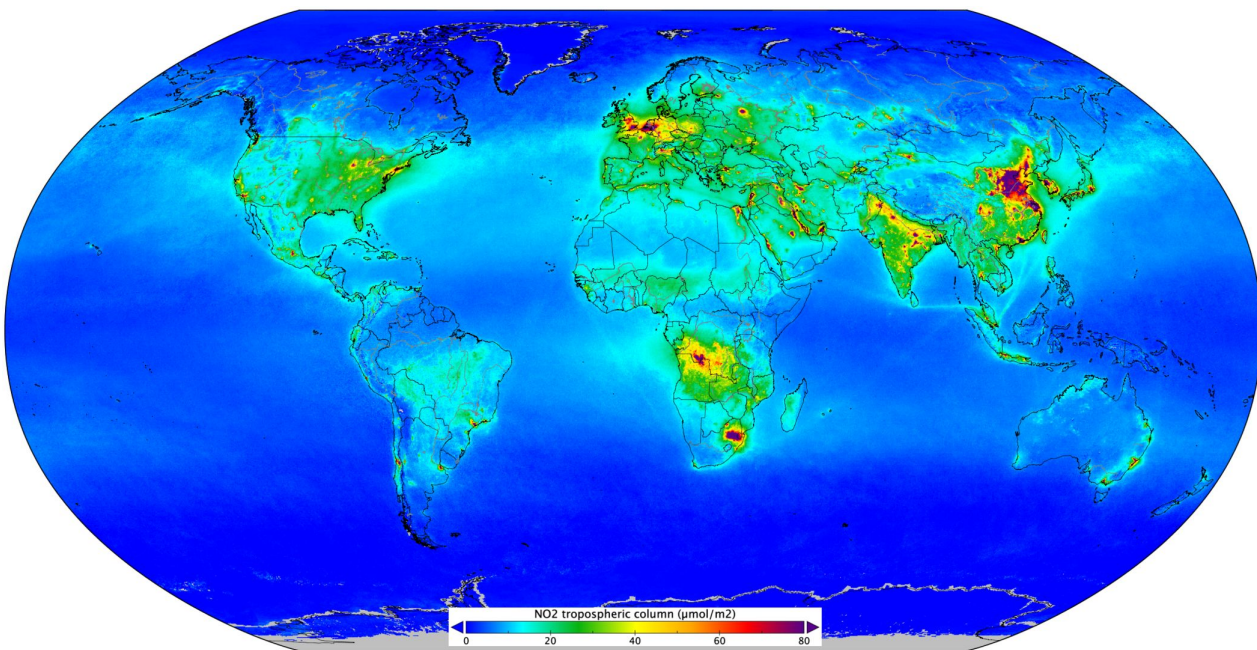


Copernicus - Space & Environmental monitoring program of the European Union

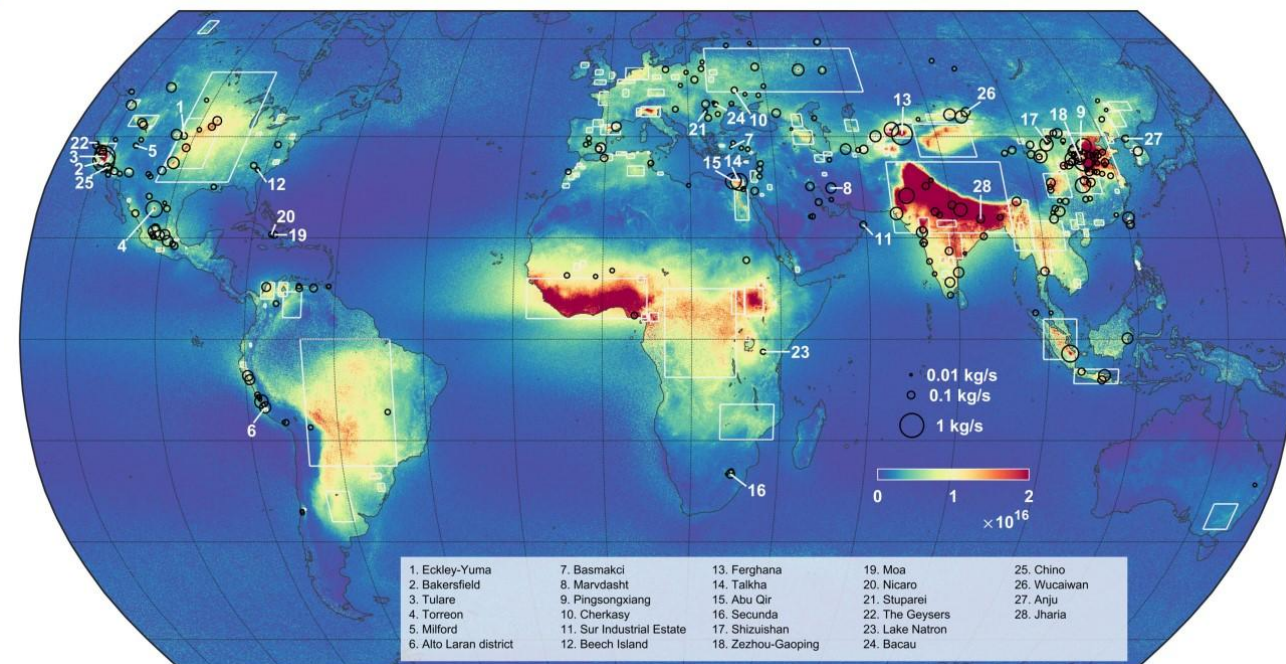


Satellites to monitor pollutants

copernicus.eumetsat.int



Nitrogen Dioxide from 1 month TROPOMI data
© Copernicus program



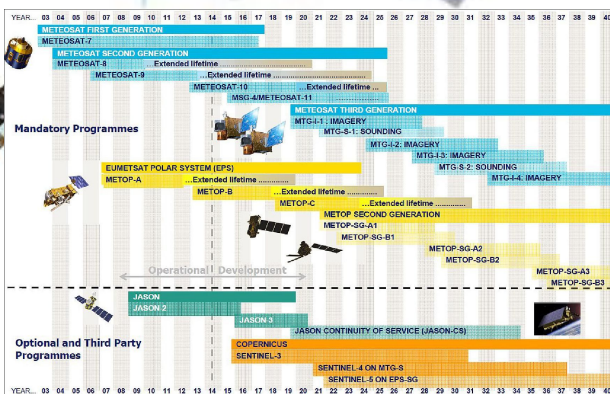
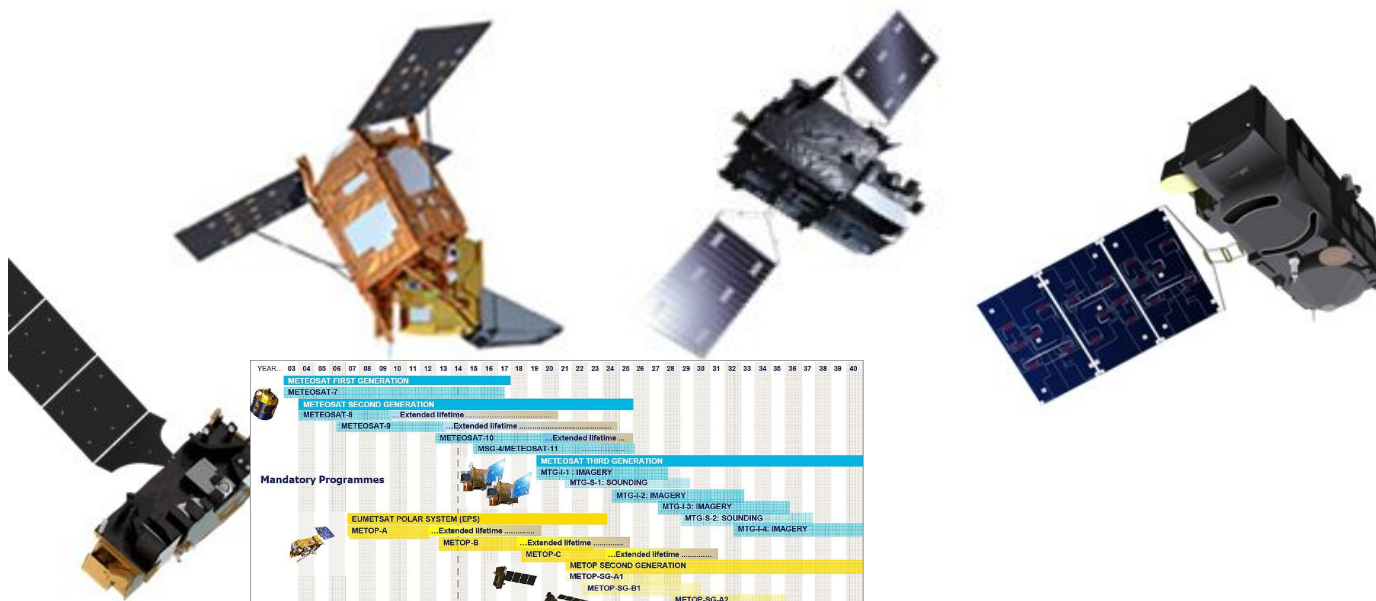
Ammonia fluxes based on 9 years of IASI data
© Martin Van Damme and Lieven Clarisse / ULB





Unique ensemble of existing and upcoming data

copernicus.eumetsat.int



	SENTINEL-1: 4-40m resolution, 3 day revisit at equator	<i>S1A and 1B</i> in orbit
	SENTINEL-2: 10-60m resolution, 5 days revisit time	<i>S2A and 2B</i> in orbit
	SENTINEL-3: 300-1200m resolution, <2 days revisit	<i>S3A and S3B</i> in orbit
	SENTINEL-4: 8km resolution, 60 min revisit time	1st Launch 2022
	SENTINEL-5p: 7-68km resolution, 1 day revisit	<i>SSP</i> in orbit
	SENTINEL-5: 7.5-50km resolution, 1 day revisit	1st Launch 2023
	SENTINEL-6: 10 day revisit time	1st Launch 2020

Current and future missions on Atmospheric composition

