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Copernicus is the European Union's revolutionary Earth observation and monitoring program, looking at our planet and its environment for the ultimate benefit of all European citizens.

Thanks to a variety of technologies, from satellites in space to measurement systems on the ground, in the sea, and in the air, Copernicus delivers operational data and information services in six thematic areas: Land, marine, atmosphere, climate change, emergency management and security.

They cover a wide range of applications including environmental protection, management of urban areas, regional and local planning, agriculture, forestry, fisheries, health, transport, climate change, sustainable development, civil protection and tourism.

The development of the observation infrastructure is performed under the aegis of the European Space Agency for the space component and under the European Environment Agency and the member states for the in situ component.

Teledyne e2v is contributing to the Copernicus program with the design of high performance hyperspectral imaging sensors, which are on board a number of instruments in the Earth observation satellites.



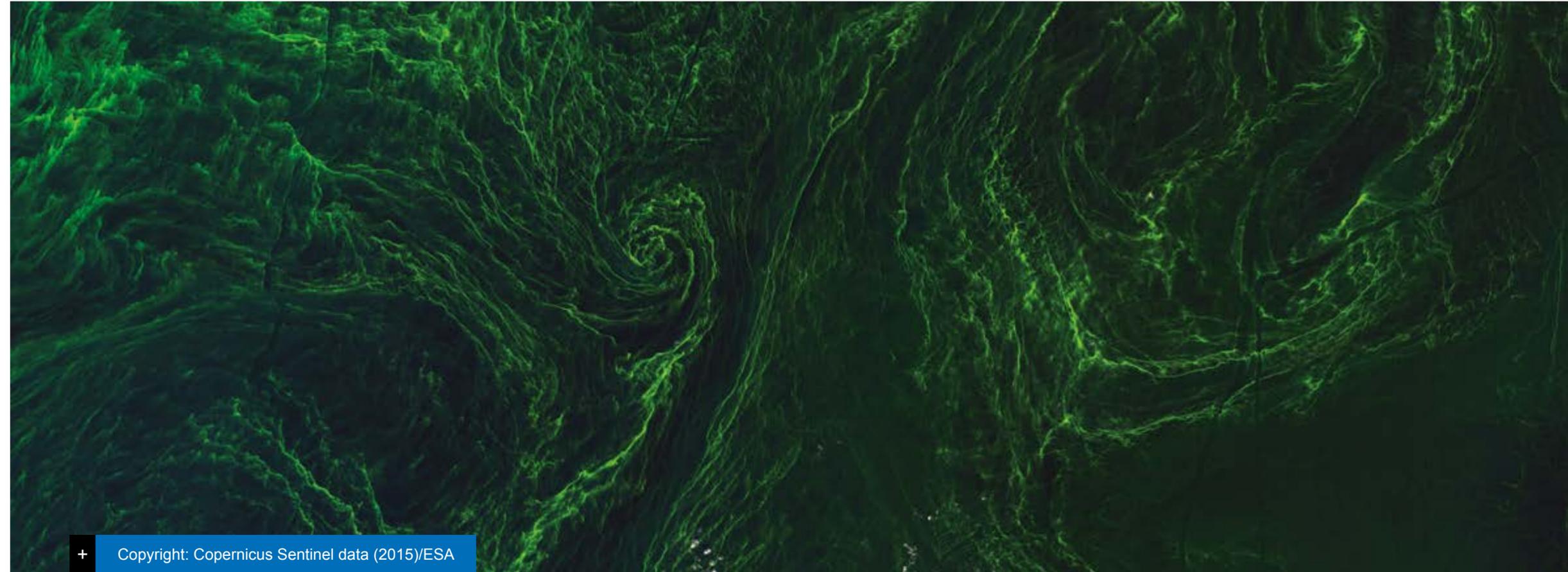
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Copernicus program

Teledyne e2v inside the sentinel satellites



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Mission: ESA's Sentinel 2 satellites

Objective: Polar-orbiting, multispectral high-resolution imaging mission for land and sea monitoring

Teledyne e2v sensor: CMOS sensors on Multispectral Instrument (MSI)

Date of launch Sentinel 2A: June 2015

Date of launch Sentinel 2B: March 2017

More on Teledyne e2v supply: Teledyne e2v utilized its space-dedicated manufacturing capabilities to package, space qualify and deliver 'flight model' CMOS sensors to Airbus Defense and Space, which designed the imaging device.

The instrument is covering 13 spectral bands (443nm–2190nm) with a swath width of 290km and spatial resolutions ranging from 10m to 60m.

