European Commission

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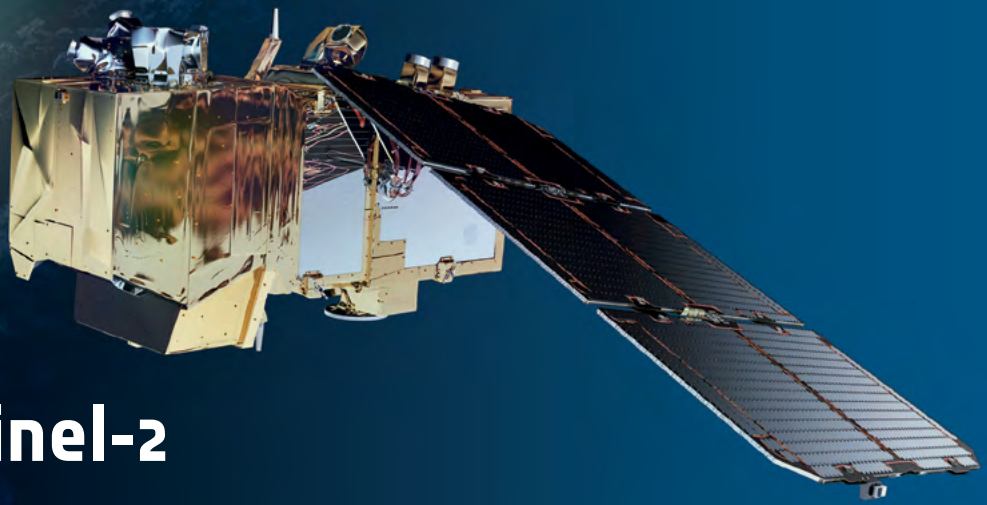