- Operational satellites
- Sentinels
- Earth Explorers





EUMETSAT programmes overview

YEAR... 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

METEOSAT FIRST GENERATION

METEOSAT-7

METEOSAT SECOND GENERATION

METEOSAT-8 ...Extended lifetime

METEOSAT-9 ...Extended lifetime

METEOSAT-10 ...Extended lifetime ...

MSG-4/METEOSAT-11

METEOSAT THIRD GENERATION

MTG-I-1 : IMAGERY

MTG-S-1: SOUNDING

MTG-I-2: IMAGERY

MTG-I-3: IMAGERY

MTG-S-2: SOUNDING

MTG-I-4: IMAGERY

EUMETSAT POLAR SYSTEM (EPS)

METOP-A ...Extended lifetime

METOP-B ...Extended lifetime

METOP ...Extended lifetime

METOP SECOND GENERATION

METOP-SG-A1

METOP-SG-B1

METOP-SG-A2

METOP-SG-B2

METOP-SG-A3

METOP-SG-B3

Operational Development



JASON

JASON-2

JASON-3

JASON CONTINUITY OF SERVICE (JASON-CS)

COPERNICUS

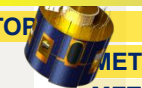
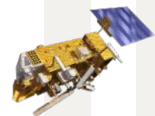
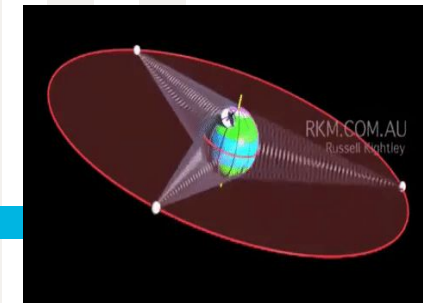
SENTINEL-3a/Sentinel-3b (Q2/2018)

SENTINEL-4 ON MTG-S

SENTINEL-5 ON EPS-SG

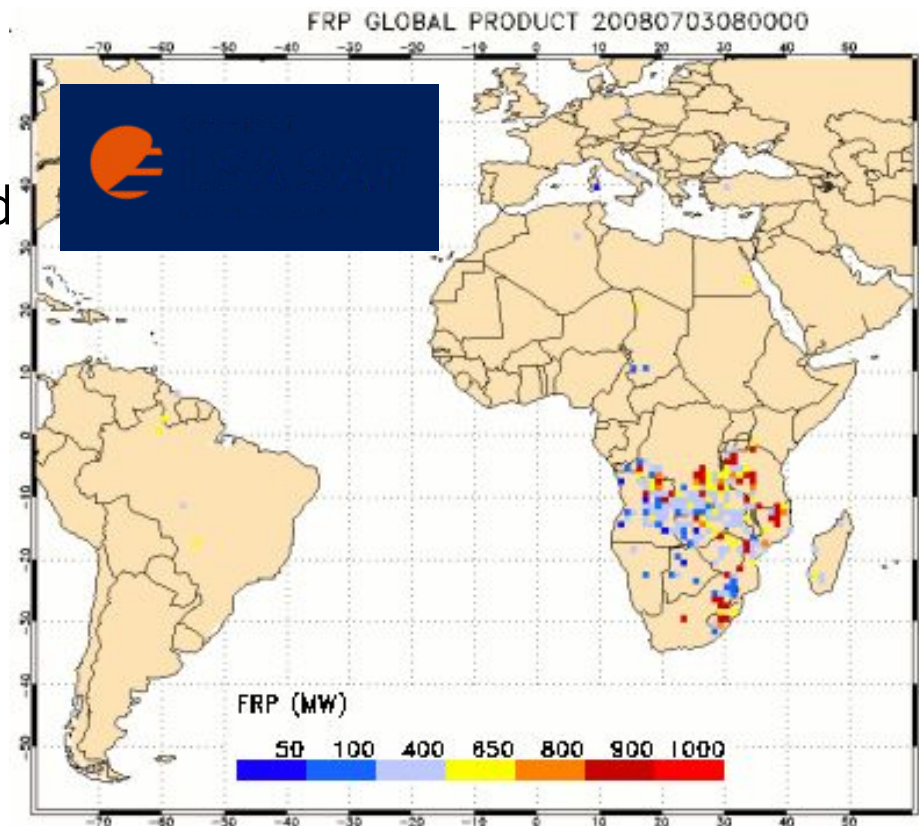
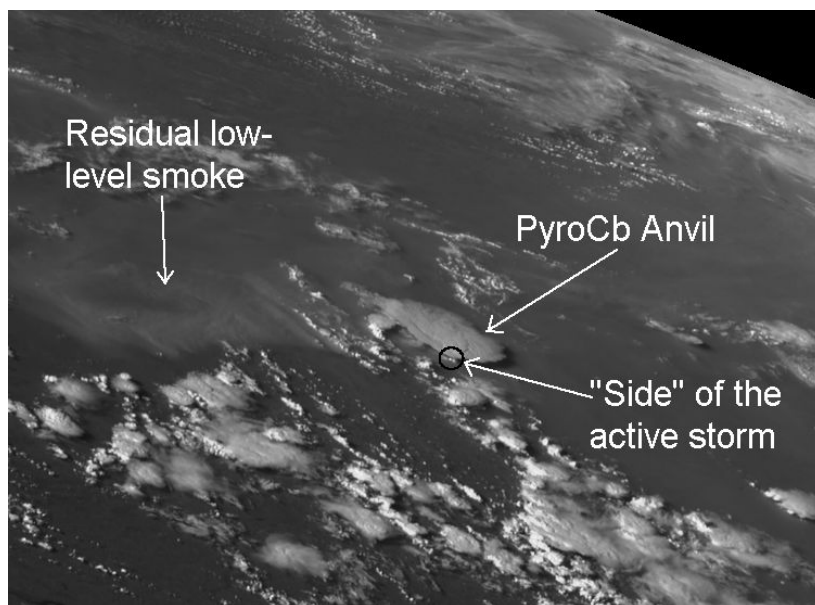
Mandatory Programmes

