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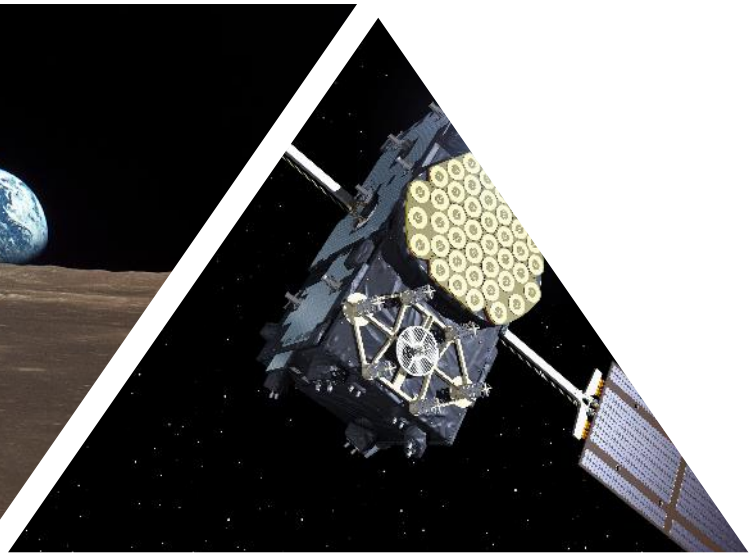

ESPI Insights

Space Sector Watch

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SPACE VENTURE EUROPE: NEW RECORD INVESTMENT IN 2021

Dear Friends of ESPI,

ESPI has just published the 4th edition of the Space Venture Europe report. The new edition of the report provides a complete overview of entrepreneurship and private investment trends in the European space sector. Furthermore, the 2021 report goes beyond the scope of previous editions by assessing global investments as well as by including key messages and recommendations from European space investors.

Investment in Europe: With €611 million invested into European space start-ups in 2021, Europe upheld a ground-breaking year and confirmed its position as a key actor in New Space globally! 2020 had already broken a trend marked by a plateauing of investments at around 200 million per year by reaching a total of €535 million. 2021 saw this volume increase even further to €611.5 million spread over another record breaking 86 deals. This is a conservative estimate that does not include investments in OneWeb €1.45 Billion and the value of 15 undisclosed transactions.

Global investment into New Space: This year, the ESPI Investment Database was expanded to cover global investment in space start-ups since 2019. To provide comparable metrics with already established sources such as BryceTech, ESPI used the broader "New Space" and start-up perimeter which includes companies such as OneWeb and SpaceX. The report highlights that Global investment into space ventures has been continuously growing from €5.2 billion in 2019 to €12.2 in 2021. The number of deals has seen similar growth from 166 deals in 2019 to 268 deals in 2021.

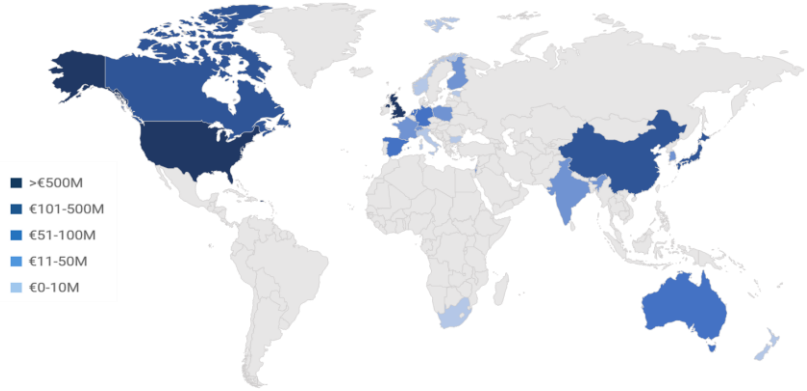


Figure 1: Global New Space investments in 2021

Recommendations from Investors: The new report also includes the outcome of interviews with European space investors. The interviews covered a wide range of topics including perspectives on issues at stake for investors, the space economy and business in general. 4 main topics were highlighted and analysed: Investing in the space sector, investing in Europe, the differences between US and the European ecosystems and investors' recommendations to start-us and to the public sector.

European start-up survey: Finally, the report also includes results of the annual European Space Entrepreneurship Survey which provides an overview of European space start-ups views on their business situation, future prospects, access to finance and expectations from the public sector.

Jean-Jacques Tortora

Director of ESPI

Yours sincerely

POLICY & PROGRAMMES

The Council of the EU adopted conclusions on space

The Council of the EU adopted conclusions on Copernicus by 2035 and EU approach to STM

Credit: Council of the EU

On June 10th, the Ministers responsible for space in the Council of the EU **adopted conclusions on the future of Copernicus by 2035 and on an EU approach to space traffic management. The conclusion on Copernicus** sets out a vision and political guidance for 2035, based on the three key pillars aiming to contribute to a more resilient Europe: (1) the Green Deal, (2) the digital transition and (3) security. The conclusion considers user needs, new environmental challenges, the state of the art of research and maximises the inclusion of new digital technologies. **The conclusion on an EU approach to STM** highlights the importance of increasing EU space surveillance and tracking capabilities and encourages a framework for legislation and standardisation.

The Council of EU adopted a negotiating mandate on the Secure Connectivity Programme

On June 29th, **the Council of the EU adopted a negotiating mandate on the proposal for a regulation on the Secure Connectivity Programme.** The **negotiating mandate** clarifies the fact that the EC is the programme's owner, but only as regards tangible and intangible assets relating to the programme's governmental infrastructure. Furthermore, the text distinguishes between ownership and use and clarifies that the EC will be entitled to use the frequencies, but ownership will remain with the member state. Moreover, it gives more detail on the portfolio of services required and makes a distinction between "hard gov" (governmental services provided by government infrastructure) and "light gov" (services provided through a commercial infrastructure). Additionally, it provides a clarification on the programme's implementation model to ensure the functioning of the envisaged the future public-private partnership, to guarantee an optimal level of governmental and commercial services.

On June 7th the EC **proposed a budget of €138M for the EU Secure Connectivity Programme for 2023**, as part of the EC's proposal of the overall EU budget of €185.6B for 2023 (complemented by approx. €113.9B in grants under NextGenerationEU).

The Council stated the following changes to the Commission's proposal. The Council text:

- clarifies the roles of and the support provided by the EUSPA and ESA in the programme
- incentivises support for a competitive and innovative space sector and sets out the support measures expected to be provided by the European Commission
- confirming a total amount of €1.6B for the period from 2023 2027

Slovakia signs Association Agreement with ESA

On June 7th, **Slovakia signed an Association Agreement with ESA**. The agreement was signed by ESA DG Josef Aschbacher and Slovak State Secretary Ludovit Paulis, following the **Slovakian government's approval end of May.** In 2010, the **Slovak Republic signed a Cooperation Agreement**, and in 2015, the **European Cooperating State Agreement** with ESA.

