



**ESPI**

European Space Policy Institute

# ESPI Insights

Space Sector Watch



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## 2021 AND NEW EUROPEAN SPACE AMBITIONS



Dear Friends of ESPI,

Following the 13<sup>th</sup> European Space Conference in Brussels, important actions were taken to accelerate European investment and competitiveness in the global space sector. **Commissioner Breton's** speech during the opening of the conference provoked a significant reaction within the European space community due to the topics addressed and pace engaged.

With the EU securing the €13.2B envelope from the MFF 2021-2027 for the new EU Space Programme, reassurances were offered regarding the role that space would play for the next 7 years in Europe. This is complemented by the €1B **Cassini space entrepreneurship investment fund** created together with the EIB/EIF targeting space start-ups, but most importantly the strong contributions provided by member states to ESA.

Following these strong financial commitments from all European actors, key steps towards a more cohesive approach to European space policy were put forward. The agreement on the new EU space programme **in December 2020** follows an integrated approach to Galileo/EGNOS, Copernicus and SSA/GOVSATCOM. This should contribute to Europe's capacity to address the multiple dimensions/components of an increasingly wide space programme in a coherent and flexible manner.

The first significant highlight during the conference was the Commission's will to develop a third European constellation. The goal of this constellation project is three-fold: Offer space-based connectivity to support the EU digital agenda and bridge the digital divide, support Europe's autonomy for strategic communication capacities and to provide solutions for secure telecommunications. With a significant emphasis on the ambitious pace of development and with its multi-orbital and multi-sectorial approach, there is clear understanding that this will not be a "business as usual" project.

Secondly, a significant push towards the topic of strategic autonomy was engaged by Commissioner Breton. This topic was focused into three primary axes: That of European launchers and the need to support them through the creation of a European launcher alliance, of STM leadership and its requirement for Europe to have an autonomous access to space and finally, projecting the EU into the quantum era by developing a secured broadband constellation with quantum encryption.

So where to for ESA and the EU? With encroaching responsibilities and varying requirements, a clear division of responsibilities will have to be assessed and shared. Furthermore, all the announcements uphold a strong industrial policy implication and with the European space industry facing major challenges through an increased global competitive pressure and a decrease in GEO Satcom orders, such projects are a great opportunity to weather economic downturns.

Another question is that of PPP arrangements. Such arrangements have historically proven to be complex to negotiate with private investors and the precedent that is the Galileo Joint Undertaking should be kept in mind. In addition, the distribution of industrial activities throughout Europe will have to be discussed amongst member states. Yet, before even approaching such industrial questions, fundamental unknowns remain regarding the economic viability and technical relevance of such a constellation. With the first phase of the study coming to term in April 2021, many of these questions should hopefully be answered by then.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'JJ Tortora', written over a white background.

*Jean-Jacques Tortora*

*Director of ESPI*



## POLICY & PROGRAMMES

### Josef Aschbacher elected new ESA DG

The ESA Council ratified the appointment of Josef Aschbacher from Austria as the **new Director-General (DG) of ESA** on December 17<sup>th</sup>. ESA released the vacancy notice for the DG position in June 2020, and the three finalists (Hauglie-Hanssen, Duque, and Josef Aschbacher) were communicated to the ESA Member States on November 24<sup>th</sup>. Josef Aschbacher received the majority support from the ESA Member States on November 26<sup>th</sup>. He will lead the agency for a period of four years starting March. He succeeds DG Jan Wörner, who **decided to accelerate the official transition** initially planned in June to February due to the familiarity of Aschbacher with ESA affairs.



*Josef Aschbacher, new ESA DG*

Josef Aschbacher started his career at ESRIN in 1989 and has been a key contributor to the creation of Earth Observation programmes such as Copernicus. He currently works at ESA, where he is the Director of Earth Observation Programmes, and Head of ESRIN.

As the new head of ESA, Aschbacher will be seeking **to strengthen the relations with the European Union** and complete the ongoing negotiations on the new Financial Framework Partnership Agreement (FFPA) between the European Commission and ESA. Under his mandate, he also aims to enhance the efficiency of the agency, minimize the cost of ESA operations, as well as promote the growth of the European space industry.

### BREXIT deal and future UK participation in EU space programmes

The agreement reached by the UK and the European Union on December 24<sup>th</sup> regarding BREXIT gave more visibility on the principles that will govern the **future participation of the UK** in EU space programmes. Although the UK will no longer participate in Galileo and EGNOS, the country is expected to maintain its participation in the Copernicus programme as third country over the 2021-2027 period pending the approval of the EU Space Regulation. The main question in this regard will be the extent of the UK's rights as a third country considering its financial contributions for the programme. With regards to the EU Space Surveillance and Tracking (EUSST) programme, the UK will continue to receive services but will no longer be permitted to contribute to the programme. Its continued presence and participation in ESA programmes remain unchanged.