Optional and Third Party Programmes



YEAR... 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

- Meteosat Second & Third Generation (Africa)
- High temporal frequency / sampling => good
- No global coverage
- High geometry deformation in high latitudes



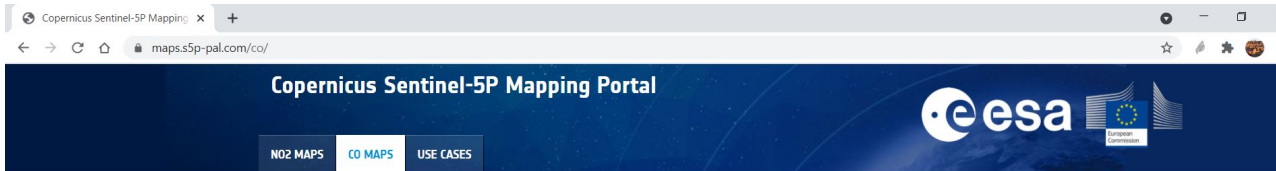
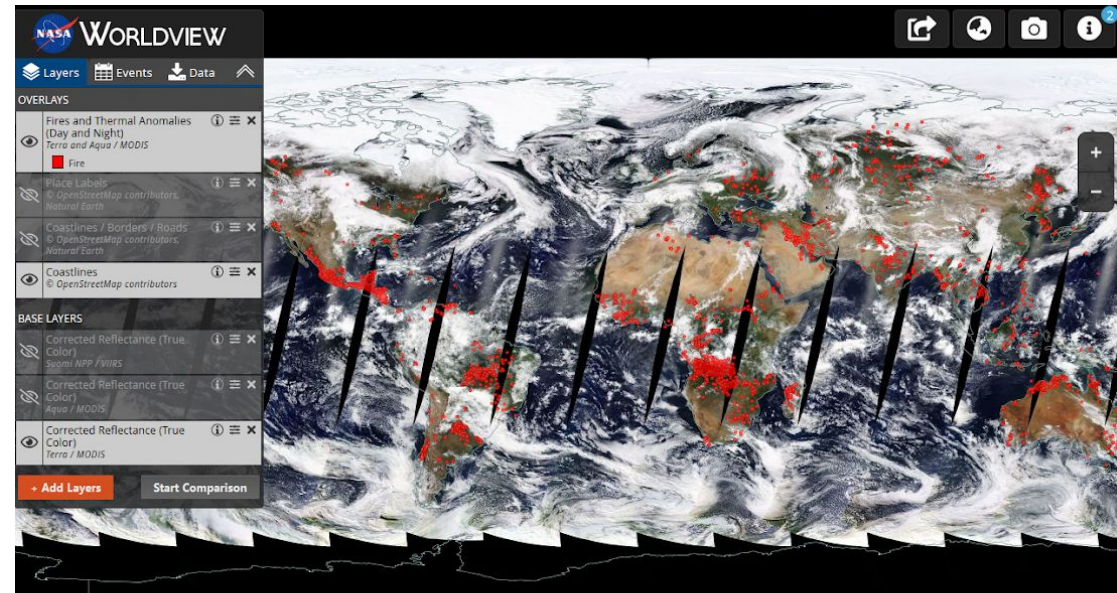
<https://landsaf.ipma.pt/en/products/fire-products/frppixel>



Observe from Polar orbit ...

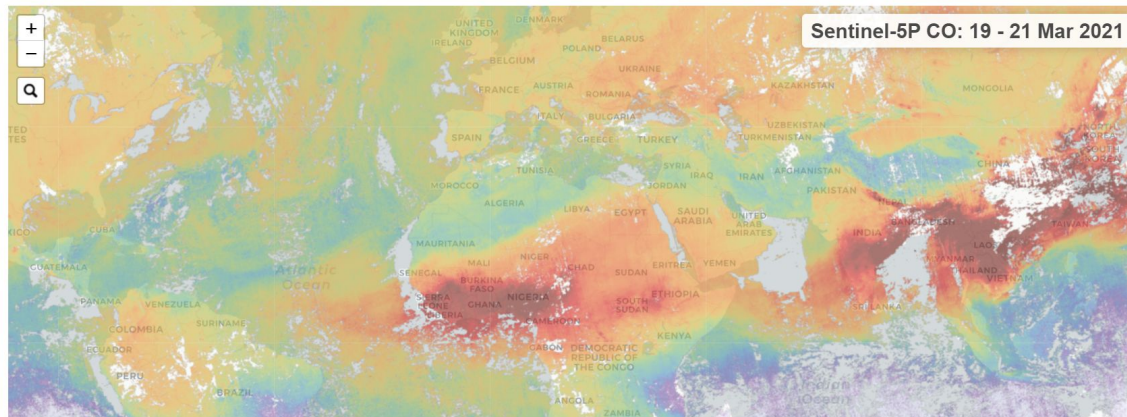
- Global, 1 km resolution (nadir)
- Tens thousands of users worldwide
- Limited temporal sampling

Accumulate data



Copernicus Sentinel-5P Carbon Monoxide

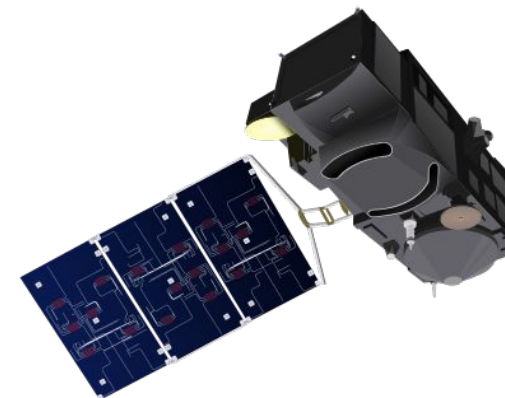
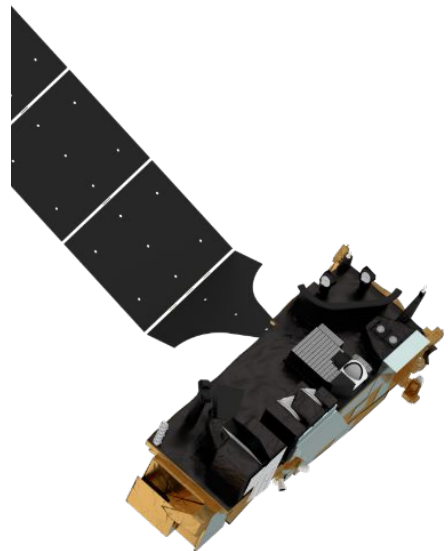
Maps of CO concentrations