ESA awards Airbus a €160M contract for the FORUM Earth monitoring satellite

ESA awarded Airbus a €160M contract for ESA's FORUM (Far-infrared Outgoing Radiation Understanding and Monitoring) satellite which has the aim to contribute to enhancing the understanding of the Earth's radiation budget and to give new insights into global warming – by measuring the Earth's long-wave infrared radiation. The 883 kg FORUM satellite will be the first satellite for EO in the far-infrared part of the spectrum planned to be launched in 2027 on Vega-C from Kourou into the polar orbit (altitude of 830 km), with its main instrument a Fourier Transform Spectrometer to operate in the far-infrared. FORUM is part of the 9th Earth Explorer mission of ESA's Future EO Programme.

Credit: ESA Earth Observation Graphics Bureau

OHB System AG signed a **€90M subcontract with the prime contractor Airbus D&S** during a Airbus-hosted event at the Palace of Westminster in London, to provide a special interferometer which will be part of FORUM's payload special interferometer, manufactured at OHB's facility in Oberpfaffenhofen.

The UK invests £30M to take the lead in ESA's Ariel Mission

The UK will invest £30M to lead ESA's 4-years Ariel Mission targeted for launch in late 2029, which aims to understand the links between the chemistry, evolution as well as the host star of a planet, surveying approx. 1.000 exoplanets. Proposed by an international consortium led by University College London (UCL), Ariel was selected by the ESA out of 26 proposals to be the next 'medium class mission' in its science programme. The UK will lead the overall science of the mission and head up a consortium of 17 countries building the mission's payload module.

France signs the Artemis Accords, while the U.S. joins the Space for Climate Observatory

CNES President Philippe Baptiste signed the Artemis Accords accompanied by NASA Administrator Bill Nelson, during an event on the 60th anniversary of CNES at the residence of the French Ambassador to the U.S., Philippe Étienne, in Washington D.C. France is the fifth European country to sign the Artemis Accords, succeeding Italy, Luxembourg, Romania and Poland. France's signature confirms the extension and deepening of already existing partnerships between France and the U.S., as French space companies are already contributing to the Artemis programme.


Credit: NASA

Furthermore, the **U.S. joined the French-led Space for Climate Observatory (SCO) initiative**. Richard Spinrad, Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the U.S. NOAA signed the SCO Charter, joined by Ambassador Philippe Étienne as well as Philippe Baptiste, Chairman and CEO of CNES and other representatives of CNES, NOOA and NASA.

Both signatures follow commitments the two countries expressed **during Kamala Harris' state visit to France** in November last year.

The UK unveils plan for space sustainability at the Space Sustainability Summit

Credit: SWF

On June 23rd and 24th, the **4th Summit for Space Sustainability took place** with the theme "Global Priorities for Space Sustainability" at the Science Museum in London, hosted by the Secure World Foundation and the UK Space Agency.

During the summit, the UK Government made several announcements regarding space sustainability. **UK Minister for Science, Research, Innovation George Freeman, introduced a plan** with new measures to drive space sustainability. The Government will establish a new "Space Sustainability Standard" to incentivise companies to implement best practices to limit space debris. The British regulatory framework for all orbital activities will also be reviewed to incentivise Active Debris Removal and In-Orbit Servicing. Freeman announced a £5M investment into SST capabilities and a further £4M debris removal programme. In addition, the National Space Surveillance and Tracking Programme, which was recently granted an additional £5M in funding, will provide a new collision assessment service, in which British operators can register.

Furthermore, during the summit**, the Space Sustainability Rating (SSR) was launched**. The SSR, developed by the World Economic Forum, ESA, the Massachusetts Institute of Technology, BryceTech and the University of Texas at Austin among others, aims to foster (long-term) sustainability in space through increasing the transparency of space debris mitigation efforts by providing a score representing the sustainability of a mission.

In addition, two report on space sustainability were published: the **OneWeb White Paper on Responsible Space to Market Access** and the **Inmarsat Space Sustainability Report.**

Spain creates interministerial space council to establish a Spanish Space Agency

On June 21st, **Spain's Council of Ministers approved the creation of an interministerial space council** with the aim to accelerate work the establishment of the planned national space agency to become operational in early 2023.

In particular, the tasks of the Space Council are to draw up the statutes and the initial plan of action of the Spanish Space Agency. The Ministry of Science and Innovation will head the space council and will have representation from different institutions, among others, by the Cabinet of the Presidency of the Government and the Ministry of the Presidency. The objective of the Spanish Space Agency is the promotion, execution and development of projects related to space, security and national defence, and to integrate functions currently distributed in different entities and ministerial areas.


Credit: MONCLOA/EFE

ESA and NASA sign cooperation agreement on lunar and Earth science

During the ESA Council Meeting in June, ESA DG Josef Aschbacher and NASA Administrator Bill Nelson **signed two agreements to enhance cooperation on Earth science and the Artemis lunar missions.**

Credit: ESA

NASA will deploy ESA's Lunar Pathfinder spacecraft, on whose development ESA cooperates with SSTL, to lunar orbit to provide communication services on the Moon. The agreement on Earth science ensures the continuity of EO promoting the open data, information and knowledge sharing to increase the understanding of climate change.

Space Force awards BlueHalo $1.4B contract, orders 8 military satellite launches from ULA and SpaceX worth $846M, and delivers first U.S. payload for Space Norway's ASBM mission

The U.S. Space Force's Space Rapid Capabilities Office awarded BlueHalo a $1.4B contract, covering the full lifecycle development of the Satellite Communication Augmentation Resource (SCAR) programme. The SCAR programme is supposed to maximise satellite automation and flexibility. As part of the contract, BlueHalo will provide the foundation of the programme with its Multi-band Software Defined Antenna (MSDA) technology and contribute radio frequency solutions. BlueHalo will partner with Kratos Defense & Security Solutions, who received a $160M award to provide their software-defined satellite ground system OpenSpace Platform to enable scalable deployments.

Furthermore, **the Air Force Research Laboratory awarded BlueHalo a $11M Air Force contract to develop a pair of optical laser communications terminals and a ground station** to be delivered in 2025, for on-orbit experiments, including demonstrations support of optical up- and downlinks between satellites in GEO and LEO, as well as for establishing space-to-ground links and for demonstrating positioning and timing over optical communication links.

