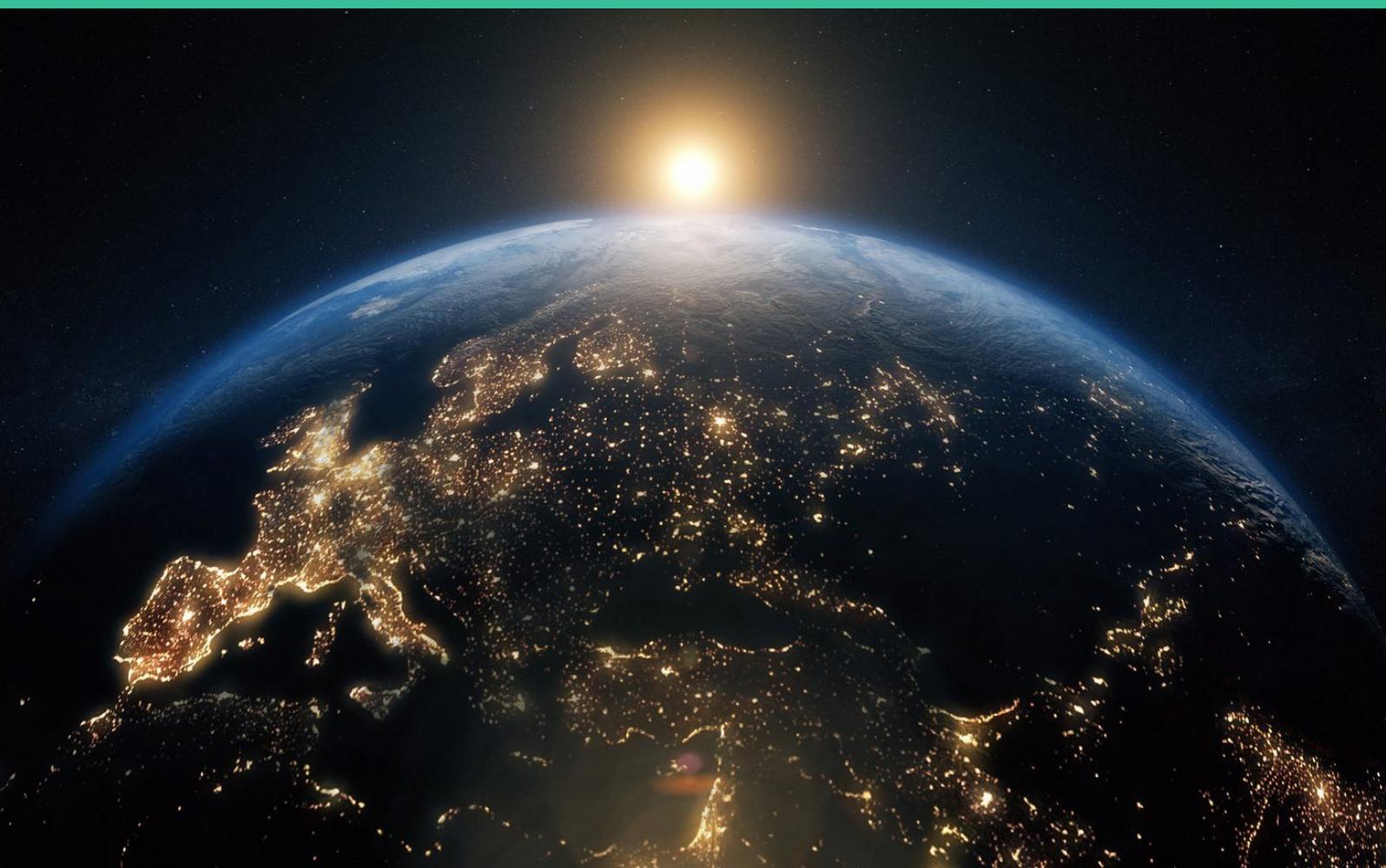


FALL 2019

Entering a new climate dimension with space

EVENT REPORT



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The EU space programme turbocharges environment monitoring

Europe's Earth observation and monitoring satellites, unmatched and admired the world over, deliver tens of terabytes of free data every day to improve our lives, support EU policy and help fight climate change. This positive conclusion was shared by 35 space industry experts at the Friends of Europe policymakers' dinner in Brussels on 19 November 2019. Yet such leadership can only be maintained through further policy focus on the EU space programme and more investment– alongside other key drivers like better governance, cooperation and societal empowerment.

