

The European Union Earth Observation programme



What is Copernicus?

Copernicus is the European Union's Earth Observation Programme, which monitors our planet and its environment for the ultimate benefit of the citizens of Europe. It delivers data, information and services based on satellite Earth Observation data and in situ (non-space) data. The Programme is funded, coordinated and managed by the European Commission in cooperation with partners such as ESA and EUMETSAT.

The Copernicus programme is served by a set of dedicated satellites (the Sentinel family) and contributing missions (existing commercial and public satellites). The Sentinel satellites are specifically designed to meet the needs of the Copernicus information services and their users. Since the launch of Sentinel-1A in 2014, the European Union has initiated a process to place a complete constellation of al-

most 20 satellites in orbit before 2030. Today, there are seven Sentinel satellites in orbit, of four different types. Copernicus satellites, along with ground-based, airborne and seaborne measurement sensors, are providing vast amounts of global data.

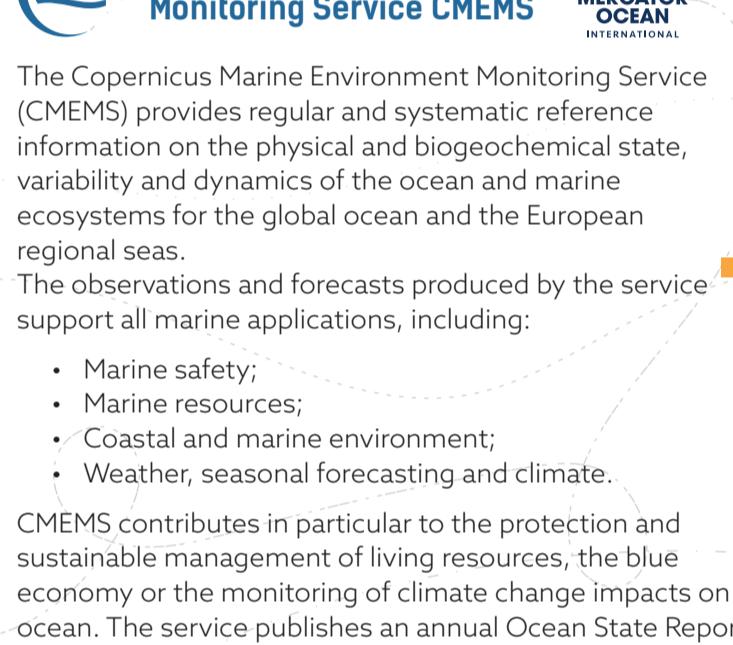
The Copernicus services transform the wealth of satellite and in situ data into timely and actionable information by processing and analysing it. The services deliver datasets and time series that are comparable and searchable, ensuring that trends and changes are monitored. Patterns are examined and used to create better forecasts of, for example, the ocean and the atmosphere. Maps are derived from imagery, features and anomalies are identified and statistical information is extracted. These value-adding activities are streamlined through six thematic streams of Copernicus

services: the Copernicus Atmosphere Monitoring Service (CAMS), the Copernicus Marine Environment Monitoring Service (CMEMS), the Copernicus Land Monitoring Service (CLMS), the Copernicus Climate Change Service (C3S), the Copernicus Emergency Management Service (CEMS) and the Copernicus Security Service.

The information services, as well as the data from which they are derived, are accessible on a full, free and open basis by anyone. This data and information is used by service providers, public authorities and international organisations to improve the quality of life for citizens of Europe and around the world, to monitor and mitigate climate change, and to preserve our fragile environment.

More information on www.copernicus.eu/en

CAMS Nitrogen Dioxide (NO₂) analysis 5 January 2019 23UTC



Atmosphere Monitoring Service CAMS

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The Copernicus Atmosphere Monitoring Service (CAMS) provides continuous data and information on atmospheric composition by monitoring and forecasting constituents such as greenhouse gases, reactive gases, ozone and aerosols. CAMS delivers consistent and quality-controlled information useful to develop applications for air pollution, health, solar energy, greenhouse gases and climate change-related topics to help policymakers, businesses and citizens address environmental concerns.

