

ESPI Insights Space Sector Watch

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FROM DJIBOUTI AND THE NORTHERN TERRITORIES TO THE USE OF SPACE - AN OUTSIDE PERSPECTIVE



ESPI Perspectives often focus on European matters like the future of European launchers at the Sevilla Space Summit (**October Perspectives**) and look at Europe in a global context of space powers (**January** and **June Perspectives**). As we are closing 2023, it may be a moment to turn our eyes from Sevilla to what may seem distant places - and not in the U.S. or China - but in Africa and Australia. It may serve as a brief illustration of the global dynamics of space, where launchers meet

demand. It provides an outside perspective at a time when Europe enters the preparation phase of ESA CM25 and the MTR of the EU Space Programme, when EU Horizon Europe budgets, incl. for space, are under thread, when geo-return discussions surrounding ESA may put at risk Europe's most significant intergovernmental funding mechanism of member states for space.

While Sevilla led to an increase of the number of guaranteed launches for Ariane 6 by 15 to 42 by 2030, the creation of demand for any launcher and the accelerated use of space in Europe remains to be addressed (July Perspectives). Following Starlink, it is now increasingly Amazon Kuipers' constellation to make the headlines. It recently contracted launches with its competitor Space-X, under the pressure of pension funds, an example of new commercial dynamics, well outside the traditional space funding mechanisms.

And China is on the rise in numbers of launches, from so far 7 locations, soon at par and may be overtaking the U.S., as Chinese satellite constellations will see the light. 94.5% of the payloads on these launches are domestic, many commercial. The Republic of Djibouti signed a MoU with a Hong Kong based Holding for the development of an international commercial spaceport, a \$1B project, which will include 7 satellite launch pads. Djibouti will provide the land with at least 35 years lease. The contract **was planned to be signed in March 2023 but is still facing legal hurdles**.



A key message here is, that a lot of the global demand is routed in institutional and commercial markets in the U.S. and China. The 18 Ariane 6 launches for the Kuiper constellation, occupying most of the capacity of the future European launcher cannot come as a surprise, as the economical sustainability of the launcher may increasingly depend on foreign commercial markets. However, a too strong dependency on foreign markets may be dangerous for any European launcher, when faced with giants, booking whopping 80 heavy-lift launches with a portfolio of ULA, Arianespace, Blue Origin, and now SpaceX. Commercial and political foreign priorities could shift preferences and conditions of market access. Geo-politics can be expected to increasingly impact the above dependencies, at a time when the technology safeguards agreement on space launches and returns, signed last month between U.S. President and the Australian Prime Minister, will allow U.S. companies to carry out space launch activities in Australia. As outlined by ASPI, this could open up possibilities for SpaceX Starship's including for defence and national security missions. This happens as Starship soon will enable wider exploration goals in commercial LEO, mega GEO, space stations, on the Moon and more - all when Europe still hesitates.

Day 1 after Sevilla, Europe needs to get started on a holistic space strategy addressing the accelerated use of space in Europe (as much as access to space, which itself is only 1-2% of the space economy). The creation of an internal market needs to be Europe's number one priority, for institutional and commercial demand, responding to security challenges, to climate change, addressing Europe's full ambitions in exploration. This may help leverage the opportunities identified in the recent report by ESPI/BCG "More than a Space Programme". The ESA 2040 Strategy may be a first step, and it is ESPI's ambition that the ESPI2040 vision may serve as a reference.

Yours sincerely,

Hermann Ludwig Moeller Director of ESPI



POLICY & PROGRAMMES

Decisions from the Space Summit 2023 in Seville

On November 6th, the European Space Summit 2023 took place in Seville, Spain, gathering Government ministers representing ESA's Member States, Associate States and Cooperating States resolved together to strengthen Europe's space ambitions. The Summit was comprised of the ESA inter-



Credit: ESA

ministerial Council Meeting and an informal EU ministerial meeting on competitiveness (space). The ESA Council Meeting was chaired by Anna Christmann, Federal Government Coordinator of German Aerospace Policy and hosted by Spain, the current Council of EU Presidency.

During the Summit, the evolution of the three accelerators was presented, including already established and planned activities running under the three initiatives to accelerate the use of space in Europe – with two new activities for space and sustainability. In particular, the Zero Space Debris Charter for sustainability and safety in space was officially launched with the opening of the registration period, as an initiative under the PROTECT accelerator. The Zero Debris Charter is a global initiative for all space entities to sign and follow towards the shared goal of a Zero Debris future. ESPI also announced the intention to sign the charter.

Moreover, related to the "Space for a Green Future" Accelerator, **ESA and the European Commission (DG CLIMA) signed an agreement for cooperation to use EO data to address climate change**. In particular, ESA and the EC aim to enhance knowledge and provide data for climate adaptation and mitigation policies supporting the European Green Deal and the EU's climate goals. The focus of the cooperation is on GHG emissions monitoring, deforestation, methane leak detection, and renewable energy site location identification.

Furthermore, European space transportation was a core topic of the Summit. With regard to Europe's future launcher procurement, **Germany**, **France and Italy signed a trilateral agreement on European launchers** with "fundamental points for the relaunch of the space sector", resolving long-standing disputes on the availability of launches and related sites. The defined space policy covers the financing of launchers, In particular, the agreement will provide €340 million of financing per year for Arianespace's Ariane 6 rocket in exchange for a commitment to an 11% cut in cost and Ariane 6 will be awarded at least 4 missions from public institutions per year – and Vega C launcher will get at least 3 launch missions per year. Moreover, the three countries will support the launcher programme for an additional 1,5 years. In total this results in an increase in the number of guaranteed launches for Ariane 6 by 15 to 42 by 2030. Moreover, in order to boost European space exploration on the ISS and as a potential first step toward developing a crewed vehicle, **ESA will start a competition between companies to develop commercial vehicles based in Europe to transport cargo** to and from the ISS by 2028. The ESA commercial cargo programme is the first response to the recommendations of the HLAG on human and robotic exploration published earlier in 2023.

The vehicle for cargo transport to the ISS could further evolve into a crew vehicle for LEO and destinations beyond. Funding for the initial project phase has already been secured (from ESA's European Exploration Envelope Programme). ESA aims to provide study contracts to 2-3 companies with a total value of €75M. For the second and later phases, the required funding would be allocated by ESA member states and will form part of the proposals for the next ESA CM25, while private funding requirements will also be embedded.



Outcomes of the Space Summit:

- ESA DG Josef Aschbacher's **Proposal on Lifting Europe's Ambitions for a Green and Sustainable Future, Access to Space and Space Exploration**
- Resolution on Lifting Europe's Ambitions for a Green and Sustainable Future, Access to Space and Space Exploration

Finally, towards the next ESA CM in 2025 set to take place in Berlin, ESA DG Josef Aschbacher announced to propose an "ESA 2040" strategy, prepared together with ESA Member States, which will be ready in early 2024 to serve as a foundation for ESA CM25.

Furthermore, at the sidelines of the Space Summit, several agreements were signed, including:

ESA, **Airbus Defence and Space**, **and Voyager Space signed a trilateral MoU**, focusing on joint efforts for the post-ISS era's Starlab space station. The MoU outlines the parties' commitment to mutually support science and technology development and explore potential collaborations related to post-ISS LEO destinations. In January this year, Voyager Space and Airbus D&S signed a first agreement for Starlab and decided to establish a Joint Venture in August.

Key areas of collaboration include:

- Access to the Starlab station for ESA and its Member States, facilitating astronaut missions, long-term research, and commercial business development.
- Contributions to research projects on upcoming missions, utilising European technology in diverse fields such as advanced robotics, automation/AI, and advancing science fields.
- Establishment of a comprehensive 'end-to-end' ecosystem, integrating the Starlab space station as a LEO destination and a potential ESA-developed European transportation system (cargo and crew), with a focus on standardised interfaces to promote an open access policy.

Moreover, **Italy and Latvia signed a MoU on space cooperation** in areas such as micro-nano satellite technologies, EO, navigation, and space science.

Council of the EU approves EU annual budget for 2024

On November 20th, the **Council of the EU approved the joint text on the EU's general budget for 2024**, which was agreed in negotiations with the European Parliament on November 11th. For the EU's general budget, total commitments are set at €189.385M and total payments at €142.630M. A budget of €2.3B is allocated for space.



The **budget for the space cluster** includes €2.18B for the EU Space Programme, €270M for EUSPA, and €190M for secure connectivity. Moreover, €13.6B of the EU 2024 budget is allocated for R&I (incl. €12.9B for Horizon Europe) and €1.6B for defence (incl. €638M to support capacity D&R under the EDF). The 2024 budget adoption was adopted by the European Parliament on November 22nd.

Having reached a consensus on the 2024 budget, there will be an agreement on the mid-term revision of the EU's Multiannual Financial Framework (MFF) in Council expected by the end of 2023. Moreover, the European Commission closed the **call for feedback for the EU mid-term evaluation of the EU Space Programme**. **ESPI submitted a contribution with recommendations**.



Council of the EU approves EU Space Strategy for Security and Defence

On November 14th, the **Council of the EU approved conclusions on the EU Space Strategy for Security and Defence**, which was tabled by the High Representative Josep Borrell and the European Commission in March 2023. The Council stated to follow the strategy implementation by the EC and the Borrell. In the Council's **conclusions**, the Council welcomed the new strategy and proposed the following actions:

- increase the EU's understanding of space threats, through a yearly classified analysis and the strengthening of military and civilian intelligence services on space security.
- increase and strengthen the resilience and protection of space systems and services, acknowledging the European Commission's plan to propose an EU space law (for which the EC collected feedback in a call in October).
- Better respond to space threats through SDA information, a dedicated toolbox for EU joint responses, and the further development of exercises.
- Increase the use of space for security and defence by better integrating the space dimension into the planning and conduct of EU CSDP missions and operations, by strengthening the EU Satellite Centre and by developing space services for governmental use at EU level (incl. by building on a pilot project proposed by the EC on a new EU EO governmental service).
- Address challenges in space through international cooperation (incl. creation of new space security dialogues).

