European Space Policy Institute

ESPI Insights

Space Sector Watch

Issue 9
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THIS MONTH IN THE SPACE SECTOR...

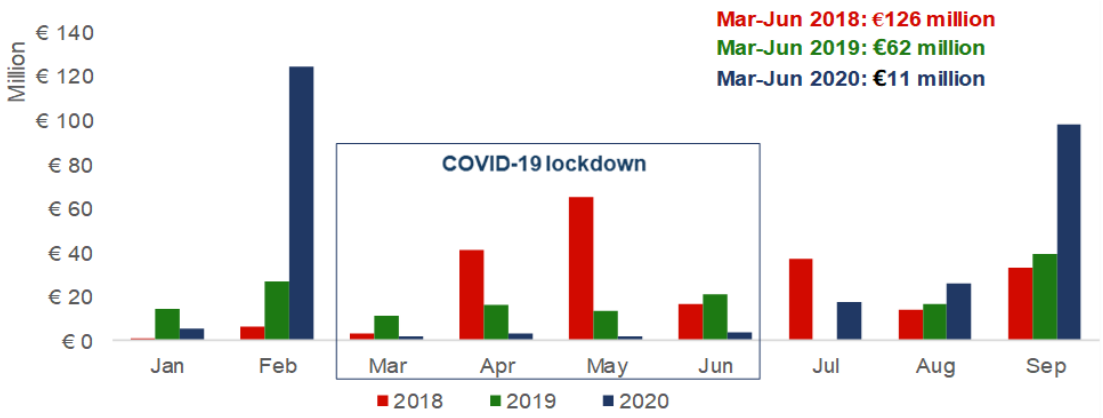
Focus: Covid-19, 2020 and European private space investments

Dear Friends of ESPI,

Over the past few years, private investments in European space start-ups have drastically increased from under €50 million in 2015 to **€188 million in 2019**. In line with this trend, EU private investments in space already reached a new record high in 2020. Totalling €283 million and with three months still to go, yearly investments already surpass the previous record of €227 million set in 2018. The month of September stood out, with major deals such as: **ICEYE's series C funding round worth €74 million**, followed by **Solar Foods' series A funding totalling €15 million** (in partnership with **ESA BIC Finland**) and finally Spanish micro launcher start-up **PLD Space which raised €7 million**.

This outcome is an encouraging signal as it occurs following a period of turmoil marked by the outbreak of the COVID-19 and the subsequent European lockdown. The uncertain financial environment that ensued was expected to be unfavourable for private investments. Yet, with already €100 million of extra funding compared to 2019 and €60 million more than the previous record of 2018, private investment in European space start-ups actually continues to thrive.

Notwithstanding the large-scale investments recorded in September, the year 2020 was still marked by the impacts of COVID-19 from March to June: the number of deals decreased two-fold compared to 2019 and 2018. With only 15 deals recorded and €11 million raised from March to June 2020, the investment pace decreased considerably during the first half of 2020. While more mature companies were able to rely on consolidated industry presence and draw funding from pre-existent investors (Kineis, ICEYE), early and seed stage companies appear to have been negatively affected by lockdown effects and struggled for initial funding.



Finally, while 2020 will still be marked by the long-lasting challenges posed by the COVID-19 crisis, the European private space sector has demonstrated its resilience and increasing value in the international NewSpace landscape. The evolving partnerships between the EU public sector and private investment mechanisms will now be more than ever necessary to strengthen this well-developed trend.

Sincerely yours,

Jean-Jacques Tortora

Director of ESPI

POLICY & PROGRAMMES

Vega returns to flight with the new rideshare service

Initially postponed because of the COVID-19 pandemic and then due to poor weather conditions, on September 2nd, Arianespace successfully launched the Proof of Concept (PoC) Small Spacecraft Mission Service (SSMS) on a Vega rocket. SSMS is now integrated into Arianespace's service portfolio to address the institutional and commercial small satellite market. The SSMS received funding from ESA and the EU Horizon 2020 programme and the satellite dispenser was developed by the Czech company SAB Aerospace.

The 16th Vega flight successfully deployed 53 satellite passengers from 13 countries and 21 customers into Sun-synchronous orbit (SSO). Among them, ESA contributed to the development of ESAIL, the first commercial microsatellite developed for ship tracking, as well as to the Federated Satellite Systems (FSSCat) mission that includes the Φ-sat-1, the AI software that improves the transmission of EO data selecting only usable images. The EU participated through the H2020 IOD/IOV Programme, funding the in-orbit technological demonstration UPMSat-2 microsatellite. Vega also deployed 14 of the 26 SuperDoves satellites for Planet, 8 Spire's LEMUR-2, Kepler´s third satellite IOD-5 TARS and GHGSat's Iris methane-monitoring satellite.

Credit: Arianespace

NASA takes a first step towards commercial lunar mining

On September 10th, NASA released a solicitation to commercial companies for the collection of lunar resources to be purchased and transferred to the Agency. The competition aims for the collection of up to 500 g of lunar rocks and it has a value between $15,000 and $25,000 for each contract, with total funding available of up to $50,000. Interestingly, the solicitation will not be limited only to U.S.-based companies. The selected companies will be requested to collect the samples from the Moon's surface and conduct an in-orbit ownership transfer to NASA. The transfer is also demanded to occur by 2024, aiming to normalise commercial activities on lunar resources. The announcement builds on the Commercial Space Launch Competitiveness Act of 2015, the Executive Order on the recovery and use of space resources of April 2020 and the subsequent NASA Artemis Accords.

White House releases SPD-5 on cybersecurity

On September 4th, the White House released the Space Policy Directive (SPD) 5, laying down the foundation of the U.S. approach to cybersecurity in the space domain by establishing principles and guidelines. The document provides a framework for five principles to safeguard space assets and critical infrastructure, ensuring cybersecurity best practices are followed for the full satellite life cycle, from design to mission operation. The directive also encourages closer cooperation between space system owners and operators, including through the Space Information Sharing and Analysis Centre (ISAC), established in 2019. On September 14th, Space ISAC released a statement welcoming the new directive, highlighting that many of the principles have already been implemented by ISAC members and calling for further regulations and standards.

