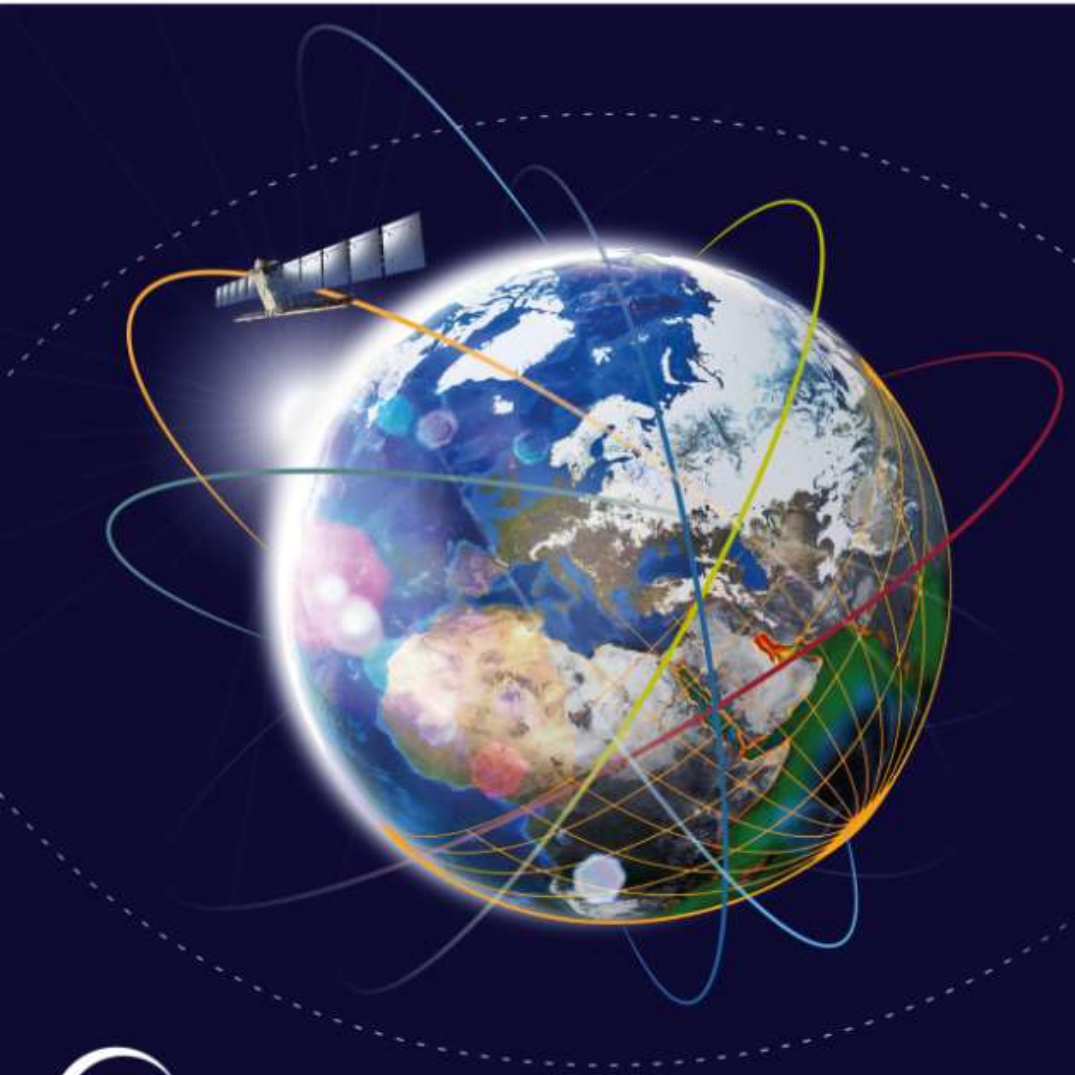


Copernicus

Michel F. Massart

Directorate-General Joint Research Centre
European Commission

Copernicus
Europe's eyes on Earth

Space

Copernicus EU
Copernicus EU
Copernicus EU
www.copernicus.eu

In brief

- **Copernicus, a component of the EU Space Programme**
- **Copernicus, the Earth Observation and Monitoring flagship programme** of the European Union:
  - **Monitors the Earth,** its environment and ecosystems
  - Prepares for crises, security risks and natural or man-made disasters
  - Supports EU policies and International agreements & conventions
  - Contributes to the EU's role as a global "soft" power
- Adopts a **full, free and open data policy**
- Is an **operational and sustainable** program
- Is **a tool for economic development** and a driver for the digital economy

Timeline

Copernicus

Copernicus timeline

2014
Start of Copernicus full operations phase

2013
EC proposed Copernicus Regulation Delegated act on Copernicus Data Policy

2012
GMES renamed "Copernicus"

2011
Start of GMES Initial Operations (GIO) phase

2008
EC - ESA agreement on GMES signed.
GMES services presented at Lille Forum

1998
Baveno Manifesto
(first reference to Global Monitoring for Environmental Security)

2005
GMES flagship of EU Space Policy
ESA approves GMES Space Component Programme

2006
EC dedicated unit (GMES Bureau) in charge of Programme development and implementation

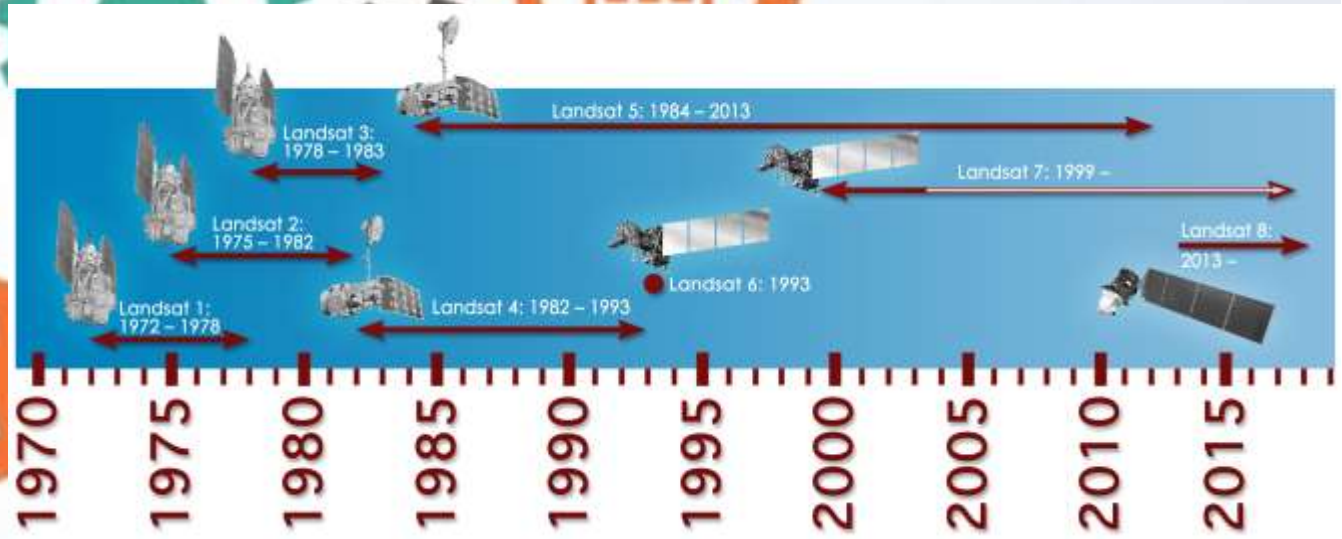
2001
Gothenburg EU Summit
(first EC involvement in establishing European capacity for monitoring the environment from space)

European Commission

Main objective

COPERNICUS aims at developing **OPERATIONAL and SUSTAINABLE services**, following the example of meteorology, but for other domains such as:

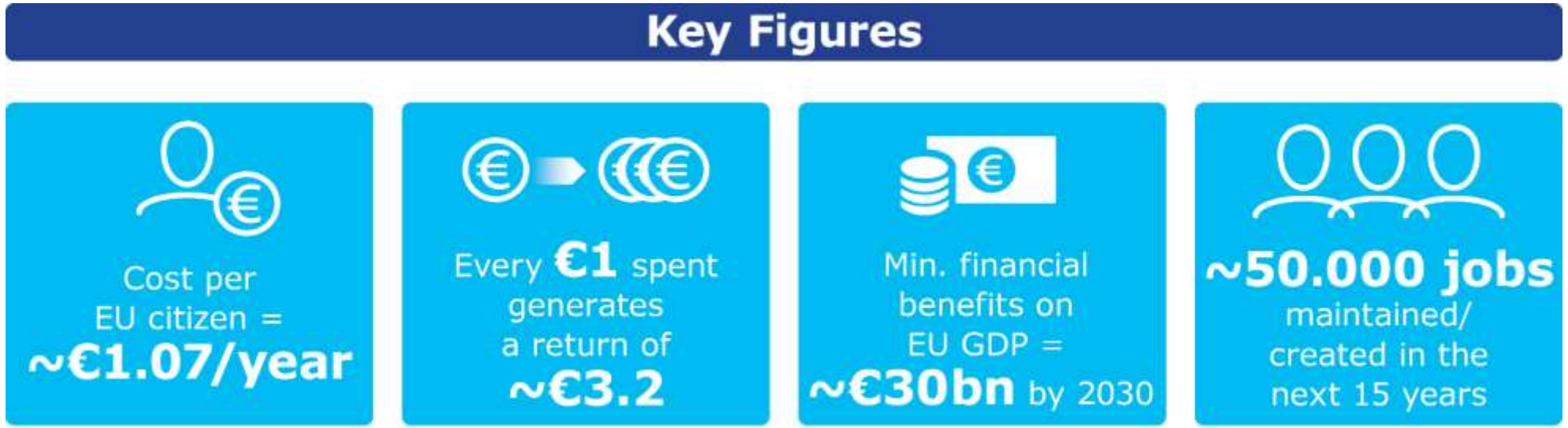
- **E**mergency situation management
- **A**ir quality and pollution monitoring
- **L**and monitoring and planning
- **O**cean & sea monitoring …



In addition, research is needed to continuously improve operational services

Socio-economic benefits

- Confident to generate significant **socio-economic benefits**
- Driver for research, innovation and the creation of **highly skilled jobs**
- **4.3 bn Euro (MFF 2013-2020) – 5.3 bn Euro (MFF 2021-2027) investment**

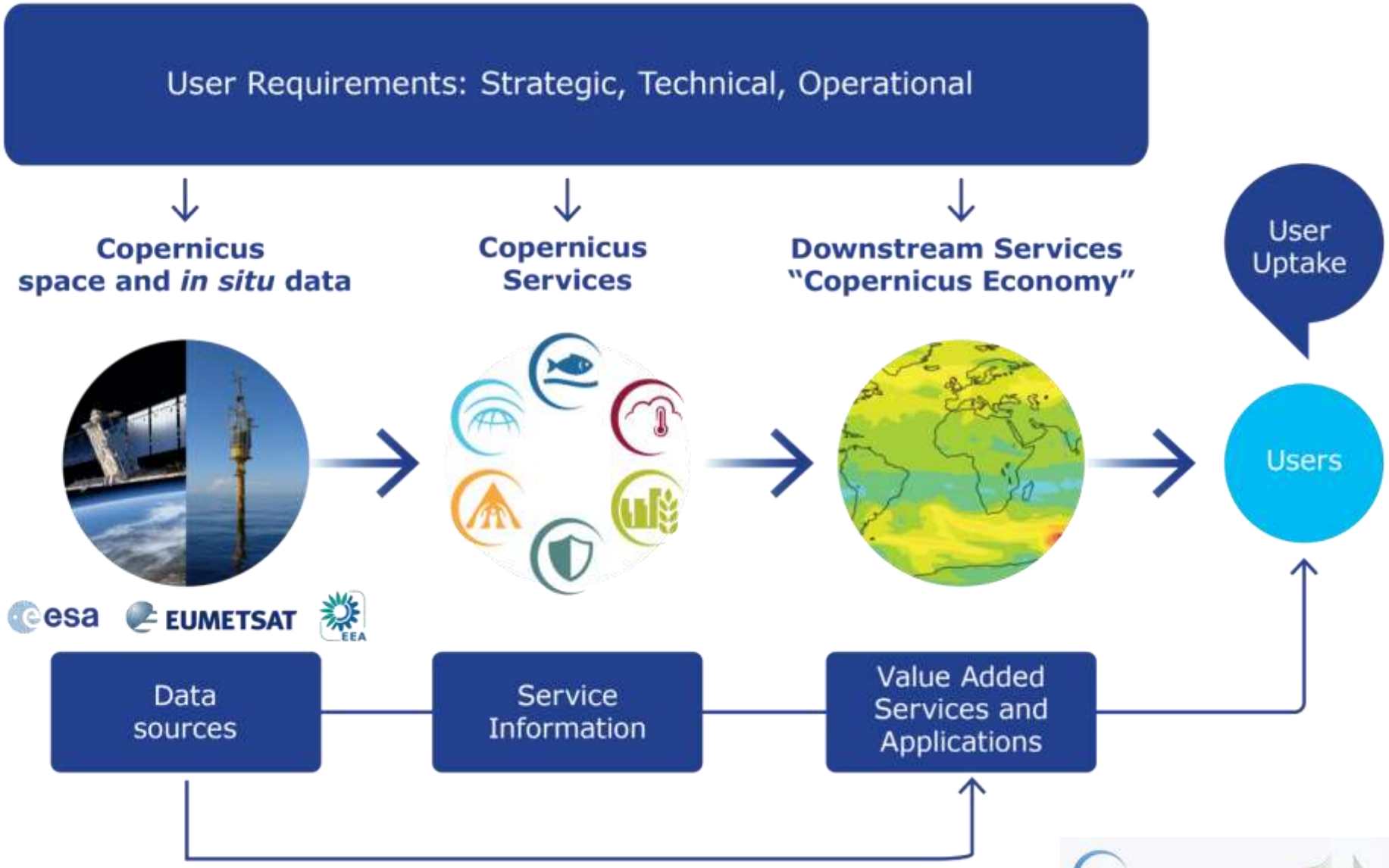


Copernicus
Europe's eyes on Earth

Architecture

European Commission

COPERNICUS IS DRIVEN BY THE USERS



COPERNICUS PARTNERSHIPS

SPACE

TECHNICAL COORDINATION BY esa

SENTINELS MISSIONS OPERATED BY esa EUMETSAT

CONTRIBUTING MISSIONS

Participant States

SERVICES

IMPLEMENTED BY

ECMWF

MERCATOR OCEAN

European Environment Agency

ECMWF

EMSA

FRONTEX

IN SITU

Participant States

COORDINATED BY

European Environment Agency

Copernicus Europe's eyes on Earth

European Commission

Copernicus

Building on existing expertise

Land Service : 65+ industry partners / 350+ experts

SYKE · enveo · HYGEOS · IMDC · University of Reading · LEGOS · TU WIEN GEO · TerraSphere · Societe · EUMETSAT · TRASYS · IGN · JOANNEUM RESEARCH · space 4 environment · GISBOX · EOXPLORE · ONF International · RMI · EOLAB · SPACEBEL · Université de Liège · Informus GmbH · EOXPLORE · SINERGISE · ZAMG · CREAF · eodc · TU WIEN · IIASA · WAGENINGEN UNIVERSITY · ipma · METEO FRANCE · University of Leicester · CLS · FINNISH METEOROLOGICAL INSTITUTE · vito · PML Plymouth Marine Laboratory · BROCKMANN CONSULT GMBH · e-geos UNA SOCIETÀ ASI/TELESPAZIO · EXELIS · ISPRA · Telespazio · LUND UNIVERSITY · Starlab STARLAB LIVING SCIENCE · IMDC · EXELIS · UCLC · ITHACA · National Research Council of Italy · ONF International · JOANNEUM RESEARCH · GEOFIT · space 4 environment · adwäisEO · BROCKMANN CONSULT GMBH · SINERGISE · GeoVille · ACRI ST · LuxCarta · adwäisEO · UCLC · iLab

