First Copernicus satellite exceeds design working life

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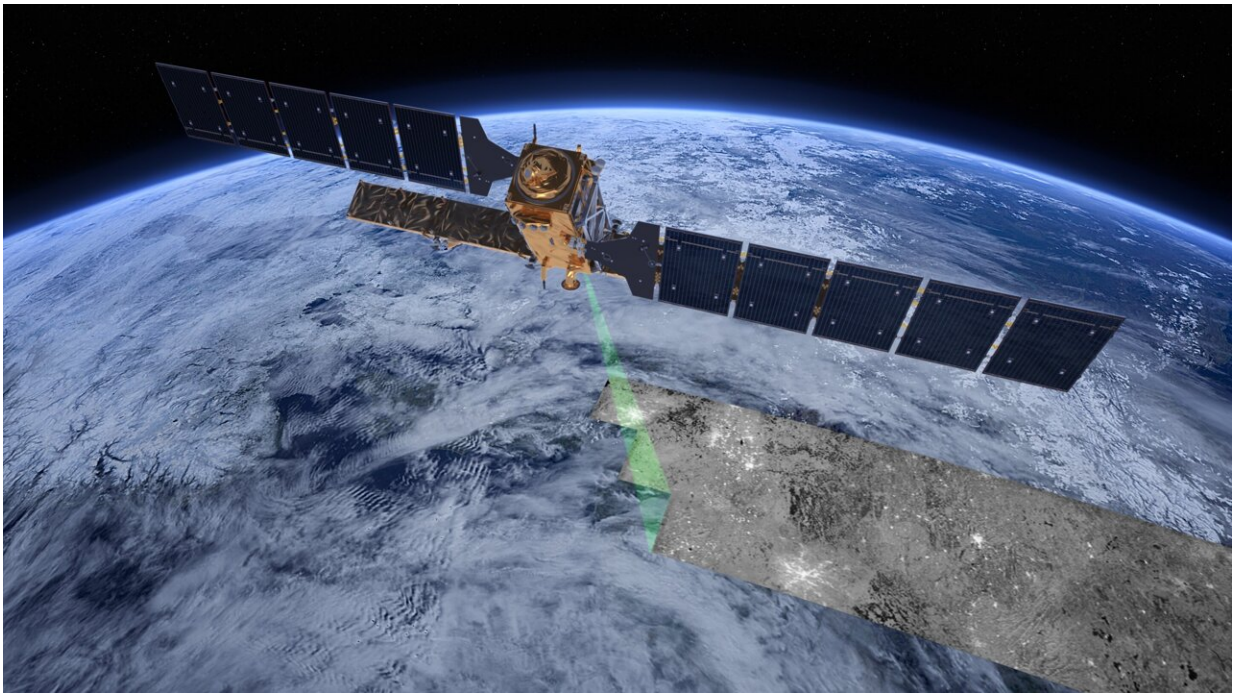


Sentinel-1 carries an advanced synthetic aperture radar that works in several specialised modes to provide detailed imagery for Europe's Copernicus programme. These data will be used for applications such as monitoring the oceans, including shipping lanes, sea ice and oil spills. It also provides data to map changing land cover, ground deformation, ice shelves and glaciers, and can be used to help emergency response when disasters such as floods strike and to support humanitarian relief efforts at times of crisis. Credit: ESA/ATG medialab

