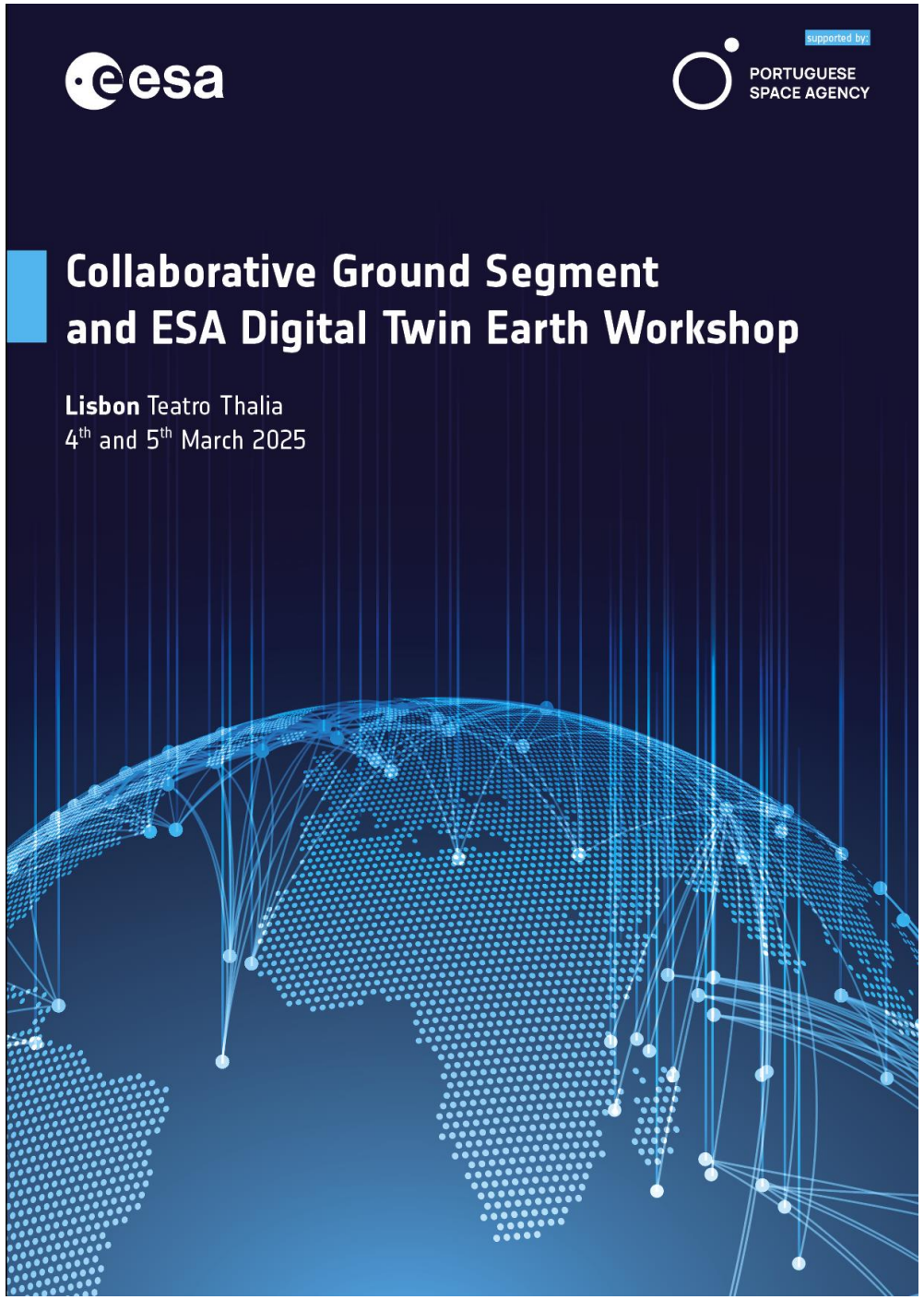


Activities in PORTUGAL

Outline

SMOS – Land Cover Monitoring system (DGT)
Integrated Rural Fire Management System (AGIF)

Digital Planet (New Space Portugal)

Digital Twin Earth:
Colab +Atlantic (Air4Health)
Development Seed (Earth Data for Global challenges)

Directorate General for Territory (DGT) - SMOS

- DGT is a public agency with a mission to pursue public policies on spatial planning, land use, and territorial and urban development.
- National authority for cartography and is responsible for the national geodetic network, the production of topographic and thematic cartography and cadastre, the coordination of the National Spatial Data Infrastructure (SNIG) and INSPIRE implementation in Portugal.
- Operates by means of the application and updating of the respective legal and regulatory frameworks, the dissemination of best practices, guidance and technical criteria.

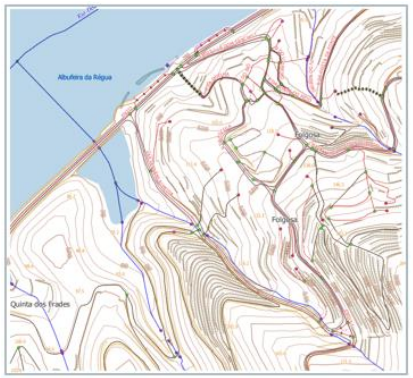
- Research and Development activities for the adoption of innovative methodologies to acquire, produce and explore geographic information.
- National Reference Center for Land Cover of the European Environment Agency (EEA) and is disseminating products of the Copernicus Land Monitoring Services within the Public Administration.
- Framework Partnership Agreement on Copernicus User Uptake (FPCUP) actions with other Portuguese institutions and some foreign partners. Actions include training sessions and events for the promotion and user uptake of Copernicus products and services.
- DGT is also responsible for the Land Cover Monitoring System (SMOS).

Directorate General for Territory (DGT) - SMOS

- SMOS aims to continuously produce reference and thematic cartographic information products on land use and land cover for continental Portugal.
- Uses the latest Spatial Technologies and Artificial Intelligence, to create maps with more detail, quality and speed.
- It is a collaborative and multifunctional system involving the public and private sector, being guided by the users needs and open data policy.
- Aims to assist a wide variety of areas such as land use planning, agriculture, forestry, cadastre, nature conservation, ecosystem services, water resources, civil protection, education, scientific research and more.

viSMOS • COScid • COSvgi

Topographic Cartography



Orthoimage

Thematic Cartography

Open data

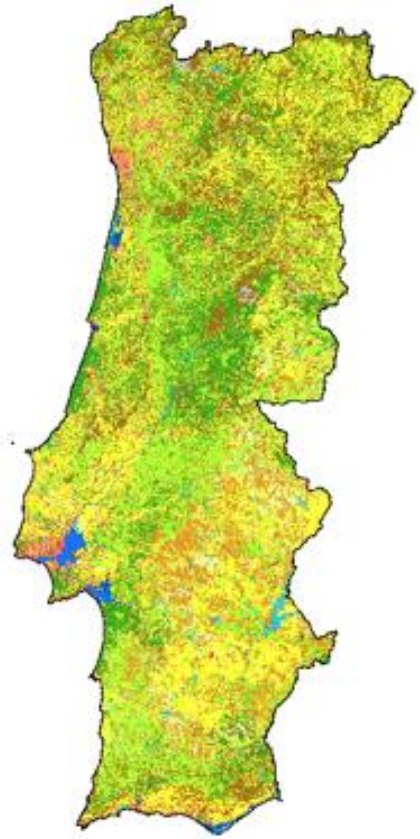
https://smos.dgterritorio.gov.pt

SISTEMA NACIONAL DE INFORMAÇÃO GEOGRÁFICA

Directorate General for Territory (DGT) - SMOS

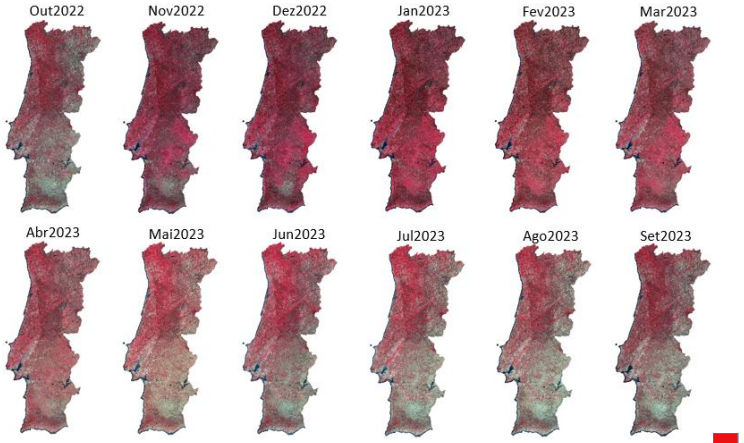
Sistema de Monitorização da Ocupação do Solo

COS – Land Use Land Cover Map



- Visual interpretation of ortophotomaps
- MMU – 1ha
- 1995-2007-2010-2015-2018 (2023 in production)
- 83 classes