In addition**, the U.S. Space Force ordered five military satellite launches from United Launch Alliance (ULA) worth $566M,** and three military satellite launches from SpaceX worth $280M. ULA and SpaceX won the Phase 2 launch services procurement over bids from Blue Origin and Northrop Grumman. The eight missions are scheduled to be launched aboard ULA's Vulcan Centaur rocket and SpaceX's Falcon 9 rocket from Cape Canaveral and the Vandenberg Space Force Base within the upcoming two years.

Furthermore, **the Space Force delivered the first of two U.S. military communications payloads to launch on Space Norway's Arctic Satellite Broadband Mission ASBM**, scheduled to lift off in 2023 on a SpaceX Falcon 9 rocket from Vandenberg Space Force Base. The $1.3B. Enhanced Polar System Recapitalization (EPS-R) payloads developed by Northrop Grumman, who was contracted by the Space Force to upgrade the EPS-R ground system in addition, will fly to highly elliptical orbits on the two ASBM satellites. In addition, the ASBM mission includes communications payloads for Inmarsat and for the Norwegian Ministry of Defence.

Credit: US Space Force

Canada unveils details on $4.9B investment plan to upgrade NORAD defence systems

Credit: The Canadian Press

Canada's Defence Minister Anita Anand unveiled a new $4.9B investment plan to upgrade Canada's NORAD continental defence systems over the upcoming six years – which is part of a broader long-term twenty-year $40B investment plan. According to Anita Anand, the plan will focus on five areas:

- a northern approaches surveillance system
- an Arctic over-the-horizon radar system for early warning radar coverage from the Canada-U.S. border to the Arctic Circle
- a polar over-the-horizon radar system to provide early radar coverage
- a system "Crossbow" where early warning sensors will be deployed across Canada in order to identify incoming threats
- a space-based surveillance project

Credit: Axiom Space

NASA selects Axiom Space and Collins Aerospace to build spacesuits for Moon space station

NASA awarded Axiom Space and Collins Aerospace the NASA Public-Private Partnership "Exploration Extravehicular Activity Services (xEVAS)" contracts valued in total of $3.5B to build new astronaut spacesuits that may be used for LEO and the Artemis lunar missions. The new suits are supposed to provide astronauts with advanced capabilities for space exploration and NASA with commercially developed human systems needed to access, live, and work in microgravity and on and around the Moon.

SpaceX's Starlink regains spectrum licence to operate in France

On June 2nd, **SpaceX's Starlink gained permission again to operate its broadband network in France**. The French telecoms regulator ARCEP decided to authorise Starlink to operate after a month-long consultation process, which underlined the demand for the services in France's rural areas. SpaceX had originally received authorisation in February 2021, but France's Conseil d'État revoked it after French environmental activist organisations submitted an appeal.

China plans space-based solar power tests

According to the **paper "Retro-directive microwave power beam steering technology of space solar power station"**, published in the China Space Science and Technology journal, first reported by the **South China Morning Post, China is planning solar power generation and transmission tests** in LEO by 2028 (Phase 1) and GEO by 2030 (Phase 2), as part of the broader plan to develop a space-based solar power station – 2 years earlier than initially planned. The China Academy of Space Technology (CAST) plans to conduct a "Space high voltage transfer and wireless power transmission experiment" in LEO in 2028, also including the development of a ground infrastructure to receive energy transmissions. The Phase 3 in 2035 and Phase 4 in 2050, will each demand extreme increase in energy generation and transmission, capabilities in orbital assembly, in beam steering accuracy and architecture of transmission.

In other news

Ariane 6 's first launch to be postponed in 2023: According to ESA DG Josef Aschbacher, Ariane 6's maiden flight, initially targeted for late 2022, will be shifted in 2023.

Omran Sharaf from the UAE appointed new UN COPUOS Director in 2022 and 2023: Prior to this, the engineer represented the UAE on UN COPUOS and the International Committee on Global Navigation Satellite Systems, and he was involved in the UAE Mars mission.

Luxembourg and Canada sign a memorandum to deepen space cooperation: The aim is to establish a cooperation framework, to exchange and share information and expertise, identify options and areas for potential cooperation and facilitate collaboration between the countries.

NASA selects two science instrument suites for Moon exploration under the Artemis program: through NASA's PRISM call for proposals, the Lunar Vulkan Imaging and Spectroscopy Explorer (Lunar-VISE) and the Lunar Explorer Instrument for space biology Applications (LEIA) were selected to be deployed to lunar surface through NASA's Commercial Lunar Payload Services (CLPS) initiative.

The European Commission awards the LiveEO a €1.7M grant (from the EIC Accelerator) to further develop its project EOinTime: The project focuses on satellite data- based time series analysis and near real time monitoring to identify external threats and predict the future impacts of climate change.

ILA 2022 #PioneeringAerospace took place in Berlin from June 22nd to 26th: At the ILA Space Pavillon, DLR, ESA, BMWK and BDLI demonstrated space research and space applications, counting 51 exhibits.

Rwandan Space Agency (RSA) signs MoU with the Global Satellite Operator's Association (GSOA): signed by RSA's DG Colonel Francis Ngabo and GSOA Secretary-General Aarti Holla-Maini, the MoU aims to enhance the development of satellite communication services in Rwanda and drive the digital inclusion plans of Africa to fill the gap of access to connectivity.

ASECNA and CNES sign agreement on Africa's first operational SBAS: the new seven-year agreement implies the development, deployment and commission of ASECNA's SBAS.

South Korea cancels asteroid Apophis probe mission due to a "lack of technical capabilities": the Ministry of Science decided not to request the $307.7M budget and canceled the plan of developing and launching a robotic spacecraft to accompany the asteroid Apophis during its 2029 close encounter with Earth.

3 Chinese astronauts arrive at the Tianhe core module of the Tiangong Space Station: During their 6-month stay they will develop Tiangong into a national space laboratory by assembling 3 modules with the Tianhe's robotic arm: the Tianhe core module to which two sides the Wentian module to launch in July, and the Mengtian module to launch in October will be integrated.

CNES appoints Nicolas Hengy as Chief Financial Officer: As part of his new position, effective June 15th, he will have a seat on CNES's Executive Committee.

INDUSTRY & INNOVATION

Sierra Space establishes an astronaut training program


Credit: Business Wire

On June 14th, the U.S.-based company Sierra Space **stated that it is establishing a commercial human spaceflight centre and an astronaut training academy**, to be led by former NASA astronaut Janet Kavandi. This programme is within the company's ambitions to build and operate Orbital Reef, a future commercial space station in a partnership with Blue Origin. The astronauts will be divided into different categories:

- "Professional astronauts", similar to NASA astronauts, will operate the station and spend months at-a-time aboard it. They will have 12 to 18 months of training.
- "Specialist astronauts", are experts in other fields and are expected to conduct scientific research, manufacturing, among other activities. They will have 3 to 6 months of training.
- "Experiential astronauts", akin to NASA's "spaceflight participants", will visit the space station. They will undergo less intensive technical training, focused on safety of operations.

