



LNEG
Laboratório Nacional de Energia e Geologia, I. P.

Voa alto com o
Copernicus para
observar a Terra



HR EXCELLENCE IN RESEARCH

Lídia Quental

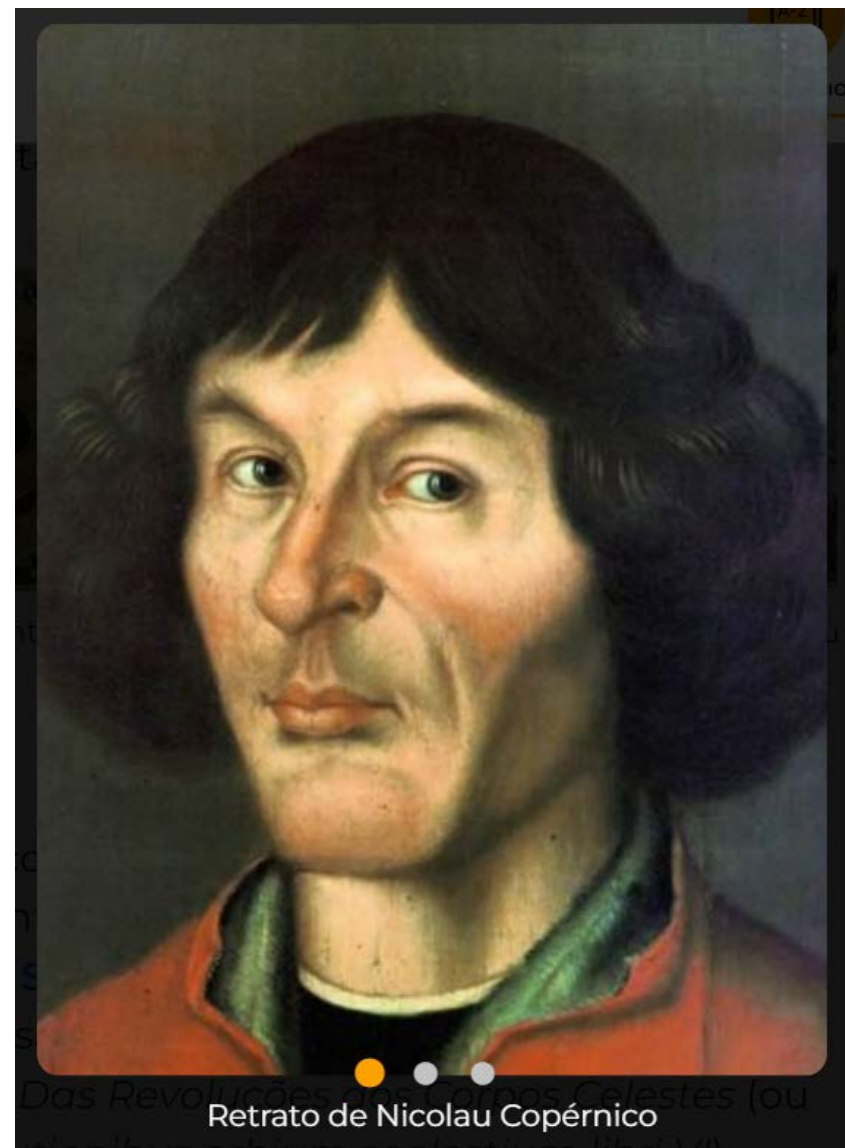


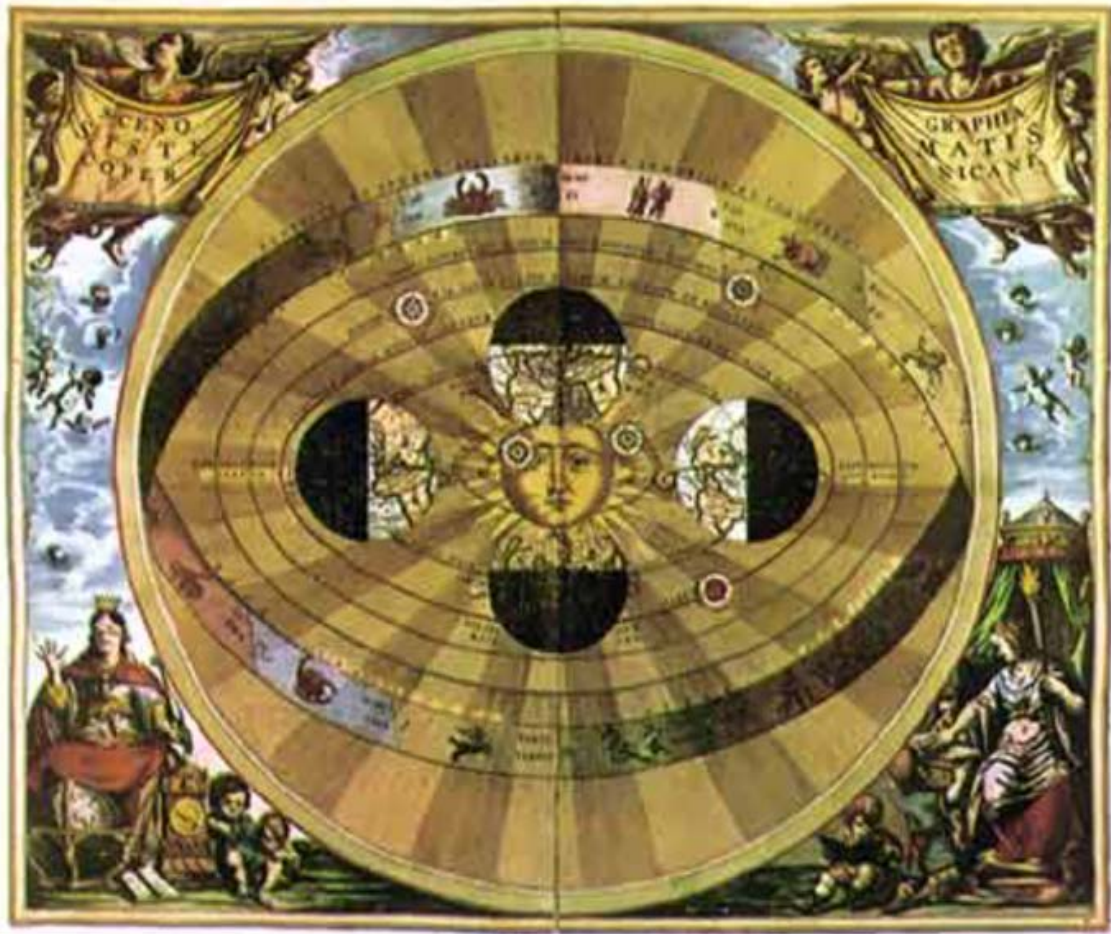


Nicolau Copérnico
(1473 -1543)

astrónomo polaco
matemático
doutorado em medicina

.....