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Space is highly strategic. Besides the European Space Agency's (ESA) Galileo satellite navigation system operating globally since 2016, seven Copernicus Sentinel satellites now measure the environment (monitoring the land and sea as well as air quality) and ensure the security of EU borders and coasts. This programme is often called a 'jewel in the crown' for Europe, reinforced by cooperation between ESA and the European Commission, and feeding into European and national policies.

In 2018, data from Copernicus was the most downloaded data on NASA websites in the United States! The US – which spends ten times more on civilian space programmes than Europe does – has an agreement with ESA to use this data. However, the EU's Earth observation capacity is apparently still under-utilised.

An environmental asset

Copernicus plays a key role in monitoring the effects of climate change, including global sea level rises and extreme weather. Satellite data is factual and cannot be disputed by global warming sceptics. This data is widely used in many other environment-related fields, from agriculture to deforestation to disaster reduction. It also provides vital information for the EU when implementing international agreements like the UN 2030 Agenda for Sustainable Development and Paris Climate Agreement.

“ EU's space programme and Earth Observation (EO) capacities will support four new European Green Deal policies

Debate participants highlighted how the EU's space programme and Earth Observation (EO) capacities will support four new European Green Deal policies: a carbon-neutral Europe by 2050, a biodiversity strategy by 2030, a renewed EU strategy for the Arctic,

and sustainable and resilient agriculture. New Copernicus missions are planned to support these ambitious policies from 2021.

Given that nearly 70% of the world is covered by water, satellites are especially valuable for observing the oceans. Today they reveal sea levels rising by 5mm every year. At this alarming rate, they could be 150 cm higher by the century's end. This would result in vast areas of heavily populated land being inundated, including Bangladesh, the Netherlands, and Florida. As one speaker put it, "This isn't fake news about the serious impacts of climate catastrophe, it's the reality seen by our satellites!"

What next for Copernicus?

Talk turned to links between the space and the new European Green Deal, set to guide much of the European Commission's policy and work over coming years. The good news is that the next generation (4.0) of Copernicus satellites will be even better placed to address the four above-outlined environmental issues: making Europe carbon-neutral by 2050, the EU Biodiversity Strategy to 2030, a renewed EU Arctic Strategy, and sustainable agriculture.

For the goal of carbon-neutrality, scientists use satellites to pinpoint where carbon is produced and released into the atmosphere and they monitor how carbon is

“ European space assets must be harnessed to deliver on EU climate goals wherever possible

transported. To ensure EU compliance with international environment agreements like Paris 2015, they then compare Europe's carbon performance with the rest of the world's.

ESA is therefore developing satellites to measure CO2 concentrations at very high accuracy and resolutions, down to 2.2 square kilometres. This will be a boon for carbon observation, as the satellites will detect carbon sources as small as a city or large industrial sites. Europe leads in this field, supported by the superb information beamed down from space; the European Commission has specifically tasked the ESA with this mission.

Copernicus CHIME satellites, now in the planning stage, will carry hyperspectral sensors. These will frequently image soil and cropland at very high resolution, contributing to achievement of the EU's biodiversity and sustainable agriculture targets.

Meanwhile, the changing Arctic has become a greater priority, with geopolitical ramifications for the climate as well as the environment, industry and shipping. This was confirmed by a representative of UN Environment Programme (UNEP), which has several reports published or pending on the Arctic, and is ready for more strategic cooperation with the EU on space and the environment.

EU space specialists are eager to do far more Earth observation. That includes

monitoring the Arctic and pulling in more data on parameters such as ice melting and sea surface temperatures.