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Space component

European Commission

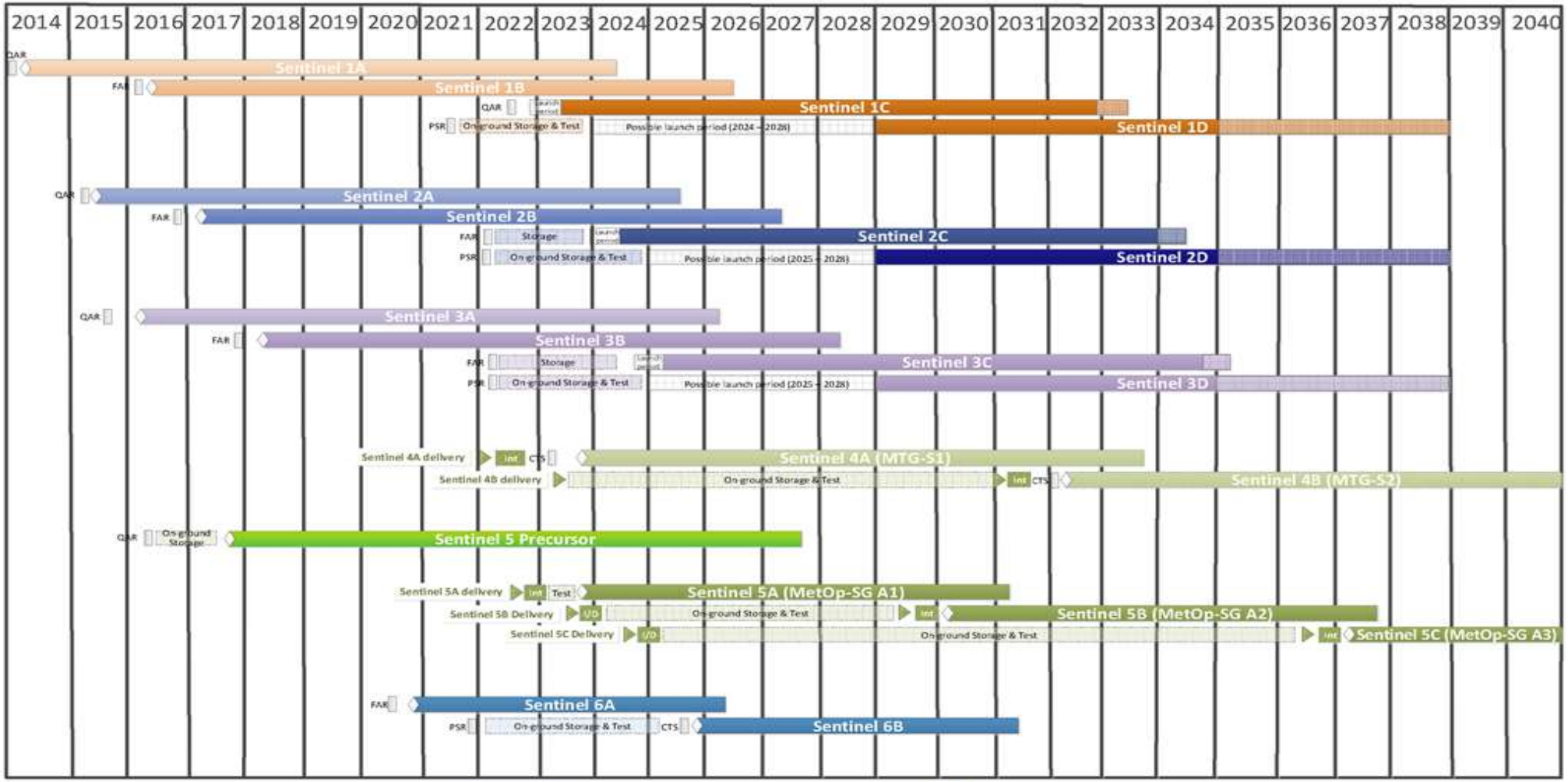
THE SENTINELS

FULL, FREE AND OPEN

Sentinel Mission and Status		Key Features
 SENTINEL-1: 4-40m resolution, 6 days revisit at equator	*1 Sat in operation*	Polar-orbiting, all-weather, day-and-night radar imaging
 SENTINEL-2: 10-60m resolution, 5 days revisit time	*2+1 Sats operation*	Polar-orbiting, multispectral optical, high-res imaging
 SENTINEL-3: 300-1200m resolution, <2 days revisit	*2 Sats in operation*	Optical and altimeter mission monitoring sea and land parameters
 SENTINEL-4: 8km resolution, 60 min revisit time	*1st Launch in 2024*	Payload for atmosphere chemistry monitoring on MTG-S
 SENTINEL-5p: 7-68km resolution, 1 day revisit	*1 Sat in operation*	Mission to reduce data gaps between Envisat, and S-5
 SENTINEL-5: 7.5-50km resolution, 1 day revisit	*1st Launch in 2025*	Payload for atmosphere chemistry monitoring on MetOp 2nd Gen
 SENTINEL-6 Michael Freilich: 10 day revisit time	*1 Sat in operation*	Radar altimeter to measure sea-surface height globally

Sentinel Satellite Deployment

Indicative Copernicus Constellation Deployment Schedule



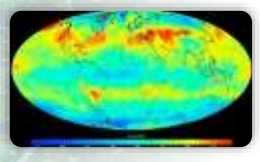
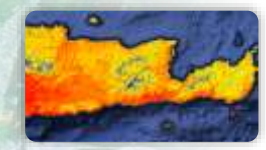
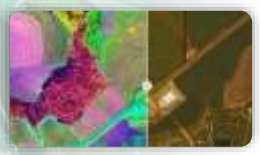
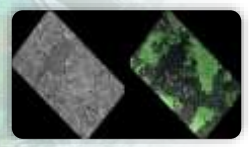
Legend:

- Qualification Acceptance Review (QAR)
- Flight Acceptance Review (FAR)
- PreStorage Review (PSR)
- Consent to Ship (CTS)
- On-ground Storage & Test — Satellite On-ground Storage & Test
- Satellite Test — Satellite Assembly, Integration & Test
- Int — Integration
- I/D — Integration & disintegration for Satellite AIT
- Tentative Launch Date

Date: 18 Jan 2022

Expansion missions post 2025

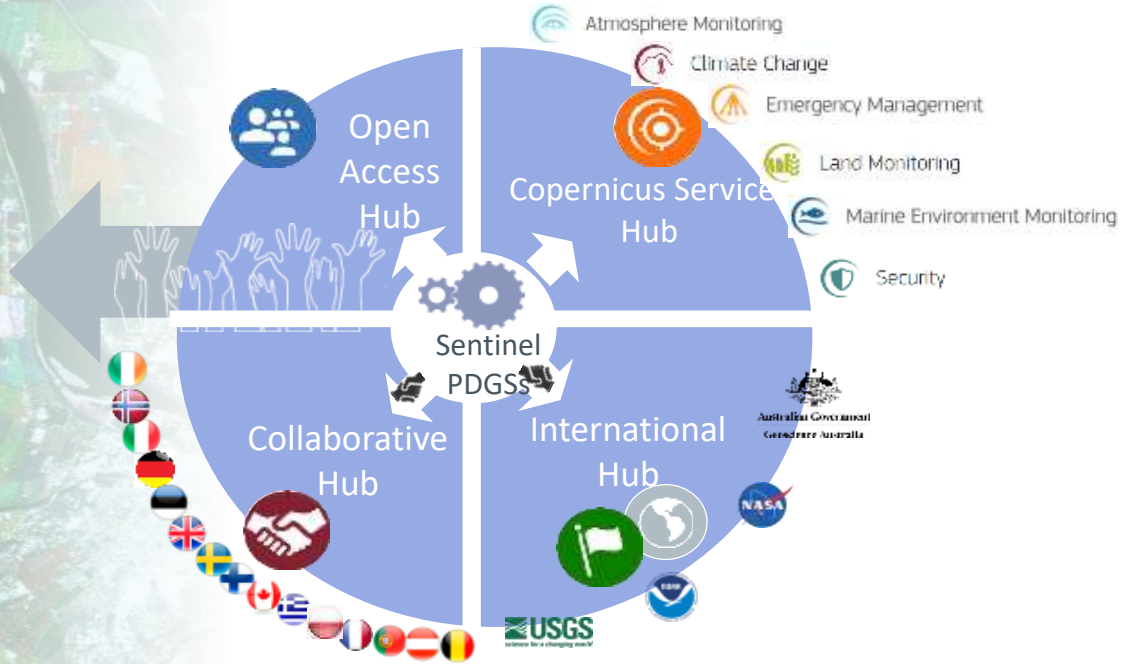
FULL, FREE AND OPEN

	Expansion Mission and Status		Key Objectives
	CO2M: Near and shortwave infrared spectrometer	*1st Launch in 2025*	Mission to measure and monitor anthropogenic CO2 emissions
	LSTM: High spatio-temporal thermal infrared	*1st Launch in 2028*	Mission for agriculture, water productivity, urban heat
	CRISTAL: Altimeter & microwave radiometer	*1st Launch in 2028*	Mission for polar sea-ice & snow thickness, and ice-sheet elevations
	CHIME: Hyperspectral Imaging mission	*1st Launch in 2028*	Mission for agriculture nutrients, Soil, Minerals, Biodiversity
	CIMR: Passive microwave radiometer	*1st Launch in 2029*	Mission for Sea Surface Temperature & Ice concentration
	ROSE-L: L Band SAR mission	*1st Launch in 2028*	Mission for Vegetation, Ground Motion and Soil Moisture

SATELLITE Data ACCESS

Access to Satellite data from Science Hub to CDSE

https://dataspace.copernicus.eu/



Main features of Copernicus Data Space Ecosystem

Full Sentinel Data On-line Repository	Data visualisation, custom analysis, and export through an interactive Copernicus Browser	Cloud computing with user-selectable capacity and performance
Copernicus Contributing Missions Data	Open and free data access with downloading and processing APIs	Onboard code lab and repositories
Additional EO data	Federation and user identity services	

Open ecosystem

Service component

European Commission

COPERNICUS SERVICES

Copernicus

Atmosphere
(CAMS)

Marine
(CMEMS)

Land
(CLMS)

Climate
(C3S)

Emergency
(EMS)

Security

Copernicus
Europe's eyes on Earth

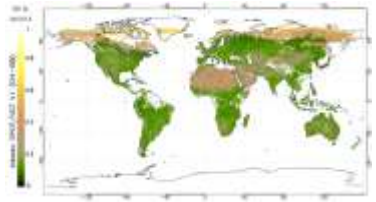
European Commission

COPERNICUS Policy Framework

Land Service Benefit areas and products

Land Monitoring

- Ecosystems
- Biodiversity
- Agriculture
- Forestry
- Energy
- Natural Resources
- Water
- Urban planning

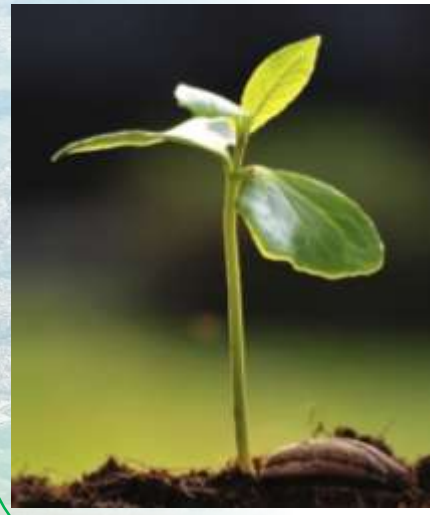


- Global Systematic Monitoring
- Global Hot Spot
- Pan-European land cover mapping and systematic monitoring
- EU Local component
- Reference Data & SENTINEL 2 Mosaic

Land Monitoring

Product Systematic Monitoring portfolio

VEGETATION



- Leaf Area Index (LAI)
- Fraction of Absorbed Photosynthetically Active Radiation (FAPAR)
- Fraction of vegetation cover (FCOVER)
- Normalized Difference Vegetation Index (NDVI)
- Vegetation Condition Index
- Vegetation Productivity Index
- Dry Matter Productivity
- Burnt Area
- Greenness Evolution Index
- Phenology metrics
- Mid Resolution Yearly Land Cover

ENERGY

- Top-of-Canopy reflectance
- Surface Albedo
- Land Surface Temperature
- Radiation Fluxes
- Evapotranspiration
- Active Fires
- Surface soil moisture
- Soil Water Index

WATER

- Water Bodies
- Coastal Erosion
- Lake surface water temperature
- Lake and river water level
- Lake surface reflectance
- Lake turbidity
- Lake trophic state
- Lake ice coverage

CRYOSPHERE

- Snow cover extent
- Snow water equivalent

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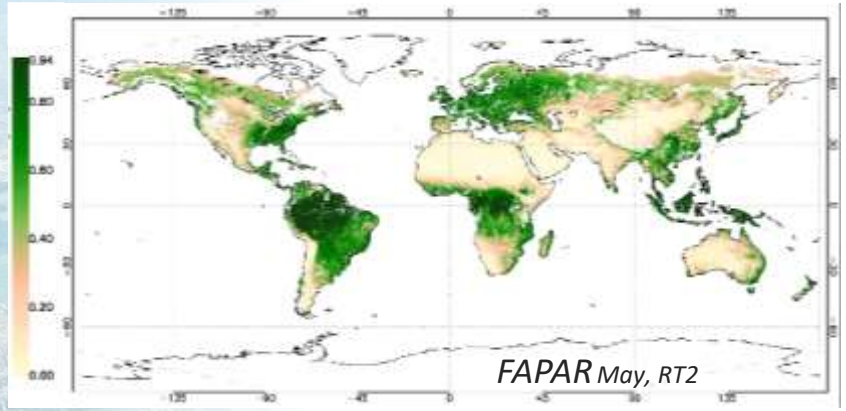
Land Monitoring

Biophysical variables - Portfolio

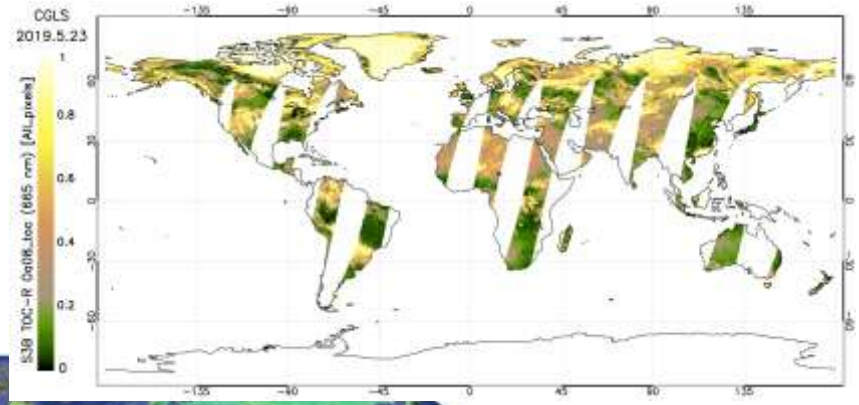
Variable	Temporal coverage	Temporal resolution	Spatial coverage	Spatial resolution	Sensor
LAI - FAPAR - FCOVER	2014 – present 1999 - 2020	10 days	Global	300 m 1km	PROBA-V, S3/OLCI SPOT/VGT, PROBA-V
NDVI	2014 – present 1999 - 2020	10 days	Global	300 m 1 km	PROBA-V, S3/OLCI SPOT/VGT, PROBA-V
Dry Matter Productivity	2014 – present 1999 - 2020	10 days	Global	300 m 1 km	PROBA-V, S3/OLCI SPOT/VGT, PROBA-V
Net Primary Production	Sept 2023 – present	10 days	Global	300 m	S3/OLCI
Burnt Areas	Jan 2019 – present July 2023 – present	1 month 1 day	Global	300 m	S3/OLCI & SLSTR
Land Surface Phenology	2023 - present	1 year	Global	300 m	S3/OLCI
Top-Of-Canopy Reflectance	2019 - present	1 day	Global	300 m	S3/OLCI & SLSTR
Land Surface Temperature	2010 – present 2017 - present	1 hour 10 days	Global	5 km	Geostationary sensors
Surface Soil Moisture	2015 - present	1 day	Europe	1 km	S1/CSAR
Soil Water Index	2007 – present 2015 - present	1 day, 10 days 1 day	Global Europe	0.1° 1 km	Metop/ASCAT Metop/ASCAT + S1/CSAR

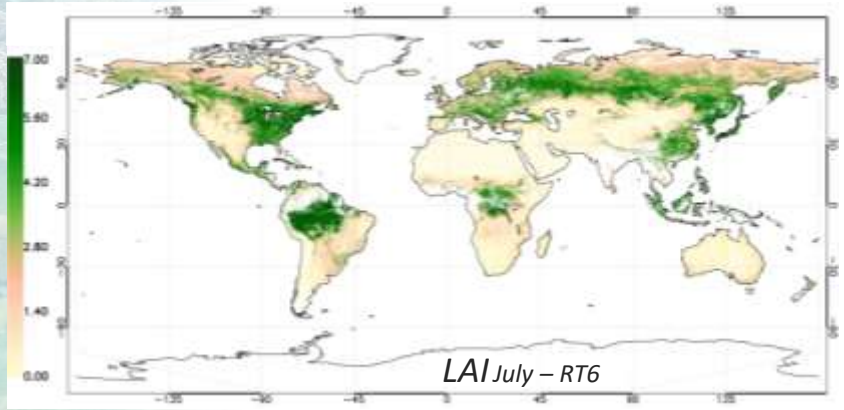
Land Monitoring

BIOPHYSICAL PRODUCTS (examples)