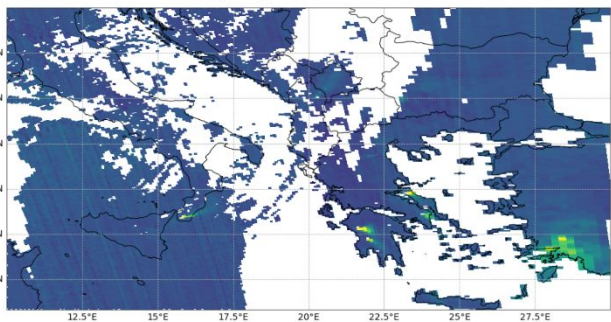


Synergy of observational datasets from Sentinels

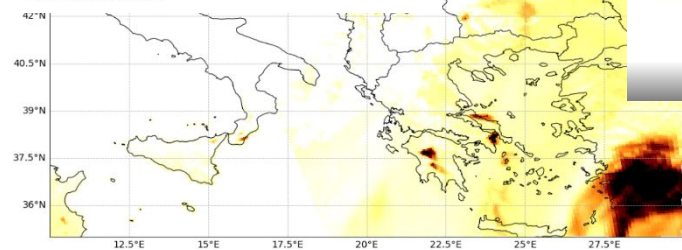
copernicus.eumetsat.int



Vertically integrated CO column 2021-08-05



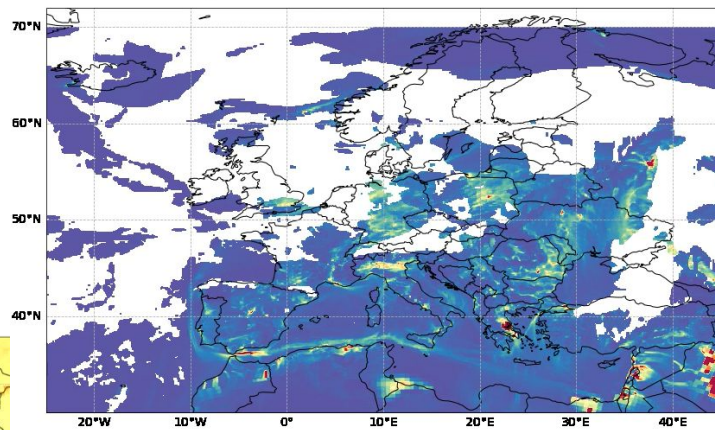
0 1 2 3 4 5 6 7 8
*1e-18 molecules per cm2



0 1 2 3 4 5 6

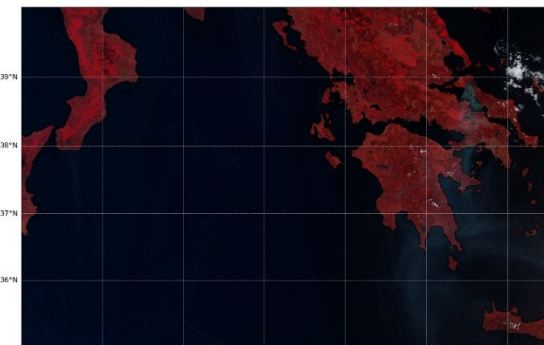
1 2021-08-05

Nitrogen Dioxide 2021-08-08T21:00:00.000000000

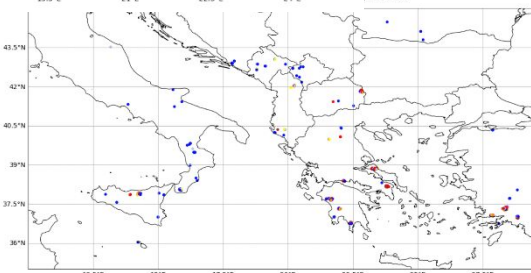


0 2 4 6 8 10

Sentinel-3 OLCI Level-1 False Color RGB - *07 August 2021*



August 2021

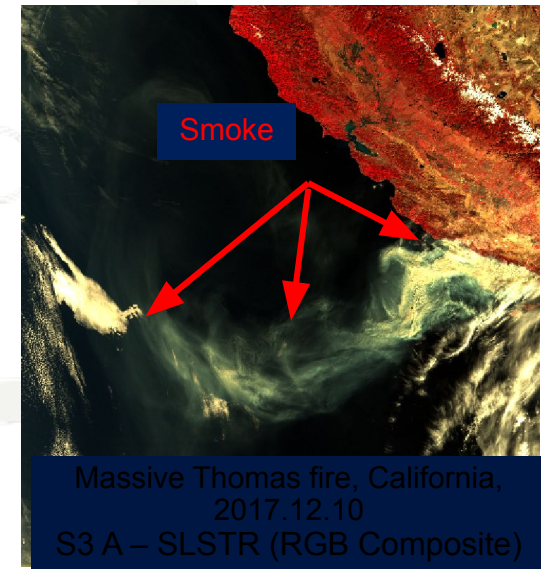
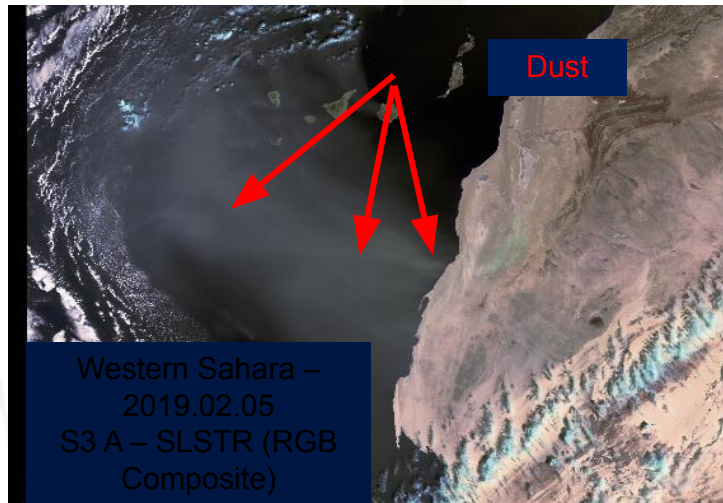


0 30 40 60 80 120 160 200
MM

AOD (Aerosol Optical depth) = How much Solar light attenuated by aerosols?

