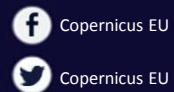


Copernicus

The European Union Earth Observation and Monitoring Programme

Copernicus
Europe's eyes on Earth

Space



Copernicus EU

Copernicus EU



Copernicus EU



www.copernicus.eu



Copernicus

COPERNICUS IN BRIEF

- **Flagship programme of the European Union, created to answer European and global societal challenges** – e.g. climate change, natural disasters, sustainable development...
- **3 components** – space infrastructure, Copernicus services, in-situ component
- **Six operational services** serving a community of users worldwide



Full, free and open access to Copernicus data and information

www.copernicus.eu



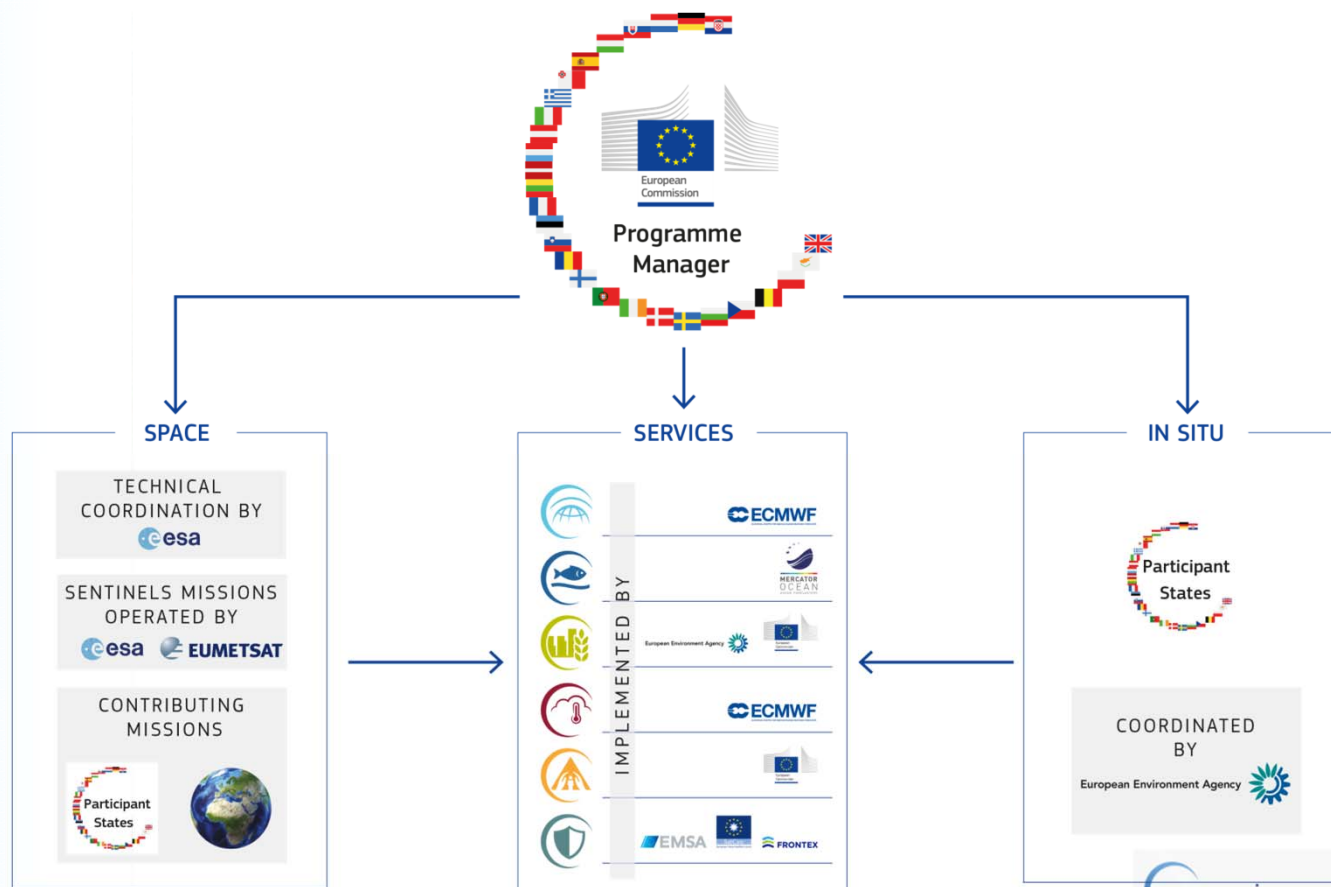
A tool for economic growth
and a driver for the **digital economy**