### French space sector to receive €500 million investment boost

As a part of president Macron's recovery plan for the industry, the French space sector will receive **€500 million in investments** that will be raised partly through Bpifrance and through the industrial sector. CNES will be the main operator through which the funds will be adjudicated, and the investments will be used to support the competitiveness of the sector in France as the country aims to remain a global leader in the field, especially with regards to the manufacture of satellites and launchers. President Macron also reaffirmed that €15 million will be committed to support the **development of the Prometheus** rocket engine to this end.



*Credit: ArianeGroup*



## Multiple new U.S. Space Policies released

### ► The U.S. issues a new National Space Policy

On December 9<sup>th</sup>, the outgoing Trump administration issued an updated version of the **National Space Policy** and published a new **Memorandum on The National Space Policy**. The National Space Policy **reiterates the principles** and goals set in 2018 by the Space Policy Directive-2 (SPD-2) (Streamlining Regulations on Commercial Use of Space) and SPD-3 (National Space Traffic Management Policy). Regarding SPD-3, it maintains that the Department of Commerce should assume responsibilities for SSA, superseding the Department of Defence. The document also introduces a renewed framework for its Space Nuclear Power and Propulsion (SNPP) strategy, which is complementary to the newly published SPD-6. The document also highlights the goal to increase international cooperation, continue science and exploration activities, and reinforce national security.

### ► The White House releases the Space Policy Directive 6 and the National Strategy for Planetary Protection

The U.S. published the **SPD-6, named “National Strategy for Space Nuclear Power and Propulsion (SNPP)”** on December 16<sup>th</sup>. The new policy comes after a year of preparation and builds on the framework set in the 2020 National Space Policy, as well as on the **Presidential memorandum** on launch of Spacecraft Containing Space Nuclear Systems. SPD-6 introduces key principles pertaining to the production of suitable fuel on new lunar and planetary surfaces, addresses nuclear propulsion and sets as a future objective the development of fission power systems on the Moon by the end of the decade. The new document also underlines the U.S.’s intention to retain its global leadership in this regard as it aims to increase efficiency for future missions to Mars and beyond.



*Credit: White House archives*

As complementary to the **new National Space Policy**, and the call for an increased coordination between the Office of Science and Technology Policy, NASA and other agencies in the development of new guidelines, the White House published the new **National Strategy for Planetary Protection** on December 30<sup>th</sup>. The bill aims to cement a general strategy to ensure appropriate protection from harmful biological contamination on planetary bodies as well as any form of backward contamination.

### ► U.S. passes law to protect Lunar Heritage Sites

A **new bill** named “One Small Step to Protect Human Heritage in Space” has been signed into law by President Donald Trump on December 31<sup>st</sup>. The document, whose aim is to complement the 2011 “**NASA Recommendations** to Space-Faring Entities: How to Protect and Preserve the Historic and Scientific Value of U.S. Government Lunar Artifacts”, applies exclusively to NASA’s partnership agreements and highlights the current administrations interest in protecting Apollo sites as missions on the moon increase.

### ► The Trump administration publishes Space Policy Directive 7

The U.S. administration has also released the memorandum on **Space Policy Directive 7 (SPD-7)** on the 15<sup>th</sup> of January. The policy memorandum’s main scope focuses on the U.S.’s future actions with regards to their space-based positioning, navigation, and timing programmes (PNT), and underlines the countries’ dependency on specific type of derived applications such as GPS. With this document, the administration aims to provide an implementation framework to guide future programmes, with the objective of reducing its dependence on GPS. **SPD-7 is in keeping** with past policies issued by the Trump administration, and officially supersedes a **2004 presidential directive** on the same topic.



## Updates on Artemis Accords: new MoU with Brazil

On December 22<sup>nd</sup>, Brazil's Minister of Science, technology and innovation **signed a MoU with NASA**, establishing Brazil's interest in becoming the first Latin American country to join the Artemis Accords. For its participation, Brazil is set to potentially contribute with a lunar rover as part of the programme, in conjunction with other science experiments.

NASA has also **formalized its partnership** agreement with Japan pertaining to the latter's participation in the construction of the Lunar Gateway within the framework of the Artemis programme. Following the accord, Japan will officially be making contributions to the station's International Habitation's module (I-HAB) and Habitation and Logistics Outpost (HALO).

## Jim Bridenstine bids farewell to NASA as the agency awaits new administrator nomination

Jim Bridenstine officially **stepped down from his role** as NASA administrator on January 20<sup>th</sup> 2021 as the agency anticipates the newly elected Biden administration to nominate his successor. His agency's administration was marked by renewed U.S. ambitions in the space sector, notably within the scope of the Artemis programme as well as progress on key public-private partnerships. There is currently no timeline for the nomination of Bridenstine successor following President Biden's nomination of Steve Jurczyk as acting NASA administrator.