Sentinel-2 Monthly Mosaics



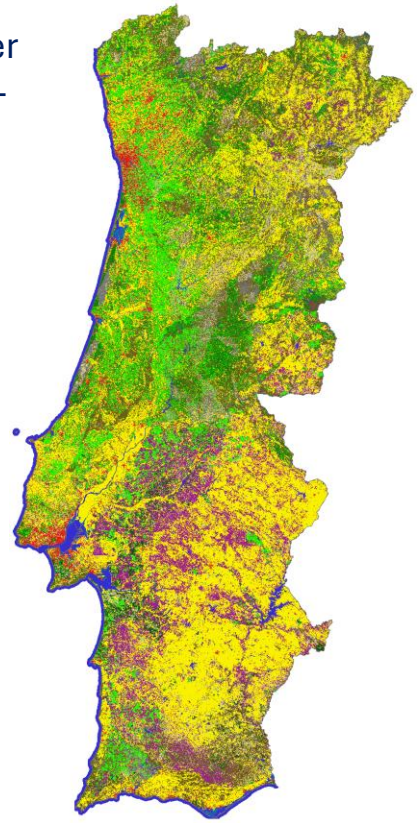
- 96 mosaics since January 2017

big data

Artificial Intelligence (IA)

COSc - Land Cover Map

- Annual raster map (2018 – 2024)
- 10 m pixels
- 15 classes

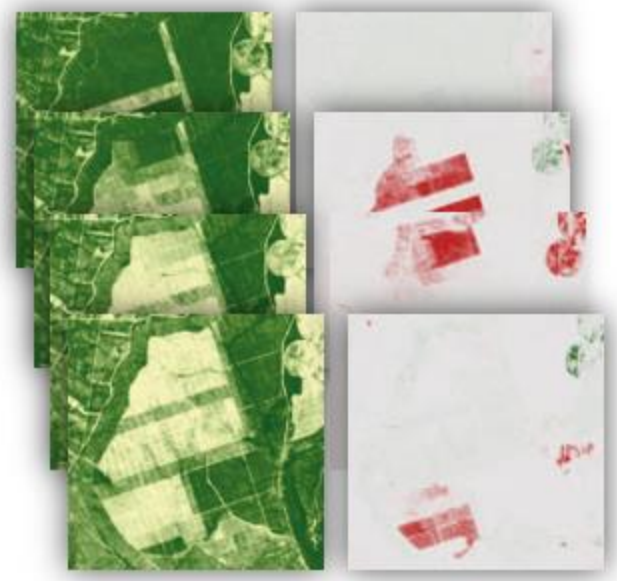


Artificializado
Culturas anuais de outono/inverno
Culturas anuais de primavera/verão
Outras áreas agrícolas
Sobreiro e Azinheira
Eucalipto
Outras folhosas
Pinheiro bravo
Pinheiro manso
Outras resinosas
Matos
Vegetação herbácea espontânea
Superfícies sem vegetação
Zonas húmidas
Água

Directorate General for Territory (DGT) - SMOS

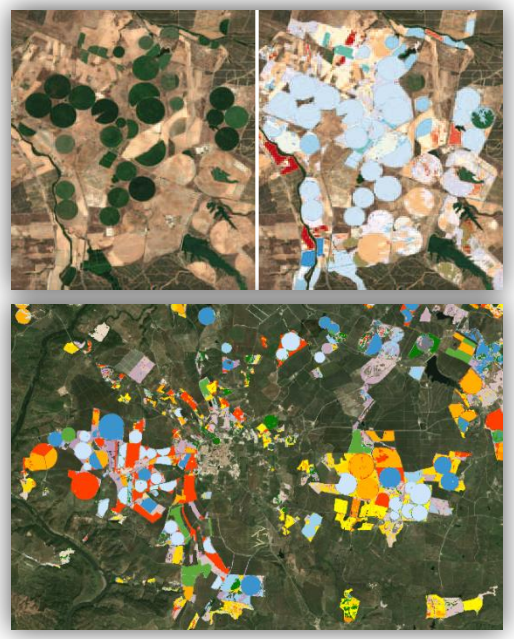
Sistema de Monitorização da Ocupação do Solo

MIAEV – Intra-Annual Vegetation State Maps



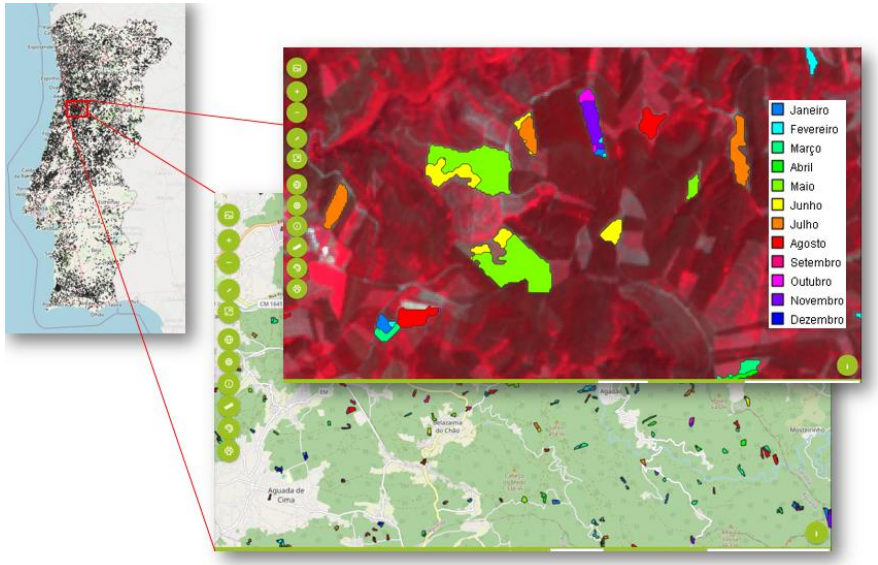
- Monthly raster maps characterizing the vegetation vigour using multitemporal Sentinel-2 NDVI time series.

MACAT – Annual Crop Map



- Annual raster product with 30 annual crops based on automatic classification of Sentinel-2 images.

CPV – Vegetation Loss Map



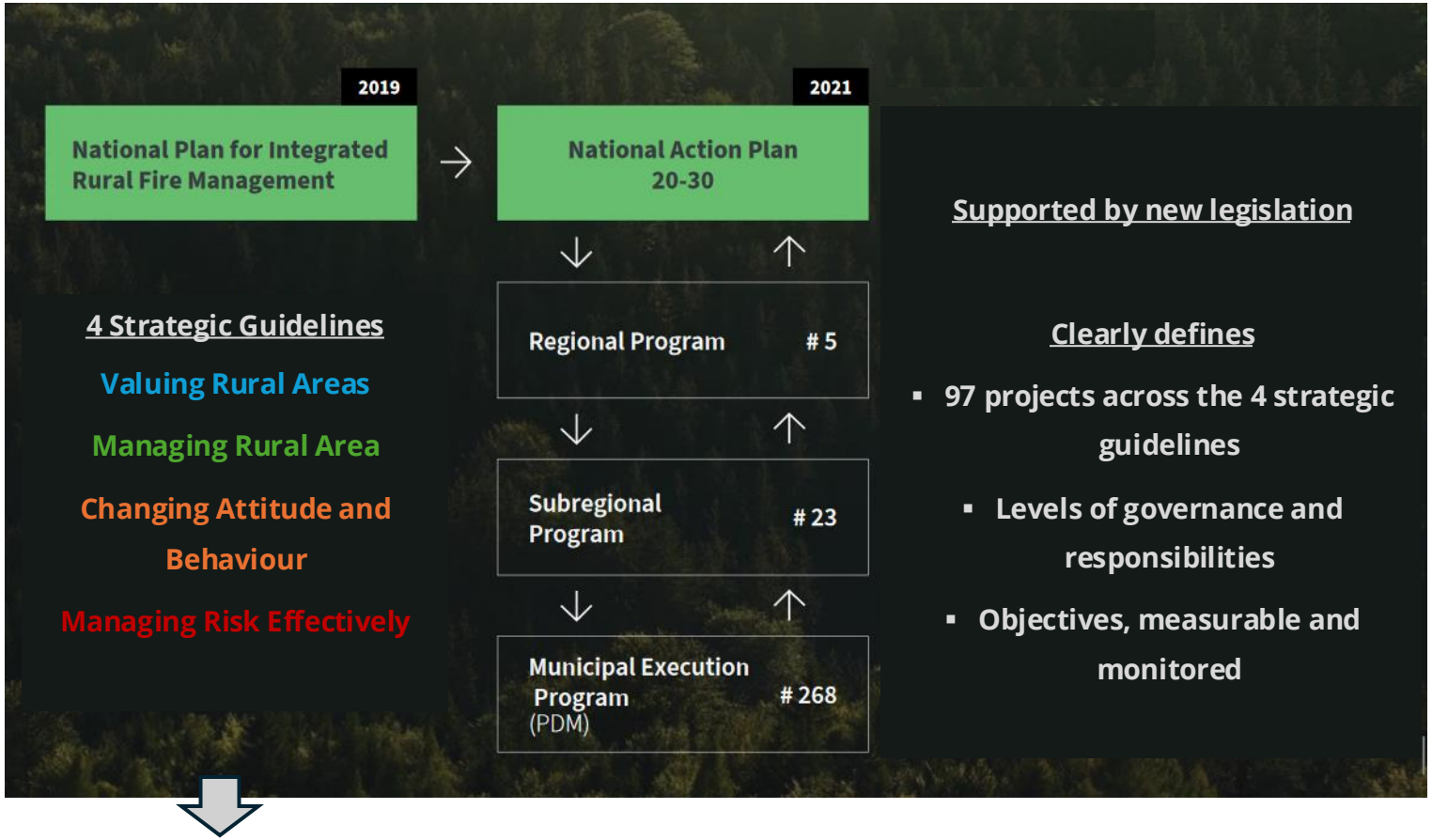
- Bi-monthly vector map of forest fires and clear cuts (>0.5ha) in Forest and Shrub areas, based on Sentinel-2.

