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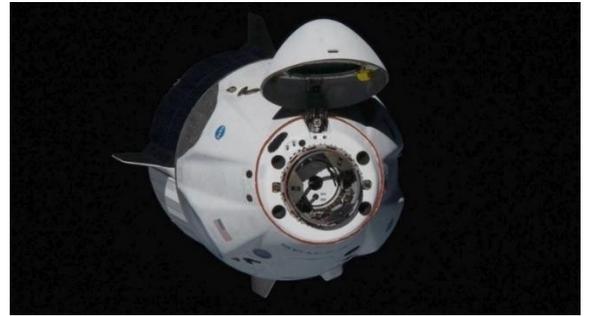
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FOCUS

The Crew Dragon mission to the ISS and the Commercial Crew Program

After missing the original target date of 27 May for weather constraints, on 30 May a Falcon 9 rocket launched the [Demonstration-2 Mission \(DM-2\) to the ISS](#) from the Kennedy Space Center Launch Complex 39A. It is the first crewed flight for a private company and the first from U.S. territory and on a U.S. launch vehicle, since the 135th and last mission of the Space Shuttle in 2011. Since then, the U.S. relied on negotiations with Roscosmos to secure seats on Soyuz missions. The Demo-2 mission builds on the previous successful [Demo-1 mission](#) and [in-flight abort test](#), respectively occurred in March 2019 and January 2020. On 31 May, the spacecraft autonomously docked to the Station approx. 19 hours after the launch, carrying NASA astronauts Bob Behnken and Doug Hurley to take part of the Expedition 63 crew on the ISS. Despite being designed to remain docked for 119 days and scheduled to stay only for few weeks, NASA is considering a [longer duration for the Dragon capsule](#), also because of positive performance of the spacecraft's solar arrays, thus also [taking advantage of an extended crew for future EVAs to replace ISS batteries](#).



Credit: NASA

The DM-2 has been influenced to some extent by the ongoing alert caused by the COVID-19 crisis, as the presence of public at Kennedy Space Center was not allowed and stricter measures were taken regarding astronauts' quarantine and social distancing. In addition, the NASA Associate Administrator responsible for human spaceflight Doug Loverro - who was appointed in October 2019 - [resigned eight days before the launch date](#). Only on 12 June, NASA announced the appointment of [Kathy Lueders, former Manager of the Commercial Crew Programme](#) since 2014, as new Head of Human Exploration and Operations Mission.



Credit: NASA, SpaceX

The DM-2 has been the last demonstration mission to validate SpaceX's crew transportation system and certify the Crew Dragon for operational, long-duration missions to the ISS under the [Commercial Crew Programme \(CCP\)](#). Launched in 2010, the CCP aimed to enable U.S. space transportation systems developed by private companies for crewed spaceflight. After an initial selection of four companies including Sierra Nevada and Blue Origin, in 2014 NASA picked SpaceX's Dragon and Boeing's Starliner, awarding overall contracts respectively for \$3.1B and \$4.4B. Overall, the CCP is reported to be NASA's [lowest-cost human spaceflight programme since Mercury](#) in 1959, cutting as well the per-seat cost compared to the Shuttle and the Soyuz missions and [saving the Agency costs for up to \\$20-30B](#).

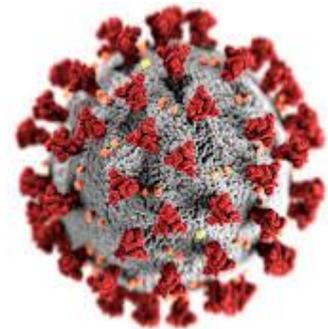
For the next steps, NASA announced the selection of the astronauts flying on the forthcoming SpaceX [Crew-1 mission](#), allowing as well SpaceX to [reuse the Crew Dragon spacecraft and Falcon 9 first stage](#) for the next expected missions. At the same time, [NASA still secured a \\$90M seat on a Soyuz mission](#) scheduled for the October. According to a NASA Inspector General report of 2019, [NASA spent approx. \\$3.9B on 70 Soyuz seats since 2006 - \\$1B since 2017](#). Therefore, the success of the CCP carries also [implications about the NASA-Roscosmos relationship and potential loss of revenues for the Russian space agency](#).

SPACE POLICY AND PROGRAMMES

EUROPE

COVID-19 and the European space sector

The latest months have been marked by the worldwide outbreak of the COVID-19 pandemic and the immediate impacts on several economic sectors. The space sector has been impacted as well by the crisis, that is poised to cause also long-term effects. ESPI examined the major [“Questions raised by the COVID-19 crisis” in the latest Executive Brief n.41](#) and will publish by the beginning of July a Special Report on “COVID-19 and the European space sector”, about the space solutions for crisis monitoring and response, the initiatives to further develop space applications and use industrial capabilities to cope with the crisis, and the analysis of the impacts and the mitigation measures.



One of the immediate and tangible impact of the crisis has been on the Guiana Space Centre: the GSC has remained closed for approx. two months, with delays in launch operations and in the development of the Ariane 6 ELA4 launch complex. Consequently, the [maiden flight of Ariane 6](#) is reported to be potentially postponed to 2021, according to the ESA Director of Space Transportation Daniel Neuenschwander.

Policy developments

In Europe, the COVID-19 crisis has also impacted the development of several policy aspects, among which the most relevant is the negotiation of the Multiannual Financial Framework 2021-2027 that includes the allocations for the EU Space Programmes and Horizon Europe. On 27 May, the EU Commission announced [the new MFF budget proposal](#), under which the EU Space Programmes would receive €14.87B (€13.3B in 2018 prices): a sensible cut compared to the initial proposal of €16B - without yet details on the budget and potential repercussion on each programme (i.e. expansion of Copernicus and Galileo, kickstart of GovSatCom and SST).

Among the European initiatives to cope with the crisis, the Commission has also proposed a new [Strategic Investment Facility of €15B](#) to invest in [strategic companies](#) impacted by the crisis in sectors such as healthcare, space, defence, digital and green technologies and generate further investments up to €150B.

On 29 May, [the Ministers responsible for space](#) in an informal videoconference acknowledged the role of space in addressing the current and future challenges. Then on 4 June, [the Council of the EU adopted the conclusions on “Space for a sustainable Europe”](#), recognising also the immediate and long-term effects of the crisis and emphasising the role of integrated space programmes for a sustainable economic recovery.

Space technologies for European defence

In June, the European Commission launched [two European Defence Fund \(EDF\) precursor programmes](#); the European Defence Industrial Development (EDIDP) funded with €200.5M and the Preparatory Action on Defence Research (PADR) funded with €4.5M. Under the [initiative](#), more than €70M contributions will be invested in projects related to space technologies, in particular:

- GEODE (Galileo for EU Defence) with maximum EU contributions of €43.9M to develop Galileo PRS receiver capabilities, led by the French FDC;
- PEONEER (Persistent Earth Observation for actionNable intElligence survEillance and Reconnaissance) with maximum EU contribution of €7.2M to develop a software platform for automated interpretation of satellite and other sources data, led by the Italian e-Geos;

- OPTISSE (Very high-resolution OPTical payload for Small Satellites for defence applications) with full EU contributions of €874.9k to develop multiple EO small satellites payload, led by the Spanish Satlantis;
- ESC2 (European Strategic Command and Control System) with maximum EU contributions of €20M to develop an interoperable Command and Control system, led by the Spanish Indra.

Moreover, the Commission launched the H2020 [7Shield project](#) (Safety and Security Standards of Space Systems, ground Segments and Satellite data assets) with maximum EU contributions of €6.9M for the development of services and technologies protecting the ground segment, led by the Italian Fair Dynamics Consulting.

On 12 May, Airbus has been awarded the [“EU SatCom Market” contract from the European Defence Agency \(EDA\)](#) reported to amount to “tens of millions of euros”. The EDA satellite communication framework contract has a four-year duration and cover the procurement of communications services in C, Ku, Ka and L bands for the military and civil missions of the EU and its Member States.

In April, NanoAvionics has been awarded a contract by the Norwegian Defence Research Establishment (FFI), the Royal Netherlands Aerospace Centre (NLR) and Netherlands Organisation for Applied Scientific Research (TNO). NanoAvionics will develop two nanosatellites - “Birkeland” and “Huygens” - for the [BROS mission \(Binational Radiofrequency Observing Satellites\)](#) to detect, classify and geolocate RF signals for military purposes.

ESA Earth Observation Missions

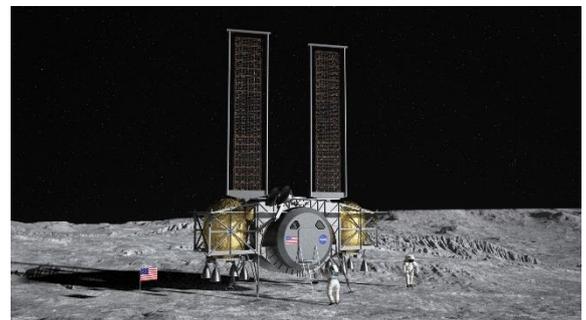
In April, ESA announced the end in the near future of [the Proba-V seven-year mission](#) focused on vegetation and the repurpose of the minisatellite in order to utilise its geometric and radiometric performance to make experimental observations in Europe and Africa, in particular in the African Sahel; the global vegetation imager mission of Proba-V is expected to be replaced in 2021 by a CubeSat developed by the Belgian Aerospace Lab.

In May, ESA announced that the [data from Aeolus are publicly distributed in near-real time](#) for forecasting and scientific purposes, also thanks to an agreement with Eumetsat; Aeolus’ data will be primarily distributed through ESA’s Aeolus Online Dissemination Centre and EUMETcast dissemination system.

Finally, ESA also released a [new Call for Earth Explorer mission](#), which would be the 11th Earth Explorer mission and could be launched between 2031 and 2032.

Thales Alenia Space among HLS competitors

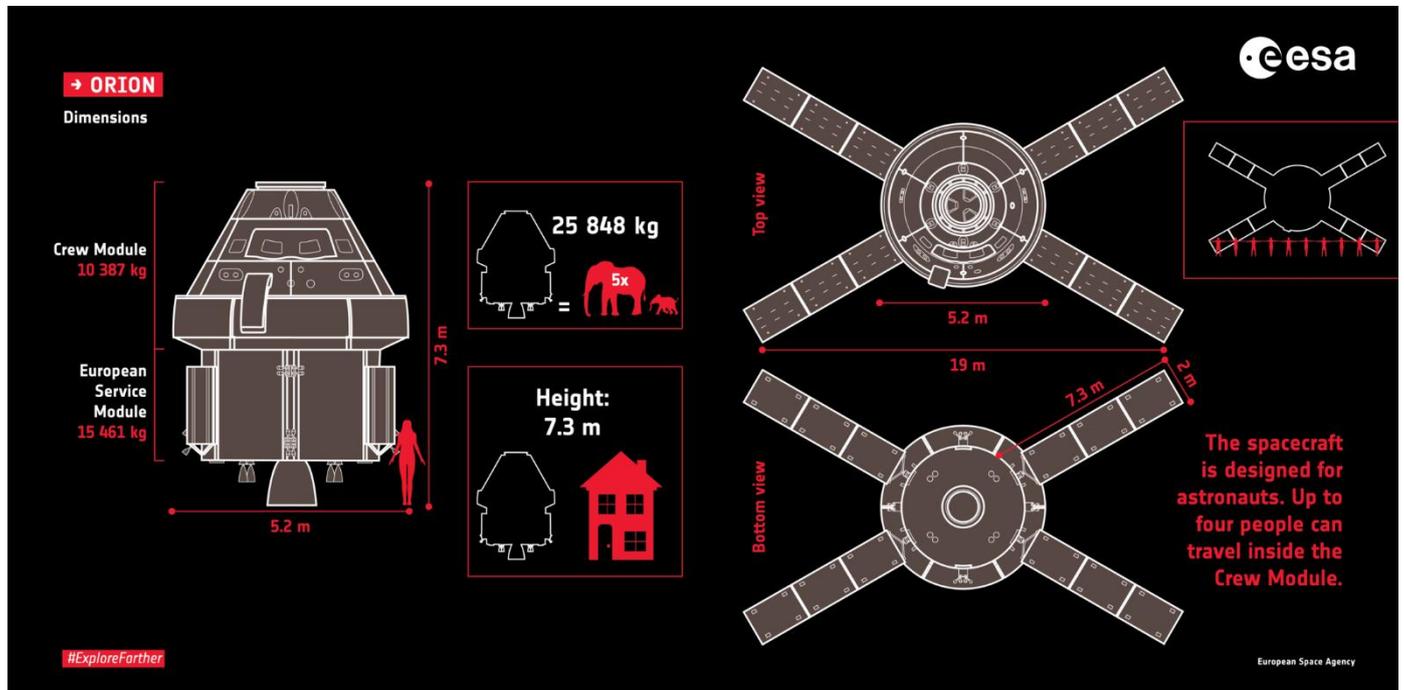
Among the teams appointed by NASA on 30 April for the Human Landing System (HLS) programme, [Thales Alenia Space has been selected as part of an international consortium of twenty-five companies, led by the prime contractor Dynetics](#). Thales Alenia Space will be focused on the design of the main volume of the crew module, including the primary structure, hatch & Extra Vehicular Activities (EVA) door, windows and thermal and micrometeoroid protection, together with the primary production of the basic tools. Among the project selected by NASA, the lander proposal presented by Dynetics ranked highest in the technical and management assessment.



Credit: Dynetics

Advancements for the European Service Module

ESA signed a contract with Airbus for the [third European Service Module \(ESM\)](#) for approx. €250M. The ESM is part of the Orion spacecraft, developed for the upcoming Artemis missions to the Moon; the new contract concerns specifically the Artemis III mission, that is expected to bring astronauts to a lunar landing in 2024. The ESM is the main propulsion system of Orion, it provides life support to the crew and is responsible for orbital manoeuvring, position and thermal control.

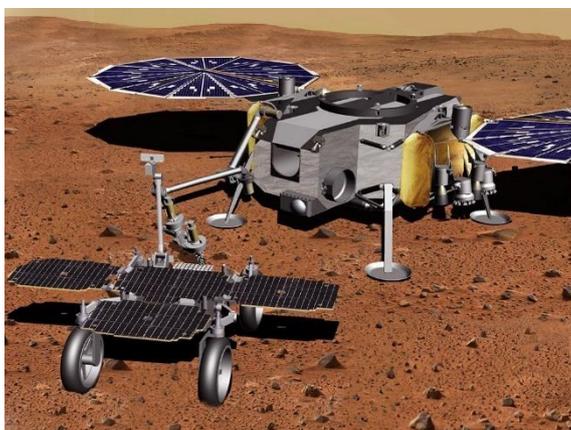


Credit: ESA

ESA is providing the ESM for the Artemis mission I and II: the first ESM is already been delivered to NASA in 2018 and integrated with the Orion spacecraft for tests, while the second ESM is currently being tested in Bremen with the delivery expected for early 2021.

On the same day of the announcement, [Thales Alenia Space has signed a contract with Airbus to develop and produce the thermomechanical systems](#) for the third ESM for approx. €75M.

Airbus for the Martian Sample Fetch Rover



Credit: NASA JPL Caltech, Airbus

In June, [ESA awarded Airbus with the Advanced B2 study contract for the Sample Fetch Rover](#), the subsequent component of the initial phase A and B1 studies undergoing at the Airbus' Stevenage facility since 2018. The rover is expected to be launched in 2026 and is part of the joint NASA and ESA Mars Sample Return mission; the rover is designed with four wheels instead of six as for the ExoMars 2022 Rosalind Franklin rover. According to Airbus, the change in the rover design is required by the performances required by the Sample Fetch Rover, that for six months will reach the location where samples are collected in metal tubes and place them in the Mars Ascent Vehicle.

