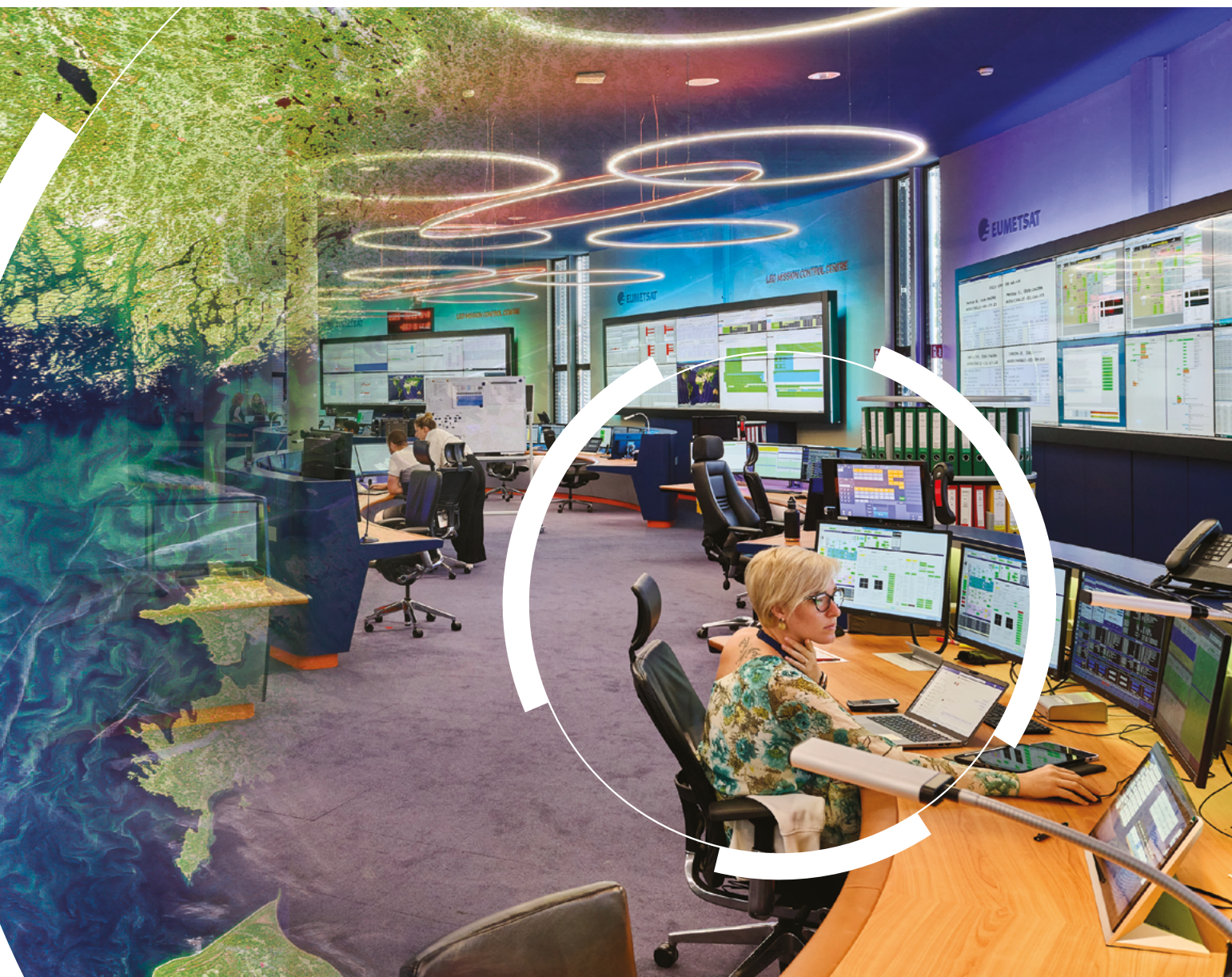


Copernicus at EUMETSAT

EUMETSAT and Copernicus – a partnership
for data-driven environmental intelligence

Monitoring weather and climate from space



COPERNICUS – Earth observation for the environment and human welfare

Copernicus is the Earth observation component of the European Union Space Programme. It provides free and openly accessible data from satellites and in situ ground-based systems, which are used to monitor Earth's land, oceans and atmosphere. The programme offers a broad range of data about our world to support European policies and global environmental monitoring for the benefit of European citizens.