ESA selects Airbus for Copernicus CRISTAL mission

On September 21st, ESA awarded Airbus with a €300 million contract to develop the Copernicus polar ice and snow topography mission (CRISTAL), one among the six proposed new high-level Copernicus missions. Expected to be launched in 2027, the CRISTAL satellite will support the activities in the polar region related to safety and security of navigation and scientific research, measuring sea ice thickness and snow depth with a dual-frequency Ku/Ka band radar altimeter. As prime contractor, Airbus will lead a consortium of companies from 19 countries, including Thales Alenia Space. TAS signed a €88 million contract with Airbus for the development of the advanced Interferometric Radar Altimeter for Ice and Snow (IRIS), replacing its predecessor, SIRAL-2.

Credit: Airbus

Italy signs declaration with NASA to cooperate on Artemis

On September 25th, Italy signed a Joint Declaration of Intent with NASA regarding the participation to the Artemis exploration programme. The Declaration confirms and substantiates the Italian contributions to Artemis, for what concerns habitat modules, scientific experiments and telecommunication services. In addition, the Italian industry is involved in the Dynetics' Human Landing System proposed project. Italy is the first European country to cooperate on Artemis beyond ESA cooperation, joining other countries worldwide that have expressed the intent to contribute to Artemis, namely Japan, Australia and Canada. The cooperation is expected to bring in a return of investments of over 1 billion euros for the Italian space industry. According to the Declaration, the two parties will then adopt specific Implementation Agreements to further define the terms of cooperation.

France boosts space through its national relaunch plan

As part of the €100 billion Plan to Relaunch the Economy, the French government allocated €515 million to support the space sector in the aftermath of the COVID-19 crisis. Presented on September 3rd, the plan aims to revitalise the space companies impacted by the crisis, boost innovation in the space sector and improve competitiveness. The funds include €365 million for the period 2021-2022 from the larger framework of the EU Recovery Plan. As part of the major targets, the funds will support the Guyana Space Centre, further sustain dual-use technologies and will also focus on specific projects such as the production of "green" hydrogen by ArianeGroup and Engie.

OHB to lead the Hera planetary defence mission

On September 15th, ESA finalised a contract of €129.4 million with OHB to build the Hera spacecraft, leading a consortium of companies from 17 ESA Member States. Hera aims to study a binary asteroid system (Didymos and Dimorphos) and explore the possibility to deflect a hazardous asteroid on a potential collision course with Earth. Planned for launch in 2024, Hera is part of the Asteroid Impact Deflection Assessment (AIDA) cooperation project, which comprises NASA's Double Asteroid Redirection Test (DART) mission expected to be launched in 2021.

Within the European consortium, Thales Alenia Space will provide the communications system and the Power Conditioning and Distribution Unit (PCDU). Hera is the second planetary defence mission aimed at the deflection of an asteroid. The previous Asteroid Impact Mission was cancelled in 2016 due to failure to secure the necessary funds.

BDI proposes sea-based small launch platform for Germany

On September 7th, the Federation of German Industries (BDI) presented a strategy paper to the German government, calling for a mobile launch platform in the North Sea in the German Exclusive Economic Zone (EEZ). Reportedly, the paper calls for federal funding of around €30 million in the form of a public private partnership, providing an initial investment to kick-start the project. According to BDI, the new platform would be "technically feasible and makes strategic and economic sense" and could be operational within two years. This platform could be utilised by upcoming German small launch start-ups such as Rocket Factory Augsburg, HyImpulse Technologies, and Isar Aerospace. Isar Aerospace started production of its Spectrum rocket at its new facility on September 7th, and HyImpulse successfully tested its hybrid rocket motor on September 25th.

Update of the Artemis funding requirements

On September 21st, NASA released the Lunar Exploration Program Overview, an updated and comprehensive outline of the Artemis programme. The Overview confirms the plan to send astronauts to the lunar South Pole in 2024 and, most importantly, specifies the funding requirements of nearly $28 billion through 2025. The funding would overall cover the Artemis "Phase I", which includes the Artemis I-III missions together with the Human Landing System (HLS) for approx. $16.2 billion, as well as the SLS, Orion and the Exploration Systems Development (ESD) mission. However, the update highlights a discrepancy with the appropriation bill passed by the House of Representatives in July, especially concerning the HLS, for which NASA requests approx. $2.6 billion more than the House proposed.

Credit: NASA

New Emirates Lunar mission as part of the 2021-2031 strategy

On September 26th, the Vice President and Prime Minister of Dubai announced plans for the first Emirates lunar mission, in the framework of a new comprehensive space strategy for 2021-2031 of the Mohammed bin Rashid Space Centre (MBRSC). The rover mission, called "Rashid", would be the first Arab mission aiming at Moon exploration and is planned for launch 2024. The mission aims to conduct a series of measurements and tests to study several aspects of the lunar surface, including lunar soil and Moon-plasma. The MBRSC strategic programmes for 2021-2031 also focuses on further exploration of Mars, as well as developments on the national satellite programme, space sustainability, and the astronaut programme in partnership with NASA.

European Commission launches the ENTRUSTED project

On September 15th, the European Commission launched a new EU research project called ENTRUSTED. With a budget of €3 million allocated under H2020, ENTRUSTED aims to develop secure, interoperable, innovative and standardised satellite communication for governmental end-users. Under the leadership of the GSA, the project will be implemented by a consortium of almost 20 institutions representing EU Member States and EU agencies. Among the agencies, the EDA will focus on "user needs, requirements and use cases definition, surveying the state-of-the-art of existing secure SatCom user technologies and definition of a R&D roadmap". The project will run until February 2023 and a set of recommendations and guidelines will be delivered to the EC at the end of the project, in order to facilitate the definition of the EU GOVSATCOM programme.

In other news

Vega C launch delayed to 2021: Avio announced that the first launch of the Vega C will occur in mid-2021, rather than late-2020 or early-2021 as previously planned. The postponement is due to delays in development activities, in order to prioritise missions on the scheduled Vega launches, as well as to the COVID-19 impacts on supply chains and the Guiana Space Centre.