sentinel-2

→ COLOUR VISION FOR COPERNICUS

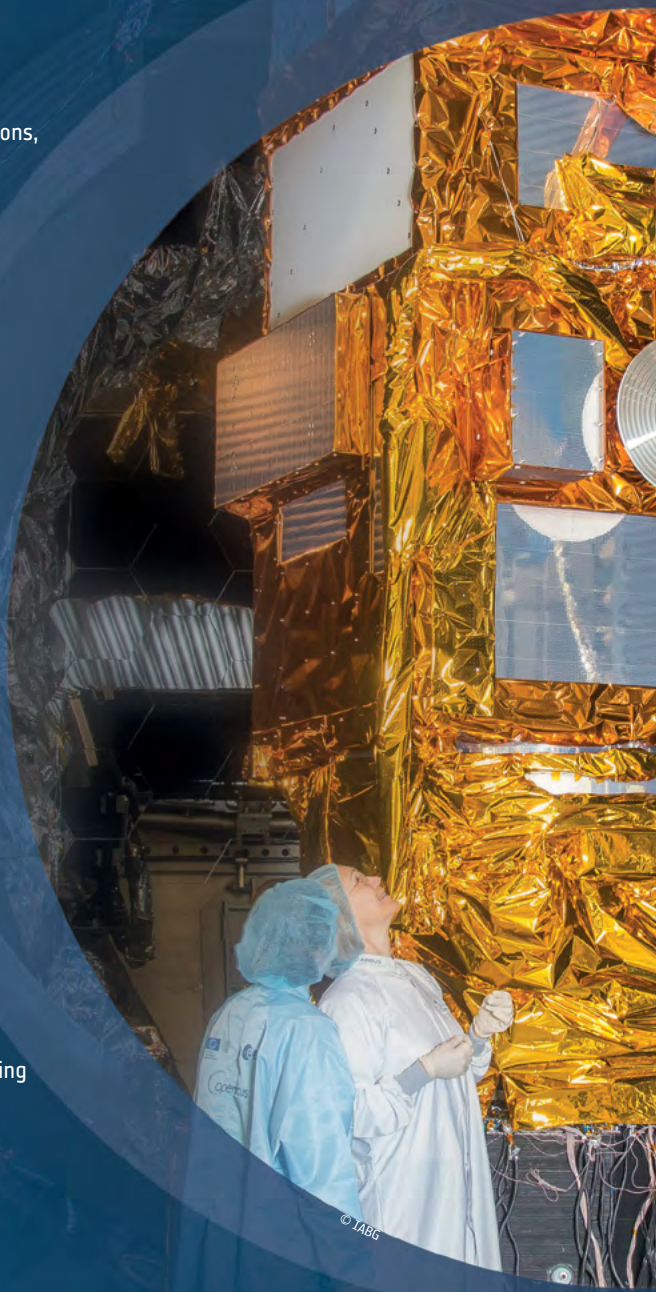
→ SATELLITES TO SERVE

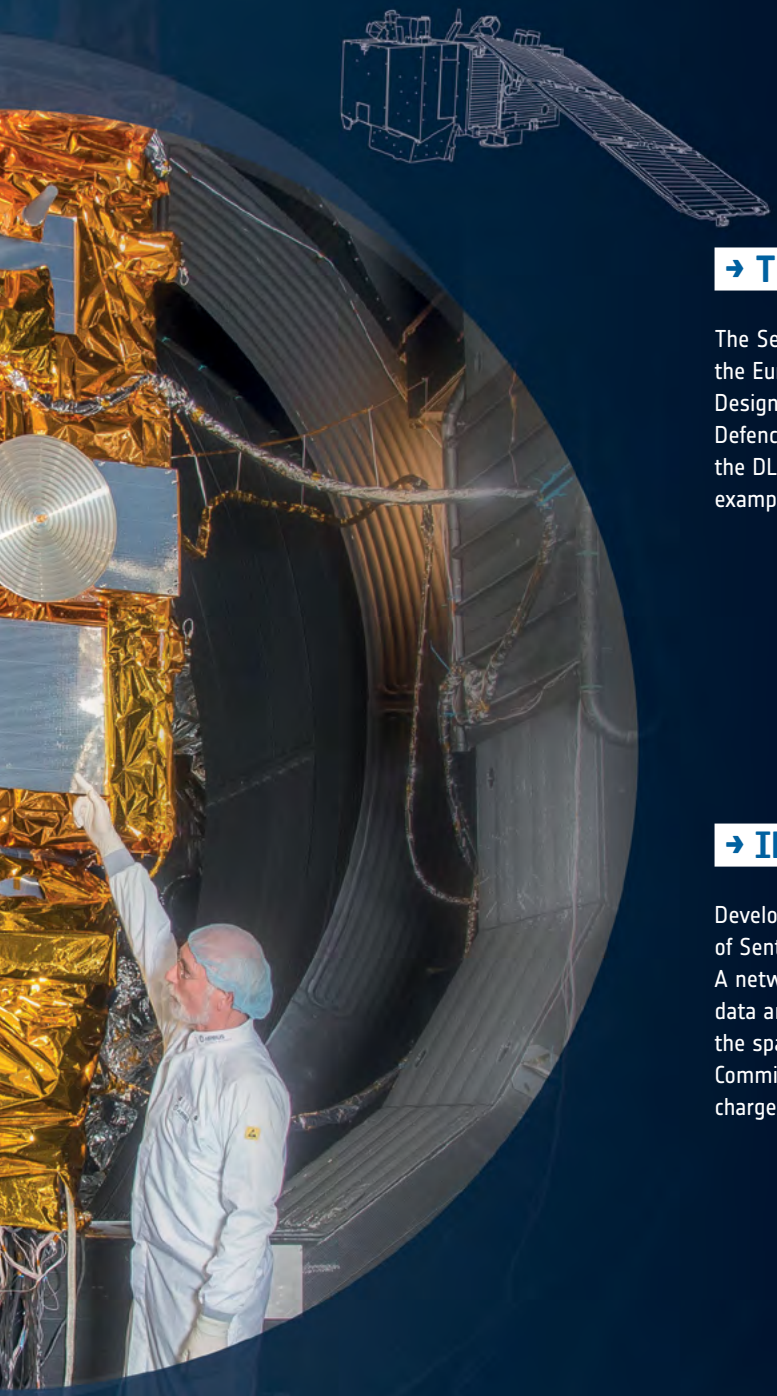
By providing a set of key information services for a wide range of practical applications, Europe's Copernicus programme is providing a step change in the way we manage our environment, understand and tackle the effects of climate change, and safeguard everyday lives. Since the provision of accurate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

→ A NEW ERA

Following on from the Sentinel-1 radar satellite launched in 2014, Sentinel-2 is the next in this suite of missions to take environmental monitoring into a new era. Offering 'colour vision' for Copernicus, Sentinel-2 combines high-resolution and multispectral capabilities with frequent revisits to deliver views of Earth's changing lands in unprecedented detail.

Delivering timely information for numerous practical applications, from monitoring the health of the world's vegetation and changes in the way land is used, to mapping regions struck by natural disaster, Sentinel-2 plays a vital role in Copernicus.





→ THE POWER OF TEAMWORK

The Sentinel-2 mission is the result of close collaboration between ESA, the European Commission, industry, service providers and data users. Designed and built by a consortium of about 60 companies led by Airbus Defence and Space, and supported by France's CNES space agency and the DLR German Aerospace Center, this new mission is an outstanding example of Europe's technological excellence.

→ IN PARTNERSHIP

Developed by ESA, the Copernicus space component includes the family of Sentinel satellites and contributing missions from other space agencies. A network of receiving stations and processing centres, through which the data are streamed and made available for the Copernicus services, supports the space component. The Copernicus services are managed by the European Commission. Data from the Sentinels are used worldwide and are free of charge.