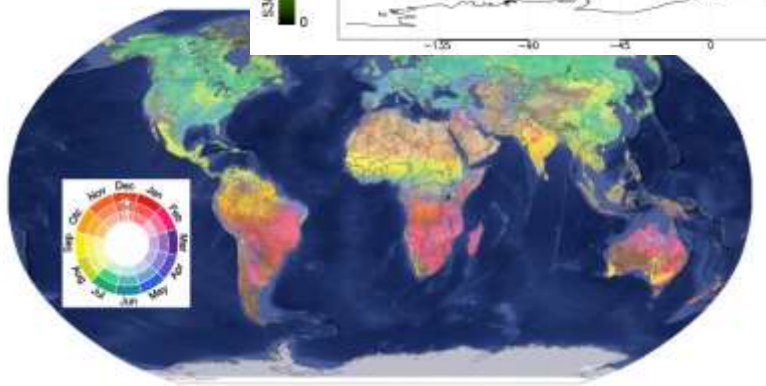


FAPAR May, RT2

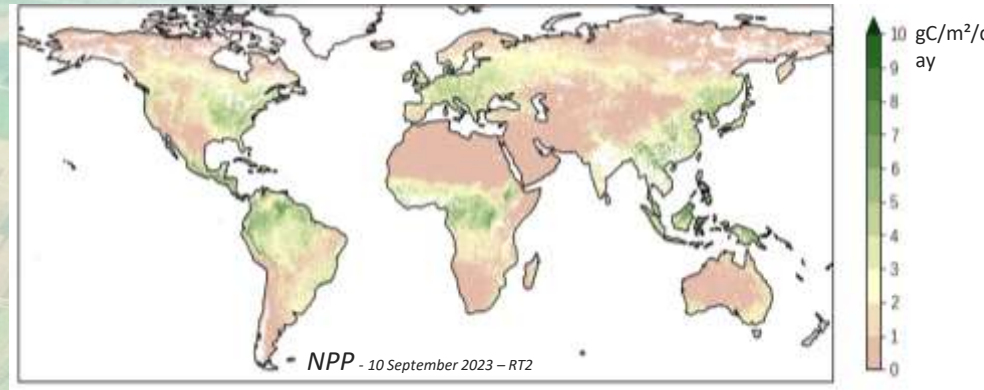




LAI July – RT6

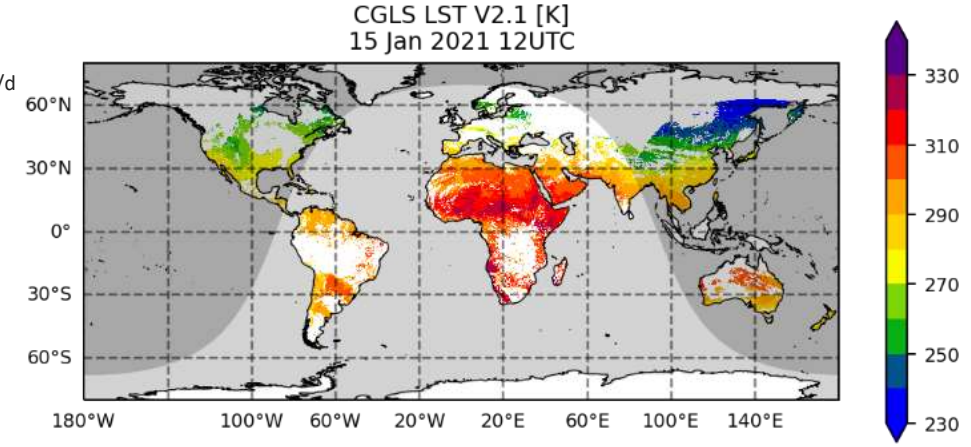


Date of the peak of growing season - 2023



NPP - 10 September 2023 – RT2

gC/m²/day



European Commission

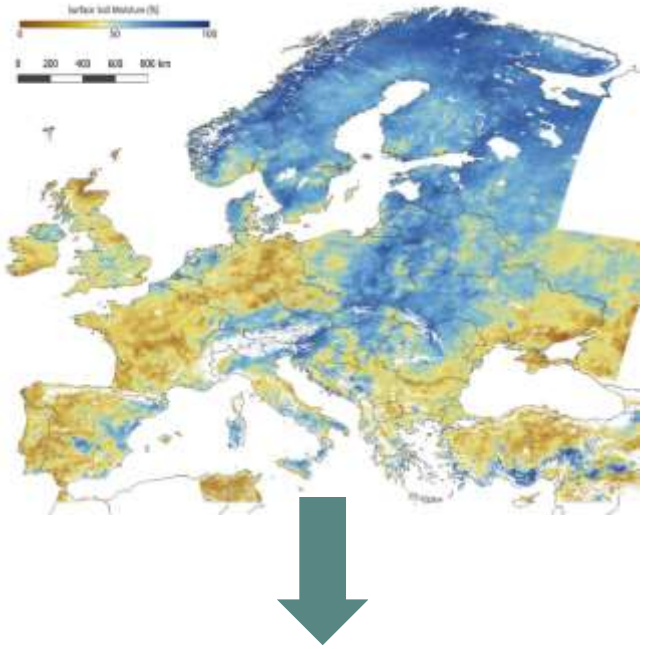
Land Monitoring

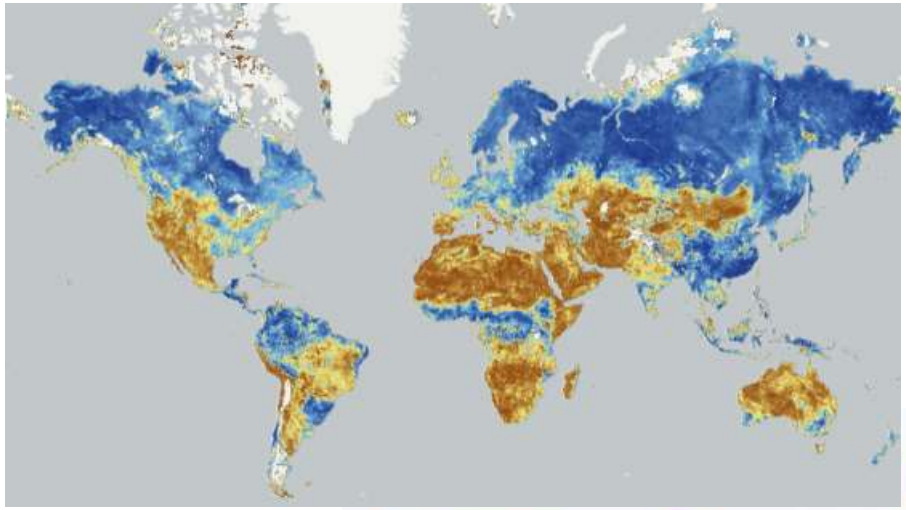
Soil moisture

Ongoing methodology evolution including:

- Upgrade of the Sentinel-1 preprocessing (filtering of unsensitive areas, better SAR geometry correction, …)
- Integration of new Surface State Flag
- Integration of dynamic water body masking
- New radiative transfer model and vegetation modelling
- Extension of 1km products coverage to the Globe

Results expected by end of 2025: reprocessing will follow



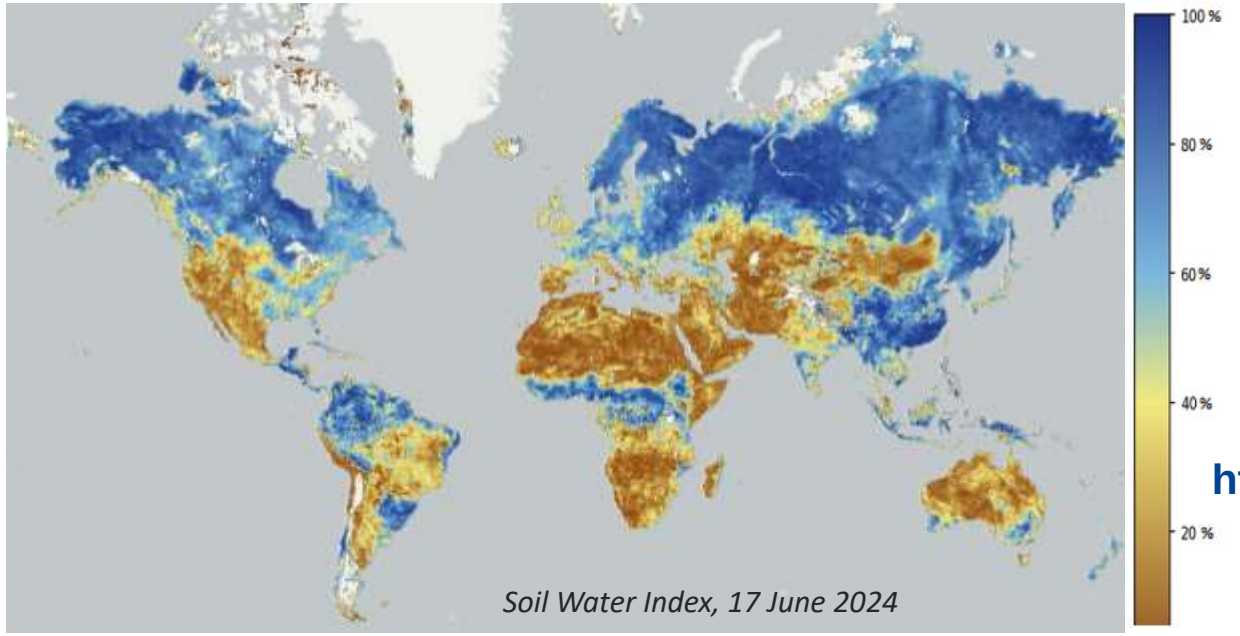


Land Monitoring

Soil Water Index

SWI quantifies the amount of water (m^3/m^3) in sol layers at various depths.

- Vital to vegetation health
- Crucial to assess irrigation needs, detect drought and predict agricultural yields



Soil Water Index, 17 June 2024

Geometric Properties	
Spatial resolution	**1 km** based upon Metop/ASCAT+S1/CSAR **0.1°** based upon Metop/ASCAT
Geolocation precision	Better than 0.5 pixels
Coordinate position	Centre of the pixel
Geodetic datum	WGS84
Geographic projection	Regular latitude/longitude grid
Geographic coverage	**Europe (1km)** **Global (0.1°)**
Temporal resolution	1 day 10 days
Timeliness	12 hours Within 3 days after synthesis period
Uncertainty (RMSD)	0.1 m^3/m^3

- Freeze and Thaw status of soil
- SWI and quality flag values are calculated for 8 soil depths

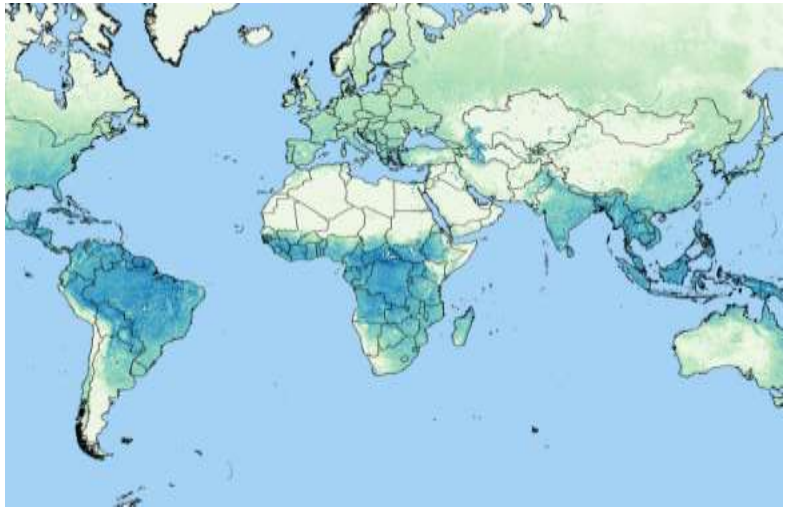
Details on https://land.copernicus.eu/en/products/soil-moisture

Land Monitoring

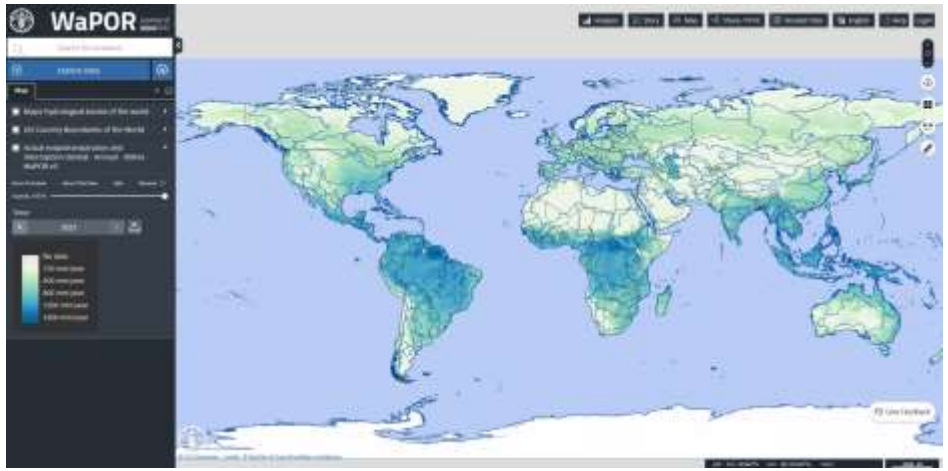
Roadmap – Evapotranspiration

ETA product will include

- 10-days Actual evapotranspiration, Soil evaporation and Canopy transpiration
- ETA is **essential for crop water use monitoring** and **sustainable water resources management**
- For **Sustainable Development Goal indicator 6.4.1** – Water Use Efficiency for custodian agency **FAO**



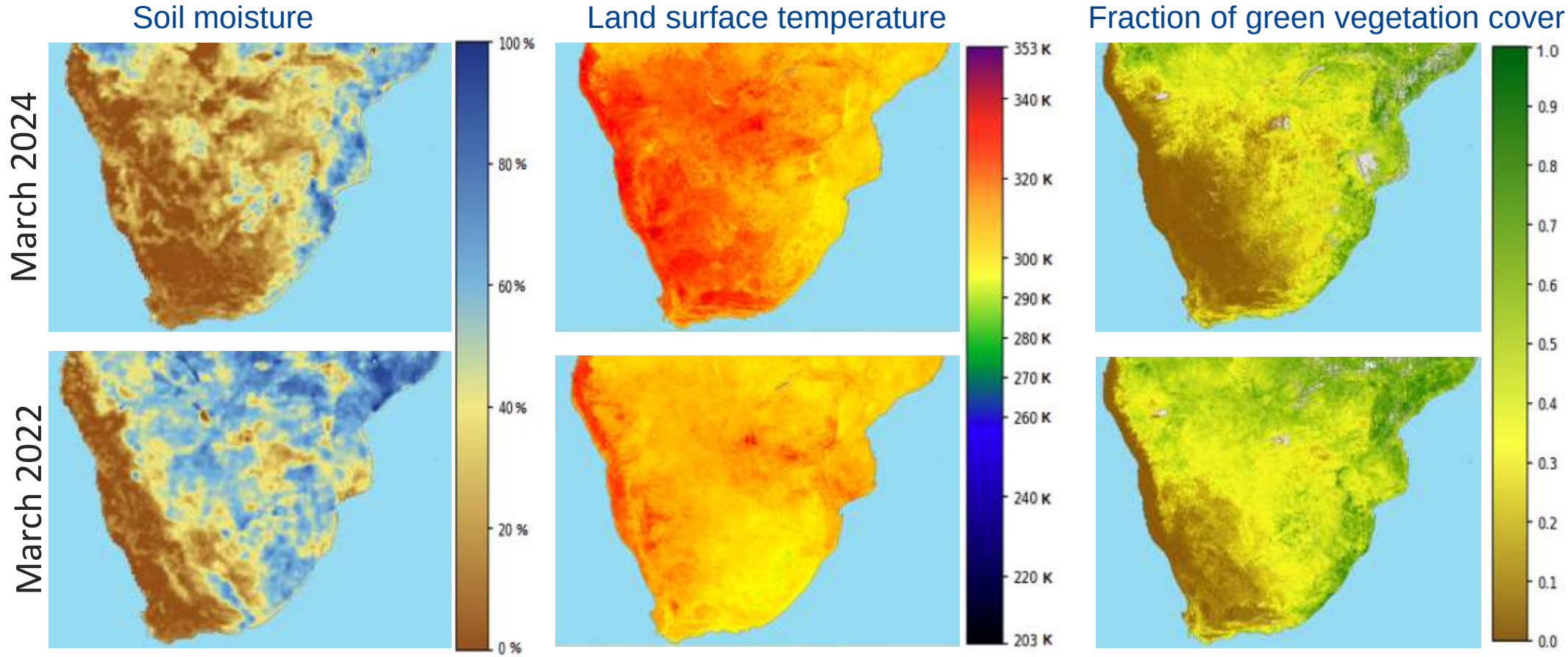
Geometric Properties	
Spatial resolution	300 m
Geolocation precision	Better than 0.5 pixels
Coordinate position	Centre of the pixel
Geodetic datum	WGS84
Geographic projection	Regular latitude/longitude grid
Geographic coverage	Global
Temporal resolution	10-day period
Timeliness	Within 2 days after the end of each dekad
Uncertainty (RMSD)	10%