AGIF Portuguese Agency for Integrated Rural Fire Management

Wildland fires in Portugal are common, but 2017 took a heavy toll, with over 100 fatalities and more than 500 thousand hectares burnt (~6% of the country)

Independent technical commissions reviewed those events to infer lessons learned and a path forward. AGIF was created in 2018 to define a new fire management strategy and coordinate its implementation within the Integrated Rural Fire Management System.

SGIFR Sistema de Gestão Integrada de Fogos Rurais — Integrated Rural Fire Management System



International Landscape Fire Governance Framework

Guiding Principles for Adjusting Strategies, Policies, and Management, to Global Change

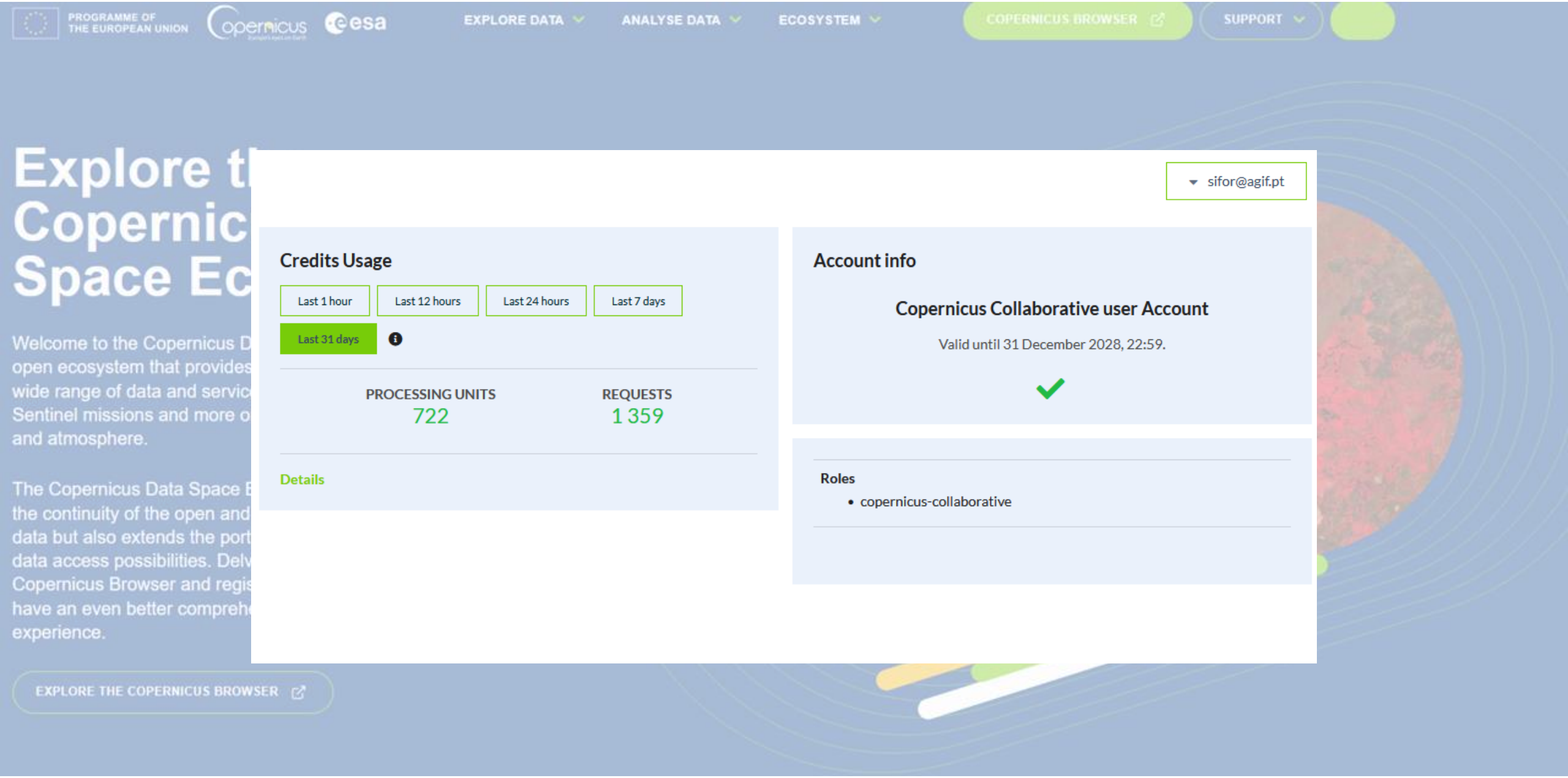
Supported by FAO, UNEP, UNFF, OECD, OSCE, Council of Europe, United States, Germany, Brazil, Spain, Australia, etc.

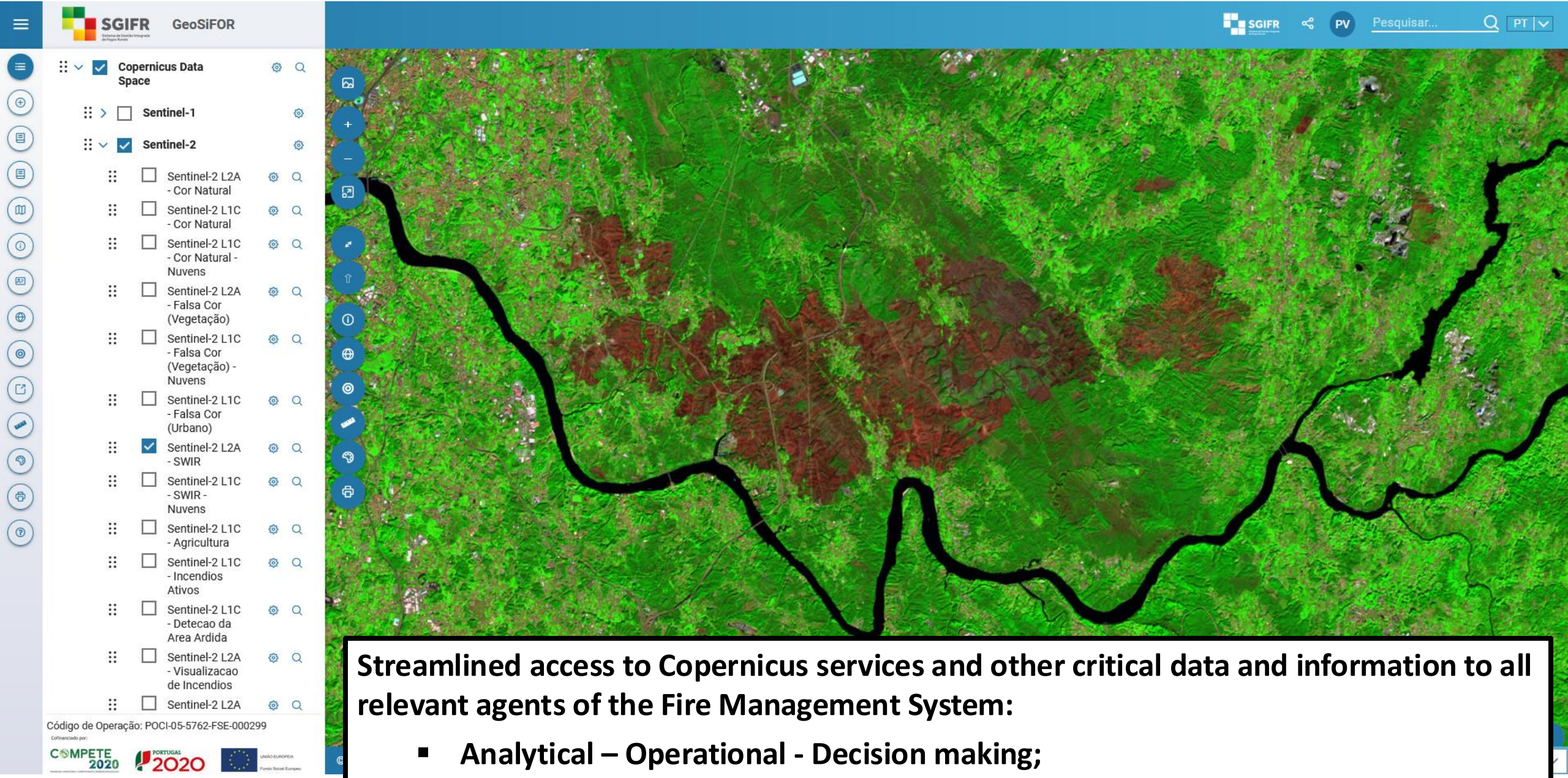
Stoof, C., Ribau, M. C., Moore, P. F., & Boustras, G. (2025). Readers respond. Nature, 637, 2.