Through six core services – Atmosphere, Marine, Land, Climate Change, Security and Emergency – Copernicus delivers a wide spectrum of high quality and timely data. From analysing air quality to mapping wildfires and tracking changes in sea level, the programme makes vital insights available for understanding and responding to our changing planet.

The Copernicus services are underpinned by the Sentinel missions – a series of Earth observation satellites jointly implemented and operated by EUMETSAT and the European Space Agency (ESA). Data from these missions help address key challenges such as climate change, natural disasters and air pollution.

Of the six current Copernicus satellite families, EUMETSAT is responsible for operating Sentinel-3, -4, -5 and -6, and will also operate the forthcoming CO2M mission. Each series is designed to monitor specific aspects of Earth's environment:

- Sentinel-3 measures variables related to the ocean and land.
- Sentinel-4 and -5 survey the atmosphere, generating data on air quality, aerosols and pollution.
- Sentinel-6 measures ocean wave height and sea level with high precision.
- CO2M will track human-made carbon dioxide and methane emissions.

In addition, EUMETSAT will generate global ocean and atmosphere data products from the Copernicus Imaging Microwave Radiometer (CIMR) and Copernicus Polar Ice and Snow Topography Altimeter (CRISTAL) missions, with the satellites operated by ESA. In particular:

- CIMR will provide data on precipitation rate, sea surface temperature and salinity.
- CRISTAL will measure wave height and sea level.

EUMETSAT has long-standing expertise in delivering satellite data for weather forecasting and environmental and climate monitoring. The Copernicus satellites significantly expand the range of operational data produced, enabling comprehensive monitoring of the Earth system, with a focus on its atmosphere, oceans and climate. The data are assimilated by meteorological agencies, the Copernicus services and other users into time-critical weather, air quality, oceanographic and environmental applications supporting the economy and society. EUMETSAT works closely with these user communities to ensure its services are fit for purpose.

Canadian wildfires
Credit: EUMETSAT



Supporting the Copernicus Marine, Atmosphere, Emergency and Climate Services

The six Copernicus services transform data into compelling insights for users ranging from scientific and commercial organisations to governments, non-specialists and the public.

EUMETSAT plays a pivotal role in supporting the following services:



The Copernicus Marine Environment Monitoring Service (CMEMS) disseminates ocean data for applications that include marine protection, maritime safety, combatting pollution and developing renewable energy resources.



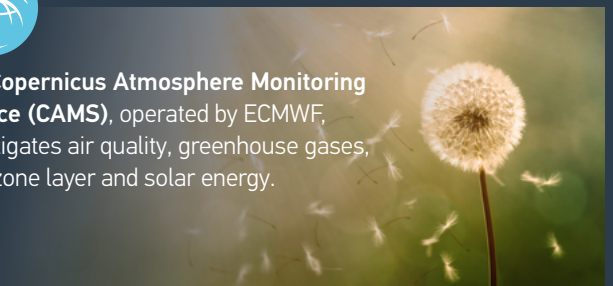
The Copernicus Climate Change Service (C3S), operated by ECMWF, provides information on the past, present and future climate, helping to advance mitigation and adaptation strategies.



The Copernicus Emergency Monitoring Service (CEMS) tracks wildfires and the resulting smoke plumes.



The Copernicus Atmosphere Monitoring Service (CAMS), operated by ECMWF, investigates air quality, greenhouse gases, the ozone layer and solar energy.



