



European Space Agency



sentinel-3

→ A BIGGER PICTURE
FOR COPERNICUS

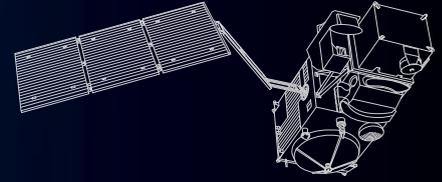


→ SATELLITES TO SERVE

By providing a set of key information services for a wide range of practical applications, Europe's Copernicus programme has been put in place to make a step change in the way we manage our environment, understand and tackle the effects of climate change, and safeguard everyday lives. ESA is developing a fleet of innovative satellite missions – the Sentinels – to provide the accurate data and imagery that is central to this ambitious initiative.

→ BUILT TO DELIVER

While Sentinel-3 provides improved continuity of satellites such as Envisat and Spot, its wide-swath coverage data and multiple instruments measuring the same place at the same time means that this new mission is set to be the workhorse for Copernicus. The mission is the result of close collaboration between ESA, the European Commission, Eumetsat, France's CNES space agency, industry, service providers and data users. The two Sentinel-3 satellites have been designed and built by a consortium of around 100 companies under the leadership of Thales Alenia Space, France.



→ THE BIG PICTURE

Carrying a suite of state-of-the-art instruments, Sentinel-3 is the most complex of all the Sentinel missions. It will systematically measure Earth's oceans, land, ice and atmosphere to monitor and understand large-scale global dynamics. It will provide critical near-realtime information for ocean and weather forecasting. This broad scope of data will allow European environmental policies to be administered with confidence.

→ IN PARTNERSHIP

The European Commission leads Copernicus. ESA is responsible for the space component, which includes the Sentinel satellites, contributing missions from other space agencies and third-party mission operators, a network of receiving stations and centres through which the data are made available. In the case of Sentinel-3, once the satellite is commissioned, it will be handed to Eumetsat to operate. ESA and Eumetsat manage the mission jointly, where ESA produces land products and Eumetsat marine products for application through the Copernicus services. Data from the Sentinels are used worldwide and are free of charge.

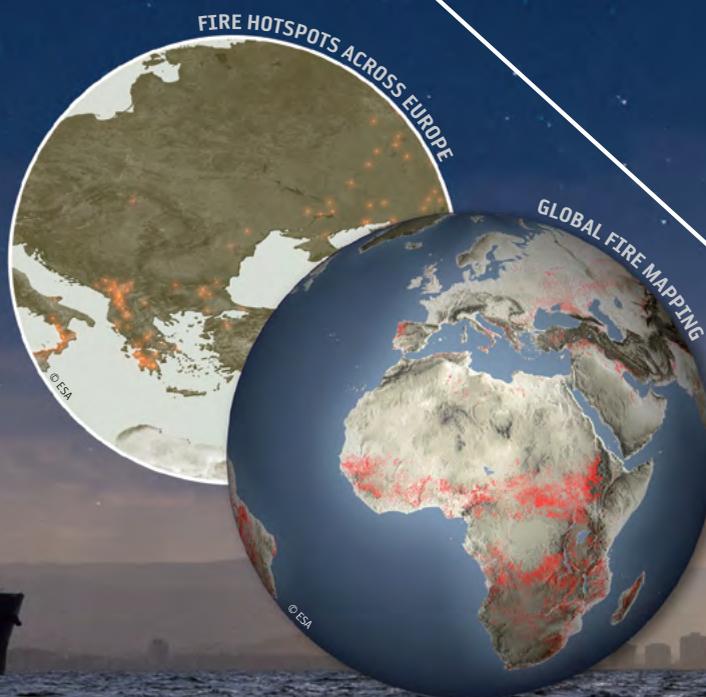
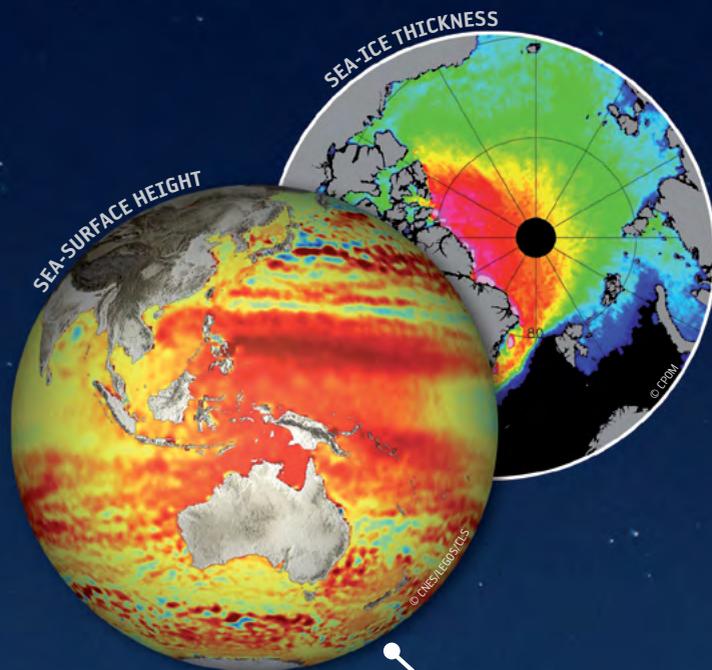
→ NEXT-GENERATION TECHNOLOGY