Accordingly, the company plans to select the first professional astronauts in 2023, begin training in 2024 and complete it by 2026. These first professional astronauts will be tasked with supporting Orbital Reef's construction. In the same month**, Sierra Space signed MoU with Spaceport America** to use its commercial spaceport in New Mexico as a potential landing site for Dream Chaser, the company's reusable spaceplane, which will be instrumental in the construction of Orbital Reef.

Sony establishes subsidiary company dedicated to space

On June 2nd, **Sony Space Communications Corporation (SSC)** was formed by Sony Group's subsidiary Sony Corporation of America. The new company will develop small devices to establish communications by laser between microsatellites, and ground stations. With this technology, SSC expects to present a more agile and faster solution for LEO satellites to provide real-time communications. Accordingly, instead of being dependent on being overhead a ground facility to beam its data, the satellites are planned to connect to each other. Moreover, the company also states that optical communications face fewer burdens regarding regulatory approval than their radio frequency counterparts. To achieve these goals, Sony plans to leverage its know-how from optical-disc technology, which was already demonstrated in 2020 aboard the ISS to establish a bidirectional laser communications link with a space optical ground station.

General Dynamics and Iridium receive $324M contract from the SDA

Credit: SDA

General Dynamics Mission Systems and Iridium Communications won a $324M contract awarded by the Space Development Agency (SDA) (comprised of a $162M base amount and $161M in options) to establish the ground Operations and Integration segment for the National Defense Space Architecture (NDSA)'s Tranche 1. General Dynamics and Iridium will jointly build operations centers and ground entry points and are in charge of the provision of network operations and system integration services for SDA's LEO satellites. General Dynamics and Iridium work with partners such as KSAT, Raytheon and EMERGENT.

AAC Clyde Space wins €560.000 contract to deliver Sirius avionics for SpaceIL's moon mission

AAC Clyde Space received a contract valued €560.000 to deliver its Sirius avionics for SpaceIL's Beresheet 2 moon mission during the first quarter of 2024. Beresheet 2, the follow-up mission of Beresheet 1 (the first private spacecraft to the Moon), is planned for launching in the second half 2024. Beresheet 2 will be comprised of an orbiter as well as two landers, on which Sirius avionics will be deployed.

Iceye develops parallel constellation for the U.S. national security community

ICEYE

Credit: ICEYE

Iceye's U.S. subsidiary is planning to develop 18 synthetic aperture radar (SAR) satellites **disconnected from the parent company's systems**. This decision comes as an attempt to answer the U.S. Pentagon and intelligence community's concerns about being dependent on foreign assets for matters of national security. Currently, the Iceye U.S. constellation has three satellites and is controlled exclusively by Iceye US mission operations centre in Irvine, United States. Jerry Welsh, CEO of Iceye US, stated that even though it represents additional costs for the company group, on the other hand, it helps create resiliency by having different manufacturing facilities, as well as diversifying supply chains.

Inmarsat demonstrates PNT capabilities

On June 8th, a team led by Inmarsat, comprised of Goonhilly Earth Station and GMVNSL, **demonstrated a platform for position, navigation and timing (PNT) capabilities**. The consortium was awarded $1.5M by the UK Space Agency in 2021, through ESA's Navigation Innovation and Support Programme (NAVISP), to conduct the first stage of the validation process. As a result of Brexit, last Summer, the UK lost access to the European Geostationary Overlay Service (EGNOS), Europe's regional satellite-based augmentation system (SBAS), used to improve global navigation satellite systems (GNSS) performance, such as Galileo and GPS. Therefore, the UK is exploring its sovereign alternative and as such, the signal, transmitted from an ageing satellite, is part of the validation of the UK Space-Based Augmentation System (UKBAS).

Virgin Orbit's new Brazilian subsidiary receives license for launch operations in Alcântara

Virgin Orbit's new subsidiary Virgin Orbit Brasil Ltda. **formally received an operator's license for the launch of LauncherOne in Alcântara Brazil** - with launches expected as early as 2023. Virgin Orbit Brazil is dedicated to bringing the LauncherOne air-launch rocket system to the Alcântara Launch Center.

Credit: EFE

Aerospacelab plans to build "megafactory" in Belgium

The Belgian start-up revealed plans to **inaugurate a "megafactory" in Charleroi, Belgium**, in 2025, with a yearly production capacity of 500 satellites between 150 and 700 kilograms. Aerospacelab currently has one factory, also located in Belgium, which can produce up to 24 satellites per year.

With this new industrial unit, the company continues to develop vertical integration and aims to reduce manufacturing costs. In February the company raised a Series B round of €40M, enabling it to scale up its production capacity.

U.S. satellite industry companies strive for spectrum usage

Dish Network files letter with FCC over Starlink's regulatory requirements

Credit: SpaceX

On 13th June, Dish Network, a U.S.-based satellite service provider, **wrote a letter to the Federal Communication Commission (FCC) to force SpaceX to deactivate Starlink customers** who have installed the satellite internet system on boats and cars. The request is justified over SpaceX lacking a licence to operate Starlink in moving vehicles. Moreover, since May, Dish has been protesting over concerns that Starlink will interfere with its satellite TV system. On June 21st, in a letter to the FCC, **SpaceX argued that Dish is trying to undermine Starlink's competition** for the same 12Ghz 5G radio spectrum. Furthermore, it warned that if Dish Network's proposal to use the 12Ghz spectrum band is approved, the Starlink broadband service would become inoperative for most Americans, who would experience "harmful interference" 77% of the time.

Starlink and OneWeb reach agreement on the use of Ku-band spectrum

SpaceX and OneWeb sent a letter to the FCC, **requesting to disregard each other's previous spectrum coordination issues**. On the one hand, SpaceX has permission to deploy 4,408 satellites LEO that use the Ku-band spectrum to connect users to the Starlink network and is seeking approval to add 30.000 additional satellites, including 7.500 V-band satellites. On the other hand, OneWeb has permission for 648 Ku-band LEO satellites to connect and plans to increase its constellation to approx. 7.000 satellites. The British company was also granted permission to add V-band payloads to its constellation. With the agreement between the parties, both are now encouraging the FCC to swiftly approve their next systems for deployment. Recently, in March, OneWeb also signed a launch agreement with SpaceX after the suspension of all its launches from Baikonur.