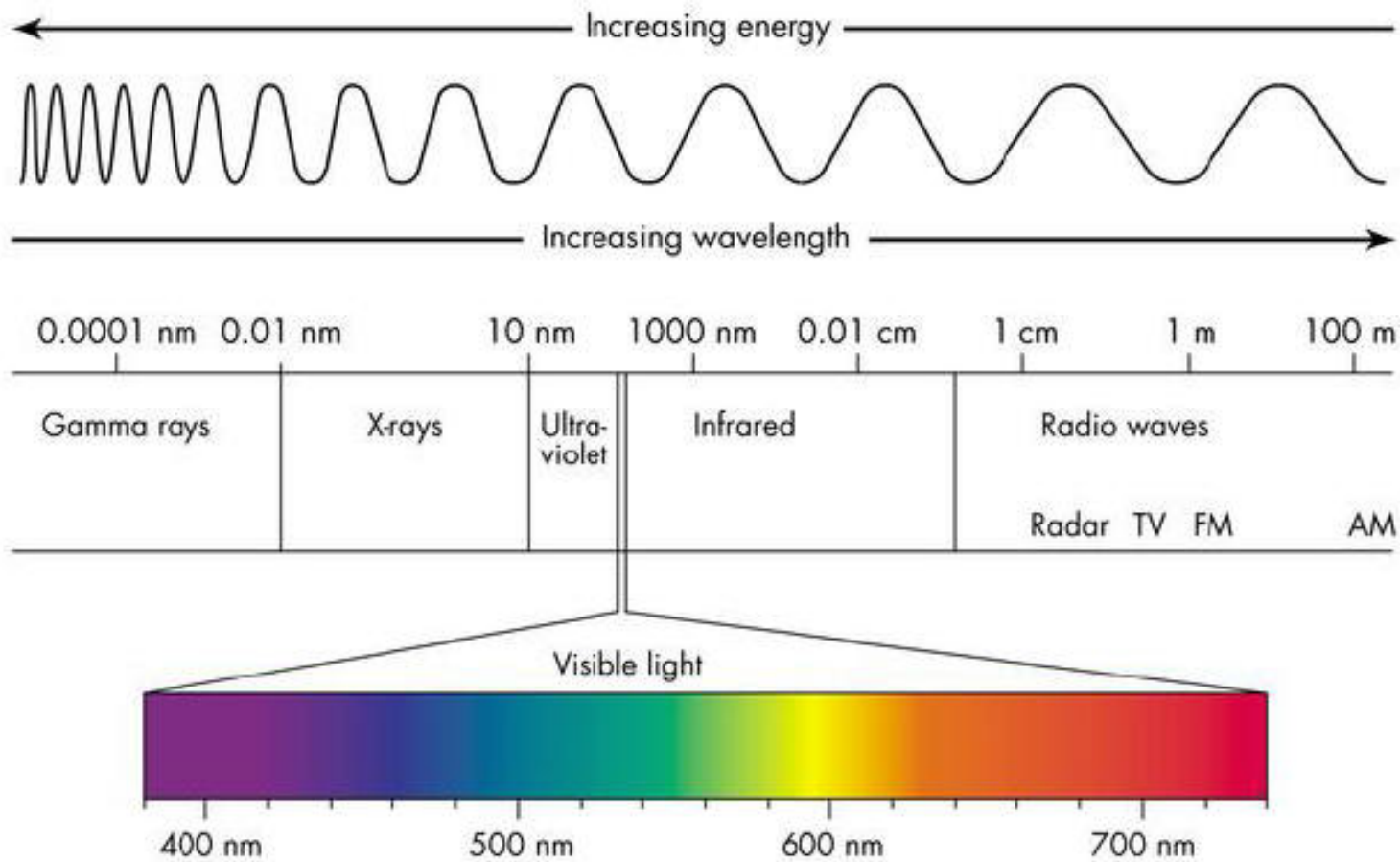


O universo heliocêntrico de Copérnico

- demonstrou a existência de dois movimentos dos planetas (rotação e translação)
- Das Revoluções dos Corpos Celestes (*De revolutionibus orbium coelestium libri VI*)
 - Sol no centro do Sistema Solar

- INTRODUÇÃO
 - espectro eletromagnético
 - detecção remota
- PROGRAMA COPERNICUS
 - dados
 - serviços
- EXEMPLOS DE APLICAÇÕES
 - meios diversos



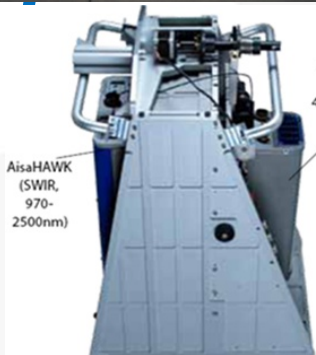


distribuição das ondas eletromagnéticas de acordo com a frequência e o comprimento de onda característico de cada radiação.

DETEÇÃO REMOTA

informação sem contacto
direto com o objeto a analisar

Plataforma



Instrumento /
Sensor



Alvo / Objeto



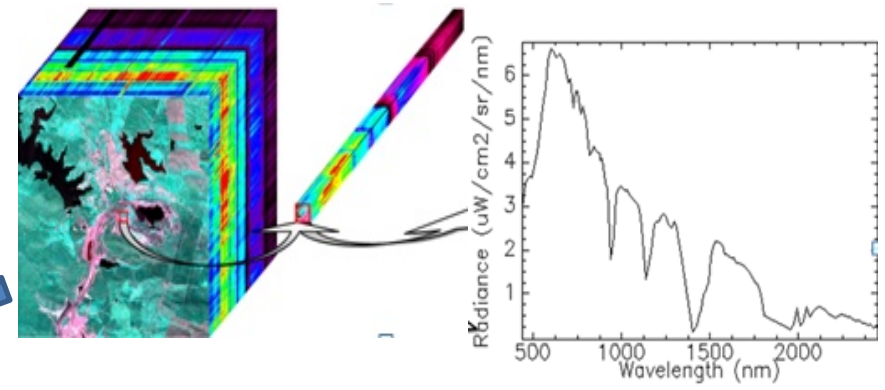
Fonte de
energia

O conceito subjacente à **deteção remota** tem por base a **medição de níveis de energia variável** dos fotões, associados ao parâmetro **comprimento de onda**.