The Copernicus Global Climate reports confirm that global annual average temperatures are increasing, with 2024 the first year to exceed 1.5°C above pre-industrial levels. Europe has been warming twice as fast as the global average since the 1980s, becoming the fastest-warming continent on Earth, while European land in the Arctic is the fastest-warming region on Earth. Sea surface temperatures are rising and changes in atmospheric circulation are favouring more frequent summer heatwaves. Glaciers are losing mass and there are changes in the pattern of precipitation. Our planet is changing, and the frequency and severity of extreme weather events is growing.

The Copernicus Ocean State Report confirms the continuous rise in sea level, the ongoing acidification of the oceans,

and the mounting prevalence of harmful algal blooms, marine heatwaves and extreme wave events.

Copernicus delivers unique, timely and reliable information to support industry and government in addressing these challenges. With the right insight to hand, policymakers are more able to assess risks, track progress towards sustainability goals and improve preparedness and response.

Copernicus data is particularly crucial for supporting and monitoring key EU initiatives, such as the EU Green Deal, the Zero Pollution Action Plan and the EU biodiversity strategy. Copernicus also supports international commitments, such as the United Nations' Sustainable Development Goals and the Paris Agreement, which aims to hold the

increase in global average temperature to well below 2°C above pre industrial levels. For the latter, the Copernicus CO2M constellation of satellites will be particularly relevant for monitoring levels of greenhouse gases.

The Copernicus satellites and services, through an open data policy, bring significant environmental and economic benefits to society. The data can, for example, direct emergency services, optimise shipping routes, identify coastal resorts and marine ecosystems threatened by cyanotoxins, warn citizens of poor air quality, and enable the planning of locations for new renewable energy facilities.

Together, EUMETSAT and Copernicus empower users to make reasoned decisions, drive innovation and help bring about a more resilient and sustainable future.

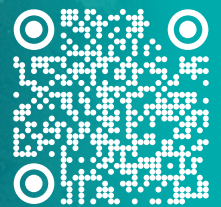
Ensuring data access for all users

EUMETSAT's fundamental contribution to the Copernicus programme enables diverse applications through the data generated from its satellites. All data from the programme are made available on the principle of full, open and free access.

The central entry point to EUMETSAT's comprehensive portfolio of data, products and services is the User Portal. Allowing users to explore, discover and download from EUMETSAT's full catalogue, the portal features guidelines and resources on exploiting a prodigious array of data, including from Copernicus and meteorological satellites. It also links to a suite of tools for viewing and downloading data in near real-time or from historical time series:

- The **Data Store** is EUMETSAT's main mechanism for online data access, offering a web interface to retrieve data in user-specified formats and geographical areas. The EUMETSAT Data Access API Client (EUMDAC) simplifies these tasks, providing access to all capabilities of the Data Store as a Python library and command-line interface.
- **EUMETCast** assures near real-time delivery of satellite data, such as for safety-critical operations and weather and environmental forecasting. Multicast technology is used to push data within guaranteed timeframes through either EUMETCast Satellite or Terrestrial. EUMETCast Satellite serves users in Europe, Africa, South America and parts of Asia, while EUMETCast Terrestrial is global.
- **EUMETview** integrates selected data from Copernicus and meteorological satellites, allowing users to view outputs in layers over a map. Custom views can be created, manipulated and stepped forward and back in time to explore parameters such as temperature, precipitation and chlorophyll concentration. Views can be downloaded in a variety of formats, including static maps and animations showing parameter changes over time.
- **WEkEO** is a Copernicus Data Access Service jointly operated by EUMETSAT, the European Centre for Medium-Range Weather Forecasts (ECMWF), Mercator Ocean International and the European Environment Agency. It is the only platform providing fast, easy access to all data and products from the Copernicus satellites, contributing missions and the marine, land, atmosphere and climate services. Through WEkEO, EUMETSAT extends its expertise to a gateway that allows users to browse, download, visualise and process environmental data for applications in sectors such as energy, agriculture and urban planning.
- The **EUMETSAT Data Centre** guarantees the long-term preservation of and access to historical data and products from its meteorological satellites. Established in 1995, this extensive archive is indispensable for users needing consistent, reliable datasets to study trends, assess environmental risks and develop climate models. The archive is one of Europe's largest and most comprehensive collections in this field.