- A proxy of the aerosol amount in air

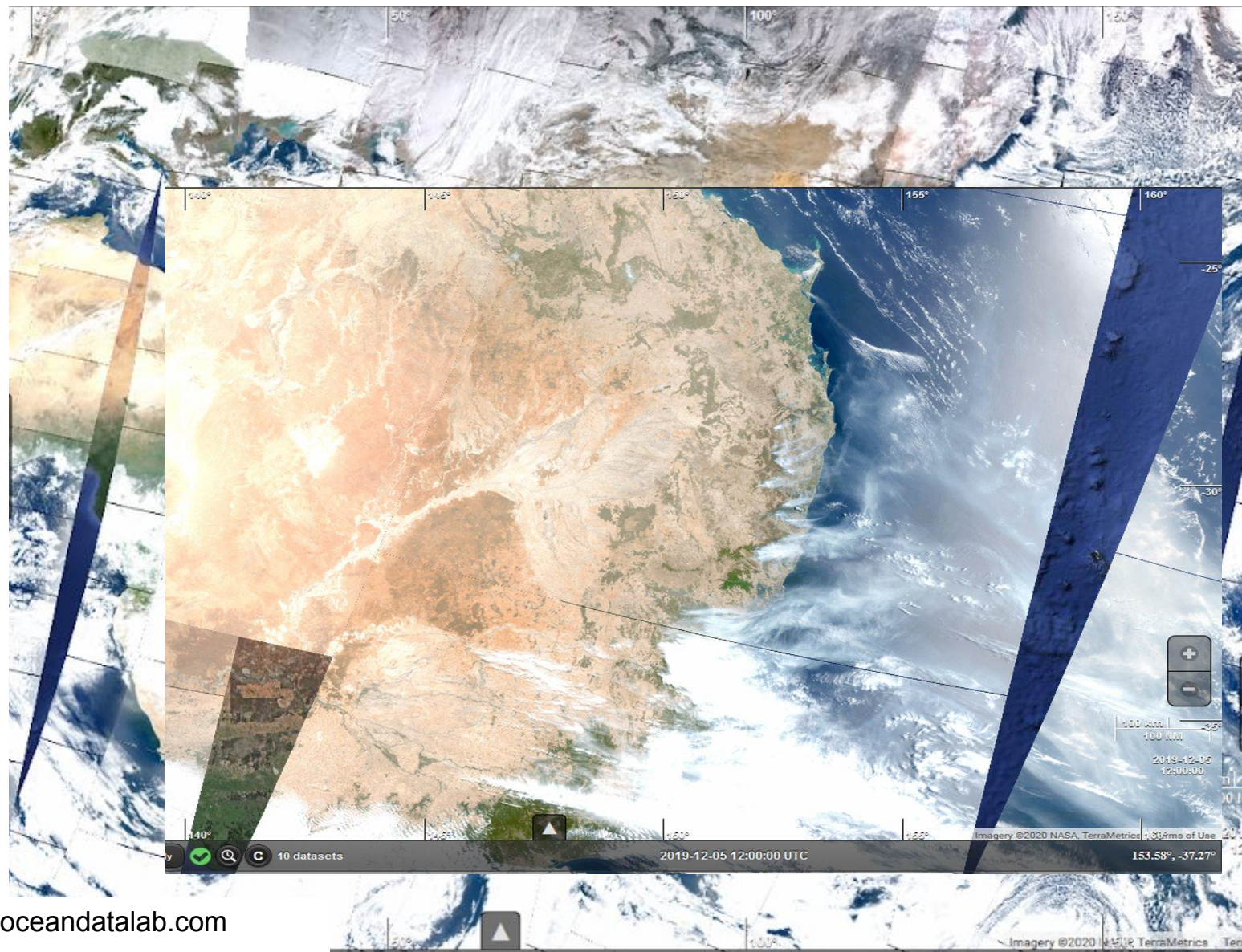
Looking at the contrast between aerosol layer & the underlying surface





Observe Smoke: Sentinel3

copernicus.eumetsat.int



<https://s3view.oceandatalab.com>



Wildfire monitoring as part of an unique data value chain

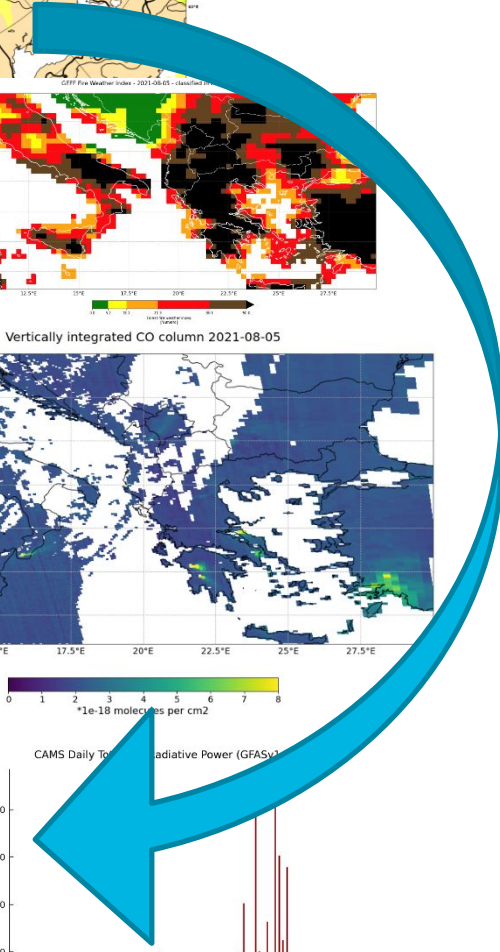
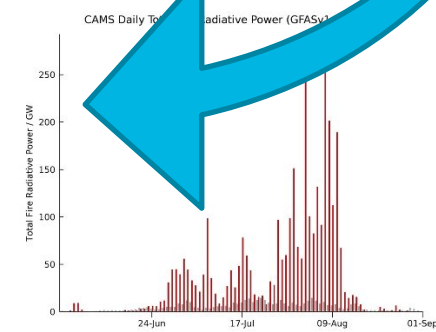
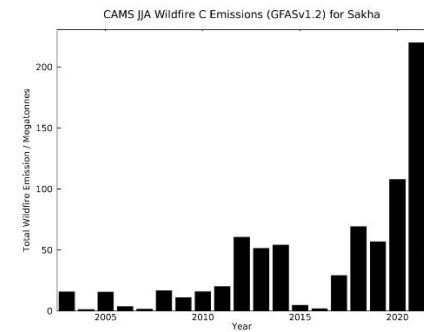
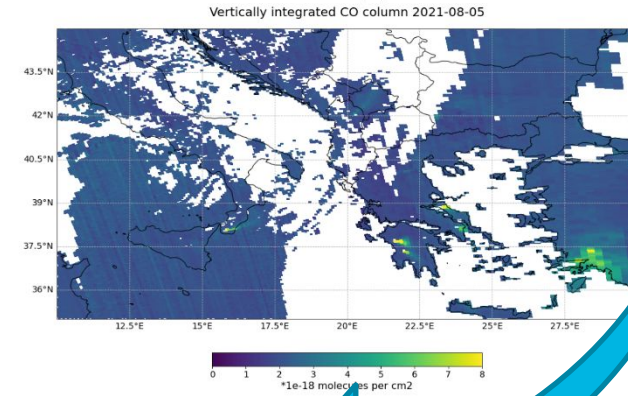
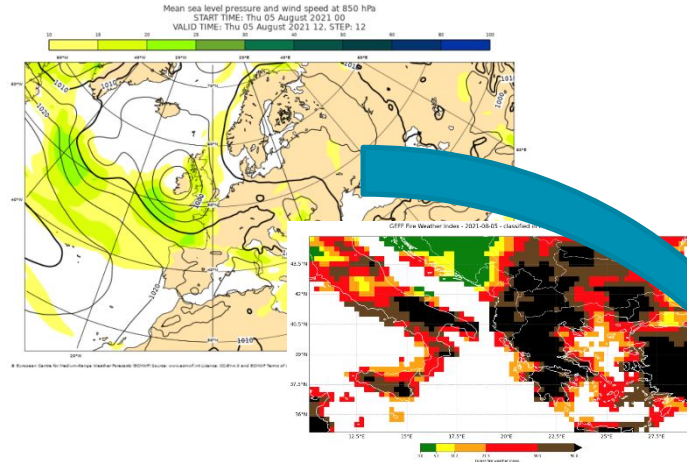
Bring to Users the concept of “Copernicus improves usability”