→ VEGETATION IN FOCUS

Ensuring that land is used sustainably while meeting the food and wood demands of a growing global population is one of today's biggest challenges. Sentinel-2 provides accurate information about plant health so that informed decisions can be made.

Images from the satellite's multispectral instrument will be used to distinguish between different crop types and determine numerous plant indices such as leaf area index, leaf chlorophyll content and leaf water content – all are essential for monitoring plant growth accurately.

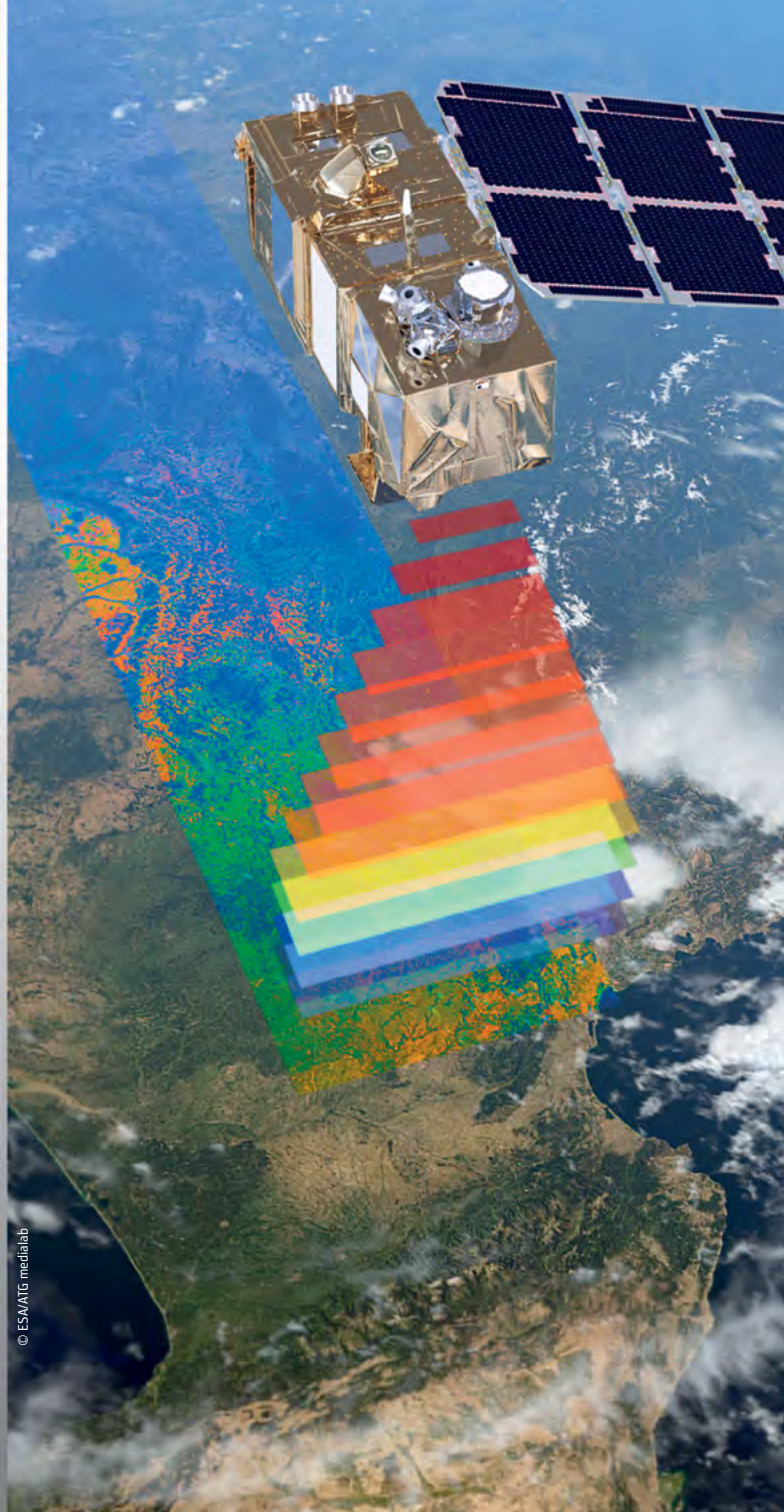
This kind of information is indispensable for precision farming. For example, helping farmers decide how best to nurture their crops and predict yield. While this has obvious economic benefits, it is also vital for developing countries where food security is at risk.

→ LEADING EDGE

The multispectral imager's array of 13 spectral bands, from the visible and the near-infrared to the shortwave infrared at different spatial resolutions ranging from 10 m to 60 m takes land monitoring to an unprecedented level.