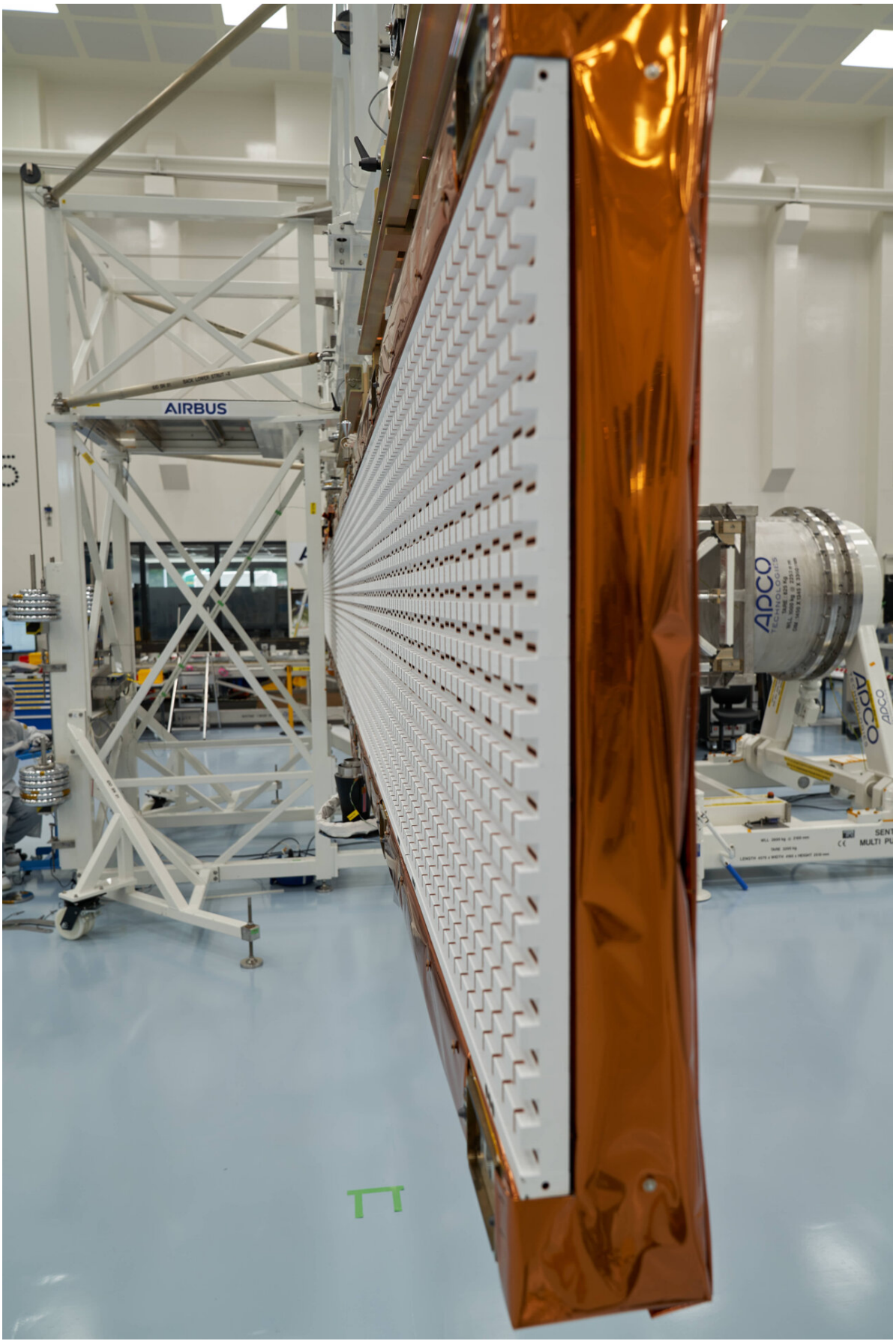
This week marks seven years since the very first satellite that ESA built for the European Union's Copernicus program started delivering data to monitor the environment. The Sentinel-1A satellite has shed new light on our changing world and has been key to supplying a wealth of radar imagery to aid disaster response. While this remarkable satellite may have been designed for an operational life of seven years, it is still going strong and fully expected to be in service for several years to come.

Launched on 3 April 2014 and delivering a stream of operational data by the beginning October 2014, Copernicus Sentinel-1A marked a new era in global environmental monitoring. Carrying the latest radar technology to provide an all-weather, day-and-night supply of imagery of Earth's surface, this new mission not only raised the bar for spaceborne radar, but also set the stage for Europe's Copernicus program.

Copernicus has been the largest provider of Earth observation data in the world for some years now. The suite of Sentinel missions in orbit delivering complementary data and the range of services offered through Copernicus help address some of today's toughest environmental challenges such as food security, rising sea levels, diminishing ice, natural disasters, and the overarching issue of the climate crisis.