Official Inauguration of Andøya Spaceport

On 2nd November 2023, Andøya Spaceport was officially inaugurated by H.R.H Crown Prince Haakon of Norway. The Spaceport, located at Nordmela, on the island of Andøya within the Arctic Circle, provides multiple launchpads. In part due to its

location, the Spaceport aims to focus on being a launch site for sun-synchronous and polar orbits for small to medium-sized satellites. **Isar Aerospace will have access to the first launch pad and is expected to carry out final testing of its Spectrum two-stage launch vehicle**. The agreement for the launch pad was signed last year and lasts for 20 years. In addition to the launch pad, the spaceport's infrastructure will include payload integration facilities and a mission control centre. Despite this, no clear timeline for a test or launch has been provided by Isar Aerospace, which is poised to conduct the first launch from Andøya.

Council of the EU approves UK participation in Horizon Europe and Copernicus

In November, the **Council of the EU approved the agreement between the EU and the UK from September for the UK's participation in EU's Horizon Europe and Copernicus**. The agreement will allow UK researchers and organisations from January 2024 to participate in Horizon Europe (with equal rights as EU MS) and the UK will participate in Copernicus and will have access to EU SST. The UK's participation will be subject to all the safeguards of the EU-UK Trade and Cooperation Agreement, including the payment of a participation fee into the EU budget.

This **decision of the Council** will enable the EU to formalise the agreement in principle reached with the UK, by adopting a decision within the EU-UK Specialised Committee on Participation in EU programmes, which was set up under the EU-UK TCA, before the end of 2023.



Credit: Andøva



Canada will join Horizon Europe

Canada will join the Horizon Europe programme as an associate member. This announcement came during a visit by EU Commission president Ursula von der Leyen and EU Council president Charles Michel in Canada. The EU and Canada confirmed that discussions about Canada's participation would only involve the second pillar, which concerns R&I collaboration on global challenges and industry competitiveness.

Slovenia's Government adopts first National Space Strategy

Slovenia's government adopted Slovenia's first National Space Strategy "2030 Slovenia - Small on Earth, Big in Space", alongside the decision to apply for full membership of ESA – Slovenia is Associate Member of ESA, and the current Association Agreement expires at the end of 2024.

The strategy outlines activities to increase the competitiveness of the Slovenian space industry and establish leadership in



selected areas. Based on the development objectives set out in the Slovenian Development Strategy 2030, the space strategy underlines space for sustainability and development goals. The outlines strategy is: "Slovenia's space sector strives to expand the frontiers of knowledge and innovation and inspire a green, digital, creative and sustainable future". The strategy's outlines long-term objectives under strategic pillars (three pillars for the programme areas and two pillars for the foundation of the sector's development) based on optional ESA programmes Slovenia currently participates in:

- Develop space technologies and R&D, incl. exploiting new capabilities in satcom on Earth and beyond.
- Strengthen participation in responsible international space exploration and research, and further developing knowledge and technologies for human and robotic exploration missions.
- Foster the development and uptake of space applications for a stronger commercial and sustainable future, leveraging next-generation innovative technologies.
- Promote STEM education among future generations.
- Stimulate entrepreneurship and university and RTO spinoffs through dedicated space innovation programmes.

Japan establishes new ¥1T space fund to develop space industry

The Japanese government plans to establish a new ¥1T (\$6.6B) Space Strategy Fund over a 10year period to support JAXA and develop Japan's space industry. The bill was approved by the Japanese government on November 20th and aims to support Japanese startups, the private sector, and universities. JAXA, using the fund, will support emerging technologies and projects that uphold national security and strategy. The Japanese government has recognised the importance of involving the private sector in developing new space technologies and ¥300B have been allocated for the fund in the most recent supplementary budget.



U.S. release National Spectrum Strategy

The Biden administration released a National Spectrum Strategy, which aims to ensure that federal operators and private companies can have adequate access to space and aims to adapt U.S. policy to address new demands raised from innovations such as 5G networks, precision farming, UAVs etc. Alongside the strategy's publication, **Biden released a presidential memorandum on spectrum**, which established an Interagency Spectrum Advisory Council to advise the National Telecommunications and Information Administration on spectrum issues.

The **strategy** is divided into 4 pillars:

- Ensuring U.S. leadership in spectrum tech (incl. studying 2,786 mh of spectrum that could potentially be repurposed).
- Developing a transparent plan for spectrum allocation with input from a wide variety of sources (incl. private sector) and routinely updating the national spectrum strategy.
- Boosting spectrum R&D (incl. creating "sandboxes" specifically intended for spectrum research), developing a national spectrum R&D plan, and encouraging private research on spectrum.
- Growing and supporting a spectrum workforce, incl. drafting a National Spectrum Workforce plan and educating policymakers about the importance of recruiting talent.

Austria increases contribution to ESA from €231M up to €261M

At the 100th General Assembly meeting of Austrospace, Austria's Federal Minister for Climate Action, Environment, Energy, Mobility, Innovation and Technology, Leonore Gewessler announced that Austria will increase its financial commitments to ESA from €231M up to €261M between 2023 and 2026.



Credit: BMK

Updates on space in Germany

Germany will launch MEO military satcom constellation

The German Bundeswehr aims to develop its own MEO military satcom constellation from 2032 onwards, which is planned to consist of up to 24 satellites. Furthermore, the Bundeswehr aims to integrate its military requirements into IRIS² and utilise IRIS²'s LEO services.

Germany releases military document "Verteidigungspolitische Grundlinien 2023"

Germany released the military document "Verteidigungspolitische Grundlinien 2023", which provides an overview of Germany's defence priorities and refers also to space. The document states that "the foreseeable consequences of climate change and the developments in cyber and information space as well as in space have strategic relevance". Furthermore, space is mentioned under other consistently perceivable tasks, stating: "defence aspects of the whole of government cybersecurity, contributions to the whole of government situation report in space as well as in cyber and information space". Moreover, it notes that it is important to "make the characteristics of the threat environment beyond geographical spaces also in cyber, information and space.



UK will join Atlantic Constellation Partnership

The **UK plans to join the partnership for the Atlantic Constellation**. For this EO satellite constellation, Spain and Portugal each committed to providing €40M, each will build and operate 8 small EO satellites. UK committed more than £3M contribution for the constellation (with additional co-funding by Open Cosmos) to contribute a pathfinder satellite (built by Open Cosmos), which will be launched with the same orbital plane as the three satellites from Portugal and will have the same design. These four satellites will constitute the first batch of the constellation.

Argentina and European Commission sign agreement for space cooperation

During the EU Space Week in Seville, the European Commission and the National Commission for Space Activities of Argentina (CONAE) signed an agreement to share and exchange EO satellite data within the framework of Copernicus and Argentina's EO missions. In particular, CONAE will have direct access to information from the Copernicus Sentinel satellites through high bandwidth connections, in return, Argentina will provide data from in situ measurement networks with terrestrial sensors and from EO satellite missions with an open data policy (such as SABIA-Mar).



Credit: Argentina.Gob.ar

Developments regarding ISS' future and post-ISS/commercial space stations

During the Beyond Earth Symposium, NASA announced to be open to extending ISS beyond 2030, if commercial space stations are not ready on time – stating that it is not mandatory to end the lifetime of the ISS and de-orbit it by 2030. Also, NASA stated that a gap between ISS retirement and operationality and availability of commercial space stations "is not the end of the world". The transition phase from ISS to the first available commercial space station was envisaged to have a duration of two years. Last month, NASA laid out a plan to de-orbit the ISS and issued a call for the U.S. industry. The ISS is planned to be de-orbited by U.S. Deorbit Vehicle (USDV) which will be developed by the U.S. industry. Also this month, Roscosmos Head Yury Borisov stated that operations of the ISS should be prolonged as much as possible. This comes while Russia actively seeks partners for its planned Russia Orbital Space Station (ROSS), most recently at the Dubai Aerospace Show - and in the light that so far, Russia is the only ISS partner that has not extended its participation in the ISS until 2030 (only until 2028). For ROSS, Russia is seeking the participation of Arab, African and Asian nations, in particular, Türkiye and the BRICS nations (Brazil, China, India, and South Africa).

Regarding the alternatives to the ISS and future commercial space stations in the post-ISS era, also this month, the **White House laid out possible rules for private/commercial space stations**. In particular, the National Space Council released a draft bill assigning oversight responsibility for space activities and infrastructure - including private space stations (and off-Earth manufacturing and space debris removal). The responsibility is envisaged to be split between the U.S. Department of Transportation (DOT) and the U.S. Department of Commerce (DOC). With regard to European involvement in commercial space stations, this month, **ESA**, **Airbus Defence and Space**, **and Voyager Space signed a MoU** for the Starlab space station and last month, **ESA and Axiom Space signed a MoU** for cooperation in the Axiom Space Station.



Bulgaria signs the Artemis Accords

On the 9th of November, **Bulgaria became the 32nd nation to sign the Artemis Accords** and the 13th European nation (among EU/ESA member states and Ukraine). The signing ceremony at NASA headquarters involved NASA Administrator Bill Nelson and Bulgaria's minister of innovation and growth Milena Stoycheva.

Italy and South Korea sign MoU on Peaceful Use of Outer Space



Credit:Korea JoongAng Daily

During the official visit of Italian President Sergio Mattarella to South Korea, **both nations confirmed their commitment to intensify cooperation in the realms of space science and technology**. The MoU signed by the President of ASI, Teodoro Valente, and South Korea's Minister of Science and ICT, Lee Jongho, aimed at encouraging increased cooperation between research institutions and businesses in Italy and South Korea, as well as focus on promoting collaboration projects within the fields

of space science and exploration, Earth observation, SAR technology, and the promotion of business initiatives in the space sector and trade among others.

First satellites launched in November: Ireland, Djibouti, and Oman

Ireland launched its first satellite EIRSAT-1

Ireland's first satellite, the Educational Irish Research Satellite 1 (EIRSAT-1), was built by students from University College Dublin, as part of ESA Academy's Fly Your Satellite! programme (FYS), was launched on December 1st on a SpaceX Falcon 9 rocket. The cubesat's primary payload, the Gamma-ray Module (GMOD), is designed to investigate and study gamma-ray bursts. In the process alongside the ESA Academy, Ireland has developed its first spacecraft operations procedures, and the project has also led to the establishment of space infrastructure at University College Dublin including a cleanroom and a mission control centre.

Djibouti 1A becomes Djibouti's first satellite Djibouti 1A

On November 11th, **Djibouti launched its first satellite Djibouti 1A from the Vandenberg Space Force Base onboard the SpaceX Transporter-9 dedicated SSO rideshare mission**. The EO satellite was built and developed as a joint capacity-building programme between Djibouti and the Centre Spatial Universitaire de Montpellier (CSUM). Djibouti 1A was created to link the allow the nation to access real-time meteorological and seismic data, which policymakers will use to improve agricultural practices and environmental policies.