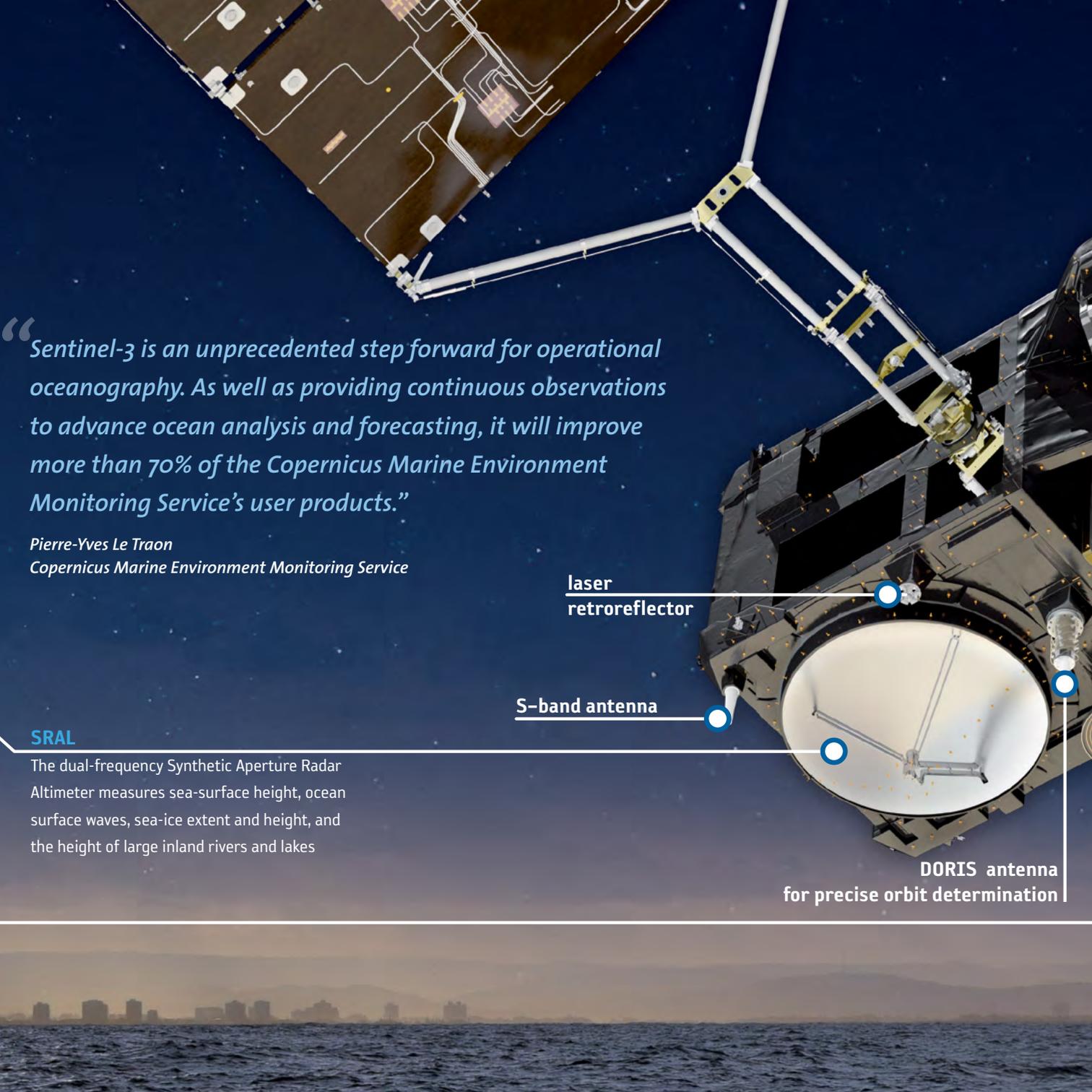
Sentinel-3 carries a precision synthetic aperture radar altimeter, an advanced infrared scanning radiometer, a wide-swath ocean and land imaging spectrometer and a microwave radiometer. These all build on the highly successful instruments carried on the Envisat and CryoSat satellites. This new generation of instruments will bring new data products to monitor our changing world so that informed decisions can be made. The mission is based on a constellation of twin satellites providing global coverage and optimal data delivery.