"It is with great pride that we see the first satellite ESA built for Copernicus pass its all-important seven-year operational life expectancy," said ESA's Director General, Josef Aschbacher.

"We have another seven Copernicus Sentinel satellites currently in operation, all of which are surpassing expectations. With more missions in the pipeline and an ever-growing community using the Sentinel missions' free and open data, the approach of building a long-term reliable observing system is clearly paying off."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Copernicus Sentinel-1C is the third Sentinel-1 satellite. The three satellites are identical, each carrying an advanced radar instrument to provide an all-weather, day-and-night supply of imagery of Earth's surface. When deployed in space, the radar measures a whopping 12 meters. Because the radar is folded to fit into the rocket fairing for liftoff, the deployment mechanism must be thoroughly tested to ensure that all will be well once it is in space. To simulate this operation in as near realistic environment as is possible on Earth, the radar is hung from a structure that helps to mimic weightlessness. The deployment test not only enables the hardware needed for the deployment to be tested, but also allows for the antenna planarity and flatness to be measured when fully deployed. The tests were carried out at Airbus in Germany. Credit: Airbus

ESA's Acting Head of Earth Observation Programmes, Toni Tolker-Nielsen, added, "The Copernicus program as a whole is going to be even more relevant as the climate crisis takes a tighter hold. Information from satellites is indispensable in measuring progress towards climate goals set by the UN and the EC's Green Deal."

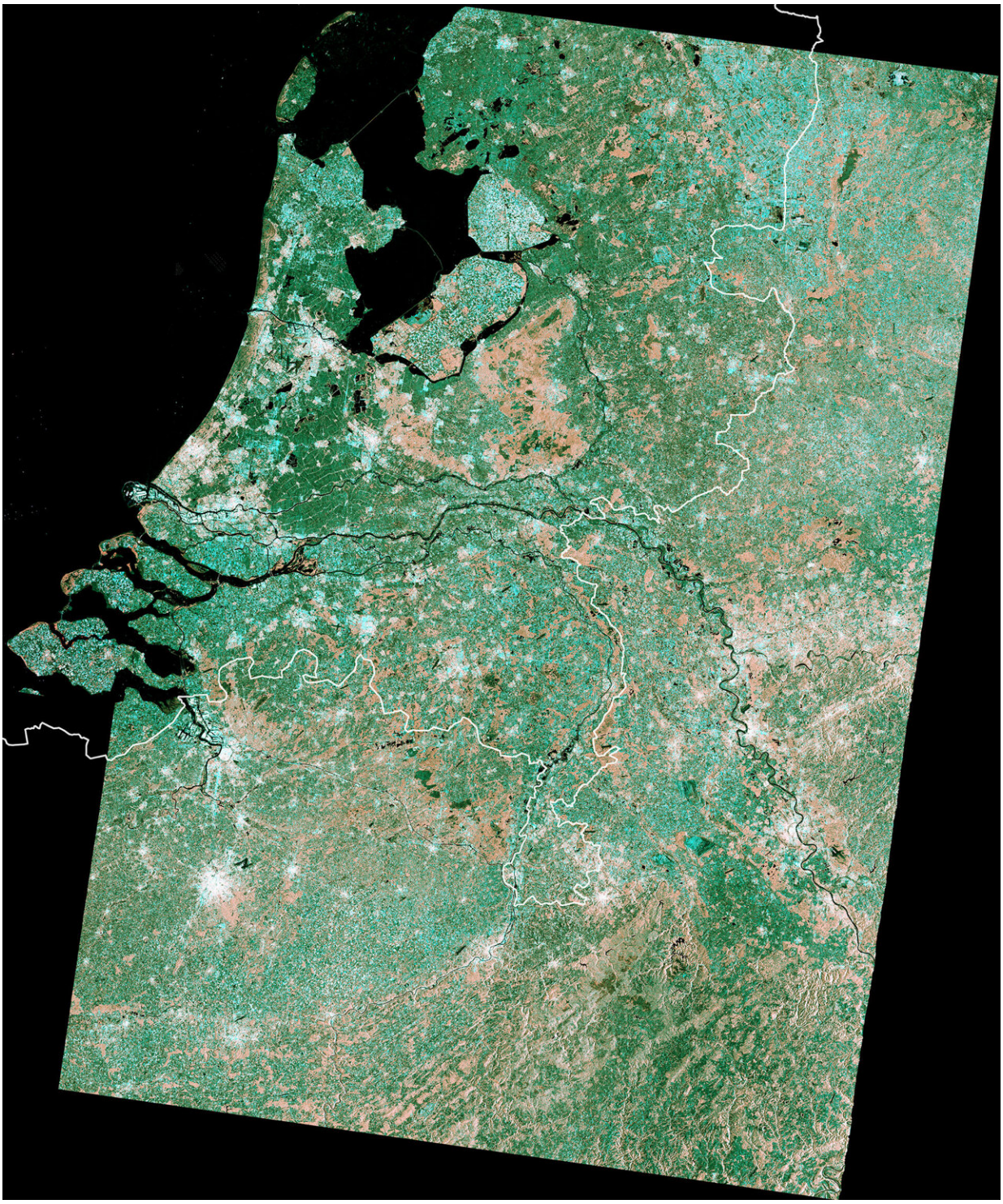
Mauro Facchini, Head of the Earth Observation Unit (DEFIS.C.3) at the European Commission, said, "The launch of Sentinel-1A has been historical for Copernicus—the start of the successful story of the family of Sentinel satellites serving Copernicus services and a huge number of users around the world with their data. The emphasis of the Copernicus program has always been on its operational nature, going far beyond the time frame of research activities. The fact that Sentinel-1A is exceeding its design lifetime in best health underpins that both, policy-makers and businesses can really rely on Copernicus data and information being provided continuously and in long term."

