



ESPI

European Space Policy Institute

ESPI Insights

Space Sector Watch



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ANOTHER RECORD-BREAKING YEAR FOR EUROPEAN SPACE START-UPS

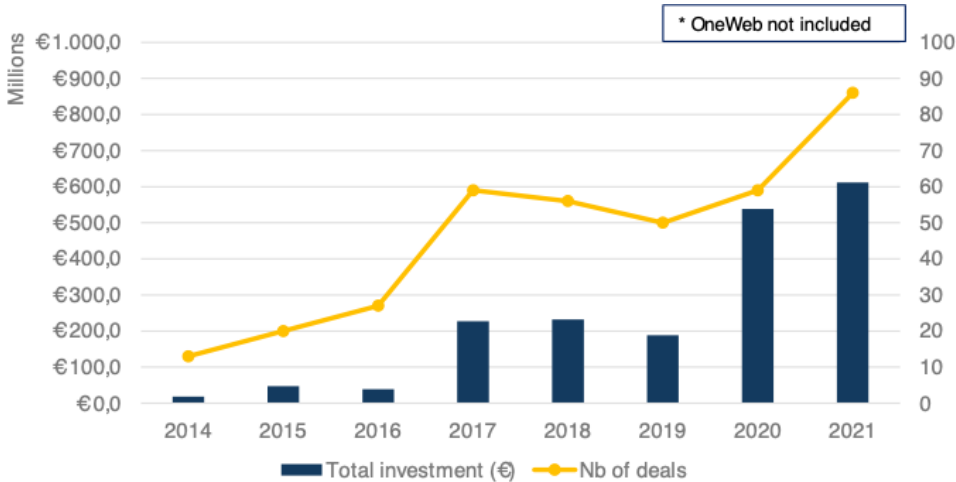


Dear Friends of ESPI,

2021 proved to be another record-breaking year for European Space start-ups. 2020 had already broken a trend marked by a plateauing of investments of 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. Furthermore, this is a conservative estimate as 15 transactions were not disclosed. It should also be noted that investments into OneWeb were not included as it is not included within our definition of a start-up.

The top five the deals of 2021 constituted 61.5% of the total raised over the year:

- Arqit (€80.6 million): The UK-based quantum encryption company raised €80.6 million in net proceeds following its “successful” SPAC merger with Centricus Acquisition Corp in September.
- Isotropic Systems (€64.8 million): Also, the UK-based broadband services start-up, Isotropic Systems secured a total of 64 million in its series B funding raising funds in February and September. With rounds led by SES and Seraphim but also supported by UKSA and the UK government’s Future Funds.
- Isar Aerospace (€57 million): The Munich-based small launcher Isar Aerospace raised an additional 57million in a round led by HV Capital bringing its total funding to date to €140 million.
- Astrocast (€41.2 million): The Swiss IoT company completed its IPO on August 25th and raised 42.2 million in a pre-IPO placement. The funding round was led by Adit Ventures and included Venture Capital firm Primo Space as well as Palantir.
- Satlantis (€30.5 million): The Spanish Earth Observation start-up Satlantis raised €30.5 million in its Series B funding over two rounds with the financing led by Enagás as well as the Spanish Ministry of Science and Innovation’s Center for the development of Industrial Technology (CDTI).



Questions could already be raised as to whether this growth is likely to continue in 2022, however deals into ICEYE, Descartes Underwriting, Sylvera, Sateliot and Aerospacelab show that an incredible 306 million have already been raised in the first two months of 2022. As such, we can expect another outstanding year for European NewSpace in 2022.

Yours sincerely,

Jean-Jacques Tortora
Director of ESPI



POLICY & PROGRAMMES

The war in Ukraine continues to impact space programmes and missions

The war in Ukraine continues to impact the space sector at different levels and to provoke reactions of the European space community.

Between March 16th and 17th, **ESA's Council meeting assessed the impact of the war** in Ukraine on European programmes and missions, as well as on cooperation in space. Additionally, the Council called for a special meeting in April to evaluate future actions. On March 22nd, EUMETSAT's member states agreed to **restrict access to satellite data** to Russia and Belarus.



Credit: ESA

- **International Space Station:** Despite initial tensions, the international collaboration on the ISS is continuing. On March 18th, three Russian cosmonauts launched from Baikonur Cosmodrome and arrived at the ISS for their normal tour of duty. On March 30th, a Soyuz brought the U.S. astronaut Vande Hei, who broke the American record for the longest single spaceflight, and two Russian cosmonauts safely back to Earth. Both missions were scheduled before the start of the war.
- **Mars missions:** ESA's Council unanimously acknowledged the impossibility to continue cooperation and mandated the ESA DG "to take appropriate steps to suspend" ExoMars. Additionally, the Council authorised ESA to carry on an accelerated industry study to define options for the prosecution of the mission. According to ESA DG Josef Aschbacher and ESA's director for Human Spaceflight and Robotic Exploration David Parker, a 2026 launch would be difficult but possible and it could potentially happen in collaboration with NASA. On March 17th, following the withdrawal of ESA from ExoMars, Roscosmos declared that Russia will **independently launch a Mars research mission**.
- **Launches:** Following the suspension of Russia's operations at Guiana spaceport and the lack of immediate replacement options, ESA's Council expressed its willingness to potentially take into consideration non-European launchers for the Galileo, Euclid, EarthCARE missions.
- **SpektrRG Space Observatory:** Germany turned off the eRosita telescope at the Russian-German SpektrRG Space Observatory. The German Space Agency at DLR declared that collaboration with Russian institutions on current or future projects "will be terminated" and, if necessary, "DLR will enter into coordination with other national and international partners". According to Russian media, Roscosmos will evaluate the losses and **ask Europe to pay for the damages**.

In response to the Western sanctions and isolation, Russia is looking for new partners for space missions and programmes as well as to buy important space industry components, starting from China.

The Council of the EU formally approves the Strategic Compass

On March 21st, the Council of the European Union **formally approved the Strategic Compass**. The document outlines a plan of action to strengthen the security and defence policy of the EU by 2030 and sets out concrete priority actions in four work strands: act, secure, invest and partner. The Strategic Compass acknowledges space as a congested and contested operational domain. It highlights how Europe should be able to act promptly in space to respond to threats and the importance of the EU Space Programme for the security of the EU. The Strategic Compass recognises the **European Defence Fund and PESCO** as the main instruments to develop joint European capabilities. Additionally, it states that the EU will strengthen international cooperation in space, including with NATO and the UN.