NASA solicits new bid for the CLPS: NASA requested its 14 Commercial Lunar Payload Services (CLPS) partners to fly a mission containing a 200kg batch of 10 NASA science investigations and technology demonstrations payloads to a non-polar region of the Moon in 2022. The Agency will select one provider by the end of the year.

UAE astronauts will train at NASA Centre: NASA signed a Reimbursable Space Act Agreement with the Mohammed Bin Rashid Space Centre (MBRSC) of UAE to train astronauts on ISS systems at the NASA Johnson Space Center in Houston from Autumn 2020.

New H2020 mission studies for EGNSS-based rail safety service: In September, DG-DEFIS awarded two mission evolution studies on EGNSS-based rail safety service, respectively led by Airbus Defence and Space and Egis Avia with the support of Thales Alenia Space and Noordwijk Navigation. Both studies aim to improve safety and reliability within the rail infrastructure.

NASA and the U.S. Space Force signed a MoU to strengthen collaboration: Replacing a previous MoU signed in 2006 between the U.S. Air Force and NASA, the agreement focuses on eleven areas of common interest and, in particular, in the fields of planetary defence and space domain awareness responsibilities.

Pentagon releases annual report on China: On September 1st, the Pentagon released the 2020 report on "Military and Security Developments Involving the People's Republic of China (PRC)". According to the report, China "continues to strengthen its military space capabilities, despite its public stance against the weaponization of space" and could potentially plan future ASAT test, in LEO as well as in GEO.

China will lose access to Australian space tracking station: Due to the expiration of the contract with the Swedish Space Corporation (SSC), China will not have access to the strategic station located in Western Australia. The space tracking station was initially leased to China in 2011 with the goal to expand space exploration and navigational capabilities in the Pacific region.

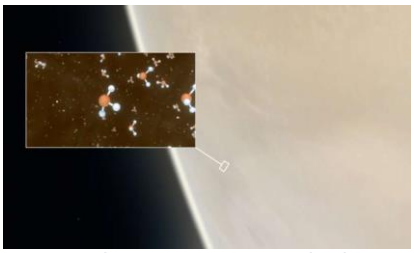
German military opens Space Operations Centre: On September 21st, the Defence Minister Annegret Kramp-Karrenbauer opened the Air and Space Operations Centre (ASOC). Operated by the Air Force, the facility is expected to be operational by spring 2022. The ASOC will provide early warning of objects entering the atmosphere, including space debris, consolidating on existing capabilities in the SST and SSA domains.

New appointments:

- The GSA elected Rodrigo da Costa as new **Executive Director of the GSA** for the next 5 years.
- In October, Lisa Campbell will officially take office as new **President of the Canadian Space Agency.**
- The General Assembly of PT Space appointed Ricardo Conde as a **President of Portugal Space on an interim basis**, until the selection of a new President by summer 2021.
- Alessandro Profumo, current CEO of Leonardo, was appointed as **President of the Aerospace and Defence Industries Association of Europe (ASD)**.

INDUSTRY & INNOVATION

Scientific discovery on Venus inspires further space exploration



Credit: ESO, NASA JPL, Caltech

A team of scientists lead by Cardiff University announced on September 16th the detection of relatively large amounts of phosphine in the atmosphere of Venus. The scientists used the JCMT in Hawaii and the ALMA telescope in Chile to observe the planet. Phosphine is considered a potential biomarker, so its presence could hypothetically indicate life on Venus.

Both NASA Administrator Jim Bridenstine and Rocket Lab CEO Peter Beck welcomed the news, conveying support for future plans related to the exploration of Venus. Indeed, NASA is expected to select two new planetary exploration missions in the framework of its Discovery Programme, which currently includes two proposals focused on Venus. Rocket Lab is reportedly working on a private mission to Venus planned for 2023 and, after the discovery, OHB also announced the completion of an in-house study for a potential exploration mission to the planet. Furthermore, the ESA Bepi Colombo mission to Mercury launched in 2018 will operate two fly-bys to Venus, the first on October 15th 2020 and the second on August 10th 2021, attempting to use the onboard scientific instruments to study Venus's atmosphere.

Mynaric considers compensation after export ban

In a September 14th report to shareholders, Mynaric stated that the company is "assessing potential claims for compensation", after the German government blocked the export of its CONDOR laser communication terminals to China in July. The application of the export ban means Mynaric will not launch any terminals this year, as previously planned. The company announced in July that they would withdraw entirely from China, and focus on U.S. markets, with potential for inclusion in the recently announced SDA constellation. The new report indeed points out that the company has been selected as part of a U.S. government programme, without specifying which one.

Rocket Lab launches first Photon satellite and secures U.S. launch licence

Following the dedicated Capella Space launch of August 30th, on September 3rd Rocket Lab announced the launch of their first Photon satellite. Rocket Lab converted their Electron kick stage into a satellite, aiming to allow customers to develop and test payloads without developing a full platform. This represents a diversification for Rocket Lab, which until now focused on developing the Electron rocket. The satellite, named "First Light", will test and demonstrate the technology as it remains in orbit for five to six years. The first operational Photon mission may be NASA's CAPSTONE lunar CubeSat, launching early next year.

Moreover, on September 1st the FAA approved Rocket Lab's licence request to launch from Wallops Island. The licence will cover all missions from Wallops Island for 5 years. The first Electron launch from Wallops is expected next year, and the expansion will give Rocket Lab the capacity to potentially launch 130 times each year.

Northrop Grumman cancels OmegA rocket

Northrop Grumman announced on September 9th that they terminated their OmegA rocket programme. The solid fuel rocket was developed to compete for a National Security Space Launch contract but failed to receive one as the contracts were secured by ULA and SpaceX. Northrop Grumman began development of the OmegA in 2016 and received a $782 million Launch Service Agreement contract to further develop the system in 2018. Northrop Grumman stated that they will leverage their OmegA investments in other activities across the business, which includes solid rocket boosters for ULA and SLS. They were awarded a $13.3 billion contract to develop a new ICBM for the U.S. Air Force on September 8th.