Oman's ETCO SPACE launches its first satellite Aman-1

The Omani company **ETCO SPACE launched its first satellite Aman-1 on November 11th**. The EO satellite was launched aboard a Falcon 9 rocket from the US' Space Launch Complex 4E in Vandenberg, California. The Sultanate of Oman, represented by ETCO SPACE, collaborated with SpaceX, the Polish nanosatellite manufacturer SatRev, and TUATARA to develop, build, and launched the satellite. Aman-1 will collect high-resolution images, which will be evaluated using computer vision, machine learning and AI tools.



Developments in the UAE

November saw developments in the UAE, with several announcements on the sidelines of the 18th Dubai Airshow which took place from November 13th-17th.

It was announced that the UAE will update the national space law and promulgate the new law in Q1/2024. Also in November, it was announced



Credit: Dubai Airshow

that the UAE will send new and experienced astronauts on missions in the near future - the MBRSC is actively working to prepare the astronauts. Furthermore, the MBRSC prepares to launch the commercial EO satellite MBZ-Sat between July and September 2024. Moreover, the UAE Space Agency and the Sharjah Research Technology and Innovation Park (SRTI Park) signed a cooperation agreement for cooperation in the aerospace technology sector. Furthermore, the UAE Space Agency and Dubai Electricity and Water Authority (DEWA) signed a MoU to jointly boost the space sector through supporting R&D and contributing to regulations.

With regard to international cooperation, the UAE discussed future cooperation with several countries/regions, including Europe (ESA) and India.

ESA DG Josef Aschbacher called for exploring potentials of cooperation in space between Europe and the UAE, including his suggestion that ESA could cooperate with the UAE on a second Rashid lunar mission to fly a UAE lander to the Moon. Moreover, in addition to ESA's presence at Dubai Airshow, ESPI Director, H. Ludwig Moeller participated in the panel "Investing in Space to Support the Country's Growth Plans".

Furthermore, a UAE delegation met a U.S. delegation of the White House and both sides agreed to advance bilateral relations in science, technology and space for mutual benefit. Moreover, at the Sharjah International Book Fair (SIBF) it was unveiled, that two UAE astronauts could be part of the Artemis mission - currently, the UAE astronauts, Mohammad AlMulla and Nora AlMatrooshi, are undergoing training with NASA.

Finally, a delegation led by the Indian National Space Promotion and Authorization Centre (IN-SPACe), comprising Indian non-governmental entities (NGEs) related to space, visited the MBRSC in Dubai - under the observership programme between India and the UAE, which aims to enhance cooperation and exchange. During the visit, IN-SPACe presented India's recent space sector reforms and 2040 goals to the MBRSC, and the parties agreed to continue the dialogue.

ASI seeks commercial partners for ORACLE project

ASI seeks commercial operators for its lunar regolith oxygen extraction mission, known as the Oxygen Retrieval Asset by Carbothermal-reduction in Lunar Environment (ORACLE) project. The ORACLE project is allocated a budget of up to €11M, and its timeline is set for a maximum duration of 48 months. ASI partnered with Politecnico di Milano to initiate the developmental phase of the ORACLE project. The collaboration involves the Advanced Space Technologies for Robotics and Astrodynamics research group at the university, tasked with laying the groundwork for the project, including operational aspects from a lander. The project encompasses various phases, with the initial collaboration focusing on the technology's validation for future missions. Once this stage concludes, ASI plans to transition the project to an industrial partner to steer it through subsequent stages, leading to an eventual launch.



Policy & Programmes

Developments in Türkiye in space

November saw several developments in Türkiye in the space sector, including announcements, capability demonstrations and bilateral agreements on space cooperation.

• Türkiye's first domestically built communication satellite Türksat-6A, which is planned to be launched "in the next months", successfully passed the testing.



Credit: TUA

- Türkiye launched the first hybrid rocket system to space: The Sonde Rocket System (SORS), developed by DeltaV Space Technologies (a subsidiary of the Turkish Defense Industry Technologies) was launched. The Hybrid Propulsion System, developed within the scope of the Turkish Space Agency's AYAP, was fired as the second stage in the payload section of SORS at an altitude of 100 km.
- Türkiye **aims to launch the first spacecraft to the moon in 2026**. The spacecraft was developed with the Lunar Research Program (AYAP) within the National Space Programme.

Thales Alenia Space will provide a transponder for Türkiye's 1st lunar mission

Thales Alenia Space signed a contract with TÜBİTAK Space Technologies Research Institute (TÜBİTAK UZAY) to provide a communication S-Band TT&C (Tracking, Telemetry and Command) Transponder for Türkiye's first lunar mission spacecraft AYAP-1. The transponder will establish a communication link between the ground station (sending commands) and the spacecraft (sending back telemetry with spacecraft status information).

Türkiye and Azerbaijan cooperate in space

Azerbaijan and Türkiye are considering cooperating in the space sector, in particular in LEO satellites, including. IoT, communication and surveillance. Moreover, the Turkish satellite operator Türksat and the Space Agency of the Republic of Azerbaijan have **signed an agreement whereby Türksat will operate the Azerspace-2 satellite** to facilitate transmission of satellite data in the region of Africa.

Türkiye and Algeria sign agreements to boost bilateral cooperation, including in space

Türkiye's President Erdogan and Algerian President Abdelmadjid Tebboune signed a joint declaration during the second meeting of the High-Level Cooperation Council between Algeria and Turkey, **including 12 MoUs and 1 agreement to enhance cooperation** in the areas of space, culture, education, energy, health and others.

Türkiye and UAE agree to strengthen space cooperation

During Turkish President Recep Tayyip Erdogan's visit to the UAE earlier in 2023, several agreements between both nations were signed. Notably, within the space industry, **both states signed agreements to increase cooperation in satellite development**, space exploration, and space-related services.

Türkiye and Malaysia discuss cooperation in space technology

Both nations have discussed **the possibility of signing a bilateral agreement** with the aim of developing space technology. The agreement has the objective of sharing expertise and developing local talent in satellite manufacturing.



ISRO and MRIC sign MoU to construct Mauritius' EO Satellite



The Indian Space Research Organisation (ISRO) and the Mauritius Research and Innovation Council (MRIC) signed a **MoU for ISRO to design, build, launch, and operate the first EO satellite for Mauritius.** The agreement laid out a 15-month partnership for the respective roles of each nation. The satellite will be operated by both ISRO and MRIC at the MRIC's ground station. MRIC engineers will be trained by ISRO to develop the satellite's platform, systems and primary payload. Both agencies will also collaborate towards

registering the satellite with UNOOSA's space objects registry and its frequencies with the ITU.

In other news

SANSA signs the Space for Climate Observatory (CSO) Charter: The CSO is an international platform leveraging EO capabilities, which aims to enhance climate action (monitoring and adaption) through the optimised use of satellite data through international cooperation.

The UAE University of Sharjah joins China's ILRS project: China's Deep Space Exploration Laboratory and the University of Sharjah signed a MoU to formalise the cooperation, which focuses on providing an international platform for implementing, operating and utilising the ILRS and includes exchange on scientific and technological experiments, data exchange and analysis, training, and space exploration capabilities development.

UK will fund 23 projects with is £4M as part of the Enabling Technologies Programme (ETP): this includes £3.2M UKSA funding and with £800K contributed by the Science and Technology Facilities Council (STFC). The projects conducted by academia and industry address fields such as use of space for weather prediction, climate change monitoring, and space debris removal.

Jordan grants Starlink a telecommunication license: Jordan's Telecommunications Regulatory Commission signed a telecommunications licence with Starlink Jordan (owned by SpaceX) to provide Starlink services for Jordan from beginning 2024.

Azercosmos and Brazilian Space Agency sign MoU for space cooperation: the cooperation will be in space science, technology, and applications with a focus on application areas such as agriculture, disaster monitoring and water resources.

DLR successfully completed first flight test of its new Red Kite Solid Rocket Motor: Red Kite can be used in a one- or two-stage rocket configuration. The Single Stage Operational Assessment of Red Kite (SOAR) mission carried scientific payloads of two DLR institutes. A first operational flight of a rocket equipped with Red Kite is planned in February 2024 from Esrange.

Egypt elected to lead UN expert team tasked to draft a treaty to prevent space arms race: The team, formed by the UN Secretary-General, elected Egypt's Plenipotentiary Minister Bassam Hassan, Director of arms control and peaceful uses of atomic energy at the Foreign Ministry, and will work on the draft until August 2024, providing recommendations to the UNGA.

Azerbaijan's space agency Azercosmos joins UN Global Compact initiative: This enables Azercosmos to implement sustainable development in the country's space activities as well as to share experiences. Azercosmos and the UN also plan to discuss the "Azercosmos Report on the Assessment of the Impacts of Global Climate Change".



INDUSTRY & BUSINESS

Ariane 6 launch set for June-July 2024 after passing long-duration hot-firing test

ESA announced the window for the maiden flight of Ariane 6, now scheduled for a launch between mid-June and the end of July 2024. Key milestones, including successful tests of the core stage and upper stage, bolstered confidence in the launch. Indeed, on November 23rd, ESA successfully conducted a seven-minute full firing test of the Ariane 6's Vulcain 2.1 engine. Despite a minor delay due to a transient threshold pressure anomaly, the static-fire test simulated a complete burn of the core stage. The combined loading tests focused on system robustness, with particular attention to cooler ambient temperatures during night operations. Upcoming tests include the upper stage firing test in Germany in September and another combined loading test in French Guiana in November.

New partners join SES-Led consortium for EAGLE-1

The SES-led consortium, driving the development of the quantum-secure EAGLE-1 system in collaboration with ESA, welcomed TNO and Airbus Netherlands B.V. to partner in designing and constructing an optical ground station for the mission. EAGLE-1, co-funded by ESA, the European Commission, and various European space agencies and



Credit: SES

industries, aims to showcase the viability of quantum key distribution technology via satellite within the EU and globally. It promises to enhance cybersecurity and lay the groundwork for a secure quantum communication infrastructure (EuroQCI). The partnership, sealed at the Space Tech Expo in Bremen, outlines a system capable of receiving quantum encryption keys from the EAGLE-1 satellite. TNO and Airbus Netherlands B.V. will spearhead the collaborative effort, with TNO overseeing design, adaptive optics, and system engineering, while Airbus Netherlands B.V. manages support technologies, control platform development, and implementation. The project also involves Officina Stellare (OFS), Celestia-STS, and Demcon, contributing to telescope and dome design, optical digital modem development, and wavefront sensor design, respectively.