The U.S. Congress passes the omnibus spending bill and provides funds for space



Credit: White House

On March 17th, the U.S. President Joe Biden signed the US government's final **omnibus spending bill** for fiscal year 2022. Out of a total of \$1.5 trillion, **NASA received a budget of approx. \$24.04 billion**, about \$760M less than what it formally requested but about 3% over its 2021 spending bill. Out of NASA's budget:

- Approx. \$7.6 billion went to science programs. Although the Congress cut approx. \$317M, NASA received \$300M more than in 2021.

- Approx. \$1.1 billion went to NASA's space technology directorate, which is the same amount received in 2021. With a difference of \$325M, this is the largest cut in NASA's budget.
- Approx. \$2.6 billion went to the Space Launch System (SLS) rocket development, increasing NASA's request by \$120M; and approx. \$1.195 billion for the Human Landing System (HLS) program, particularly for the development of a lunar lander for Artemis 3 and future missions.
- Approx. \$101M went to support commercial space stations' development under the voice Commercial LEO Development. The Congress fully funded NASA's request.

The omnibus spending bill added **approx. \$1.3 billion** for the U.S. Space Force and Space Development Agency (SDA) activities, increasing the amount requested by Biden's administration. Among the largest appropriations, the Congress provided \$550M for the demonstration of missile-tracking satellites that the SDA will develop for the U.S. Indo-Pacific military command and \$70M for small launch services.

Biden administration requests funding for fiscal year 2023

On March 28th, the White House's Office of Management and Budget (OMB) released Biden administration's budget proposal for fiscal year 2023. The proposal, which was pleasantly welcomed by the space industry, **requested approx. \$25.974 billion for NASA**, increasing its spending bill of approx. 8% over 2022. Out of this amount, the proposal requested increases in some areas:

- More than \$2.4 billion for Earth Science, with an increase of approx. \$350M; approx. \$822.2M for the Mars Sample Return mission, with an increase of \$653M over 2022; and about \$5 billion for the Europa Clipper mission, with an increase of \$750M.
- Approx. \$1.438 billion for space technology, with an increase of \$1.1 billion. Approx. \$30M are specifically allocated for orbital debris research.
- Approx. **\$7.6 billion for deep space exploration**. Particularly, approx. \$1.486 billion for the Human Landing System (HLS) program, \$290M over 2022, and approx. \$4.7 billion for the Common Exploration Systems Development to support lunar missions.
- Approx. \$224M for commercial space stations.

Additionally, Biden administration requested for **approx. \$24.5 billion for the U.S. Space Force and the Space Development Agency (SDA)**, about \$5 billion over the 2022 spending bill. These funding are part of the \$773 billion budget requested for the Department of Defense. The budget proposal also requested **approx. \$11.7 billion for the Department of Commerce (DoC)**, 31.2% over 2021.



Credit: White House



ESA and NASA replan the Mars Sample Return mission

ESA and NASA agreed to replan the Mars Sample Return mission, opting for the use of **two landers instead of one to retrieve samples** from Mars and changing the schedule of the mission. The changes find confirmation in the Biden administration's budget proposal for fiscal year 2023. The original plan only comprised the NASA-led Sample Retrieval Lander, that was supposed to be launched in 2026, together



Credit: NASA

with the ESA-led Earth Return Orbiter. The lander would have then collected Perseverance's samples through an ESA-built rover and load them into the Mars Ascent Vehicle (MAV) rocket. The samples would have returned to Earth through ESA's orbiter in 2031. In 2020, an Independent Review Board expressed doubts regarding costs and timeline, and another panel recommended NASA to use a dual-lander approach to reduce risks.

Under the revised plan, the two landers will use the same landing system of Perseverance and Curiosity. The JPL will build the lander (SRL1) that will carry the MAV and a robotic arm to transfer the samples. After the Key Decision Point B, the Agencies will decide who is going to build the second lander (SRL2), which will carry the fetch rover. Both landers will be launched in 2028, one year after the launch of ESA's Earth Return Orbiter. The return to Earth of the samples is now scheduled for 2033.

NASA supports the development of a second Artemis lunar lander

On March 23rd, NASA declared it will support the development of a **second Artemis lunar lander** to ensure competition with SpaceX's Human Landing System (HLS). The award will include an uncrewed demonstration landing and a crewed landing. NASA will launch a competition for Sustaining Lunar Development under which the competitors will have to design landers for greater performances than what was required in the HLS competition. The landers will have to be able to transport more astronauts and cargo to the Moon, as well as support longer stays. SpaceX will not be able to compete for the new contract. Additionally, NASA expressed its intention to exercise the Option B provision in its HLS contract whereby it can commission SpaceX to make changes to its Starship lander to support new requirements.

Three more countries sign the Artemis Accords

Romania, Bahrain, and the Republic of Singapore became the 16th, 17th, and 18th signatory countries of the Artemis Accords. Bahrain is also **the second Arab country to join the Artemis Accords**. According to the Bahrain's National Space Science Agency, signing the Accords could benefit the country with new cooperation and investment opportunities, as well as with new training and research contingencies.

Canada starts the design phase of the Lunar Gateway's Canadarm3 and launches new facility

The Canadian Space Agency (CSA) awarded MDA a **€194.5M contract for the Canadarm3 Phase B**, under which the Canada-based company will complete the Canadarm3 robotics system's preliminary design. Canadarm3, which is planned for launch in 2027, is Canada's contribution to the Lunar Gateway. The CSA's contract is part of Canada's Moon program unveiled by Prime Minister Trudeau during a



Credit: CSA, NASA

speech in February 2019 and to which the Canadian government has committed €1.48 billion over 24 years. Additionally, MDA released news regarding the construction of a new global headquarters in Brampton, Ontario, where the development of the Canadarm3 will take place. The new facility will host the Space Robotics Centre of Excellence and a Space Robotics Mission Control Centre. The project is backed by the Ontario Ministry of Economic Development, Job Creation and Trade with a €18.08M grant and **MDA is investing approx. €72.3M**. The new facility should be fully operational by the end of 2022.