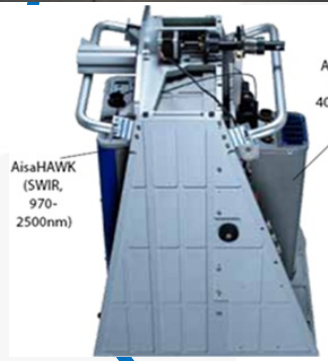


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Plataforma



Instrumento / Sensor



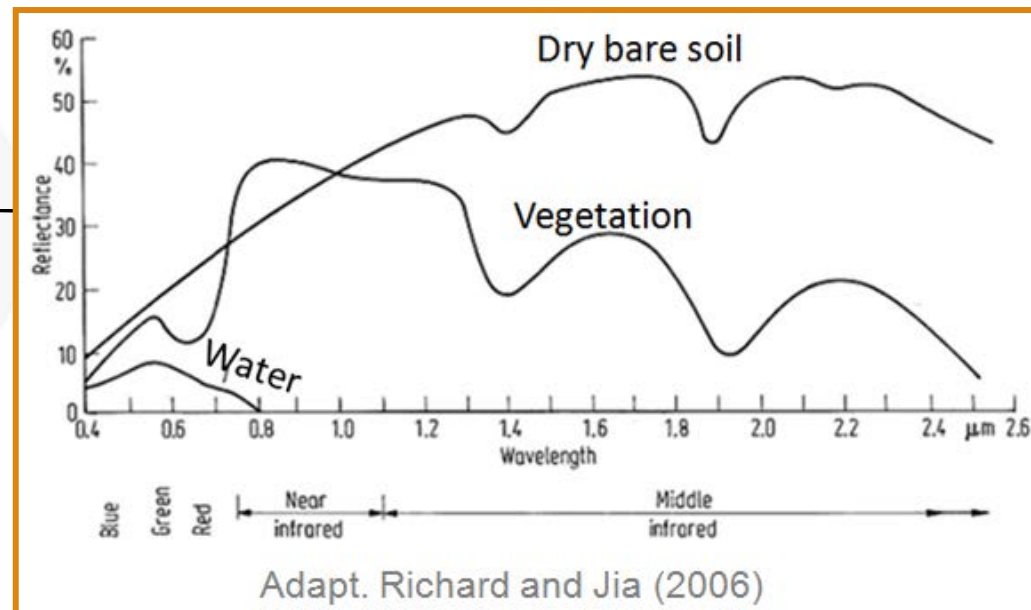
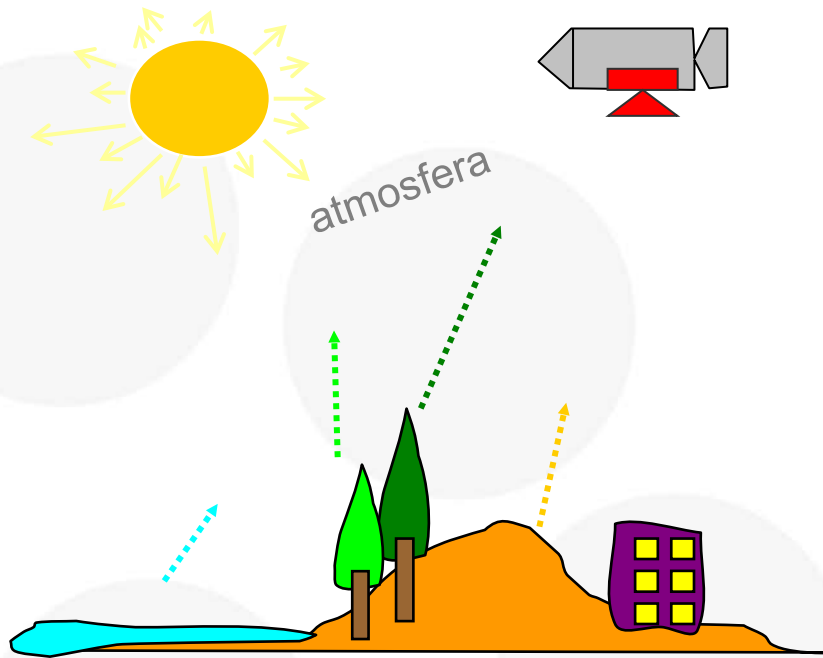
Alvo / Objeto



Fonte de energia



Quando um material “alvo” é excitado por processos internos ou pela interação com radiação electromagnética incidente, vai emitir ou refletir fótons de comprimento de onda variáveis, cujas quantidades radiométricas diferem para diferentes comprimentos de onda, de uma forma diagnóstica do material





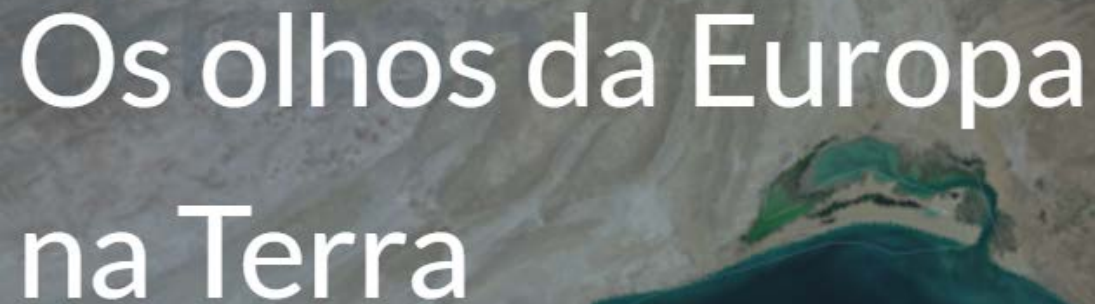
Copernicus é o programa de Observação da Terra da União Europeia, que analisa o nosso planeta em mudança e o seu ambiente em benefício dos cidadãos.

Gratuito/ aberto

<https://www.copernicus.eu/pt-pt>



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Os olhos da Europa
na Terra

A olhar para o nosso planeta e o seu
ambiente

ESPAÇO

Agência Espacial Europeia (ESA)



Missões Sentinels
S1-S2-S3-S5P-S6....

https://www.esa.int/Applications/Observing_the_Earth/Copernicus/The_Sentinel_missions

+

Missões
contributivas



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SERVIÇOS



IN SITU

para produzir, enriquecer
e validar os serviços,
melhorando a sua
precisão e fiabilidade
[https://insitu.copernicus.eu/
observations](https://insitu.copernicus.eu/observations)

Recolhidos em bóias,
navios, balões
atmosféricos, estações
meteorológicas, drones
ou cidadãos cientistas



Land
Monitoring



Marine
Environment
Monitoring



Atmosphere
Monitoring



Emergency
Management



Security



Climate
Change



Sentinel-1 (Credits: ESA/P. Carril)

Sentinel-1 imagens de radar noturnas e diurnas, para Serviços TERRA e OCEANOS.



Sentinel-2 (Credits: ESA/P. Carril)

Sentinel-2 imagens óticas de alta resolução para serviços TERRA, no Visível e infravermelho do EM. Vegetação, solos e água, e informação para serviços de emergência.



Sentinel-3 (Credits: ESA/J. Huart)

Sentinel-3 dados óticos, radar e altimetria para serviços TERRA e MARINHOS. Medidas da topografia da superfície oceânica, temperatura, cor oceânica e Terrestre.





MTG (Credits: ESA/P. Carril)

Sentinel-4 dados para a monitorização da composição atmosférica
Meteosat Third Generation (MTG),



MetOp (Credits: ESA/P. Carril)

Sentinel-5 dados para a monitorização da composição atmosférica
EUMETSAT.



Copyright ESA/ATG medialab

Sentinel-6 altímetro radar para medir altura global da superfície oceânica para oceanografia operacional e estudos climáticos