NRT products expected by end of 2025

Land Monitoring

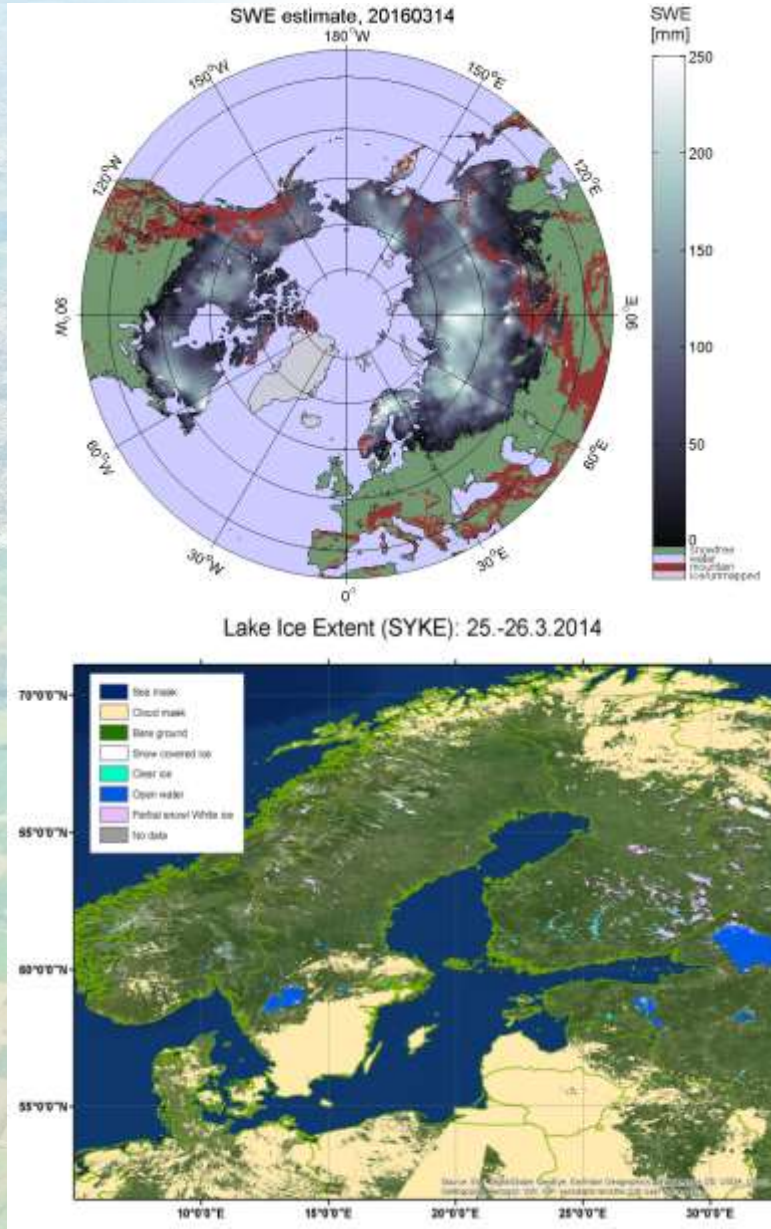
Drought – South Africa

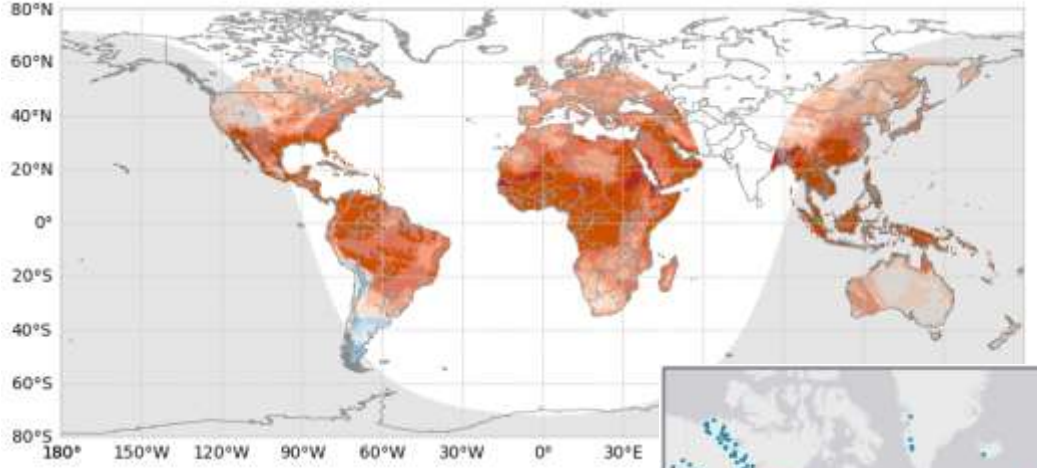


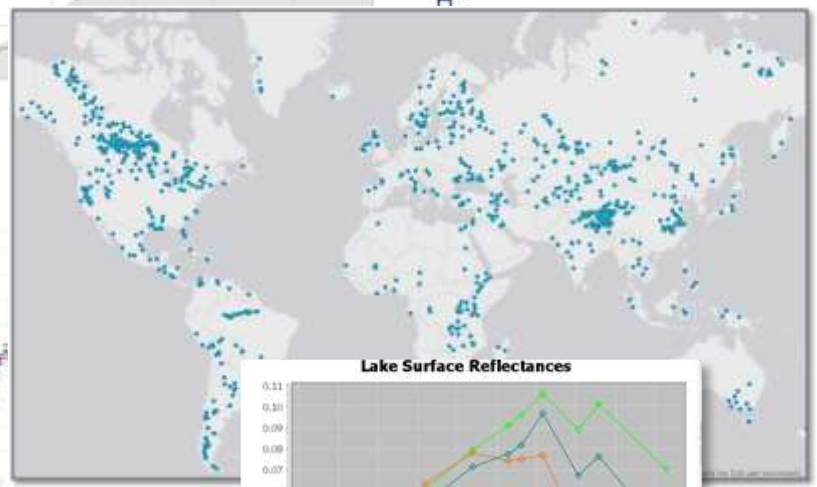
Different satellite input data, different retrieval algorithms, different processing chains but **fully consistent and complementary** biophysical products characterizing land surface state

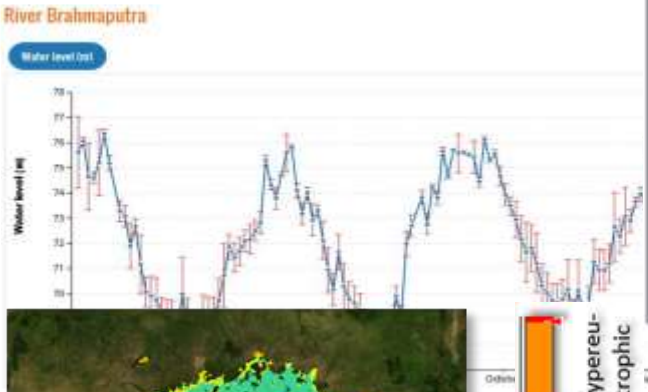
Land Monitoring

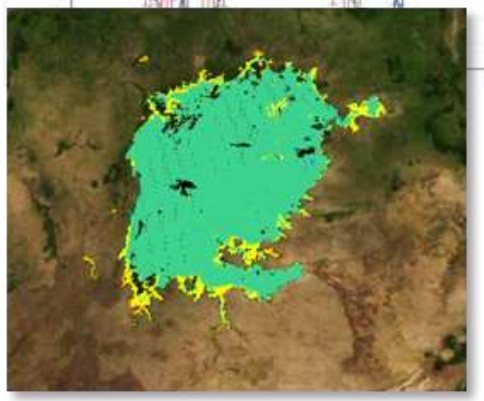
Global Systematic Monitoring Water-Cryosphere portfolio

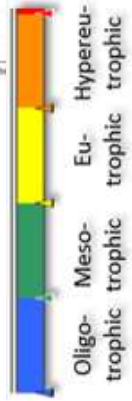


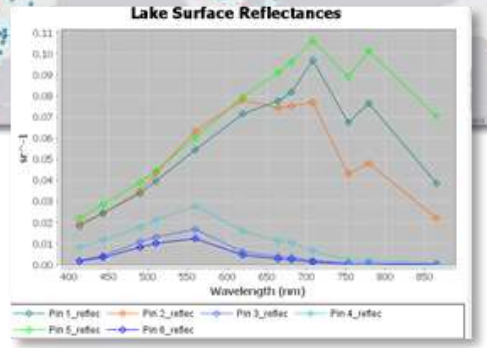












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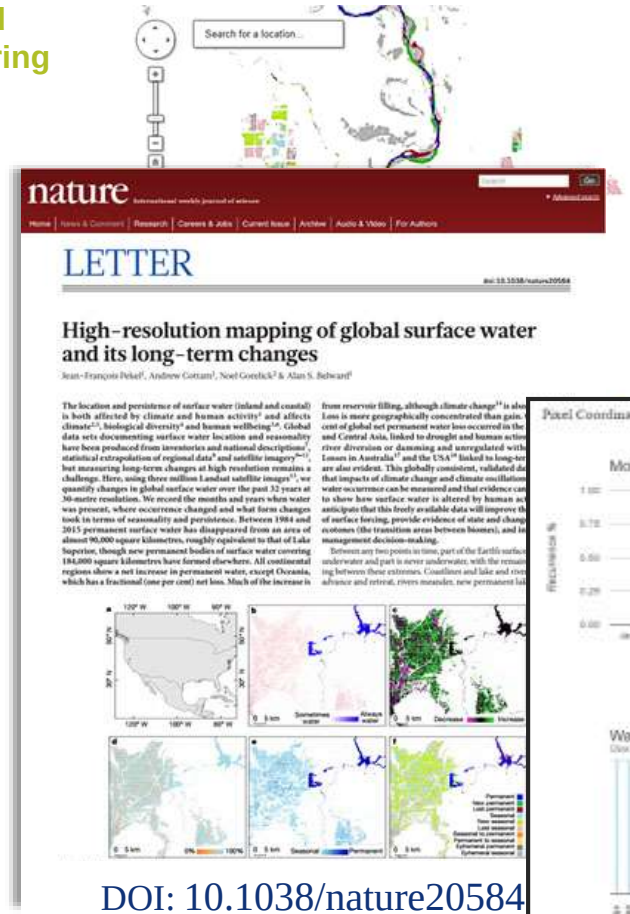
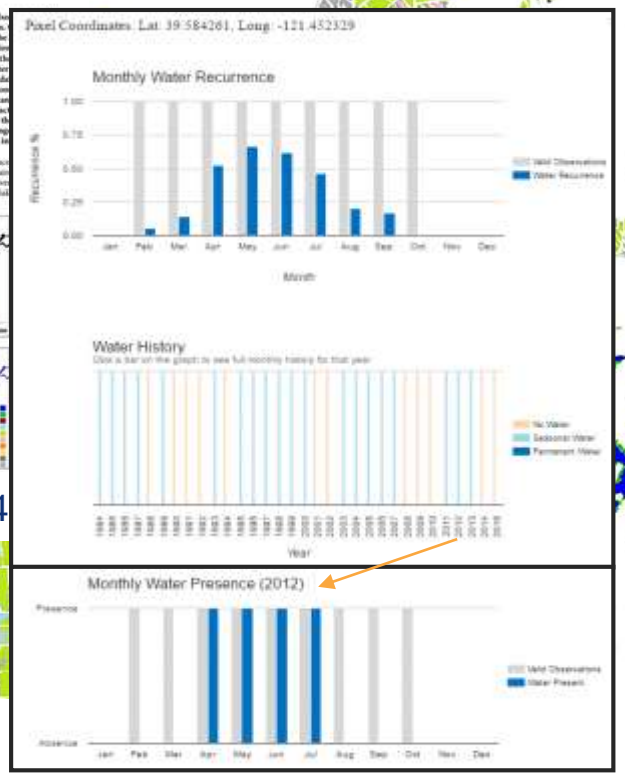
Water extent monitoring at EU and global scale

Land Monitoring

Monitoring of changes in water bodies at high resolution in NRT



DOI: 10.1038/nature20584

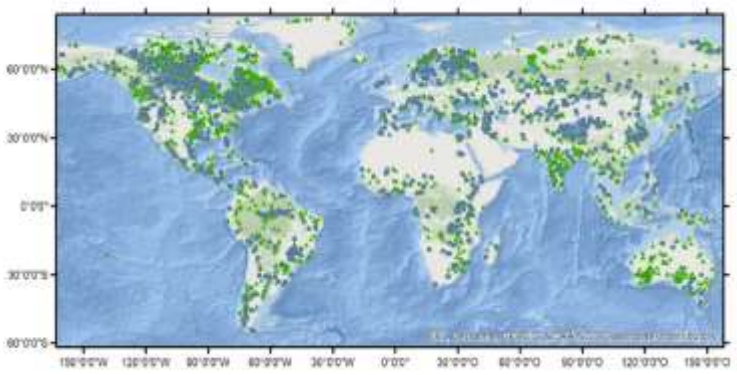


https://global-surface-water.appspot.com

Water Quality at EU and Global scale

Land Monitoring

6 CLEAN WATER AND SANITATION



Water bodies location

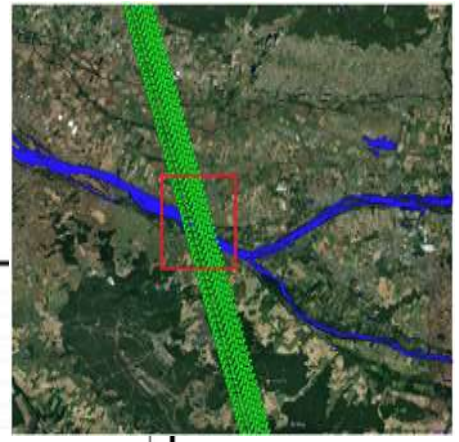
Brockmann Consult Dashboard

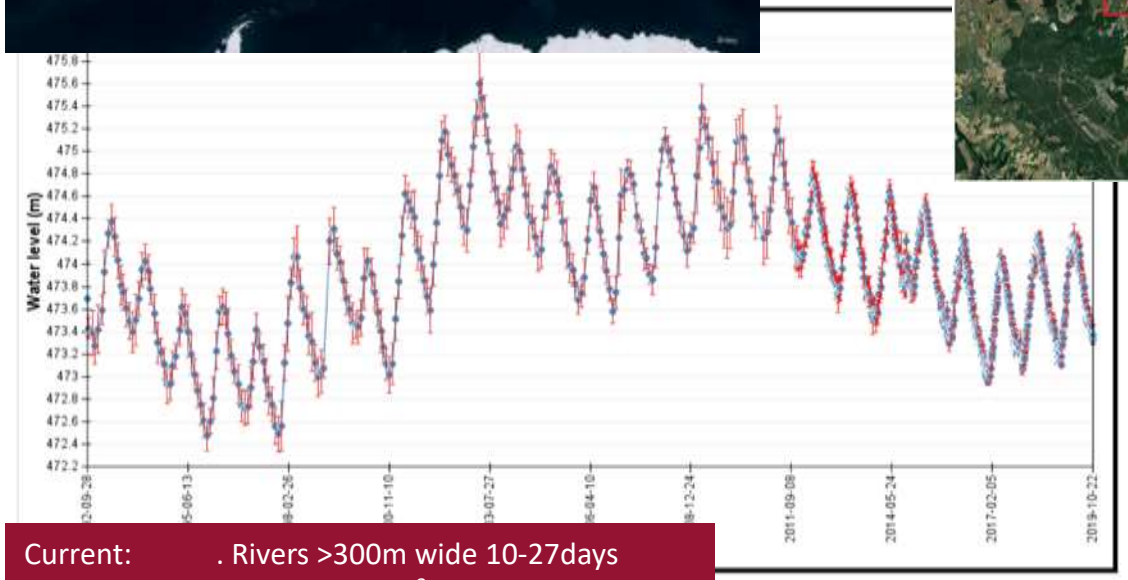
	Lake Water Quality 300m (LWQ-300m)	Lake Water Quality 100m (LWQ-100m)
Parameters	Lake Surface Reflectance Turbidity Trophic state (based on CHL) Chlorophyll Concentration Floating Cyanobacteria Index Total Suspended Matter	Lake Surface Reflectance Turbidity Trophic state (based on CHL) Chlorophyll Concentration Floating Cyanobacteria Index Total Suspended Matter
Spatial resolution	300m	100m
Extent	Global	Global
Coverage	Selected lakes/reservoirs/lagoons	Selected S-2 tiles in Europe and Africa
Number of Entity	4264	225 selected tiles
Temporal aggregation	10 days	10 days
Temporal frequency	10 days	10 days
Timeliness	3 days after last acquisition	4 days after last acquisition
Projection/Datum	Geographic lat/lon WGS-84	Geographic lat/lon WGS-84
Sensor	Sentinel-3 OLCI	Sentinel-2 MSI
File format	netCDF	netCDF
Status / Version	Operational / v1.4	Demonstration / v1.5

Water level at EU and Global scale

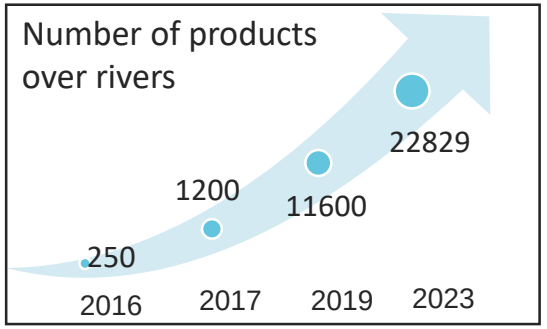
Land Monitoring

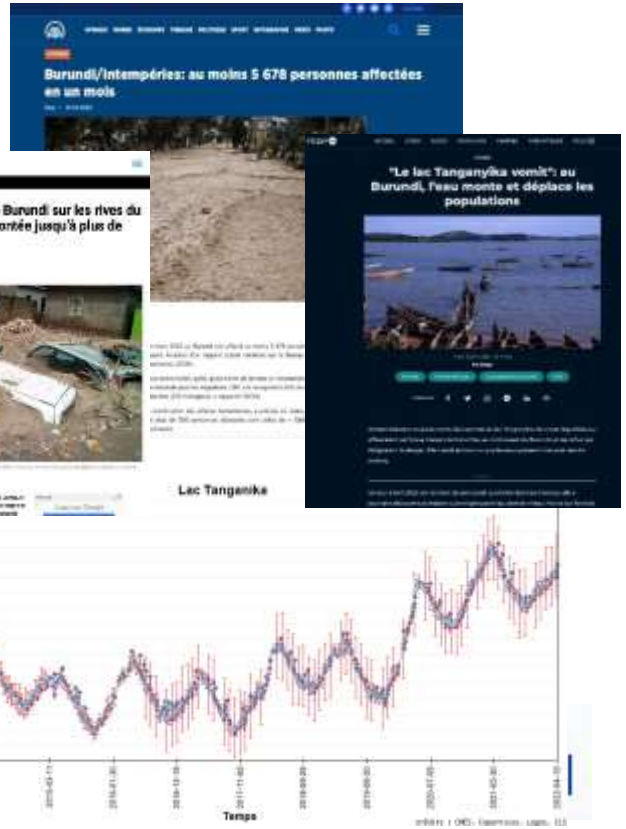
Monitoring of levels of lakes and rivers





Current: . Rivers >300m wide 10-27days
. Lakes >500Km^2 1-10 days
. J3, S3A&B SRAL, Sentinel 6





~23 000 Virtual Stations available
(+ 4750 possible with SWOT nadir)