Northrop Grumman receives multi-year contract from United Launch Alliance (ULA)

The U.S.-based company stated on June 8th that it received a **$2B contract from ULA to increase production of solid rocket boosters** over several years. Accordingly, Northrop Grumman will produce GEM 63 and 63XL boosters for ULA's Atlas 5 and Centaur launch vehicles. This multi-year contract will bring Northrop's production to more than 75 motors per year.

Ursa Major announces new engine Arroway available for order


Credit: Ursa Major

On June 2nd, **the U.S. rocket propulsion company Ursa Major introduced its new reusable engine Arroway**, a thrust liquid oxygen and methane staged combustion engine, to be available for order from now, targeted for initial hot-fire testing in 2023 and for delivery in 2025.

The engine is able to displace the Russian-made RD-180 and RD-181 no longer available to U.S. launch companies, and will serve for U.S. national security missions, commercial satellite launches and orbital space stations.

In other news

OHB and The Exploration Company sign a MoU to test European exploration equipment on the Moon: the two companies plan to test The Exploration Company's Guidance, Navigation & Control (GNC) system under real conditions. OHB will accommodate the GNC on the Lunar Surface Access Service (LSAS) which landing on the Moon is planned in 2025.

OHB Sweden AB and ESA signed a contract for work on autonomous orbit control management of super-constellations: As study prime contractor, OHB Sweden leads a consortium comprised of OHB System, DLR and Luleå University of Technology. In particular, the work will focus on the design, development and test of the onboard algorithms needed to perform autonomous orbit control tasks in space,

Airbus plans to send a 3D printer to the International Space Station in 2023: This marks a first step in its plan to set up an orbital satellite factory to conduct off-Earth factories.

Gilat Satellite Networks Ltd. receives $8M follow-on order for gateway support of LEO constellation: The company's subsidiary Wavestream was chosen as the sole provider to supply Gateway Solid State Power Amplifiers (SSPAs) for the support of the constellation.

Satellite Vu selects Orbit Logic's collection planning software for the operation of its thermal imaging constellation: Orbit Logic will provide software configuration, custom model development and training and deliver its Collection Planning & Analysis Workstation (CPAW).

The German Space Agency DLR launch the second competition round for free flight of small satellites on microlaunchers built in Germany: This time, the competition is not only aimed at European institutions, but also at SMEs and start-ups. The application phase for the second flight of Isar Aerospace's Spectrum rocket scheduled to take place in 2023, is until October 15th 2022.

Thales Alenia Space signed an amendment to the CRISTAL (Copernicus polaR Ice and Snow Topography Altimeter) contract with prime contractor Airbus D&S: the amendment marks a critical milestone and provides for the development and qualification of the Interferometric Radar Altimeter for Ice and Snow "IRIS" to be carried on the CRISTAL mission.

Isar Aerospace signs firm launch services agreement with D-Orbit: Isar Aerospace's Spectrum launcher will launch D-Orbit's ION Satellite Carrier from Andøya to a Sun-synchronous orbit in 2023.

Momentus Inc. provided its third Mission Update of its Vigoride-3 spacecraft: After its launch on May 25th, Vigoride-3's deployable solar arrays did not operate as intended in orbit, which led to power and communications problems. Momentus is continuing to solve the issue.

Isar Aerospace becomes customer of ExoTrails's cloud-based space mission simulation software ExoOPS™: Isar Aerospace will use ExoOPS™ to support its mission management team to handle the increasing constellation deployment demand onboard its Spectrum rocket by running a quick and easy preliminary mission design with simulation software.

Skyrora appointed Lee Rosen as new Chief Operations Officer: Prior to this Rosen spent 23 years in the US Air Force and then worked for SpaceX for 10 years where he participated in over 150 SpaceX missions.

Economy & Business

UK Space Agency releases Size and Health of the UK Space Industry report

The UK Space Agency has issued its yearly **Size and Health of the UK Space Industry report**, which tracks the growth of the UK space sector. BryceTech, who prepared the report, highlights a series of key trends.

Credit: BryceTech

Overall, the report notes optimism from its survey participants regarding expectations on income, employment, exports, R&D spending and investment over the next three years. Space-related organisations reported £16.5B in profits in 2019/2020, 32% of which came from exports. Within exports, UK's main trading partner is Europe (48% of exports and 15% of the industry's income), followed by North America (24% of exports, 8% of income). Moreover, the space industry contributed £6.9B of direct gross value added (GVA), comprising 0.31% of the UK's GDP.

Regarding the space industry's segments, the income generated in 2019/2020 in comparison with 2018/2019 grew by 1% (£23M) for in-space manufacturing and 4% (£20M) for ancillary services. On the other hand, there was an overall decrease of 4% (£20M) for space operations and 2% (£280M) for space applications. Concerning customer segments, 83% of the income derived from direct-to-consumer and business-to-business sales. Accordingly, only 17% of the profits resulted from sales to public consumers.

Regarding employment, the report underlined that, in 2019/2020, the space sector directly employed 47.000 and indirectly accounted for a total of approx. 190.000 jobs across the space value chain. Additionally, the UK space workforce is the most qualified in the UK, with 87% holding vocational degrees or higher. Since 2000/2001, the number of workers in this industry tripled, with a yearly growth rate of 6%.

European Innovation Council (EIC) Accelerator selects start-ups for funding

Credit: European Commission

The **European Innovation Council (EIC) selected 74 start-ups to receive a total of €382M** in a combination of grants and investments to support them in bringing their technologies to the market. Among the selected companies, three are space-related start-ups. The French start-up Cailabs, which is dedicated to photonic solutions, **received €8.5M in blended finance** (grant plus equity) to expedite the deployment and industrialisation of its laser communication products. Moreover, LiveEO, a German start-up, **was awarded a €1.7M grant** for its project centred on time series analysis and near real-time monitoring based on satellite data. Lastly, Constellr, a German thermal remote sensing start-up, **will receive an undisclosed blend of grant and equity** financing to accelerate the development of more satellites and grow its workforce.

SpaceX raises $1.68B in equity financing, Starlink IPO will not happen in the short-term

On June 16th, SpaceX **completed a $1.68M equity funding round** where it sought to raise $1.725B, meaning approx. $40M remained to be sold. The round of investment comes amid heavy investments in the Starship super-heavy-lift launch vehicle and the Starlink broadband internet satellite constellation. Moreover, Elon Musk stated that **Starlink's IPO won't happen in the near future**, needing three to four years before it can go public, conditional on the predictability of Starlink's revenue.