New appointments in ESA, GSA and Eurospace

On 24 June, the ESA Council approved the [appointment of Elodie Viau as Director of Telecommunications](#), currently Vice-President for Technology Program Management at SES, to succeed Magali Vaissiere from 1 September 2020. At the session, the Council also approved Anna Rathsman as new Council Chair, a two-year extension of the Director of Science Günther Hasinger, and launched the recruitment process of a new Director General to succeed Jan Wörner, expected to be selected by the end of the year. Wörner term will then end on June 2021.

Starting from 23 June, [Alberto Tuozzi is the interim President of the European GNSS Agency \(GSA\)](#), until the elections for new President that will take place in 2021. Currently Head of Telecommunications and Satellite Navigation in ASI and Vice-President of the GSA, Tuozzi succeeds to the former President Jean-Yves Le Gall and will manage the transition to the establishment of the EU Space Programme Agency (EUSPA) as well as the nomination process of the new Executive Director.

On 24 June, [the Eurospace General Assembly appointed André-Hubert Roussel as President](#) of the European space industry association. Roussel is currently CEO of ArianeGroup and will succeed Jean-Loïc Galle.

Italy introduces Platino, regions launch Mirror Copernicus

In June, ASI signed a long-term agreement with Sitael, Leonardo, Airbus Italy and Thales Alenia Space Italy for the [PLATiNO programme, funded for over €100M by ASI and the Italian Government](#). The agreement concerns in particular the commercialisation and industrialisation of the programme and identifies Sitael as the leader of the temporary group of companies. The PLATiNO programme will realise [two small satellites platforms of 200 kg each with multipurpose applications](#) (from optical and SAR observation to telecommunication services) and are expected to be launched by 2021 and 2022 on the Vega SSMS (Small Spacecraft Mission Service). [Platino 1 and Platino 2](#) will be equipped respectively with SAR capability operating in X-band and an observation infrared instrument.

Moreover, based on a MoU with the Australian Space Agency signed in 2019, [ASI will participate in the SpiRIT satellite project](#) with an X-ray detector hosted onboard the spacecraft.

In May, the Italian Ministry of Economic Development together with the Apulia region and thirteen other regions signed a [MoU for the realisation of the Mirror Copernicus programme](#) with allocation of approx. €6.6M; the programme is part of the [Italian Space Economy Strategic Plan](#) and aims at developing and consolidating the national capabilities related to Copernicus concerning the upstream and downstream segments and the ground infrastructures.



Credit: ASI, Sitael

DLR new research observatory

DLR announced in May the development of a new research observatory, located at the Empfingen Innovation Campus in Baden-Württemberg, and is expected to be completed by spring 2021. The [observatory project, called MS-LART \(Multi-Spectral Large Aperture Receiver Telescope\)](#), will be developed in partnership with Astro Systeme Austria (ASA) for approx. €2.5M, funded by DLR and the German Federal Ministry for Economic Affairs and Energy (BMWi). The MS-LART will study the nature and trajectory of objects in LEO using specialised lasers and its primary mirror with a diameter of 1.75 metres.

CNES progresses on the French-Indian Trishna

Following a formal [approval](#) in March by the CNES Board of Directors, CNES has awarded Airbus a contract for the [development and manufacture of the thermal infrared instrument for the TRISHNA satellite](#) (Thermal infraRed Imaging Satellite for High resolution Natural resource Assessment). The satellite will have a three-day revisit time capability and a 50 centimetres resolution and is expected to be launched by 2025. Trishna is developed under a broader partnership between CNES and ISRO, the prime contractor of the satellite, and will focus especially on water resources and climate change impacts on the environment through a wide range of surface temperatures measurement.

New projects in UK, follow-up on OneWeb

In June the UK and U.S. government representatives signed a [U.S.-UK Technology Safeguards Agreement \(TSA\)](#) that enable U.S.-based companies to launch from UK spaceports; the [agreement](#) sets standards concerning the U.S. technology utilisation from foreign locations. According to the Minister for Science, Research and Innovation Amanda Solloway the agreement paves the way for “the first ever launch into space from British soil”.

In May, the UKSA has launched a funding initiative for solutions to [monitor space debris in LEO and improve the use of existing orbital data](#), especially through the use of artificial intelligence; the initiative amounts overall to approx. €1.1M.

In May, the Telegraph mentioned the possibility for the UK to [abandon the plan](#) to establish a British GNSS system. On the same topic, the Financial Times reported about the [prospect to scale back the £5B programme and support instead a national bid toward OneWeb](#) as an alternative solution to establish a GNSS system; despite the lack of detailed information about the bidding process of OneWeb, [the UK government is indeed reported to have joined a consortium bidding £500M](#) to acquire the London-based company. If no bid is successful, the process will continue with an auction expected on 2 July.

Andøya Spaceport secures financial support

Following a previous [positive decision](#) from the parliamentary Committee on Business and Industry, on 10 June the Norwegian Parliament approved the [funding to the Andøya Spaceport for approx. NOK365M \(approx. €34M\)](#) and [discussed a new Norwegian space strategy](#), updating the previous 2013 document. The approval of the spaceport aims to consolidate the development of a proper launch facility inside the Andøya Space Centre and attract further investments to the centre as well as to the national space economy. Located in the Arctic circle, the spaceport would then expected to be fully operational by 2025, but with the possibility of launch operations from 2021.

USA

White House and NASA push on lunar exploration



Credit: NASA

On 6 April, the White House issued an [“Executive Order on Encouraging International Support for the Recovery and Use of Space Resources”](#), and intended to encourage international support around public and private initiatives to utilise resources in outer space. The EO insists on the rejection of the Moon Agreement by the United States and reiterates the contents of the Commercial Space Launch Competitiveness Act of 2015. The EO seeks to create a supportive policy and establish a U.S. position as leader of international supported initiatives. In particular, the State Department will “encourage international support for the public and private recovery and use of resources in outer space” through joint statements and bilateral/multilateral arrangements.

ESPI examined on the EO in the [Executive Brief n.40 “USA seeking support for recovery and use of space resources”](#), discussing the long-term U.S. position on the topic as well as the international framework and the European stance.

As [reported by Space News](#), the EO was planned since 2019 but it has been linked with the NASA [“Plan for Sustained Lunar Exploration and Development”](#). The document was released on 2 April and discussed the long-term human and robotic exploration activities on the lunar surface, based on an “Artemis Base Camp” at the Moon’s South Pole. On 15 May, NASA announced the formulation of the [Artemis Accords](#), i.e. ten principles to facilitate future exploration in outer space. Space agencies and NASA partners are called to share via execution of bilateral agreements, thus creating the legal conditions for international cooperation for the Artemis missions. The Artemis Accords put forward ten principles based on the OST and include: the protection of sites and artefacts with historic value, the ability to extract and utilize resources, the creation of “safety zones” to prevent harmful interference on operations and the respect of LTS guidelines.



Artemis major components take shape

On 30 April, NASA announced the selection of [three companies/teams out of five for the Human Landing System \(HLS\) programme](#) that will be awarded a fixed-price ten-month study contract:

- Blue Origin (together with Lockheed Martin, Northrop Grumman and Draper) with a contract of \$579M;
- Dynetics (together with twenty-five companies, including for instance: Thales Alenia Space, Sierra Nevada, Maxar, L3Harris, Astrobotic) with a contract of \$253M;
- SpaceX with a contract of \$135M.

Boeing and Vivace are the two companies excluded for further consideration for a lunar lander award. At the end of the study period, NASA will conduct a “continuation review” to assess which project is closer to realisation and will perform initial demonstration missions.

Moreover, in a change of the original plan for the Artemis missions, [the Lunar Gateway might not be required for the Artemis III landing mission](#). NASA also changed the [plans to launch the Gateway](#), as the first two elements (PPE and HALO) are now programmed to be combined on the ground and launched together on a single rocket by November 2023. Yet, the Gateway would still be critical for long-term exploration and as a communication hub and in June NASA awarded Northrop Grumman a [\\$187M contract for preliminary design of the Habitation and Logistics Outpost \(HALO\) module](#).

However, the COVID-19 crisis impacted the normal flow of operations at several NASA facilities, affecting also the production activities for SLS and Orion at the [Michoud assembly facility](#): the [SLS launch is now expected in late 2021](#). Despite the delays, NASA announced on 1 May a contract with Aerojet Rocketdyne for [additional eighteen SLS RS-25 rocket engine for the overall amount of \\$1.79B](#).

NASA Suborbital Crew Space Transportation Services

On 23 June, NASA announced the creation of the [Suborbital Crew \(SubC\) office](#), tasked to develop a system qualification of suborbital vehicles in order to assess their safety and explore research and training opportunities. In this perspective, NASA issued as well a [Request for Information \(RFI\), investigating the process for system qualification](#) to enable astronaut training, test and qualification of spaceflight hardware and human-tended microgravity research.

U.S. Defense Space Strategy 2020

On 17 June, the Deputy Assistant Secretary of Defense for Space Policy Steve Kitay presented the new [Defense Space Strategy \(DSS\)](#), an update of the National Security Space Strategy from 2011. The DSS 2020 is a strategic document released separately by the Pentagon, [unlike the former document](#) that was built on a close collaboration with the Intelligence Community (IC). The DSS aims to address an increasingly competitive and threatening space environment and improve the DoD “spacepower capacity to ensure space superiority”. The document identifies:

- three desired objectives: 1. Maintain space superiority, 2. Provide space support to national, joint and combined operations and 3. Ensure space stability;
- four lines of effort (LOEs): 1. Build a comprehensive military advantage in space, 2. Integrate military spacepower into national, joint and combined operations, 3. Shape the strategic environment and 4. Cooperate with allies, partners, industry, and other U.S. Government departments and agencies.

U.S. Space Force acquisition reform

In May, the U.S. Space Force presented to the Congress Committees a report on the [Alternative Acquisition System](#), to improve the acquisition authorities and policies within the newly established military branch. The report recommends nine actions, among which only three would require legislation reform, that overall aim to reduce the bureaucratic procedures and requirements, consolidate separate budget lines into fewer “portfolios” and also start new programmes under a Continuing Resolution, in the event of government shutdowns and delays in the approval of annual budgets.

DoD selects small launchers to support the COVID-19 recovery

In June, the Department of Defense and the Space and Missile Systems Center awarded contracts to six launcher companies to launch two rideshare missions in the next two years. The small launcher companies are: Aevum, Astra, X-Bow, Rocket Lab, Space Vector and VOX Space. The measure is made possible under the Defence Production Act funding provided by the Coronavirus Aid, Relief, and Economic Security (CARES) Act. Already in April, the small launch industry was identified by the Department of Defense as particularly impacted by the COVID-19 crisis.

FCC approves Ligado application amidst objections

On 20 April, the FCC unanimously authorised Ligado to deploy its L-band spectrum 5G network, despite the Department of Defense and industry representatives had already emphasised their objections asking for reversion of the FCC's decision; according to the Pentagon and Iridium, the approval of Ligado's application would have caused disruptions to the GPS satellites signals as well as other L-band networks. However, according to the FCC the approval "with conditions" of Ligado ensures the protection of adjacent band operations, further guaranteed by technical changes in the 5G network design.

The FCC approval was welcomed by the Department of State and Secretary Pompeo, according to whom the deployment of 5G network is essential to the U.S. growth and security. In May, the Pentagon stated that it would have formally appealed against the FCC approval, seeking help from the Congress to reverse the decision. By the end of May, the FCC informally confirmed its decision against disapproval also from the Senate and House Armed Services Committees. Yet, in June five associations engaged in GPS services formed the "Keep GPS Working Coalition", announcing support to a Senate Committee bill that would require Ligado to provide financial relief to GPS users impacted by the 5G network.



FCC on space debris regulations

On 23 April, the FCC updated the satellite rules concerning orbital debris mitigation for the "New Space Age". The rules are comprehensively updated for the first time since 2004 and will now require satellite companies to disclose their debris mitigation plans. In particular, the update is related to the expected collision risk, the probability of successful post-mission disposal and re-entry casualty risk. The FCC adopted also a Further Notice of Proposed Rulemaking, in order to encourage a more exhaustive discussion around stricter debris mitigation measures, and decided to postpone decision on successful "disposal bonds" and indemnification of U.S. government against harms caused by satellites, controversial topics that caused widespread criticism.

NSC 7th Meeting and remote sensing regulations

On 19 May, the 7th National Space Council meeting was held at NASA HQ, after being originally scheduled for 24 March. The NSC meeting focused on the upcoming Demo-2 mission, formalised the creation of the Space Advisory Committee within the DoD, introduced as new Member the Secretary of Energy - who announced reorganisation in the its Department to strengthen cooperation - and reported about ongoing developments in the Department of Transport regarding the updated launch service regulations.

The most relevant outcome of the NSC is the release from the Department of Commerce of the revised regulations for remote sensing licences - in line with provisions of the SPD-2 - that modernise a regulatory approach dated back to 2006 and put in place by NOAA. The Commerce Department presented the new regulations discussing the streamlined approach to review licences applications (from 120 to 60 days) and easing some of the stricter requirements.

Starliner 2nd uncrewed test flight

On 6 April, Boeing announced a [second Orbital Flight Test \(OFT\)](#) of the CST-100 Starliner crew vehicle by the end of 2020, in order to demonstrate the flight test objectives after a failure occurred during the first OFT in December 2019. NASA and Boeing started an investigation to [review the Boeing's software and an additional anomaly](#) not disclosed during the test flight. Boeing will be performing the second OFT at its own expenses, [as already hinted](#) at the end of January.

CANADA

Canadarm3 for the Lunar Gateway

On 26 June, the Minister of Innovation, Science and Industry Navdeep Bains announced Canada's commitment to [contribute to the Lunar Gateway with the Canadarm3](#), the smart robotic arm system for which the government and the Canadian Space Agency plan to sign a contract with MDA. The details and schedules of the contract have not been formally determined. Previously part of Maxar and recently sold to a consortium of investors led by [Northern Private Capital](#), MDA built the Canadarm in use for the Space Shuttle missions and the Canadarm2 as well currently operating on the ISS.

RUSSIA

Russia's SSA projects and orbital station plans

In May, Roscosmos announced the plan to launch by [2027 the first satellite part of the "Milky Way" project's space segment](#); the project aims to monitor space debris and improve the detection capabilities of a planned network of 65 ground optical telescopes (that are currently 36).

In May, Dmitry Rogozin commented on the agency's priority to [launch a new orbital station](#), adding also that the technical plans are based on [orbital assembly](#) by crew of cosmonauts.

In June, Russia also announced the successful launch of the [fourth Tundra satellite](#) to complete its early warning system for ballistic missiles, part of the Kupol space system.

INDIA

New measures to boost private participation in space

On 16 May, the Minister of Finance and Corporate Affairs Nirmala Sitharaman announced [measures addressed to the Indian private space sector](#), within a broader economic plan in response to the COVID-19 crisis. The [announced reforms](#) will allow private space companies to use ISRO facilities, other national assets and benefit knowledge transfer, so to improve their technological and industrial capabilities. The measures aim also at creating a ["predictable regulatory environment"](#) focused on an open satellite data policy and the participation of private companies in planetary exploration and human spaceflight activities.

Furthermore, on 25 June ISRO commented on the new governmental measures for the private space sector and announced that the agency launched the [Indian National Space Promotion and Authorisation Centre \(IN-SPACe\)](#) - under the Department of Space - to engage in space business activity and act as a nodal agency, ensuring "permissions and authorisation of private activities".