→ OCEANS OF CHANGE

The oceans are intrinsically linked to our weather and climate, are essential for global transport and provide a wealth of resources. Supplying a new generation of data products, Sentinel-3 is at the heart of operational oceanography. For example, its imaging spectrometer provides biogeochemical measurements to monitor the health of our oceans and its radar altimeter delivers measurements to derive ocean flow and surface waves, essential for safe marine operations. The mission will monitor sea-level change and diminishing Arctic sea ice.

The benefit Sentinel-3 will bring to practical applications is coupled with the new scientific understanding that will develop in unison – this will not only improve the way the data are used, but will also increase our understanding of our Earth system.





“Sentinel-3 is an unprecedented step forward for operational oceanography. As well as providing continuous observations to advance ocean analysis and forecasting, it will improve more than 70% of the Copernicus Marine Environment Monitoring Service’s user products.”

Pierre-Yves Le Traon
Copernicus Marine Environment Monitoring Service

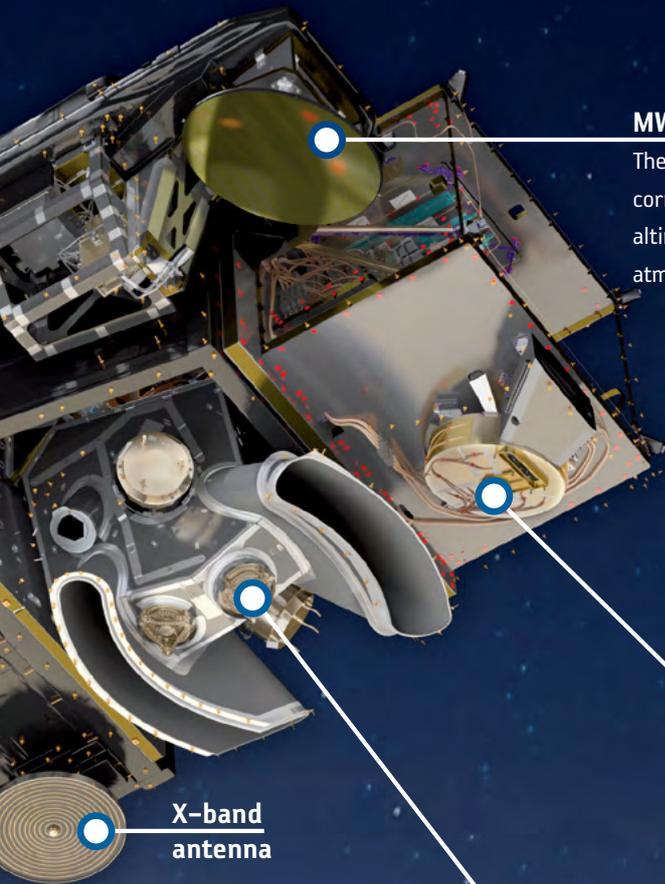
laser
retroreflector

S-band antenna

DORIS antenna
for precise orbit determination

SRAL

The dual-frequency Synthetic Aperture Radar Altimeter measures sea-surface height, ocean surface waves, sea-ice extent and height, and the height of large inland rivers and lakes



MWR

The Microwave Radiometer is used to correct measurements from the radar altimeter affected by water vapour in the atmosphere

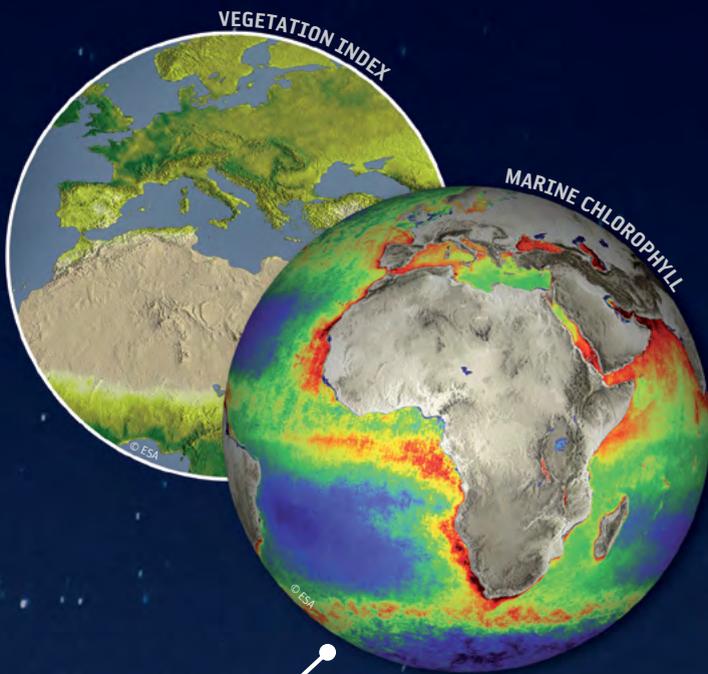
OLCI

The Ocean and Land Colour Instrument has 21 bands and a spatial resolution of 300 m per pixel to map changing land cover and to monitor ocean biology and water quality

X-band antenna

SLSTR

The Sea and Land Surface Temperature Radiometer delivers very accurate temperature measurements of Earth's surface at 1000 m resolution and includes two channels for monitoring wildfires