Credit: SpaceX

ExPace secures $237M in Series B financing round

ExPace, a Chinese launch service provider subsidiary of the state-owned China Aerospace Science and Industry Corporation (CASIC), **raised $237M in a Series B financing round**, the largest-ever raised by a Chinese commercial launch company. ExPace will use the financing to continue developing and improving its Kuaizhou solid launch vehicle series, as well as to conduct research on liquid propellant launchers.

Spire Global secures $120M credit facility

Spire Global obtained **$120M through a 4-year credit agreement**, led by Blue Torch Finance. $20M will be held in an escrow account until Spire reaches certain funding conditions, which the company expects to attain by the end of 2022. The company will use $71M to pay a credit line and the remaining amount will be invested in the development of its business on various fronts including sales, capabilities, and market position. **Spire told investors** that it sought the cash inflow to have the flexibility of taking future opportunities for mergers and acquisitions and to be used as a cushion for unforeseen expenses.

Contec closes $47.3M series C funding round and plans IPO in 2023

Credit: Contec

The South-Korean ground station operator **raised $47.3M in a Series C funding round**, led by Spring Ventures. The investment comes amid Contec's plans for an aggressive expansion into different countries and markets, coupled with an IPO in 2023.

Accordingly, Contec plans to develop new ground stations both in the country and overseas. Presently, the company operates six ground stations, two of them in South Korea and the other four in Ireland, Alaska, Sweden and South Africa. By the end of 2023, Contec aims to operate 15 radio-frequency ground stations, six of which are scheduled to be operational until the end of November 2022.

Moreover, the company is planning to operate three optical ground stations by 2024, the first to be inaugurated in November 2023 in Australia. Contec also plans to enter the space situational awareness market by installing four telescopes in an unnamed location in 2023. Additionally, it is developing its own fleet of Earth Observation satellites, the first of which is to be launched in the fourth quarter of 2023 aboard a SpaceX Falcon 9.

Beyond Gravity launches incubator programme

Credit: Beyond Gravity

Beyond Gravity, headquartered in Switzerland, is set to **launch its start-up programme "Launchpad"** in October 2022. The programme focuses on three areas: space technologies, value chain and people. The eight-week incubator will open applications in mid-August and select between three and five early-stage companies to be guided from ideation to seed funding maturity. At the end of the programme, the start-ups will be able to do a final pitch to a jury and be selected for further support, including financially.

Epsilon3 secures $15M in Series A financing round

On 20th June, Epsilon3 a U.S.-based start-up which provides software to space companies, such as Sierra Space's spaceplane, stated it had **completed a $15M Series A funding round** with Lux Capital. The funds will be used to develop the company's web-based platform supporting collaborative tools for spacecraft production and operations as well as to expand its team of engineers and build new software products.

ZeroG Lab closes $14.9M Series A funding round

The China-based satellite component developer, **raised $14.9M in a Series A round** of financing, with the participation of Caitong Capital, and Borgin Capital, among others. ZeroG Lab will use the funds to develop the Magpie constellation and continue the expansion of its business overseas. The Magpie Constellation Project aims to operate a total of 160 satellites dedicated to high-resolution earth observation.

Latitude raises €10M in Series A

The French-based company, focused on launch solutions for nanosatellites, **closed a €10M Series A round of funding**. With the investment, the company will continue the development of its micro-launcher "Zephyr" rocket, namely with the testing of Mark 1, the first version of the 3D-printed engine "Navier" to be used in the rocket, in the second half of 2022. The company has recently unveiled an updated design for Zephyr, including additional three Navier engines in the first stage. Moreover, the Latitude recently rebranded itself – **previously, it was called Venture Orbital Systems** – so as not to be strictly connected with being a launch company, indicating that the company intends to diversify its portfolio of services.

Bellatrix Aerospace raises $8M in Series A round

Credit: Bellatrix Aerospace

On June 1st, the India-based start-up specialized in satellite propulsion **secured $8M in a Series A investment round**, led by BASF Venture Capital and Inflexor Ventures. Bellatrix Aerospace is currently developing an orbital transfer vehicle relying on its own in-space propulsion technologies and plans to test four thruster modules until the end of the year. The company aims to invest in the expansion of its portfolio and workforce, and validate its future orbital transfer vehicle in space.

Impulse Space raises $10M in seed round

Credit: Impulse Space

The U.S.-based start-up focused on in-orbit services **secured $10M in a seed round** from Lux Capital. This round of investment was complementary to a previous one in March, where Impulse Space raised $20M, bringing the total to $30M. The company stated that the interest of the investment firm coupled with the current uncertain economic environment led to the decision in raising additional funds. The company will use the funds to develop three designs for orbital transfer vehicles, the first one will be small and dedicated to cube and nanosatellites in LEO and the other two will be bigger and able to move spacecraft into higher orbits.

In other news

Astrocast acquires Hiber: The Swiss-based IoT network operator Astrocast acquired the Netherlands-based IoT-as-a-service provider Hiber. Accordingly, Astrocast will obtain all of the latter shares, in exchange for the issuance of new shares, representing 16.5% of its share capital. Moreover, Hiber's shareholders will also invest $10.45M in Astrocast IPO.

Leanspace secures €6M seed round: The French start-up dedicated to cloud services for space missions, raised €6M in a round led by Karista, with the participation of Bpifrance. The company will invest the funds to scale its cloud services platform.

Okapi:Orbits secures €5.5M in a seed funding round: The German start-up focused on collision avoidance software for satellites, closed the €5.5M investment round led by Munich Re Ventures. The company, which currently services more than 50 satellites, will use the investment to expand its user base, expand internationally and enhance its product portfolio.

ION-X raises €3.8M in financing round: The French-based start-up established in 2021, dedicated to satellite propulsion, will use the investment to expand its engineer workforce currently working on its ion-beam engine prototype. The company expects to make the first demonstration mission at the end of 2023. The financing round had the participation of TF Participations and Geodesic, among others.