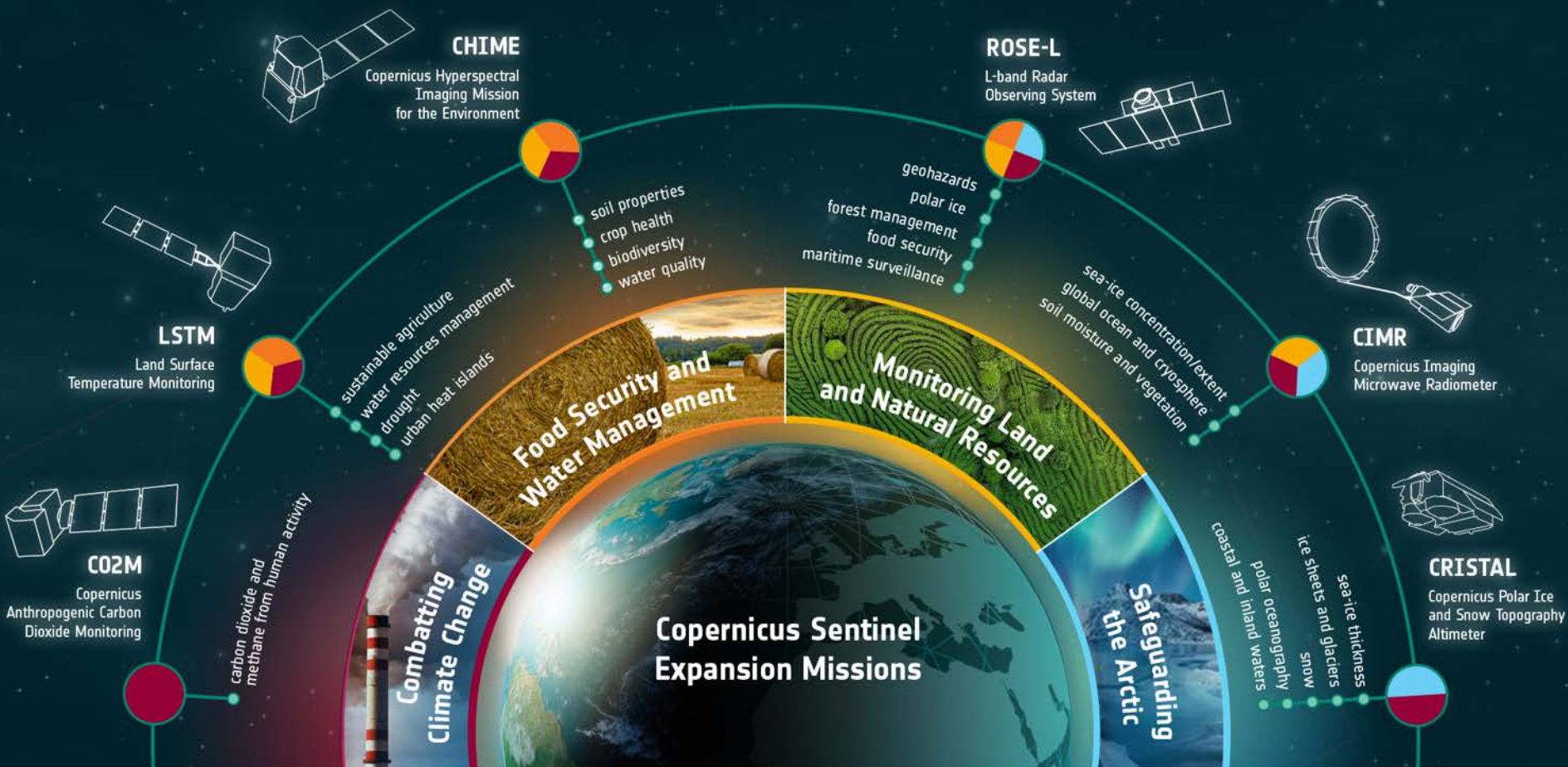
Missões de expansão dos Sentinelas com seis missões prioritárias



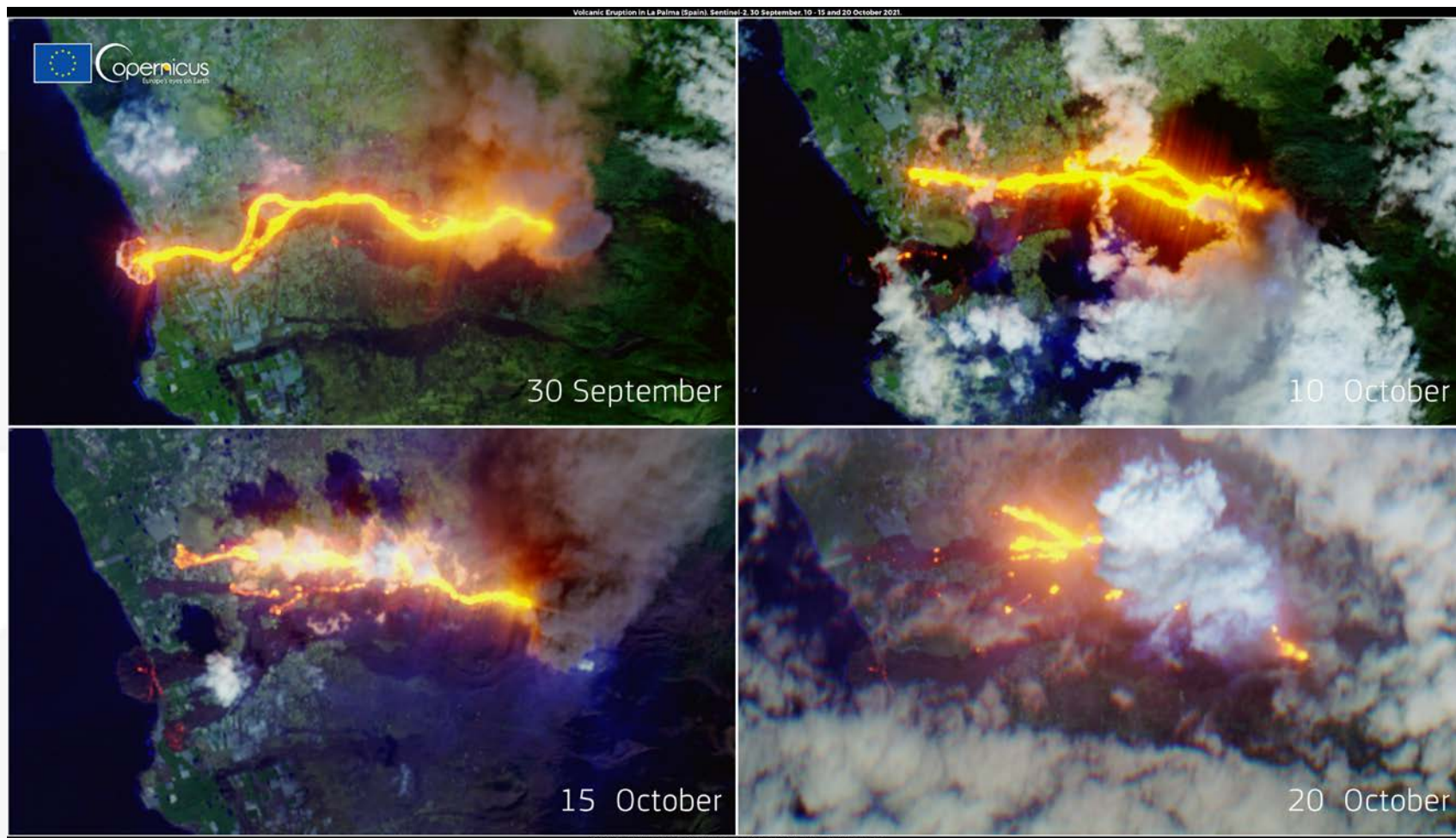
PROGRAMME OF THE EUROPEAN UNION



co-funded with



Copernicus imagens Sentinel-2 das escoadas lávicas emitidas durante a erupção de La Palma, Canárias 2021.