Rural Fire Information System (SIFOR)

1. Ensure interconnection of data between all public entities.
2. Allow private organizations to provide data (e.g. fuel management), and to develop new services.
3. Public portal with access to information (e.g. fire hazard, active fires), knowledge, prevention guidelines, etc.
4. Monitorization (KPIs of the national wildfire strategy).
5. Lessons learned platform.

Integration of the Copernicus Data Space Ecosystem in SIFOR





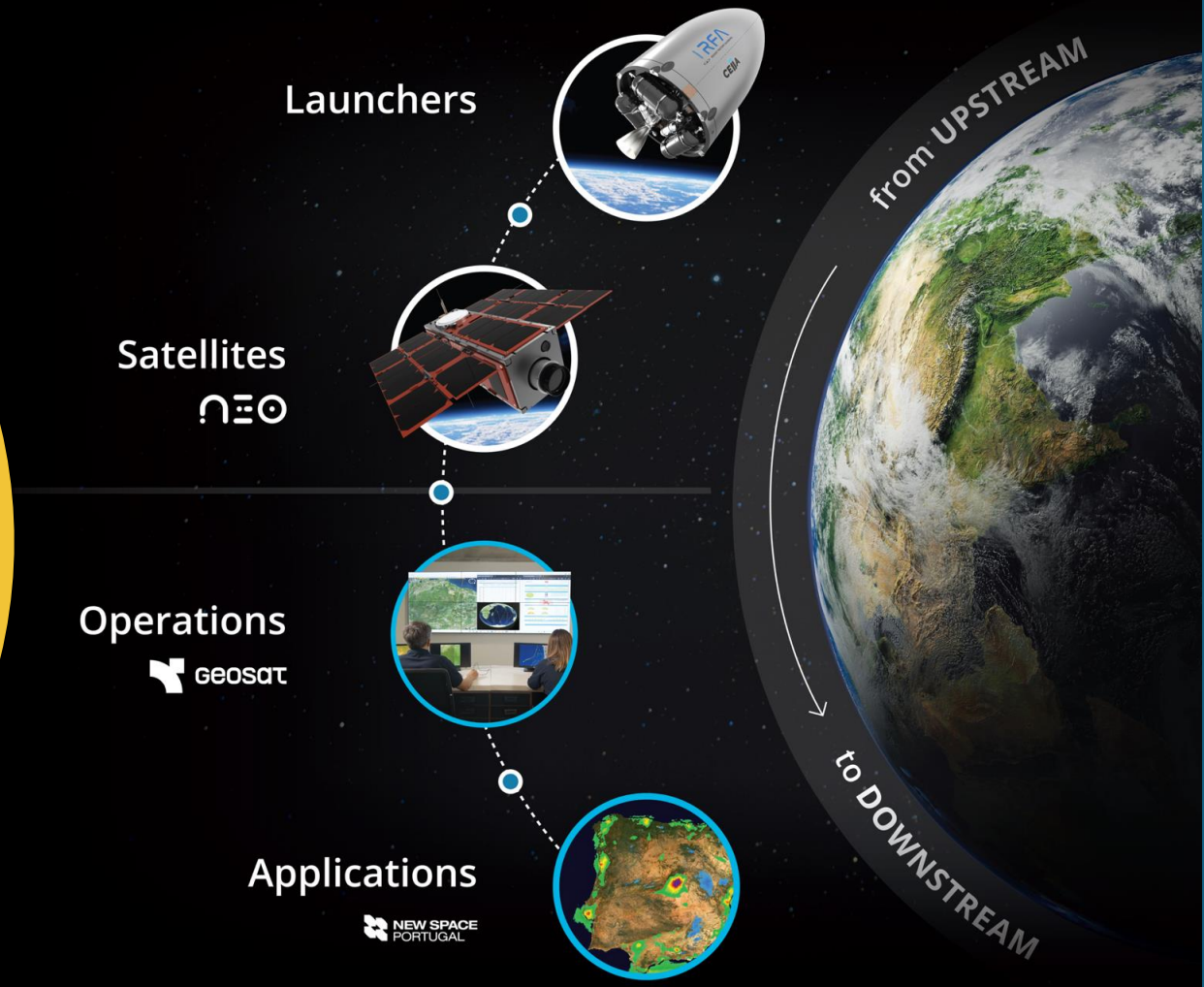
Código de Operação: POCI-05-5762-FSE-000299
Cofinanciado por:
COMPETE 2020
PORTUGAL 2020
UNIÃO EUROPEIA
Fundo Social Europeu

Streamlined access to Copernicus services and other critical data and information to all relevant agents of the Fire Management System:

- **Analytical – Operational - Decision making;**
- **Planning - Prevention – Fire suppression – Post fire restoration;**
- **Local – Regional - National governance levels.**

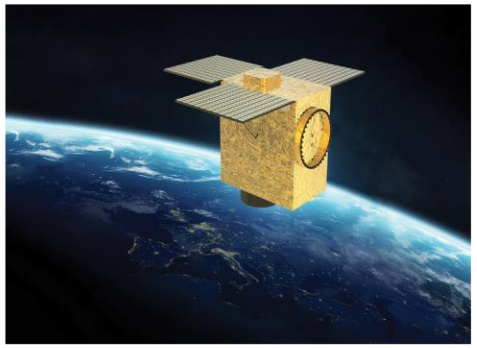
Space

Develops and productizes new technologies, products and services for the New Space Industry



SPACE

The New Space Portugal Agenda

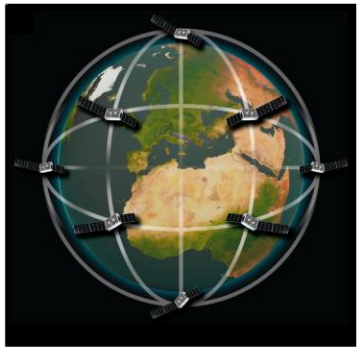


Atlantic Constellation

VHR EO satellites, sub-metric resolution, high revisit, interoperability, data sovereignty to address global markets of Defense, Security and Sustainability

Synthetic Aperture Radar

SAR, to obtain images of the Earth at night and through clouds, to support emergency management



Open Constellation

HR EO satellites in a mutualized satellite infrastructure, enabling organizations to share the data

VDES Constellation

VHF Data Exchange System satellites for communications between vessels in the middle of the ocean

With close to 180MEUR global investment, the NSP Agenda materializes in the delivery of multiple Earth Observation constellations (VHR, HR, SAR, VDES) and applications and services for the global market through the Digital Planet Platform. GEOSAT is the consortium leader, and CEiiA its largest investor/beneficiary (among 39 entities).