Monitoring global land cover changes

Land Monitoring

Proba-V since 2015

100m Global / Yearly

Sentinel 2 / 100m and 10m

23 classes & Fractions

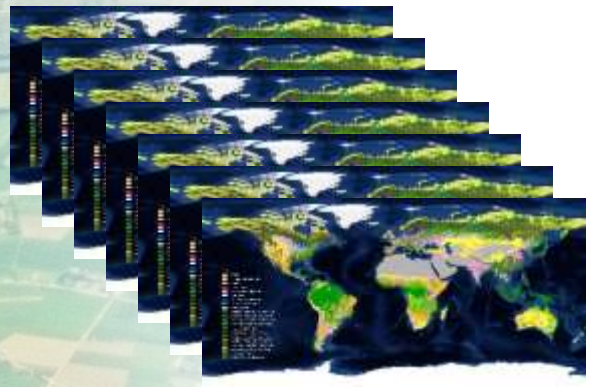
Global accuracy >80%

Land Monitoring

A dynamic global land cover service

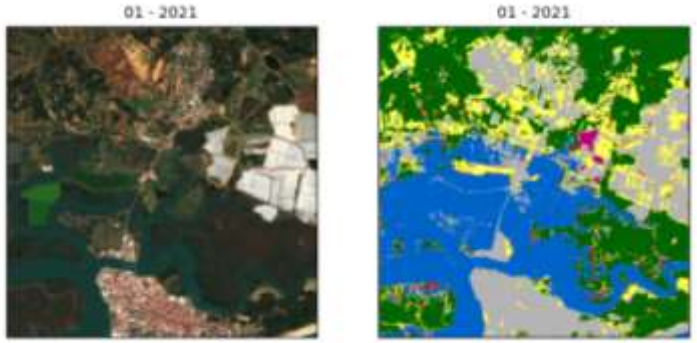
CONTINUE

- Continuation of 100m global LC
- Yearly updates (2020-2026)



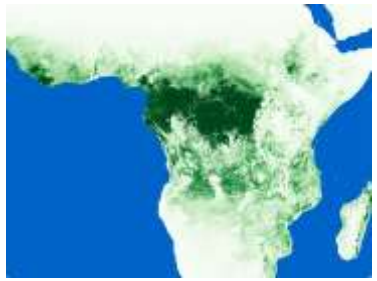
ENHANCE

- Spatial resolution: towards 10 m
- Temporal resolution: towards monthly and NRT
- Improved accuracy
- Consistent change mapping



EXTEND

- Sub-annual products
- Specific Tropical Forest Products (TCD, TCPC)



Copernicus Global Land Cover and Tropical Forest Mapping and Monitoring

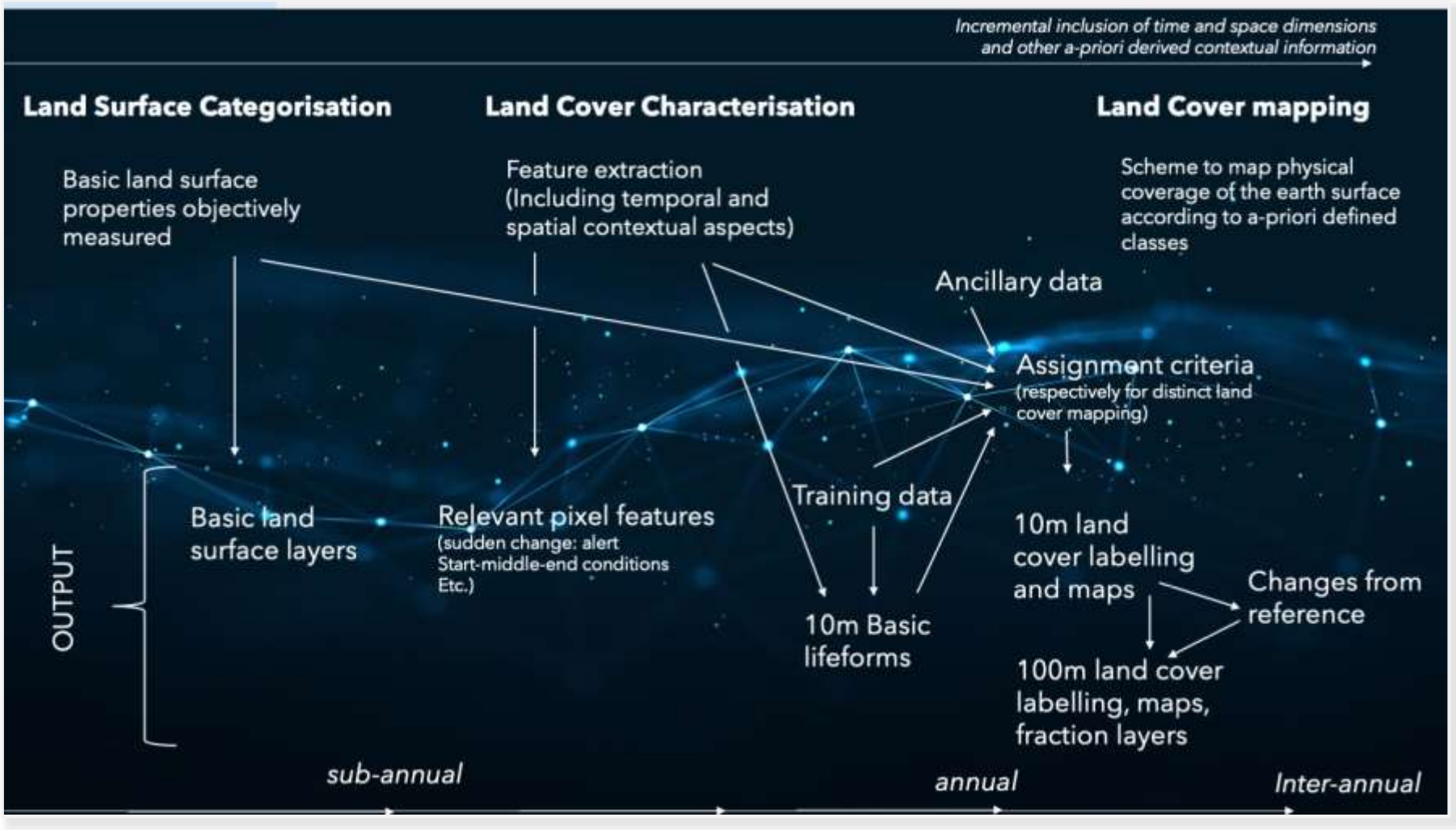
LC FM

Copernicus Europe's eyes on Earth

European Commission

Land Monitoring

Dynamic and flexible



Providing dynamic global land surface categories and characterization, consolidated into global annual land cover mapping and tropical forest monitoring products at 10m resolution.

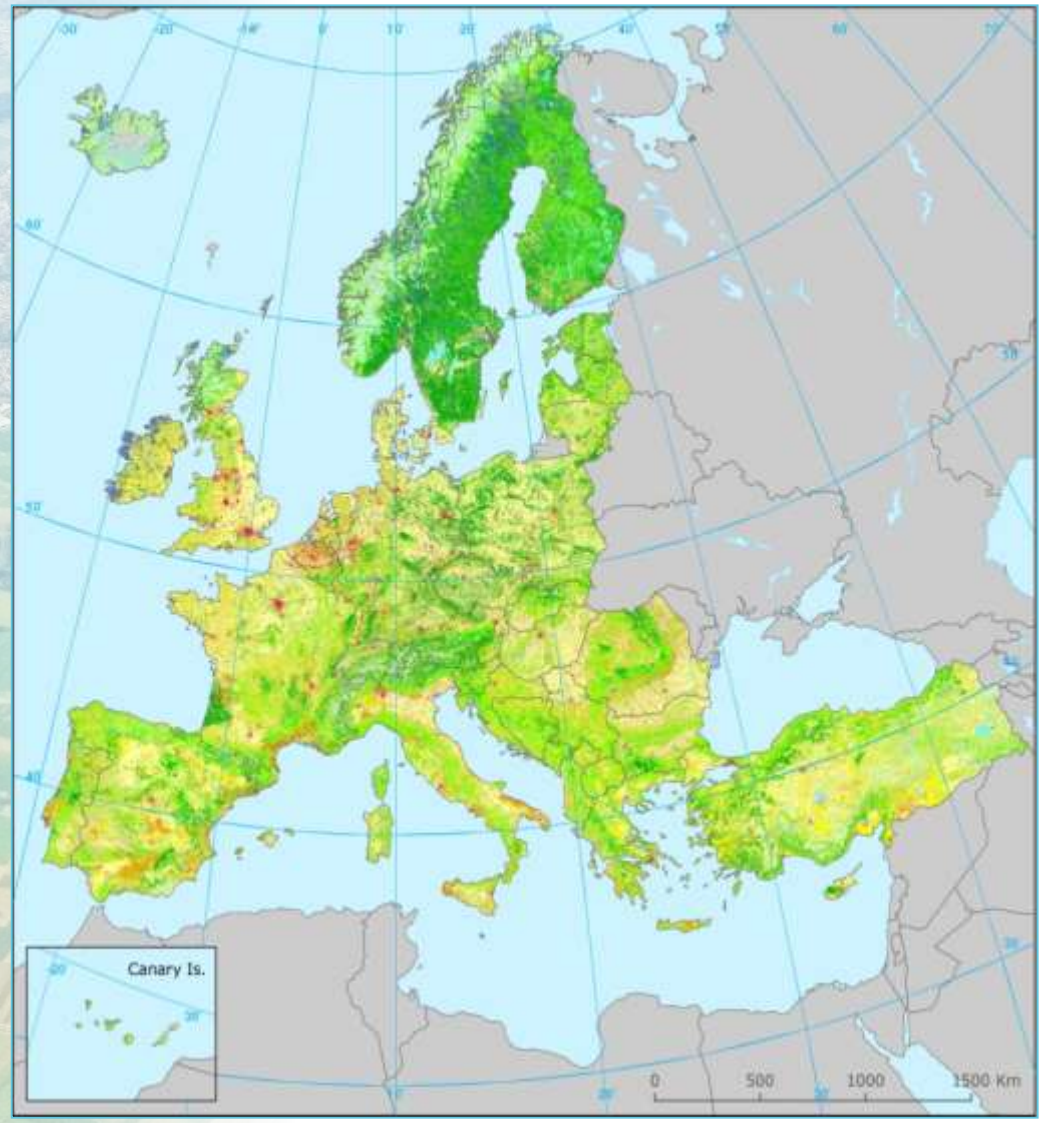
Copernicus Europe's eyes on Earth

European Commission

Land Monitoring

Pan-European Land cover mapping

CORINE Land Cover



- Mapping ~permanent surface features at scale 1:100.000 based on physical characteristics (changes > 1 year)
- MMU: 25 ha (5 ha for changes); MMW: 100 m
- Nomenclature: 5 main groups, three levels, 44 level-3 LU/LC classes (representing Europe)
- Basic data support: satellite imagery
- Ancillary (in-situ) data: national ortho-photos, topographic maps, VHR imagery…
- Implemented by national teams
- Inventories: 1990, 2000, 2006, 2012, 2018

Copernicus Europe's eyes on Earth | European Commission

Land Monitoring

Pan-European Land cover HRL mapping

Imperviousness

Degree of Imperviousness 2012 (20 m and 100 m)	Degree of imperviousness, values from 1-100 %
Impervious density change 2009-2012 (100 m)	Mapping degree of change over time, values from -100 to +100 %

Forest

Tree cover density (20 m and 100 m)	Tree cover density, values from 1-100 %
Forest Type (20 m and 100 m)	Mapping dominant leaf type: coniferous and broadleaved

Natural and semi-natural grassland

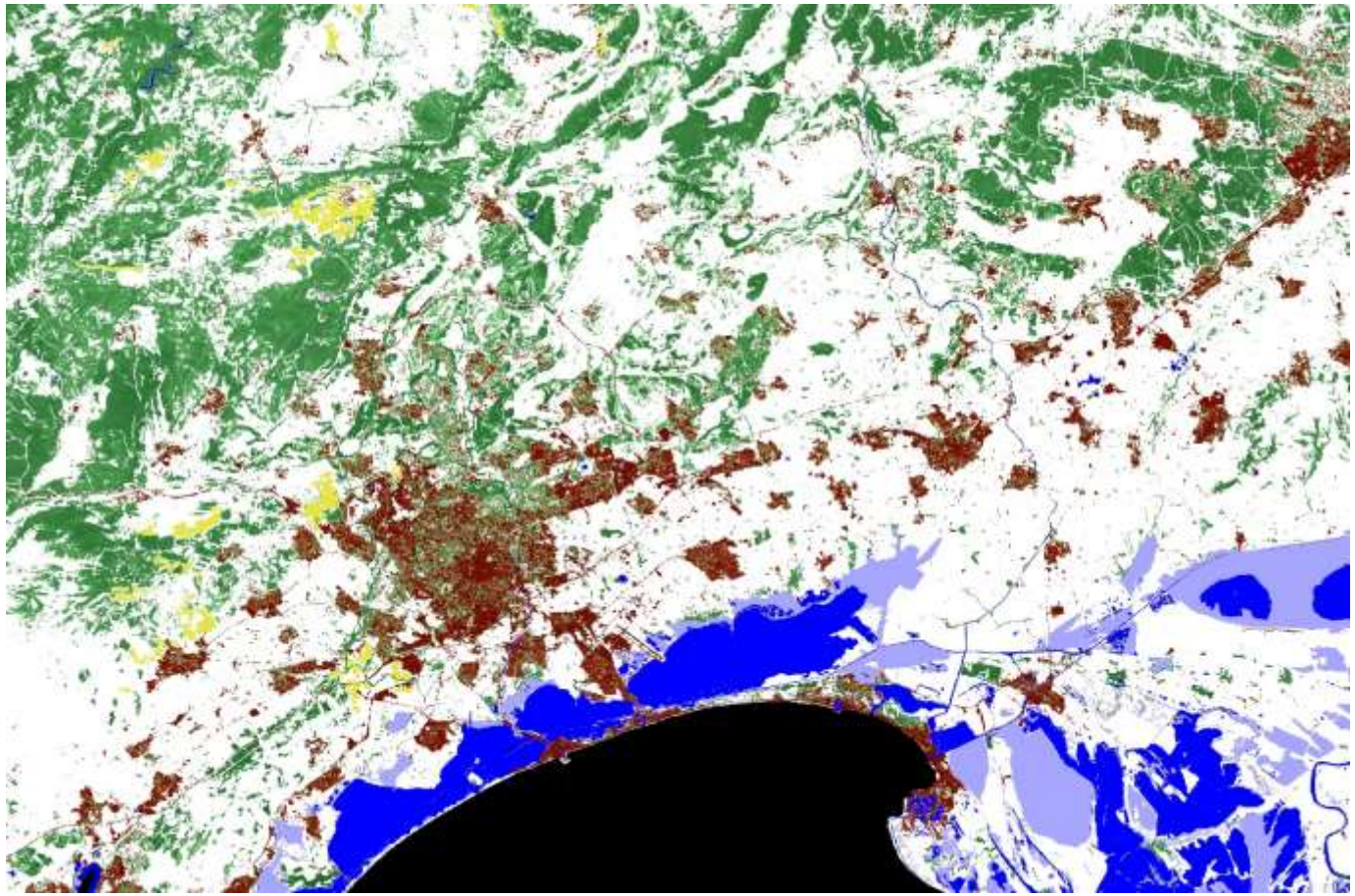
Natural and semi-natural grassland (20 m and 100 m)	Mapping natural and semi-natural grassland

Wetlands

Wetland (20 m and 100 m)	Mapping wetlands

Water bodies

Permanent water bodies (20 m and 100 m)	Mapping permanent water bodies, including small water bodies



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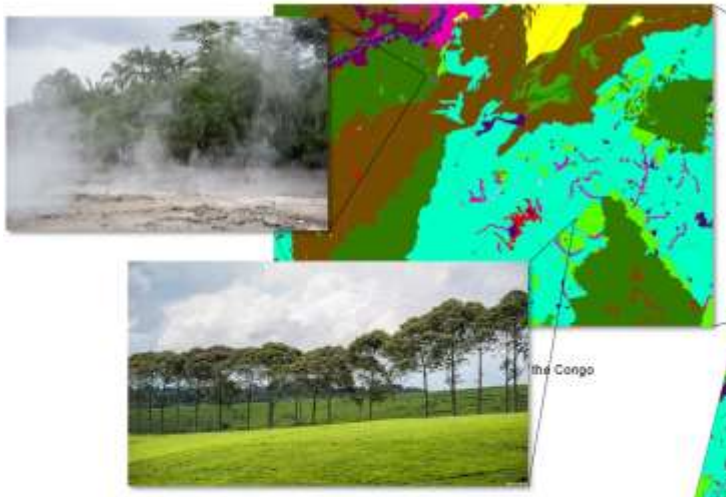
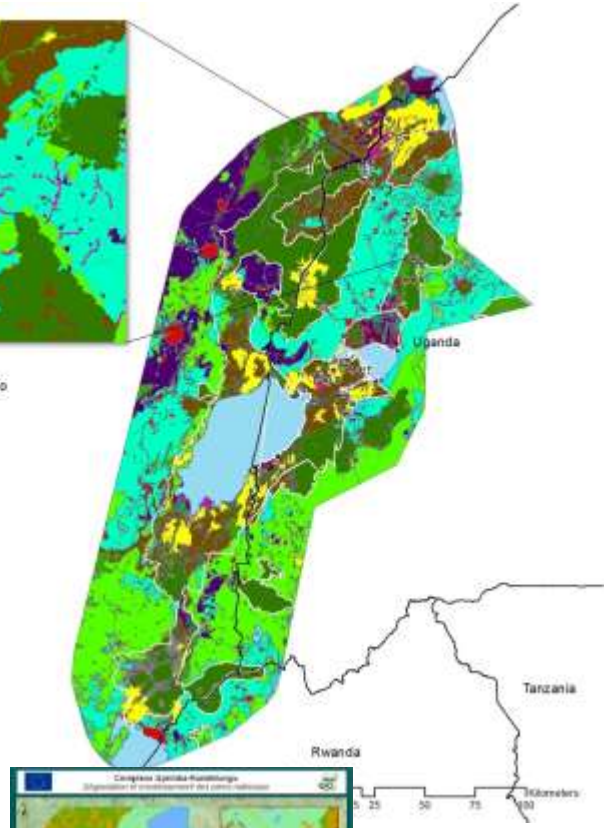
European Commission

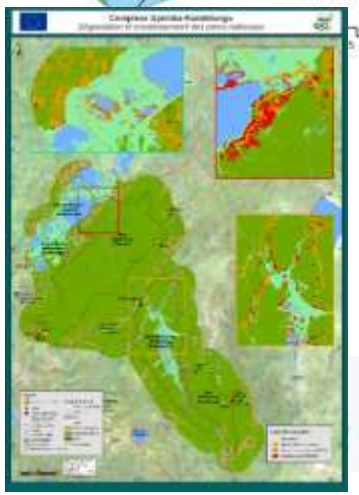
GLOBAL Hot Spot component - Biodiversity

Land Monitoring

Provide detailed land cover information on specific areas of interest for EU outside the European Union, particularly in the domain of the sustainable management of natural resources.



