

## Summary

**Jean-Yves Le Gall**, Former President CNES, ESA Council and Arianespace/ Chair of the Strategic Oversight Council at Paris-Saclay University/ Member of the IAA and of several international public and private bodies active in the high-tech and space sectors, France, **addressed the importance of earth-observation satellites for climate monitoring.**

A network of about 200 satellites provides measurements of the temperature of the oceans, the land and the atmosphere. It was also satellites that proved that global temperature has risen at an unprecedented rate in the last century and is still rising.

In 1938, by collecting records from 147 weather stations, Guy Callendar discovered that the planet had warmed 0.3 degrees Celsius over the previous 50 years. But it was not until the advent of satellites 30-40 years ago that Callendar's measurements could be confirmed. Space science is important to track climate change—but it is also something rather new.

The first satellite providing accurate measurement of earth atmosphere temperature was NASA's Nimbus 3 launched in 1969. Today's satellites are much more capable and able to make extremely sophisticated measurements of a variety of climate-related variables. Sentinel satellites are part of Copernicus, the European earth observation programme. The instruments on board of the satellites are highly sophisticated and a lot of work goes into testing and calibrating these instruments to assure accuracy of the measurements. Today, satellites are becoming a kind of multipurpose climate observatory. Satellites can measure sea surface temperatures from 800 km away, collect data that are vital for understanding global warming but also to see the impact of net-zero policies on climate change.

Earth-observation satellites not only track global warming, they also help to fight climate change, for instance by monitoring wildfires. During the 2019/20 wildfires in Australia, scientists kept a close eye on near-real time satellite observations. In addition to the visible plumes of smoke, they also tracked gases of carbon monoxide and methane and were able to show that forest fires can have an effect on the air quality all around the world as the carbon monoxide plumes travelled all the way around the southern hemisphere, to South America and back to the west coast of Australia.

Satellites help detecting fires on the ground and satellite data can also be used to measure the health of forests. Earth-observation satellites have become an invaluable tool helping to preserve our planet and understand and fight climate change.