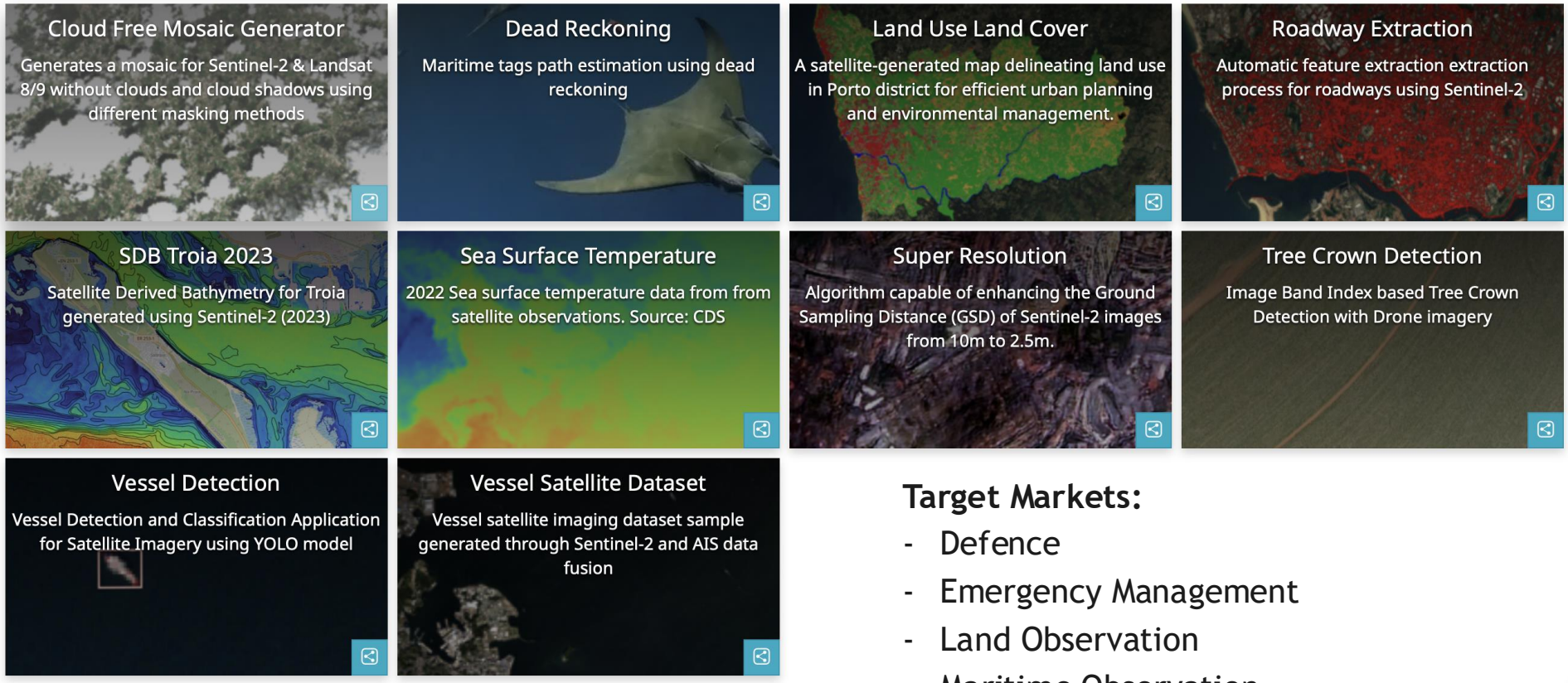
Digital Planet

Capacity Building | Entrepreneurship | Research EO Markets

NEW SPACE PORTUGAL

SPACE

Digital Planet: Building and Prototyping Applications

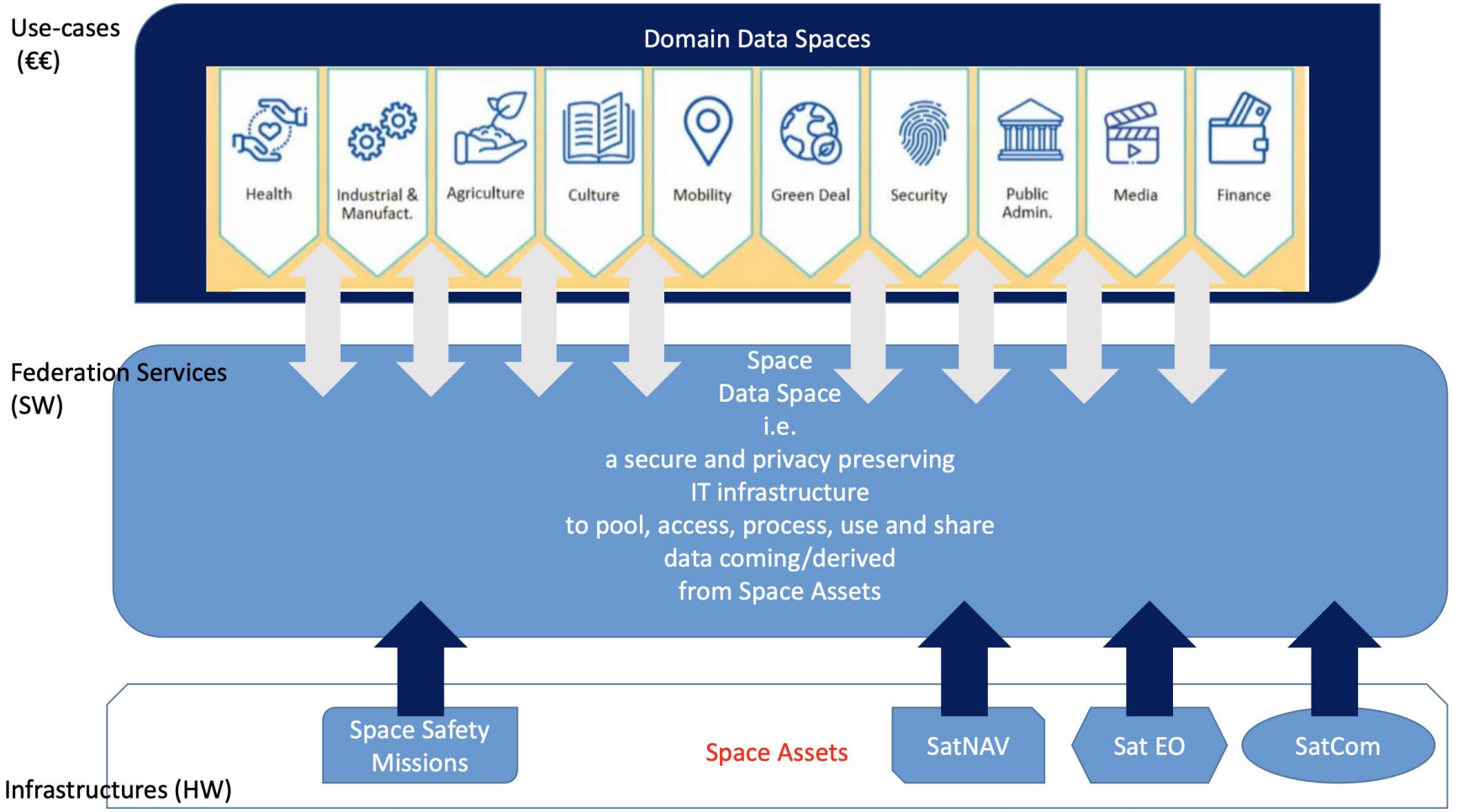


Target Markets:

- Defence
- Emergency Management
- Land Observation
- Maritime Observation
- ...

S P A C E

Digital Planet: Marketplace vs Space Data Space



Focus on:

- Data distribution (Consumers and Producers)
- Federated resources
- E2E use cases to be validated during 2025
- Compliance/Alignment with Gaia-X and IDSA

From collaboration towards a precursor solution for an integrated climatic and environmental multi-risk monitoring

+ATLANTIC@**Digital Twin Earth**

CoLAB +ATLANTIC

Ana Oliveira, on behalf of the +ATLANTIC CoLAB team

ana.oliveira@colabatlantic.com, tiago.garcia@colabatlantic.com

March 2024

@colabatlantic.com

WHO WE ARE

WHAT WE DO

Funding

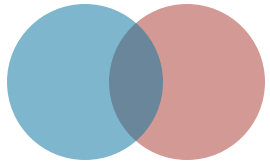
PRR Plano de Recuperação e Resiliência
REPÚBLICA PORTUGUESA
Financiado pela União Europeia NextGenerationEU
CoLAB Laboratórios Colaborativos
MI MISSÃO INTERFACE
ANI AGÊNCIA NACIONAL DE INOVAÇÃO

TODAY

WHERE WE ARE NOW

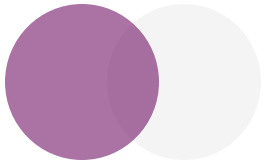

ONE DAY, SON, THIS WILL BE ALL YOURS TO SOLVE
Antarctic Ice MELTING
CHAPPATTE
International New York Times

The **AIR4health** overarching goal is to develop **two spatiotemporal Compound Climate and Air Quality Extremes Risk Algorithms (AIR4health Risk Algorithms) for predicting excess mortality and morbidity** by major diagnostic groups, using Portugal as a data-driven opportunity for **operationally servicing a European Heat Waves and Cold Waves (HW/CW) and Air Quality (AQ) surveillance system**.