Mission: ESA's Sentinel 3 satellites

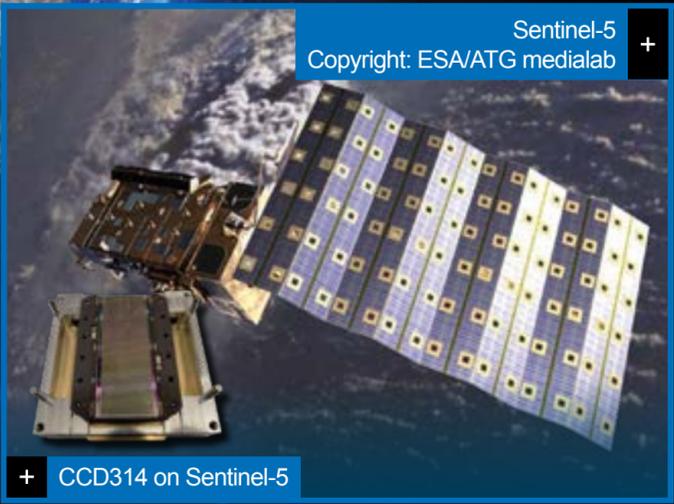
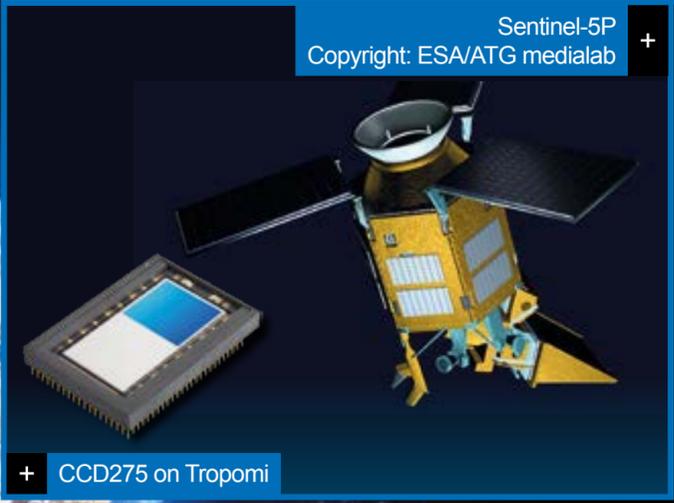
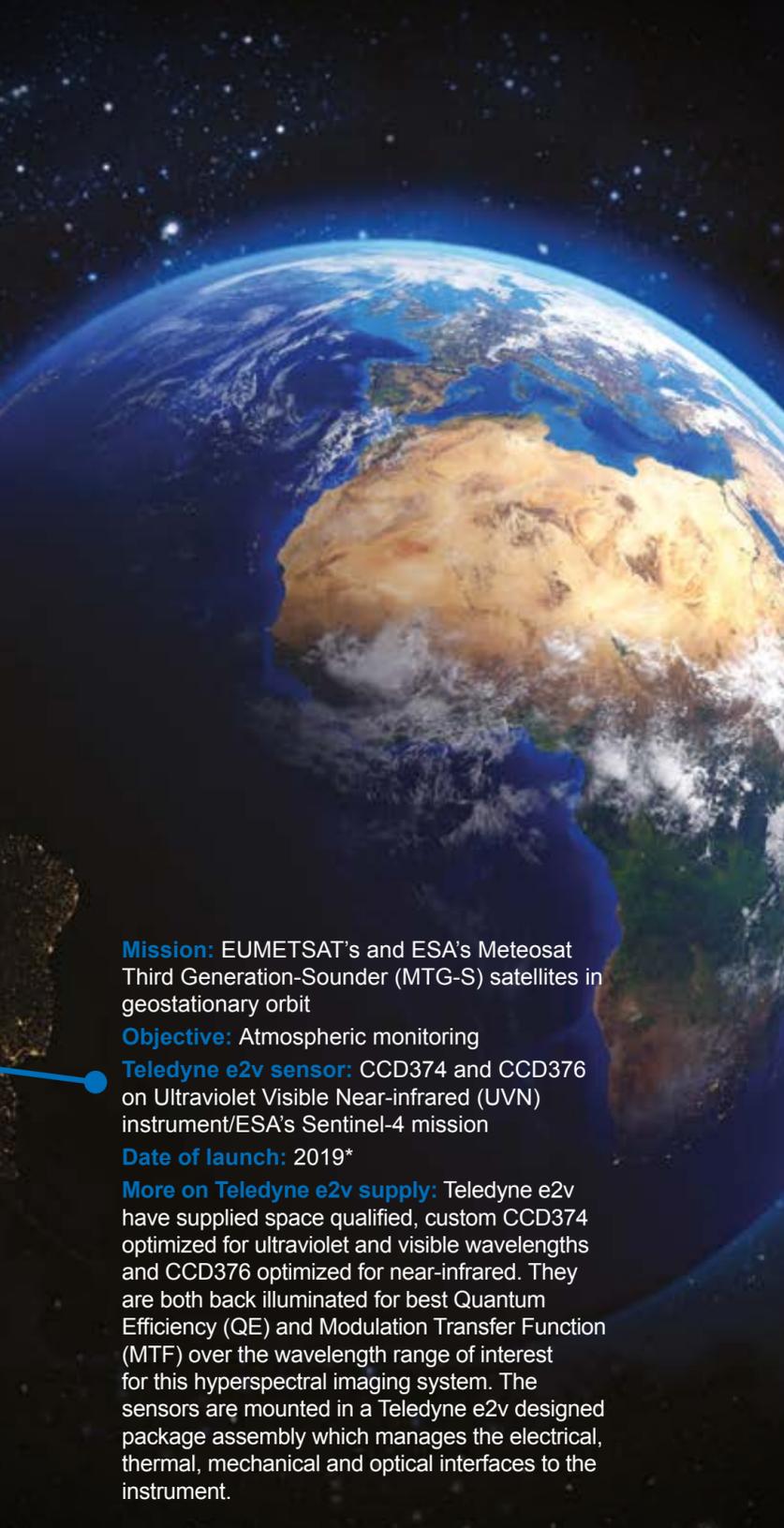
Objective: Multi-instrument mission to support ocean forecasting systems, as well as environmental and climate monitoring