ESA presents the European Centre for Space Economy and Commerce (ECSECO)



Credit: ESA

ESA DG Josef Aschbacher presented the **European Centre for Space Economy and Commerce (ECSECO)**. The ECSECO's objective is "to serve as a European forum for interdisciplinary discussions and research on space economy and commerce". The new Centre will provide a platform in which professionals with diverse backgrounds and working in the space economy and commerce field can discuss, network, collaborate, and carry out activities. ESPI will host the Secretariat of the ECSECO at its premises in Vienna and support ESA in the management of the Centre.

The European Commission releases the DG DEFIS Management plan 2022

On March 7th, the European Commission released the **Directorate-General for Defence Industry and Space Management plan 2022**. The annual Management plan outlines the key deliverables for the year, in line with the DG DEFIS' 2020-2024 strategic plan and intervention logic. Particularly, the DG DEFIS will contribute to four of the six European Commission's priorities, namely a European Green Deal, a Europe fit for the digital age, a stronger Europe in the world and promoting our European way of life. Additionally, the Management Plan highlighted ten main priorities of the DG DEFIS and three main challenges for 2022.

Telespazio will lead the consortium in charge of all ESA-managed Copernicus operations

Telespazio received an ESA contract to lead an international consortium, comprising Telespazio France, Exprivia, S&T, AliaSpace, Eversis and EJR Quartz, to coordinate all the operations of Copernicus managed by ESA. Under the contract, Telespazio will manage the Copernicus Coordination Desk; it will deliver end-to-end monitoring of Copernicus operations; it will serve as a link between the services that ESA deploys for the EO data's acquisition and generation; it will ensure the services comply with ESA's requirements.

Luxembourg presents its first Defence Space Strategy

The Deputy Prime Minister, Minister of Defence François Bausch presented **Luxembourg's first Defence Space Strategy**. The Strategy aims to "consolidate Luxembourg's role as a reliable reference partner in the field of space by 2030", "guarantee access and preserve a peaceful and sustainable use of space, in full compliance with international law, while relying on the expertise of the Luxembourg space sector". To achieve this long-term goal, the Defence Space Strategy defines four main strategic objectives.

Australia launches new Defence Space Command

On March 22nd, Australia's new **Defence Space Command**, established in January, became officially operational. The new Command aims to **ensure Australia's access to space** to protect the country and its national interests, as well as to promote global security and stability. Additionally, the Australian government released a **Defence Space Strategy** whose vision is to "assure Australian civil and military access to space, integrated across Government, and in concert with allies, international partners and industry". The Strategy also sets out the objectives and five lines of effort up to 2040.

NASA orders more commercial missions to the International Space Station

NASA formally modified the existing Commercial Crew Transportation Capability (CCTCap) contract with SpaceX and added three more commercial crew missions to the original six to the International Space Station. NASA only disclosed the **total value of the contract which is approx. \$3.49 billion**. NASA expressed its intention to modify the CCTCap contract in December after delays in Boeing's Starliner development. Additionally, within its Commercial Resupply Services-2 (CRS-2) program, NASA ordered **12 more cargo and science delivery missions** to the ISS to Northrop Grumman and SpaceX, six each, through 2026.



NASA selects KBR Wyle Services for several services and mission operations

NASA awarded two contracts to the U.S.-based company KBR Wyle Services LLC of Greenbelt. Under the first one, which has a **total maximum ordering value of \$640M**, KBR will provide several services for the Agency's ground systems, and multiple mission operations. Particularly, it will support NASA's science and Earth science missions. Under the second contract, which has a **value of \$71.7M**, KBR will be responsible for security services and mission guarantee to NASA Headquarters and other centers.

In other news

EUSPA and UNOOSA sign a MoU to leverage the benefits of space applications and services: EUSPA and UNOOSA will conduct joint studies to investigate the integration of the European GNSS and Earth Observation, as well as satellite communications and Space Situational Awareness (SSA). They will exchange know-how, conduct pilot projects, and boost space economy to better support the UN SDGs.

The European Commission and its partners launch Destination Earth initiative: DestinE aims to develop a high-precision digital twin of Earth to monitor, model and predict human activities and environmental changes, and to develop and test scenarios to have a more sustainable development.

AI Sweden and ESA open a laboratory to advance technology development in AI and Earth observation: The Φ -lab Sweden, which brings together researchers, industry, and investors, seeks to develop breakthrough technology and to deliver it to the market. The Φ -lab Sweden will be inaugurated in spring and is the first of a larger network of Φ -labs that ESA aims to establish.

China plans to open its Tiangong space station to the private sector: According to the chief designer of China's human spaceflight program Zhou Jianping, China will actively encourage the private sector to carry on commercial activities and missions on Tiangong, once completed.

The Air Force Research Laboratory calls on companies to design and develop a cislunar satellite: The Cislunar Highway Patrol System (CHPS) experiment aims to extend the U.S. military's operational domain and space awareness capabilities in the lunar orbit, as well as help AFRL develop objects' detection, tracking and identification capabilities. CHPS is planned by the AFRL's Space Vehicles Directorate and managed by the Space Force's Space Enterprise Consortium (SpEC).

James Webb's team successfully completes the full alignment of the telescope's optics: The alignment between the Near-Infrared Camera, Webb's main imager, and the observatory's mirrors was carried out without encountering obstacles. Webb's team will align other instruments over the next six weeks and the telescope is expected to start science operations by the end of June.

The ITU's Radio Regulations Board (RRB) rejects extension requests for force majeure: RRB warned there was a limit to what it would accept as "force majeure" deadline extensions. Luxembourg claimed it for the delays caused by a LEO constellation's satellite operator disappearance and asked for more time to make Cleosat operational. Papua New Guinea had asked for a deadline extension to complete the development, launch and maneuvering into the right slot of the replacement satellites of the failed Intelsat IS-29e.

The German Bundeswehr chooses Polaris to develop and test a scaled demonstrator of Aurora: Polaris' vehicle will be used to validate key technologies and operational procedures. Its first flights are scheduled for the end of 2022. Aurora will be a German reusable horizontal launch and hypersonic vehicle, which will also be used for European defence activities.