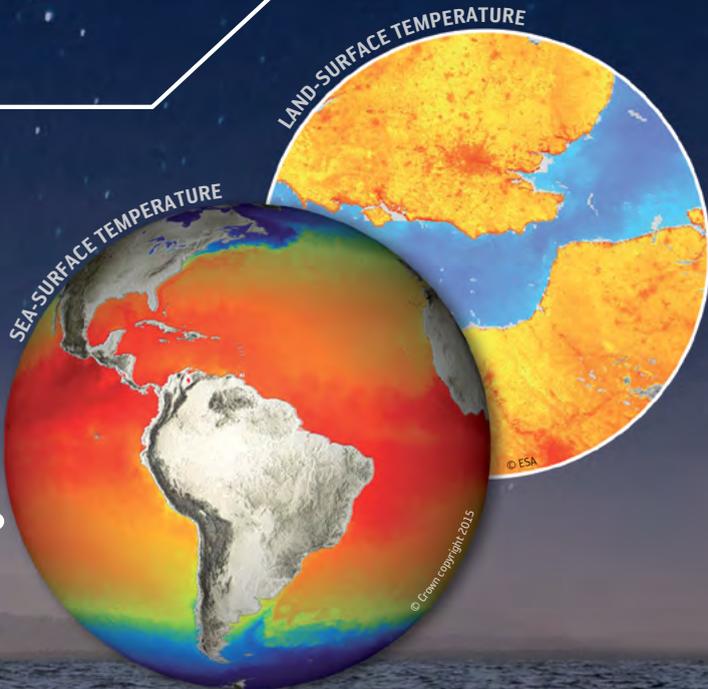
→ COLOUR OF LIFE

Primary productivity in the oceans forms the basis of marine life and also plays a role in the carbon cycle. While important for the marine food chain, some algae blooms can be toxic to humans, marine ecosystems and fisheries. The imaging spectrometer instrument on Sentinel-3 will monitor aquatic biological productivity and marine pollution. The same instrument can measure differences in the 'colour' of the land, allowing scientists to monitor the way land is being used and helping resource managers to plan. It also provides indices on the health of our vegetation, which is essential for agricultural practices and food production.

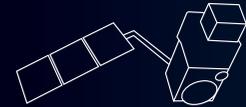
→ FEELING THE HEAT

The temperature of the sea surface influences the weather and climate as well as ocean circulation patterns. For example, every few years a large swath of the Pacific Ocean along the equator warms, giving rise to El Niño, which alters rainfall patterns around the world. Sentinel-3's infrared radiometer will provide precise global maps of sea-surface temperature for monitoring climate change, and ocean and weather forecasting. Over land, the instrument will be used, for example, to monitor urban heat islands, which is useful for planning authorities and healthcare systems.

The instrument also includes specific channels for tracking wildfires. This information will be used by weather and climate services for avoidance strategies and relief efforts.



FACTS AND FIGURES



launcher	Sentinel-3A: Rocket from Plesetsk, Russia Sentinel-3B: Vega from Kourou, French Guiana
orbit	Polar, Sun-synchronous at altitude of 814.5 km
revisit time	Systematic global coverage of all surfaces: SLSTR ~1 day, OLCI ~2 days, SRAL 57 km ground track separation after 27 days (at the equator), all cases using two-satellite constellation separated by 180° in the same orbit
life	Minimum of seven years (consumables for 12 years)
satellite	2.2 m long, 2.2 m wide, 3.7 m high and a mass of 1150 kg (including 130 kg fuel)
instrument	Ocean and Land Colour Instrument (OLCI) covering 21 spectral bands (400–1020 nm) with a swath width of 1270 km Sea and Land Surface Temperature Radiometer (SLSTR) covering 9 spectral bands (550–12 000 nm), dual-view scan with swath widths of 1420 km (nadir) and 750 km (oblique view) Synthetic Aperture Radar Altimeter (SRAL) Ku-band (300 m after SAR processing) and C-band Microwave Radiometer (MWR) dual-frequency at 23.8 & 36.5 GHz
receiving stations	Scientific data: transmitted to core Sentinel ground stations Telemetry data: transmitted to and from Kiruna ground station in Sweden
main applications	Sea-level change, sea-surface temperature and sea-ice monitoring; water-quality management; numerical ocean prediction; land-cover mapping; vegetation-health, glacier, water-resource monitoring; wildfire detection, numerical weather prediction
mission	Developed by ESA, jointly operated by ESA and Eumetsat
prime contractors	Thales Alenia Space France for satellite, OLCI & SRAL; Selex ES Italy for SLSTR; EADS-CASA for MWR
funding	ESA Member States and EU
data access	sentinels.copernicus.eu

www.esa.int/sentinel-3

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