Microsoft enters ground station business

On September 22nd, Microsoft launched a new ground station service, called Azure Orbital, to connect satellites to its cloud computing network. SES has partnered with Microsoft to invest in Azure Orbital ground stations for its O3b mPower constellation, including co-locating ground stations in the U.S. as well as providing connectivity to remote cloud services. Other Partners include KSAT, Amergint, Kratos, and Viasat. Microsoft was authorised by the FCC to perform proof-of-concept demonstrations connecting the Spanish imaging satellite DEIMOS-2 to two ground stations during its Ignite conference. Microsoft will be competing against Amazon, which launched its AWS Ground Station services in 2018, and Japanese start-up Infostellar, founded in 2016.

Dynetics unveils lunar lander design

As part of the U.S. Human Landing System programme, on September 15th, Dynetics unveiled its lunar lander design. The full-scale mock-up will be used for testing, including evaluating the placement of components and the overall habitability. Dynetics is one of the three teams that received contracts in April to develop their design and are competing to build a lander to take crew to the moon by 2024 under the Artemis programme. The Dynetics mission will require three launches in quick succession to allow in space refuelling of the spacecraft.

Credit: Dynetics

ESA and NASA award contracts on COVID-19 projects

On September 2nd, ASI and Telespazio Joint Venture e-GEOS won an ESA contract to develop a port monitoring solution to track the economic recovery following COVID-19. The project will use satellite and non-satellite data and focus on Italian ports and logistic centres, with the possibility to scale globally. In September, NASA also awarded eight projects focused on the impacts of the COVID-19 pandemic, for a maximum offering of $100K. The projects will investigate the environmental, economic, and societal impacts of the COVID-19 pandemic with a focus on how the lockdown affected several environmental variables and on the potential correlations between the environment and the spread of the virus.

XAGE selected by the U.S. Air Force for cybersecurity

The U.S. Air Force awarded the cybersecurity start-up Xage Security with a $743,000 contract to develop a data protection system across military and civilian assets to support the Pentagon and Space Force operations. Xage will employ its blockchain-protected Security Fabric solution to enable the Space Force to enforce verification and cyber data protection for space systems.

In other news

Exotrail receives two ESA contracts for electric propulsion systems: The first contract is under the ESA General Support Technology Programme (GSTP), supported by CNES, and will accelerate the flight demonstration of Exotrail's EcoMG micro thruster. For the second contract Exotrail will deliver a propulsion system to ESTEC in 2021.

Spire launches first crosslink CubeSats: Spire launched its first CubeSats with intersatellite links, reducing the data latency from tens of minutes to tens of seconds. The links will be included on further satellites they launch in order to eventually connected the whole 90 satellite constellation.

ISS manoeuvres to avoid space debris: The ISS fired its thrusters to avoid a piece of space debris caused by the breakup of a Japanese rocket launched in 2018. 25 similar actions have been conducted between 1999 and 2018, and it is the third manoeuvre this year, a record-high since 2015.

New research shows rust on the Moon: New data analysed from ISRO's Chandrayaan-1 lunar mission, which ceased operating on 2009, indicates the presence of hematite, a form of iron oxide (or rust), on the Moon. The discovery creates uncertainty as the findings are also far from the lunar poles where water deposits have been located. According to researchers at NASA JPL and other institutes, the discovery has implications for our understanding of Earth's magnetic field and lunar regolith.

NASA patents new lunar trajectory for DAPPER mission: The U.S. patent office approved in June 2020 an application filed in 2015 by NASA to record a new lunar mission trajectory, as reported by Business Insider and highlighted by the NASA Administrator in September. The trajectory will be used to reduce fuel requirements for the Dark Ages Polarimeter Pathfinder (DAPPER) mission as part of the NASA Explorer programme.

Swissto12 and Thales Alenia Space develop 3D printing: Together with TAS, the Swiss start-up has developed waveguides for GEO communication satellites using additive manufacturing technology. Thales Alenia Space will integrate the 3D printed components to the Eutelsat Konnect VHTS satellite scheduled for launch in 2021.

First all-Australian launch contract: Space Machines Company, an Australian start-up, signed a contract with Gilmour Space Technologies for an orbital launch. Gilmour aims to launch its first Eris rocket in 2022, which could then represent a milestone or the country's launch history, as the first launch of an Australian spacecraft by an Australian launch company from national soil.

SBAS over Africa: The Agency for Air Navigation Safety in Africa and Madagascar (ASECNA) launched the first SBAS open service over Africa and the Indian Ocean. The service is provided by NIGCOMSAT-1R, operated by the Nigerian government. The system testbed, based on EGNOS1, was financed by the EU and designed by Thales Alenia Space.

Telesat proposes C-band clearing process: The Canadian Ministry of Innovation, Science and Economic Development included in the federal government consultation a proposal from Telesat to expeditiously reallocate satellite services to clear the 3800 MHz C-band spectrum from fixed satellite use to 5G services. The proposal aims to clear 400 MHz of the 500MHz C-band spectrum allocated to Telesat in Canada.

Economy & Business

ICEYE raises $87 million in series C funding round

Finnish SAR start-up ICEYE announced on September 22nd the closing of a series C funding round worth $87 million (€74 million). The round was led by True Ventures and included $30 million from OTB Ventures, which is backed by the European Investment Fund and the European Commission's InnovFin for Equity programme. Overall, the investment brings the funding raised by ICEYE since its foundation in 2014 to $152 million. The funding will be used to accelerate the growth of the constellation, currently comprising five satellites, improve customer service operations around the world and expand operations in the U.S., including manufacturing.

Credit: Iceye

NASA assesses its impact on the national economy

On September 25th, NASA released the "Economic Impact Report" for 2019, an assessment of the Agency's impact on the national economy commissioned to the University of Illinois. The report points to the economic benefits at large generated by NASA in all 50 states, supporting over 300,000 jobs and with more than $64.3 billion revenues during FY2019, $14 billion of which are the result of the Moon to Mars exploration plans and Artemis Program. Representing only "one-half of 1% of the federal budget", NASA activities also generated around $7 billion in federal, state and local taxes. Finally, the study reported that NASA has more than 700 active international agreements in 2019, filed for 85 new patents and overall produced more than 2,000 technological spinoffs since 1976.

