

## **Call for a sustainable future in space**

### **European conference on space debris, Darmstadt, Germany**

With more than 750 000 pieces of dangerous debris now orbiting Earth, the urgent need for coordinated international action to ensure the long-term sustainability of spaceflight was a major finding from Europe's largest-ever conference on space debris. This was reported toward the end of April by the European Space Agency, ESA.

In the words of Brigitte Zypries, German Federal Minister for Economic Affairs and Energy: *'We require a coordinated global solution to what is, after all, a global problem that affects critical satellites delivering services to all of us.'*

She was speaking at a press briefing at the close of the European Conference on Space Debris held in Darmstadt, Germany.

ESA Director General Jan Woerner appealed to space stakeholders to keep Earth's orbital environment as clean as possible. Developing and implementing the ESA Space Situational Awareness (SSA) programme as decided during ESA's last ministerial council in 2016 will be a key factor.

Woerner said: *'In order to enable innovative services for citizens and future developments in space, we must cooperate now to guarantee economically vital spaceflight. We must sustain the dream of future exploration.'*

The call for international action came on the final day of a gathering of over 350 participants from science, academia, industry and space agencies worldwide held at ESA's mission control centre, where the ESA Space Debris Office and the SSA effort are based.

Findings from the week-long meeting were presented to media in front of Minister Zypries, who is also the German national aerospace coordinator, and Director General Woerner by senior ESA managers and representatives from the national space agencies of Italy, France, Germany and the UK, as well as the Committee on Space Research and the International Academy of Astronautics.

#### **Addressing the space debris threat**

The latest results of debris research were featured, especially the safe disposal of retired satellites and rocket stages and the still uncertain challenges posed by satellite mega-constellations being considered by commercial operators.

Holger Krag, head of ESA's debris office noted: *'Only about 60% of the satellites that should be disposed of at the end of their missions under current guidelines are, in fact, properly managed.'*

Researchers also confirmed there is now a critical need to remove defunct satellites from orbit before they disintegrate and generate even more debris.

*'This means urgently developing the means for actively removing debris, targeting about 10 large defunct satellites from orbit each year, beginning as soon as possible – starting later will not be nearly as effective,'* said Dr Krag.

### **Inconvenient truths**

Since 1957, more than 5250 launches have led to a population today of more than 23 000 tracked debris objects in orbit. Only about 1200 are working satellites – the rest are debris and no longer serve any useful purpose.

Many derelict craft have exploded or broken up, generating an estimated 750 000 pieces larger than 1 cm across and a staggering 166 million larger than 1 mm.

Krag added: *'In orbit, these objects have tremendous relative velocities, faster than a bullet, and can damage or destroy functioning space infrastructure, like economically vital telecom, weather, navigation, broadcast and climate-monitoring satellites.'*

### **Working for the future**

Launched in 2009, SSA is developing software, technologies and precursor systems to test a fully European surveillance network that will ensure independent data on space infrastructure.

Additionally, the Agency is developing new technologies under the Clean Space initiative that promise a significant reduction in the creation of space pollution at all stages of space activities.

To close Krag said: *'Space debris threaten all working satellites, including Europe's Sentinels and the Galileo navigation constellation, and any loss of space infrastructure would severely affect modern society. The sustainable use of space has been persuasively shown to be at risk, and the status quo is obviously no longer acceptable. We must now start removing dead satellites.'*

## **About the European Space Agency**

The European Space Agency (ESA) provides Europe's gateway to space.

ESA is an intergovernmental organisation, created in 1975, with the mission to shape the development of Europe's space capability and ensure that investment in space delivers benefits to the citizens of Europe and the world.

ESA has 22 Member States: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland and the United Kingdom. Slovenia is an Associate Member.

ESA has established formal cooperation with six Member States of the EU. Canada takes part in some ESA programmes under a Cooperation Agreement.

### **Picture caption**

*The Copernicus Sentinel-2B satellite takes us over part of the western Netherlands on 16 March, with the capital city of Amsterdam at the centre of the image.*

*Divided among some 90 islands, Amsterdam has more than 100 km of canals. The city lies about 2 m below sea level – in fact, around a third of the country lies below sea level, making it susceptible to floods. Rising sea waters during periods of bad weather – called storm surges – are kept under control by dams, dikes, floodgates and natural sand dunes.*

*While we can see the North Sea on the left, the water on the right is part of the Markermeer lake. This area was once a saltwater bay called the Zuiderzee, but was closed off by a dam in the 1930s. The bay was drained in stages and land reclaimed, including Flevoland on the right side of the image – one of the world's largest artificial islands.*

*Another relatively recent addition to the Dutch landscape is the neighbourhood of IJburg comprising six artificial islands east of Amsterdam. The first residents moved in only 15 years ago.*

*Satellites like Sentinel-2 can help to monitor urban expansion. For example, in the upper-right corner we see what looks like an artificial island being built – but this structure is not present in satellite imagery from a year ago.*

*The meticulously planned landscape seen in most of the image breaks for the coastal dunes along the left. These areas are home to dozens of bird species, as well as deer, squirrels, rabbits and foxes. In one protected area, grazing animals including Highland cattle were introduced to the area.*

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