JAPAN

Launch of the space defence unit and adoption of updated space policy

Following a [previous announcement](#) on a space defence unit from January, on 18 May the Minister of Defence Taro Kono officially launched the [Space Operations Squadron](#), operating as part of the Air Self-

Defense Force. Located at Tokyo's Fuchu Air Base and with an initial staff of twenty officers, the Squadron will be responsible for SSA operations to protect Japanese satellites and monitor space debris and will cooperate with JAXA, the U.S. Space Command and the U.S. Department of Defense.

Furthermore, on 30 June the Japanese Cabinet approved the adoption of the [2020 Basic Plan on Space Policy](#), updating the previous policy from 2015. Structured in four main parts, the space policy document points out the [main national goals](#) based on ensure space security, strengthen national resilience, consolidate space science and exploration activities and fulfil space economy growth.

Basic Agreement for Epsilon launch vehicle and first contract

On 12 June, JAXA announced an agreement with IHI Aerospace (IA) for the [development of the Epsilon S launcher and its independent launch service business](#). JAXA aims as well at demonstrating synergy with the H3 launcher, also to reduce costs, as Epsilon S shares various components and technologies with the larger H3. Moreover, JAXA announced the first contract for Epsilon, thanks to a [contract with NEC Corporation to launch the Vietnamese LOTUSat-1 EO satellite in 2023](#).

J-SPARC initiative for space debris devices

JAXA and ALE Co. advance to the demonstration phase of the "JAXA Space Innovation through Partnership and Co-creation" (J-SPARC) initiative, aimed at commercialise space debris prevention devices for deorbiting satellites. By 2021, the two partners expect to launch the [device aboard a nanosatellite in order to demonstrate the technology and initiate the manufacturing and sales of the device](#), based on a ElectroDynamic Tether (EDT) and a carbon nanotube (CNT) to take advantage of Earth's magnetic field to change orbit and allow re-entry.

CHINA

Long March 5B launches prototype and opens the way for modular space station



Credit: CASC

On 5 May, a Long March 5B rocket launched a prototype crew spacecraft from the Wenchang Centre; the launch meant to [demonstrate the capability to carry space station modules to LEO and perform uncrewed test on the spacecraft](#), designed for human spaceflight and deep space exploration. A week after the launch, the rocket's core stage has made an [uncontrolled re-entry into Earth's atmosphere](#) over the Atlantic Ocean, said to be the largest vehicle to make an uncontrolled re-entry since the Salyut 7 space station in 1991.

At the end of May, the Chinese human spaceflight programme presented a plan of 11 missions over two years, to assemble the space station and complete the construction by 2023, and a new selection of taikonauts expected in July.

BeiDou-3 satellite completes navigation system

On 23 June, the China Aerospace Science and Technology Corporation (CASC) confirmed a Long March 3B launch from the Xichang Satellite Launch Centre, carrying the BeiDou-3 satellite to complete the Chinese global PNT system, after the first BeiDou launched in 2000. After the launch, it has been reported a major accident caused by a booster dropped close to inhabited areas.

Quantum communication team achieves milestone

In a paper published on Nature on 15 June, the research team behind the quantum satellite Micius of the University of Science and Technology of China presented a new entanglement-based Quantum Key Distribution experiment to enable secure communication between two ground station at 1.120 kilometres of distance.

Tianwen-1 on track to launch

In April, the China National Space Administration unveiled the name of the Chinese mission to Mars, called Tianwen-1 and composed of a Mars orbiter and a rover. The mission has so far not been impacted by the outbreak of the COVID-19 crisis and is reported to proceed to launch in July on a Long March 5 rocket from the Wenchang Centre.

Haiyang-1D forms observation constellation

On 10 June, a Long March 2C vehicle launched the Haiyang-1D ocean observation satellite from the Taiyuan Satellite Launch Centre. The satellite is reported to be equipped to monitor the global oceans colour and temperatures but also to provide data on coastal zones and vessels. The satellite forms an ocean observation constellation together with the Haiyang-1C launched in 2018.

OTHER SPACE NATIONS

UAE cooperation with UNOOSA and HOPE mission

In June, UNOOSA and the UAE Space Agency announced an agreement to foster collaboration on the topic of space sustainability and to establish a UNOOSA project office in the Emirates, as a global hub to reinforce the international cooperation on LTS and space for development.

Despite the outbreak of the COVID-19 crisis, the UAE Space Agency announced in April that the HOPE mission to Mars was about to be shipped to the launch site in Japan.

Australian space ecosystem grows

In June, the Australian Space Agency (ASA) announced a \$6M grant to Saber Astronautics to establish a Mission Control Centre in Adelaide, to complement the agency's HQ and meant to operate as one of the country's "focal point" for space activities, SMEs and researchers.

The Department of Industry, Science and Technology also announced a \$11M grant investments in support of ten projects that involve 24 national businesses as well as more than 10 international space agencies. The larger grants include the SpIRIT CubeSat mission in cooperation with Sitael Australia (approx. \$3.95M) and the Akin project to integrate AI for crewed missions (approx. \$1.5M).

The Australian Space Agency released in May the "State of Space" 2018-2019, a report on the first full year of operations of ASA and achievements with public and private partners.

South Africa invests in the Space Infrastructure Hub

In June, the South African government announced a plan to invest approx. \$179M in a Space Infrastructure Hub, a top priority for key infrastructure investment focused on production of satellites products and services in cooperation with the South African National Space Agency (SANSA).

Launch of the Rwanda Space Agency

In May, the Rwanda government approved a draft law establishing the Rwanda Space Agency (RSA), expected to become operational in July 2020 in Kigali. Rwanda applied for membership to COPUOS in June 2019 and participated as new member of the Committee at the STSC 2020.

Brazil Call for launches from Alcântara Space Center

In May, based on a cooperation agreement with the national Air Force Command, the Brazilian Space Agency (AEB) issued a Public Call to identify companies interested in orbital and suborbital launch operations from the Alcântara Space Center, providing as well information on the contractual and licensing processes.

SPACE ECONOMY AND FINANCE

SPACE ECONOMY

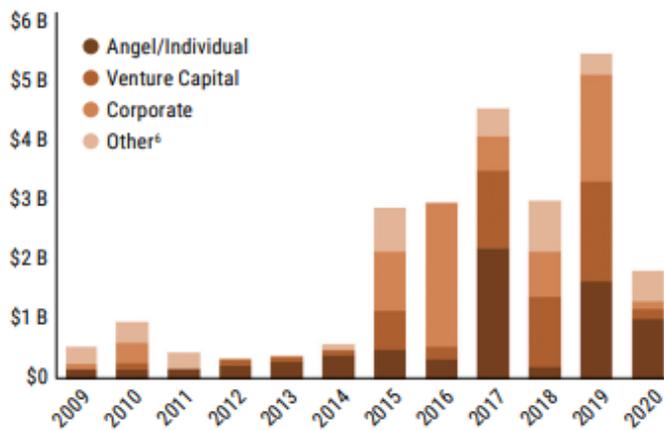
Space Investment Quarterly Q1 2020

The U.S. Venture Capital firm Space Angels - rebranded as [Space Capital](#) - released its [Space Investment Quarterly Q1 2020](#). The report provides insights of the global investments in the Space sector. Analysis and statistics are provided by region, source of funding and industry segmentation. It also features the evolution of investment activity over time (since 2009). It should be noted that the report includes in the scope all space-related companies without any distinction made on the size and maturity of the companies, encompassing therefore both start-ups and large groups but also business ventures with limited links to space, in particular for downstream activities.

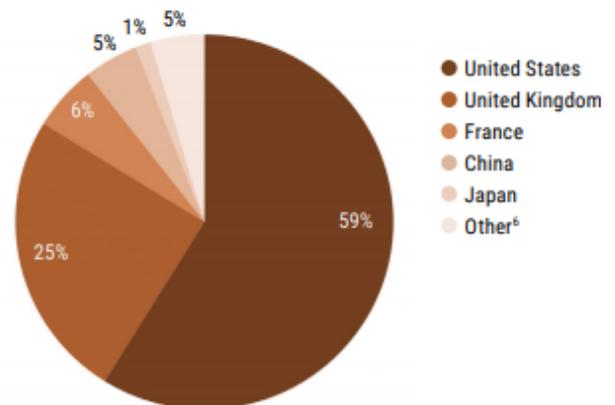
Space Capital estimate that \$5.4B were invested in Q1 2020. This includes \$3B invested into the PNT-based application Indonesian company Gojek which offers courier multi-service and the annual \$1B self-capitalisation of Jeff Bezos for Blue Origin. Outside of those two investments, Series B financing rounds continued to dominate with a total of 31% of total investments including deals in space companies Skylo Technologies, AST& Science, Astranis and Spinlaunch.

Considering the distribution of investments, U.S. firms continues to dominate across all sectors in Q1 2020 accounting for 59% of investment in the infrastructure section, 45% in distribution and 45% in applications. Interestingly, Chinese private companies are playing an increasingly more prominent role. With Tencent and JD.com leading the series F round of financing for Gojek, China is being highly active in this sector.

ANNUAL INVESTMENT SOURCE



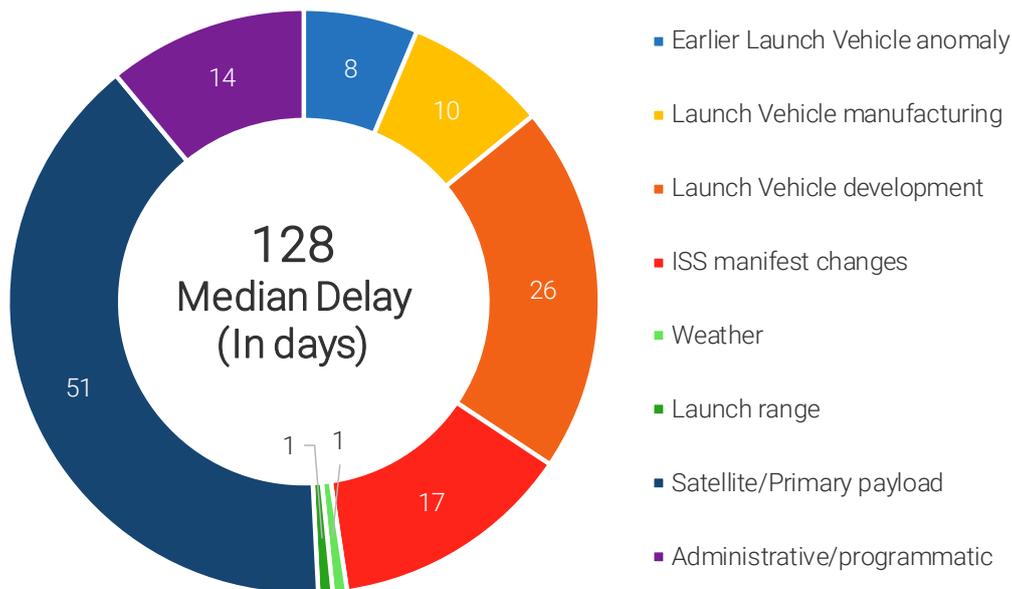
CUMULATIVE INVESTMENT GEOGRAPHY



Credit: Space Capital, 2009-2020

Bryce market report on small satellites launch delays

With the quick expansion of the number of small satellites, Bryce analytics enquired into the reasons at the base of most launch delays, a major issue for small satellite operators. In the [“Smallsat Launch Delays Report 2020”](#), the analysis covered all 1078 smallsats launched over the past 5 years and found that smallsat launches suffer a median delay of 128 days. Knowing what caused these delays would allow policy makers and operators to better assess potential risks, anticipate associated costs and plan appropriately. The figure is a graphic version elaborated by ESPI on the basis of original Bryce data included in the report.



Data: Bryce Space and Technologies. Visual elaboration: ESPI.

The State of Commercial Earth Observation

In the frame a study commissioned by ESA to quantify the size the EO market and the size of the New Space EO in ESA Member States and Slovenia, London Economics published a bottom-up organisation level analysis for the years 2013-2018. The objective of the analysis was to aid ESA in tracking industry growth and the emergence of new entrants at national level. Cataloguing over 800 companies and assessing financial and employment information, [the report pointed out that in 2018, out of 23 countries, the total market size for EO was €3.3B, supporting almost 17.000 employees](#). Out of the total €3B in turnover and 17.000 workers, New-Space EO market accounted for €1B in turnover and employed 6.300 individuals.

The Scottish Space Cluster

In May 2020 London Economics published a report on the [“Scottish Space Cluster”](#), a follow-up of a previous 2016 report. The report expanded on the increasing role of the Scottish space cluster within the overall UK space sector. The cluster has 133 active space organisations in close geographic proximity which focus principally on the space sector value chain. This includes 66 space manufacturing companies and 57 involved in space applications. This network is now estimated to contribute to 14% of the entire UK space industry’s gross added value (GVA).

Furthermore, with a total of 8000+ employees, the Scottish space cluster represents a total of 19% of the UK space workforce. The report estimates that if further action is developed to address some of the network’s gaps, the Scottish space industry income could raise from £380M in 2020 to £1.9B in 2030.

SPACE FINANCE

ESPI Space Venture Europe Q2 2020

Methodology Note

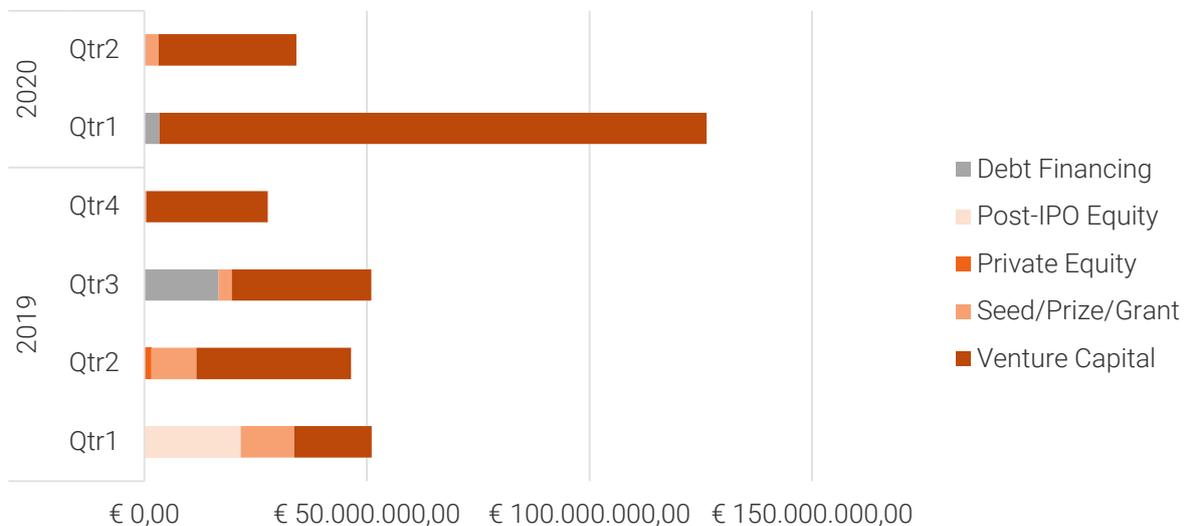
The assessment of private investment provided in the report is based on the ESPI dataset that includes public data from a high number of sources. The perimeter of the analysis is based on the definition of start-up with following features:

- ✓ founded after 2000,
- ✓ with annual turnover <€50M,
- ✓ with number of employees <250,
- ✓ headquartered in Europe,
- ✓ whose main business is part of the space value chain.