A further challenge is acquiring and installing the technology for independently storing all EU space data. So ESA is collaborating with the European Commission's DG CONNECT and DG GROW, with the vision of achieving excellence in space and excellence on the ground. This will ensure that Europeans enjoy preferential access to their own space capabilities. However, it will also require an enhanced regulatory environment, enabling the bloc's space engineers and scientists to engage better with politicians.

The audience heard about a promising EU commitment to tackle the climate crisis. European Commission President Ursula von der Leyen recently sent mandate letters to each new Commissioner. Among them was a specific missive to Thierry Breton, responsible for the Internal Market portfolio, explaining that European space assets must be harnessed to deliver on EU climate goals wherever possible.

Europe also intends to pay more attention to methane, an under-estimated greenhouse gas and one that often lurks under vulnerable permafrost. A new methane monitoring campaign will associate ESA and NASA, while UNEP is working with European Commission DG ENERGY and US partners to measure methane via satellites and ground data.

Banking on EU R&D

The EU space programme owes much of its success to a complex ecosystem, including research and development guided by the Horizon 2020 programme. Its successor Horizon Europe, plus the new Copernicus Sentinel satellites, will pave the way for further research useful for space and technology. This will include Earth system science and climate action. The EU space downstream sector, which is

“ The EU must match space excellence with digital excellence

growing commercially by 10% every year, will also see improvements going forward. There are plans now to bring more space users into EU programmes.

According to a Commission official, the EU will strive over the 2021-27 period to bring together the space programme with three other major EU initiatives: Digital Europe Programme, Connecting Europe Facility, and Horizon Europe. If all goes well, this collaboration could enable the EU to create a 'digital twin Earth', offering insight and foresight on our physically changing world.

The EU faces other major space challenges. The first is to bring together three layers – infrastructure, data resources from space, and artificial intelligence – something never done before. Secondly, the EU must help all users by merging the space data and



1. **Jerome Béquignon**, Senior Advisor for the ESA
2. **Giulia Del Brenna**, Deputy Head of Cabinet at the European Commission
3. **Guillem Anglada**, Space Scientist at Institut de Ciències de l'Espai
4. **Josef Aschbacher**, Director of Earth Observation Programmes for the ESA.
5. **Veronika Safrankova**, Head of Brussels office for UNEP



ground data sectors. Lastly, it must match space excellence with digital excellence. If not, Europe risks falling behind the rest of the world.

In Switzerland, at UNEPS in Geneva, EU space data and Geographic Information System (GIS) systems play a major role supporting the World Environment Situation Room. Though still in the trial stage, this open and interactive platform boasts numerous partners worldwide. It displays statistics such as global temperature and CO2 levels. Users can for instance look at mining concessions in Africa and check if these are legally licensed, or they can envision the movement of plastic pollution in the oceans. EU and UN policymakers can evidently learn much from this interactive data, which is vital when country planning in fields such as development cooperation, the environment and risk reduction. An ESA representative remarked that the agency also has an interactive display room: it shows how space is used to inform civilian work in areas ranging from pollution to refugee camps.

Will defence and space be too closely linked, given that much of EU space policy in the European Commission is being shifted to the new DG Defence Industry and Space? A Commission official allayed these fears, noting that in this case the Directorate-General will cover two separate areas – space policy and the defence industry. In other words, Europe is not militarising space.

As for space junk, the EU hopes this can be mitigated through the emerging concept of Space Traffic Management (STM), in partnership with the United States.

More funding needed

Europeans interested in the environment are bound to discover the incredible capacities and value of their space programme. Yet surprisingly this programme only costs an average of €10 per EU citizen – a tiny amount relative to other space-faring nations

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like the US and India. Although €16 billion is earmarked for the next EU budget from 2021 to 2027, this may not be enough to meet European ambitions for space and Earth observation, as several dinner participants remarked.

Boosting this future budget would enable the EU to build up its Earth observation capacity, adding value to Europe's initiatives in climate action and development policy, and turning it into a global leader in space. The EU could expect to enjoy improved decision-making, especially for climate action – thanks to the increased data, analytics and foresight from observing Earth from high in the sky.