User journey encompassing:

- Forecast
- Monitoring and nowcasting
- Estimate of impacts

Integrated system:

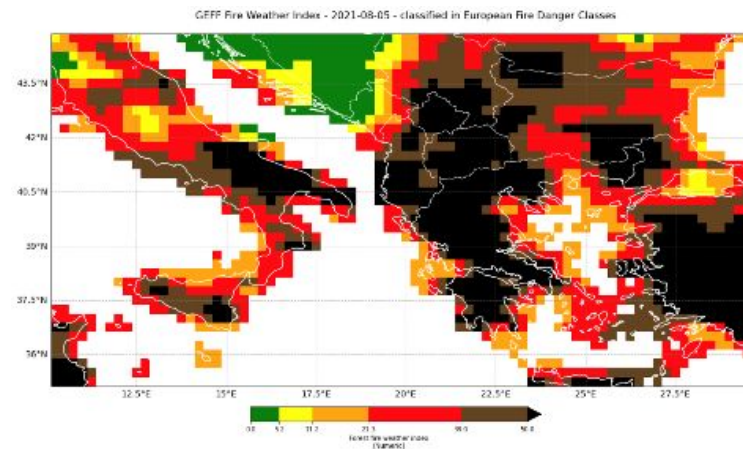
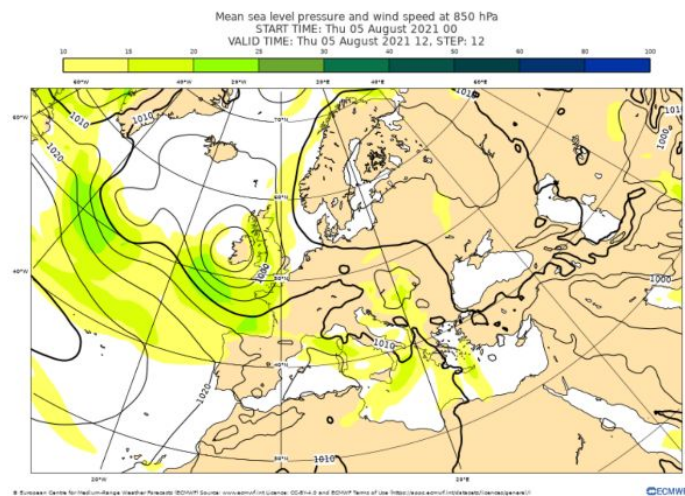
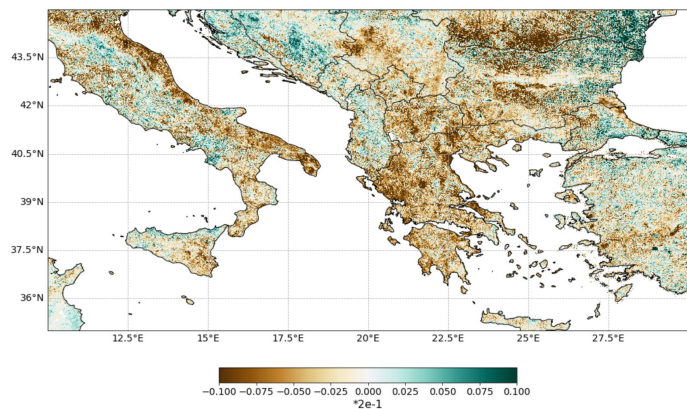
- Satellite and non satellite, models
- Support emission estimate
- Generate added value products
- Ensure Quality and usability