SpaceX receives regulatory clearance and launches Starship for a second time

The Federal Aviation Administration (FAA) completed a **review of SpaceX's Starship launch license**, focusing on public health and property impact. The safety evaluation encompassed SpaceX's safety procedures, flight safety analysis, and risk criteria. Collaborating with the U.S. Fish and Wildlife Service, the FAA initiated the review on October 19th, with a 135-day timeline for updates. **On November 15th, SpaceX received final regulatory clearance** for its second integrated Starship/Super Heavy launch. The FAA granted an updated launch license, ensuring SpaceX met safety, environmental, and financial requirements. The review found no significant environmental changes, validating prior conditions.

On November 18th, SpaceX's Starship showcased **successful booster performance and a new stage separation technique**. Lift-off from Boca Chica, Texas, encountered a brief delay due to upper stage pressurisation. The Super Heavy booster demonstrated stability, employing a "hot staging" method for improved engine ignition before separation. However, at around 3 minutes and 30 seconds post-liftoff, the booster experienced a "rapid unscheduled disassembly". Despite setbacks, this flight marked progress compared to April's test.



Avio's updates from the Space Summit 2023



On November 6th, at the Space Summit held in Seville, **ESA member** states granted Avio independence in marketing and managing Vega C launches, ending its association with Arianespace. Avio is set to become the Launch Service Operator for Vega C by mid-2024, managing flight operations and commercialisation rights. The Kourou Space Center will allocate infrastructure to Vega C and Vega E, enhancing launch frequency. The allocation of facilities at the

Guiana Space Centre ensures the future of Vega, positioning it for continued success.

Airbus launches Detumbler to prevent satellite tumbling

Airbus patented "Detumbler" device was successfully launched on November 11th. It is designed to prevent the tumbling of satellites at the end of their operational lives. Developed in 2021 with support from CNES under the Tech4SpaceCare initiative, the Detumbler is a 100kg magnetic damping device attached to a satellite. It features a central rotor wheel and magnets that interact with the Earth's magnetic field. During normal flight, the rotor acts like a compass following the magnetic field. If the satellite starts tumbling, the rotor induces eddy currents, creating a friction torque to dampen the motion. Scheduled for an in-orbit demonstration in early 2024, the Detumbler could facilitate future space debris-clearing missions. The test will occur on a mission by Exotrail (SpaceVan) alongside the Exo-0 nanosatellite from EnduroSat.

Airbus Defence and Space tests EUMESTAT Metop Second Generation satellites

Currently undergoing testing and instrument integration at Airbus Defence and Space in Toulouse, France, the Metop Second Generation A1 and B1 (Metop-SGA1 and Metop-SGB1) represent the initial pair of six satellites in the EUMETSAT Polar System – Second Generation (EPS-SG). The Metop-SGA satellites, developed under ESA contract by Airbus Defence and Space, boast enhanced capabilities to contribute to accurate and timely weather forecasts, impacting various sectors, from monitoring wildfires to predicting droughts. The system also supports the EU's Copernicus Sentinel-5 instrument for air pollution monitoring. The EPS-SG system will serve as the primary data source for sophisticated computer modelling in advanced weather forecasting, spanning from 12 hours to 10 days ahead. These satellites are expected to launch into a low-Earth, polar orbit around 835 km altitude in 2025-2026 and aim to enhance weather and climate services in Europe until at least the mid-2040s.

Sierra Space introduces Dream Chaser 'Tenacity'

On November 2nd, Sierra Space unveiled a new version of the Dream Chaser spaceplane. The vehicle, named "Tenacity", is recognised for its potential as a commercial runway-capable spaceplane and will undergo environmental testing at NASA's Armstrong Test Facility in Ohio. Under NASA's CRS-2 contract, Dream Chaser – designed for cargo and crew transport – will resupply the ISS. The priority is on safety and sustainability, aligning with eco-friendly propulsion systems. The inaugural mission is planned for March 2024, launching with ULA's Vulcan Centaur rocket.



Credit: Sierra Space





SES S&D secures \$270M from U.S. DoD and launches O3b mPOWER satellites

SES Space & Defense secured a \$270M Blanket Purchase Agreement with the U.S. DoD for MEO satellite services. The agreement covers low-latency, high-throughput satellite services and includes end-to-end managed services, broadband, gateway services, monitoring, control, terminal leasing, sales, field support, training, and terrestrial backhaul.



Credit: SES

Furthermore, on November 12th, SES successfully launched the fifth and sixth O3b mPOWER satellites via SpaceX Falcon 9 from Cape Canaveral. However, the first four satellites, launched last year, are undergoing orbital checks and SES is rescheduling the launch of its O3b mPOWER satellite constellation's commercial service to early Q2 2024 due to power module issues. After "trip offs"

on some satellites, the company revealed increased power module shutdowns, impacting the satellites' expected lifetime and capacity. To address this, **SES and Boeing are upgrading satellites seven through eleven and adding two more**. An agreement was finalised to share risk and capital expenditure. SES is contemplating an insurance claim, and Boeing might share in proceeds.

ESA selects Square Peg Communications for 5G and 6G testing initiative

The Canadian company Square Peg Communications has been **chosen by ESA to lead the implementation of an emulation environment for testing various scenarios across multiple satellite constellations under the Space for 5G and 6G Strategic Programme Line**. Collaborating with WORK Microwave, Square Peg's high-performance RLS-2100 tester creates an emulation environment supporting terrestrial and non-terrestrial links for 5G application testing, offering a wide frequency range and seamless integration. The project enhances ESA's ability to test 5G scenarios flexibly and affordably across diverse satellite constellations, marking a significant advancement in space-based 5G technology. The RLS-2100 allows hardware-in-the-loop testing, realistic emulation of link characteristics, and verification of link performance during handovers.

HyImpulse to launch its suborbital rocket and partners with SaxaVord Spaceport

At the Space Tech Expo in Bremen held in November, the German-based company Hylmpulse Technologies announced **the upcoming launch of its SR75 suborbital rocket from Southern Launch's Koonibba Test Range, Australia, in March 2024**. The company completed the assembly and integration of the rocket, featuring its innovative HyPLOX-75 hybrid rocket engine. The SR75 aims to carry payloads up to 255 kgs to a maximum altitude of 200 km. The rocket will undergo final preparations before shipment to Australia, highlighting Southern Launch's role in supporting global cooperation in space exploration. The SR75 mission is subject to regulatory approval.

Moreover, the UK **SaxaVord Spaceport announced it will host orbital rocket launches by Hylmpulse Technologies from late 2025**. A letter of intent seals two subsequent sub-orbital launches from Scotland's SaxaVord Spaceport. Full-scale orbital launches are anticipated from late 2025, leading to full commercial operations by 2030.



Credit: SaxaVord



SatRev partners with TelePIX for 6U AI satellite in Blue Carbon programme



Credit: SatRev

The Wrocław-based SatRev partnered with South Korea's TelePIX to develop a 10-kilogram 6U satellite, housing an onboard optical AI instrument. Set for a 2024 launch, the satellite is part of the TelePiX Blue Carbon AI satellite programme. It features a medium-resolution optical instrument and the onboard processor for TelePIX's AI "blue carbon" monitoring algorithm. The contract encompasses platform development, integration, launch, and satellite operation. The partnership also secures licensing rights for satellite images, facilitating EU access to TelePIX's EO data.

Kratos secures \$579M contract extension from USSF Space Systems Command

Kratos Defense & Security Solutions secured an **eight-year contract extension for technical services supporting U.S. military communications satellites' ground systems**. Awarded by the U.S. Space Force's Space Systems Command, the indefinite-delivery/indefinite-quantity contract, valued at up to \$579M, extends through November 2031. Operating under the programme name C-SAR (Command-and-Control System-Consolidated Sustainment and Resiliency), Kratos will maintain and enhance satellite ground systems for the USSF and U.S. Space Command. Tasked with providing planning, processing, and information assurance measures, Kratos will also facilitate information technology infrastructure upgrades as new satellite constellations are deployed. The contract supports command-and-control operations for 26 military communication satellites across four constellations, as well as the integration of future satellites and constellations. The work is set to take place at Schriever Space Force Base, Colorado; Vandenberg Space Force Base, California; and Peterson Space Force Base, Colorado.

DISA launches \$900M PLEO Satellite-Based Services contract

On November 22nd, the Defense Information Systems Agency (DISA) released a **request for proposals for LEO satellite-based services**, marking the initiation of the Proliferated Low Earth Orbit (PLEO) Satellite-Based Services contract. Managed by DISA on behalf of the Space Force's Commercial Satellite Communications Office (CSCO), the contract could see task orders worth up to \$900M over the next five years. Initially involving 16 vendors, including SpaceX and OneWeb, the roster has expanded to include AT&T, Honeywell Aerospace, Iridium, and Lynk Global. The IDIQ contract aims to fulfil the Department of Defense's global, low-latency PLEO services requirement, fostering collaboration for swift, cost-effective mission capabilities.

Telesat wins Phase 2 contract for DARPA's Space-BACN Programme

Telesat Government Solutions, a subsidiary of satellite operator Telesat, secured the **Phase 2 contract for the Defense Advanced Research Projects Agency (DARPA) Space-Based Adaptive Communications Node (Space-BACN) programme**. Space-BACN aims to develop a reconfigurable, low-size, weight, power, and cost (SWaP-C) intersatellite optical communications terminal. It facilitates connectivity between diverse satellite constellations, fostering the Department of Defense's joint all-domain command and control initiative. The 20-month Phase 2 contract builds on Telesat's Phase 1 work, emphasising scalability, increased nodes, and improved efficiency for cross-constellation communications.