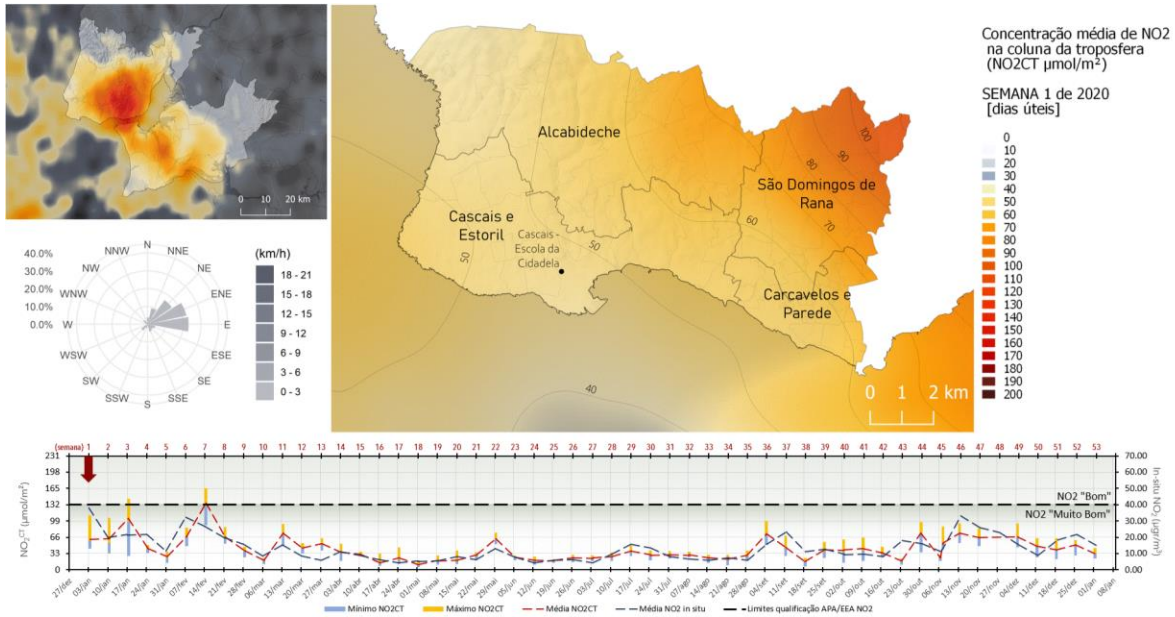
Use Case 1: Heat and Ozone

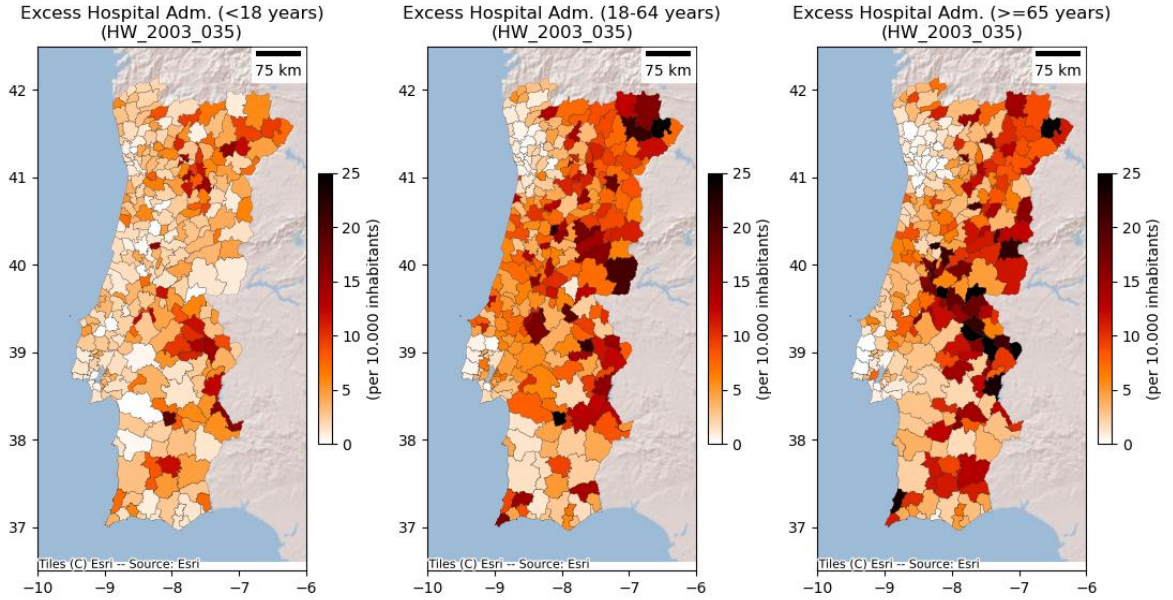
How can we use EO and Geospatial Data Science to Downscale and Forecast Heatwaves and Ozone Compound Events?



Use Case 2: Cold and Nitrogen Dioxide

How can we use EO and Geospatial Data Science to Downscale and Forecast Cold Spells and Nitrogen Dioxide Compound Events?





AIR4health is under a programme of, and funded by, the European Space Agency. Views expressed do not reflect the official opinion of the European Space Agency.

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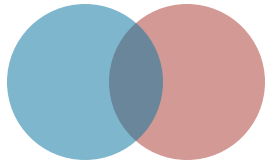

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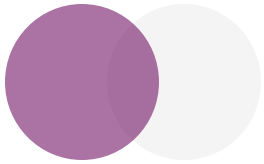

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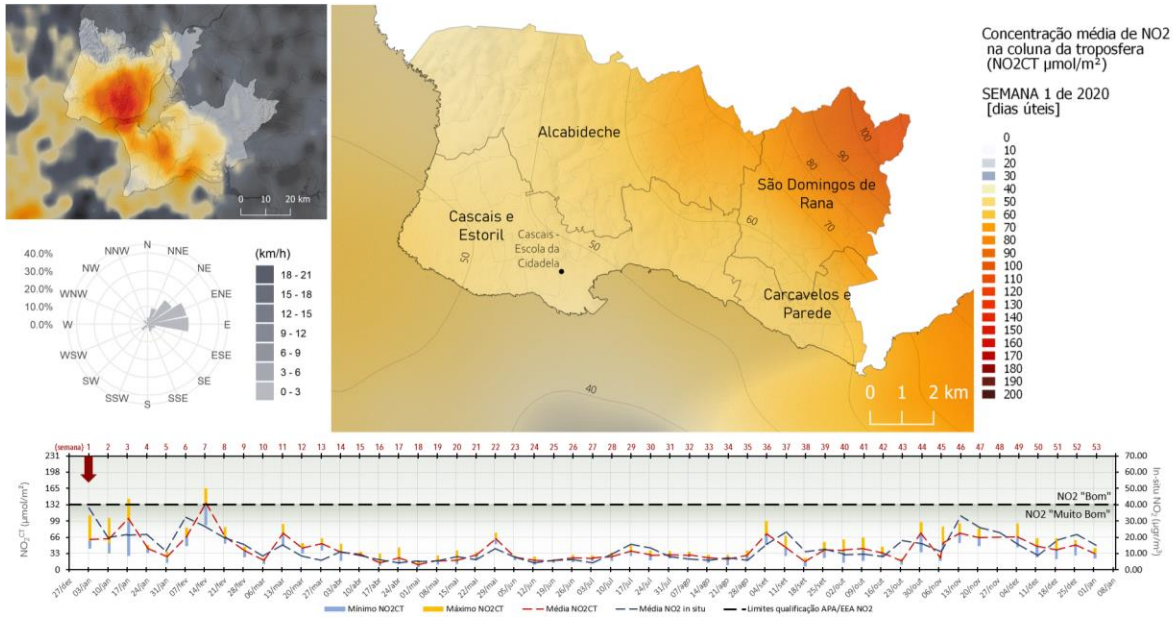

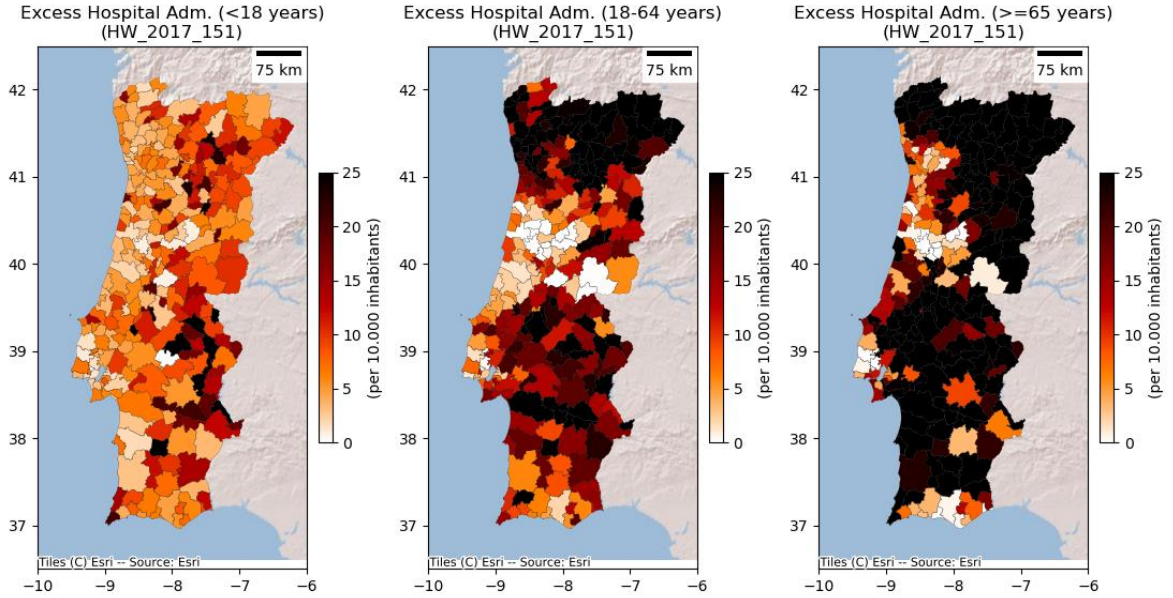

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ESA DTE AIR4health Synergies: a multi-scale nested approach.