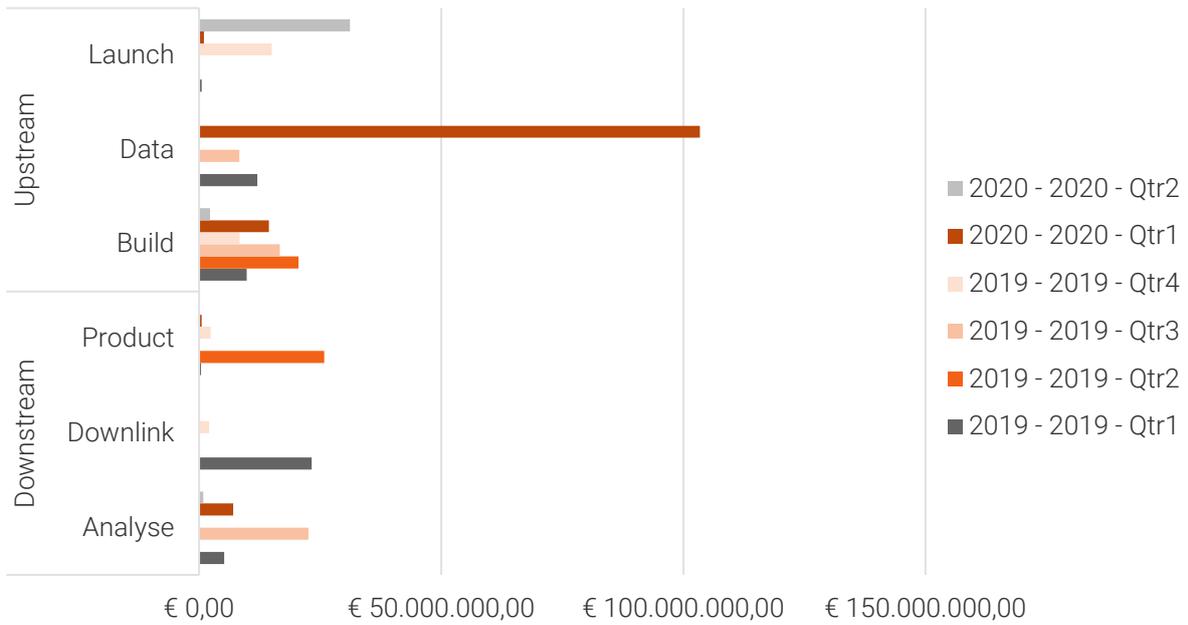
More detailed information on definitions applied and investors and investment categories used for the purposes of this research, are available in the [Space Venture Europe 2018 Report](#) free for download.

In Q2 2020, the total amount of pure private investments in European space and space-related start-ups amounts to approx. €34M, led by the investment in the Germany-based start-up Liliium. Consistently with the previous years and quarters, the main source of private funding in the Q2 2020 is venture capital. However, except for the funding round achieved by Liliium - a single significant investment - the Q2 2020 sees a substantial decrease in the overall volume of private funding, potentially reflecting some uncertainty in the private investment landscape caused by the COVID-19 crisis.

In Q2 2020, the distribution of private investments across the space value chain is inclined toward the upstream segment, in particular because of the investment in the German start-up Liliium.

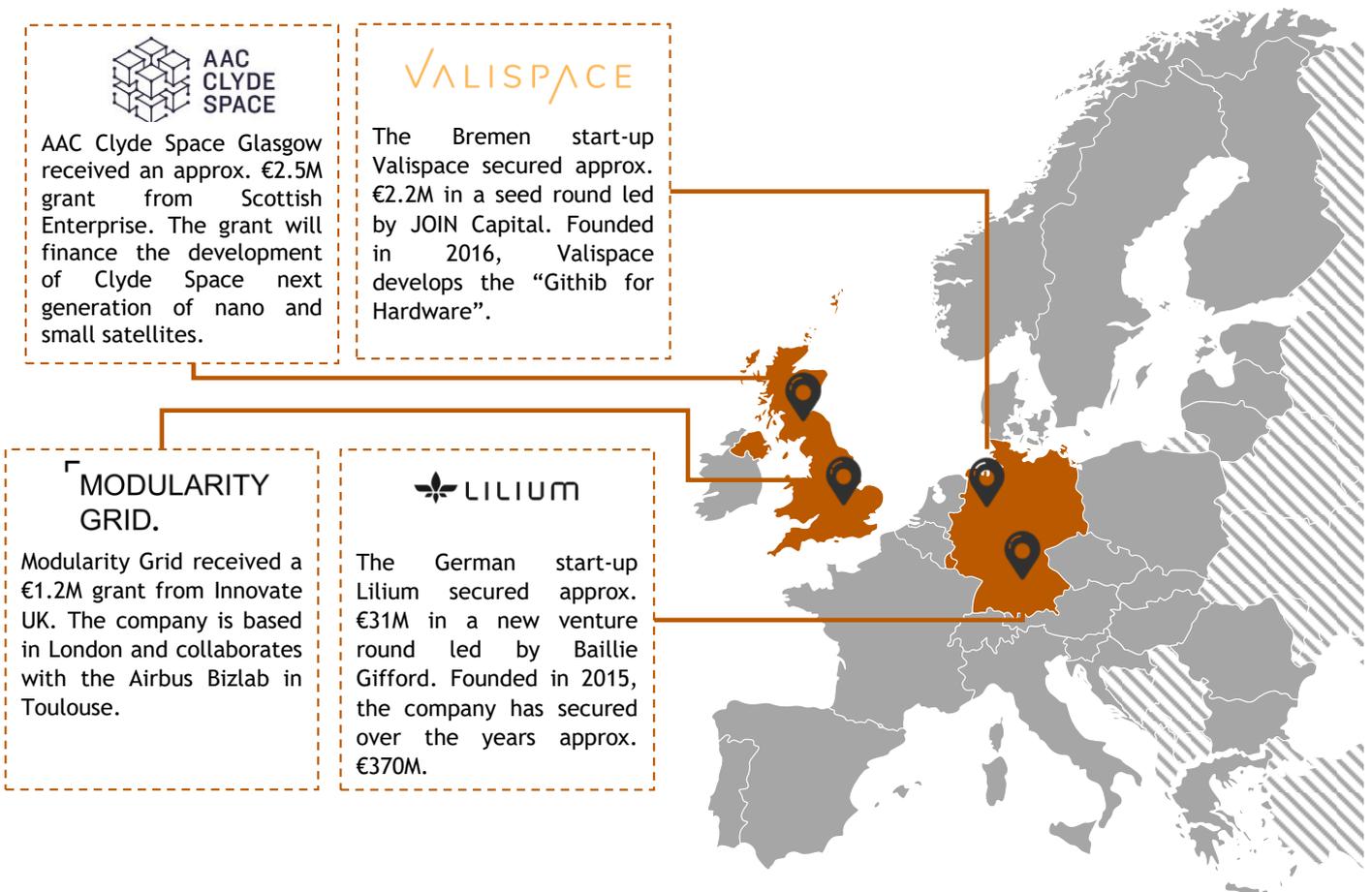


Private investments in European space start-ups by deal category



Private investment in European space start-ups across space value chain

Distribution of Top 4 Transaction in Europe



SPACE BUSINESS

Intelsat files for bankruptcy

On 13 May 2020, [Intelsat SA filed for Chapter 11 bankruptcy process](#). After having accumulated a heavy debt load in the 2000s due to a series of private equity buyouts and its merger with PanAmSat, Intelsat's revenues have consistently been shrinking while the debt remained constant. By filing for Chapter 11, Intelsat is hoping to eliminate half of its 15\$ billion debt and free the company to invest in next-gen satellite technology according to CEO Stephen Spengler. The move was highly anticipated, [as Bloomberg had already reported the possibility of bankruptcy in February 2020](#).



One of the primary catalysts behind the filing for bankruptcy is Intelsat's desire to [participate in the FCC's accelerated clearing of the C-Band spectrum](#). To meet the FCC requirements and be eligible to receive \$4.87 billion in relocation payments, Intelsat will have to spend more than \$1billion in clearing activities, which will happen long before the costs begin to be reimbursed.

In addition to the bankruptcy process, the COVID-19 pandemic is expected to add serious challenges for Intelsat's underlying business. For its [Q1 2020 results](#), the first quarterly results since the bankruptcy, Intelsat reported a net loss of \$218 million, a 81% increase compared to Q1 2019. Total revenues also fell 13% compared to Q1 2019. Furthermore, Intelsat's Network Services and Media business which generate a total of 78% of Intelsat's revenues have also begun suffering serious losses.

Announced Investment Deals*Europe:*

- ▶ [VanderSat](#), a Dutch start-up focused on satellite-derived data for cross-sector analysis, announced an undisclosed amount investment of "several million euros" to expand the satellite technology capabilities.
- ▶ [OroraTech](#), a German start-up based in Munich and focused on wildfire monitoring, raised €849k in a seed investment led by ConActivity KG.
- ▶ [Blue Skies Space](#), a UK upstream start-up, received approx. €113k in a seed round led by Startup Funding Club.
- ▶ [Modularity Grid](#), a UK-based start-up developing mini-grids, received a grant of approx. €1.2M from Innovate UK.
- ▶ [Valispace](#), a German start-up focused on developing a browser-based software for hardware manufacturing, raised €2.2M in a seed round led by JOIN Capital.
- ▶ [Space Forge](#), a UK-based start-up founded in 2018 to develop a reusable satellite, secured an approx. €670k seed investment from the Development Bank of Wales, Bristol Private Equity Club and Innovate UK.
- ▶ [Lilium](#), the German start-up developing electric air-taxi, announced an approx. €31M deal in a venture round led by the new investor Baillie Gifford.
- ▶ [Smallspark Space System](#), a Cardiff-based start-up focused on small launchers, secured two funding for approx. €165k from the SPRINT (Space Research and Innovation Network for Technology) and announced one other [grant](#) of undisclosed amount from SPRINT, Research England and the European Regional Development Fund.
- ▶ [AAC Clyde Space](#) Glasgow secured a three-year grant of approx. €2.5M from Scottish Enterprise for the development of the company's next generation of nanosatellites.

Rest of the World:

- ▶ [SpaceX](#) has been reported to have raised approx. €305M in a funding round, totalling investments up to €1.5 billion since 2019.
- ▶ [Ligado Networks](#), the US-based developer of 5G satellite communication network, secured an approx. €92M deal from an unknown investor.
- ▶ [Astroscale](#), the Japanese company founded in 2013 to focus on orbital debris mitigation, announced the first deal of undisclosed amount in a Series E funding from I-NET Corporation.
- ▶ [Enview](#), a US-based 3D geospatial analytics company, raised €11M from several investors led by BrightCap Ventures and Stratkraft Ventures.
- ▶ [Xona Space Systems](#), a US satellite navigation-based services start-up, announced an approx. €1M investment in a pre-seed round led by 1517 investment fund. The company has also been reported to be expanding with a [subsidiary](#) in the UK.
- ▶ [Atlas AI](#), a US cross-sectorial geospatial intelligence company, secured approx. €6.5M Series A investment round led by Airbus Ventures.
- ▶ [Regulus Cyber](#), an Israeli GNSS cybersecurity technology provider, has raised approx. €3.5M in a Series B round led by SPDG Ventures.
- ▶ [Myriota](#), the Australian company focused on IoT nanosatellites connectivity, raised approx. €17M in a Series B funding round led by Hostplus and Main Sequence Ventures.
- ▶ [Infostellar](#), a Japan start-up focused on ground-segment innovation, announced a €3.2M investment from Airbus Ventures and Sony Innovation Fund.
- ▶ [Space Pioneer](#), a Chinese space propulsion start-up, announced an approx. €12.8M investment in a pre-Series A round led by ZJU Joint Innovation Investment.
- ▶ [Commsat](#), a Chinese commercial satellite start-up founded in 2015, announced an approx. €35M investment in a Series B round led by Beijing Wealth Capital and AVIC Capital.
- ▶ [Deep Blue Aerospace](#), a Chinese launch company, announced a seed funding investment of approx. \$14.1M led by the China Huijin Group.
- ▶ [VestaSpace Technologies](#), an Indian small satellites manufacturer start-up, raised approx. €9.2M in an investing round led by Next Capital LLC.
- ▶ [Apollo Agriculture](#), a Kenyan start-up founded in 2016, announced an investment of approx. €5.5M in a Series A round led by Anthemis Group among several investors.

Major contracts

- ▶ Thales Alenia Space has been awarded two contracts by ESA [to upgrade the EGNOS navigation system to improve performances and coverage](#). Financed under the H2020 programme, the contracts aim to bring development to EGNOS aeronautical services, particularly in terms of landing safety under limited visibility conditions, and to expand “the A-RAIM (Advanced Receiver Autonomous Integrity Monitoring) concept and the global coverage of Galileo”.
- ▶ [Airbus](#) signed an annual renewal contract with ESA for approx. €16M on continuing the operations and the use of European components on the ISS.
- ▶ [GomSpace](#) has won an approx. €1.8M contact from the Norwegian Defence Research Establishment (FFI) to develop and deliver a nanosatellite for tactical communication over the Arctic region. GomSpace plans to launch the satellite by October 2021.
- ▶ [NanoAvionics](#) has been selected by NASA to develop a nanosatellite for the Advanced Composite Solar Sail System (ACS3) mission to test the solar sail propulsion systems. NanoAvionics will assemble the 12U

satellite platform at its facility in Illinois, while the final integration of the payload will be carried out at NASA Ames facilities.

- ▶ [NanoAvionics](#) has also announced a €1M contract with ESA to develop key components for small satellite propulsion systems, fostered by the Government of Lithuania based on the Plan for European Cooperating States (PECS).
- ▶ [Cysec](#), a Swiss company focused on cybersecurity services, has been awarded a contract from ESA to develop innovative solution to mitigate cyber risk on ship-tracking satellite services and protect both GNSS and AIS communication.
- ▶ [ISISpace](#) has announced a contract agreement with ESA to develop In-Orbit Demonstration and Verification services onboard two 6-Unit CubeSat in the Low Earth Orbit.
- ▶ [Kleos Space](#) secured a comment with the Utah State University Space Dynamics Laboratory in collaboration with U.S. Air Force Research Laboratory to provide access to data, under the Micro-Satellite Military Utility (MSMU Project) project.
- ▶ [Exolaunch](#), a German launch services provider, partnered with SpaceX for a small satellites rideshare mission scheduled in December 2020. Then, in June [Exolaunch signed a contract with NanoAvionics](#) for the integration and in-orbit deployment of two CubeSats from the Lithuanian company.
- ▶ [Xenesis](#) signed a contract with Airbus for a payload slot on the Bartolomeo platform, installed on the ISS in April, for the demonstration of the Xen-Hub optical communication space, developed by JPL and for which Xenesis holds an exclusive license from NASA.
- ▶ [AAC Clyde Space](#) announced a \$250k contract from the US company Loft Orbital to provide the power system on two satellites, YAM-3 and YAM-5.
- ▶ [Northrop Grumman](#) received a \$2.37B contract from the Space and Missile Systems Center for two Next-Generation Overhead Persistent Infrared (Next-Gen OPIR) missile warning satellites, expected to be launched by 2027 and deployed in polar orbits.
- ▶ [Northrop Grumman](#) won a \$222.5M contract by the Space and Missile Systems Center to provide technical and engineering support to the early warning satellite constellation “Defence Support Program” (DSP), in operations since 1970.
- ▶ [Raytheon](#) announced a \$37.4M contract from DARPA for the development by 2023 of an unknown number of early warning sensors, the Overhead Persistent Infrared (OPIR) payloads, part of the Blackjack constellation programme.
- ▶ [Maxar](#) has won a \$20M contract from the US National Geospatial Intelligence Agency (NGA) to provide change detection model and deliver land cover and classification solutions
- ▶ [SpaceX](#) received a \$8.9M contract, an addition to a 2019 \$297M contract, from the U.S. Space Force for “non-National Security Space fleet surveillance” from May to November 2020.
- ▶ [Planet](#) announced a \$7M contract with NASA for the duration of approx. 3 years to give unlimited access to NASA employees, contractors and research team to the Planet EO imagery data.
- ▶ [Lockheed Martin](#) announced a \$5.8M contract with the US DARPA for satellite integration services of the Agency’s Blackjack programme.
- ▶ [NOAA](#) awarded seven contracts for the next generation weather satellites, to York Space System, SSL (Maxar), Leidos, L3Harris, GeoMetWatch, BAE Systems Information and Electronic Systems Integration and Brandywine Photonics. In June, NOAA has also announced a contract with [Raytheon](#) to develop the weather instrument called High-Resolution Infrared Sounder (HIRIS) for approx. \$295k.
- ▶ [Rocket Lab](#) secured a contract with the Japanese company Synspecive to launch the StriX-α satellite, the first of a planned constellation of 25 SAR satellites, on an exclusive Electron launch, after that Synspecive had reached an [initial agreement with Arianespace](#).