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FERRAMENTAS / LINKS PARA EXPLORAR DADOS E SERVIÇOS

<https://www.sentinel-hub.com/explore/eobrowser/>



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SIGN IN



- Explore
- EO Browser**
- Data
- Sentinel Hub API
- Industries & Showcases
- Education

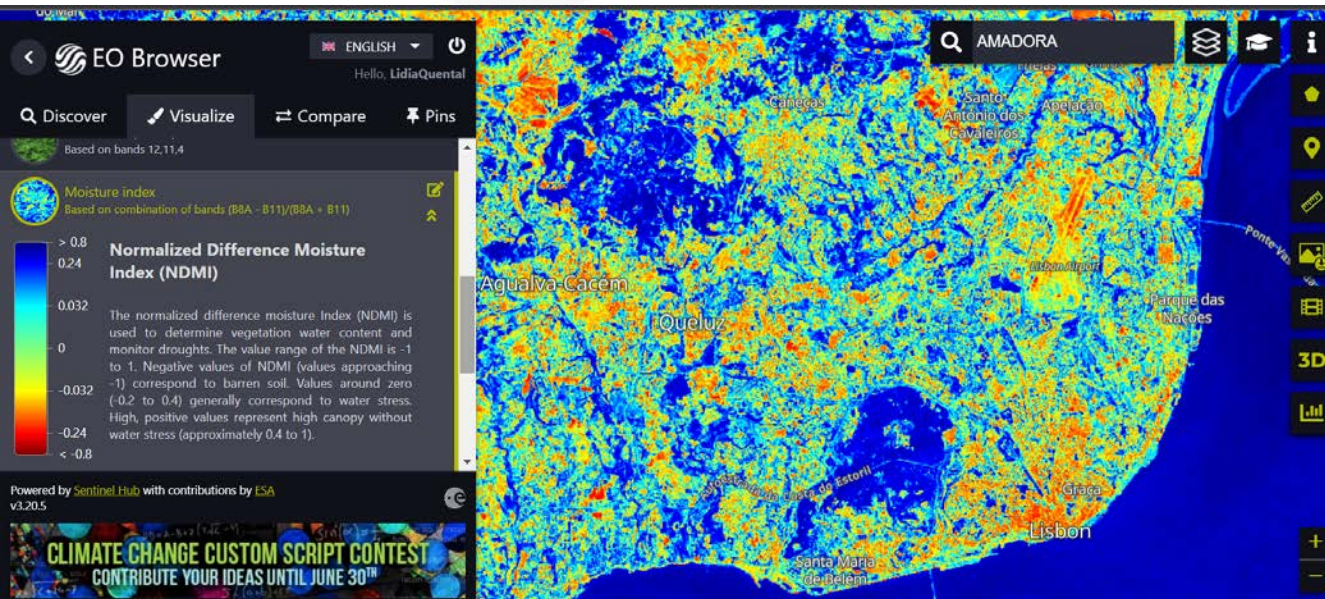
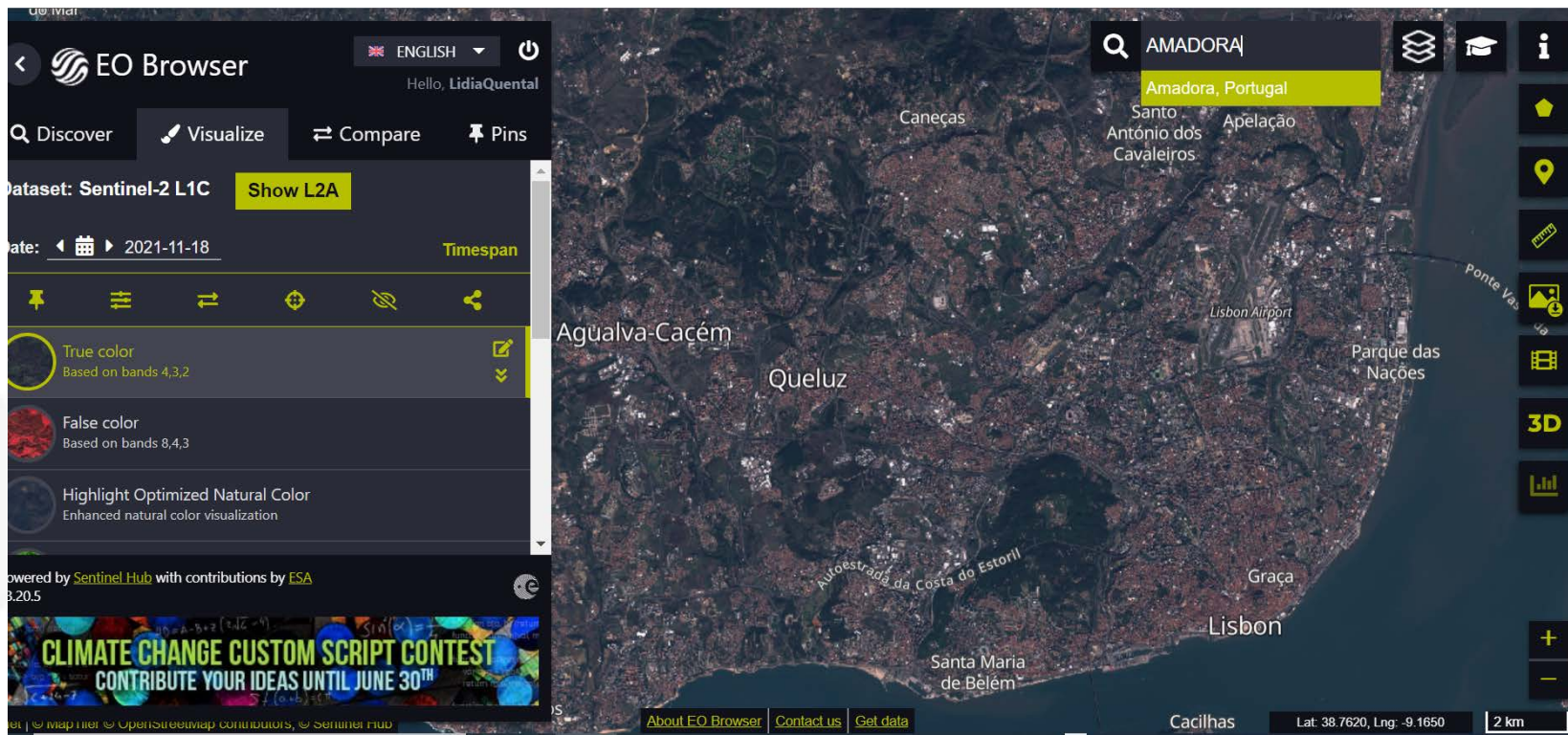
Home / Explore / EO Browser

EO Browser makes it possible to browse and compare full resolution images from all the data collections we provide. You simply go to your area of interest, select your desired time range and cloud coverage, and inspect the resulting data in the browser. Try out different visualizations or make your own, download high resolution images and create timelapses.



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<https://www.sentinel-hub.com/explore/eobrowser/>



Credit: European Union, Copernicus Sentinel-2 Imagery - Processed by @DEFIS_EU.

Islândia 21 abril 2022 Sentinel-2



Höfn - Iceland Sentinel-2, 21 April 2022.

Höfn



PROGRAMME OF THE
EUROPEAN UNION

Copernicus
Europe's eyes on Earth

1 km

Credit: European Union, Copernicus Sentinel-2 Imagery - Processed by @DEFIS_EU



Copernicus Sentinel-2 mission

Namibia. Com 55 milhões de anos é considerado o deserto mais antigo da Terra

Captura a 27-10-2019.

Parque Nacional Namib-Naukluft

As áreas brancas de sal e argila contrastam com as dunas vermelho-ferrugem que a cercam.