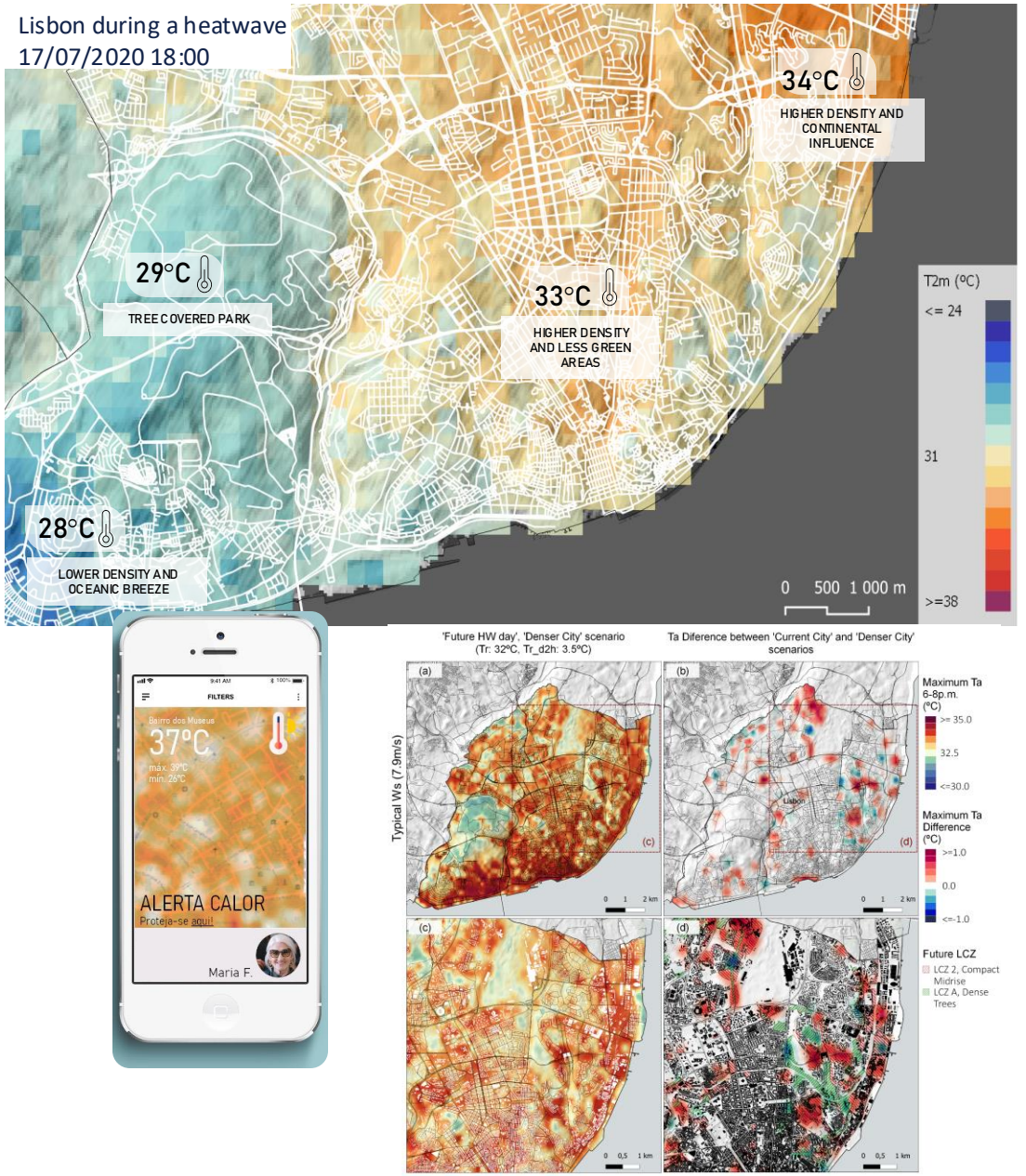
ESA XHEAT: developing **a seasonal and synoptic-scale predictability EO and climate-based indicator** of compound heat-droughts events

ESA CLIM4cities: assimilating EO into a Machine Learning downscaling approach for **hyper-local heat exposure assessments**

ESA Delta Twin: sharing the DT integration with the research community for **wider reach and improved scalability**

ECMWF DE-UHHF: replicating CLIM4cities forecasts approach in the Weather Extremes DT, over Europe and global south cities

Horizon EU Terra DT: replicating CLIM4cities what-if scenarios in the Climate Adaptation DT, over Europe capital cities



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TOMORROW

WHERE WE WANT TO BE

WHERE WE WANT TO GO

TOMORROW

Destination Earth

EDITO
European Digital Twin Ocean

From DestinE and the EU Digital Twin Ocean...

Boundaries — Geometric replica

History — Time-fixed data

Real-time — IoT observations

Forecasts — Short-term predictions

...towards national-to-local nested DT's.

MERCATOR OCEAN INTERNATIONAL — Marine (CMEMS)

Services
3 Ongoing
165k€

ECMWF — Climate (C3S) — Atmosphere (CAMS)

Services
5 Ongoing
858k€

esa

Services
9 Ongoing (+2 Under Evaluation)
994k€ (+250k€ Under Evaluation)

Horizon Europe

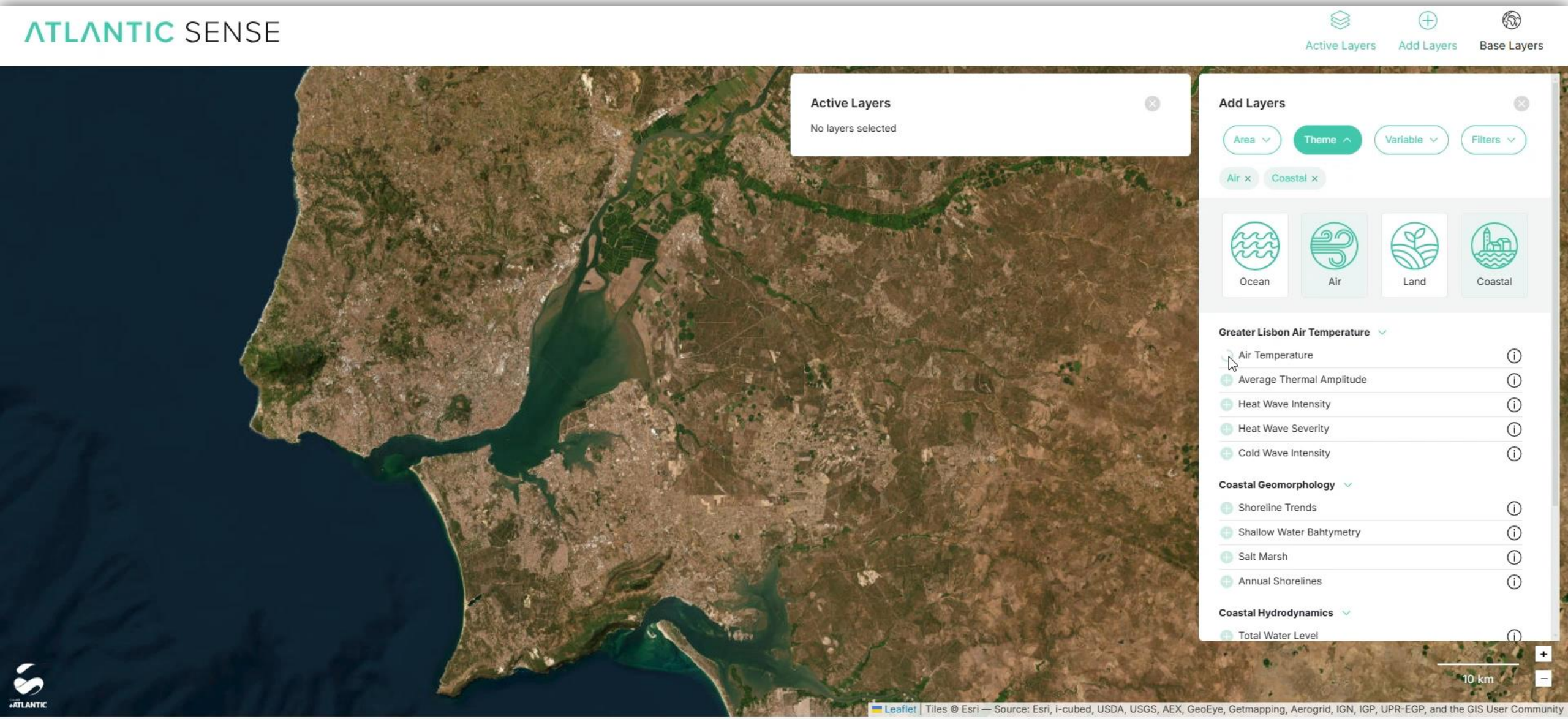
Grants
12 Ongoing
2.5M€

fct Fundação para a Ciência e a Tecnologia

Grants
1 Ongoing
35k€

PRR Plano de Recuperação e Resiliência

Grants
2 Ongoing
4.2M€ + 0.9M€ (MI + NSP)


ATLANTIC SENSE
Active Layers
Add Layers
Base Layers
Active Layers
No layers selected
Add Layers
Area
Theme
Variable
Filters
Air ×
Coastal ×
Ocean
Air
Land
Coastal
Greater Lisbon Air Temperature
Air Temperature
Average Thermal Amplitude
Heat Wave Intensity
Heat Wave Severity
Cold Wave Intensity
Coastal Geomorphology
Shoreline Trends
Shallow Water Bahtymetry
Salt Marsh
Annual Shorelines
Coastal Hydrodynamics
Total Water Level
10 km
Leaflet | Tiles © Esri — Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community
-1 DAY
-1H
+1H
+1 DAY
13/09/2024 15:00:00
15H
38.78598, -8.10292

THANK YOU!!!

Ana Luisa Almeida
COO

Ana Oliveira
CTO Space

Ana Rodrigues

Fabíola Silva

Andreia Silva

Maria Manuel Gil
CTO Ocean

Beatriz Lopes

Bruno Marques

Caio Fonteles

Catarina Cecilio

Cintia Bonanad

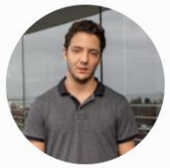
Francisco Campuzano

Inês Girão

Inês de Sousa Magusteiro

João Paixão

Luis Pedro Almeida



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Manvel Khudinyan

Maria Castro

Nuno Lourenço
CEO

Paula Salge

Renato Mendes

Rita Cunha

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Sofia Aguiar

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NEW SPACE PORTUGAL
esa
PRR
Plano de Recuperação e Resiliência
REPÚBLICA PORTUGUESA
Financiado pela União Europeia
NextGenerationEU
MISSÃO INTERFACE
AGÊNCIA NACIONAL DE INOVAÇÃO
European Commission
Climate Change Service
climate.copernicus.eu
ECMWF

developmentSEED

Accelerating the application of Earth Data to our biggest global challenges

Emmanuel Mathot, 4 March 2024, Lisbon

Development Seed

Who we are

Our mission is to make sure every decision that can positively affect our planet, is made with the best data available.