Others noted the urgency of strengthening Europe's IT infrastructure. From its central data hub, ESA distributes 250 terabytes of space data daily, more than anywhere

else in the world. This big data must be processed and archived for the agency and its users, hence the need for ESA to continually add new computer facilities.

One third of the planet's computing needs originate from Europe, especially in the space domain, yet the continent only provides 2% of those needs. If the EU wants more autonomy and sovereignty in space, it must spend far more on high-performance computers, big data, cloud storage and artificial intelligence – or risk being left behind by competitors in the US, Russia and China among others.

Commercialising space

Copernicus data is extremely valuable for the 'downstream sector', where data is converted into information. This sector is thriving in Europe, growing at 10% annually. It creates new and innovative geospatial services and employment in the scientific and business worlds. But not everything is in place, as the EU is midway in the process of building a global service system.

Businesses like Austria's Geoville rely on Copernicus to provide geo-information to 135 countries. "It's the world's best tool, providing data that can improve or save lives," said the firm's representative, citing forest management in Honduras and World Bank micro-credits. "It's also brilliant for Europe's prosperity and jobs." The

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moderator commented that Copernicus is expected to generate 48,000 new jobs in Europe by 2030.

Equinor, a Norwegian oil and gas company with a growing renewables portfolio, has some 20,000 staff making extensive use of European satellite data and information – the latter typically purchased from niche start-ups. A representative explained the company aims to produce high-value, low carbon energy safely, and acknowledged the importance for the company of collaborating with ESA, NASA and the Oil and Gas Climate Initiative (OGCI). Building energy sources is not always easy, due to opposition from landowners, politicians and communities. Spatial data has helped Norway to decide where new onshore windfarms should be built. Equinor is also looking at public-private partnerships, including the space sector, so it can make energy while meeting relevant UN Sustainable Development Goals (SDGs).

A Costa Rican politician underlined how European satellite data assists the country with its plans for decarbonisation, biodiversity and protecting local seas: "Precise data like this is essential for political decision-making and is great for open-minded politicians."

During a discussion on protecting European space capabilities, there was plenty of support for spending more if this will ensure that the continent's business and institutions retain their competitive edge in space. European space must remain

autonomous wherever possible, especially in technology, data access and data dissemination. After all, Copernicus data is currently free and open, and European taxpayers are entitled to benefit first from their investments in space.

Ensuring space is a public good

Independent space data is vital for creating a scorecard on where the world is in achieving the UN SDGs. Thanks to multi-variable analysis and data crossing, this data also benefits society in fields like poverty reduction. In Malawi, forest coverage has grown thanks to the sharing of satellite data with indigenous groups and civil society, rather than just the government. Several speakers remarked how the social pillar has been missing from EU space policy.

To date the space sector has mainly highlighted how space benefits industry. So there should be more focus on educating European citizens about space's benefits for them, as a form of empowerment. A great way to raise people's awareness of space is to show them how Copernicus satellites deliver valuable environmental data. People should also be taught the difference between low-Earth orbits and geostationary orbits – all with a view to making space an exciting and inspiring topic.

Using space data is fine, declared a climate and space weather risk expert. But what scientists really need are the right 'figures of merit', especially for climate change, because simply saying we need to limit global warming to 2°C is too simplistic. Thus satellite data must be combined with society data – supplied by industry and scientists.

Experts must also decide what they want to get from space data, when planning the design of future missions. They will need to justify why they need more funds for space missions or why they want to make more measurements there. Hence the debate's call for bringing a more societal aspect into EU space policy. This could be done through better governance and regulation, which in turn would help regulate the predicted boom in private-sector spaceflight.

The topic of Brexit inevitably arose, because the UK is a leading ESA contributor. A spokesman confirmed the UK will continue to collaborate with the agency. The UK is also strongly committed to growing its own space capabilities.



1. **Niklas Nienass**, Member of the European Parliament
2. **Lorena Aguilar Revelo**, Vice-Minister of Foreign Affairs for the Government of Costa Rica
3. **Andreas Veispak**, Head of Unit, Space Data for Societal Challenges and Growth at the European Commission
4. **Christophe Grudler**, Member of the European Parliament