Teledyne e2v sensor: CCD55-20 on Ocean and Land Color Instrument (OLCI)

Date of launch Sentinel 3A: February 2016

Date of launch Sentinel 3B: April 2018

More on Teledyne e2v supply: Teledyne e2v delivered CCD55-20, a high-performance, back-illuminated frame transfer CCD image sensor optimized for hyperspectral imaging. The instrument has a spatial resolution of 300m for all measurements and a swath width of 1270km. The optimized CCD includes the use of a 'gated dump drain' allowing the readout of selected image lines and the dumping of unwanted data. It also includes the use of graded thickness anti-reflection coating to minimize sun-glint, giving the minimum possible reflection from the silicon surface for all targeted wavelengths.



Mission: EUMETSAT's and ESA's Meteosat Third Generation-Sounder (MTG-S) satellites in geostationary orbit

Objective: Atmospheric monitoring

Teledyne e2v sensor: CCD374 and CCD376 on Ultraviolet Visible Near-infrared (UVN) instrument/ESA's Sentinel-4 mission

Date of launch: 2019*

More on Teledyne e2v supply: Teledyne e2v have supplied space qualified, custom CCD374 optimized for ultraviolet and visible wavelengths and CCD376 optimized for near-infrared. They are both back illuminated for best Quantum Efficiency (QE) and Modulation Transfer Function (MTF) over the wavelength range of interest for this hyperspectral imaging system. The sensors are mounted in a Teledyne e2v designed package assembly which manages the electrical, thermal, mechanical and optical interfaces to the instrument.

Mission: ESA's and Netherlands Space Office (NSO) Sentinel-5P

Objective: Atmospheric monitoring and reducing data gaps between Envisat (in particular the Sciamachy instrument) and the launch of Sentinel-5

Teledyne e2v sensor: CCD275-42 on TROPospheric Monitoring Instrument (TROPOMI)

Date of launch: October 2017

More on Teledyne e2v supply: Teledyne e2v delivered CCD275-42 for TROPOMI, an advanced spectrometer for the operational monitoring of air quality, ozone and surface. The back illuminated CCD is optimized for different wavelengths, from ultraviolet and visible to near-infrared. It covers 7x7km^2 ground with a spectral range from 270–495nm to 710–775nm. The sensor is optimized for high frame transfer rates to reduce image smearing and it's delivered in a special ceramic package.

Mission: EUMETSAT's and ESA's MetOp Second Generation satellite, a payload that will monitor the atmosphere from polar orbit

Objective: Air quality monitoring, stratospheric ozone monitoring, solar radiation measurements and climate monitoring

Teledyne e2v sensor: CCD314 on Ultraviolet Visible Near-infrared Shortwave (UVNS) instrument/ESA's Sentinel-5

Date of launch: 2021

More on Teledyne e2v supply: Teledyne e2v have supplied CCD314 optimized for this particular instrument design, covering different wavelength from the ultraviolet to visible and near-infrared (270nm–733nm).

Its spatial resolution is below 8km for wavelengths above 300nm. Its operating frequencies fit the optical requirements of the instrument in terms of large pixels for good signal-to-noise ratio.

*Launch dates estimated at time of print and subject to change