© contains modified Copernicus Sentinel data (2019), processed by ESA, [CC BY-SA 3.0 IGO](https://creativecommons.org/licenses/by-sa/3.0/)



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https://www.esa.int/ESA_Multimedia/Images/2020/04/Namib_Desert



EO Browser

ENGLISH Login

Discover Visualize Compare Pins

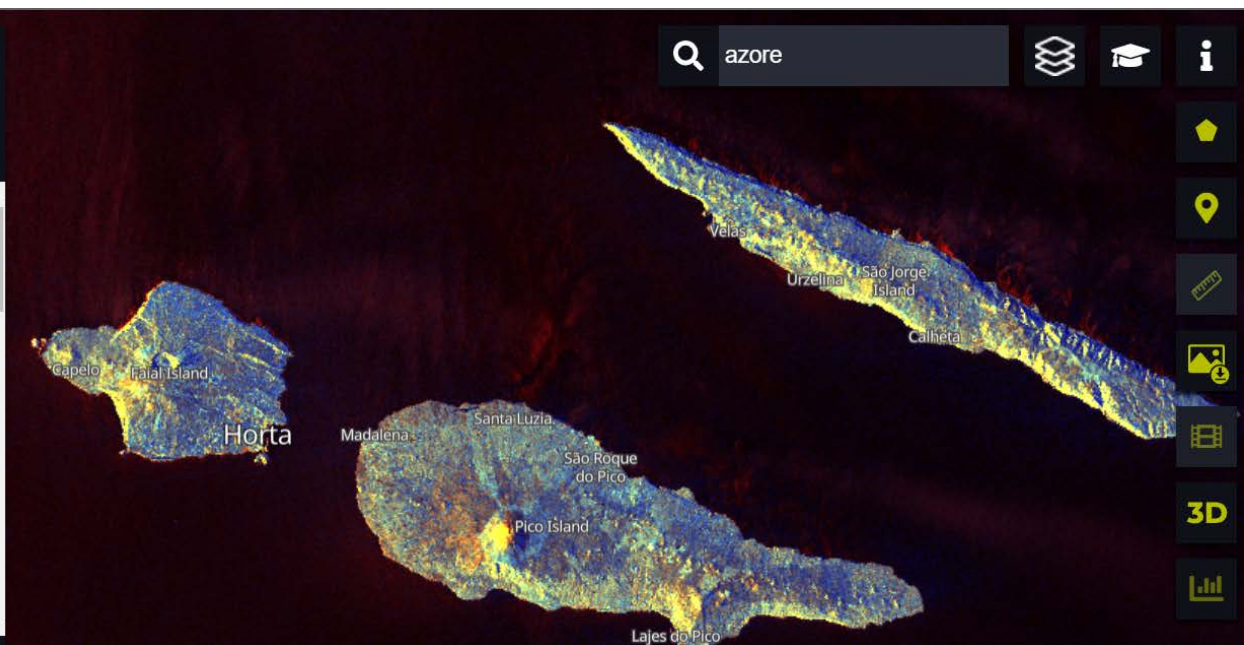
Dataset: Sentinel-1 AWS-IW-VVH

Date: 2022-04-26 Timespan

SAR urban

RGB ratio

Enhanced visualization



Visão de radar sobre o grupo central dos Açores Sentinel 1

<https://land.copernicus.eu/local/coastal-zones/coastal-zones-2018>

Map View

Metadata

Download

Legend

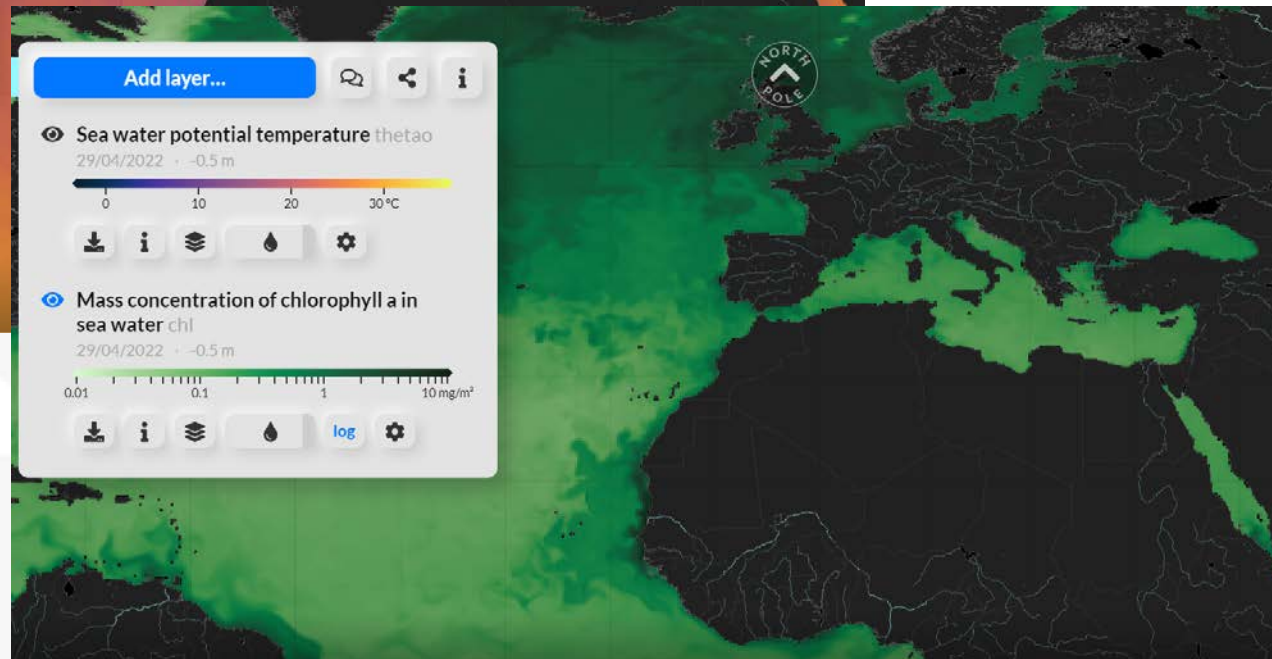
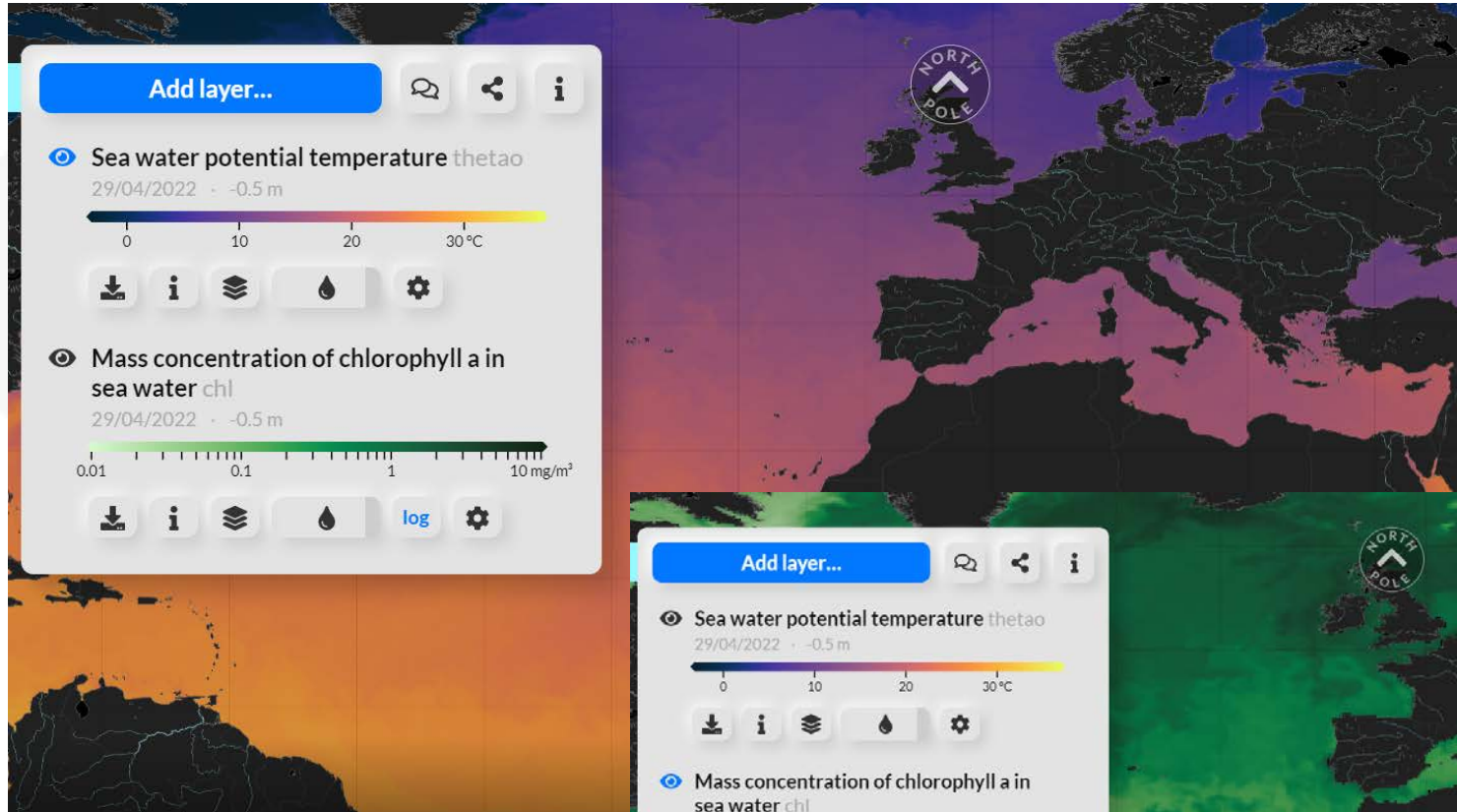
Web services