Intelsat orders final C-band satellite and four launches

Intelsat announced on September 17th that it has contracted Maxar Technologies to build the last of its seven C-band transition satellites. In total, five satellites will be built by Maxar and two by Northrop Grumman. Furthermore, Intelsat contracted SpaceX and Arianespace to launch all seven satellites across four launches. The launches are scheduled for 2022 and 2023. Intelsat filed its C-band transition plan with the FCC in August, outlining its intention to meet the accelerated clearing deadlines.

OneWeb saga continues…

On September 21st, OneWeb announced it would resume launches under an amended contract with Arianespace. The contract will cover 16 launches rather than the initial 19, starting from December 2020, and each launch will put 34-36 satellites into orbit. When first signed, it was the largest commercial launch contract ever, worth over $1 billion. Furthermore, as OneWeb's restructuring process continues, the bankruptcy court approved $235 million of debtor in possession (DIP) loans for OneWeb to continue its operations. As part of the restructuring, Softbank has been reported to convert $87 million of DIP loans into an equity stake in the company.

Eutelsat renews lease with Sky Italia for €450 million

On September 2nd Eutelsat renewed its multi-year contract to lease capacity to DTH TV provider Sky Italia for approximately €450 million. Further details were not disclosed. Broadcast represents 50% of Eutelsat's revenues and Sky Italia is the largest customer for Eutelsat's Hot Bird broadcast satellite fleet. The renewal guarantees annual revenues for Eutelsat in the medium term.

Intelsat announces acquisition of Gogo for $400 million

On August 31st, Intelsat entered into an agreement to acquire Gogo´s Commercial Aviation division for an amount of $400 million. Intelsat expects to finance the transaction using its existing debtor-in-possession credit facility, as also approved by the relevant U.S. Bankruptcy Court. The acquisition is in line with Intelsat's intention to deliver more cost-effective commercial in-flight connectivity and represents an extension into downstream business. Euroconsult commented that the acquisition is an example of the reorganization of the in-flight connectivity industry following the COVID-19 crisis. According to the consulting firm, IFC service revenues are expected to decrease by 20-30% in 2020.

Space Development Agency secures contracts for military constellation

Credit: SDA

Lockheed Martin and York Space Systems received contracts on 31st August respectively worth $187.5 million and $94 million to develop 10 satellites each for the Space Development Agency. The military communications satellite constellation is the first National Defense Space Architecture tranche, known as Transport Layer Tranche 0, and the satellites will feature optical cross links. Further satellite manufacturers will be contracted every two years to continue to build the constellation. Lockheed Martin has also subcontracted Tyvak, in which they own equity, to build the satellites.

GHGSat raises $30 million in series B funding

Canadian greenhouse gas monitoring start-up GHGSat raised $30 million in a series B round, bringing their total funding to $55 million. The round was led by Investissement Québec, and included public and private organisations, such as OGCI Climate Investments, Space Angels and oilfield services company Schlumberger. The funding will be used to build and launch three satellites and develop an aircraft-based sensor, following the launch of GHGSat's second satellite on September 2nd.

Chinese company Landspace raises $175 million in series C+ funding

Chinese private launch start-up Landspace raised $175 million on September 9th in a series C+ funding round led by Sequoia Capital China. This brings their total funding raised to date to over $335 million. The funding will be used to develop the Zhuque-2 launch vehicle, capable of launching 2000 kg to 500 km SSO, which is planned to launch in June 2021. Landspace's first rocket, Zhuque-1, failed to reach orbit in its only attempt in October 2018. The funding comes less than a month after competitor iSpace raised a similar amount of $173 million.

Northrop Grumman receives $298 million contract to develop AEHF successor

On September 17th, the U.S. Space Force awarded a contract worth $298 million to Northrop Grumman to prototype the space segment for the Evolved Strategic SATCOM (ESS) programme. The ESS programme will support and then succeed the current AEHF satellites built by Lockheed Martin and used by the U.S. military; the final AEHF satellite was launched in March. Northrop Grumman will deliver a preliminary design and ground-based demonstration of the space segment. The satellite will be completed in 2025.

Andøya Space partners with Boeing and RFA

After securing approval and investments from the Norwegian government in June, the Norwegian company Andøya Space is developing a new medium lift launch complex on Andøya island, near its existing suborbital launch site. They announced on September 17th a partnership with Boeing that includes expanding Andøya Space's ability to provide medium launch services to customers in Europe.

Credit: Andøya Space Center

Furthermore, on September 28th the German small launch start-up Rocket Factory Augsburg (RFA) signed a Letter of Intent with Andøya Space for the first launch of its RFA ONE rocket from the Andøya Space Centre in 2022. RFA is aiming to provide an end-to-end satellite launch service with a payload capacity of 200 kg.

QuadSAT raises €2 million in pre-series A funding round

Danish start-up QuadSAT announced September 10th that it has raised €2 million in a pre-series A investment round led by Seraphim Capital. QuadSAT currently uses their own drones and technicians to test satellite antennas, but will use the new funding to develop off the shelf drone-and-software products that satellite and antenna manufacturers can operate themselves; they are aiming for these products to be on the market in March 2021. The funding will also allow QuadSAT to expand its team, which is currently spread between Denmark and Harwell, UK.

NanoAvionics expands to India

NanoAvionics signed an agreement of distribution with Ananth Technologies Ltd (ATL) for products and services in India. The ATL manufacturing facilities will allow NanoAvionics to serve the emerging Indian NewSpace market more effectively, assembling and testing their satellite, including subsystems, at the Ananth's facilities in Hyderabad and Bengaluru. This comes in line with the recent massive revenue growth of over 300% that NanoAvionics has experienced this past year with new contract awards from ESA, Thales Alenia Space and Nasa.