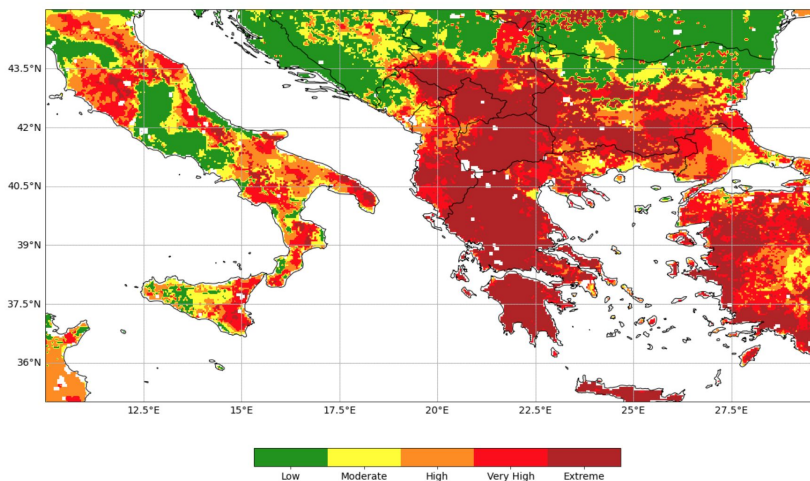


Use of Satellite data – early warning & forecast

Normalized Difference Vegetation Index (ENDVI10) Anomaly - Dekad 3 - 2021-07



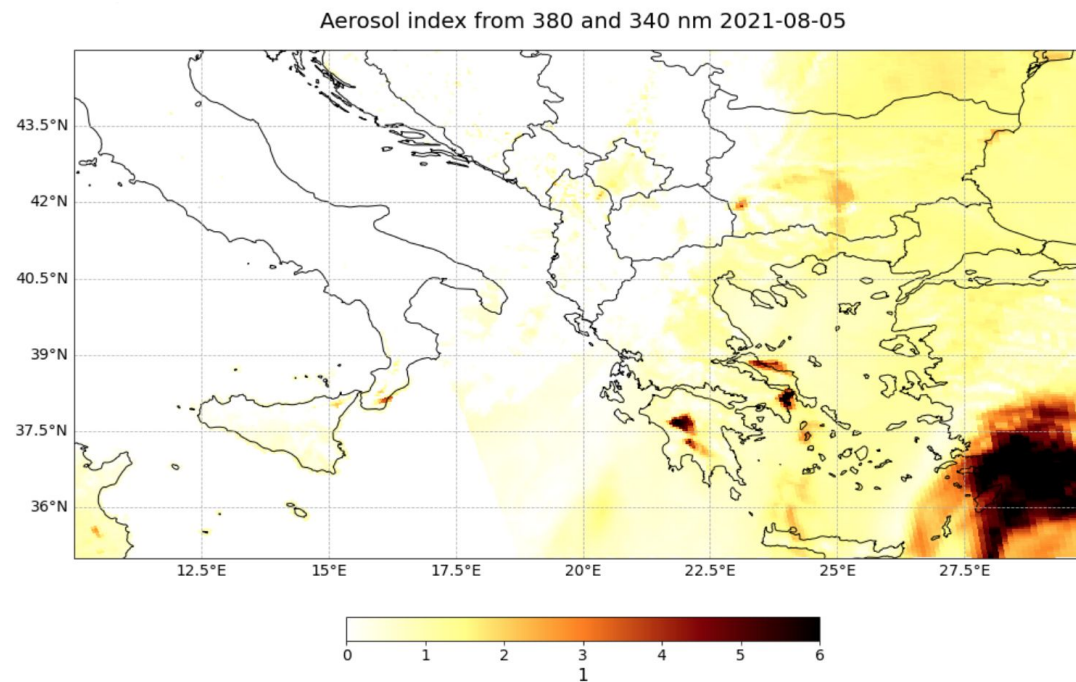
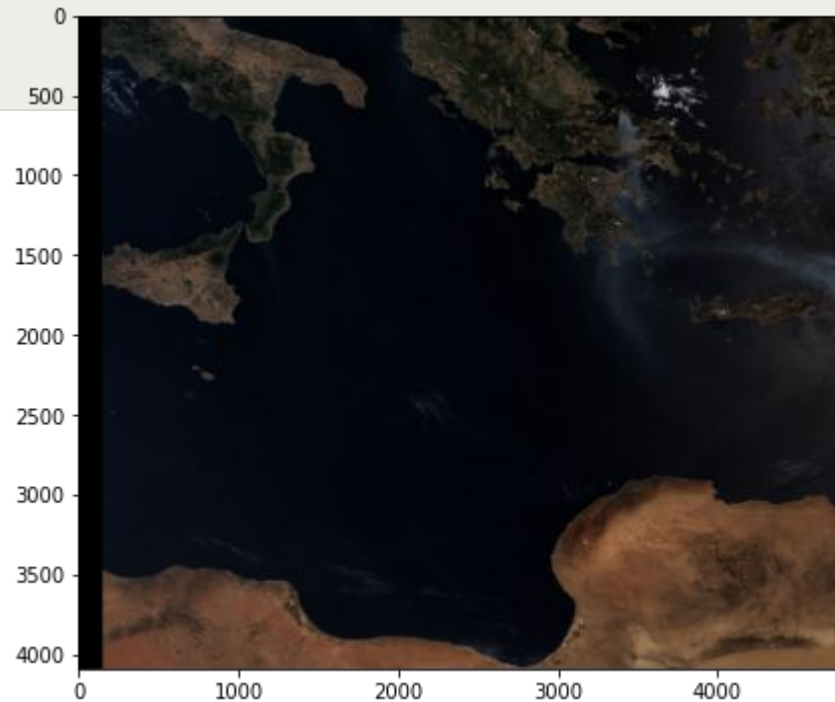
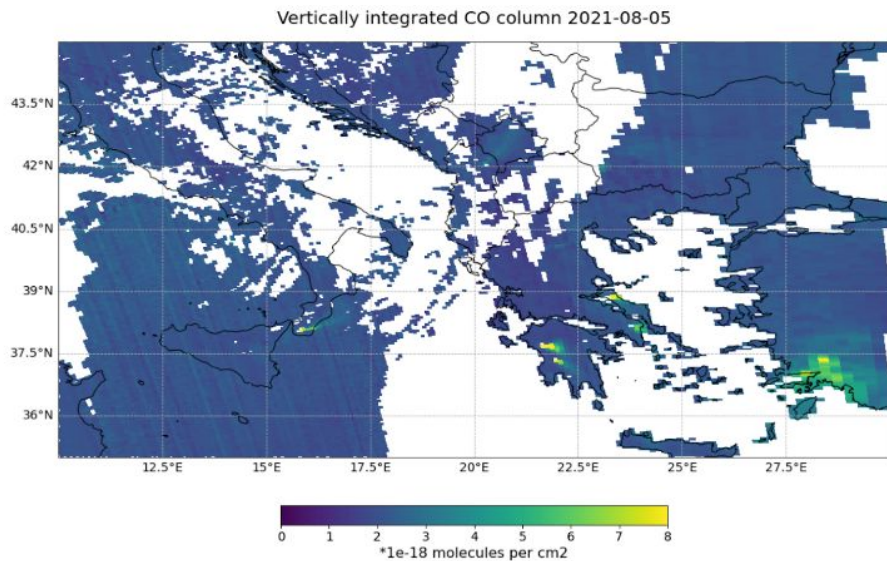
LSA SAF Fire Risk Map v2 - Risk (24h) on 05 August 2021