INDUSTRY & INNOVATION

Developments in the private space sector following the war in Ukraine

Russia's attack on Ukraine is impacting the space sector at international, European, and national level. The **Ukrainian space sector is first-hand heavily affected** by the war being fought on its territory. Much of Ukraine's communications infrastructure has been destroyed, as well as many company headquarters and factory sites. The main Ukrainian space industry hubs revolve around some of the most affected cities by the Russian attacks: Dnipro, Kyiv, and Kharkiv. According to Ukrainian senior industry representatives, local companies are trying to adapt their activities to the current reality and advance their work with European partners. On the other hand, space companies around the world are also trying to adapt to this changing reality. Arianespace and SpaceX are reorganising to meet new launch demands. In March, **OneWeb signed a launch agreement with SpaceX**. The decision came after the **suspension of all OneWeb's launches from Baikonur**, voted by the company's board of directors after the UK Government rejected Roscosmos DG Dmitry Rogozin's conditions for future launches using Baikonur facilities.



Credit: OneWeb

Besides suffering the consequences of Russia's attack, the **private space sector is also playing a role** in the Ukraine war and Ukraine itself is calling on the private sector for assistance. On March 1st, the Ukraine's Vice Prime Minister Mykhailo Fedorov released an **open letter addressing commercial space companies** and asking them to provide "real-time SAR data to support the Armed Forces of Ukraine with actionable intelligence". Companies such as Maxar Technologies, Capella Space, ICEYE, MDA, Hawkeye 360, Spire Global and others are providing Ukraine with satellite imagery and data. Additionally, following the cyberattack that on February 24th **crushed ViaSat's KA-SAT GEO satellite network**, which was used by the Ukrainian army, Ukraine's Vice Prime minister and the country's minister of digital transformation Mykhailo Fedorov asked Elon Musk "to provide Ukraine with Starlink stations". **SpaceX then activated its Starlink internet service** and sent additional technology to Ukraine.

The Ukraine war affects the space industry and its supply chain

The war in Ukraine is affecting the world's space industry and several companies are expecting to suffer severe losses. Selected examples of the impacts of the war on the supply chain, investments and sales involve:

- **Engines:** The upper stage of Avio's Vega-C rocket uses engines designed by the Ukraine's factory Youjnoye, which was recently destroyed, and developed by the Dnipro-based company Yuzhmash. According to ESA Launcher Director Daniel Neuenschwander, Avio had already received the engines needed for Vega-C's 2022 missions, but it is unclear whether Yuzhmash will be able to deliver more engines. While Avio declared it will stand besides its Ukraine engine providers, ESA is looking for potential replacements. Additionally, following a ban issued by Russian institutions, U.S. companies such as ULA and Northrop Grumman **can no longer buy rocket engines from Russia**. However, the Air Force Secretary Frank Kendall said that the U.S. will not be affected by Russia's cut in supplies.
- **Satellite transportation:** European space companies, such as Thales Alenia Space and Airbus use planes to transport satellites from European factories to the Guiana Space Center in Kourou. The world's biggest Antonov-225 cargo plane was destroyed in an airport near Kiev by a Russian airstrike and the Antonov-124 cargo planes might become unavailable since they are owned by two Russian and one Ukrainian company.



Rivada Space Networks to invest in new satellite network

The German-based company, a subsidiary of US-based Rivada Networks, aims to launch a **constellation of 600 LEO satellites to deliver secure end-to-end connectivity on a global scale using lasers**. The constellation, which will serve the telecom, enterprise, maritime, energy and government services markets, is expected to be deployed in 2024 and completed by mid-2028. The decision comes after the company acquired an 85% stake from the Liechtenstein-based company Trion which was similarly planning to deliver a €4B satellite network system, now taken over by Rivada. Trion already has a licence for a 4.000-megahertz spectrum.

Intelsat integrates its services with Starlink constellation



Credit: Intelsat

The Luxembourg-based company is **combining the services of its geostationary satellites, the Starlink constellation and cellular broadband under one package**. To do so, the company created a single gateway and interface for all these services, to which customers can subscribe. Intelsat's Vice President of Business Development, Don Claussen, justified the new service by saying that its customers' needs lie with all these services. This decision came at a time when **Starlink reached 250.000 customers** across various markets, from consumer broadband to services for schools. Moreover, Jonathan Hofeller, Vice-

President of Starlink Commercial Sales, revealed that SpaceX is currently testing an aviation antenna, which would expand Starlink to that market segment.

Lockheed Martin, Northrop Grumman and York Space receive approx. \$1.8B in contracts

The US-based companies were selected by the US Department of Defence (DOD) to develop a 126 satellite LEO global communications network. Under the contract, **Lockheed Martin will receive \$700M, Northrop Grumman \$692M and York Space \$382M**, and each company will produce 42 satellites until 2024. The conclusion of this procurement process comes after the DOD changed the method by which it attributes the contracts after Maxar Technologies filed a complaint in October 2021 alleging it unfairly favoured some applicants.

OneWeb signs agreements with Eutelsat, Speedcast and Kymeta

The UK-based company signed **distribution contracts with Eutelsat, Speedcast and Kymeta**. Eutelsat plans to combine its GEO satellites with OneWeb's LEO constellation, to complement their services, while Speedcast will incorporate OneWeb's services into its Unified Global Platform, used to support connectivity from different beams, such as from high throughput satellites, LEO and MEO technologies. Moreover, Kymeta will resell the British company's services in conjunction with hardware solutions.

SpaceX seizes operations with Spaceflight Industries

On 18th March, the SpaceX Rideshare team sent an email to its customers stating that **it will cease working with Spaceflight Industries after the currently manifested missions**. Previously, there had been two cancelled launches of Spaceflight's Sherpa vehicles, first in December 2020 and then in April 2021, due to technical errors. However, the launch integration company indicated it was not aware of the reason that led to the latest decision. In a **communiqué**, it further stated that "Our Sherpa vehicles are designed to be operable with many different launch vehicles (...) and are looking forward to many upcoming missions."



Credit: SpaceX



In other news

Rocket Lab designates location of first launch site: The American-based company will soon start the construction of its new Neutron Production Complex in Virginia, USA. The Complex will harbour manufacturing, operation and launch facilities, and was thought for a “rapid production of the Neutron rocket” as well as for the refurbishment and re-flight of used rockets.