Pixxel partners with EUSI for advanced remote sensing

The U.S.-based Pixxel partnered with the European Space Imaging (EUSI) **to grant users access to Pixxel's detailed hyperspectral imagery through EUSI**. The synergy of Pixxel's technology and EUSI's insights aims to set a new standard in regional remote sensing applications. EUSI's expanding offerings solidify its position as a hub for EO data. Customers can now acquire Pixxel's hyperspectral dataset alongside optical and SAR imagery from a single source, advancing applications in agriculture, forestry, energy, and mining.

ispace unveils micro rover for lunar Mission 2

The Japanese-based company ispace **unveiled the final design of its micro rover**, a **key component of its upcoming Mission 2**. The micro rover, measuring 26 cm tall and weighing approximately 5 kg, will be transported to the Moon's surface by the RESILIENCE lander. Constructed with carbon fibre-reinforced plastics, the rover is designed for stability during rocket launch and lunar transit. Mission 2 is scheduled for launch no earlier than winter 2024 via a SpaceX Falcon 9 rocket. The exploration activities during Mission 2 will involve the micro rover conducting initial resource exploration. Notably, the mission aligns with NASA's Artemis programme, with ispace EUROPE set to collect lunar regolith for NASA. Epiroc, a sustainability partner, collaborated with ispace on the development of a regolith collection system for the micro rover. Other supporting companies, including Chiyoda Corporation and Bandai Namco Research Institute, joined the HAKUTO-R programme, expanding collaboration in lunar exploration.

ESA signs three contracts with SWISSto12, Planetek Hellas and TEKEVER

ESA and SWISSto12 signed a contract for the comprehensive development of HummingSat, a new line of small-sized satellites. This ESA Partnership Project aims to enable SWISSto12 to carve a niche in the global market for small, flexible geostationary satellites. SWISSto12 has already sold four satellites, with the first slated for a 2026 launch on an Ariane 6 rocket for Intelsat. These HummingSats are more cost-effective to build and deploy due to their compact size. Leveraging SWISSto12's 3D-printing technology, these satellites promise enhanced payload performance, streamlined



Credit: ESA

manufacturing, and reduced production costs. The HummingSat Partnership Project receives support from various European countries, reflecting its potential return on investment.

Moreover, Planetek Hellas reached a collaboration phase with ESA through a newly signed contract under the ESA's EO for Civil Security Applications initiative. Valued at €500K, this 12-month initiative aims **to develop EO strategies for security and law enforcement**, demonstrating innovative approaches for global authorities combating terrorism and organised crime. Led by Planetek Hellas, the consortium includes Janes (UK) and the Center for Security Studies (Greece). The project seeks to enhance operational efficiency by integrating EO services into INTERPOL's Counter Terrorism operations.

Lastly, the Portuguese company TEKEVER secured a €3.2M contract **to provide satellite communications for the ESA's Comet Interceptor mission**. TEKEVER's Inter-Satellite Link (ISL) technology, GAMALINK, will enable communication between satellites and ground stations during the 2028 mission to observe a long-period comet.





Celestia TTI secures ESA contract for space debris tracking radar

The Netherlands-based Celestia TTI, leading a consortium, secured a €9.9M contract from ESA for a Tracking Radar to monitor LEO Space Debris in Greece. Acting as the prime contractor, Celestia TTI will oversee the design, development, and deployment of the LEO Space Debris Tracking Radar (HSTR), Greece's contribution to the European Space Surveillance and Tracking (EU-SST) consortium. The radar, to be operational by end-2026, enhances EU-SST capabilities for better space surveillance data. The project, managed by Celestia TTI Madrid, involves GMV and OHB Hellas, leveraging advanced radar processing techniques and expertise in radar solutions. HSTR aims to refine orbits, predict re-entry, and improve collision avoidance services, detecting objects of 2.5 cm diameter at a range of 1000 km. The project unfolds in two phases, including a design phase and subsequent development, deployment, and validation.

UK awards Spaceflux contract for ground-based space telescope in Cyprus



Credit: Spaceflux

The UK Space Command and the UK Space Agency granted a contract to Spaceflux for **constructing a ground-based space camera-telescope system in Cyprus, known as Project 'Nyx Alpha'**. Spaceflux, a UK space technology firm, will build and operate the system. This telescope, positioned to monitor objects in geostationary orbit, serves the mission of providing positional information on UK satellites, aiding collision prevention and enhancing the UK's Space Domain Awareness.

Firefly Aerospace and Fleet Space join forces for lunar exploration

The U.S. company Firefly Aerospace partnered with Australian space exploration company Fleet Space Technologies to transport and operate Fleet's Seismic Payload for Interplanetary Discovery, Exploration, and Research (SPIDER) on the Moon's far side. As part of Firefly's second lunar mission in 2026, the Australian-backed SPIDER payload will be carried on Firefly's Blue Ghost lander. The SPIDER technology, part of the Australian Space Agency's Moon to Mars initiative aligned with NASA's Artemis programme and will capture seismic data from the lunar surface for up to 14 days, providing insights into the geological properties and mineral profile of the Moon.

Intuitive Machines plans Moon missions in 2024

Houston-based Intuitive Machines is gearing up for its inaugural lunar mission, IM-1, now scheduled for a January 12th launch from Kennedy Space Center. Delays, attributed to "launch pad congestion", are being used for additional testing of the Nova-C lander, headed for the moon on January 19th. Despite launching after Astrobotic's Peregrine lander, IM-1 may land before Peregrine. Intuitive Machines is planning two more missions in 2024, IM-2 and IM-3, with lunar rover services.



Credit: SpaceNews/Jeff Foust



Virgin Galactic completes 'Galactic 05' mission and plans two new spacecraft



On November 2nd, Virgin Galactic announced **the completion of its 'Galactic 05' space mission, marking the sixth in six months**. Serving as a suborbital lab for spacebased research, the mission carried astronauts Dr. Alan Stern, Kellie Gerardi, and Ketty Pucci-Sisti Maisonrouge. Stern conducted biomedical experiments for a future NASA mission, while Gerardi explored fluid dynamics and biomedical research. This underscores Virgin Galactic's

commitment to supporting scientific advancements and expanding role in facilitating space research.

However, Virgin Galactic is set to **lay off 185 employees, constituting 18% of its workforce**, to navigate financial challenges and prioritise a new spacecraft line. The layoffs, affecting various roles, aim to streamline operations tied to the existing VSS Unity spaceplane. The company will temporarily suspend spaceflights in mid-2024 to concentrate resources on developing two new spacecraft, with plans to retire the existing VSS Unity spaceplane and focus on the new "Delta Class" spaceships capable of twice-weekly flights. After Unity's retirement, staff at Spaceport America will relocate to a new factory near Phoenix, with Delta Class vehicle test flights expected to commence in 2025.

Avanti Communications shifts focus to global multi-orbit connectivity

The UK-based Avanti Communications is shifting its focus from being a geostationary satellite operator to a global multi-orbit provider of integrated connectivity services. The move comes in response to the growing complexity of the satellite industry due to increased convergence between terrestrial and non-terrestrial connectivity. Avanti aims to address the diverse needs of its customer base by adopting a customer-centric approach, emphasising a "customer pull" rather than a "technology push" model. The company is in talks with a leading LEO operator to procure capacity and plans to invest in managed services capabilities to stay agile and responsive to industry trends.

Momentus and RIDE! Space partner for in-space infrastructure services

The U.S. commercial space company Momentus entered into an agreement with the French-based RIDE! Space **to offer its in-space infrastructure services through the RIDE! Space platform**. The digital platform manages the entire launch process, catering to the needs of both launch vehicles and satellite operators. This tool excels in scouting launch opportunities, evaluating performance, pricing, and service levels, and finalising contractual agreements for launch services. The partnership between the two companies includes a services agreement to launch two payloads on a single mission in 2024: the second satellite launched for Djibouti, Djibouti-1B, and the first one launched for Senegal, Gaindesat.



Credit: Momentus



Eutelsat OneWeb partners with Taiwan, South Africa, India and South Korea



Credit: Eutelsat OneWeb

Taiwan's Chunghwa Telecom signed a **multi-million-dollar distribution deal with Eutelsat OneWeb for LEO satellite services**. This collaboration aims to enhance Chunghwa Telecom's communication services suite with additional spacebased connectivity, providing resilience and complementing existing terrestrial networks. The partnership allows Chunghwa Telecom to integrate Eutelsat OneWeb's LEO satellite services

into its offerings. The move is crucial for Taiwan, relying heavily on submarine cables for external connectivity, with satellites as a secondary option. The deal reflects the growing demand for robust and resilient connectivity, as Eutelsat OneWeb's LEO constellation comprises over 600 satellites.

Eutelsat OneWeb also signed a multi-year master distribution agreement with NEC XON, in South Africa, to bring high-quality LEO connectivity to Sub-Saharan Africa. The collaboration includes installation services and extensive training across the region, to address the growing demand for seamless and borderless connectivity. Eutelsat OneWeb's LEO satellite network will provide high throughput, low latency connectivity, supporting applications in cellular backhaul, oil and gas, agriculture, government, and mining.

Furthermore, OneWeb India received regulatory approval from IN-SPACe, the Indian space regulator, **to launch Eutelsat OneWeb's commercial satellite broadband services in India**. Eutelsat OneWeb, with existing licenses from the Department of Telecommunications, aims to provide high-speed, low-latency internet connectivity across India, pending final spectrum authorisation.

Lastly, Eutelsat OneWeb entered a distribution partnership with Hanwha Systems **to offer high-speed**, **low-latency connectivity services in South Korea**. The partnership enhances connectivity for emergency services, disaster-prone regions, and areas with poor infrastructure. The collaboration involves Hanwha's participation in the 'commercial low-orbit satellite-based communication system' project for the Korean government, leveraging Eutelsat OneWeb's satellite network. The initiative aims to install satellite communication terminals in challenging-to-reach areas, including remote locations, at sea, and in the air. Hanwha Systems is seeking government approval for cross-border telecommunications services.

Bayanat, Yahsat and ICEYE expand EO programme with SAR satellites

Bayanat and Yahsat, in collaboration with ICEYE, are expanding their EO space programme, **adding two synthetic aperture radar (SAR) satellites**. This expansion enhances monitoring capabilities, offering near real-time, high-definition images for government and business sectors. The SAR technology, provided by ICEYE, allows persistent monitoring day and night, aiding in detecting ground changes. The applications span various sectors, including insurance, national security, and climate change monitoring.

MDA secures \$180M ATP contract

MDA secured a **\$180M** Authorization to Proceed (ATP) contract for a Non-Geostationary Orbit (NGSO) satellite constellation from an undisclosed customer. The ATP initiates engineering and programmatic activities, including long-lead item procurement. The full constellation, valued at a minimum of \$750M, is set to feature at least 36 MDA software-defined digital satellites. MDA anticipates the definitive contract as the prime contractor in 2024, pending finalisation.



