



Copernicus:

The EU Earth Observation and Monitoring Programme

What is Copernicus?

Copernicus is a European Union Programme aimed at developing European information services based on satellite Earth Observation and in-situ (non-space) data. The Programme is coordinated and managed by the European Commission. It is implemented in partnership with the Member States, the European Space Agency (ESA), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the European Centre for Medium-Range Weather Forecasts (ECMWF), EU Agencies and Mercator Océan. Vast amounts of global data from satellites and from ground-based, airborne and seaborne measurement systems are being used to provide information to help service providers, public authorities and other international organisations improve the quality of life for the citizens of Europe. The information services provided are freely and openly accessible to everyone.

How does Copernicus collect data?

The Copernicus Space and Service Components have been specifically designed to meet user requirements. On the basis of satellite and *in situ* observations, the services deliver near-real-time data on a global level which can also be used for local and regional needs, to help us better understand our planet and sustainably manage the environment we live in. Copernicus observes from satellites: Copernicus observes from satellites: Copernicus is served by a set of dedicated satellites (the Sentinel family)

and contributing missions (existing commercial and public satellites designed for other purposes but providing some of their observation capacity to Copernicus). The Sentinel satellites are specifically designed to meet the needs of the Copernicus services and their users. Since the launch of the first unit of the Sentinel-1 mission in 2014, the European Union set in motion a process to place a constellation of almost 20 more satellites in orbit before 2030. Sentinel-1 satellites provide a unique set of high-resolution, all-weather, day and night radar images to be used for land and ocean

monitoring. Sentinel-1B reached orbit in 2016. Sentinel-2 satellites provide data based on their multi-spectral optical sensor, while Sentinel-3 satellites carry a suite of optical and radar instruments for land, ocean and atmospheric applications. The two constellations were placed in orbit between 2015 and 2018. Sentinel-5P and its atmospheric composition sensor was launched in 2017. The other Sentinel missions (Sentinel-4, Sentinel-5 and Sentinel-6) will be launched within the next years and will be progressively covering all domains of Earth Observation.



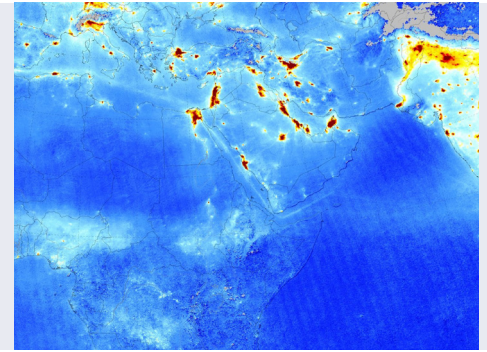
Mont Saint-Michel, France - Copernicus Sentinel-2 data (2018).



Geba River Estuary and Bissagos Islands in Guinea-Bissau – Copernicus Sentinel-2 data (2018) processed by Pierre Markuse



Santa Vitória e Mombeja and Beja in Portugal – Copernicus Sentinel-2 data (2018)



Europe, Africa, Middle East and India – Copernicus Sentinel-5P data (2018) processed by KNMI

Copernicus also collects information from *in situ* sensors such as ground stations, which deliver data acquired by a multitude of sensors on the ground, at sea or in the air. These data come from European and non-European organisations and from Member States. Copernicus monitors: it stores the information and keeps track of changes or recurring phenomena. This constitutes a large amount of reliable and up-to-date information on the status of our planet. Copernicus analyses: the data is analysed in a way that generates indicators useful for researchers and end users, providing information on past, present and future trends. They can analyse, for example, the air quality in our cities and detect visible and noticeable increases in air pollution (smoke, dust, smog) or analyse the rise in global sea levels.

What are the services?

The services address six thematic areas:

- An Atmosphere Monitoring Service fully operational since July 2015;
- A Marine Environment Monitoring Service fully operational since May 2015;
- A Land Monitoring Service fully operational since January 2013;
- A Climate Change Service fully operational since July 2018;
- An Emergency Management Service fully operational since April 2012;
- A Security Service operational since 2016.

What happens to the data?

The Copernicus system delivers data and information to Copernicus users, supplied on a long term and sustainable basis through a set of services and petabytes of Sentinel open data. The EC funds industry and public entities which provide these services. The information can be used by end users for a wide range of applications in a variety of areas. These include urban area management, sustainable development and nature protection, regional and local planning, agriculture, forestry and fisheries, health, civil protection, infrastructure, transport and mobility, as well as tourism.

What is the added-value of the Copernicus System?

- Guarantee of service, providing global spatial coverage;
- Near-real time data provided to end users;
- Integration of the data (space and *in situ*) and analyses;
- High resolution images;
- Regular and systematic validation of data;
- Reduced reaction time to enable better response to man-made or natural disasters;
- Global/Pan European Approach to Earth monitoring.

The Copernicus data policy promotes the access, use and sharing of Copernicus information and data on a full, free and open basis

There is no restriction on use or reproduction and redistribution, with or without adaptation,

for commercial or non-commercial purposes. This data policy applies to the data and information generated within the Copernicus programme, i.e., Sentinel mission data and Copernicus service information.

How does Copernicus help the citizens of Europe?

Copernicus is the concrete realisation of the European idea of providing our citizens with new public services on both a European and global scale. By investing in Earth monitoring and observation systems and networks, which monitor and forecast the state of the environment on land, sea and in the atmosphere, we are now better able to understand our planet, protect and sustain our environment and feel more safe and secure.

Copernicus in Action (examples)

- The Marine Environment Monitoring Service provided data to the Italian authorities supporting oil spill scenario calculations during the parbuckling of Costa Concordia;
- During the terrible forest fires in Sweden in July 2018, the Emergency Management Service provided reference maps and forest fires delineation of the affected areas;
- Copernicus also plays an important role in creating business opportunities for small and medium-sized enterprises, which create jobs and growth. It is estimated that the programme could result in some 48,000 direct and indirect jobs being created over the period 2015-2030.