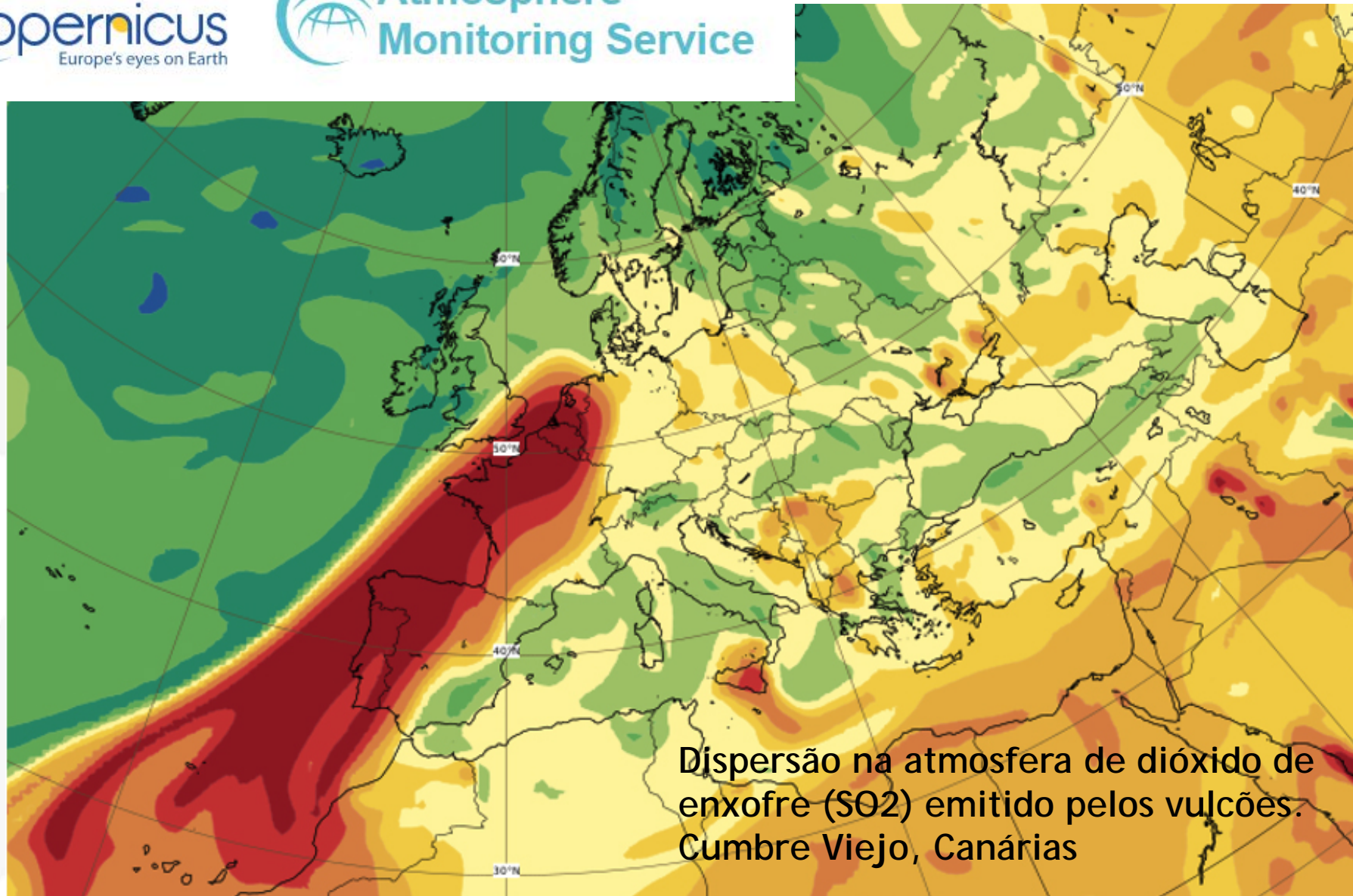
CZ_CoastalZones_2018

Coastal Zones 2018 raster

- 11110 Continuous urban fabric (IMD $\geq 80\%$)
- 11120 Dense urban fabric (IMD $\geq 30-80\%$)
- 11130 Low density fabric (IMD $< 30\%$)
- 11210 Industrial, commercial, public and military units (other)
- 11220 Nuclear energy plants and associated land
- 12100 Road networks and associated land
- 12200 Railways and associated land
- 12310 Cargo port
- 12320 Passenger port
- 12330 Fishing port
- 12340 Naval port
- 12350 Marinas
- 12360 Local multi-







Dispersion na atmosfera de dióxido de enxofre (SO₂) emitido pelos vulcões.
Cumbre Viejo, Canárias



Dióxido de nitrogénio NO₂

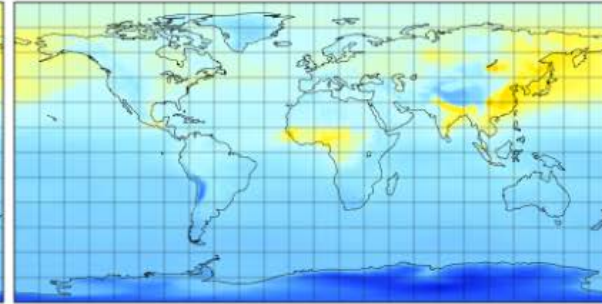
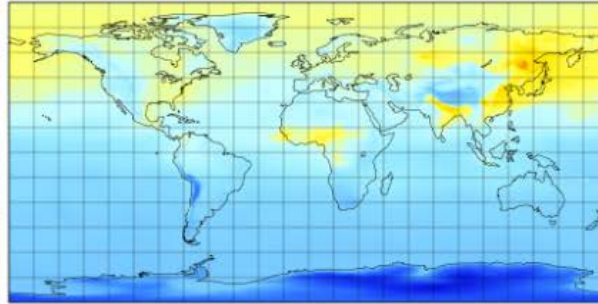
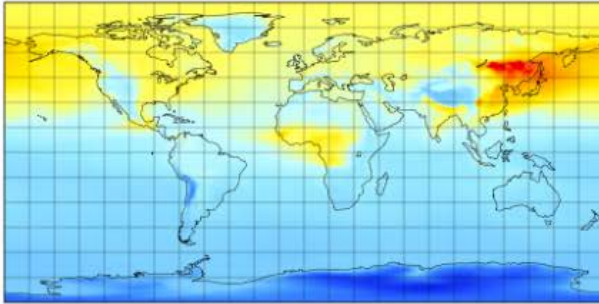
Efeitos de SAR Covid-19