*Credit: NASA*

## Phil Evans becomes new EUMETSAT DG

On January 1<sup>st</sup>, Phil Evans **succeed Alain Ratier** as new Director General of EUMETSAT. Phil Evans was previously the Director of Physics Programmes for the Institute of Physics, taking responsibilities on education, and science and innovation programmes. He also worked at the UK Met Office, covering various positions over the past 32 years.

## NASA and FAA sign MoU on Commercial Space Activities

On January 4<sup>th</sup>, **NASA and the FAA signed an MoU** following up on last year's successful launch of the agency's SpaceX Crew-1 mission. The mission was the first manned-mission conducted on American soil to ever receive a license from the FCC. The main objective of the agreement is to strengthen the existing framework for future **commercial launches and re-entries** operated on American soil involving both government and non-government passengers. **The framework** of the agreement includes cargo and crewed missions as well as suborbital flights which are part of NASA's collaboration with the FAA on through the Commercial Crew Program's Suborbital Crew (SubC) office.

## Congress approves Omnibus spending bill for Fiscal Year 2021

On December 21<sup>st</sup>, Congress agreed to provide NASA with a **budget of \$23.3 billion** for the FY2021 through this year's Omnibus spending bill. The budget represents a compromise between both the House of Representatives and the Senate. The assigned sum still falls short of the \$25.2 billion requested by NASA: many programmes like the SLS received at least requested funding, while Congress provided **roughly a quarter** of the administration's request for HLS programme raising questions on the schedule for the planned 2024 manned mission to the Moon.



## Hayabusa-2 capsule returns Ryugu asteroid sample to Earth

The asteroid sample return capsule **landed on December 5<sup>th</sup>** and the sample has been brought back to be studied by an initial analysis team in Japan. The Hayabusa-2 asteroid explorer was initially launched in 2014 and spent over a year orbiting the Ryugu asteroid. During that period, it also deposited two landers on the surface of the asteroid and performed two touchdowns. The capsule landed in Australia's Woomera prohibited area as part of the country's operations partnership with JAXA.

### In other news

**The EU commits €82.5 million to reinforce cooperation on space technologies with African Union (AU):** As part of the Pan-African Programme started in 2014, the investment aims to strengthen the capacity of the AU by use of space and digital technologies through data sharing.

**Space Force terminates Launch Service Agreements with Northrop Grumman and Blue Origin:** The termination of the contract comes as part of the plan to discontinue the LSAs signed in 2018 with companies that subsequently did not receive a NSSL contract. ULA is the only company of the three to have received such contract and will continue to collaborate with the Space Force until the end of the six-year term.

**Virgin Galactic and Masten Space systems awarded NASA contracts:** Within the framework of its Flight Opportunities programme, the agency has awarded two contracts for the delivery of Flight and Integration services. These new agreements are part of the government's goal to obtain additional payload capacity through private commercial partners.

**Dawn Aerospace receives license for sub-orbital flight in New Zealand:** The New Zealand Civil Aviation authority licensed the flight under civil aviation law, enabling the company to fly its Dawn Mk-II Aurora without the need of a restricted airspace. The first flights are expected for 2021.

**U.S. Geological Survey awards \$300 million contract to KBR:** As part of a programme for the USGS's Earth Resources Observation and Science centre, the company will contribute to the centre's activities by providing analysis and technical overview for missions monitoring variations in the Earth's landscape.

**NASA and UNOOSA sign landmark MoU on science and technology:** The agreement aims at integrating NASA's Artemis programme with UNOOSA's Access to Space 4 All initiative to provide organisations access to data, and increase benefits coming from space, especially in developing countries. The collaboration provides for the design of joint capacity-building programmes to this end.

**Japan signs MoU with U.S. Space Force:** The agreement between Japan's National Office of Space Policies and the Space Force concerns the integration of two American Space Domain awareness optical sensors on Japan's Quasi Zenith Satellite System. The two satellites are expected to be launched in 2023 and 2024 from the Tateshima Space Centre.



## INDUSTRY & INNOVATION

### Thales and Airbus awarded €1.47 billion in contracts for second generation Galileo satellites

On January 20<sup>th</sup>, the European Commission **awarded two contracts** to Thales Alenia Space and Airbus Defence and Space for the development of 12 new satellites that will compose the second generation of Europe's Galileo programme. The European Commission decided to award the contracts on the basis of the availability of the technology necessary to build the satellites in-house in order to be able to respect the timeline requested by European Commissioner Thierry Breton for the projected 2024 launch.