More information on <https://atmosphere.copernicus.eu/>

Marine Environment Monitoring Service CMEMS

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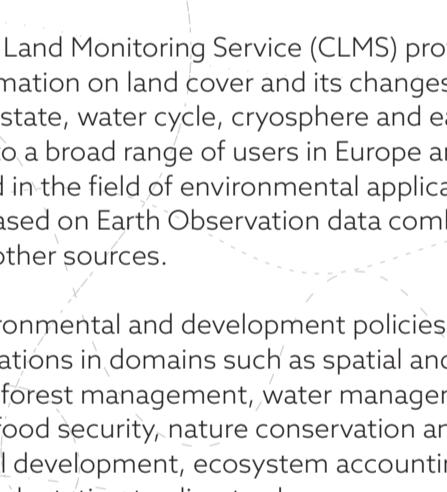
The Copernicus Marine Environment Monitoring Service (CMEMS) provides regular and systematic reference information on the physical and biogeochemical state, variability and dynamics of the ocean and marine ecosystems for the global ocean and the European regional seas.

The observations and forecasts produced by the service support all marine applications, including:

- Marine safety;
- Marine resources;
- Coastal and marine environment;
- Weather, seasonal forecasting and climate.

CMEMS contributes in particular to the protection and sustainable management of living resources, the blue economy or the monitoring of climate change impacts on the ocean. The service publishes an annual Ocean State Report.

More information on <http://marine.copernicus.eu/>



Land Monitoring Service - CLMS

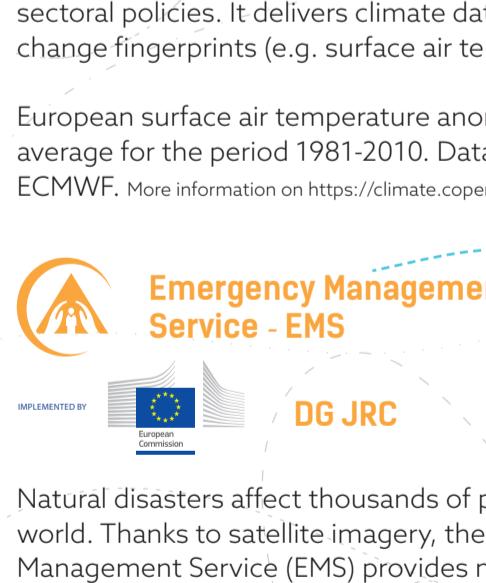
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The Copernicus Land Monitoring Service (CLMS) provides geospatial information on land cover and its changes, land use, vegetation state, water cycle, cryosphere and earth surface energy to a broad range of users in Europe and across the world in the field of environmental applications. The service is based on Earth Observation data combined with data from other sources.

It supports environmental and development policies, as well as applications in domains such as spatial and urban planning, forest management, water management, agriculture and food security, nature conservation and restoration, rural development, ecosystem accounting and mitigation/adaptation to climate change.

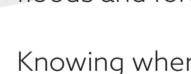
More information on <https://land.copernicus.eu/>



Hamm, East Flanders - CORINE Land Cover

Climate Change Service - C3S

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The Copernicus Climate Change Service (C3S) strongly supports the adaptation and mitigation policies of the European Union by providing consistent and authoritative information about the past, present and future climate change in Europe and the rest of the world.

C3S provides access to state-of-the-art quality-assured climate information, relevant to European Union sectoral policies. It delivers climate data records to monitor major climate drivers and document climate change fingerprints (e.g. surface air temperature).