- ▶ [Relativity Space](#) was awarded a contract by Iridium to launch six Iridium Next replacement satellites on the company's Terran 1 rocket, beginning from 2023 and from a launch site at the Vandenberg Air Force Base currently under development by Relativity.
- ▶ The US company [PlaneWave Instruments](#) won a contract to develop the Ritchey-Chrétien Optical Ground Station (OGS) telescope at the Australian National University Observatory to track satellites in LEO, GEO and support Free-Space Optical Communication (FSOC) as well as for scientific purposes.
- ▶ The Chinese start-up [Origin Space](#) signed a deal with DFH Satellite Co. for the development of optical space telescopes for the observations of asteroids.
- ▶ [Silentium Defence](#), a South Australian company, announced the assignment of A\$1.46M (approx. €892k) in government funding to develop a multi-sensor space observatory, expected for July 2021.
- ▶ [LatConnect 60](#), an Australian EO start-up founded in 2019, announced the selection York Space Systems for the manufacturing of initial satellites of an planned constellation.

Other Major announcements

Business-oriented:

- ▶ [Leonardo](#) increased its stake in Avio by 3,75% purchasing shares for a total of €14M, reaching overall the 29.63% in Avio's share capital.
- ▶ [Virgin Group](#) has announced to have sold some shares of the Virgin Galactic business - up to approx. 32 million shares of the space company, considering one another similar [announcement](#) occurred in May - to support other portfolio companies affected by the COVID-19 crisis, as for instance the airline company [Virgin Australia](#) that filed for voluntary administration. Overall, [Virgin Galactic](#) has reported net losses for \$60M in the first quarter of 2020.
- ▶ [Sky and Space Global \(SAS Global\)](#) has recurred to the voluntary administration procedure of the Australian legal system, where the company is listed, in order to avoid liquidation and preserve part of its business in a process similar to the Chapter 11 bankruptcy of the US Code.
- ▶ In April, [Speedcast](#) announced the decision to file for Chapter 11 bankruptcy, mentioning previous financial issues aggravated by the impacts of the COVID-19 crisis, related especially to the maritime and oil and gas business lines. Speedcast is reported to continue with its operations without interruptions during the bankruptcy procedures, expected to end before September 2020.
- ▶ With a Falcon 9 launch in June, [Planet](#) announced the completion of its SkySat fleet, overall lowered in altitude to improve the resolution to 50 centimetres and the revisit time up to 12 times per day for some locations. Planet also unveiled a new dashboard for commercial customers.
- ▶ [OHB SE](#) announced a five-year new credit facility agreement for an increased volume of €300M, with two extension options of one year each.
- ▶ [Argotec](#), an Italian upstream start-up based in Turin, announced a new nanosatellite constellation called Andromeda, developed with the purpose of providing real-time data access with the Lunar orbit.
- ▶ [Astranis](#) announced a significant milestone achieved on its MicroGEO, a small communication satellite designed for the GEO, aimed to offer low-cost broadband to specific geographic markets, such as Alaska, and expected to be launched in mid-2021 on a SpaceX rocket mission.
- ▶ [PredaSAR Corp.](#) announced plans to start deploying the first 48 satellites of its SAR constellation by early 2021, currently manufactured by Tyvak. PredaSAR had raised \$25M in a seed round in March.
- ▶ [Space Perspective](#) announced plans to develop stratospheric balloon systems for research payload as well as tourism flights and to initiate flight tests in 2021.

SPACE ECONOMY AND FINANCE

- ▶ The [Zentrum für Telematik \(ZfT\)](#) is finalising the development of four “NetSat” small-satellites, expected to be launched in August 2020, that will demonstrate the autonomous capability of creating a satellite formation for better EO and telecommunications conditions.
- ▶ [e-Geos](#) announced Paolo Minciocchi, former Director at Spaceopal, as the new CEO of the company succeeding Massimo Comparini after his designation as Chief Executive Officer of Thales Alenia Space Italia and Senior Executive VP Observation Exploration & Navigation in Thales Alenia Space. In June, [Spaceopal](#) appointed Marco Folino, former CEO of Telespazio VEGA UK, as new CEO and Managing Director.
- ▶ The German start-up [Isar Aerospace](#) announced the commissioning of a production facility near Munich to start the manufacture of its small rocket Spectrum, expected to conduct a test flight by 2021.
- ▶ The US start-up [York Space Systems](#), founded in 2015, announced the operativity of a new manufacturing facility in Denver, Colorado, with the goal of sharply increase manufacturing operations.
- ▶ [Blue Canyon Technologies](#) announced the opening of a new manufacturing facility in Colorado for small satellites, where the company expects to produce 50 satellites in 2021.
- ▶ [RUAG Space](#) has announced the resignation of Peter Guggenbach as Head of the company, designating Luis De Léon Chardel as interim Director of the company’s space segment.
- ▶ [Amazon Web Services](#) announced the creation of a new business segment devoted to space called “Aerospace and Satellite Solutions” to offer a cloud service for the space industry and is based on the AWS Ground Station created in 2018.

MoU and Partnerships:

- ▶ [D-Orbit](#) announced a partnership with Marubeni Corp., a Japanese trading house, also with the goal of establishing a broad partnership in the space upstream segment, from satellite launch and transportation services.
- ▶ [CommStar Space and Thales Alenia Space](#) announced a partnership to deploy the CommSat-1 satellite in the Cislunar service area by 2023, for hybrid optical and radio frequency communications between the Moon and the Earth.
- ▶ [Telespazio](#) signed a partnership agreement with the UAE-based Thuraya for the distribution and integration of Thuraya’s communication products and services in its customer base.
- ▶ The US-based satcom company [Ovzon](#) announced a partnership with Airbus Defence and Space to integrate the company’s satellite communication services into Airbus’ portfolio in the UK. The [reseller agreement](#) includes Ovzon’s mobile terminals, as well as several other satcom products and systems, and from 2021 will integrate the company’s planned first satellite (Ovzon 3).
- ▶ [Serco, Inmarsat, CGI UK and Lockheed Martin UK announced](#) a partnership, called “Athena”, to combine expertise and improve industrial capabilities in a sort of UK national space team and cooperate on business opportunities.
- ▶ [Airbus UK, KBR, Leidos UK, Northrop Grumman and QinetiQ](#) established a partnership in the framework of the “Open Innovation - Space initiative”, aimed at raising the SMEs participation in future services and activities and engage with the team.
- ▶ [Hispasat](#) signed an agreement with the Mexican network Altán La Red Compartida to provide Ka band satellite links in remote areas of the country and up to 65 new base stations of the Mexican network company.
- ▶ [Thales Alenia Space](#) announced completion of validation tests on the satellite-based augmentation system “SBAS for Africa and Indian Ocean”, under a contract with the Agency for Air Navigation Safety in Africa and Madagascar (ASECNA) to improve positioning accuracy provided by Galileo and GPS.

SPACE ECONOMY AND FINANCE

- ▶ [General Atomics Electromagnetics](#) announced a partnership with the Space Development Agency to conduct experiments for an Optical Intersatellite Link (OISL) based on 1550nm Laser Communication Terminals (LCTs) hosted by two 12U CubeSats.
- ▶ [Astroscale](#) signed a MoU with the Northumbria University to study the potential application of end-of-life standards, best practices legal frameworks and business models relevant for the satellite industry from decommissioning policies in other sectors, such as oil and nuclear energy.
- ▶ [Spire Global](#) has announced a partnership with the Greek company VesselBot to further develop Automatic Identification System (AIS) data for the maritime industry, in particular providing enhanced monitoring and tracking services.
- ▶ The Australian [Gilmour Space](#) has announced a partnership with the Australian Defence Force and the Department of Defence Science and Technology (DST) to develop several technologies related to propulsion, material and avionics, including a hybrid rocket.

Mergers & Acquisitions:

- ▶ The private equity firm [AE Industrial Partners](#) has announced the acquisition of Deep Space Systems and the subsequent reorganisation of the acquired company together with Adcole Space into a new space venture called Redwire, to develop mission critical systems and electronics components. In June, [Redwire has announced the acquisition of Made in Space](#), the Florida-based company focused on 3D printing and in-space assembly, for an unknown amount and in a gradual process of closer merging of operations.
- ▶ The Colorado-based [AMERGINT Technologies](#) announced the acquisition for an undisclosed amount of Tethers Unlimited, the aerospace company founded in 1994 focused on in-space services.
- ▶ The UK antenna manufacturer [Phasor Solutions](#) has been acquired, after filing for bankruptcy, by the Korean company Hanwha Systems for an undisclosed amount.
- ▶ The Scottish satellite imagery company [Bird.i](#) has been acquired by the Meyers Research Centre, a US housing industry consultant company, for an undisclosed amount.
- ▶ [Advanced Logistics for Aerospace](#) announced the acquisition of the Germany-based Industrio GmbH, an aerospace distribution company.
- ▶ A consortium of investors led by [Northern Private Capital](#) has successfully concluded the operation to acquire MDA from [Maxar](#) for approx. €660M (CAD\$1 billion). Later on, [MDA](#) has announced the former NASA astronaut Tim Kopra as Vice President of Robotics and Space Operations.
- ▶ [Maxar](#) announced an agreement to acquire the shares of Saab of Vricon Inc. for \$140M, a Joint Venture between Saab and Maxar launched in 2015, in order to integrate the 3D imagery capabilities
- ▶ [Kratos Defence & Security Solutions](#) announced the acquisition for \$35M of the satellite antenna manufacturer ASC Signal, a subsidiary of Communications & Power Industries (CPI) and following also an [agreement](#) between CPU and the US Department of Justice regarding planned acquisition and competition in the ground station antennas market.
- ▶ The Australia-based space group [EOS](#) announced the complete acquisition of Audacy, the US start-up founded by former NASA and SpaceX employees that failed at the end of 2019.
- ▶ [Rocket Lab](#) announced the acquisition of the Canadian Sinclair Interplanetary, a provider of satellite hardware founded in 2001.
- ▶ [Mitsui & Co. and Yamasa Co.](#) has completed the acquisition of Spaceflight Inc., the satellite rideshare business previously owned by Spaceflight Industries. The business will remain headquartered in Seattle.

SPACE INDUSTRY AND INNOVATION

LAUNCHERS

Rocket Lab returns to launch after the COVID-19 crisis

After a first launch attempt cancelled on 11 June due to weather conditions, on 13 June Rocket Lab launched the [Electron's 12th launch](#) from New Zealand. The launch originally scheduled for the end of March was [postponed](#) because of the outbreak of the COVID-19 pandemic. The Rocket Lab mission put in orbit three payload for the National Reconnaissance Office (NRO) and two universities' CubeSats. In April, the company had announced a successful test related to the helicopter [recovery](#) procedures of the first stage of its Electron rocket. Furthermore, on 18 June Rocket Lab announced [new contracts from the NRO](#) for two back-to-back launches scheduled in 2021 from Launch Complex-1A and the under construction Launch Complex-1B, in New Zealand.

Virgin Orbit misses orbit at first launch attempt, prepares next steps

On 25 May, [Virgin Orbit](#) launched its first LauncherOne rocket mission, experiencing an unexpected failure in the first stage engine; the [failure](#) prevented the rocket to enter in orbit after the release from the "Cosmic Girl" Boeing 747 carrier. In April, [Virgin Orbit](#) had completed a successful cryogenic captive carry test and announced also the closure of a \$35M contract for three missions for the U.S. Space Force to deliver up to forty-four satellites in LEO. Furthermore, the subsidiary of [Virgin Orbit](#) VOX Space announced in May the approval from the U.S. Space Force to conduct launch operations on LauncherOne from the Andersen Air Force Base in Guam.



Credit: Virgin Orbit

Starship fails static fire test, is now SpaceX's "top priority"

On 29 May, the [SN4 Starship](#) rocket prototype experienced a massive explosion during a static fire test in Boca Chica, Texas. Being the 4th prototype manufactured by SpaceX, the SN4 had successfully passed the [pressurization](#) test, a milestone test failed by the previous prototypes, as well as a first static fire of its [Raptor](#) engine at the beginning of May. The day before the static test, SpaceX had obtained [authorisation](#) from the FAA to conduct suborbital launch missions of the Starship. After the failed test and the successful launch of the Demo-2 mission to the ISS, SpaceX has been reported to accelerate the work on Starship, to be considered as the company's [top priority](#).

Japan proceeds on the H3 rocket

On April 30, JAXA reported successful hot fire test for the [first stage LE-9 booster](#), the engine of the new Japanese H3 launch vehicle. The engine fired for approx. four minutes in its 7th fire test at JAXA's Tanegashima Space Centre. The second stage of the H3 vehicle has already been tested in February 2019 with the 15th hot fire test of the LE-5B-3 engine. The H3 is now expected to proceed with the first test launch before the end of the Japanese FY2020 (1 April 2020 - 31 March 2021), as [projected despite the COVID-19 crisis](#) by the prime contractor Mitsubishi Heavy Industries (MHI).

Skyrora successfully launches from Scotland

On 20 May, the Scottish launcher start-up Skyrora completed a full static fire test to its [Skylark L rocket](#), from a mobile launch complex built for the test at Kildemorie Estate, in North Scotland. The Skylark L test is also the first vertical static fire test in the UK in 50 years. According to the company, the sub-orbital

flight rocket will be ready to launch by the spring 2021. Then on 13 June, the Scottish company also launched the [Skylark Nano rocket](#), reaching an altitude of approx. 6 km for educational and testing purposes, from the Fethaland Peninsula in the Shetland. The test is also relevant for the future of the LEO launch vehicle Skyrora XL, that could be launched from Shetland as well.

Chinese launch companies mark significant advancements

The Chinese launch companies [Landscape](#), [iSpace](#) and [Galactic Energy](#) have been reported to make progresses on their respective vehicles, with multiple positive tests during the second quarter of 2020. Landscape achieved fire tests on the two stages of its Zhuque-2 vehicle and is expected to proceed with the first launch by the beginning of 2021. iSpace also completed fire tests for the reusable Hyperbola-2 launcher. Galactic Energy announced a payload fairing separation test in May as well as a previous fire tests for its four-stage Ceres-1 rocket.