*Credit: ESA*

### Thales Alenia Space wins contract to build the European Lunar Gateway module

On January 7<sup>th</sup>, ESA awarded Thales Alenia Space a contract worth **€296.5 million** for the construction of the Europe's projected module on the Lunar Gateway (ESPRIT). The module is expected to be delivered in 2026. Europe's contribution to the Lunar Gateway will be divided between the Halo Lunar Communication System (HLCS), that will be used to provide communication services between the moon and the Gateway, and the ESPRIT Refuelling Module (ERM), to be used to make way for a projected reusable lunar lander. The module will primarily be assembled by Thales Alenia Space in France, with contributions coming from the company's teams in Italy and the UK.

### Independent investigation confirms Vega VV17 launch failure findings

On December 18<sup>th</sup> ESA and Arianespace **confirmed the results** of an independent investigation conducted for determining the cause Vega's VV17 launch failure, stating that misconnected cables part of the rocket's AVUM upper stage were the source of the mistake that provoked the mission failure. The Independent Inquiry Committee that conducted the investigation presented a **list of recommendations** in preparation for the Vega's next launch, which is expected to be in March of 2021.

### Thales Alenia Space and AVIO receive contract to build European LEO reusable space plane

A €167 million contract was awarded by ESA to Thales Alenia Space and Avio for the purpose of **manufacturing the Space Rider**, Europe's first reusable space plane. An additional contract worth €8 million was awarded to Telespazio and Altec for the ground segment and operations component of the mission. The Space Rider is expected to have its first official launch in 2023 and will carry out missions lasting up to two months in order to launch and transport payloads in LEO. It will be operated from Italy's Fucino Space Centre with Italy and Romania being the two **main contributors** to the project.

### Airbus receives €190 million contract for Copernicus ROSE-L mission

Thales Alenia Space has awarded Airbus a **contract worth €190 million** for the manufacture of the planar space radar antenna that will be fitted on the ROSE-L mission expected to launch in 2028. In the same month, Thales Alenia Space in Italy was named **prime contractor** by ESA and received a €482 million contract for the mission. Airbus will lead a team of nine companies for the manufacture of the radar and is currently involved in the provision of critical equipment in all six of the next-generation Copernicus Environment and EO missions.



### The FCC's C-band auction grosses \$81 billion in phase one

On December 8<sup>th</sup>, the FCC kicked off an spectrum auction for 5,684 licences in the C-Band spectrum that resulted in all licenses being won by bidders in what became the **highest grossing auction** in the organisation's history. Although the name of the winning bidders has not been disclosed by the agency, this represents an important step in the U.S.'s pursuit of 5G leadership and is seen as an endorsement of the FCC's plans to make the C-band an essential part of the rollout of 5G technologies and services. The decision to hold a public auction came following a vote held within the FCC, after a market-based approach was alternatively proposed by the satellite operators who are part of the C-Band Alliance. The **assignment phase** for the specific frequencies is expected to start on February 8<sup>th</sup>.

### Blue origin sets new milestones for future human spaceflights

On January 14<sup>th</sup>, Blue Origin demonstrated the capabilities of its New Shepard programme by successfully completing a test for the **NS-14 mission**, thus attesting to the reliability of the newly fitted and improved RSS First Step crew capsule. Although the timeline remains uncertain, the mission is expected to represent a preparation for future human space flights. The successful launch comes one month following an **agreement with NASA**, in which the agency awarded a one of its Launch Services II contracts (NLSII) to Blue Origin for its heavy lift reusable launch vehicle, named New Glenn Rocket. Blue Origin also leads NASA's Human Landing System National Team who submitted its Option A proposal to the Agency in December, in view of a 2024 landing.

### SES moves forward in \$1.8 billion claim against INTELSAT

On January 6<sup>th</sup>, SES requested the U.S. bankruptcy court of the Eastern District of Virginia to issue a letter of request to a Canadian court to coerce Telesat to testify in its \$1.8 billion claim against Intelsat. The U.S. court is currently conducting the Chapter 11 bankruptcy proceedings filed by Intelsat, whose **alleged violation** of the three companies' C-Band alliance agreement (CBA) represents the root of SES's claim. The CBA provided for an equal split between the two companies on the proceeds of a C-band agreement with the FCC, who ultimately decided to move forward through a public auction of the freed-up C-band spectrum. The bankruptcy court has adjourned the hearing to June 2021.



*Credit: Blue Origin*

### ThrustMe completes first on-orbit test for its iodine propulsion system

French start-up ThrustMe **completed two on-orbit tests** of its iodine propulsion system in December and January, managing to change the altitude of Spacety's Beihangkongshi-1 Cubesat by 700 meters. This test is the first ever on-orbit demonstration of iodine propulsion systems and confirms its potential as a viable alternative for assisted de-orbiting and controlled collision avoidance. The French company also aims to streamline the production process for satellite manufacturers, as the system comes completely prefilled, and expects to have at least two more demonstrations in 2021 and 2022 for a national space mission and a GOMspace GOMx-5 mission respectively.