SaxaVord Spaceport receives approval and signs new partnership: The UK-based spaceport obtained authorization from the Shetlands Island Council for its construction in Lamba Ness, from which the first launch is planned to be conducted before the year’s end. Moreover, the French company Venture Orbital Systems signed a plan to launch from SaxaVord Spaceport in 2024.

SENER Aeroespacial closes contract with Airbus: The Spanish company was awarded a contract to produce and test components such as antenna noise amplifiers and dedicated central power supply units for the OneSat product, developed by Airbus.

Iceye and Fermat Capital Management agree on strategic partnership: Iceye will provide flood hazard data as well as help develop uses of data related to other natural disasters, which Fermat, an investment manager, will use in insurance-linked securities.

Skyrora opens new rocket engine testing facility: The facilities will be used to test Skyrora XL’s engines and reduce dependency on third parties. According to the company, the site located in Midlothian, Scotland, is the largest of its kind in the kingdom.

NorthStar Earth & Space and Spire Global reveal agreement on satellite constellation: Spire will develop the first three cubesats with components from NorthStar, to be launched in 2023. The objective is to develop a satellite constellation to provide space-based space situational awareness and debris monitoring.

E-Space sets date for first launch with Rocket Lab: E-Space, the start-up that raised a \$45M seed round last month, stated in a press release that it will launch the first three demonstration satellites in the second quarter of 2022, aboard Rocket Lab’s Electron rocket from Launch Complex 1, in New Zealand.

Isotropic Systems and SpaceBridge sign partnership: The companies agreed to collaborate in the optimization of satellite resource usage by integrating Isotropic antenna into SpaceBridge modem solution.

Privateer reveals platform to track space objects: The newly established company unveiled Wayfinder, a visualisation tool that aggregates data from various sources to provide better information about objects in orbit and more tailored space situational awareness services for satellite companies.

Orbit Fab awarded \$12M contract: The company’s Rapidly Attachable Fluid Transfer Interface (RAFTI) has been chosen as the main refuelling interface for multiple Department of Defence on-orbit refuelling missions, enabling Orbit Fab to scale its operations.

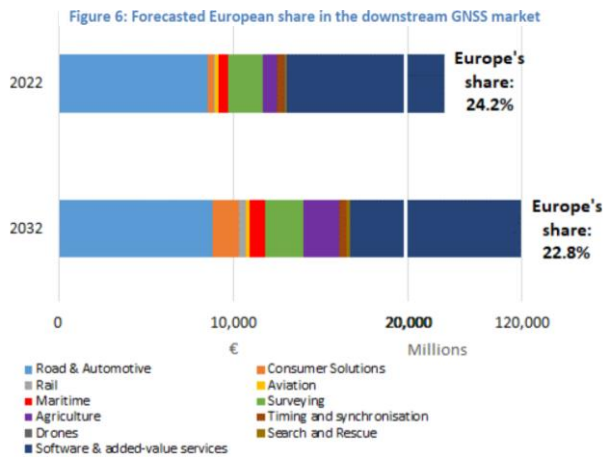


ECONOMY & BUSINESS

EUSPA and EIB release EU Global Navigation Satellite Systems report

The report requested by EUSPA and EIB explores the current funding framework of EU Global Navigation Satellite Systems (GNSS) downstream companies. About the current investment needs of this market segment, it was found that:

- There were significant foreign acquisitions of European companies, and the price to reverse those conducted during 2016-2021 would be between €5.5 and €6.8B.
- Rising star companies (i.e., “companies which have completed Series A with an implied equity valuation not lower than €30M”) have so far raised €1.25B in private funds until 2022. Moreover, these companies are interested in finding alternative paths to foreign investment, therefore an investment of up to €710M is needed to make that option available.
- Although R&D expenditure by European companies reached a Compound Annual Growth Rate (CAGR) of 5.7%, competitors from North America had a CAGR of 8.6% and Asia-Pacific 8.7%. To reach these values there would need to be an investment of between €34.1 and €42.7B, over the next 10 years.



The study concludes that there is a need for substantial investments, especially through personalised ad-hoc instruments, to maintain the European GNSS downstream market competitiveness, coupled with a robust market analysis to continue monitoring its changing dynamics.

Euroconsult released new report on high throughput satellites



The consulting firm released an **analysis of high throughput satellites (HTS) in GEO and non-geostationary (NGSO) markets**. The overall conclusion is that HTS is entering a new phase of high growth, as its capacity supply is expected to quickly increase over the next five years to 60 terabytes per second. Accordingly, Euroconsult projected that the capacity demand for HTS will average 28% on a compound annual basis until 2030.

This trend is driven by the development of NGSO constellations, which is expected to represent 90% of the capacity supply in 2026, such as Starlink, OneWeb and O3b mPOWER. The more traditional dominance of GEO-HTS systems is thus in jeopardy, as there is a shift in capital towards the NGSO satellite systems, nevertheless, these will also see growth, albeit moderate. As a response, GEO-HTS operators are adopting software-defined satellite architectures to help reduce market risk and improve the agility of their systems.



March sees terminated, successful and new SPACs amid proposed new SEC regulations

Tomorrow.io terminates merger



Credit: Tomorrow.io

Tomorrow.io, a U.S.-based weather satellite company, accepted to pay \$1.5M to the SPAC called Pine Technology after the companies **agreed on the termination of a merger due to “market conditions”**. The SPAC, agreed in December, was set to raise approx. \$420M in gross proceeds, putting the company’s valuation at \$1.2B. In response to these developments, Tomorrow.io’s CEO, Dan Slagen, stated, “Our mission does not change and neither do our growth plans”.

Terran Orbital completes SPAC

On March 25th, Terran Orbital **completed its merger with SPAC Tailwind Two Acquisition Corp, with gross proceeds of approx. \$255M**. The proceeds are comprised of \$50.8M from a private investment in public equity (PIPE) round with participants that include AE Industrial Partners and Lockheed Martin, and \$175.3M in debt financing by Francisco Partners, Beach Point Capital and Lockheed Martin. The company will use the funds to expand its production capacity and become more vertically integrated. The combined company was **originally expected to provide the satellite manufacturer with \$470M**.