In April, the Chinese launch provider company Expace, a subsidiary of the China Aerospace Science and Industry Corporation, held a [live streamed auction for its Kuaizhou-1A rocket, receiving up to 800 bids and selling a KZ-1A launch service package for approx. \\$5.6M](#) that includes the launch operations, a custom rocket painting and a launch site visit.

Improved connectivity for Vega

Thales Alenia Space in Spain signed a contract with Avio concerning the design, development and qualification of the [Tracking and Data Relay Satellite \(TDRS\) transmitter](#) for the Vega launchers. The contract aims to improve the Vega telemetry system and overall connectivity to the ground, allowing a continuous transmission using geostationary data relay satellites. The company further confirmed that the new TRDS system will be compatible also to the new versions of the Vega launcher.

Progress on 3D-printed components

ArianeGroup and DLR successfully completed several fire tests of a fully [3D-printed combustion chamber](#), part of ESA's Future Launchers Preparatory Programme. The test validates the use of additive manufacturing and allows to make progresses regarding the [Prometheus](#) engine test model (M1), with the ultimate goal of develop low-cost and potentially reusable rocket propulsion technology.



ArianeGroup Holding

Roscosmos confident on the Angara heavy rocket

At the end of May, Roscosmos has announced that the schedules to [begin flight tests](#) on the Angara-A5M rocket will proceed despite the outbreak of the COVID-19 crisis and the consequent restrictive measures adopted in the country. The Russian space agency expects to begin the flight test before the end of 2020 and start the [assembly and mass manufacturing](#) of the rocket by 2023, as the Angara is expected to launch the Oryol crewed mission by 2024.

Credit: ESA

EARTH OBSERVATION

Airbus to provide NASA with satellite imagery

Airbus is reported to have been selected by NASA under the [Commercial Smallsat Data Acquisition Program \(CSDAP\)](#) in order to grant access to EO data from seven operated satellites, “two Pleiades satellites and two Spot optical satellites as well as three X-band radar satellites”. Although the contact and the details of the partnership are not yet defined, Airbus would join a number of companies providing NASA with EO data under the CSDAP initiative, that currently are Maxar, Planet, Spire Global and Teledyne Brown Engineering.

EO for water leak reduction

Telespazio UK received a contact from ESA to lead a team focused on [predicting and detecting potential leaks in clean water supply pipelines](#) using EO data. The team led by Telespazio will develop three different services to analyse the structural health of water pipelines and provide early warnings and near-real-time situational awareness information on potential interferences and leaks. The services will be based on optical as well as SAR imagery, analysed together with additional scientific data, and will be a test also for potential “more comprehensive demonstration project” for commercial services.

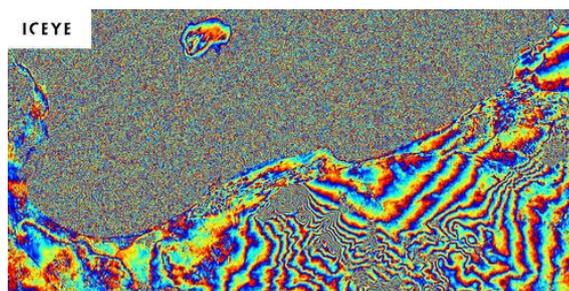
Italian capabilities improved with COSMO-SkyMed SG and are made accessible with PRISMA

Launched in December 2019, during April 2020 the first satellite of the COSMO-SkyMed Second Generation (CSG-1) implemented a new operational mode, called D12S-MS, or “[Discrete Stepped Strip Multi-Swath](#)”; the CSG-1 proved its unique capability to simultaneously acquire two Spotlight images, [providing two different satellite imagery of separate locations](#) hundreds of kilometres far from each other.

Furthermore, the PRISMA satellite launched in March 2019 has completed the commissioning phase and the calibration and validation phase and has been opened to the user community through a [free data access policy](#). PRISMA offers access to a wide database of hyperspectral images that focus on a chemical-physical analysis of the Earth.

ICEYE demonstrates interferometry capability

In May, [ICEYE](#) announced a new interferometric capability on its small SAR satellites constellation; accessible to ICEYE’s customer by the end of 2020, the SAR constellation is now able to maintain an exact orbit for interferometric purposes and enable a 18-day revisit cycle. The SAR interferometry capability is also based on the correlation between two acquisitions and will generate information related to several potential uses, such as: change detection analysis, land cover classification, infrastructure analysis and flood monitoring.



Credit: Iceye

Φ-sat-1 launches AI and ESAIL in orbit

Onboard the first Vega Small Spacecraft Mission Service (SSMS) of the 21 June, ESA launched the [Φ-sat-1 \(PhiSat-1\)](#), an experimental artificial intelligence Earth Observation mission to monitor vegetation, water quality and urban heat islands. The Federal Satellite Systems (FSScat) mission is powered by Artificial Intelligence, that will filter the number of images acquired by the satellite in order to automatically transmit only the usable data.

On the same Vega mission, ESA has also launched the ESAIL microsatellite, developed in partnership with the LuxSpace and exactEarth. ESAIL capabilities include fisheries monitoring, fleet management, environmental protection and security monitoring, such as the AIS detection of ships worldwide, and will provide relevant info to the European Maritime Safety Agency (EMSA).

Umbra Lab unveils a SAR reflector for a microsatellite constellation

In April, the U.S. start-up Umbra Lab announced the patent application for a new [antenna for microsatellite](#) that features a large SAR reflector with a diameter of approx. four metres. According to the company, the designed antenna will allow a high-resolution capability of up to 25 centimetres in the planned microsatellite constellation, that Umbra Lab expects to start launching by the end of 2020.

Capella Space partners with U.S. Navy

The U.S. start-up Capella Space announced in May a contract with the U.S. Navy to [provide airborne SAR imagery and analytics service](#), as a first partnership to establish a closer commercial cooperation on satellite imagery services. Reporting serious impacts from the COVID-19 crisis in terms of satellite launches schedule, Capella Space will still test its radar, data processing and delivery services based on an airborne platform, in order to consolidate future business opportunities based on satellite data.

TELECOMMUNICATIONS

SES and Intelsat announce orders for new C-band satellites

On 15 and 16 June, based on the upcoming FCC C-band spectrum auction SES and Intelsat announced their plans to replace older GEO satellites by 2023 and continue to serve the C-band customers. The planned orders aim to respect the FCC deadline to receive the incentive payments for the accelerated clearing process. [SES](#) procured two satellites each with Northrop Grumman (SES-18 and 19) and Boeing (SES-20 and 21), while an additional order for two satellites is still expected. [Intelsat](#) ordered four satellites from Maxar (Galaxy-31, 32, 35 and 36) and two from Northrop Grumman (Galaxy-33 and 34) and is also anticipated to order a seventh GEO satellite. The accelerated clearing auction is expected to assign \$3.97B to SES and \$4.87B to Intelsat.

Viasat modifies plans for satellite constellation

After having received FCC approval in April for a [MEO constellation](#) of 20 satellites, Viasat disclosed plans to build a [LEO constellation](#), in order to access the FCC subsidies under the Rural Digital Opportunities Fund (RDOF). Viasat CEO Mark Dankberg confirmed that the opportunity to receive funding from the FCC RDOF has been the most relevant factor in the company's decision to plan a LEO constellation of 288 satellites in place of a MEO constellation. The RDOF subsidies amount to a total of \$20.4B, awarded in two phases, and aims to reduce digital divide. On 11 June, the FCC released the RDOF [requirements for the auction](#) scheduled in October, mentioning that the criteria for the selections will be particularly challenging.

SES targets an integrated network, filing for LEO constellation

On 26 May, SES replied to an FCC call, filing a proposal for a [36 LEO satellites constellation aimed at the IoT market as well as for expanding by 34 satellites the O3b MEO constellation](#). If successful, SES would operate satellites in LEO, MEO and GEO - where the company already operates 20 O3b satellites and 50 GEO satellites. In March, SES CEO Steve Collar informed about the company's will to build an integrated network, adding the capability of inter-satellite links for communications between the multiple constellation on different orbits.

Telesat observes improvements on its LEO satellite and plans constellation

In June, Telesat announced that a series of [in-orbit testing on its LEO Phase 1](#) satellite have been completed by Telefonica. According to the company, the performances for wireless backhaul demonstrated by the LEO satellite - launched in 2018 - present considerable improvements compared to GEO links. In May, Telesat already announced that it would have soon selected a prime contractor between two current bids for its [planned LEO constellation](#) of 298 satellites. The constellation is considered to be worth for an approx. \$3B contract and is then expected to start to be deployed by 2022, for which launch services Telesat already signed contract with Blue Origin and Relativity Space.

Hisdesat and Xtar consider life extension services

Xtar and Hisdesat are reported to be considering the option to [order In-Orbit Servicing \(IOS\) life-extension mission](#) to keep operative the SpainSat and Xtar-Eur satellites. The two satellites, respectively launched in 2006 and 2005, are approaching their end-of-life phase and Hisdesat already ordered from Airbus Defence and Space two next-generation SpainSat satellites to replace from 2023 the older ones. However, the two companies are considering the IOS solution, as a more effective option compared to the alternative of inclining the satellites' orbit in order to reduce the fuel consumption. A final decision concerning also the potential IOS provider has not yet been announced.

Thales Alenia Space and NanoAvionics selected for IoT constellation satellites

In April, [Thales Alenia Space](#) has been selected by the US-based Omnispace satellite operator to develop two prototypes NGSO satellite for the company's planned hybrid IoT network. [Omnispace](#) is reported to be evaluating launch providers options to launch the prototypes by the early 2021. The initial set of two satellites that will support 3GPP-defined (3rd Generation Partnership Project telecommunications specifications) Narrow-Band IoT radio interface. In June, Thales Alenia Space selected [NanoAvionics](#) to build the two satellites buses that will host the TAS-developed payload. NanoAvionics will also provide launch support and in-orbit operations.

Maritime satellites network to improve communication and security

The Danish satellite company [Sternula](#) announced the creation of a consortium of research centres and satellite developers to develop a maritime IoT (MARIOT) satellite network in LEO. The [MARIOT project](#) aims to build a network for advanced maritime and navigation services also focused on the Arctic region, based on a VDES (VHF Data Exchange System) technology that looks to expand the AIS capabilities for improved communication and security of navigation.

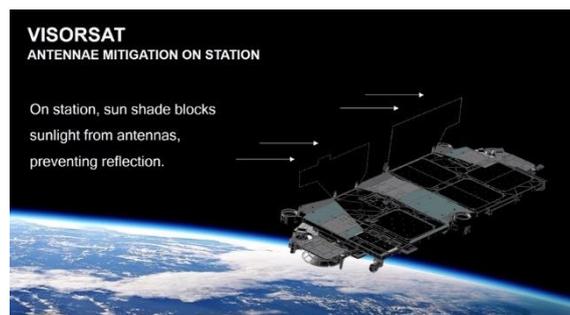
U.S. Army to experiment the Starlink constellation capabilities

On 20 May, the U.S. Army signed an Cooperative Research and Development Agreement (CRADA) with [SpaceX](#) to experiment for three years the Starlink broadband services for the military communications network. Under the agreement, the U.S. Army aims to assess the potential use of the Starlink constellation also in terms of the requirements to implement the commercial satcom technology, in particular for what concerns ground equipment and system integration.

Furthermore, sources reported that SpaceX satcom services could provide the U.S. military with [communication capabilities in the Arctic region](#). Indeed, in February the U.S. Northern Command (USNORTHCOM) had requested to the Congress additional funding for \$130M, to explore OneWeb and Starlink capabilities to provide broadband to the Arctic circle region.

Intelsat launches new connectivity service, targeting military users

On 15 June, Intelsat announced a [new mobile broadband service](#), "FlexGround Communications-On-The-Move", that could effectively serve military uses especially in remote areas. The new service is based on the company's "Epic" GEO satellites, on small "laptop size" antennas as well as flexible contracts and higher data rates in Ku and Ka bands. Intelsat signed a Cooperative Research and Development Agreement (CRADA) contract with the U.S. Army, similar to the one signed with SpaceX to experiment the Starlink services - reported above.



Credit: SpaceX

SpaceX expands Starlink and starts integration of reflectivity equipment

In May, [SpaceX](#) announced the decision to incorporate specific sunshades, called “VisorSat”, to the future Starlink constellation satellites, in order to reduce the satellites’ brightness and the impact on astronomy and night sky observation. SpaceX will then operate approx. 500 satellites without VisorSat and then sunshades-equipped satellites in the planned constellation of up to 12.000 satellites. The measure has been welcomed by astronomers that however emphasise how the magnitude of future Starlink satellites have to reach to a magnitude of seven, in order to allow normal operations and image processing.

Furthermore, on 3 and 13 June SpaceX respectively launched the eight batch of [60 Starlink satellites](#) including one integrating with VisorSat and the ninth batch of [58 Starlink satellites](#), reaching approx. 540 satellites launched.

RSCC aims at Arctic coverage

The Russian Satellite Communication Co. (RSCC) plans to launch [four elliptical orbit satellites](#), called “Express RVs”, aiming to obtain Ku-band coverage over the Arctic circle and Russia’s Far North region. According to RSCC’s CEO, the Arctic satellites would be integrated in a single constellation with ten GEO satellites already operated by the company. RSCC referred plans to launch the [Express RVs](#) by 2024 but reported also the possibility of schedule delays also due to the COVID-19 outbreak.

Indian private company targets 5G LEO constellation

The Indian [Vesta Space](#) satellite company announced in May plans to launch a 5G constellation of approx. 35 satellites for commercial network purposes and IoT applications. The constellation would then rely on eight ground stations and 31.000 data receptors installed across the Indian region. A beta version of the satellite platform is expected to be released in September and the first launch operations are planned to take place in 2021.

SSA

Space Fence site is operational

After five years from the beginning of construction activities, the [Space Fence](#) site in the Marshall Islands has been declared operational at the end of March. Developed by [Lockheed Martin](#) since 2014, the project costs \$1.5B. The Space Fence is a ground-based radar system able to track satellites, breakups, manoeuvres, launches and space debris objects “[as small as 4-inches in diameter](#)” in LEO and presents a search capability for objects in higher orbits as well, integrating the capabilities of the Space Surveillance Network.

LeoLabs launches its Collision Avoidance platform

In May, [LeoLabs](#) introduced its automated [Collision Avoidance](#) dashboard platform based on the company’s networks of three ground-based phased array radars. The Collision Avoidance platform presents real-time risk analysis, comprehensive information and cloud-based services on close approach events, improving the responsiveness and the flexibility of the service. The platform is available to commercial as well as government and defence satellite operators, space agencies and research operators.

HUMAN AND ROBOTIC EXPLORATION

Thales Alenia Space signs for Axiom space station

In June, Thales Alenia Space announced an Authorisation To Proceed (ATP) agreement with Axiom Space to commence the [development of the first two elements of Axiom commercial space station](#) at its facility in Turin. Thales Alenia Space is responsible of the design, development, assembly and test of the primary structure and the Micrometeoroid & Debris Protection System for the Axiom Node One (AxN1) and Habitation Module (AxH). The Axiom space station is designed to detached from the ISS at its retirement and operate independently as commercial station. Thales Alenia Space build on its expertise from the previous development of ISS Node 2 and 3, the pressurised elements of Columbus, the Multi-Purpose Logistics Module (MPLM), the Permanent Logistic Module (PPM), the Cupola, the Automated Transfer Vehicle (ATV) and the Cygnus cargo modules.