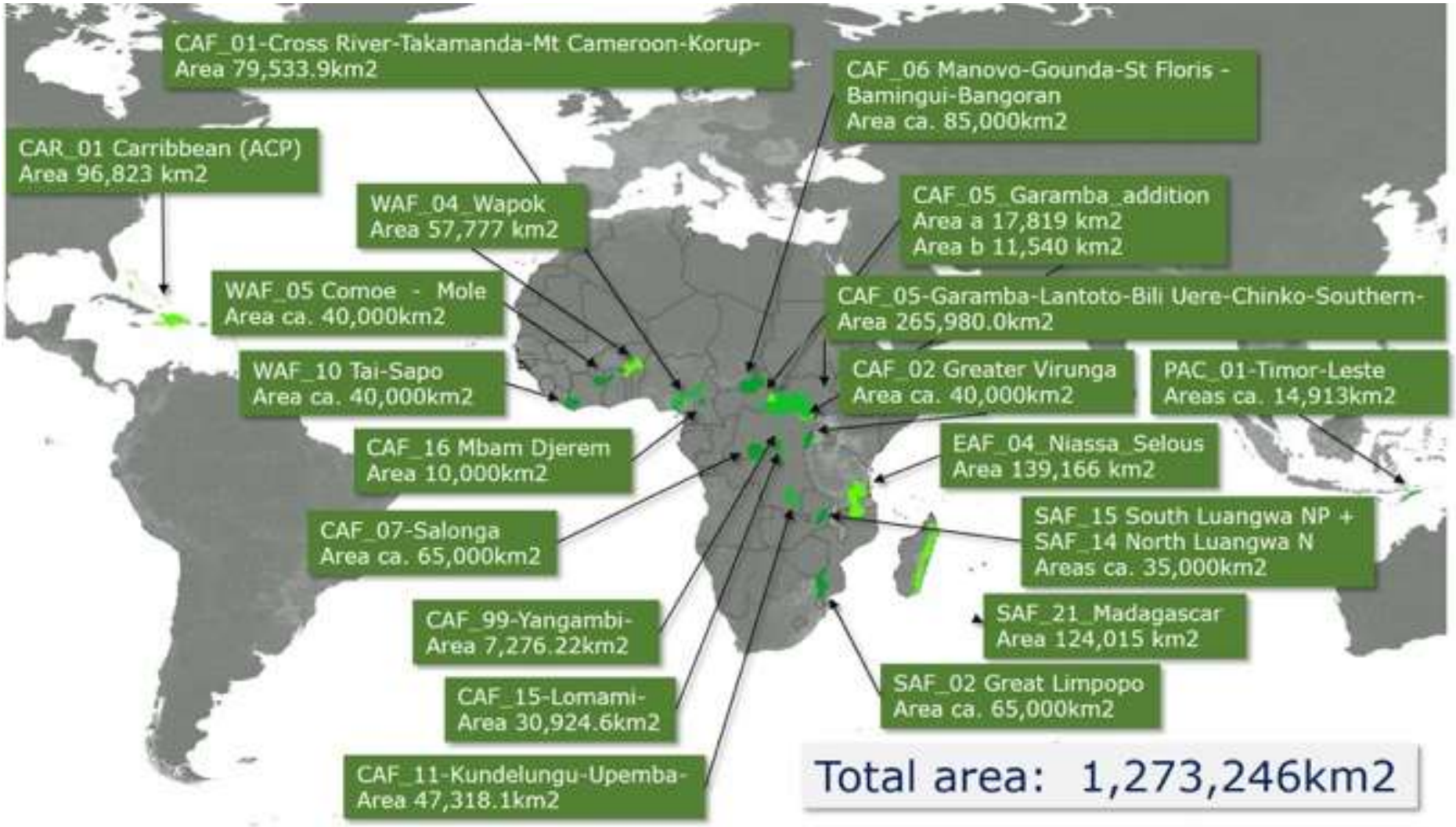




European Commission

Land Monitoring

Areas mapped



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European Commission

Upemba-Kundelungu complex (Democratic Republic of Congo)

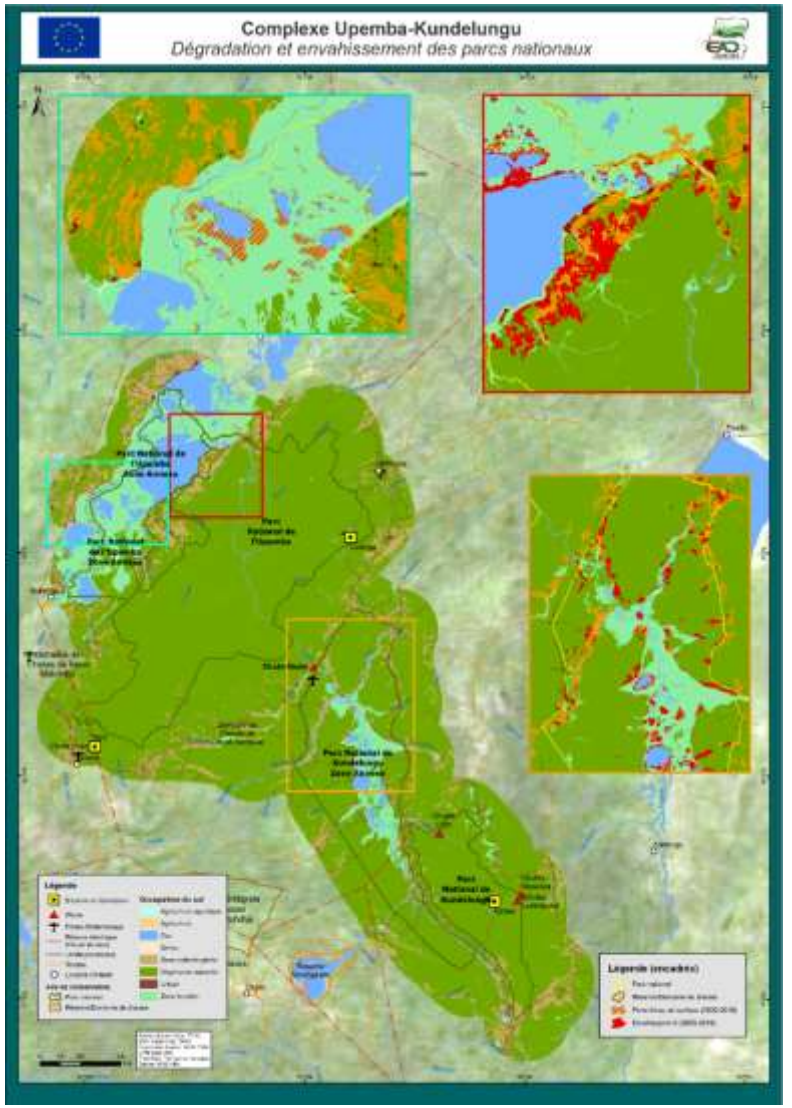
Land Monitoring

The HSM Land Cover map

(i) highlights the **threats and pressures** on the wetlands and the last population of elephants in the Katanga province and the wetlands which is one of the biggest RAMSAR site in the world (since 2017),

(ii) supports to **prioritize the actions of EU funds** in the complex and the management plan of the complex and

(iii) brings some leverage in **negotiations** between EU/national agency in charge of the PAs and the private sector.



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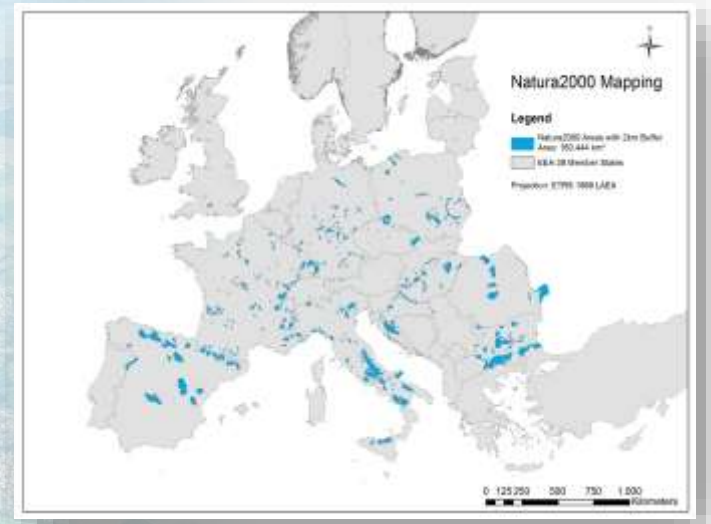
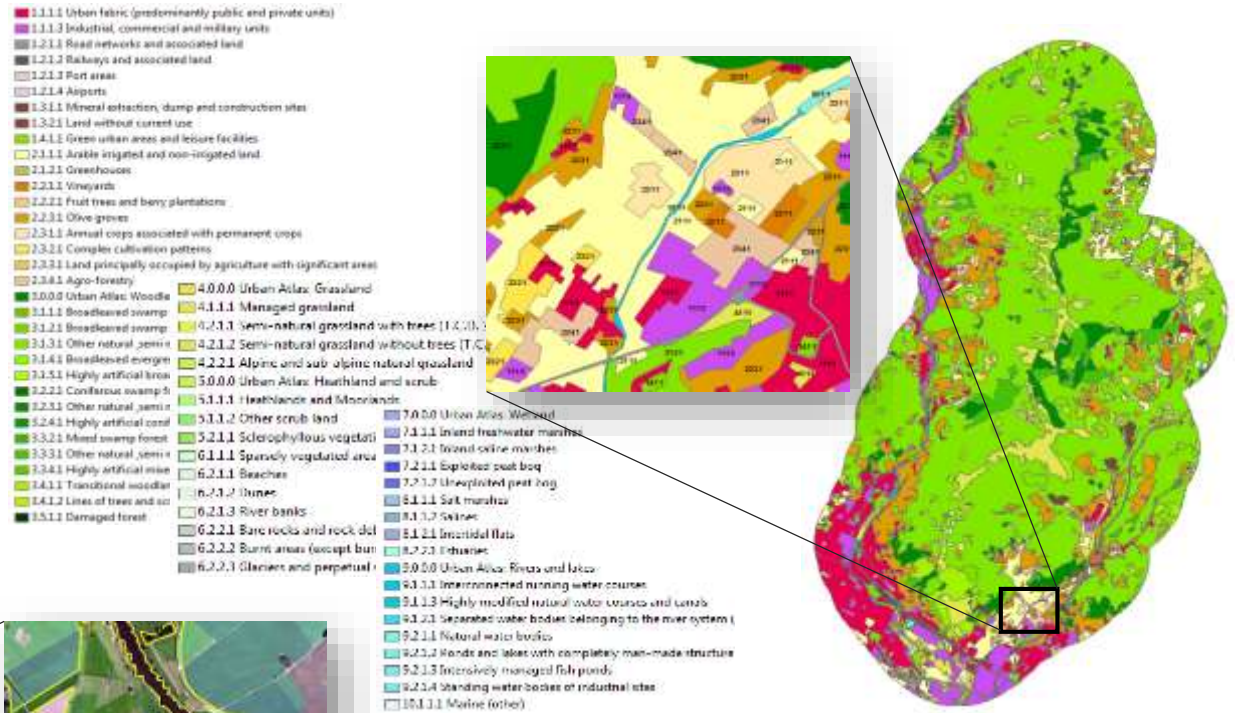
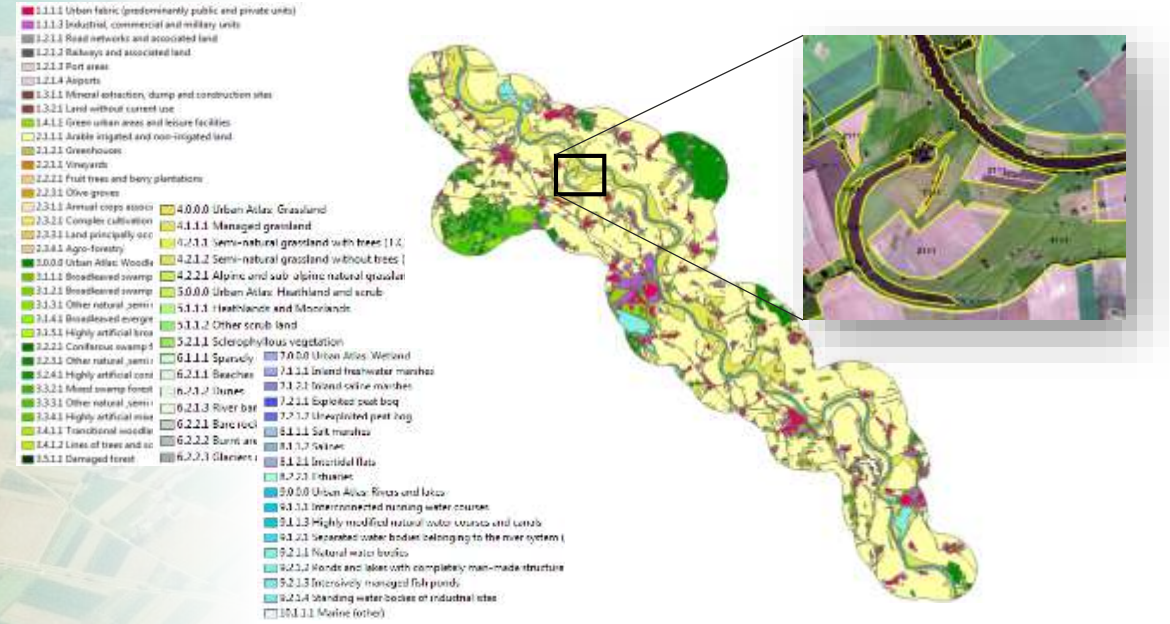
European Commission