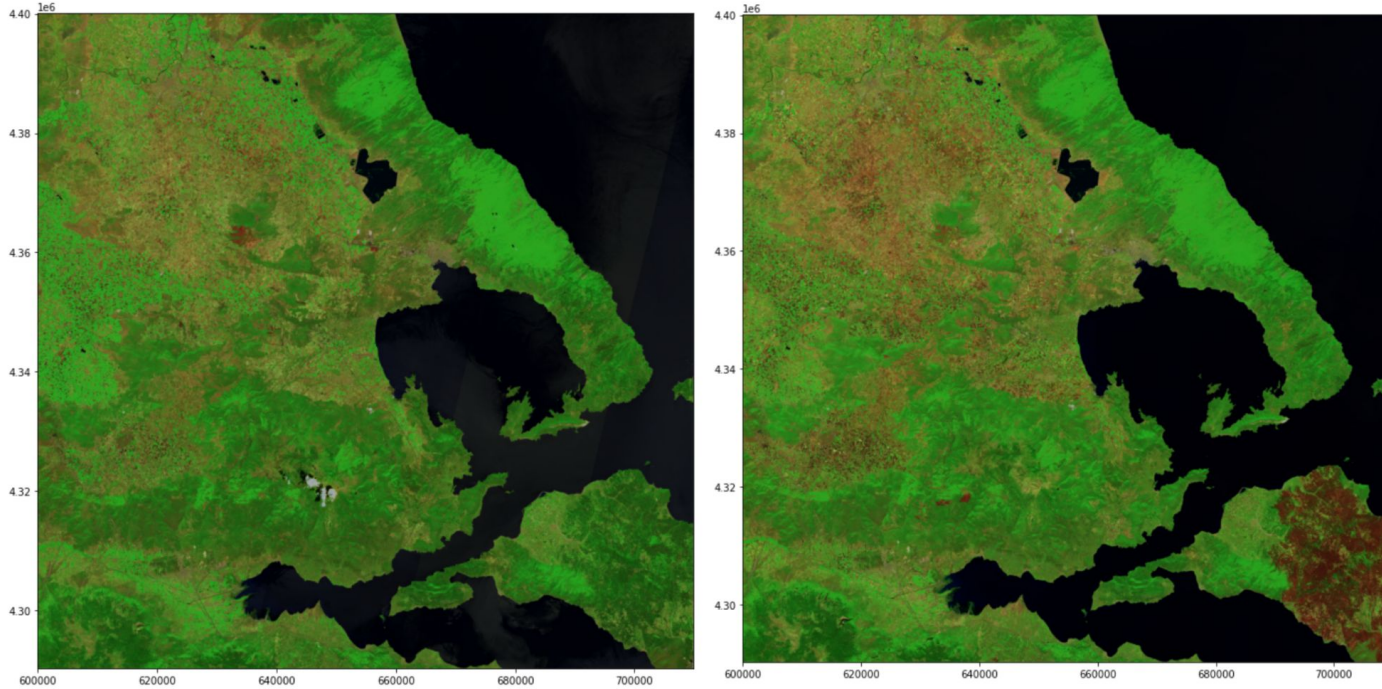
Use of Satellite data – Monitor

copernicus.eumetsat.int

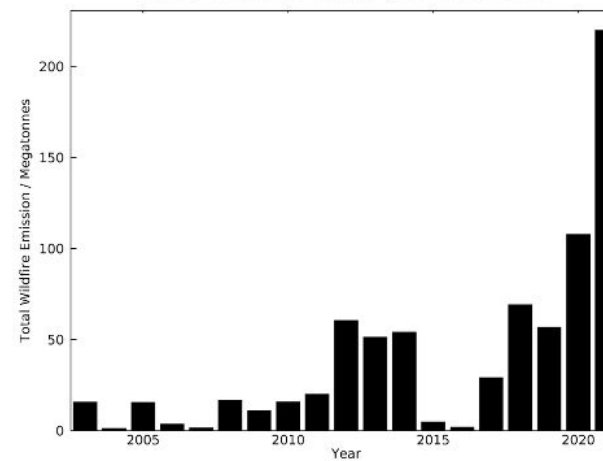




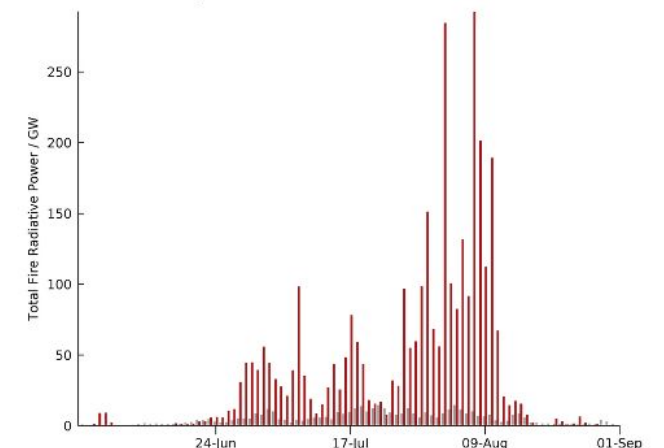
Use of Satellite data – Impact



CAMS JJA Wildfire C Emissions (GFASv1.2) for Sakha



CAMS Daily Total Fire Radiative Power (GFASv1.2) for Sakha





Example: Use Sentinel and EUMETSAT data for wildfire monitoring

Multiple layers of knowledge

- Thematic Text

50_modules/02_fangs/ med_part2_application_case - Jul x +

https://ltpy.adamplatform.eu/user/ltpydev/notebooks/50_modules/02_fangs/med_part2_applicati...

File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3

datasets

ly risk, n

Monitoring active fires with next-generation satellites: Mediterranean Fires Case Study

Part 2 of 3

In the near future, new satellites such as [Meteosat Third Generation \(MTG\)](#) and [Metop - Second Generation \(Metop-SG\)](#) will provide advanced capabilities and valuable data for monitoring fires and their impacts. This three-part case study will introduce upcoming data products from MTG and Metop-SG in the context of the summer wildfires which occurred in southern Italy and Greece in early August 2021. In this part, we will introduce you to new capabilities in monitoring the active fires as part of the fire life cycle with data products from MTG and Metop-SG.

The Case Event

A long period of warm and dry weather led to fires breaking out across the Mediterranean during the summer of 2021. In the Mediterranean region, the winters are rainy and mild while the summers are hot and dry, leading to vegetation stress and the accumulation of fuels in the summer months.

In Greece, the largest wildfires occurred in Attica, Olympia, Messenia, and Evia (also known as Euboea). The fires in Evia, Greece's second largest island, were particularly devastating. They led to two deaths and [destroyed 125 000 hectares of land](#).

Southern Italy and Sicily were particularly impacted by wildfires. In Calabria, fires restarted in early August in the Aspromonte Mountain around the San Luca Valley, [threatening ancient and primeval beech forests](#) (Faggete vetuste) that are recognised as a UNESCO World Heritage site.

Meteosat Third Generation (MTG)

MTG will see the launch of six new geostationary satellites from 2022 onwards. The satellite series will be based on 3-axis platforms and comprise: four imaging satellites (MTG-I) and two sounding satellites (MTG-S). The full operational configuration will consist of two MTG-I satellites operating in tandem, one

17:39 04/04/2022



Example: Use Sentinel and EUMETSAT data for wildfire monitoring

Multiple layers of knowledge

- Thematic Text
- Dataset presentation

The screenshot displays two overlapping Jupyter Notebook windows. The top window shows a page titled "Monitoring active fires with next-generation satellites: Mediterranean Fires Case Study". The bottom window shows a page titled "Proxy dataset - MTG Sentinel-4 UV-Visible-Near infrared (UVN) spectrometer - Nitrogen Dioxide (NO2)".

Monitoring active fires with next-generation satellites: Mediterranean Fires Case Study

Part

In the... and va... context... monito...

The

A long... are rai...

In Gre... were p...

South... Valley,

Met

MTG v... imagin...

Proxy dataset - MTG Sentinel-4 UV-Visible-Near infrared (UVN) spectrometer - Nitrogen Dioxide (NO2)

About

The geostationary [Sentinel-4](#) mission will provide hourly data on tropospheric constituents over Europe for air quality applications. The target species of the Sentinel-4 mission include key air quality parameters such as nitrogen dioxide, ozone, sulphur dioxide, formaldehyde, glyoxal, and aerosols. These species will be monitored by the [Sentinel-4 UVNS instrument](#) aboard the MTG Sounder satellite.

This notebook provides you an introduction to [European Air Quality Forecasts](#) from the Copernicus Atmosphere Monitoring Service (CAMS) and [ERA5 reanalysis](#) data from the Copernicus Climate Change Service (C3S). A combination of these two dataset can be used as a proxy for data from the geostationary Sentinel-4 mission.

The event that this notebook highlights are the fires in southern Italy and in Greece during August 2021.

Nitrogen dioxide is a useful indicator of smoke presence and transport.

Basic Facts

CAMS European Air Quality Forecasts

Spatial resolution: 0.1° x 0.1°
Spatial coverage: Europe
Temporal resolution: 1-hourly up to leadtime hour 120
Temporal coverage: three-year rolling archive
Data format: GRIB or zipped NetCDF



Example: Use Sentinel and EUMETSAT data for wildfire monitoring

Multiple layers of knowledge

- Thematic Text
- Dataset presentation
- Practical handling and data access

The screenshot displays two pages from a Jupyter Notebook. The top page is titled "Monitoring active fires with next-generation satellites: Mediterranean Fires Case Study". It features logos for Copernicus and EUMETSAT. The bottom page is titled "Proxy dataset - MTG Sentinel-4 UV-Visible-Near infrared (UVN) spectrometer - Nitrogen Dioxide (NO2)". It includes an "About" section, "Basic Facts", and a map titled "Nitrogen Dioxide 2021-08-08T21:00:00.000000000".

Monitoring active fires with next-generation satellites: Mediterranean Fires Case Study

Part

In the... and va... contex... monito...

The

A long... are rai... In Gre... were p... South... Valley...

Met

MTG v... imagin...

Proxy dataset - MTG Sentinel-4 UV-Visible-Near infrared (UVN) spectrometer - Nitrogen Dioxide (NO2)

About

The geostationary [Sentinel-4](#) mission will provide hourly Sentinel-4 mission include key air quality parameters su... be monitored by the [Sentinel-4 UVNS instrument](#) aboard... This notebook provides you an introduction to [European reanalysis](#) data from the Copernicus Climate Change S... geostationary Sentinel-4 mission.

The event that this notebook highlights are the fires in:

Nitrogen dioxide is a useful indicator of smoke pre...

Basic Facts

CAMS European Air Quality Forecasts

- Spatial resolution: 0.1° x 0.1°
- Spatial coverage: Europe
- Temporal resolution: 1-hourly up to lead
- Temporal coverage: three-year rolling
- Data format: GRIB or zipped NetCDF

Nitrogen Dioxide 2021-08-08T21:00:00.000000000