PLD Space raises €7 million

Spanish small launch start-up PLD Space announced on September 15th that it raised €7 million as part of an ongoing series B round. The funding from investor Arcano Partners brings the total raised by the start-up, founded in 2011, to around €27 million. It will be used to launch its Miura 1 suborbital rocket in late 2021 or early 2022. PLD Space has not announced when they expect to close the series B round.

Solar Foods raises €15 million

Finnish start-up Solar Foods raised €15 million led by packaged food producer Fazer Group, bringing their series A fundraising round started in 2019 to the overall amount of €18.5 million. The company has teamed up with ESA BIC Finland to develop a food production concept for space missions, in particular for Mars missions. Solar Foods is developing a protein produced by air-captured CO2 and electricity as primary materials. After the successful investment round, the company plans to open a facility by 2022 for the development and commercialisation of its products.

In other news

UK companies selected for tracking space debris: The UK Space Agency has awarded over £1 million in funding to seven projects which will develop new sensor technology or artificial intelligence to monitor hazardous debris in space. Among the companies, there is D-Orbit UK, Deimos, and Northern Space and Security. UK Space Agency and Ministry of Defence also signed a partnership agreement to jointly work to enhance the UK's space domain awareness.

NASA awards SpaceX the IMAP mission launch contract: a SpaceX Falcon 9 will launch the Interstellar Mapping and Acceleration Probe (IMAP) mission, planned for October 2024. The mission will study the heliosphere from the L-1 Lagrange point. The overall value of the contact is $109.4 million.

Made in Space signs MoU with Momentus: Small satellite propulsion start-up Momentus signed an MoU with Made in Space Europe to collaborate on a robotic spaceflight mission planned for 2022. The spacecraft will use Momentus' Vigoride transfer vehicle and Made in Space's robotic arms, allowing both companies to demonstrate their technology.

Planet to supply imagery to Everbridge: Planet announced a partnership with Everbridge, a U.S. critical event management company. Planet's Earth observation data will be used to help mitigate the impact of disasters for government and corporate customers.

Airbus Ventures opens Tokyo based fund: Airbus Ventures announced in August the launch of Airbus Ventures Fund III and a new office based in Tokyo. The target fund size is not disclosed but investors include the Development Bank of Japan, Mitsubishi UFJ Lease and Guyo General Lease.

GMV UK merges with Nottingham Scientific Ltd.: GMV's UK subsidiary merged with GNSS system provider Nottingham Scientific Ltd. The new venture, comprising around 80 employees, is called GMV NSL and will focus on offering GNSS-based services and solutions for critical markets as part of GMV.

LiveEO raises six figure seed round: Berlin based EO start-up LiveEO raised an undisclosed 'six figure' second seed funding round. Prior to the round, the company raised €2.3 million. LiveEO provides infrastructure monitoring for utilities and energy companies using satellite data.

AXESS Networks receives €36 million financing: European/Latin American satellite telecoms service provider AXESS Networks received €36 million in financing from Spanish development fund COFIDES and debt fund ALANTRA. The funding will be used for further international expansion, including exploring acquisitions.

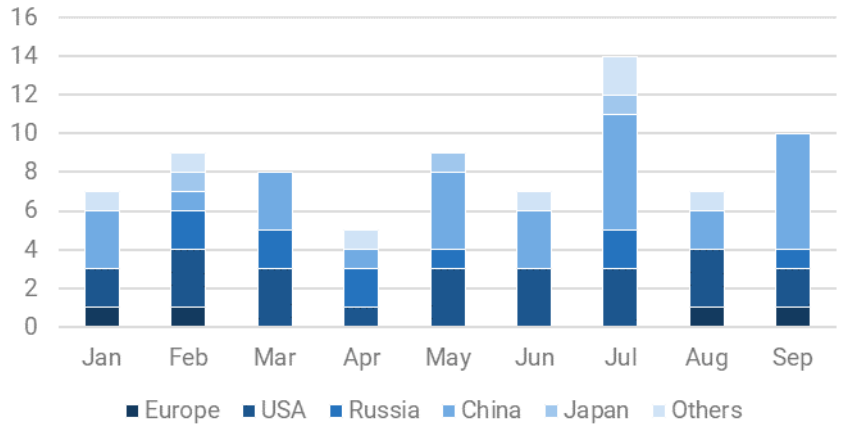
Applied Composites acquires Alliance Spacesystems: U.S. aerospace supplier Applied Composites acquired Alliance Spacesystems, a composite manufacturer for satellites and other aerospace applications, for an undisclosed amount. Applied Composites is owned by private equity firm AE Industrial (AEI) Partners, who are aiming to vertically integrate composites manufacturing to create a 'one-stop shop' for composites products and services.

Launches & Satellites

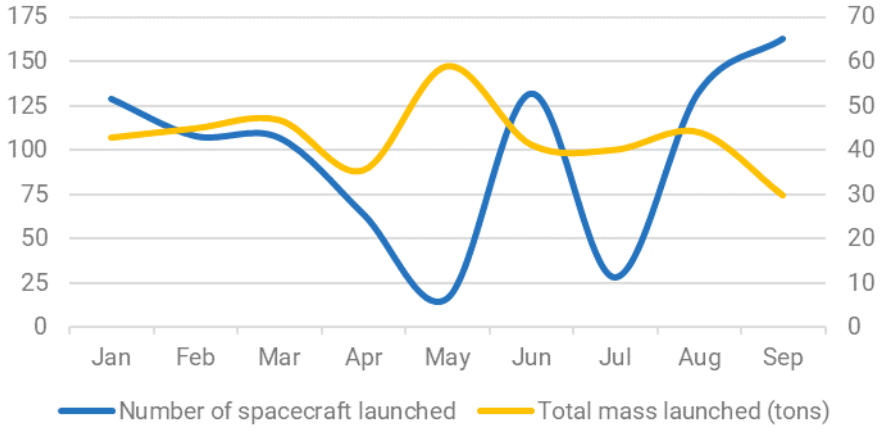
Global space activity statistics

September 2020	Europe	USA	China	Russia	Total
Number of launches	1	2	6	1	10
Number of spacecrafts launched	65	61	15	22	163
Mass launched (in kg)	759	15 600	12 410	1 106	29 875