OHB and Israel Aerospace Industries proceed on a lunar lander mission

Following a partnership agreement signed in January 2019, [OHB and the Israel Aerospace Industries \(IAI\)](#) are progressing on a commercial lunar lander mission scheduled for late 2022. OHB and IAI reported technological advancements based on the investigations related to IAI-developed Beresheet lander, that experienced a failure in the attempt to land on the Moon in April 2019. In particular, IAI is developing new avionics and flight software on the lander platform, that will also offer more space capabilities to host 20-25 kilograms of payload and operate for eight days. The Lunar Surface Access Service (LSAS) programme prime contractor OHB is reported to be in the process of identifying potential payload customers.

NASA selects lander for VIPER and awards contract for nine lunar payloads

On 11 June, NASA awarded Astrobotic the \$199.5M contract to deliver the [Volatiles Investigating Polar Exploration Rover \(VIPER\)](#) to the South Pole of Moon in 2023. The contract is part of the Commercial Lunar Payload Services (CLPS) initiative established by NASA. The U.S. space robotics company [Astrobotic](#) will carry VIPER onboard the company's Griffith lunar lander, after one another CLPS contract service that Astrobotic is expected to deliver on the Moon's surface in 2021. VIPER will study the location and concentration of ice in the South Pole of the Moon, collecting data particularly relevant for the subsequent Artemis missions.

Furthermore, in April [Masten Space System](#) was selected by NASA to deliver nine payloads - and potentially other commercial payloads - to the lunar surface by December 2022 on the company's XL-1 lander. The \$75.9M contract to Masten is awarded under the Commercial Lunar Payload Services (CLPS) initiative and aims to deliver various technology instruments relevant for lunar scientific exploration.

NASA announces Mars helicopter for upcoming mission launch

NASA unveiled the [Mars Ingenuity helicopter](#) that will fly onboard the upcoming Mars 2020 mission, scheduled to launch between July and August 2020. The technology demonstrator helicopter Ingenuity will be carried by the Perseverance rover and will be the first powered flight test on Mars, starting from the mid-2021 after the landing expected for February 2021. Ingenuity has the capability to make multiple flights for approx. 90 seconds and up to 300 meters on Mars' surface.



Credit: NASA

Virgin Galactic signs agreement with NASA on private orbital spaceflight

On 22 June, Virgin Galactic announced a [Space Act Agreement](#) with the NASA Johnson Space Center to develop a “private orbital astronaut readiness program”. The agreement identifies the possibility to purchase private astronaut mission to the ISS and aims to foster the commercial participation in orbital human spaceflight. Under the programme, Virgin Galactic would also account for the procurement of transportation to the ISS and for the astronaut training packages, based on the company’s existent infrastructure and facilities.

SCIENCE AND INNOVATION

Initiative for a 100% European satellite

Thales Alenia Space Spain will lead a consortium of companies from other five European countries to provide technological independency in the field of satellite manufacturing. [The PROMISE \(PROgrammable Mixed Signal Electronics\) project](#) will be funded under the Horizon 2020 research programme; PROMISE aims to develop a European competitive solution based on a system of blocks for electronic circuits - as Mixed Signal ASIC (Application-Specific Integrated Circuit) are today produced in non-EU countries - to reduce costs and lead time and enable future telecommunications, navigation, EO and exploration missions. The results of the project are expected for the second half of 2022.

Momentum Space expands customer basis for its Vigoride shuttle

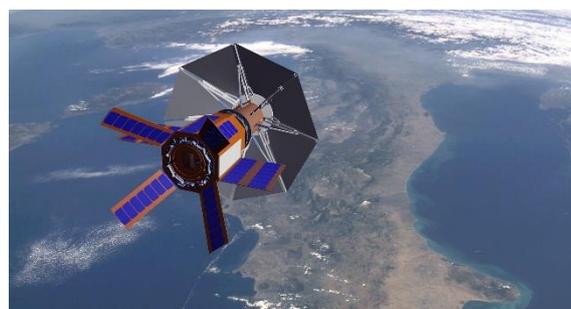
[Momentum Space](#) announced contracts with the European companies Sen, Alba Orbital, SatRevolution and [EnduroSat](#) for its Vigoride in-space transportation service, expected to conduct a test flight by the end of 2020 onboard the SpaceX Falcon 9 rideshare mission. The announced contracts follow-up one other contract already signed in April, with the Taiwan-based [Odysseus Space](#). Moreover, Momentum is developing an upgraded version of its orbital transfer vehicle called “Ardoride”, expected for demonstration in 2022-2023, that could be able to transfer payload to the GEO as well as the Moon.

Astroscale acquires satellites life extension capabilities

[Astroscale](#) announced the acquisition of intellectual property and other assets of Effective Space Solutions (ESS), the Israeli-based In-Orbit Servicing (IOS) company. Astroscale will then set up a subsidiary in Tel Aviv, Israel, directed by the current CEO of Effective Space and additionally hire members of the staff from ESS. By this acquisition, Astroscale aims to enter the IOS market and add the ESS “Space Drone” GEO satellites life-extension and to their current expertise in space debris removal operations in LEO, a field where Astroscale was awarded a [commercial partner contract](#) by JAXA to demonstrate debris removal technologies.

Telespazio presents re-entry capability for microsattellites

[Telespazio](#) will lead a consortium of industrial and research partners to develop the MISTRAL (MIni-SaTellite with Re-enter capability, Aircraft-Launched) system project, also funded Campania Region and promoted by the Campania Aerospace District (DAC). MISTRAL is designed to allow autonomous atmospheric re-entry for several types of missions, such as for micro-gravity experiments, and presents an aircraft-launched capability as well. According to Telespazio and Leonardo, the MISTRAL project will be especially relevant also to develop active debris removal capability.



Credit: Telespazio

ESA explores debris removal and mitigation solutions

ESA is developing [Radio Frequency \(RF\) tags](#) to improve the efficiency of close proximity operations and active debris removal. According to a study led by Leonardo, the implementation of passive RF tags on future European LEO platforms could enhance the rendezvous and proximity operations (RPOs) conducted by a space debris “chaser”. The tags could therefore present a cheap, robust and reliable option to allow navigation around the targeted debris.

Furthermore, ESA supported a study directed by Airbus to investigate the possibility of [semi-controlling the re-entry of spacecraft](#), in place of dangerous uncontrolled re-entry or fuel-expensive fully-controlled re-entry. According to the study, partially controlling re-entry phase could be based on electrical propulsion systems and would occur after the initial descent phase, in order to reduce the casualty risks posed by uncontrolled re-entry.

KSAT starts developing optical ground station

KSAT announced the development of a [commercial optical ground station](#), located in Greece where KSAT already operates a ground station and that according to the company allows “optical space-to-ground communications of up to 95% in summer”. The project will be manufactured in partnership with the German system integrator Astelco Systems and be installed starting from autumn 2020. KSAT aims to integrate the optical station into a multi-mission network and to optimise it to specific requirements in terms of automatization, remote operations and capability to support multiple missions. According to KSAT, the optical ground station will still be considered on the side-line of Radio Frequency but will allow higher data rates.

Start-up launches autonomous satellite operations platform

The Texas-based Hypergiant Industries (Galactic Systems Division) released a [mission management platform](#) for autonomous satellite operations. Developed together with Dynetics, the Hyper-Intelligent Vehicle Enhancement (H.I.V.E.) Fleet Operations Platform aims to reduce costs for commercial and government entities. According to the company, the AI-powered disaster-response capabilities of the platform could also be relevant for critical operations that have been impacted by the COVID-19 crisis and enforced teleworking.



Credit: U.S. Air Force, ULA

X-37B to test a solar power experiment

On 17 May, the U.S. Air Force X-37B Orbital Test Vehicle was launched for its sixth mission on an Atlas 5 rocket. The spaceplane was firstly launched in 2010 and spent overall seven years and ten months in space. The reusable spaceplane carries [several military and NASA experiments](#), among which there is the Photovoltaic Radio-Frequency Antenna Module (PRAM) developed by the U.S. Naval Research Laboratory. The PRAM will experiment the conversion of sunlight harvested on solar panels into microwave energy and the transmission to Earth. The experiment will then also [test the thermal performance of the module and the energy-conversion capability](#) for the eventual possibility of antennas on solar power satellites to beam power back to location on Earth.

Astrobotic selected for UltraNav spacecraft system

NASA selected Astrobotic to develop the autonomous [visual navigation system](#) called UltraNav (Ultra-Compact Standalone Visual Relative Navigation), under a Small Business Innovation Research (SBIR) Phase II contract for approx. \$750k over two years. The UltraNav system could serve satellites in Earth orbit, RPOs, as well as Lunar and Martian spacecraft and rovers thanks to a built-in computer to enhance the visual navigation by calculating the relative location.

NASA discloses Lunar Flashlight mission

In a [paper](#) published in April, NASA has disclosed the information related to the low-cost [Lunar Flashlight CubeSat mission](#), to fly on the first SLS launch for the Artemis I mission. The Lunar Flashlight aims to detect potential ice location on the surface of the Moon and in permanently shadowed regions (PSRs), such as deep craters, near the lunar poles with a laser projector. The mission purpose will be then to validate previous scientific measurements and prepare the future Artemis missions and explorations. Moreover, according to NASA the CubeSat will use a green propellant that provides “nearly 25% higher performance than hydrazine in a low toxicity form for transport and storage”.

Deployable L-band antenna for secure communication

The U.S. satellite hardware supplier Rocco announced the development of a deployable L-band antenna for [reception and transmission of Link 16 signals](#) via spacecraft. Developed in partnership with Viasat and the Air force Research Laboratory, the two-meter-long deployable RF antenna could expand the Link 16 tactical communications network capabilities and serve NATO Member States and the U.S. Department of Defense for a space-based communication solution between ships, aircraft, vessels and troops.

SPACE ACTIVITY OVERVIEW

KEY INDICATORS AND GRAPHS

Methodology note

ESPI is tracking all launch events and related data since 2000. The ESPI Space Launch Activity Database encloses those worldwide data allowing for detailed quantitative analysis rendered into graphs and charts. The database is a repository of publicly available information on global space activity such as:

- Launch events: date, launch site, outcome, launcher, spacecraft and service provider;
- Spacecraft: customer, orbit, mass, manufacturer, payloads, mission and market.

The database architecture allows the user to create dedicated field and categories to tailor specific analysis. In order to provide the reader with a spacecraft's categorization taking into account both the capacity of the launchers and the different sizes of satellites, ESPI team defined and applied to the dataset the following categories:

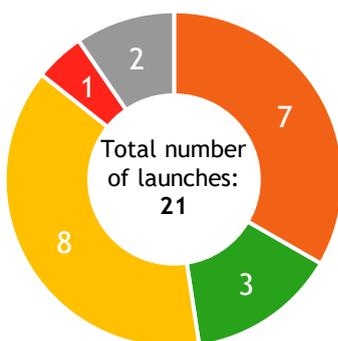
Large spacecraft >500kg	Extra heavy-class	>8,000kg
	Heavy-class	2,000-8,000kg
	Medium-class	500-2,000kg
Small spacecraft <500kg	Mini-class	100-500kg
	Micro-class	10-100kg
	Nano-class	<10kg

Detailed information about all the satellites deployed are available in the Launch Log section.

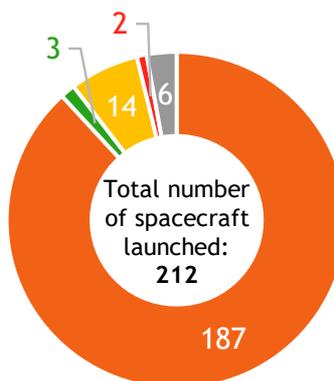
Launch activity by country

Q2 2020 was a particular quarter: with a lot of countries taking measures to face the COVID-19 outbreak, launch activity significantly slowed down. Some key players, such as Europe or India, did not carry out any launch between April and June. China and the United States are the two main countries regarding the number of launches (representing together more than 70% of all launches), but the United States clearly dominates in the number of spacecraft launched (almost 90%). This is in large part due to the 178 Starlink that were launched this quarter. Finally, the overrepresentation of China in the total mass launched compared to the number of spacecraft that the country put in orbit is mainly due to the launch of a prototype of its new manned capsule, which weighed around 21.5 tons.

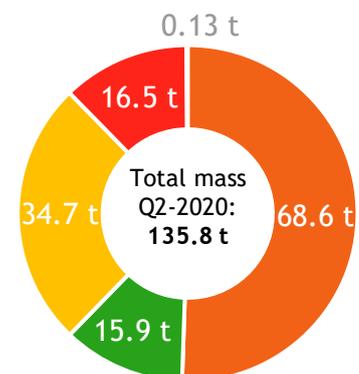
Total number of launches per launch country