EDGE signs two MoUs to improve partnerships in the UAE

The **UAE Space Agency and EDGE signed a MoU to launch the Sirb programme**, a constellation of three synthetic aperture radar (SAR) satellites, with the first satellite, Sirb-1, set for launch by 2026. EDGE, acting as prime contractor, forms a consortium with Yahsat, Bayanat, and NSSTC, covering SAR payload, satellite management, and testing operations. The move follows the recent launch development phase by UAE leaders. This partnership aims to grow the private space sector, fostering innovation and competitiveness.

Moreover, **EDGE signed a MoU with the MBRSC for knowledge exchange and data sharing**. This partnership reflects EDGE's commitment to extending its capabilities into the space domain and underscores the importance of local partnerships in the UAE. This collaboration aligns with their vision to solidify the country's leadership in the global space arena and EDGE's strategy to become a notable contributor to the space industry by leveraging MBRSC's advanced space programmes.

UAE companies partner with Thales Alenia Space, ALTEC and CRP Technology

The UAE MBRSC prolonged its MoU with the Italian companies Thales Alenia Space and ALTEC, **extending their partnership for an additional two years**. The agreement, initially signed in October 2021, was officially extended at the Dubai Airshow 2023, held in November. The extended collaboration aims to explore and develop solutions for space and planetary exploration systems, focusing on initiatives such as interplanetary missions, rover system design, and advanced terrestrial analogous systems.



Credit: MBRSC

Moreover, the UAE company EPI, an EDGE Group entity, signed a **Letter of Intent with Thales Group at the Dubai Airshow 2023**. The agreement facilitates joint exploration of procurement opportunities for industrial parts and engineering services. EPI plans to offer precision machining services for metallic parts, supporting functions like surface treatments and assemblies. The collaboration is part of Thales' "Go to UAE" initiative, aiming to strengthen the local industrial footprint by cultivating local suppliers.

Furthermore, the UAE-based Orbital Space officially partnered with the Italian company CRP Technology. The collaboration aims **to support Orbital Space's Lunaris Moon Mission for lunar exploration**. CRP will utilise its Windform selective laser sintering (SLS) materials to manufacture payloads and components, utilising their space-qualified 3D printing materials.

Orbit Fab collaborates with UKSA for GRASP

Orbit Fab is collaborating with the UK Space Agency to develop the GRASP (Grasping and Resupply Active Solution for Propellants) active refuelling interface, which ensures a secure link between spacecraft during docking and refuelling. This partnership focuses on creating fundamental components for in-space refuelling, enhancing space sustainability, and extending the mission life of existing programmes. The project has also contributions from MDA, City University, and an expanded UK team.



Marble Imaging and Scanway partner for high-resolution satellite constellation



Credit: Marble Imaging

The German company Marble Imaging and Poland's Scanway formed a strategic partnership **to create a multispectral payload for Marble's planned constellation of up to 200 small EO satellites**, offering global imaging at very high resolution. The collaboration already won the German "Kleinsatelliten Nutzlastwettbewerb" competition, securing free provision of the satellite platform and transport into space. Scanway, with expertise in optical payload development, aims to deliver a telescope with a resolution target of 0.7 metres. The satellites will provide valuable Earth surface data for clients

worldwide, emphasising European self-reliance in EO. Marble will process the data for insightful analytics, catering to applications like environmental monitoring, sustainability, and humanitarian aid.

Saber Astronautics secures \$1.2M USSF contract

Saber Astronautics secured a \$1.2M contract from the US Space Force **to advance manoeuvre planning capabilities in the "CisLunar" region between Earth and the Moon's orbit**. Teaming up with Purdue University, the project aims to enhance Space Domain Awareness using Saber's Space Cockpit software, offering operators a sandbox environment to model threats and plan nonstandard orbit manoeuvres.



In other news

The Italian Apogeo Space launched nine smallsats designed for IoT services: launched by SpaceX's Falcon 9 and released by D-Orbit's Orbital Transfer Vehicle, the pico-satellites will offer global IoT coverage. Future launches, beginning in March 2024 with Momentus, will augment revisit frequency and introduce bi-directional communication. The project is slated for completion in 2027.

TEKEVER partnered with CNES: the aim is to trial innovative Inter-Satellite Link (ISL) concepts using GAMALINK, TEKEVER's software-defined radio. The contract focuses on delivering engineering models of ISL equipment with ranging and synchronisation capabilities for a future space mission. The collaboration also aids CNES in satellite swarm activities, contributing to the development of distributed sensors for space exploration.

AAC Clyde Space secures a €1.14M order for Starbuck power systems: slated for Q1 2025 delivery, the PCDU (Power Conditioning and Distribution Unit) system is lauded for reliability and adaptability, serving applications from lunar missions to military use.

Solestial secures a \$849,954 Phase II SBIR contract from NASA for "Next Generation Silicon Based Solar Arrays": the 18-month contract aims to develop 50-kilowatt class solar array wings using Solestial's silicon solar blanket technology, collaborating with Opterus Research & Development.

DCUBED and Solestial collaborate on a solar array: the product combines DCUBED's in-space back structure manufacturing with Solestial's flexible silicon solar blanket. Anticipated to be ten times more cost-effective than existing solutions, the deployable smallsat solar array targets high-power-consuming satellites in communication constellations, to reduce mission costs.

iSpace (China) successfully launched and landed the reusable test vehicle Hyperbola-2Y: the company plans to launch the 13.4-ton reusable Hyperbola-3 in 2025, with a goal of 25 launches annually by 2030.

Lockheed Martin granted Terran Orbital \$7.7M contract modification, boosting the total value to over \$52M: this accommodates previously expected scope into the existing satellite design and manufacturing programme. Terran Orbital delivered 10 satellite buses last year and is now constructing 42 buses for Lockheed Martin's Tranche 1 Transport Layer, scheduled for a late 2024 launch, and secured 36 buses for the Tranche 2 Transport Layer, slated for late 2026 under a \$816M contract.

Venturi Astrolab's FLEX rover secures agreements with eight enterprise customers for its Mission 1 to the Moon: the mission is valued at over \$160M and the FLEX rover, transported by SpaceX, is set to deploy payloads on the lunar surface by mid-2026.

Skyrora and Spirit AeroSystems partner for UK's orbital launches: targeting 16 launches annually for small satellites, Spirit's manufacturing supports Skyrora's production path, and the partnership extends to additive manufacturing research with Skyprint 2.

Comtech secures a \$20M order from Spectra Group for its COMET system: catering to NATO and EU partners, the COMET Troposcatter technology provides resilient, secure, and interoperable Beyond-Line-of-Sight (BLOS) communication.

HawkEye 360 secured \$12.25M U.S. Government contract: the aim is to enhance maritime domain awareness in the Indo-Pacific. They will share satellite RF data and analytics and its satellite constellation will monitor vessel activity, ensuring stability and prosperity in the region.



INVESTMENT & FINANCE

Space Norway acquires Telenor Satellite for \$216M



Credit: Space Norway

Norwegian state-run telco **Telenor is selling its satellite division to Space Norway in a \$216M deal**, pending parliamentary approval. The move aims to consolidate Norway's space interests and maintain control over critical satellites. Telenor Satellite, owning three geostationary spacecraft, will refocus on terrestrial communications. Space Norway, known for the Arctic Satellite Broadband Mission, expands its capabilities with Telenor's assets, boosting Norway's global space presence. Both companies

produced combined revenues of \$165M in 2022 and would employ around 170 people as a combined group. The deal, fostering continued cooperation, marks a strategic shift for Telenor while enabling new satellite projects.

D-Orbit reaches agreement with Marubeni Corporation to lead Series C round

D-Orbit and Marubeni Corporation, a Japanese company, announced a new investment agreement, with Marubeni leading D-Orbit's Series C funding round, **expected to exceed 100 million euros**. This investment will bolster D-Orbit's global operations, focusing on in-orbit servicing, space cloud computing, and orbital transportation. Marubeni's partnership aims to foster innovation and sustainable space services, expanding Marubeni's agency mandate beyond Japan and Southeast Asia.

Firefly Aerospace raises \$300M in Series C round

Firefly Aerospace successfully raised \$300M in Series C round. Led by AE Industrial Partners, the Texas-based space transportation company experienced increased investor interest in a third tranche of Series C funding. This will develop the company's orbital vehicle capabilities to pursue their end-to-end transportation. The company's CEO, Bill Weber, attributes the successful investment round due to Firefly's focus on production and mission executions, following the launch of a Millennium Space Systems-built space domain awareness satellite aboard its Alpha launch vehicle for the Space Force's VICTUS NOX mission.

Viasat logs \$900M write-down charge after expected insurance proceeds

Viasat logged a \$900M charge in the second quarter of the 2024 fiscal year due to the impairment of ViaSat-3, a total loss on Inmarsat-6 F2, and the write-down on ViaSat-4. **The \$900M net impairment charge consisted of \$1.6B of asset write-downs and contract liabilities**, and was partially offset by the gains associated with the expected insurance proceeds for ViaSat-3 F1 and Inmarsat-6 F1. This comes as the ViaSat-4 project, originally



Credit: ViaSat

designed for fixed broadband, was abandoned, with CEO Mark Dankberg citing a shift in priorities towards mobility services, saving significant near-term costs and accelerating free cash flow generation. With a forthcoming report on the ViaSat-3 feeder link antenna anomaly, the company expects a decline in the U.S fixed broadband market until a new ViaSat-3 satellite is launched.



Euroconsult predicts dual growth trajectory in ground segment and Earth **Observation (EO) markets**



Euroconsult released its fourth annual report on the ground segment market, predicting that it will reach a value of \$80B by 2032. The report emphasises the necessity for adaptable ground infrastructure to support advanced communication needs in the evolving space segment. Euroconsult's market intelligence predicts a 2.3-factor increase in commercial user terminals by 2032, driven by NGSO constellation deployments, resulting in an 8.7% Compound Annual Growth Rate (CAGR).

This trajectory aligns with Euroconsult's projection for the EO market in its 16th edition, which anticipates growth from \$4.6B in 2022 to \$7.6B over the next decade. The EO market expansion is driven by technological advancements, premium product offerings, and increased public investment, with North America currently holding a leading 45% market share, followed by Europe at 22%. However, the sector faces challenges such as inflation, launch delays, and geopolitical constraints affecting export opportunities. To counter these challenges, leading operators are reducing expenses, incorporating AI-based tools for quicker data evaluation, and navigating funding issues related to commercial constellation initiatives.