The Copernicus Sentinel-1 mission comprises two identical satellites

orbiting 180° apart to image the planet with a repeat frequency of six days, down to a daily coverage at high latitudes to support operational sea-ice monitoring. Sentinel-1B was launched in April 2016.

The mission benefits numerous services and applications, such as those that relate to Arctic sea-ice monitoring, iceberg tracking, routine sea-ice mapping, glacier-velocity monitoring, surveillance of the marine environment including oil-spill monitoring and ship detection for maritime security as well as illegal fisheries monitoring. It is also used for monitoring ground deformation resulting from subsidence, earthquakes and volcanoes, mapping for forest, water and soil management, and mapping to support humanitarian aid and crisis situations.

Over the last seven years, the mission has, for example, tracked the huge A-68 iceberg that calved from Antarctica and had a near-collision with South Georgia, has been used in synergy with the Copernicus Sentinel-2 optical mission to map crop types and with ESA's CryoSat to map ice loss from ice sheets and diminishing sea ice as well as ice lost from the world's glaciers.



This image is a mosaic based on Sentinel-1A satellite coverage of the Netherlands in three scans during March 2015. The Netherlands borders the North Sea to the north and west, Germany to the east, and Belgium to the south.

Credit: Copernicus Sentinel data (2015)/ESA

The mission has also been used to map subsidence and shifts in the ground following earthquakes, track surface wind speeds below tropical storms and hurricanes and been called upon through the Copernicus Emergency Mapping Services and the Disaster Charter to map floods at times of disaster.

Sentinel-1 data have also formed the basis for countless scientific papers that shed new light on how our planet functions. The list goes on.

With the mission designed to work as a pair of satellites, when the time does come for Sentinel-1A to retire, Sentinel-1C will take its place in orbit. The same goes for Sentinel-1B, which will eventually be replaced by Sentinel-1D. The latter two Sentinel-1 satellites will further improve performance and services with new instruments dedicated to marine applications.

To ensure the provision of data over next decades, the same approach is taken for the other Sentinel missions.

Looking even further ahead, it's all systems go as ESA and the European Commission are developing the next generation of Sentinels building on the newest technology developments. Not only will this ensure continuity of data that many users have come to rely on, but it will also lead to new users and applications.

Provided by European Space Agency