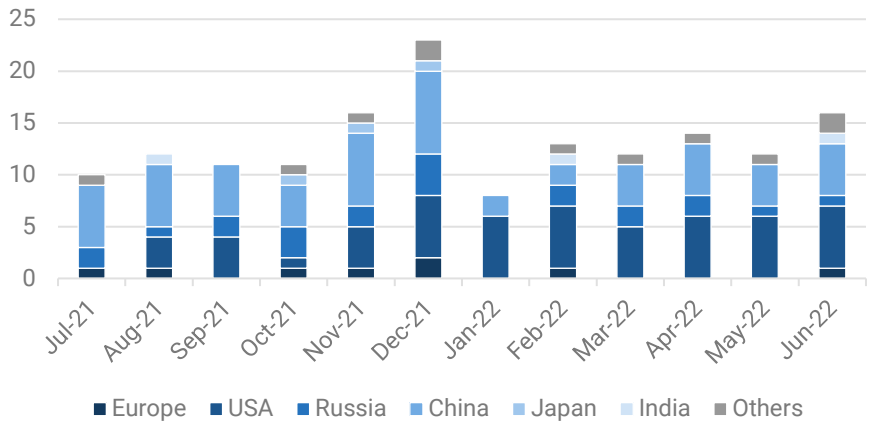
SpaceX presents complaints with the U.S. FCC on Viasat-Inmarsat merger plans: The company alleges that the competitor satellite operator Viasat violated commission rules and thus cannot be approved to control Inmarsat. Viasat is set to acquire the Inmarsat for $7.3B and expects to close the transaction in the second half of 2022.

Launches & Satellites

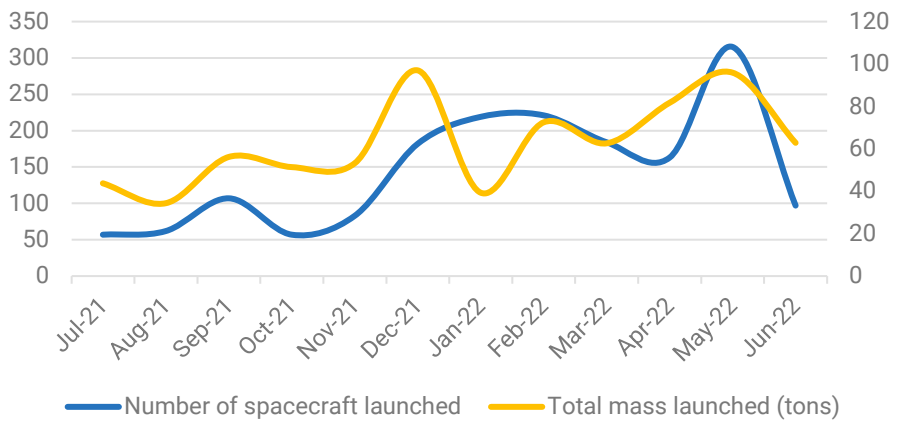
Global space activity statistics

June 2022	Europe	USA	Russia	China	India	Others	Total
Number of launches	1	6	1	5	1	2	**16**
Number of spacecraft launched	2	63	5	15	4	8	**97**
Mass launched (in kg)	9829	28 964	7299	14 002	873	1810	**62 776**

Launch activity over the year

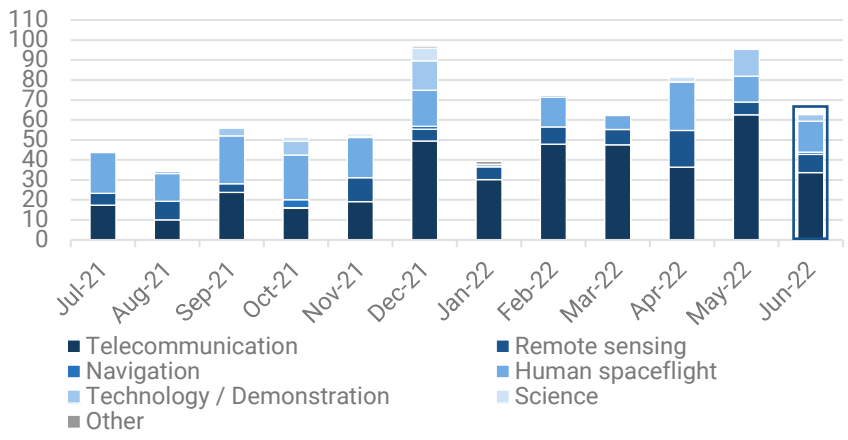


Evolution of the number of launches per launch country



Evolution of launch activity over the year 2021-2022

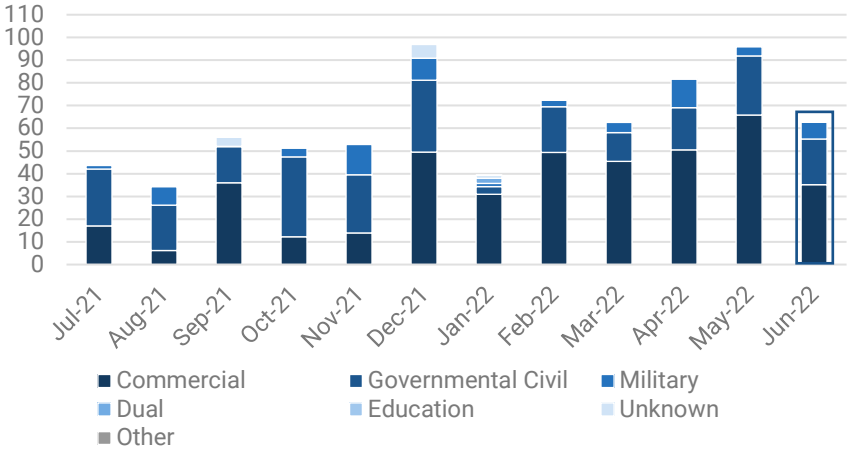
Satellite missions and markets



Evolution of the total mass launched (tons) per mission (Jul. 2021-Jun. 2022)

June 2022	Telecom	Remote sensing	Nav.	Human Spaceflight	Tech/ Demo	Science	Other
Europe	3500	4000					
USA	16 335				1207	10.6	
Russia				7280	19.2		
China		4650	1170	8082	100		
India	4181				350		
Others	9586	532.8			1762.5	6.5	3.8

Total mass (kg) launched by mission and customer country



Evolution of the total mass launched (tons), per market (Jul. 2021-Jun. 2022)

June 2022	Commercial	Governmental Civil	Military	Education
Europe	3500		4000	
USA	16 335	37.6	1180	
Russia		7280		19.2
China	1170	10 582	2250	
India	4181	350		
Others	10 041	1844		6.6