Through these tools and services, EUMETSAT is actively engaged in ensuring the full breadth of Copernicus data and products are freely accessible for use in supporting a vast range of users and applications.



Sea ice in Foxe Basin, Canada
Credit: EUMETSAT

Complementary missions and international relations

EUMETSAT's meteorological satellites and the Copernicus satellites are highly complementary, maximising the value of Earth observation for the benefit of citizens in Europe and across the world.

Such synergies are achieved through the combination of the acquired datasets and the design and operation of the satellites. Sentinel-4, for example, focuses on monitoring atmospheric composition and is hosted on the Meteosat Third Generation – Sounder 1 satellite (MTG-S1), which also carries an Infrared Sounder (IRS). The IRS offers a dynamic view of the atmosphere, with information on temperature and humidity, while Sentinel-4 tracks aerosols and concentrations of atmospheric trace gases. Together, these data provide insights into the dynamics and composition of the atmosphere.

A similar complementarity is seen with Sentinel-5, a high-resolution spectrometer system on Metop-SGA. Among its other instruments, the satellite's payload includes the Infrared Atmospheric Sounder Interferometer-Next Generation (IASI-NG) instrument from the French space agency, CNES. Working in tandem, Sentinel-5 and IASI-NG deliver enhanced understanding of atmospheric composition.

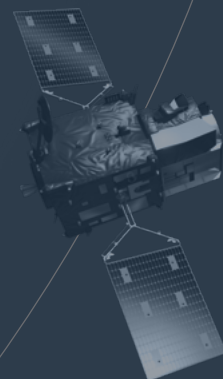
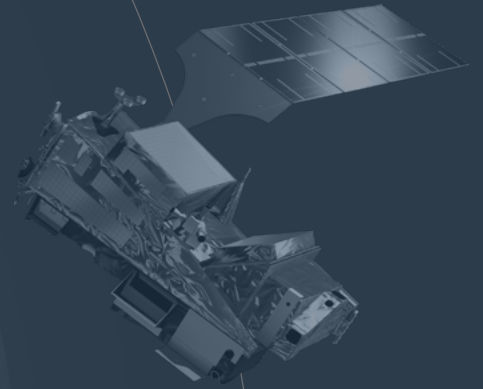
Sentinel-6 is a prime example of transatlantic collaboration. Building on the legacy of high-precision sea level monitoring begun by the Jason satellites, Sentinel-6 is a joint initiative involving EUMETSAT, the European Commission (EC), ESA and CNES in Europe, together with NASA and NOAA in the US, all under the umbrella of the Copernicus Programme.

The combined strengths resulting from cooperation are both technical and strategic. EUMETSAT works closely with the EC, which oversees the Copernicus programme, and ESA. Together, such partnerships help maintain Europe's leading capabilities for Earth observation.

Beyond Europe, EUMETSAT collaborates with agencies such as NOAA, Japan's JAXA, India's ISRO and China's Meteorological Agency. By sharing missions and data, including Copernicus services, users benefit from a quality-assured and timely environmental monitoring system.

These international relationships ensure that EUMETSAT data and Copernicus products further the monitoring of the world's health and support climate commitments such as those of the Paris Agreement, the EU's Green Deal and the United Nations Framework Convention on Climate Change (UNFCCC).

Through its focus on collective working and effective partnerships, EUMETSAT is a key contributor to Copernicus and an essential component of a coordinated international effort to monitor, understand and protect our evolving planet.





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PROGRAMME OF
THE EUROPEAN UNION



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Brochure: COP.02, V.5



Baltic Sea phytoplankton bloom
Credit: EUMETSAT
**EUMETSAT Low Earth Orbit
Mission Control Centre (LEO MCC)
in Darmstadt, Germany**
Credit: EUMETSAT