*Credit: EUTELSAT*



### Missile Defence Agency awards Northrop Grumman and L3Harris contracts worth \$276 million

The U.S. Missile Defence Agency **selected designs** from Northrop Grumman and L3Harris for the manufacture of hypersonic and ballistic missile sensor satellites, awarding two contracts worth \$155 million and \$121 million respectively. The missiles will be part of the DoD's projected **Hypersonic and Ballistic Tracking Space Sensor programme**, which aims to complement the work of sensors in geosynchronous orbits through the placement of thousands of satellites in LEO. Both contractors are expected to deliver working prototypes by 2023.

### Intelsat orders two OneSat satellites from Airbus

On December 31<sup>st</sup>, Intelsat signed an agreement for the **delivery of two Airbus OneSat** satellites in 2023. The deal is part of Intelsat's projected software-defined network following the company's **acquisition** of Gogo's commercial aviation division. The company awaited approval from creditors and the bankruptcy court to approve the transaction after filing for Chapter 11 in May last year. Airbus's Software Defined Satellites have been a major success for the company with six of them currently in production for three major operators.

### NASA Missions demonstrate functionalities of new green propellants

NASA's Green Propellant Infusion Mission (GPIM) has successfully performed an in-space demonstration of **new type of green propellant** developed by the Air Force Research Laboratory and now named Advanced Spacecraft Energetic Non-Toxic (ASCENT).

In addition, NASA is also set to demonstrate the functionality of a newly developed type of **water-based spacecraft propulsion** system as a part of its Pathfinder Technology Demonstrator (PTD) missions this month. The first mission is set to take off from Cape Canaveral on a SpaceX Falcon 9 Rocket at the end of January and will test the performance of the new CubeSat technology, using water as a fuel for the propulsion system in a series of manoeuvres in-orbit.

### Thales Alenia Space and Telespazio sign COSMO-Skymed second generation contracts

The Italian Ministry of Defence and the Italian Space Agency signed **contracts worth about €200 million** with Thales Alenia Space and Telespazio for the delivery of two additional satellite for the COSMO-Skymed second generation constellation (CSG). Thales Alenia Space will continue leading the consortium for the development of the four CSG satellites and is responsible for their design and development, while Telespazio is expected to continue development of the CSG Ground Segment. The two new satellites will have the **same specifications** as the first pair and are expected to be launched on board a Vega-C rockets in 2024 and 2025.



### In other news

**Rolls-Royce and UK Space Agency sign contract on study for nuclear propulsion:** The UK Space Agency awarded Rolls-Royce a contract to conduct a study on the future of nuclear propulsion for future space exploration to Mars and beyond. The contract aims to give the UK an autonomous capability in this area building on its strong experience with nuclear networks and supply chains.

**UK government invests £7 million to fund innovative space companies:** 21 UK organizations received funding from the UK government to expand positive spill over effects coming from the space sector to tackle questions such as climate change and the digital divide. Every grant ranges from £170,000 and £1.4 million and originates from the UK's new National Space Innovation Programme (NSIP).

**OHB selects Avio as subcontractor for ESA planetary defence system:** The Hera project is carried out in collaboration with NASA's Double Asteroid Redirect Test (DART) with the objective of attempting an asteroid exploration and trajectory modification mission. OHB System AH leads a consortium of European companies for the mission, which is expected to launch in 2024.

**China Great Wall Industry Corporation and APT Satellite sign contract:** The two companies have concluded an agreement on the in-orbit transfer of the APSTAR-6E Satellite set to be launched in 2023 aboard a Long Marc 2C vehicle. The satellite will transmit signals through the Ku-band to provide broadband telecommunications services in the Asia Pacific Region.

**ESA collaborates with the UK on its National Space Propulsion facility:** The agency has contributed to the facility through technical oversight, as well as a €4.5 million investment from ESA's optional General Support Technology programme for the design and construction phases.

**Final Sunshield test completed for James Webb Space Telescope:** NASA and prime contractor Northrop Grumman have completed the final test for the Sunshield. The telescope is expected to be launched in 2021 from the Kourou launch site following final system evaluations.

**CNES and EUMETSAT sign agreement concerning Nadir altimeter data:** The agreement regulates Eumetsat's access to the data collected by CNES's Poseidon-3C and DORIS altimeters included in the Nadir payload on the SWOT satellite. The data will be stored in Toulouse, at the SWOT mission centre following the launch of the satellite in 2022.