Saudi Arabia's space sector records \$400M in revenue in 2022

A recent report from the Saudi Communications, Space, and Technology Commission indicate that the country's space industry has recorded revenues of \$400M in 2022, with even greater growth in 2023. The KSA expects the sector to continue to grow, with key enablers such as a space sectoral fund for local actors, incentivisation programmes, and upskilling initiatives. In particular, the development of sovereign spacecraft capabilities is expected to become a pivotal subsector in the Kingdom.

Astra Space defaults on loan and plans to go private



Credit: Astra

California-based space launch company, Astra Space, had to default on a \$12.5M loan due to low cash reserves. In October, Astra's cash on hand fell below the required minimum, triggering a default. Astra was able to secure interim financing of \$13.4M from investors JMCM Holdings and Sherpa Venture Funds II, which gave the company time to find additional funding. Astra had aimed, through this additional funding, to raise \$15-25M intending to pay off the defaulted loan and address general corporate

needs. The financial struggles come amid earlier layoffs and delays in the development of the Rocket 4 launch vehicle.

The situation has prompted Astra to consider privatisation. Founders Chris Kemp and Adam London, who collectively hold all of the company's Class B stock, amounting to 66% of the company's voting power, offered a non-binding proposal to take Astra private at \$1.50 per share, valuing the company at nearly \$30M. The special committee formed by independent directors will evaluate the offer. The founders emphasised that privatisation aligns with Astra's strategic objectives, offering flexibility and serving the best interests of shareholders, employees, and customers.



World View and Leo Holdings terminate merger deal

World View, a stratospheric exploration and flight company, and Leo Holdings Corp. II, a special purpose acquisition company (SPAC), have **mutually agreed to terminate their previously announced business combination agreement**. The decision comes in response to challenging market conditions and despite strong interest from potential investors, leading to the dissolution and liquidation of the SPAC, as its securities are expected to be delisted from the New York Stock Exchange.



Credit: World View

Leo Holdings Corp. II had faced challenges even before the

termination announcement. The SPAC had extended its deadline seven times to complete the \$350M merger with World View, and shareholders had voted to allow 11 more month-long extensions until October 2024. The termination adds to the broader challenges faced by SPACs in the space industry, with several companies struggling to meet financial projections, and regulatory bodies proposing stricter rules for SPAC transactions.

Gilat Satellite Networks completes DataPath acquisition

Gilat successfully concluded the acquisition of DataPath, a key player in trusted communications for the U.S. DoD Military and Government sectors. The acquisition aligns with Gilat's strategy to expand its footprint in the defence market. This transaction was approved by both the Gilat and DataPath Board of Directors, stakeholders, and received the required regulatory approvals, including that from the Committee on Foreign Investment in the United States (CFIUS).

The move positions Gilat to provide integrated solutions in the evolving satellite communication market, reinforcing its strategy in the global defence sector. Adi Sfadia, CEO of Gilat, underscored the strategic importance of the acquisition, while David McDonald, President of DataPath, emphasised the joint capabilities that the acquisition will facilitate.

Telespazio acquires e2E to push into U.K. market



Credit: Telespazic

Telespazio, the European space mission integrator, has acquired British engineering and consultancy firm e2E, strengthening its presence in the expanding U.K. satellite industry, The acquisition is part of a strategic move to align with the U.K.'s 10-year national space strategy. The company e2E specialises in systems engineering for space-based communications networks and is a key actor in the U.K.'s Skynet 6 military satellite communications programme.

The takeover positions Telespazio to develop its integrated space capabilities in the national space strategy, as the U.K. government invests over \$12.5B in space activities. Whilst financial details of the acquisition have yet to be released, e2E employs around 85 people, substantially increasing the presence of Telespazio UK, which employs around 116 people.



SpaceX anticipates \$15B in sales next year

SpaceX is on track to achieve \$15B in projected sales in 2024, resulting in \$9B in revenues. Starlink, SpaceX's internet service, is anticipated to surpass the launch business in sales next year, becoming the predominant contributor to SpaceX's revenues. Starlink is expected to contribute over \$10B to total sales in the coming year, potentially reaching annual revenues of \$30B. This



Credit: Starlink

comes after a statement from Elon Musk, who recently announced on social media that Starlink had reached cash flow breakeven.

Kuva Space raises €16.6M in Series A funding

Finnish startup Kuva Space, specialising in hyperspectral satellite imagery, secured €16.6M in a Series A funding round. Led by existing investors Voima Ventures and Nordic Foodtech VC, the funding will expedite satellite launches, enhance AI analytics, and support market expansion, starting with the United States. The technology can monitor various Earth materials and it works through a subscription model. The funding will also contribute to the planned satellite constellation, targeting 100 satellites by 2030.

Blackshark.ai secures \$15M Series A extension

Al geospatial intelligence firm **Blackshark.ai secures an additional \$15M in a Series A extension, bringing the total Series A funding to \$35M**. Existing investors Point72 Ventures, M12 (Microsoft's Venture Fund), and Maxar were joined by other investors such as In-Q-Tel, and Capgemini's VC Fund managed by ISAI. Blackshar.ai aims to democratise high-frequency 3D mapping applications across geospatial use cases through its platform that converts raw satellite data and aerial imagery into geospatial data. The latest funding will support strategic technology developments, as well as to strengthen their sales and marketing activities.

Arcfield acquires Orion Space solutions



Credit: Orion Space Solutions

Arcfield, an American company specialising in space mission support and technology for government clients, has acquired Orion Space Solutions to enhance its capabilities and broaden its offerings to the DoD. Kevin Kelly, Arcfield's Chairman and CEO expressed confidence that integrating Orion's expertise will strengthen Arcfield's ability to deliver space technologies for DoD and intelligence missions.

Orion Space Solutions, based in Colorado and founded in 2015, emphasises science-centric engineering, spanning instrumentation, cubesats, data science, and AI. The collaboration aims to leverage their collective expertise. Orion's leadership, including CEO Geoff Crowley, will assume key roles within Arcfield's structure, with Orion becoming Arcfield's fourth business sector.



In other news

Solar Foods raises €8M in Series B round: Finnish company, Solar Foods, raised €8M through the Finnish investment organiser Springvest Oyj. The capital will ramp up production of their commercial-scale production facility and development of food products.

Spherical Systems secures €1M in pre-seed round: Noordwijk-based startup, Spherical Systems, raised €1M for the development of a chip suitable for extreme space conditions. Led by VroegeFaseFinanciering powered by UNIIQ, it will fund product development and team growth.

Databourg raises \$1M in seed funding: Data analytics startup Databourg raised \$1M in seed funding led by the Asian Development Bank (ADB) Ventures. The Luxembourg-based company aims to expand its operations on early warnings and risk management against extreme weather events.

FOSSA Systems close on funding round: FOSSA, a Spanish company commercialising spacebased IoT for industries, has secured funds to build out its constellation of satellites to provide D2D communications. The round was led by Nabtesco Technology Ventures and Indico Capital.

Sift raises \$7.5M in seed round: Sift, a telemetry tool-based startup in the U.S., raised \$7.5M in funding. Led by Riot Ventures and Fika Ventures, the American company intends to expand operations and its development efforts.

Zephr raises \$3.5M in seed round: Led by Space Capital and First Spark Ventures, the GPS startup Zephr raised \$3.5M. The American company aims to create a networked GPS solution to enhance GPS accuracy for mobile devices using GNSS.

KMI closes \$750K from a seed round: U.S. debris removal startup, KMI, secured \$750k in private investment to advance its technology development and commercialisation initiatives after securing around \$4.3M in DoD contracts.



LAUNCHES & SATELLITES

Global space activity statistics

November 2023	USA	China	Russia	Others	Total
Number of launches	10	4	1	1	16
Number of spacecraft launched	252	6	1	1	260
Mass launched (in kg)	126 742	9870	500	100	137 212

Launch activity over the year



Evolution of the number of launches per launch country



Evolution of launch activity over the year 2022-2023



Satellite missions and markets



Evolution of the total mass launched (tons) per mission (Dec. 2022-Nov. 2023)



Evolution of the total mass launched (tons), per market (Dec. 2022-Nov. 2023)

November 2023	Telecom	Remote sensing	Human spaceflight	Tech / Demo	Science	Other
Europe	3423.6	404		154		251.45
USA	109 604	386	11 200	434.15	300	250
China	5500	3800		570		
Russia		500				
Japan					10	
Others	18.1	178.5		224		4.2

Total mass (kg) launched by mission and customer country

November 2023	Commercial	Governmental Civil	Military	Education	Other
Europe	4213.6	18		0.25	1.2
USA	110 494	11 500		180.25	
China	5500	1370	3000		
Russia			500		
Japan		10			
Others	306.1	5.5	100	13.2	

Total mass (kg) launched by market and customer country



Launch Log

Launch date	Launch country	Launcher	Spacecraft name	Main customer	Customer country	Prime manufacturer	Manufacturer country	Mass (kg)	Mission	Market
03/11/2023	USA	Falcon-9 v1.2 (Block 5)	Starlink (23 spacecraft)	SpaceX	USA	SpaceX	USA	800 (each)	Telecom	Commercial
03/11/2023	China	CZ-7A	TJS 10	PLA	China	SAST	China	3000,00	Signal Intelligence	Military
08/11/2023	USA	Falcon-9 v1.2 (Block 5)	Starlink (23 spacecraft)	SpaceX	USA	SpaceX	USA	800 (each)	Telecom	Commercial
09/11/2023	China	CZ-3B/G3	ZX 6E / ChinaSat 6E	China Satcom	China	CAST	China	5500,00	Telecom	Commercial
10/11/2023	USA	Falcon-9 v1.2 (Block 5)	Dragon CRS-29	NASA	USA	SpaceX	USA	11000,00	Cargo Transfer	Gov.Civil
			AWE	NASA	USA	Space Dynamics Laboratory	USA	300,00	Earth Science	Gov.Civil
			ILLUMA-T	NASA	USA	MIT	USA	200,00	Space Station Infrastructure	Gov.Civil
11/11/2023	USA	Falcon-9 v1.2 (Block 5)	AEther (1 & 2)	Kepler Communications	Canada	Kepler Communications	Canada	100 (each)	Tech/Demo	Commercial
11/11/2023	USA	Falcon-9 v1.2 (Block 5)	Aman 1(R)	ETCO	Oman	SatRevolution SA	Poland	3,00	Earth Observation	Gov.Civil
			Barry-1	Rogue	USA	EnduroSat	Bulgaria	17,00	Tech/Demo	Commercial
			BRO 10 & 11	UnseenLabs	France	GOMSpace	Denmark	6 (each)	Signal Intelligence	Commercial
			Connecta T3.(1 &2)	Plan-S	Turkey	Plan-S	Turkey	8 (each)	Tech/Demo	Commercial
			Crypto3	Cryptosat	USA	Cryptosat	USA	4,00	Telecom	Commercial
			Djibouti 1A	University of Djibouti	Djibouti	University of Djibouti	Djibouti	1,00	Earth Observation	Education
			EPICHyper 3	ĂAC Clyde Space	Sweden	ÅAC Clyde Space	Sweden	8,00	Earth Observation	Commercial
			FalconSat X	USAF Academy	USA	USAF Academy	USA	180,00	Tech/Demo	Education
			Flock-4q (36 spacecraft)	Planet	USA	Planet	USA	5 (each)	Earth Observation	Commercial
			GENMAT 1	GenMat	USA	Exobotics	United Kingdom	8,80	Tech/Demo	Commercial
			GHGSat C (9 , 10 & 11)	GHGSat Inc.	Canada	UTIAS/SFL	Canada	15 (each)	Earth Observation	Commercial
			HADES D	AMSAT-EA	Spain	AMSAT-EA	Spain	0,20	Radio Amateur	Amateur
			Hello Test (1 & 2)	Hello Space	Turkey	Hello Space	Turkey	0,25 (each)	Telecom	Commercial
			Heron Mk2	University of Toronto	Canada	University of Toronto	Canada	4,00	Tech/Demo	Education
			ICEYE X (31 , 32 , 34 & 35)	ICEYE	Finland	ICEYE	Finland	85 (each)	Earth Observation	Commercial