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
02/06/2022	China	CZ-2C(3)	GeeSAT-1 (9 satellites)	Geespace	China	Geespace	China	130 (each)	Navigation	Commercial
03/06/2022	Russia	Soyuz-2-1a	Progress-MS 20	Roscosmos	Russia	RKK Energia	Russia	7280	Cargo Transfer	Governmental Civil
			Tsiolkovsky-Ryazan (1 & 2)	Southwestern State University	Russia	Southwestern State University	Russia	4,8 (each)	Tech / Demo	Education
			YuZGU-55 (11 & 12)	Southwestern State University	Russia	Southwestern State University	Russia	4,8 (each)	Tech / Demo	Education
05/06/2022	China	CZ-2F/G	Shenzhou 14	CMSA	China	CASC	China	8082	Crew Transfer	Governmental Civil
08/06/2022	USA	Falcon-9 v1.2 (Block 5)	Nilesat 301	Nilesat	Egypt	Thales Alenia Space	France	3938	Telecom	Commercial
12/06/2022	USA	Astra Rocket-3	TROPICS (02 & 03)	NASA	USA	Blue Canyon Technologies	USA	5,3 (each)	Earth Science	Governmental Civil
17/06/2022	USA	Falcon-9 v1.2 (Block 5)	Starlink (53 satellites)	SpaceX	USA	SpaceX	USA	295 (each)	Telecom	Commercial
18/06/2022	USA	Falcon-9 v1.2 (Block 5)	SARah 1	Bundeswehr	Germany	Airbus	France	4000	Earth Observation	Military
19/06/2022	USA	Falcon-9 v1.2 (Block 5)	Globalstar M087 / Globalstar-2 FM15	Globalstar	USA	Thales Alenia Space	France	700	Telecom	Commercial
			USA 328, 329, 330 & 331	Unknown (USA, Public)	USA	SpaceX	USA	295 (each)	Tech / Demo	Military
21/06/2022	South Korea	Nuri	MIMAN	Yonsei University	South Korea	Yonsei University	South Korea	3,7	Earth Science	Governmental Civil
			Nuri Test Payload 2	Korea Aerospace Research Institute	South Korea	Korea Aerospace Research Institute	South Korea	1300	Tech / Demo	Governmental Civil
			PVSAT	Korea Aerospace Research Institute	South Korea	Korea Aerospace Research Institute	South Korea	162,5	Tech / Demo	Governmental Civil
			RANDEV	KAIST	South Korea	KAIST	South Korea	3,2	Earth Observation	Governmental Civil
			SNUGLITE 2	Seoul National University	South Korea	Seoul National University	South Korea	3,8	Radio Amateur	Education
			STEP Cube Lab 2	Chosun University	South Korea	Chosun University	South Korea	9,6	Earth Observation	Governmental Civil
22/06/2022	France	Ariane-5ECA+	Gsat 24 / CMS 02	NSIL	India	ISRO	India	4181	Telecom	Commercial
			MEASAT 3D	MEASAT Satellite Systems	Malaysia	Airbus	France	5648	Telecom	Commercial
22/06/2022	China	Kuaizhou-1A	Tianxing 1	Unknown (China, Public)	China	CAS	China	100	Tech / Demo	Governmental Civil
23/06/2022	China	CZ-2D(2)	Yaogan 35-02A (A, B & C)	People's Liberation Army	China	DFH Satellite Co.	China	750 (each)	Earth Observation	Military
27/06/2022	China	CZ-4C	Gaofen 12-03	CNSA	China	SAST	China	2400	Earth Observation	Governmental Civil

28/06/2022	New Zealand	Electron Photon-IP	CAPSTONE	NASA	USA	Tyvak Nano-Satellite Systems	USA	27	Tech / Demo	Governmental Civil
			Lunar Photon	Rocket Lab	New Zealand	Rocket Lab	New Zealand	300	Tech / Demo	Commercial
29/06/2022	USA	Falcon-9 v1.2 (Block 5)	SES 22	SES	Luxembourg	Thales Alenia Space	France	3500	Telecom	Commercial
30/06/2022	India	PSLV-CA	DS-EO	DSTA	Singapore	Satrec Initiative	South Korea	365	Earth Observation	Governmental Civil
			NeuSAR	ST Electronics	Singapore	Satrec Initiative	South Korea	155	Earth Observation	Commercial
			POEM	ISRO	India	ISRO	India	350	Tech / Demo	Governmental Civil
			SCOOB 1	Nanyang Technological University	Singapore	Nanyang Technological University	Singapore	2,8	Space Science	Education

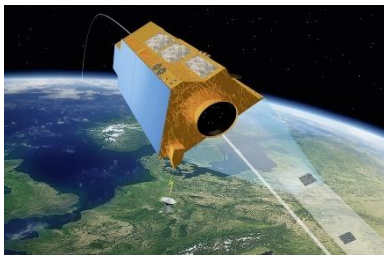
Launch Highlights

Credit: Arianespace

First launch of the year for Ariane 5

On June 22nd, Arianespace conducted the first Ariane 5 launch of the year, conducted from the Guyana Space Centre. The launch sent two communication satellites in GEO for Asian customers, namely MEASAT and NewSpace Limited India. The MEASAT's satellite also carries a payload that will be used by the Korean Augmentation System to improve air traffic control over South Korea. On its end, NSIL is a government-owned company and will lease the capacity of the satellite to a private customer, Tata Play. The latest launch of an Ariane 5 was for the James Webb Space Telescope in December 2021.

Germany starts the deployment of its new military constellation



Credit: Airbus

On June 18th, the German military satellite SARah-1 built by Airbus was launched aboard SpaceX's Falcon 9 from the U.S. Space Force base in Vandenberg, following a launch contract that the German government awarded to SpaceX in 2013. SARah-1 is the first of a constellation of three satellites that will replace the previous SAR-Lupe constellation and will provide Synthetic Aperture Radar images to the German armed forces for intelligence, surveillance and reconnaissance purposes. The Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) contracted OHB System for the development and integration of the satellite in March 2018, while Airbus was appointed as the main subcontractor.

South Korea succeeds in the launch of its indigenous rocket

On June 21st, South Korea managed for the first time to reach orbit with Nuri (also called KSLV-2), a rocket that is fully built domestically. This success follows the failure that happened during the first launch of the rocket, which took place in October 2021. The payload of this second flight was a performance test satellite, which will later release four smaller satellites built by Korean universities. A heavier dummy payload was also onboard, in order to simulate the mass of a more "traditional" satellite and to assess the performance of the launcher. Four more launches of Nuri are planned by 2027.

Rocket Lab performs its first lunar launch

On June 28th, Rocket Lab launched the CAPSTONE CubeSat for NASA, the first satellite to launch under the umbrella of the Artemis programme. After a four-month journey, the spacecraft is intended to reach and test a Near Rectilinear Halo Orbit around the Moon as a pathfinder mission for the Lunar Gateway, which will use the same orbit. To deploy this payload, the company used a new type of its rocket, equipped with Lunar Photon, which acts as both the upper stage of the rocket and an independent spacecraft once CAPSTONE deployed. Lunar Photon will thus fly by the Moon and take a few pictures after having accomplished its primary mission.

Figure 2: Credit: KARI

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