Protected sites mapping

Land Monitoring

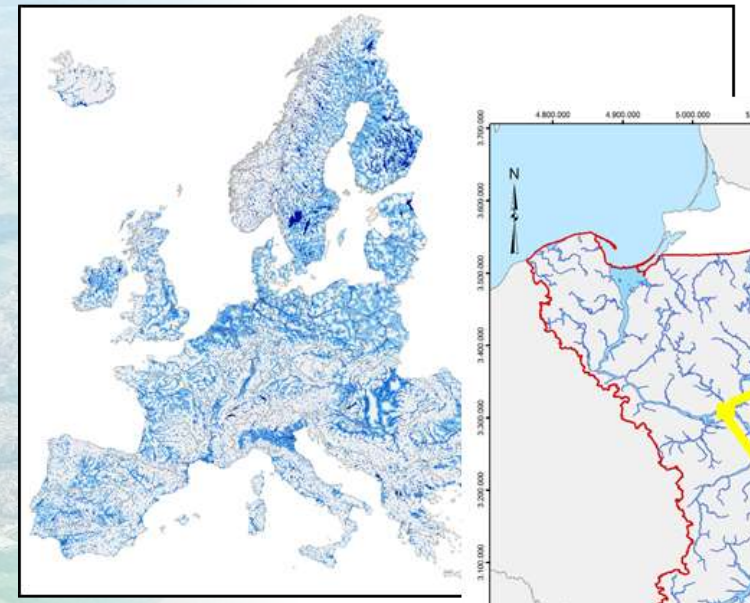


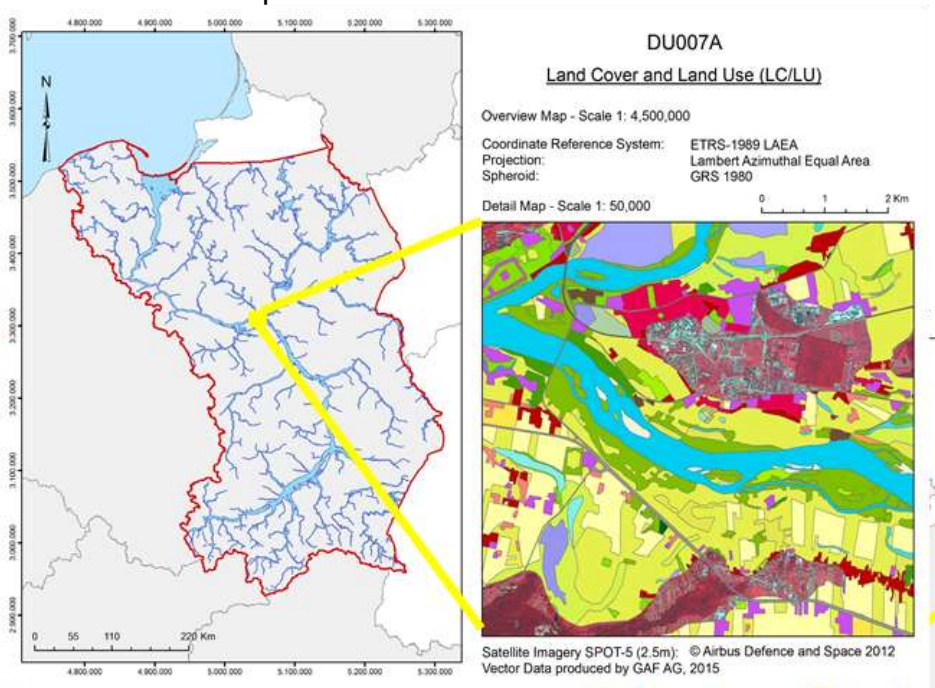


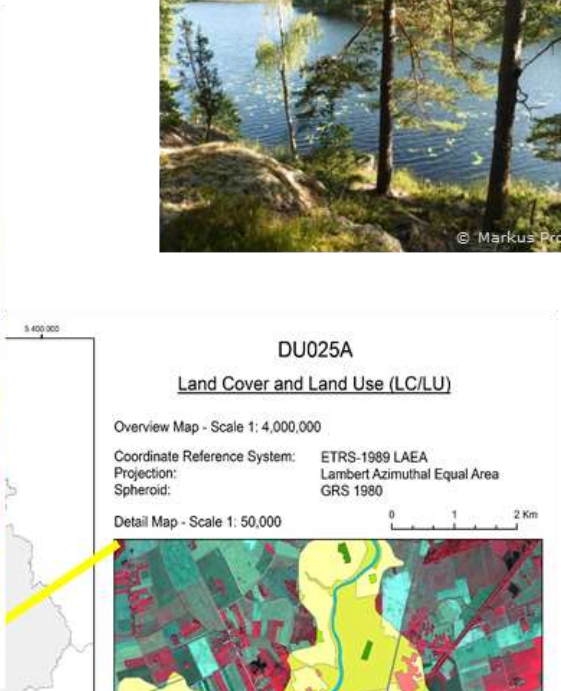


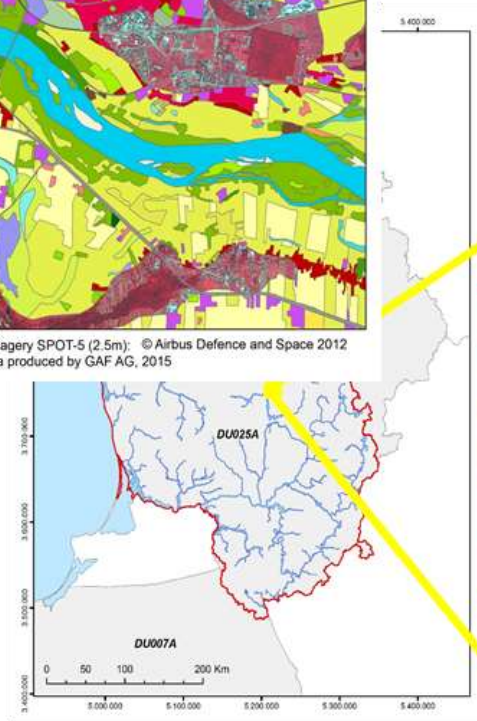
Local component – Riparian areas mapping

Land Monitoring









Copernicus Europe's eyes on Earth

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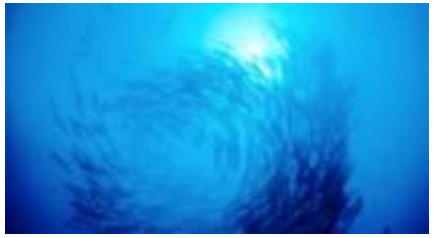
Marine Monitoring

Marine Service Benefit areas and products

- Marine safety
- Marine resources
- Coastal and marine environment
- Climate and meteorological forecasting
- Other: Transport, Tourism, Environment, Pollution, Energy, etc.



- Sea Level
- Ocean Salinity
- Ocean Temperature
- Sea Ice
- Wind
- Ocean Currents
- Ocean Colour / Biogeochemistry (e.g. optics, chlorophyll, biology, chemistry)

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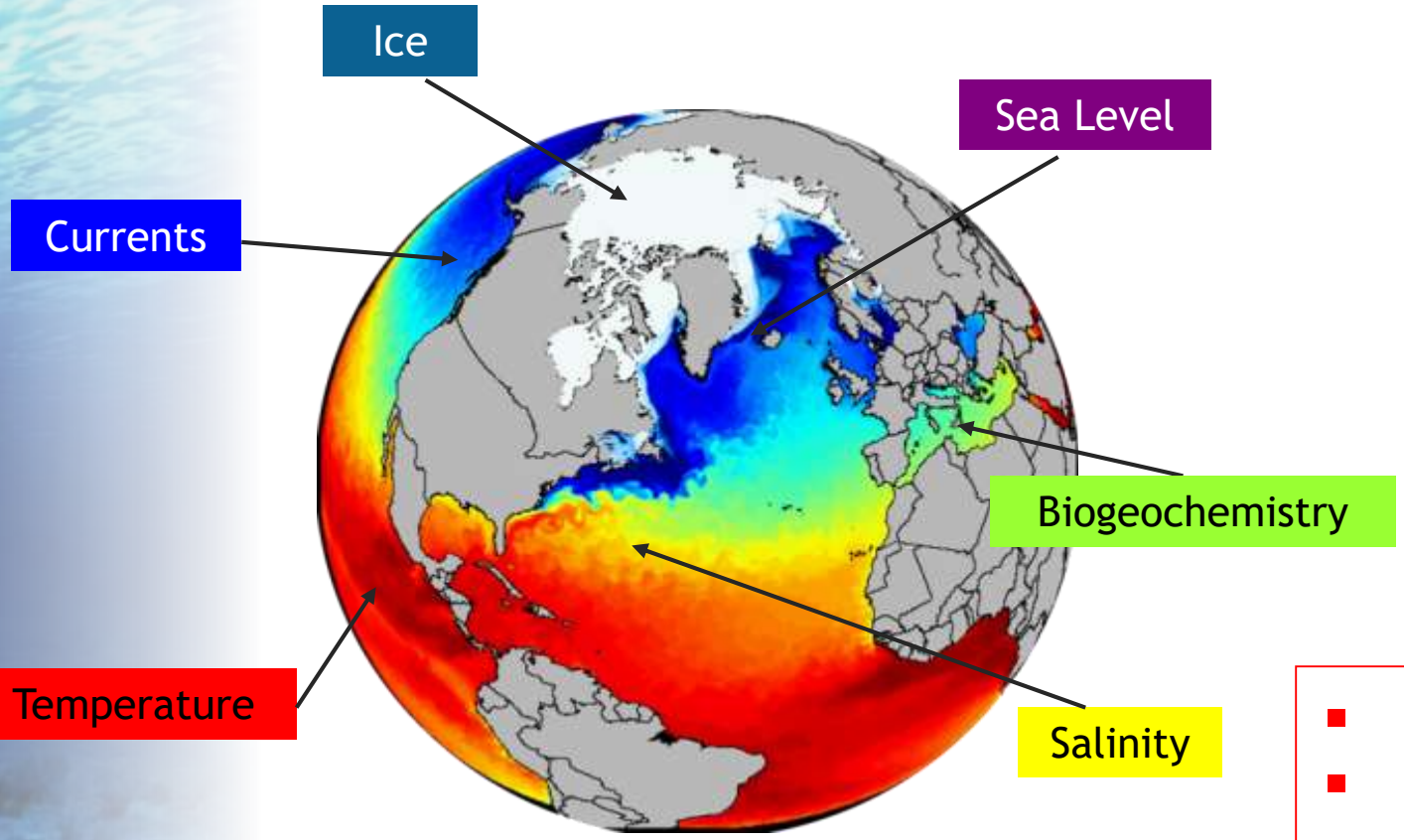
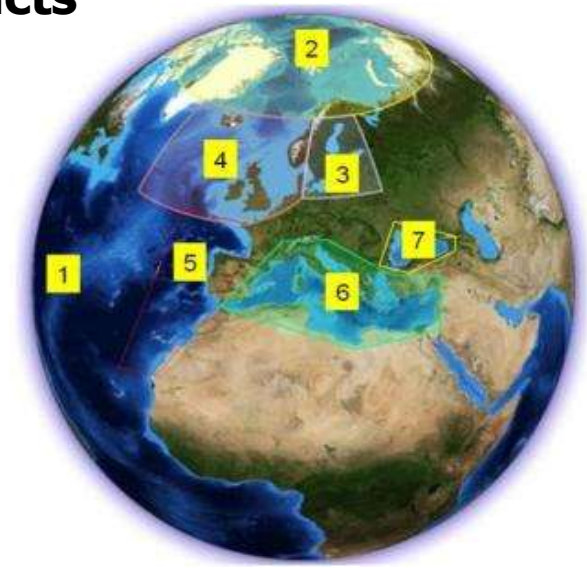
Marine Environment Monitoring Service

Marine Monitoring

11 product groups & 140 products

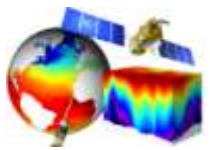




- 1. Global
- 2. Arctic
- 3. Baltic
- 4. NWS
- 5. IBI
- 6. Med Sea
- 7. Black Sea

A 3D and consistent estimation of the ocean state

- **Global** and **Regional**
- **Re-analyses / Real Time / Forecast**
- **Satellite** & **In Situ** obs. and **Models**



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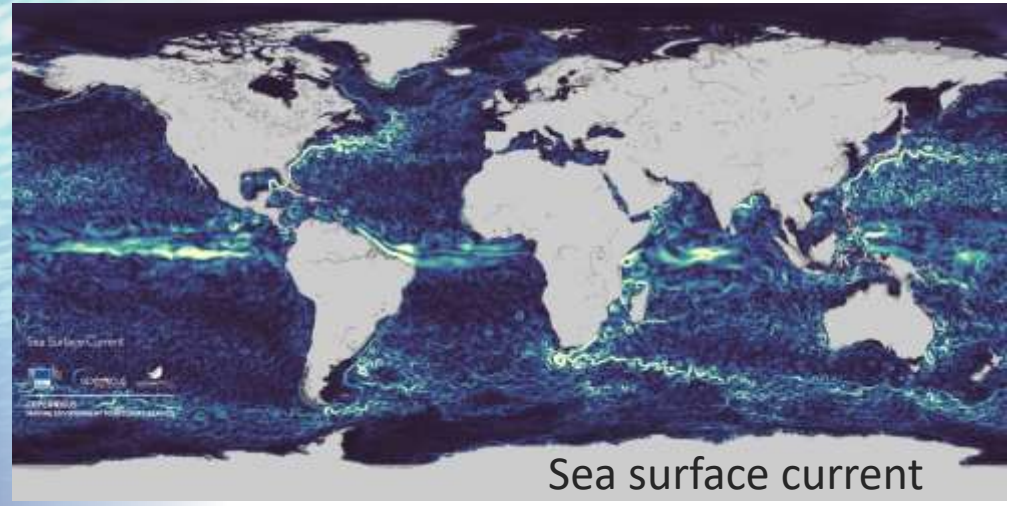
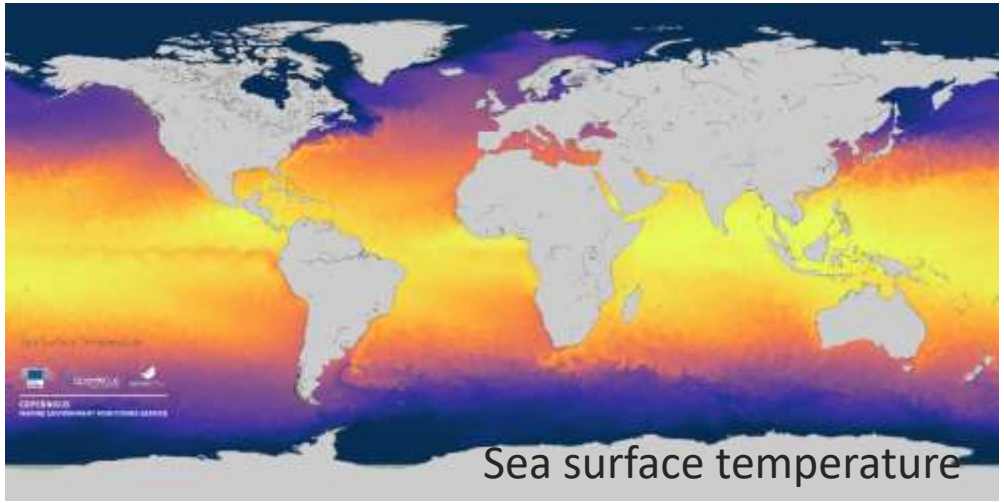
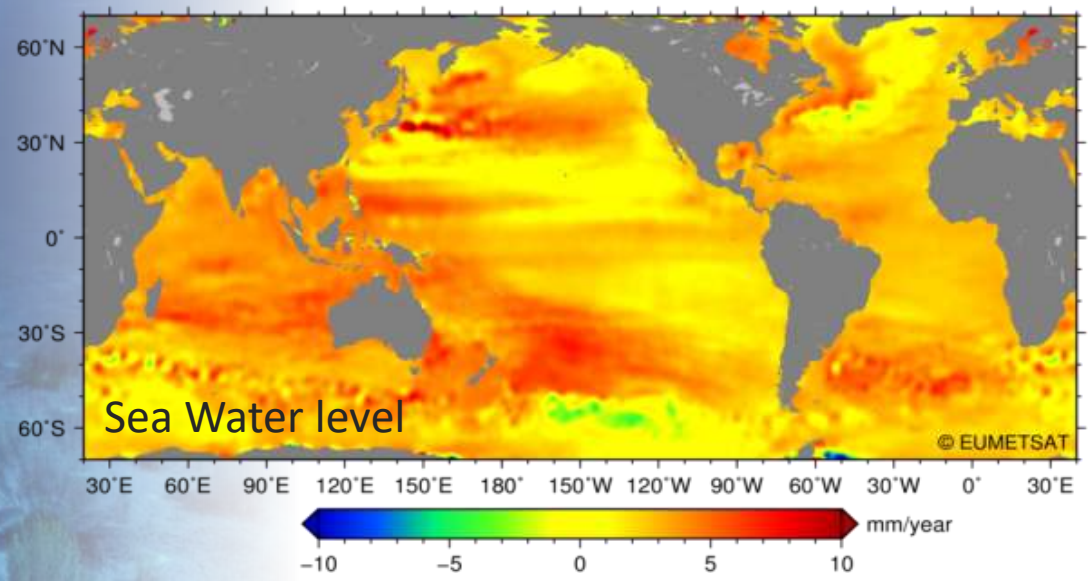
Marine Monitoring

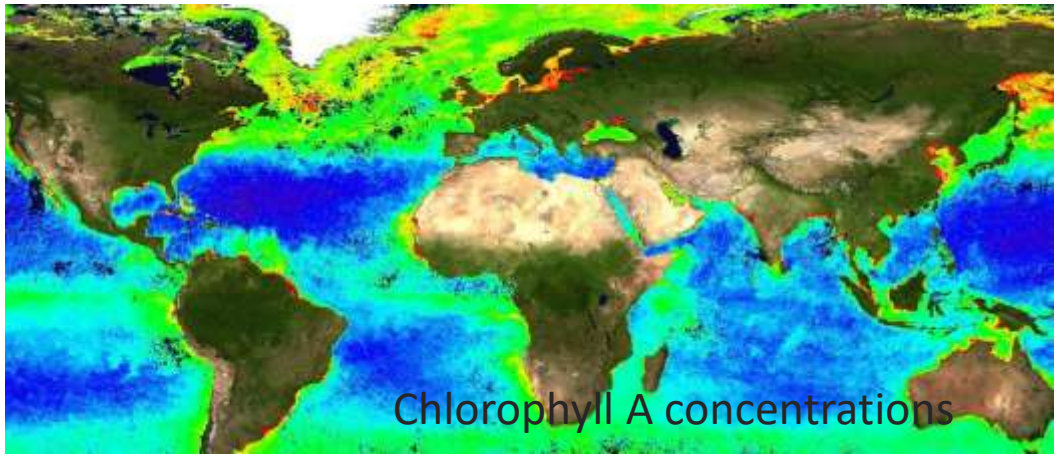
Marine Service products (example)


Sea surface current


Sea surface temperature



Sea Water level


Chlorophyll A concentrations

European Commission | Copernicus Europe's eyes on Earth | MERCATOR OCEAN

Atmosphere Monitoring

CAMS Benefit areas and products

- Health
- Environment
- Pollution
- Climate
- Renewable Energy

Air Quality and Atmospheric Composition

Climate forcing

Ozone layer & UV

Solar radiation

Emissions and surface fluxes

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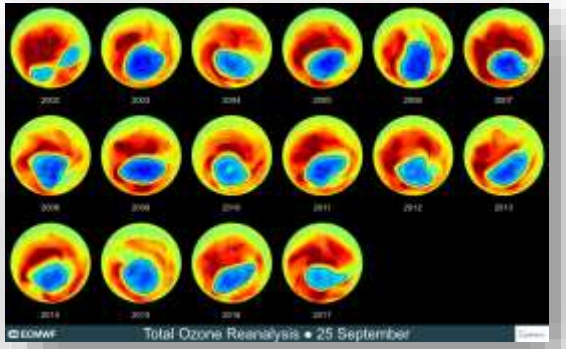
Atmosphere Monitoring Service PRODUCTS