Satixfy set to go public through SPAC merger

Satixfy, an Israel-based company that produces satellite communications components, stated on March 8 that it expects to raise up to **\$350M in gross proceeds from going public through a SPAC merger**, \$29M of which through a PIPE, valuing the company at \$813M. Moreover, the company also received a committed equity facility of \$75M from the private equity firm Cantor Fitzgerald and \$55M in a loan from Francisco Partners. The company did not disclose the date the merger will take place.

Security and Exchange Commission (SEC) proposed new rules on SPACs

On March 30, the **SEC proposed new rules and amendments to regulate SPACs**. SEC Chair Gary Gensler justified the need for new rules stating that “Functionally, the SPAC target IPO is being used as an alternative means to conduct an IPO. Thus, investors deserve the protections they receive from traditional IPOs”. The new regulations would require, among other things:

- Additional disclosures on SPAC sponsors, conflict of interests, and sources of dilution;
- Additional disclosures on merger transactions between SPACs and private operating companies;
- Expansion of the rules on projections made by SPACs and their target companies.

Consequently, the requirements on financial statements of private operating companies in transactions involving blank-check companies would be more similar to those required in registration statements for an initial public offering.

Leonardo DRS sells Global Enterprise Solutions (GES) to SES for \$450M

On March 22, the companies’ boards of directors reached an agreement to **sell Global Enterprise Solutions (GES) for \$450M**. The GES provides managed satellite communication services to the U.S. Defence Department and other agencies. SES now plans to reorganise the DRS GES business unit under the SES Government Solutions (SES GS), a subsidiary fully owned by SES. In the press release, Leonardo DRS states that this sale will enable the company to consider “larger potential acquisitions” to strengthen the company and “open new market opportunities”.



Celestia Aerospace raises €100M seed round

On March 15th, the Spanish company **Celestia Aerospace** disclosed it had raised €100M in a seed round. The investment, which was made by Invema Group, headquartered in London, will be used to launch a nanosatellite production centre with a production capacity of 100 units per year. This will be complemented by the launcher development and operations centre for Sagitarius Airborne Launch System, thus providing an end-to-end service for nanosatellites, from manufacturing to launch and operation.



Credit: Celestia Aerospace

Synspective secures \$100M in Series B funding round

The Japanese SAR satellite data and solutions start-up announced on March 29 that it raised \$100M in a Series B funding round. Comprised of equity and bank loans, it was led by Sompo Japan Insurance, Nomura SPARX Investment and Pavilion Capital. The investment will be used to develop, produce, launch and operate its SAR satellites and prepare for global expansion.

Hadrian Automation raises \$90M

Hadrian Automation secured \$90M in a new round of investment led by venture capital firms Lux Capital and Andreessen Horowitz. The start-up specialized in the production of precision components will use it to finance the construction of a second factory in California. Hadrian's CEO Chris Power stated that the company currently has three customers, all of which are in the space sector and that for now, Hadrian is producing aluminium components. The company expects to expand its production into steel and other hard metals in the short term.

CesiumAstro closes \$60M Series B funding round

The American manufacturer of communication systems for satellites and airborne platforms raised \$60M in a Series B funding round led by Airbus Ventures and Forever Ventures, where L3harris Technologies also participated. The company aims to invest in the growth of its manufacturing operations, expand its offices domestically and abroad, and develop satellites built in-house. Accordingly, the company plans to establish a European presence by opening a new department in Germany.

HISPASAT acquires AXESS Networks

The Spanish companies reached an agreement in which AXESS Networks was acquired by HISPASAT. The transaction was envisaged in HISPASAT's 2020-25 Strategic Plan, which established the objective of focusing the company on satellite solutions and providing services to its target markets. Therefore, the acquisition will enable the company to optimize and develop its connectivity solutions, namely on the Internet of Things and satellite 5G networks, especially in emerging markets such as Latin America.

Kymeta raises an additional \$84M

On March 15, Antenna manufacturer Kymeta stated it raised an additional \$84M in equity financing. The funding was led by Bill Gates and saw the participation of Hanwha System, as well as other investors and originally, sought to secure \$132M. The U.S.-based company will apply the capital to accelerate the manufacturing process and prepare to scale up its operations to grow its services for LEO and defence customers. Doug Hutcheson, executive chair and co-CEO of Kymeta said that the company is planning to launch three antennas this year, including a new third-generation u8, which will help reduce costs.



Credit: Kymeta



Firefly Aerospace closes \$75M Series B round

On March 22th, the U.S-based manufacturer of launch vehicles **secured \$75M in a Series B investment round** led by AE Industrial Partners (AEI). The company will use the capital for future Alpha launch vehicle flights, to develop the Blue Ghost Lunar Lander Program and additional launch and in-space solutions. Additionally, AEI also completed the acquisition of Noosphere Venture Partners LP's stake in the company.



Credit: Firefly Aerospace

Kayros secures €40M financing round

On March 22th, the French company **Kayros completed a €40M financing round**. The investment, led by the General Secretariat for Investment and managed by the French Public Investment Bank (Bpifrance), under the framework of "France 2030", came from a mix of state-backed investment vehicles and private firms. The European Investment Bank participated in the round, as well as venture capital firms such as NewSpace Capital and Opera Tech Ventures. The funds will serve to foster the company's commercialisation in the geospatial monitoring industry.

Pixxel raises \$25M in Series A

On March 28, the India-based **Pixxel raised \$25M in a Series A** funding round, led by Radical Ventures and with the participation of Seraphim Capital. The company will invest in the production of its hyperspectral satellites, bringing the global coverage cadence down from two days to one or less. Moreover, according to Awais Ahmed, Pixxel's CEO, the company aims to cover over 200 hyperspectral bands with a spatial resolution of 5 meters. These will serve the company's customers, which are approx. 95% commercial, in sectors such as agriculture, oil and gas, mining and climate.

In other news

Slingshot Aerospace secures \$25M in funding round: The investment, led by Draper Associates, was done in a second funding round of its Series A, bringing the total amount to \$34.6M. The funds will be used to boost the commercialization of the company's products and technologies, namely the Slingshot Beacon, a collision-avoidance cross-coordination and communications platform.