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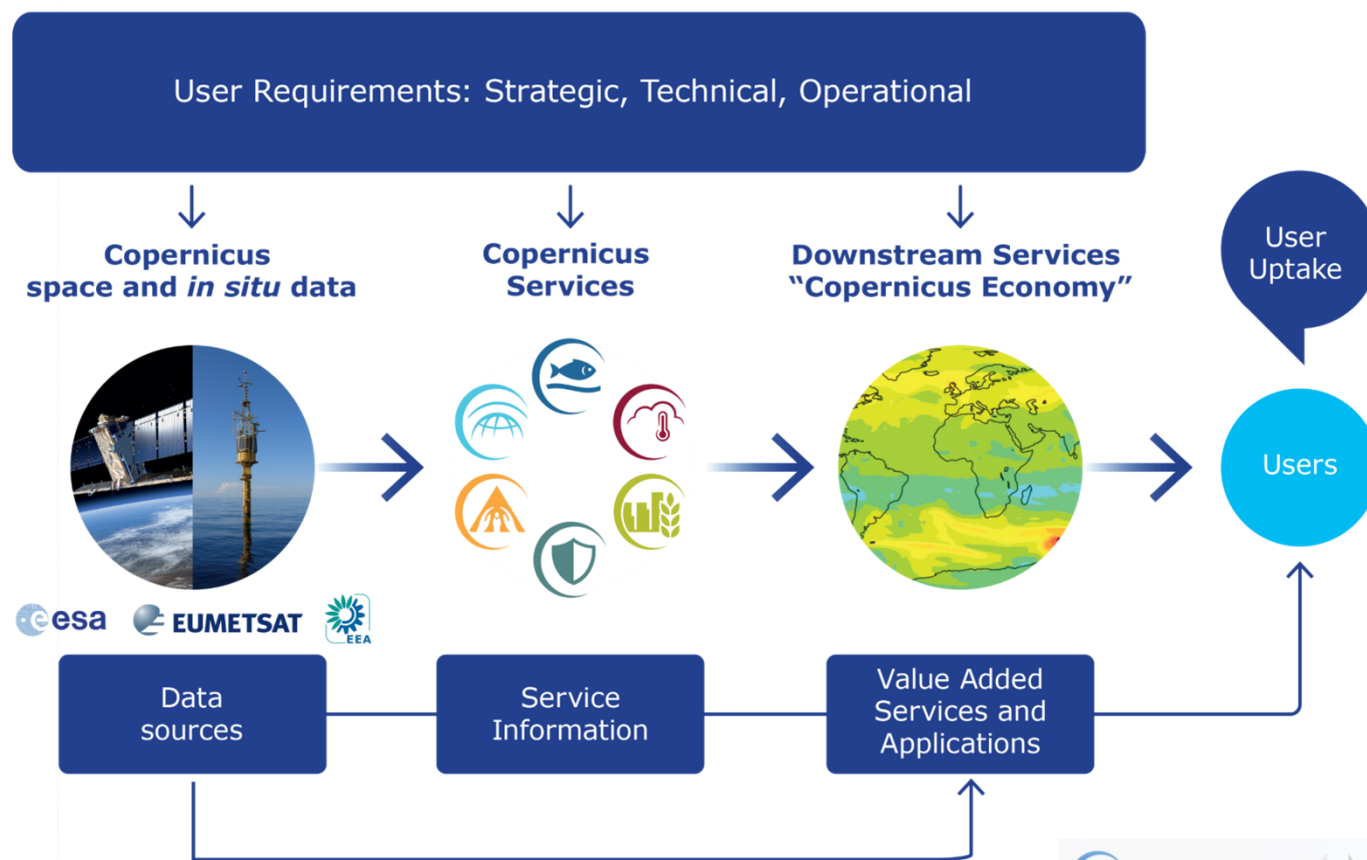
COPERNICUS GOVERNANCE