Launch activity over the year

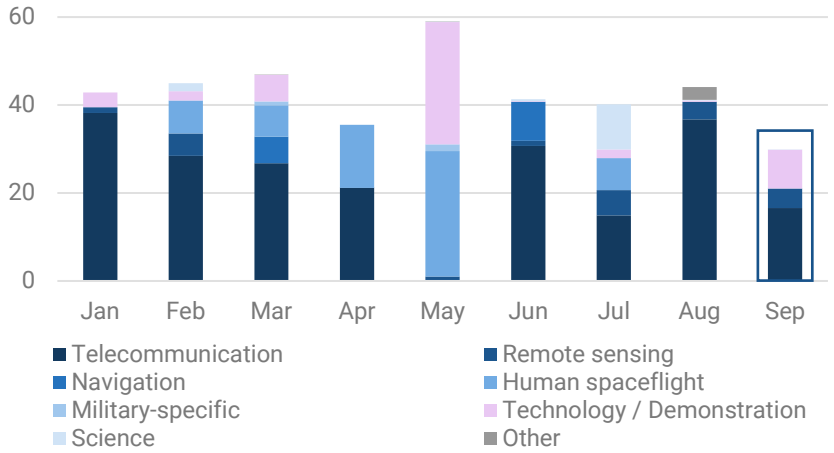


Evolution of the number of launches per launch country



Evolution of launch activity over the year 2020

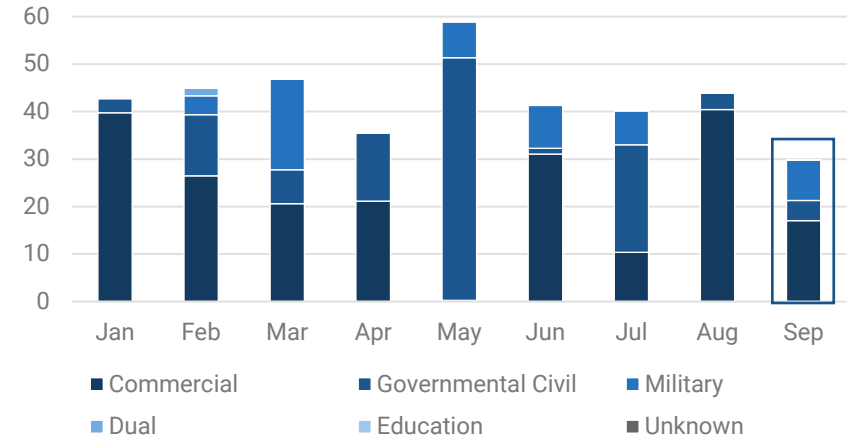
Satellite missions and markets



Evolution of the total mass launched (tons) per mission

September 2020	Telecom	Remote sensing	Tech/Demo	Science
Europe		261	176	10
USA	15 612	186	146	
Russia	840		10	4
China		3 910	8 500	
Others	144	72	4	

Total mass (kg) launched by mission and customer country



Evolution of the total mass launched (tons), per market (Jan.-Sep. 2020)

September 2020	Commercial	Governmental Civil	Military	Education
Europe	277	89		81
USA	15 944			
Russia		854		
China	590	3 320	8 500	
Others	207		10	3

Total mass (kg) launched by market and customer country

Launch Log

Launch date	Launch country	Launcher	Spacecraft name	Main customer	Customer country	Prime manufacturer	Manufacturer country	Mass (kg)	Mission	Market
02/09/2020	France	Vega	AMICal-Sat	CSUG-IPAG	France	SatRevolution SA	Poland	2	Earth Science	Education
			Athena	PointView Tech	USA	Maxar	USA	138	Tech / Demo	Commercial
			DIDO 03	SpacePharma	Switzerland	SpacePharma	Switzerland	4	Biology	Commercial
			ESAIL	exactEarth	Canada	LuxSpace	Luxembourg	112	AIS	Commercial
			Flock-4v (26 satellites)	Planet	USA	Planet	USA	5 (each)	Earth Observation	Commercial
			FSSCat (A & B)	Universidad Politécnica de Cataluña	Spain	Tyvak Nano-Satellite Systems	USA	8 (each)	Earth Observation	Governmental Civil
			GHGSat C1	GHGSat Inc.	Canada	University of Toronto	Canada	15,4	Earth Observation	Commercial
			ION-SCV Lucas	D-Orbit	Italy	D-Orbit	Italy	90	Tech / Demo	Commercial
			Lemur-2 (8 satellites)	Spire	USA	Spire	USA	5 (each)	Earth Observation	Commercial
			NAPA 1	Royal Thai Air Force	Thailand	ISIS	Netherlands	10	Earth Observation	Military
			NEMO-HD	Space-SI	Slovenia	University of Toronto	Canada	65	Earth Observation	Governmental Civil
			NuSat 6	Satellogic SA	Argentina	Satellogic SA	Argentina	43,5	Earth Observation	Commercial
			OSM-1 CICERO	Orbital Solutions Monaco	Monaco	Tyvak Nano-Satellite Systems	USA	10	Earth Observation	Commercial
			PICASSO	Belgian Institute for Space Aeronomy	Belgium	ÅAC Clyde Space	Sweden	4	Earth Science	Governmental Civil
			SIMBA	Royal Meteorological Institute	Belgium	ISIS	Netherlands	4	Tech / Demo	Governmental Civil
			SpaceBEE (12 satellites)	Swarm Technologies	USA	Swarm Technologies	USA	1 (each)	Telecommunication	Commercial
			TARS (Kepler 3)	Kepler Communications	Canada	ÅAC Clyde Space	Sweden	4	Tech / Demo	Commercial
			TRISAT	University of Maribor	Slovenia	Skylabs	Slovenia	5	Tech / Demo	Education
			TTÜ100	Tallinn University of Technology	Estonia	Tallinn University of Technology	Estonia	1	Tech / Demo	Education
			Tyvak 0171	Tyvak Nano-Satellite Systems	USA	Tyvak Nano-Satellite Systems	USA	8	Tech / Demo	Commercial
			UPMSat 2	Universidad Politécnica de Madrid	Spain	Universidad Politécnica de Madrid	Spain	45	Tech / Demo	Education