CAMS Global Reanalysis - Carbon monoxide 2003 - 2016

May 2003

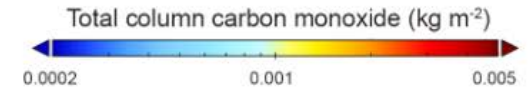
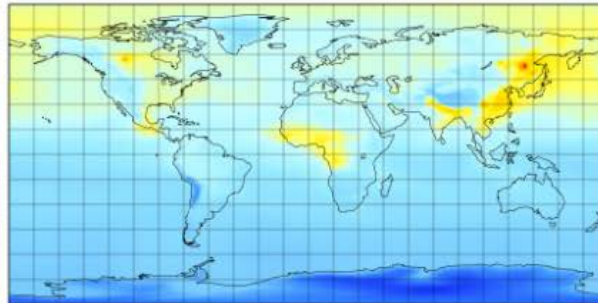
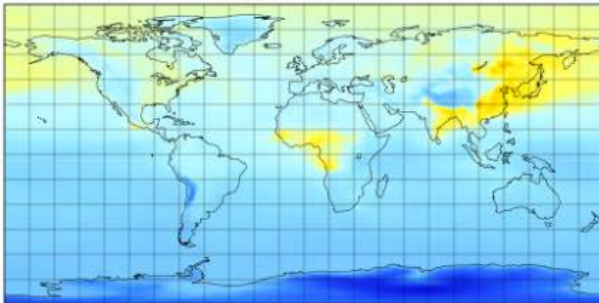
May 2006

May 2009



May 2012

May 2016



<https://confluence.ecmwf.int/display/CKB/CAMS%3A+Reanalysis+data+documentation>

Information for emergency response and disaster risk management.



On demand mapping

Copernicus EMS On Demand Mapping provides on-demand detailed information for selected emergency situations that arise from natural or man-made disasters anywhere in the world.



Rapid Mapping

Rapid Mapping provides geospatial information within hours or days of a service request in order to support emergency management activities in the immediate aftermath of a disaster.



Risk and Recovery Mapping

Risk & Recovery Mapping supplies geospatial information in support of Disaster Management activities including prevention, preparedness, risk reduction and recovery phases.



<https://emergency.copernicus.eu>



Early Warning & Monitoring

Copernicus EMS Early Warning and Monitoring offers critical geospatial information at European and global level through continuous observations and forecasts for floods, droughts and forest fires.



Floods

The European Flood Awareness Systems (EFAS) and Global Flood Awareness Systems (GloFAS) provide complementary flood forecast information to relevant stakeholders that support flood risk management at the national, regional and global level.



Fires

The European Forest Fire Information System (EFFIS) monitors forest fire activity in near-real time. EFFIS supports wildfire management at the national and regional level for EU member states and across the Middle East and North Africa.



Droughts

The Drought Observatory (DO) provides drought-relevant information and early-warnings for Europe (EDO) and globally (GDO). The service publishes short analytical reports (Drought News) in anticipation of an imminent drought.



<https://emergency.copernicus.eu/mapping/list-of-activations-rapid>

Home | What is Copernicus? | What is CEMS - Mapping? | Link to Early Warning Systems

News 

LATEST NEWS · 2022-04-13 | Information Bulletin 154 - CEMS activities for Australia floods

EMS - MAPPING

- Who can use the service
- How to use the service
- Portfolio: Rapid Mapping
- Portfolio: Risk and Recovery
- Quality control
- User Guide

RAPID MAPPING

- List of Activations
- Map of Activations
- GeoRSS Feed
- Online Manual

RISK AND RECOVERY

- List of Activations
- Map of Activations
- GeoRSS Feed
- Online Manual

OTHER

- Map of Activations of Other Organizations
- Meetings, Workshops
- Citation Guidelines
- Citations
- Press Mentions
- Calls for Tender

List of EMS Rapid Mapping Activations

Title <input type="text" value="Contains"/> <input type="text"/> Activation Status <input type="text" value="- Any -"/> <input type="button" value="Apply"/> <input type="button" value="Reset"/>	Event Type <input type="text" value="Drought"/> <input type="text" value="Epidemic"/> <input type="text" value="Extreme temperature"/> <input type="text" value="Humanitarian"/> <input type="text" value="Infestation"/> <input type="text" value="Mass movement"/>	Event Date (UTC) Start date <input type="text" value="E.g., 2022-04-28"/> End date <input type="text" value="2022-04-29"/> <input type="text" value="E.g., 2022-04-28"/>	Affected Countries <input type="text" value="Palestinian Territory"/> <input type="text" value="Papua New Guinea"/> <input type="text" value="Paraguay"/> <input type="text" value="Peru"/> <input type="text" value="Philippines"/> <input type="text" value="Poland"/> <input type="text" value="Portugal"/> <small>Select multiple countries with Ctrl/Cmd</small>
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Act. Code	Title	Event Date	Type	Country/Terr.	Feed
EMSR539	Fire in Algarve, Portugal	2021-08-14	Wildfire	Portugal	
EMSR463	Forest fire in Castelo Branco, Portugal	2020-09-13	Wildfire	Portugal	
EMSR462	Forest Fire in Viseu, Portugal	2020-09-07	Wildfire	Portugal	
EMSR448	Forest fire in Castelo Branco, Portugal	2020-07-25	Wildfire	Portugal	
EMSR443	Fire in Algarve, Portugal	2020-06-19	Wildfire	Portugal	
EMSR417	Flood in Portugal	2019-12-19	Flood	Portugal	
EMSR395	Tropical Cyclone in Flores Island, Portugal	2019-10-02	Storm	Portugal	
EMSR386	Forest fire in Aveiro District, Portugal	2019-09-05	Wildfire	Portugal	
EMSR372	Fire in Castelo Branco, Portugal	2019-07-20	Wildfire	Portugal	
EMSR303	Forest Fire in Faro, Portugal	2018-08-03	Wildfire	Portugal	
EMSR250	Forest fire Portugal	2017-10-15	Wildfire	Portugal	
EMSR207	Forest fires in Leiria District, Portugal	2017-06-17	Wildfire	Portugal	
EMSR204	Fátima 100th Anniversary	2017-05-13	Humanitarian	Portugal	
EMSR175	Forest Fire in Madeira Island	2016-08-08	Forest fire, w...	Portugal	
EMSR072	Floods in central Portugal	2014-02-12	Flood	Portugal	
EMSR066	Flood in Portugal	2014-01-06	Flood	Portugal	
EMSR050	Fires in Braganca, Portugal	2013-07-09	Forest fire, w...	Portugal	
EMSR010	Forest Fire in Portugal	2012-07-18	Forest fire, w...	Portugal	

Displaying 1 - 18 of 18 items



Obrigada

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