Copernicus








COPERNICUS IS DRIVEN BY THE USERS





Copernicus

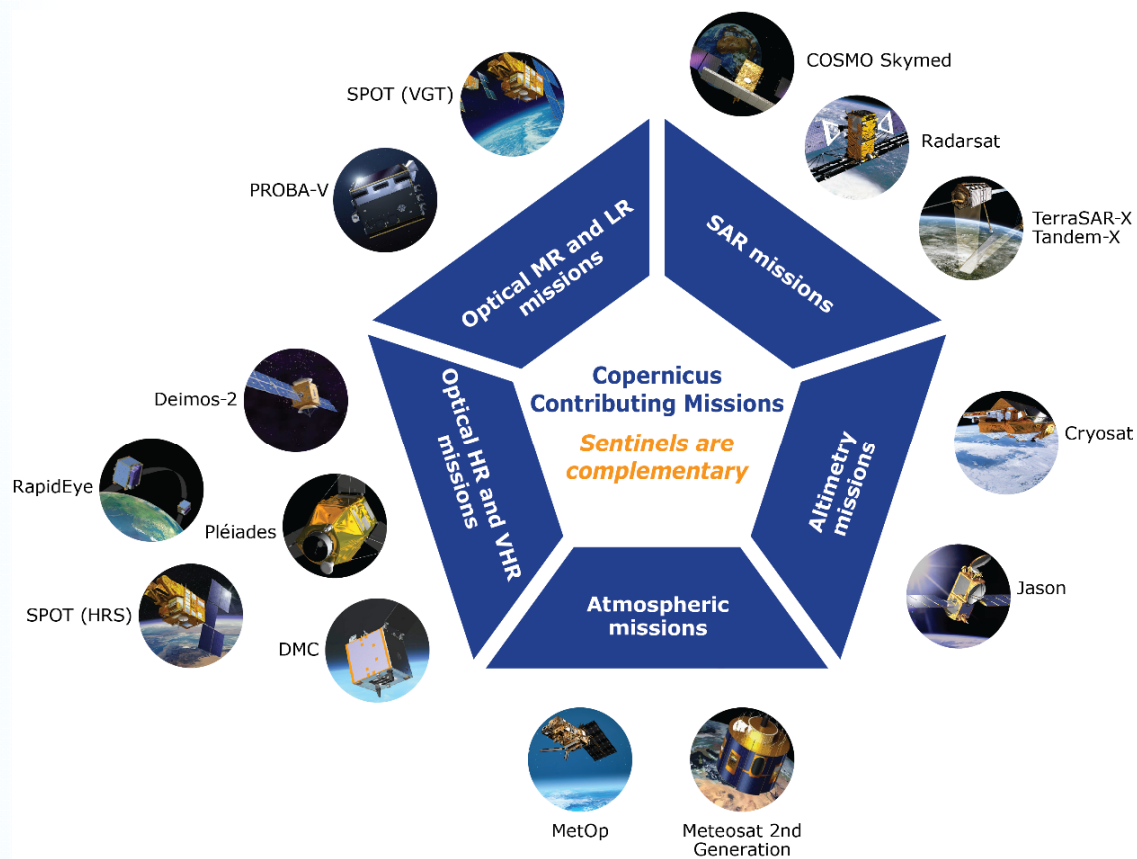
THE SENTINELS

| | | | |
|---|--|--|---|
|  | SENTINEL-1: 4-40m resolution, 3 day revisit at equator | S1A and 1B in orbit | ▶ Polar-orbiting, all-weather, day-and-night radar imaging |
|  | SENTINEL-2: 10-60m resolution, 5 days revisit time | S2A and 2B in orbit | ▶ Polar-orbiting, multispectral optical, high-resolution imaging |
|  | SENTINEL-3: 300-1200m resolution, <2 days revisit | S3A in orbit S3B launch in April 2018 | ▶ Optical and altimeter mission monitoring sea and land parameters |
|  | SENTINEL-4: 8km resolution, 60 min revisit time | 1st Launch 2020 | ▶ Payload for atmosphere chemistry monitoring on MTG-S |
|  | SENTINEL-5p: 7-68km resolution, 1 day revisit | S5P launched 13/10/2017 | ▶ Mission to reduce data gaps between Envisat, and Sentinel 5 |
|  | SENTINEL-5: 7.5-50km resolution, 1 day revisit | 1st Launch 2021 | ▶ Payload for atmosphere chemistry monitoring on MetOp 2 nd Gen |
|  | SENTINEL-6: 10 day revisit time | 1st Launch 2020 | ▶ Radar altimeter to measure sea- surface height globally |



Copernicus

THE CONTRIBUTING MISSIONS



Subject to Data
Owner's Data
Policy



Land
Monitoring

LAND MONITORING SERVICE

Ecosystems

Biodiversity

Agriculture

Forestry

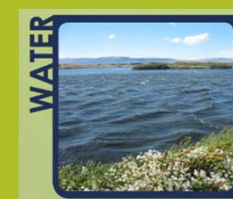
Energy

Natural Resources

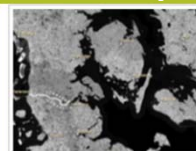
Water

Urban planning

Global



Pan-European



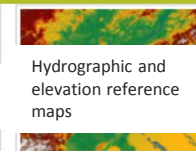
[Image Mosaics](#)