Total number of spacecraft launched per launch country



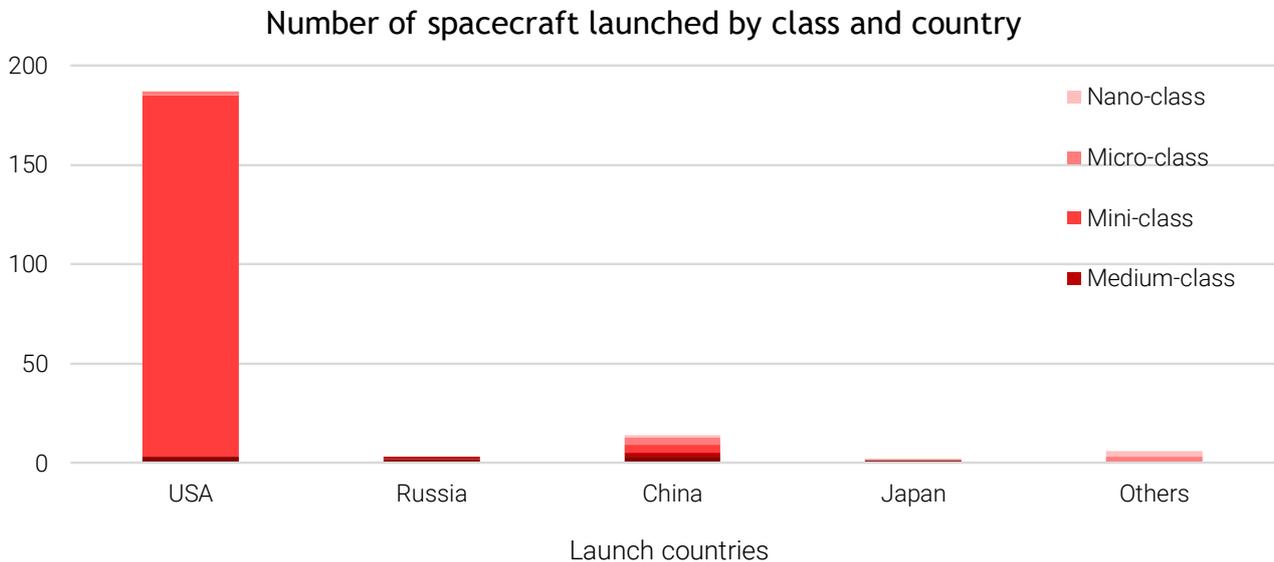
Total mass launched per launch country



■ USA ■ Russia ■ China ■ Japan ■ Others

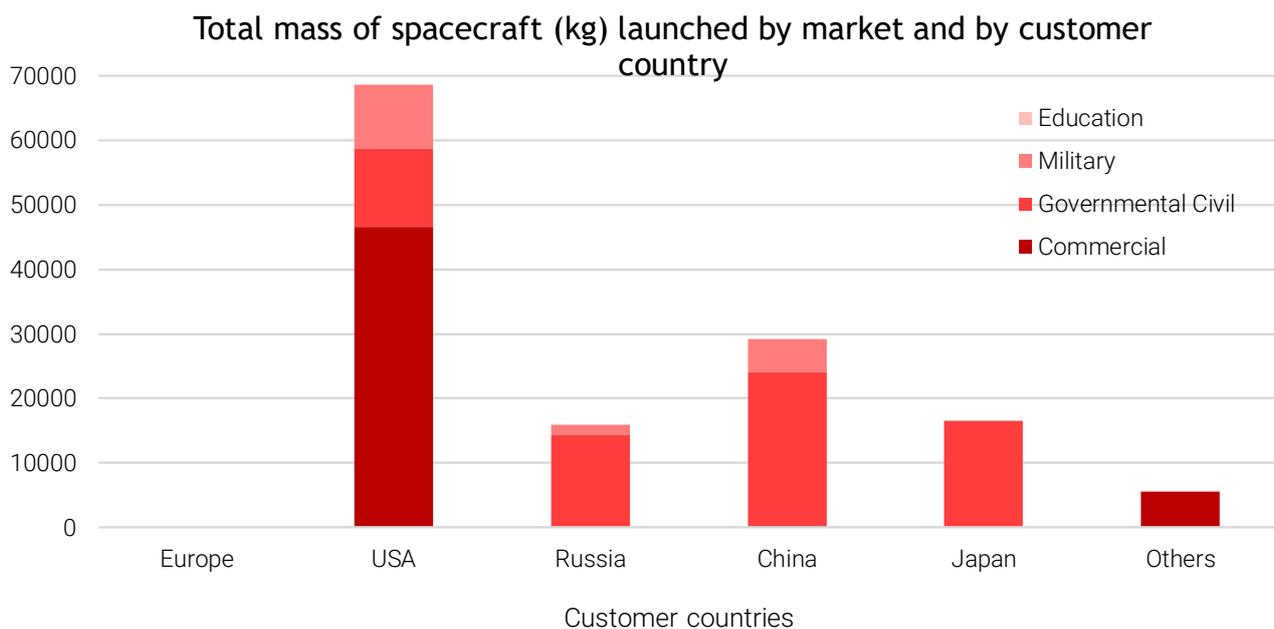
Spacecraft classes

Most of the spacecraft launched this quarter belong to the mini-class category (88%), that were quasi-exclusively launched by the United States (almost 98% of the spacecraft of this class were launched from this country). Other meaningful categories are micro-class (10 spacecraft) and heavy-class (5 spacecraft). Finally, China is the only country who launched all types of satellites this quarter.



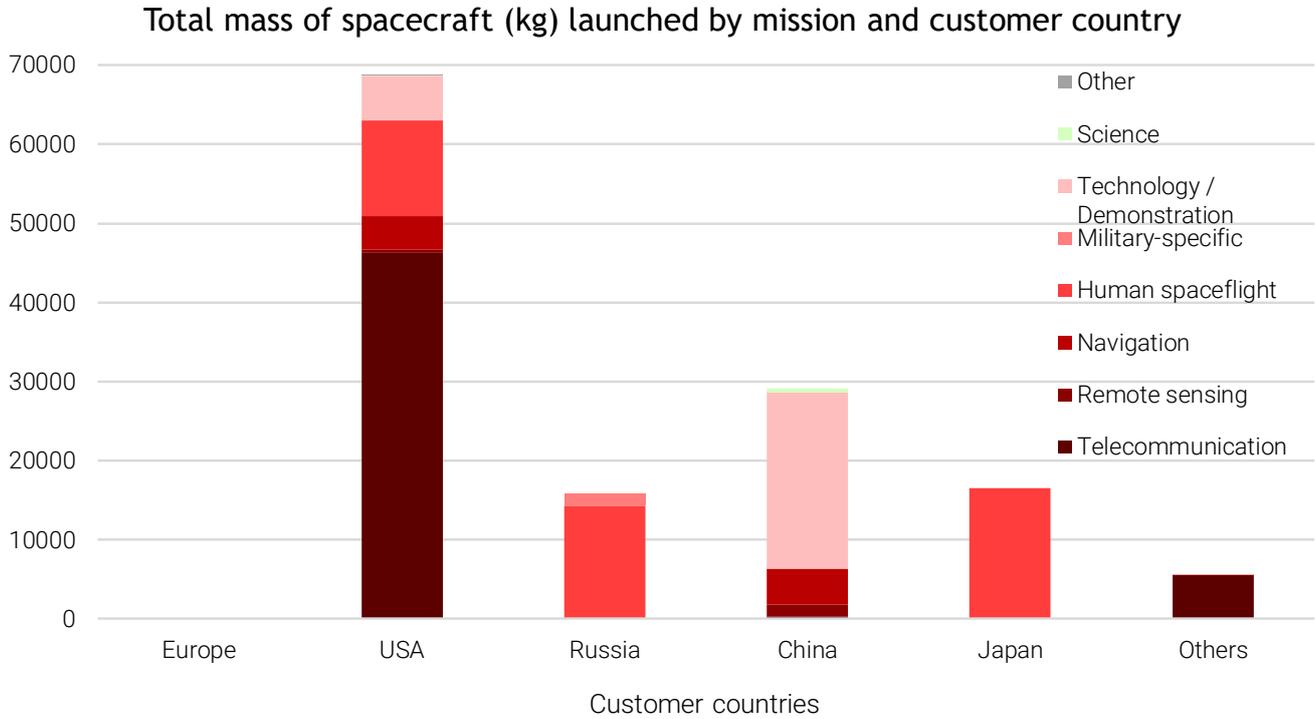
Spacecraft markets

In Q2 2020, most of the mass launched aimed at serving the governmental market. It represents the main market for China, Russia and Japan (respectively 82%, 90% and 100% of the mass launched for these states), while the commercial market dominates for spacecraft launched for American, European and Other customers. Yet, in the United States, most of the mass dedicated to the commercial market is due to Starlink satellites. Moreover, the institutional market (governmental civil and military) still represents more than 30% of the total mass launched for U.S. customers.



Spacecraft missions

While Human Spaceflight represented the main mission for spacecraft launched for Russia and Japan, the Technology/Demonstration category held this position for China. Indeed, the manned capsule sent in May 2020 was only a prototype aimed at verifying its performances. Two thirds of the spacecraft launched for American customers were dedicated to Telecommunication missions, once again in large part due to Starlink satellites. The United States and China also have a noticeable mass aimed at navigation purposes, through the launches of their GPS-3 and Beidou-3 satellites.



ESPI LAUNCH LOG

Launch date	Launch country	Launcher	Spacecraft name	Main customer	Customer country	Prime manufacturer	Manufacturer country	Mass (kg)	Mission	Market
09/04/2020	Russia	Soyuz-2-1a	Soyuz-MS 16	Roscosmos	Russia	RKK Energia	Russia	7080	Crew Transfer	Governmental Civil
09/04/2020	China	CZ-3B/G2	Palapa N1	Palapa Satelit Nusantara Sejahtera	Indonesia	CASC	China	5550	Telecommunication	Commercial
22/04/2020	USA	Falcon-9 v1.2 (Block 5)	Starlink 6 (60 satellites)	SpaceX	USA	SpaceX	USA	260 (each)	Telecommunication	Commercial
22/04/2020	Iran	Qased	Noor 1	Islamic Revolutionary Guard Corps	Iran	CubeSat Kit	USA	5	Earth Observation	Military
25/04/2020	Russia	Soyuz-2-1a	Progress-MS 14	Roscosmos	Russia	RKK Energia	Russia	7280	Cargo Transfer	Governmental Civil
05/05/2020	China	CZ-5B	RCF-FC-SC	CASIC	China	CASIC	China	200	Technology / Demonstration	Governmental Civil
			XZF-SC	People's Liberation Army	China	CAST	China	21600	Technology / Demonstration	Governmental Civil
12/05/2020	China	Kuaizhou-1A	Xingyun-2 01 & 02	Xingyun Satellite Co.	China	CASIC	China	93 (each)	Telecommunication	Commercial
17/05/2020	USA	Atlas-5(501)	FalconSat 8	USAF Academy	USA	USAF Academy	USA	136	Technology / Demonstration	Military
			X-37B OTV 6	USAF	USA	Boeing	USA	5400	Technology / Demonstration	Military
20/05/2020	Japan	H-2B-304	HTV 09	JAXA	Japan	Mitsubishi Electric	Japan	16500	Cargo Transfer	Governmental Civil
			iSIM	Satlantis	Spain	Satlantis	Spain	15	Technology / Demonstration	Commercial
22/05/2020	Russia	Soyuz-2-1b Fregat-M	Tundra 04	Russian Aerospace Forces	Russia	RKK Energia	Russia	1500	Early Warning	Military
25/05/2020	USA	LauncherOne	Intern-Sat	Virgin Orbit	USA	Virgin Orbit	USA	15	Other	Education
			Starshine 4	NASA	USA	Unknown (USA)	USA	50	Earth Science	Education
29/05/2020	China	CZ-11	XJS G	CAST	China	Shanghai Engineering Center for Microsatellites	China	250	Technology / Demonstration	Military
			XJS H	CAST	China	National University of Defense Technology	China	250	Technology / Demonstration	Military
30/05/2020	USA	Falcon-9 v1.2 (Block 5)	Crew Dragon 2	SpaceX	USA	SpaceX	USA	12055	Crew Transfer	Governmental Civil
31/05/2020	China	CZ-2D(2)	Gaofen 09-02	CNSA	China	CAST	China	750	Earth Observation	Governmental Civil
			HEAD 4	HEAD Aerospace	China	SAST	China	45	Automatic Identification System	Commercial
04/06/2020	USA	Falcon-9 v1.2 (Block 5)	Starlink 7 (60 satellites)	SpaceX	USA	SpaceX	USA	260 (each)	Telecommunication	Commercial
10/06/2020	China	CZ-2C(3)	HaiYang 1D	CAST	China	DFH Satellite Co.	China	442	Earth Science	Governmental Civil

SPACE ACTIVITY OVERVIEW

13/06/2020	USA	Falcon-9 v1.2 (Block 5)	Starlink 8 (58 satellites) SkySat 16, 17 & 18	SpaceX Planet	USA USA	SpaceX Maxar	USA USA	260 (each) 120 (each)	Telecommunication Earth Observation	Commercial Commercial
13/06/2020	New Zealand	Electron KS	ANDESITE	Boston University Center for Space Physics	USA	Boston University Center for Space Physics	USA	5,5	Earth Science	Education
			RAAF M2 Pathfinder	Royal Australian Air Force	Australia	University of New South Wales	Australia	4	Technology / Demonstration	Military
			USA 301, 302 & 303	NRO	USA	Unknown (USA)	USA	40 (each)	Technology / Demonstration	Military
17/06/2020	China	CZ-2D(2)	Gaofen 9-03	CNSA	China	DFH Satellite Co.	China	750	Earth Observation	Governmental Civil
			HEAD 5	HEAD Aerospace	China	SAST	China	45	Automatic Identification System	Commercial
			Zheda Pixing 3A	Zhejiang University	China	Zhejiang University	China	0,2	Technology / Demonstration	Education
23/06/2020	China	CZ-3B/G3	BD-3 G3Q	People's Liberation Army	China	CAST	China	4600	Navigation	Military

LAUNCH HIGHLIGHTS

Maiden launch for Long March 5B and prototype of next-gen crewed spacecraft



Credit: Su Dong/China Daily

On 5 May 2020, China launched for the first time a new version of its Long March 5B. The success of the launch was crucial for the country, as this rocket configuration will carry parts of the future Chinese Space Station to LEO. The [rocket](#) does not have any second stage and can lift until 25 metric tons to LEO. In line with Chinese efforts in space exploration, the launcher carried a demonstrator for the next-generation spacecraft of China as well as a cargo return spacecraft equipped with an inflatable heat shield, which was tested during [re-entry](#) but failed. The rocket created international concern due to its first stage, which re-entered Earth atmosphere without control: this stage, weighing almost 20 tons, was the [largest uncontrolled object](#) to fall from LEO since 1991, and some of its debris could have impacted cities like New York.

The United States recovers its crewed launch capability

For the first time in almost nine years, a crew flight was launched from the U.S. territory, with astronauts Bob Behnken and Doug Hurley onboard SpaceX's Falcon 9 rocket and Crew Dragon capsule, developed in the frame of NASA's the Commercial Crew Program. The launch, called Demo-2, took place on 30 May from the Kennedy Space Centre in Florida, after having been postponed of two days because of bad weather. The capsule docked to the ISS after a trip of [19 hours](#). The exact duration of the stay of Behnken and Hurley to the ISS is still unknown, as they may be used for some additional work, such as the replacement of ISS batteries. The first operational flight of Crew Dragon is planned for August 2020.



Credit: SpaceX

Virgin Orbit fails its first launch



Credit: Virgin Orbit

On Monday 25 May, Virgin Orbit performed the [first launch](#) of its LauncherOne system. For the first time, the company ignited the rocket and its Newton Three engine after having dropped it from under the Boeing 747 "Cosmic Girl" aircraft. However, while the rocket maintained its stability after release, an issue occurred shortly in the first stage flight. Indeed, [after nine seconds](#), the engine extinguished. The rocket went therefore out of control and did not continue its travel to space, thus preventing the two test payloads from reaching orbit. The company still managed to retrieve data from these few seconds of flight in order to analyse them and find the source of the anomaly.

Completion of the BeiDou constellation

In June, China launched the last satellite of its GNSS constellation, called BeiDou. This launch marks the completion of the system's third generation, which will provide global services (contrary to the regional services provided by the second generation). The spacecraft is the 55th BeiDou satellite launched into orbit (+ four experimental, for a total of 59), and the 30th of the third generation. The satellite is expected to start operations at the end of July 2020; it has a life expectancy of at least 12 years and is meant to improve the network's accuracy. Quite unusually for such inland launch, the operation was broadcasted and streamed by Chinese state media.



Credit: H. Xujie/Xinhua

About ESPI

The European Space Policy Institute (ESPI) is an independent public think-tank based in Vienna and specialized in international and European space affairs.

ESPI provides decision-makers with an informed view on mid- to long-term issues relevant to Europe's space activities. In this context, ESPI acts as an independent platform for developing positions and strategies. The Institute fulfils its objectives through various multidisciplinary research activities leading to the publication of books, reports, papers, articles, executive briefs, proceedings and position papers, and to the organisation of conferences and events including the annual ESPI Autumn Conference.

The Institute is supported by 17 members including the Austrian Research Promotion Agency (FFG), the European Space Agency, the European Commission, national space agencies and major satellite operators and manufacturers. Located in the heart of Vienna, the center of international space diplomacy, ESPI has developed a privileged relationship with the United Nations Office for Outer Space Affairs (UNOOSA) and with a network of space policy experts in Europe and across the globe.

More information on ESPI is available on our website: www.espi.or.at

About ESPI Insights

ESPI Insights is a publication of the European Space Policy Institute available on ESPI website. It offers a synthetic overview of major developments in the global space sector on the covered period and provides useful links to official documents, public reports, web articles or conference websites for further details on the issue.

The publication is organised around four thematic sections:

- ▶ **Space Policy and Programmes** outlines important space policy developments in the World by country and region. This includes political decisions, institutional affairs, public budgets and programmatic plans.
- ▶ **Space Economy and Finance** provides statistics and information on space markets and industry results as well as on major investment and contractual deals in the European and global space sector.
- ▶ **Space Industry and Innovation** addresses major programmatic and industrial announcements and developments.
- ▶ **Space Activity Overview** is based on quarterly statistics from ESPI space activity database. It includes key indicators and graphs, a launch log and space mission highlights.

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