Launches & Satellites



Impulse 1 / MIRA	Impulse Space	USA	Impulse Space	USA	250,00	In-Orbit Servicing	Commercial
Intuition 1	KP Labs	Poland	ÅAC Clyde Space	Sweden	10,00	Tech/Demo	Commercial
ION-SCV 13	D-Orbit	Italy	D-Orbit	Italy	100,00	In-Orbit Servicing	Commercial
IRIS C2	National Cheng Kung University	Taiwan	National Cheng Kung University	Taiwan	4,00	Tech/Demo	Education
JinjuSat 1	Jinju City	South Korea	CONTEC	South Korea	2,50	Earth Observation	Gov.Civil
KAFASAT	ROKAFA	South Korea	ROKAFA	South Korea	4,00	Radio Amateur	Education
Lemur-2 x (1 & 2) / MangoTwo (1 & 2)	Spire	USA	Spire	USA	4 (each)	Earth Observation	Commercial
MANTIS	ESA	Europe	Open Cosmos	United Kingdom	10,00	Earth Observation	Gov.Civil
NinjaSat	Riken	Japan	NanoAvionics	Lithuania	10,00	Space Science	Gov.Civil
Observer 1A	Nara Space	South Korea	Nara Space	South Korea	24,00	Earth Observation	Commercial
OMNI-LER1	Internet Think Tank	USA	Internet Think Tank	USA	16,00	Tech/Demo	Commercial
OrbAstro (PC1 & TR1)	OrbAstro	UK	OrbAstro	United Kingdom	7 (each)	Tech/Demo	Commercial
Outpost Mission 2	Outpost	USA	Outpost	USA	6,00	Tech/Demo	Commercial
PEARL 1 (C & H)	Foxconn	Taiwan	National Central University	Taiwan	8,8 (each)	Telecom	Commercial
Pelican 1	Planet	USA	Planet	USA	155,00	Tech/Demo	Commercial
Picacho	Lunasonde	USA	Lunasonde	USA	1,00	Tech/Demo	Commercial
PiCo-loT (9 spacecraft)	Apogeo Space	Italy	Apogeo Space	Italy	0,4 (each)	Telecom	Commercial
PLATERO	AGAPA	Spain	Open Cosmos	United Kingdom	8,00	Earth Observation	Gov.Civil
Platform 5 / OSW Cazorla	EnduroSat	Bulgaria	EnduroSat	Bulgaria	6,00	Tech/Demo	Commercial
ProtoMéthée	Prométhée	France	NanoAvionics	Lithuania	26,00	Earth Observation	Commercial
ROM 3	RomSpace	Romania	RomSpace	Romania	0,25	Radio Amateur	Education
Spaceant-D	SpaceIn	Malaysia	SpaceIn	Malaysia	0,20	Radio Amateur	Education
SpaceVan 001	Exotrail	France	Exotrail	France	150,00	In-Orbit Servicing	Commercial
SPIP	Aerospacelab	Belgium	Aerospacelab	Belgium	120,00	Tech/Demo	Commercial
Tartan-Artibeus 2	Carnegie Mellon University	USA	Alba Orbital	United Kingdom	0,25	Tech/Demo	Education
Tiger (5 & 6)	OQ Technology	Luxembourg	NanoAvionics	Lithuania	10 (each)	Telecom	Commercial
Time We'll Tell	TrustPoint	USA	TrustPoint	USA	50,00	Tech/Demo	Commercial



Launches & Satellites

			Umbra-SAR (07 & 08)	Umbra Lab	USA	Umbra Lab	USA	83 (each)	Earth Observation	Commercial
			Unicorn 2 (J & K)	Alba Orbital	UK	Alba Orbital	United Kingdom	0,5 (each)	Tech/Demo	Commercial
			Veronika	Spacemaniac	Slovakia	Spacemaniac	Slovakia	1,00	Radio Amateur	Amateur
			Vindlér (1 , 2 , 3 & 4) / Lemur-2 x	Sierra Nevada Corporation	USA	Spire	USA	8 (each)	Signal Intelligence	Commercial
			Ymir-1	ÅAC Clyde Space	Sweden	ÅAC Clyde Space	Sweden	3,00	Tech/Demo	Commercial
12/11/2023	USA	Falcon-9 v1.2 (Block 5)	O3b mPower (5 & 6)	SES	Luxembourg	Boeing	USA	1700 (each)	Telecom	Commercial
17/11/2023	China	CZ-2C(3)/YZ- 1S	HaiYang 3A	National Satellite Ocean Application Service	China	DFH Satellite Co.	China	800,00	Earth Observation	Gov.Civil
18/11/2023	USA	Falcon-9 v1.2 (Block 5)	Starlink (23 spacecraft)	SpaceX	USA	SpaceX	USA	800 (each)	Telecom	Commercial
18/11/2023	USA	Starship B9/S25	Starship S25	SpaceX	USA	SpaceX	USA	0,10	Tech/Demo	Commercial
20/11/2023	USA	Falcon-9 v1.2 (Block 5)	Starlink (22 spacecraft)	SpaceX	USA	SpaceX	USA	800 (each)	Telecom	Commercial
21/11/2023	North Korea	Chollima-1	Malligyong 1 (3)	NADA	North Korea	NADA	North Korea	100,00	Earth Observation	Military
22/11/2023	USA	Falcon-9 v1.2 (Block 5)	Starlink (23 spacecraft)	SpaceX	USA	SpaceX	USA	800 (each)	Telecom	Commercial
23/11/2023	China	CZ-2D(2)/YZ- 3	Hulianwang Jishu Shiyan 2 (A , B & C)	China Satellite Network Group	China	CAS	China	190 (each)	Tech/Demo	Gov.Civil
25/11/2023	Russia	Soyuz-2-1b	Kosmos 2572 / Razdan 1	Unknown (Russia)	Russia	Unknown (Russia)	Russia	500,00	Earth Observation	Military
28/11/2023	USA	Falcon-9 v1.2 (Block 5)	Starlink (23 spacecraft)	SpaceX	USA	SpaceX	USA	800 (each)	Telecom	Commercial



LAUNCH HIGHLIGHTS

SpaceX conducts second Starship test flight

On November 18th, SpaceX's Starship vehicle embarked on its second integrated test flight from the Starbase test site in Texas and successfully demonstrated its booster's performance and the introduction of a new hot staging separation technique. Additionally, the booster was intended to execute a "boostback" manoeuvre for a planned splashdown in the Gulf of Mexico. However, the flight termination system was activated approximately 3 minutes and 30 seconds after liftoff.



Credit: Spacenews

Simultaneously, the Starship continued its ascent but lost communication after 8 minutes. At the time of telemetry loss, the spacecraft was at an altitude of 148 kilometres, hurtling at over 24,000 kilometres per hour, nearing orbital velocity. Originally designed for an almost complete circumnavigation of the Earth, the plan was for Starship to re-enter and splash down near Hawaii 90 minutes after liftoff. Despite the mission not achieving all intended outcomes, this flight showcased considerable advancements compared to the initial test flight in April, which ended prematurely. Starship holds critical importance for both SpaceX and NASA. SpaceX relies on Starship for launching payloads like full-sized V2 Starlink satellites. Additionally, NASA has awarded SpaceX contracts valued at \$4 billion to develop a crewed lunar lander version of Starship for the Artemis 3 and 4 missions.

Third pair of SES telecommunication satellites brought to MEO by Falcon 9



Credit: SE

On November 12th, SpaceX successfully launched a duo of internet-providing satellites for SES on their Falcon-9 rocket from Cape Canaveral Space Force Station. This marks the third launch of the Boeing-manufactured O3b mPower satellites. Previous satellites were launched in December 2022 and April 2023. Positioned in a medium Earth orbit (MEO) approximately 8,000 kilometers above Earth, these satellites boast over 4,000 adjustable beams each,

allowing for focused bandwidth allocation in high-demand areas. This is a significant enhancement compared to the original O3b satellites, which featured only 10 beams per spacecraft. Launching six O3b mPOWER satellites before a critical deadline on 5th December has been a top priority for SES, not only to expedite the commencement of services but also to qualify for a fiscal incentive from the Federal Communications Commission (FCC). Like other satellite internet operators, SES is required to vacate the C-band spectrum auctioned to 5G wireless operators.

North Korea successfully deploys reconnaissance satellite

According to reports from North Korean state media, the country has asserted **the successful placement of its inaugural reconnaissance satellite**, **Malligyong-1**, **into low earth orbit on November 21st**. If the claims are accurate, this launch would signify North Korea's third recent attempt to deploy its initial spy satellite into orbit on its Chollima-1 launcher, with previous endeavors in May and August having faced failures. The United States and South Korea have criticized the launch, citing concerns that the technology employed supports North Korea's intercontinental ballistic missile program. North Korean sources have indicated plans for additional launches involving further surveillance satellites.

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