[CORINE Land Cover](#)



[High Resolution Layers](#)



[Reference Data](#)

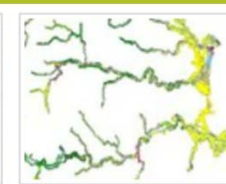


[Related Pan-European products](#)

Local



[Urban Atlas](#)



[Riparian Zones](#)



[Natura 2000 \(N2K\)](#)



Marine
Monitoring

MARINE MONITORING SERVICE

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)



Atmosphere
Monitoring

ATMOSPHERE MONITORING SERVICE

Health

Environment

Pollution

Climate

Renewable Energy

Air Quality and Atmospheric Composition



Climate forcing



Ozone layer & UV



Solar radiation



Emissions and surface fluxes





Climate
Change

CLIMATE CHANGE SERVICE

Climate change

**Mitigation and
adaptation**

Weather forecast

Pollution

Environment

Health

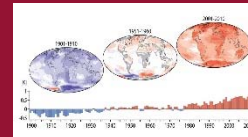
**Consistent Estimates of the
Essential Climate Variables (ECVs)**



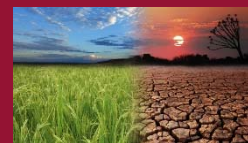
**Support to Mitigation and
Adaptation Strategies**



**Global and Regional
Reanalyses**



**Seasonal Forecasts
And Climate Projections**





Emergency
Management

EMERGENCY MANAGEMENT SERVICE

**Disaster
Emergency
Situations**

**Humanitarian
Crises**



Risk & Recovery Mapping:

- Reference Maps
- Pre-disaster Situation Maps
- Post-disaster Situation Maps

Rapid Mapping:

- Reference Maps
- Delineation Maps
- Grading Maps

Early Warning:

- Floods: EFAS
- Forest Fires: EFFIS

*EFAS = European Flood Awareness System;
EFFIS=European Forest Fire Information System*



Security

SECURITY SERVICE

Border Surveillance

- Coastal monitoring
- Pre-frontier monitoring
- Reference mapping



Maritime Surveillance

- Maritime surveillance of an area of interest
- Vessel detection
- Vessel tracking and reporting
- Vessel anomaly detection



Support to EU External Action

- Road network status assessment
- Conflict damage assessment
- Critical infrastructure analysis
- Reference map
- Support to evacuation plans
- Crisis situation map
- Border map
- Camp analysis

