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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.

**FACTS AND FIGURES**

**Sentinel-2A in 2015, Sentinel-2B in 2016**

**Sentinel-2A**: Vega rocket from Kourou, French Guiana

**Sentinel-2B**: Rockot rocket from Plesetsk, Russia

**Polar, Sun-synchronous at an altitude of 786 km**

**Five days (at equator) from two-satellite constellation**

**Minimum of seven years**

**3.4 m long, 1.8 m wide, 2.35 m high with a 2.2 × 4.1 m solar array**

**1140 kg (including 123 kg fuel)**

**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)**

**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

**Developed, operated and managed by various ESA establishments**

**ESA Member States and the EU**

**Prime contractors**

- Airbus Defence and Space Germany for the satellite, Airbus Defence and Space France for the MSI

**www.sentinel-2.com**

**An ESA Communications Production**


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- **sentinels.copernicus.eu**
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. 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.

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.

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 scarcity is an intractable problem.

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. 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.
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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.”
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