Our engineers and designers build products and technology to support some of the world's most impactful organizations

Collaboration and openness are core to our approach

developmentSEED

Things our team is excited about

Pushing the state of the art

Copernicus
Data Space Ecosystem

Copernicus Data Space Ecosystem

- EOEPCA building blocks
- Indirectly participating to the new catalog built with stac-fastapi-pgstac.
- openEO by TiTiler: light and fast open-source software for Open Science
- *GeoZarr and multiscale specifications and prototyping*

PARTNERS

Sinergise, CloudFerro, VITO, Telespazio, DLR, ESA

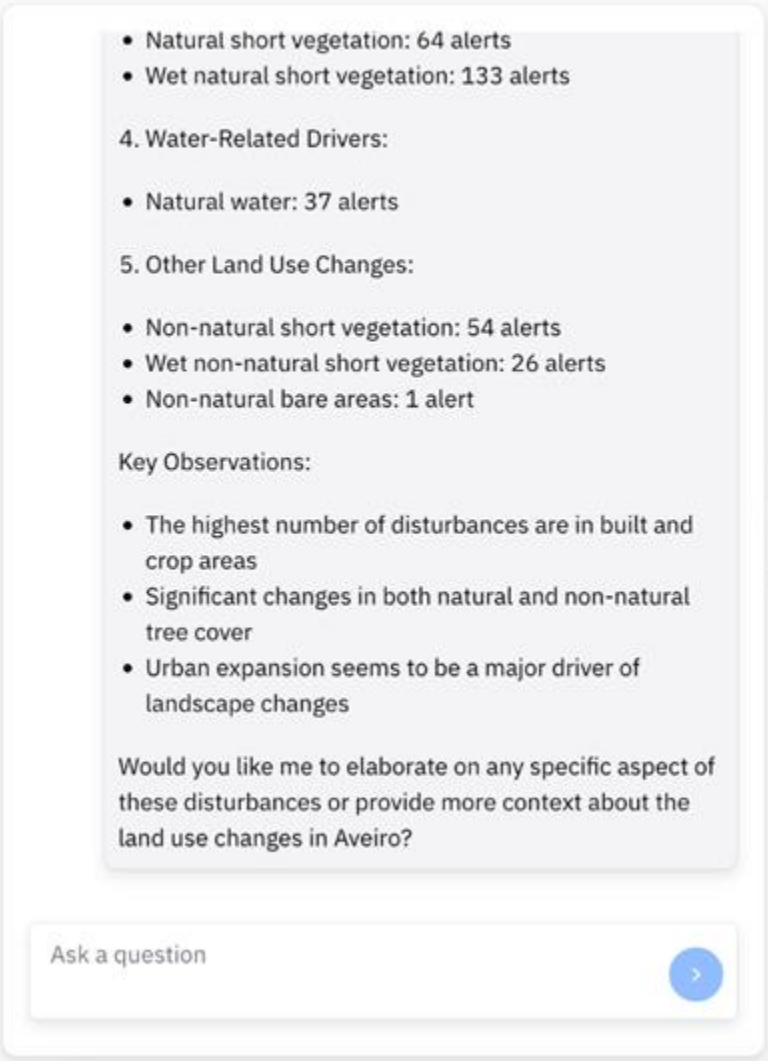
developmentSEED

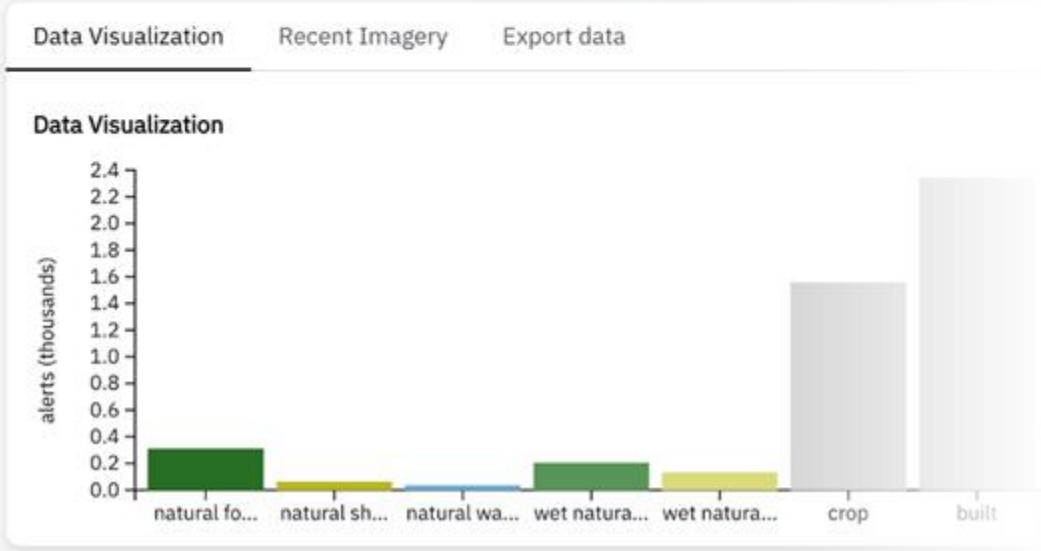
developmentSEED

Land & Carbon Lab

PROJECT ZEN0_

Language Interfaces for Maps (GeoLLMs)





Combining the power of AI with human insight to make geospatial analysis more accessible and reliable.

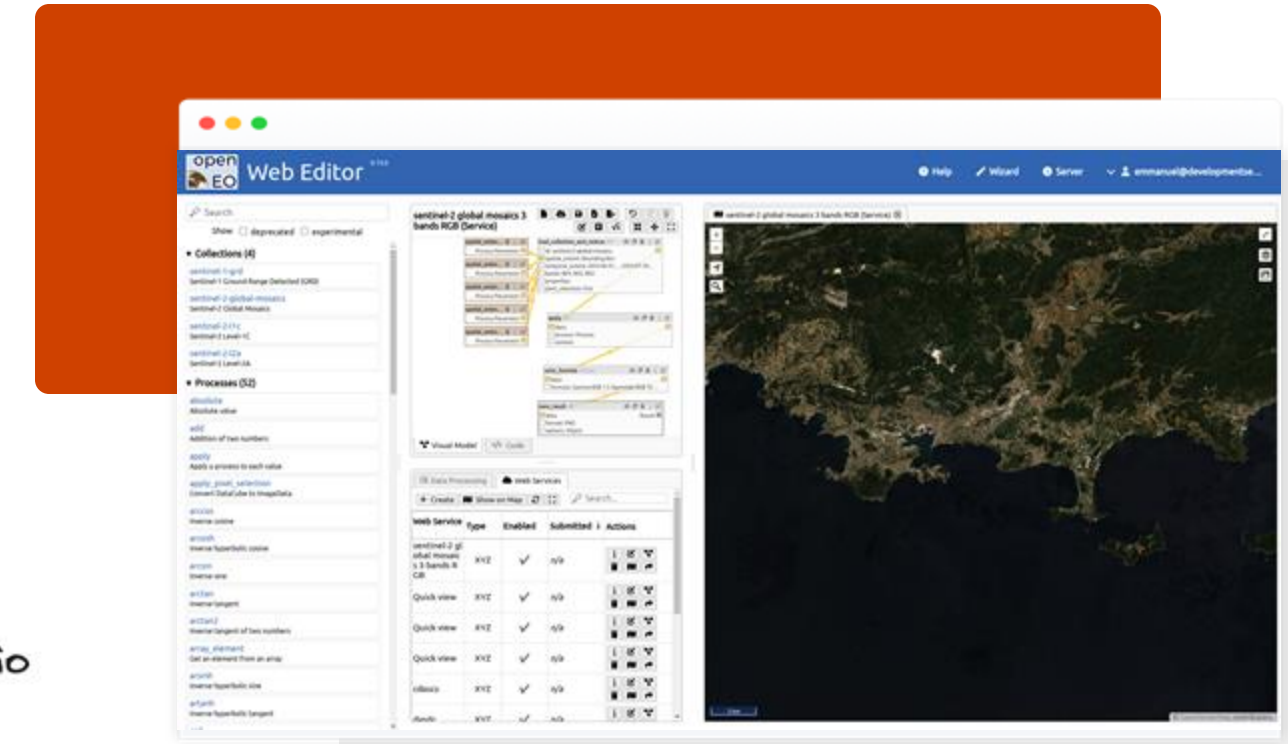
- → Spatial Queries: From Technical to Natural
- → LLMs to orchestrate analysis, tools to carry it out
- → Building Trust with Human in the Loop
- → From Theory to Practice: The Land and Carbon Lab

PARTNERS

Land and Carbon Lab & WRI

developmentSEED

Advancing the state of multidimensional data



TiTiler + xarray = TiTiler-Xarray

Rasterio

Fsspec + Xarray + Rasterio

COG

Zarr

netCDF

HDF

2D,3D

2D,3D,4D, ...

- → GeoZarr + Multiscale specifications for Zarr v3
- → Beyond PoC (NASA VEDA), targeting MVP for 2025 Q3
- → Open-source and FAIR
- → Driven by Copernicus Space Component (CSC) new EOPF Sentinel Data Processors