Ensuring continuity with missions such as Spot-5, the four bands at 10 m resolution provide observations for basic land cover, while the six bands at 20 m resolution allow different plant indices to be measured. Bands at 60 m are used mainly for atmospheric correction and cirrus cloud screening.

Moreover, Sentinel-2 is the first Earth observation optical mission of its kind to include three bands in the 'red edge', which provide key evidence on the state of vegetation.



"Sentinel-2 is set to revolutionise Earth observation, providing free and open access to global high-resolution data. The ability to monitor the dynamics of delicate ecosystems will be transformed, bringing particular benefits to countries most at risk. FAO will make significant use of this new data flow."

John Latham
UN Food & Agriculture Organization

→ WIDE VIEW

As well as imaging in high resolution and in different wavelengths, the key to assessing change in vegetation is to image the same place frequently. The Sentinel-2 mission is based on a constellation of two satellites orbiting 180° apart, which along with their 290 km-wide swaths, allows Earth's main land surfaces, large islands, and inland and coastal waters to be covered every five days. This is a significant improvement on earlier missions in the probability of gaining a cloud-free look at a particular location, making it easier to monitor changes in plant health and growth.

In addition to transmitting data to a number of ground stations for rapid dissemination, Sentinel-2 also carries a laser to transmit data to the geostationary European Data Relay System for continual data delivery.

→ TRACKING CHANGE

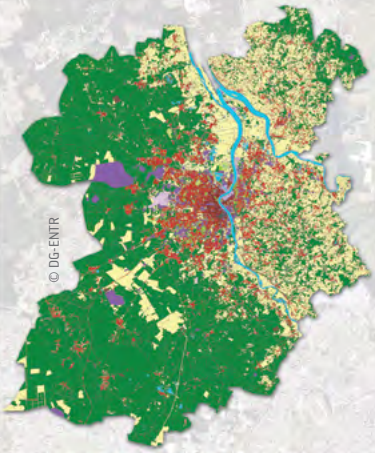
As well as offering new detail on vegetation, Sentinel-2 will play a key role in providing information to map land cover so that changes in the way land is being used can be monitored. This includes tracking tree-cover density and distinguishing between different types of forest, which is particularly useful for monitoring deforestation and mapping areas damaged by fire.

A growing global population also means that cities are expanding. Urbanisation is leading to an increase in soil sealing, fragmentation of habitats and health-related issues. Information from Sentinel-2 allows urban growth to be monitored accurately around the world, providing essential information to urban planners and decision-makers.

This multitalented mission will also provide high-resolution images of pollution in lakes and coastal waters. Frequent coverage is also fundamental to monitoring floods, volcanic eruptions and landslides. This allows Sentinel-2 to contribute to disaster mapping and to support humanitarian aid.

SEEING RED

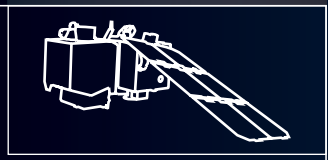
Capturing an area east of Lake Constance in Germany, this infrared image simulates detail at 10 m resolution. It shows differences in vegetation, with dark red to light green depicting high to low chlorophyll content, respectively.



MAPPING URBAN GROWTH

Land-cover maps are produced using high-resolution satellite imagery. The image shows Bordeaux in France and is featured in the European Urban Atlas as part of the Copernicus land monitoring service.

FACTS AND FIGURES



launch	Sentinel-2A in 2015, Sentinel-2B in 2016
launcher	Sentinel-2A: Vega rocket from Kourou, French Guiana Sentinel-2B: Rockot rocket from Plesetsk, Russia
orbit	Polar, Sun-synchronous at an altitude of 786 km
revisit time	Five days (at equator) from two-satellite constellation
life	Minimum of seven years
satellite	3.4 m long, 1.8 m wide, 2.35 m high with a 2.2 × 4.1 m solar array
mass	1140 kg (including 123 kg fuel)
instrument	Multispectral imager (MSI) covering 13 spectral bands (443–2190 nm) with a swath width of 290 km and spatial resolutions of 10 m (4 visible and near-infrared bands), 20 m (6 shortwave-infrared bands) and 60 m (3 atmospheric correction bands)
receiving stations	MSI data: transmitted to core Sentinel ground stations and via laser link through the European Data Relay System Telemetry data: transmitted to and from Kiruna, Sweden
main applications	Monitoring agriculture, forests, land-use change, land-cover change; mapping biophysical variables such as leaf chlorophyll content, leaf water content, leaf area index; monitoring coastal and inland waters; risk mapping and disaster mapping
mission	Developed, operated and managed by various ESA establishments
funding	ESA Member States and the EU
prime contractors	Airbus Defence and Space Germany for the satellite, Airbus Defence and Space France for MSI
data access	sentinels.copernicus.eu

www.esa.int/sentinel-2

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