Impulse Space Propulsion closes \$20M seed round: The U.S-based start-up focused on in-orbit services will use the funds to continue developing its last-mile space payload delivery services. The investment round was led by Founders Fund.

Interstellar Lab raises \$5M in pre-seed round: The French American start-up aims to use the funds to double its staff by the end of the year and to develop new products for the space market. The funding round included the participation of Uranla, Seldor Capital and E2MC.

Ursa Space raises \$16M in Series C funding: The company will use the funds to answer customer demand for analysis-ready satellite data and to expand its field sales organization for newly emerging markets in earth observation data. The investment round was led by Dorilton Ventures.

Synthetiaic closes \$13M in Series A funding: The American start-up aims to use the funds to increase its workforce and continue to hire top AI talent. The start-up's solution called Rapid Automatic Image Categorisation can be used to build models from earth observation imagery using artificial intelligence.

Canaccord Genuity initiates coverage of Virgin Orbits stocks: The financial services firm stated that Virgin Orbit was an "emerging defence contractor" and attributed a "buy" rating with \$20 being the stock price cap.

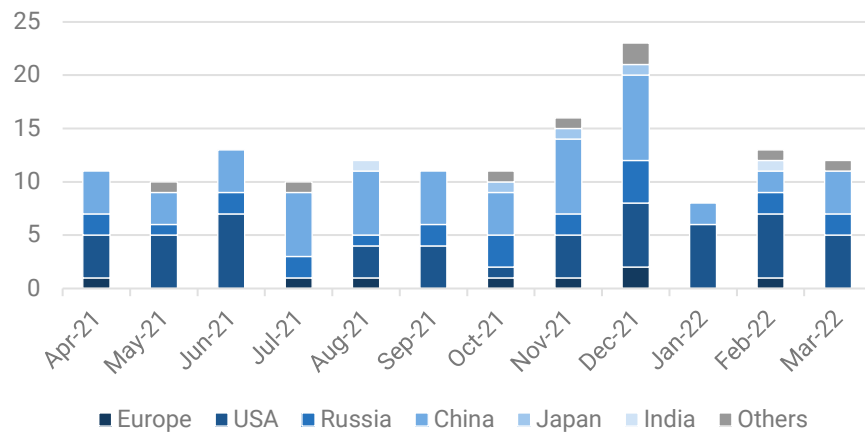


LAUNCHES & SATELLITES

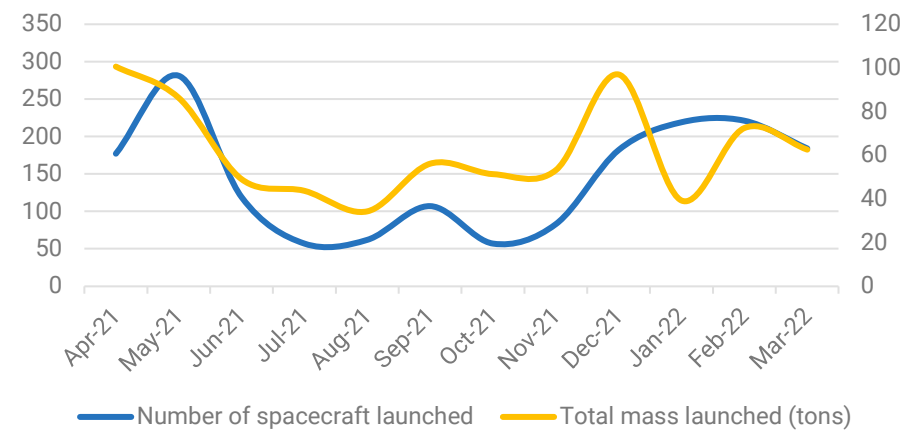
Global space activity statistics

March 2022	USA	Russia	China	Others	Total
Number of launches	5	2	4	1	12
Number of spacecraft launched	168	2	13	1	184
Mass launched (in kg)	49 447.8	9180	3883	40	62 550.8

Launch activity over the year



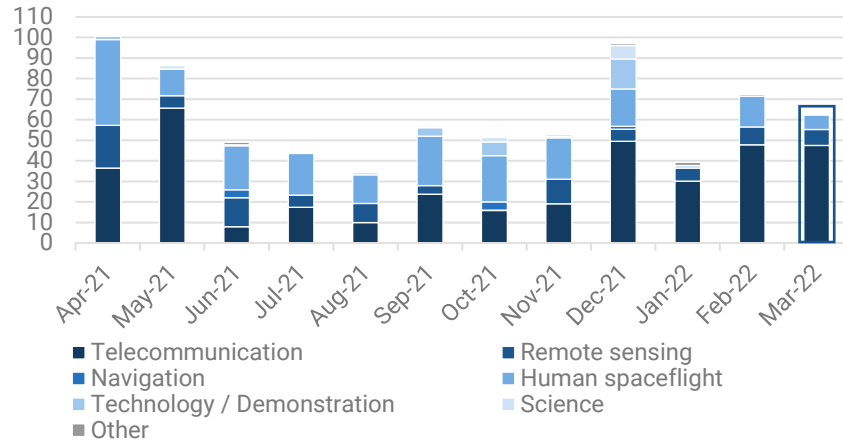
Evolution of the number of launches per launch country



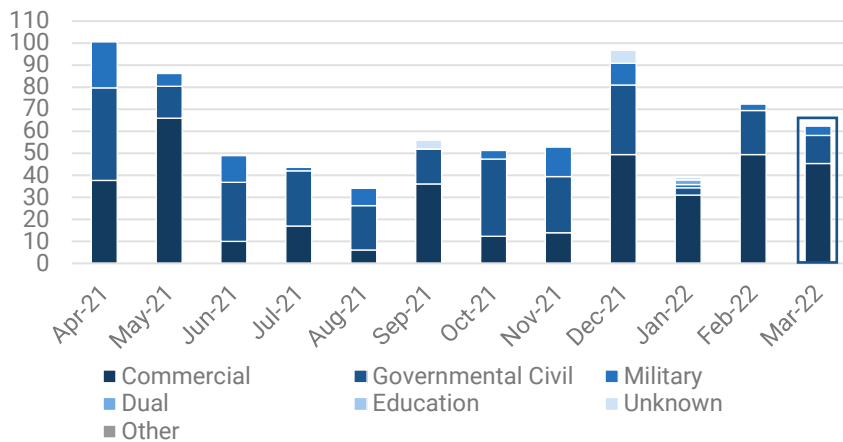
Evolution of launch activity over the year 2021-2022