**Airbus Defence and Space and Thales Alenia Space sign contract for THRISNA cryocoolers:** Thales Alenia Space signed a contract for the delivery of two cryocoolers to be equipped on Airbus Defence and Space's thermal infrared instrument for the TRISHNA satellite. The satellite is part of a joint collaboration between CNES and ISRO and it aims to enable a better management of the Earth's water resources.

**China's space station reaches new milestone:** The Tianhe module is the expected to serve as the station's core module of the station and is scheduled to launch by the end of 2021 with its testing having reached the final stages. The Chinese station is projected to be entirely assembled by the end of 2022.

**Kymeta's next generation u8 antenna is now commercially available for defense:** After securing a \$85 million investment in August, Kymeta has launched the successor to the u7. The new antenna is designed for land mobility needs and covers the entirety of the Ku-band. In addition to its use in defense, the service will be available to first responder and government customers such as the U.S. Forest Service.

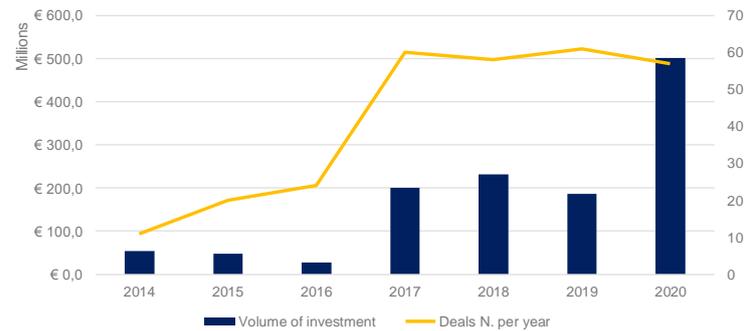


## ECONOMY & BUSINESS

### New record in European private space investment (ESPI Space Venture Europe)

ESPI Space Venture Europe provides every year an in-depth report of the state of European private investments in the space sector.

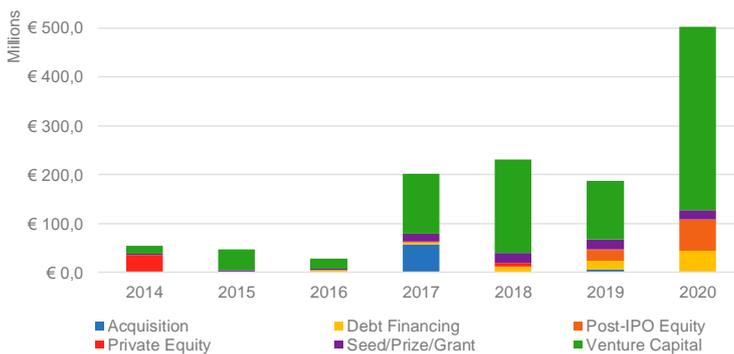
2020 found itself to be a groundbreaking year in terms of volume of investment. Despite the worldwide impacts of covid-19, a total of €502M were invested in over 60 deals. This represents a 168% increase compare to 2019.



Volume and deals of investment in Europe (source ESPI).

In terms of types of investment, Venture-Capital remained the primary source of investments for startups representing 75% of all investments for 2020, VC investments were then followed by Post-IPO Equity and Debt financing representing 13% and 8% of the total volume of investments respectively.

Space Venture Europe 2020 will be released Q2 2021 with additional detail and specifics behind European New-Space.



Volume per type of investment in Europe (source ESPI).

### The Space Foundation's fourth quarter Space Report 2020 highlights

In January, the Space Foundation published their **Space Report** for the fourth quarter of 2020 giving an overview of the main activities and trends of the year in the space sector. In spite of the macroeconomic difficulties related to the global pandemic, the Space Foundation reports a generally thriving condition for the space industry, with the announcement of over 69 acquisitions and buy-outs during the year totalling around \$11.7 billion of disclosed activity of which \$4.4 billion were attributable to Aerojet Rocketdyne's acquisition by Lockheed Martin. Likewise, the yearly activity in equity financing remained dynamic with around \$5.7 billion worth of investments, with \$1.3 billion coming in the fourth-quarter due to the continued evolution of the launch market where companies like Relativity Space, Isar Aerospace and Orbex raised over \$600 million.



Credit : The Space Foundation



## New space investment initiatives from the European Union

### ► The European Commission launches the CASSINI space entrepreneurship initiative

The European Commission's DG DEFIS, in partnership with the European Investment Bank and the European Investment Fund, launched the Competitive Space Start-ups for Innovation (CASSINI) initiative, which aims to establish a **€1 billion fund** to boost European start-ups in the space sector. In line with the EU Strategy for SMEs, the initiative intends to make the EU an anchor customer for European space start-ups as well as an essential promoter of their fast growth through a dedicated acceleration programme.