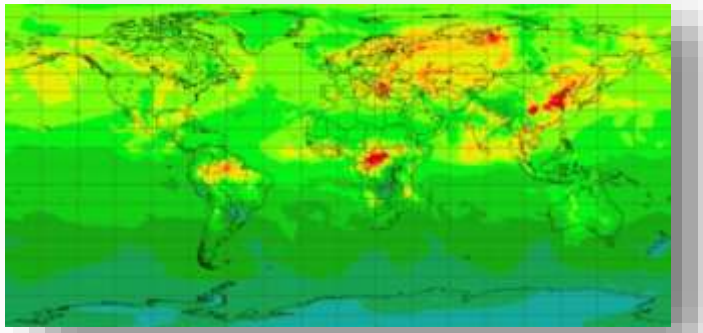
Atmosphere Monitoring

European Air Quality and products in support of policy users

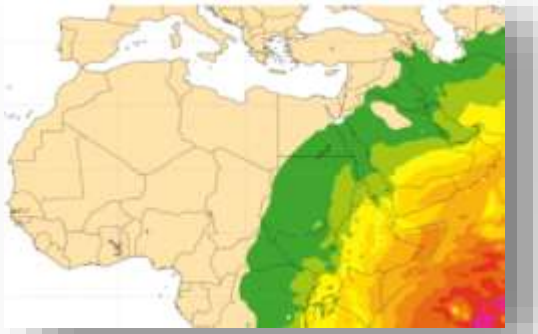


Ozone layer

Emissions and surface fluxes



Atmospheric composition : global analyses, forecasts and reanalyses



Solar radiation and UV index

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C3S Benefit areas and products examples

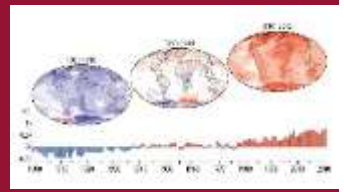
Climate Change

- Climate change
- Mitigation and adaptation
- Weather forecast
- Pollution
- Environment
- Health

Consistent Estimates of the Essential Climate Variables (ECVs)

Support to Mitigation and Adaptation Strategies

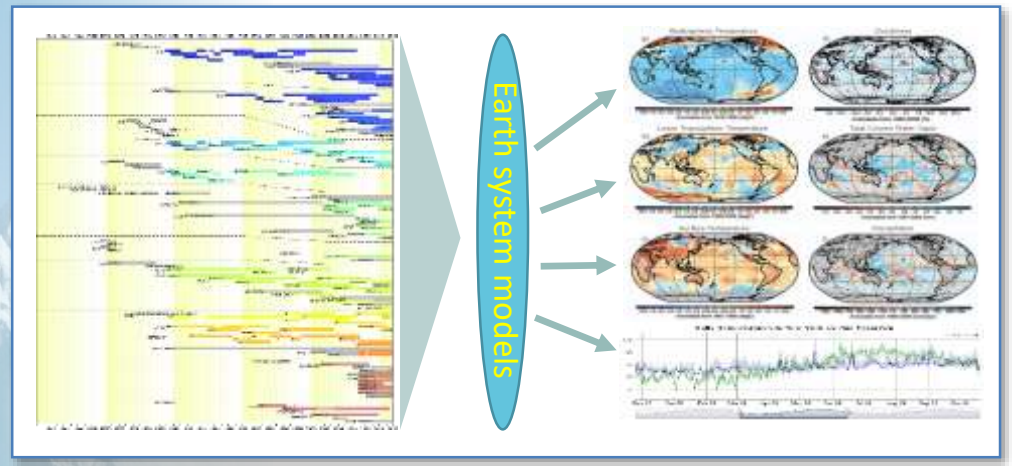
Global and Regional Reanalyses



Seasonal Forecasts And Climate Projections

C3S / Access to past, present and future climate information

Climate Change

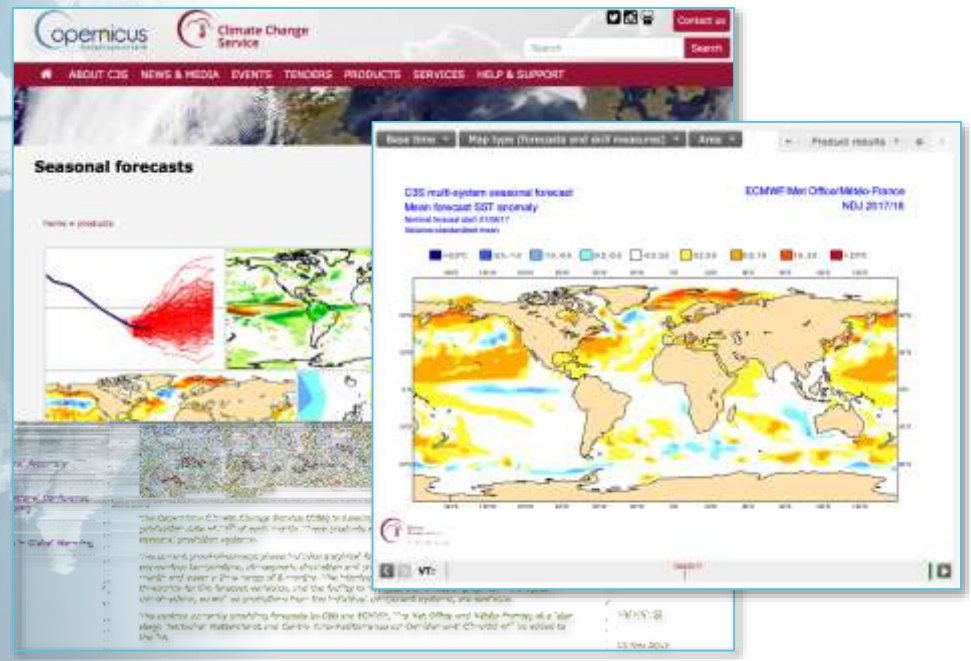


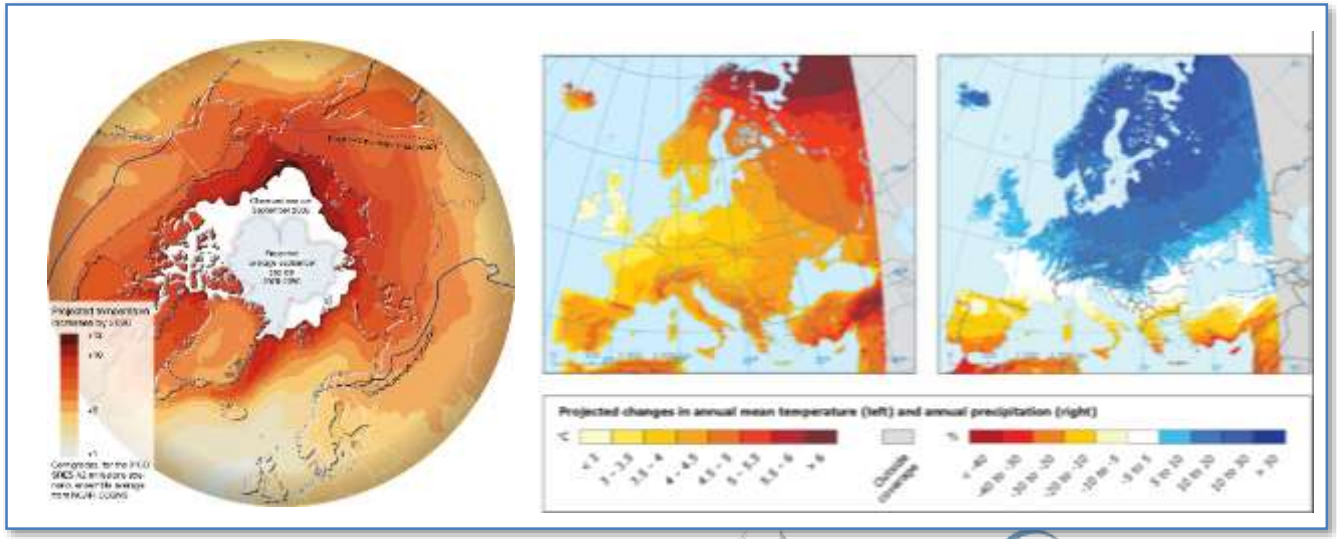
Observations and climate re-analyses

Seasonal forecast data and products

Climate model simulations

Sectoral Impact Assessment





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Emergency Management

EMERGENCY MANAGEMENT SERVICE

The Emergency Management Service supports actors (e.g. civil protection, insurance companies, risk evaluation and humanitarian aid sectors) dealing with:

Emergency Response

Natural Disasters

Man-made Emergency Situations

Humanitarian Crises

Preparedness and Recovery Activities

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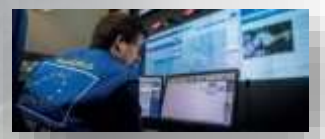
CEMS / Service Overview

Emergency Management

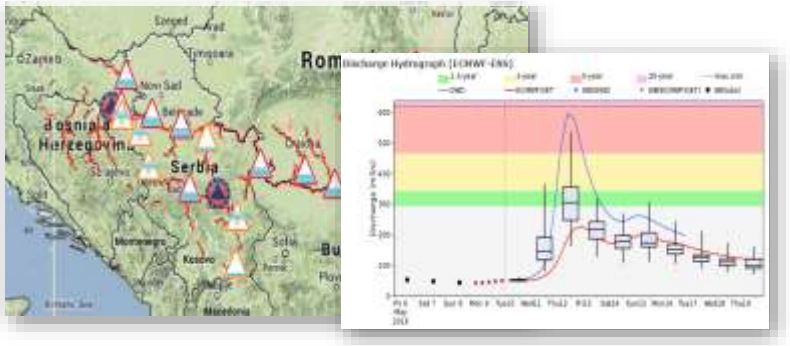
Scope

- Complementary to national efforts
- Supporting the EC's Emergency Response and Coordination Centre (ERCC)
- Focus on Europe but available globally



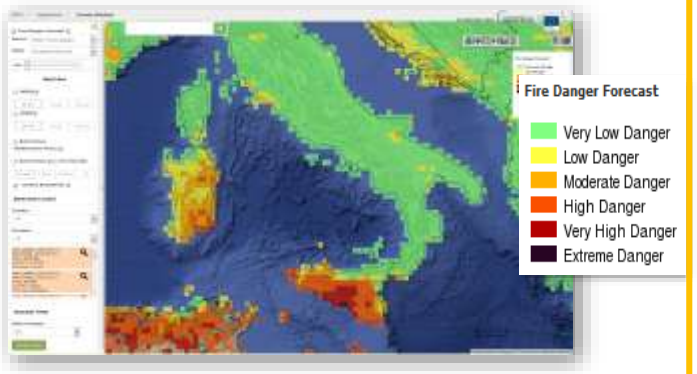
Flood Awareness System (EFAS - GLOFAS)

Flood monitoring and forecasting across Europe and Global



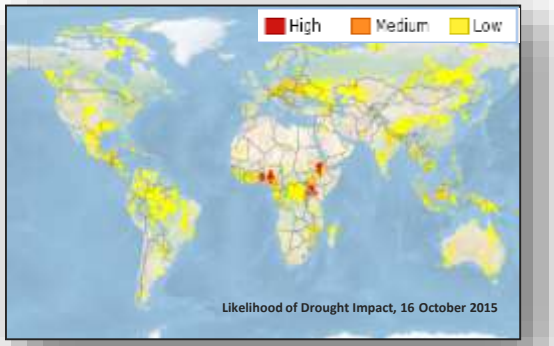
European Forest Fire Information System (EFFIS)

Near real-time & historical information on forest fires in the European, Middle Eastern & N-African regions



Drought Observatory (EDO – GDO)

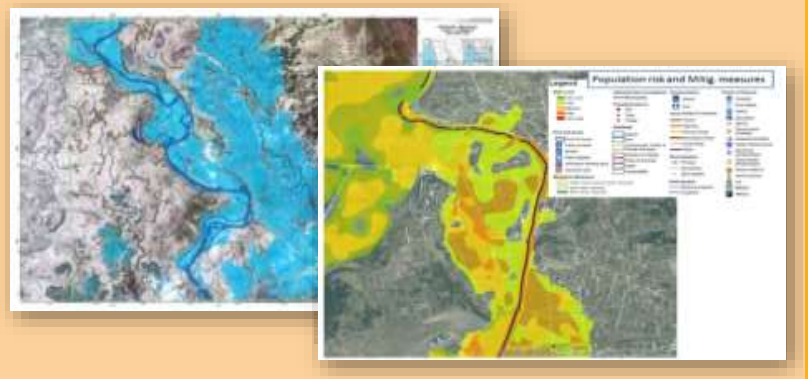
Early warning, monitoring & forecasting, risk of droughts & their impacts



On-demand Mapping

Any disaster

On-demand provision of geospatial information in support of preparedness, emergency response, recovery for any type of disaster



GMES and Africa

European Commission

G M E S & A f r i c a

Long-standing EU-Africa Cooperation to support Africa capacity to exploit Earth Observation

2006:
Maputo Declaration
Call to extend the benefits of European GMES programme to ACP countries

2007:
Lisbon Declaration
Launch of GMES & Africa initiative

2018:
Launch of first implementation phase with the GMES & Africa program

2022:
Second implementation phase of GMES & Africa program

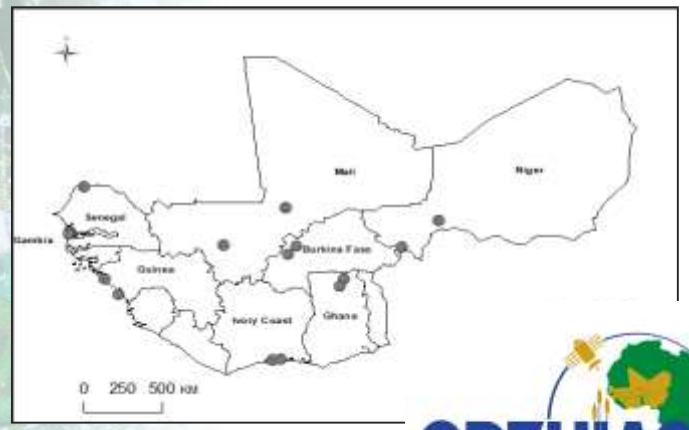
2026:
Third phase of GMES & Africa program under the EU Africa Space Flagship

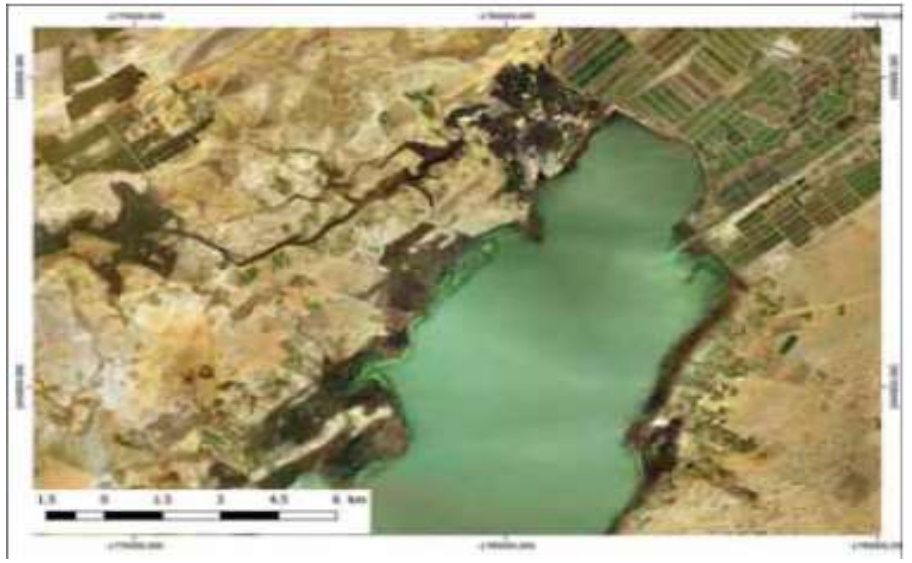
COPERNICUS program is the main pillar of GMES & Africa

West Africa Consortium - CSE

This project implemented in ten (10) West African countries, has developed a service entitled Wetlands Monitoring which is focusing on five indicators to monitor:

1) surface water dynamics;
2) extent of mangroves;
3) extent of invasive aquatic plants,
4) soil moisture
5) water turbidity





Main Objective, GMES – WeMAST portal

To upscale and operationalize the Geoportal for delivering products and information services to policy makers, private sector and other end users for management and monitoring of Wetlands in Southern Africa.

- To improve access to satellite Earth Observation and in situ data on wetlands monitoring and management in Southern Africa considering the feedback from the end-users

WETLAND MONITORING AND ASSESSMENT SERVICE FOR TRANSBOUNDARY BASINS IN SOUTHERN AFRICA (WeMAST)

Copernicus
Europe's eyes on Earth

Conclusions

European Commission

Conclusions

- Copernicus is a performant instrument to deliver operational services
- Not research but based on latest research developments (Horizon, ESA … JRC)
- Ensure long term sustainability
- Maintain state of the art products with evolution and re-processing

- CLMS portfolio includes Global systematic coverage but also Hot Spot coverage (ad hoc request)
- Propose core multi-purpose products but sectoral dimension envisaged from 2025
- Land Cover & Forest Monitoring system is based on a flexible approach and is the cornerstone for global land cover and land use mapping

- Opportunities at short / mid term

Thank you