Satellite missions and markets



Evolution of the total mass launched (tons) per mission (Apr. 2021-Mar. 2022)



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

March 2022	Telecom	Remote sensing	Human Spaceflight	Technology/ Demonstration
USA	44 249.8	5192		6
Russia	2100		7080	
China	1140	2508		235
Others		40		

Total mass (kg) launched by mission and customer country

March 2022	Commercial	Governmental Civil	Military	Education
USA	44 254.8	5192		1
Russia		7080	2100	
China	1148	435	2300	
Others			40	

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
01/03/2022	USA	Atlas-5(541)	GOES 18 / GOES T	NOAA	USA	Lockheed Martin	USA	5192	Meteorology	Governmental Civil
03/03/2022	USA	Falcon-9 v1.2 (Block 5)	Starlink (47 satellites)	SpaceX	USA	SpaceX	USA	295 (each)	Telecommunication	Commercial
05/03/2022	China	CZ-2C(3)	Xingyuan 2	SpaceWish	China	SAST	China	8	Earth Observation	Commercial
			Yinhe 2 (6 satellites)	Galaxy Space	China	CAST	China	190	Telecommunication	Commercial
08/03/2022	Iran	Qased	Noor 2	Islamic Revolutionary Guard Corps	Iran	Islamic Revolutionary Guard Corps	Iran	40	Earth Observation	Military
09/03/2022	USA	Falcon-9 v1.2 (Block 5)	Starlink (48 satellites)	SpaceX	USA	SpaceX	USA	295	Telecommunication	Commercial
14/03/2022	USA	Astra Rocket-3	OreSat 0	Portland State University	USA	Portland State University	USA	1	Technology / Demonstration	Education
			S4 Crossover	NearSpace Launch	USA	NearSpace Launch	USA	5	Technology / Demonstration	Commercial
			SpaceBEE (17 satellites)	Swarm Technologies	USA	Swarm Technologies	USA	0.4 (each)	Telecommunication	Commercial
17/03/2022	China	CZ-4C	Yaogan 34-02	People's Liberation Army	China	CAST	China	2300	Earth Observation	Military
18/03/2022	Russia	Soyuz-2-1a	Soyuz-MS 21	Roscosmos	Russia	RKK Energia	Russia	7080	Crew Transfer	Governmental Civil
19/03/2022	USA	Falcon-9 v1.2 (Block 5)	Starlink (53 satellites)	SpaceX	USA	SpaceX	USA	306 (each)	Telecommunication	Commercial
22/03/2022	Russia	Soyuz-2-1a Fregat	Meridian-M 10	Ministry of Defense of the Russian Federation	Russia	ISS Reshetnev	Russia	2100	Telecommunication	Military
29/03/2022	China	CZ-6A	Pujiang 2	SAST	China	SAST	China	200	Earth Observation	Governmental Civil
			Tiankun 2	CASIC	China	CASIC	China	85	Technology / Demonstration	Governmental Civil
30/03/2022	China	CZ-11	Tianping 2 (A, B & C)	Unknown	China	Unknown	China	50 (each)	Technology / Demonstration	Governmental Civil



Launch Highlights

Astra succeeds in launching operational satellites

On March 14th, slightly more than one month after a failed launch, **Astra reached orbit for the first time with operational satellites**, from Kodiak Island, Alaska. The launch was also the first in a multi-launch agreement with Spaceflight Inc. announced the same day by the company. The Astra 3.3 rocket deployed a technology/demonstration CubeSat for the Portland State University as well a payload for NearSpace Launch, which remained attached to the first stage as planned. A few days after the launch, it was disclosed that 16 SpaceBEE spacecraft of Swarm Technologies, an IoT company acquired by SpaceX in 2021, were part of the ride. A few days before the launch, Astra revealed that the failure of its February mission was due to a problem during separation of the rocket's payload shroud, followed by a software glitch on the upper stage.



Credit: Astra/John Kraus



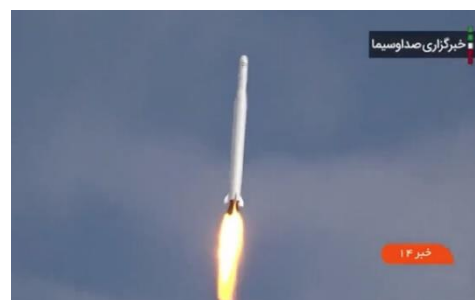
Credit: Kennedy Space Center

SpaceX sets two new records for its fleet

On March 19th, SpaceX sent a new batch of 53 Starlink satellites to orbit. According to Elon Musk, the launch represented the **heaviest payload ever** for a Falcon 9, reaching 16.25 tons. The launch was also a milestone in terms of reusability: indeed, for the first time, a booster of the company flew on 12 launches. In particular, the first use of the booster was for the Demo-1 commercial crew test flight in 2019; the booster has also launched from **all active SpaceX's launch pads** in Florida and California.

Iran reaches orbit for military purposes

On March 8th, Iranian media announced that the country's **second military satellite** (Noor 2) was put in orbit by the Iranian Revolutionary Guard Corps, a claim that was confirmed by the U.S. Space Command after a few hours. Noor 2 is a **6U CubeSat** carrying imagery equipment. The launch was the first to succeed since the first military satellite, Noor 1, was deployed in April 2020. In the meantime, Iran failed another attempt in December 2021. The launch took place in a specific context, as negotiations for a new "nuclear deal" with Iran are taking place in Vienna. It also raised **concerns**, in particular from the United States, which consider that the space programme of the country is a way to develop its ballistic missile capabilities, with the potential to deliver nuclear weapons.



Credit: IRIB

Long March 6A launches for the first time

On March 29th, China performed the **first launch of Long March 6A**, a rocket which, for the first time in China, uses solid boosters. The rocket is designed to launch 4 tons to SSO, thus filling a gap in current capabilities. It will also be a "modular" launcher, as it can be launched with two boosters or none at all. Finally, a dedicated launch complex was built for the rocket in the Taiyuan Centre.

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