### ► European space sector receives an additional €300 million in investment

The European Investment Fund and the European Commission planned **an investment worth €300 million** to back the European space sector and support continued growth and innovation. The investment will be made through the first-ever equity pilot officially backed by the EU named the InnovFin Space. Part of the initial investment will be made through the financing of European funds that specialise in space technologies and start-ups, as is the case with Luxembourg based Orbital Ventures and the Italian investor Primo Space, who are the first funds to have been selected. The InnovFin space equity pilot was a part of Horizon 2020's InnovFin pilot programmes, and it is expected to benefit over 50 space companies across the continent.

### ► The European Investment Bank commits €200 million loan for development of KONNECT VHTS

The European Investment Bank (EIB) and Eutelsat signed an **eight-year financing agreement** worth €200 million on January 13<sup>th</sup>. The agreement aims to provide the company with the necessary funds in order to proceed with the procurement and launch phases of the KONNECT VHTS satellites, which will carry out next-generation broadband services in Europe and surrounding areas. The funding is in continuity with the EU's recent commitment to reinforce their support for the European space sector through diverse investment measures. The KONNECT VHTS is also expected to provide broadband services to the most remote areas on the continent, in line with the EU's **Connectivity for a European Gigabit Society** policy.

### ► The European Council makes first equity investment in 42 start-ups

On January 6<sup>th</sup>, the European Commission carried out its first ever **direct equity investment in highly innovative European start-ups** through the European Innovation Council (EIC) Fund. With a total value of €178 million, the investment will grant each company financing in between €500,000 and €15 million and **is part of a series of EU initiatives** to plug the funding gap on the continent and encourage complementary private investment. Some companies that had been selected in the EIC accelerator in 2019 have also qualified for the new fund, as is the case for Dutch space start-up Hiber. Through this investment, the European Commission is expected to gain an ownership stake ranging between 10% and 25% in each company.

## Spire Global receives €20 million funding from the European Investment Bank (EIB)

U.S. start-up Spire Global received a **\$20 million venture debt deal** from the EIB to fund their projected weather tracking satellite constellation. The funding will go through the company's office in **Luxembourg** and is part of an ongoing effort by the EIB to provide financial support to space companies. The investment is backed by the European Fund for Strategic Investment (EFSI). The company currently has an active constellation of 100 nanosatellites.



### OneWeb streamlines constellation and secures additional \$400 million funding

On January 15<sup>th</sup>, **OneWeb secured an additional \$400 million in funding** from Japanese group SoftBank and Maryland-based Hughes Network Systems, with the first investing \$350 million and the latter adding the remaining \$50 million. The funding comes practically a year after the Chapter 11 bankruptcy filing and their joint-acquisition by the UK government and Bharti Global. This brings the company's total funding to \$1,4 billion, with executive chairman Sunil Bharti Mittal stating OneWeb would likely **need an additional \$1 billion** to complete its first constellation of 648 satellites by the end of 2022. Following the successful launch of 36 new satellites on December 18<sup>th</sup> OneWeb now has 110 satellites in orbit, with the company streamlining its **final constellation** size to around 7000 satellites. The company has also recently concluded a three year deal worth **\$250 million** with Hughes Network System for the manufacture of Gateways and User Terminal Modules.



*Credit: OneWeb*

### Four companies sign lunar samples purchases contract with NASA

Lunar Outpost, Masten Space Systems, ispace Europe and ispace Japan signed **four contracts worth a total of \$25,001** to collect lunar regolith samples on behalf of NASA following the agency's published solicitation in September. Collection is to start in 2022 and an official property transfer for the regolith will be made in-situ on the moon, with plans for retrieval to be determined later. This partnership is part of NASA's plan to determine appropriate landing sites in the framework of the Artemis programme.

### Isar Aerospace raises €75 million

The German start-up Isar Aerospace secured **€75 million in Series B** financing led by Swiss venture capital firm Lakestar on December 9<sup>th</sup>. The company plans to use the funding to continue the design and manufacture of their first micro-satellite launcher, which it expected to be operational in early 2022. Their launcher, will transport payloads to low-Earth orbit and is **projected to launch** from the Guiana Space Centre following a recently concluded agreement with CNES.

### Primomiglio Sgr launches Primo Space VC Fund

Italian VC firm **Primomiglio SGR created a new venture capital fund** centred on space start-ups working in both upstream and downstream segments. The fund has started operations, first closing at €58 million with investments coming from actors such as the European Investment Fund and CDP Venture Capital SGR. Primo space subsequently closed a VC funding round worth €1.5 million with Italian start-up **Aiko Space** and led a €5 million Series A round in **Leaf Space** in conjunction with Whysol Investments.