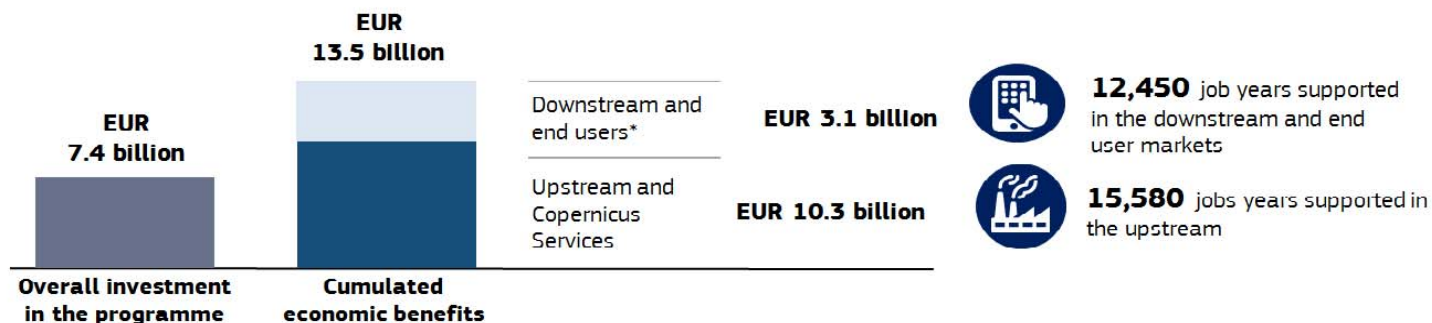




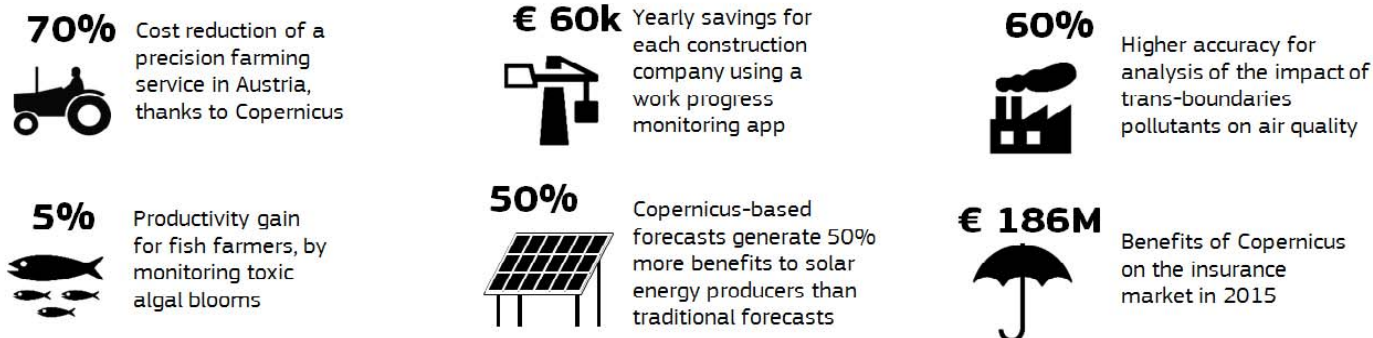
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COPERNICUS MONETARY BENEFITS

Estimated direct monetary benefits between 2008 and 2020



Examples of existing Copernicus benefits



* The Downstream and end user analysis includes only 8 value chains: Agriculture, Forestry, Urban Monitoring, Insurance, Ocean Monitoring, Oil & Gas, Renewable Energies and Air Quality. Estimates for end users were only calculated for Insurance, Oil&Gas and Urban Monitoring. The estimates of downstream and end user benefits should be seen as extremely conservative because they were calculated a year after the launch of the first Sentinel satellite. Benefits are likely to increase significantly as more Sentinels become operational.

Copernicus
Europe's eyes on Earth





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COPERNICUS BROADER BENEFITS

Climate change & Environment



Development & Cooperation

Security & Defence



Tourism

Health



Insurance & Disaster management

Blue economy



Urban planning...

Energy & Natural resources



Forestry...



Copernicus

COPERNICUS DATA ACCESS

Access to Satellite data

FULL, FREE AND OPEN




sentinel data hub

Scientific and Other Access

<https://scihub.copernicus.eu/>

esa



CSC data access

Copernicus Space Component
Data Access Portal*
CSC-DA

<https://spacedata.copernicus.eu/>

FULL, FREE AND OPEN

EUMETSAT

- Copernicus Online Data Access (CODA)
- EUMETCast:
www.eumetcast.com

Need to get a station and pay a yearly fee

Access to Copernicus Services Data

- Land-related data: <http://land.copernicus.eu>
- Atmosphere-related data: <http://atmosphere.copernicus.eu>
- Marine-related data: <http://marine.copernicus.eu>
- Emergency-related data: <http://emergency.copernicus.eu>
- Climate change-related data: <http://climate.copernicus.eu> (Beta version)

FULL, FREE AND OPEN



*Preferential access for international partners:
requires bilateral arrangement*

(*) Includes instructions on how to access Contributing Missions data



Copernicus

CLOUD COMPUTING: THE COPERNICUS DIAS



- Strengthen Copernicus data distribution platforms
- Create a flexible data exploitation ecosystem based on the latest ICT technologies

*ca. 10 Terabyte/day with
just Sentinels-1, -2 and -3
fully operational*

Data Access and Information Services (DIAS)



- Access to all Copernicus data and information virtually collocated with computing resources
- Allowing Big Data analytics without the need to download the data and information
- Allowing data fusion with non-EO data and information



User
Uptake

COPERNICUS EVOLUTION

- **Stability of the programme and long-term commitment:**
 - (Enhanced) continuity of current data and services
 - Continuity of full, open and free data policy for the environmental domain
- **Additional services to meet emerging needs:**
 - Climate change and sustainable development
 - Monitoring CO₂ and other greenhouse gas emissions
 - Land use and forestry
 - Changes in the Arctic
 - Improve the EU's capacity in security domain (border control, maritime surveillance).
- **Next generation of satellites:** evaluation on-going to define observation needs in cooperation with users - e.g. GHG monitoring, thermal infrared, hyperspectral



User
Uptake

GMES & AFRICA

Long-standing EU-Africa cooperation to build
Africa's own capacity to exploit EO



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



2007:
Lisbon Declaration
Launch of GMES & Africa

GMES/Copernicus programme as main pillar of GMES & Africa





User
Uptake

HISTORICAL OVERVIEW: GMES... AND AFRICA...