03/09/2020	USA	Falcon-9 v1.2 (Block 5)	Starlink 11 (60 satellites)	SpaceX	USA	SpaceX	USA	260 (each)	Telecommunication	Commercial
04/09/2020	China	CZ-2F/T	Chongfu Shiyong Shiyan Hangtian Qi	People's Liberation Army	China	CAST	China	8500,00	Tech / Demo	Military
07/09/2020	China	CZ-4B	Gaofen 11-02	CNSA	China	CAST	China	805,00	Earth Observation	Governmental Civil
12/09/2020	*China*	*Kuaizhou-1A*	*Jilin-1 Gaofen-02C*	*Chang Guang Satellite Technology*	*China*	*Chang Guang Satellite Technology*	*China*	*230,00*	*Earth Observation*	*Commercial*
12/09/2020	*USA*	*Astra Rocket-3*	*Astra Rocket-3.1*	*Astra Space*	*USA*	*Astra Space*	*USA*	*0,01*	*Tech / Demo*	*Commercial*
15/09/2020	China	CZ-11H	Jilin-1 Gaofen-03B (6 satellites)	Chang Guang Satellite Technology	China	Chang Guang Satellite Technology	China	40 (each)	Earth Observation	Commercial
			Jilin-1 Gaofen-03C-01	Chang Guang Satellite Technology	China	Chang Guang Satellite Technology	China	40	Earth Observation	Commercial
			Jilin-1 Gaofen-03C-02	Bilibili	China	Chang Guang Satellite Technology	China	40	Earth Observation	Commercial
			Jilin-1 Gaofen-03C-03	CCTV	China	Chang Guang Satellite Technology	China	40	Earth Observation	Commercial
21/09/2020	China	CZ-4B	HaiYang 2C	National Satellite Ocean Application Service	China	CAST	China	1575	Earth Observation	Governmental Civil
27/09/2020	China	CZ-4B	HJ (2A & 2B)	CRESDA	China	DFH Satellite Co.	China	470 (each)	Earth Observation	Governmental Civil
28/09/2020	Russia	Soyuz-2-1b Fregat-M	Dekart	Moscow State University	Russia	SINP	Russia	4	Tech / Demo	Governmental Civil
			Gonets-M (17, 18 & 19)	Roscosmos	Russia	ISS Reshetnev	Russia	280 (each)	Telecommunication	Governmental Civil
			ICEYE (X6 & X7)	ICEYE	Finland	ICEYE	Finland	85 (each)	Earth Observation	Commercial
			Kepler 4	UTIAS/SFL	Canada	Kepler Communications	Canada	16	Telecommunication	Commercial
			Kepler 5	Kepler Communications	Canada	Kepler Communications	Canada	16	Telecommunication	Commercial
			LacunaSat 3	Lacuna Space	United Kingdom	NanoAvionics	Lithuania	3	Tech / Demo	Commercial
			Lemur-2 (4 satellites)	Spire	USA	Spire	USA	4 (each)	Earth Observation	Commercial
			MeznSat	KUST	United Arab Emirates	AURAK	United Arab Emirates	3,00	Earth Observation	Education
			NetSat (4 satellites)	Centre for Telematics	Germany	Centre for Telematics	Germany	4 (each)	Tech / Demo	Education
			Norbi	Novosibirsk State University	Russia	Novosibirsk State University	Russia	6	Tech / Demo	Governmental Civil
			SALSAT	TU Berlin	Germany	TU Berlin	Germany	12	Tech / Demo	Education
			Yarilo-1 & -2	Bauman University	Russia	Bauman University	Russia	2 (each)	Space Science	Governmental Civil

Launch Highlights

Return flight to Vega

Credit: Arianespace

On September 2nd, a Vega rocket made its first launch since the accident that it suffered in July 2019. The launch, initially planned for March, was postponed due to the COVID-19 pandemic and the subsequent closure of the Guiana Space Centre. The rocket launched 53 satellites, the first rideshare launch with such a large number of satellites for Arianespace. The launch was the Proof of Concept of the Small Spacecraft Mission Service (SSMS), which aims at offering routine services tailored to small satellites using the ESA-developed launch vehicles. One of the payloads launched was the ION-SCV Lucas, developed by D-Orbit, a demonstration spacecraft for the delivery of small spacecraft in precise orbital slots. Once released from the Vega rocket, the ION-SCV moved to deploy individually 12 Flock satellites from Planet following the customer's specifications. Moreover, the Vega rocket also launched Athena, an experimental communications satellite testing technologies for a potential future constellation. Athena's customer is PointView Tech, a subsidiary of Facebook.

Chinese first reusable spacecraft

Credit: Jonathan McDowell/Twitter

On September 4th, China launched a reusable experiment spacecraft with a Long March-2F carrier rocket from the Jiuquan Satellite Launch Centre. While much remains secretive about the exact nature of the mission, the spacecraft may be a spaceplane similar to the U.S. X-37B (with a horizontal landing), as such projects were presented by Chinese organisations (CASC and CASIC) in the past years. Moreover, the spacecraft used an orbital path close to the one employed by the X-37B. The spacecraft returned to Earth after a two-day period of in-orbit operations and tests of reusable technologies. Two orbits before returning to Earth, it released an object into space, which has not been clearly identified yet. However, according to a Russian radio-astronomer, this may be a satellite orbiting only 50 km from an ultra-secret American payload, thus raising concerns about the objectives of the mission.

Kepler Communications deploys the first elements of its constellation

Credit: Kepler Communications

At the end of the month, a Russia Soyuz rocket launched 22 satellites in orbit. Among them were the first satellites of Kepler's GEN1 constellation, after the launch of three prototypes, which was especially visible through an increase in size. The satellites were built for the first time in Kepler's own factory, thus making the company both an operator and a manufacturer of spacecraft. Their design will be reused in the constellation of 140 satellites that Kepler is expected to deploy.

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