European surface air temperature anomaly for annual averages from 1979 to 2017 relative to the annual average for the period 1981-2010. Data source: ERA-Interim. Credit: Copernicus Climate Change Service/ECMWF. More information on <https://climate.copernicus.eu/>

Emergency Management Service - EMS

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DG JRC

Natural disasters affect thousands of people every year in the world. Thanks to satellite imagery, the Copernicus Emergency Management Service (EMS) provides maps to first responders, showing the impact on the ground in the first hours following a large natural disaster or a humanitarian crisis. These maps assist the organisation of the safe evacuation and sheltering of people affected by disasters such as earthquakes, volcanic eruptions, floods and forest fires.

Knowing where vulnerable citizens and infrastructure are located enables prevention measures to be taken to reduce the impact of a potential disaster. The EMS maps can also be used to monitor recovery and reconstruction after a disaster has occurred.

More information on <https://emergency.copernicus.eu/>



EMS mapping activations to cover forest fires

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Security
Service



The Copernicus Security Service applications aim to support European Union policies by providing information in response to Europe's security challenges. The applications focus on three key areas:

- Copernicus Maritime Surveillance provides satellite image products for monitoring activities at sea by European maritime authorities.
- Copernicus Border Surveillance Service improves the situational awareness at the EU's external borders, contributing to saving lives at sea and tackling cross-border crime.
- Copernicus Service in Support to EU External Action provides geospatial intelligence in support of global EU security commitments, such as crisis mitigation and risk assessment outside the EU territory.

More information on <https://www.copernicus.eu/en/services/security>



The Copernicus Sentinels are the programme's dedicated Earth Observation satellites. They ensure an independent and autonomous Earth Observation capacity for Europe. There are six Sentinel families, covering a broad range of Copernicus observation needs, ranging from day-and-night all-weather observations, to land and ocean surfaces, sea-surface topography, and air quality, measuring trace gases in the atmosphere. In addition to these dedicated satellites, Copernicus is making use of satellite data from contributing missions, either from private companies or from institutional partners through dedicated agreements.

More information on <https://spacedata.copernicus.eu/>

Space Component



Sentinel-1A

Synthetic Aperture Radar

Sentinel-1B

Synthetic Aperture Radar

Sentinel-2A

Multi-spectral optical sensor

Sentinel-2B

Multi-spectral optical sensor

Sentinel-3A

Medium resolution optical sensor and Altimeter

Sentinel-3B

Medium resolution optical sensor and Altimeter

Sentinel-5P

Atmospheric Chemistry sensor

Planned and ordered

Sentinel-4

Atmospheric Chemistry sensor

Sentinel-5

Atmospheric Chemistry sensor

Sentinel-6

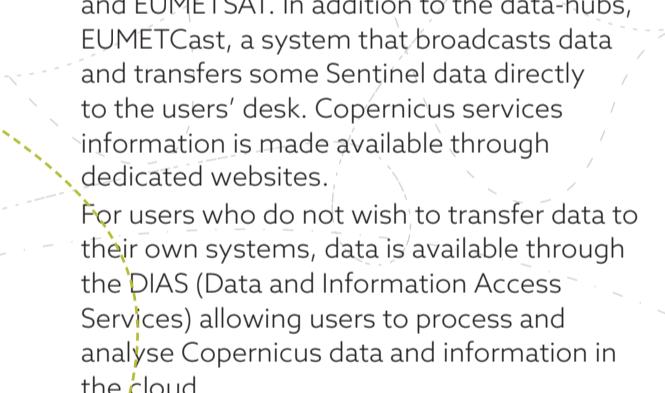
Radar Altimeter



In situ Component

The Copernicus programme provides accurate, high-quality data and information. It also relies on in situ observations from ground, sea-, and airborne sensors, as well as geospatial ancillary or reference data. The in situ component is mainly used to identify data access gaps and bottlenecks, support the provision of cross-cutting data, manage partnerships with data providers to improve access and use conditions, and to broker innovative solutions with services, providers or national authorities.

More information on <https://insitu.copernicus.eu/>



AERONET-Europe calibration facility - © Concepcion Bayo