### Orbex secures new €19.7 million funding

On December 10<sup>th</sup>, UK micro launcher company **Orbex secured about €19.7 million** in a funding round led by BGF Ventures. The company aims to use the funds to maintain a rapid pace as they prepare for their first launches, which are expected to come in 2022 from the Sutherland spaceport. The funding round also included a €2.5 million grant coming from the Horizon 2020 programme, making Orbex the first UK space start-up to receive funding from the programme.



### In other news

**Viasat acquires RigNet** for a total value of approx. \$222 million: The acquisition, seeks to provide added capabilities to Viasat's current mobility businesses as the company aims to expand towards new global services.

**Momentus announces delay of first Vigoride launch and planned merger:** The first launch of the company's last-mile small-satellite delivery vehicle Vigoride-1 has been postponed to later in 2021 due to regulatory delays by the FCC. The chairman underlined that it would not affect its planned revenues and that the \$1.2 billion valued merger with Stable Road Acquisition Corporation (SRAC) will go through pending regulatory approvals.

**NASA awards \$16.7 million in contract to three small launch vehicle companies:** Astra Space, Relativity Space and Firefly Aerospace won contracts worth \$16.7 million in total through NASA's Venture Class Launch Services 2 programme. The contract received by Astra Space is worth \$3.9 million, while Firefly Aerospace won a \$9.8 million contract and Relativity Space has not disclosed its financial terms.

**Kratos receives \$11 million contract for satellite programme:** The development contract was received by the company's Microwave Electronic Product Division and pertains to the development of the next generation satellite programme.

**The Space and Missile Systems Centre orders two more GPS 3F satellite from Lockheed Martin:** The contract has a total value of \$511 million. The new agreement brings the total amount of the centre's ordered GPS 3F satellites to four, as the original contract foresees the possible acquisition of up to 22 satellites costing \$7.2 billion.

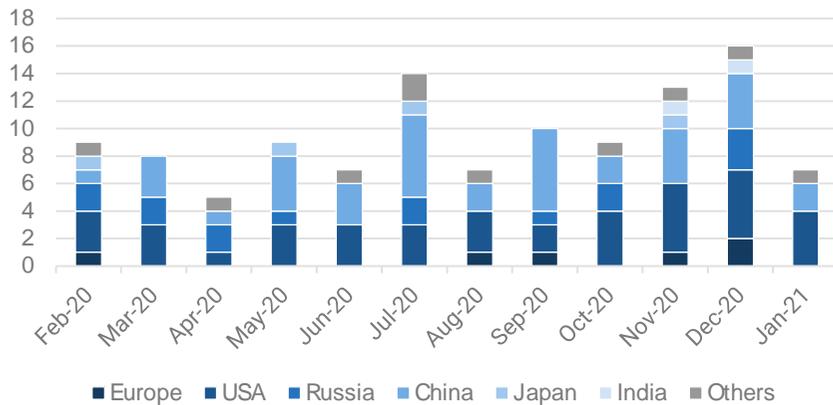


# LAUNCHES & SATELLITES

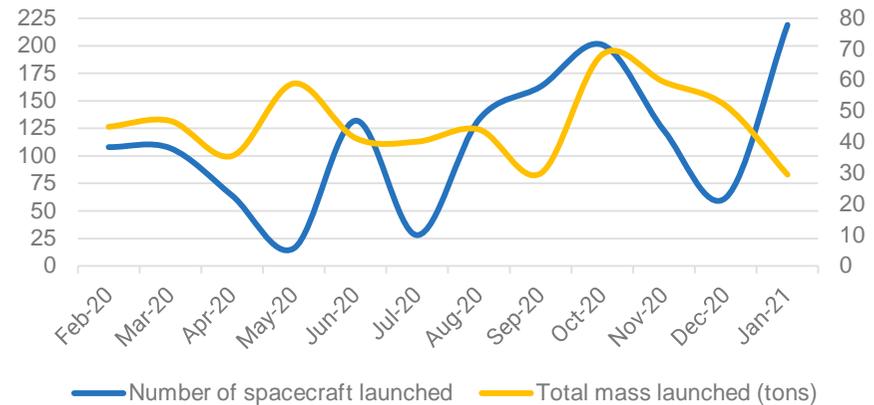
## Global space activity statistics

| December 2020-January 2021     | Europe | USA    | Russia | China  | India | Others | Total         |
|--------------------------------|--------|--------|--------|--------|-------|--------|---------------|
| Number of launches             | 2      | 9      | 3      | 6      | 1     | 2      | <b>23</b>     |
| Number of spacecrafts launched | 2      | 221    | 41     | 14     | 1     | 2      | <b>281</b>    |
| Mass launched (in kg)          | 4752   | 53 419 | 8179   | 13 310 | 1410  | 200    | <b>81 270</b> |

## Launch activity over the year



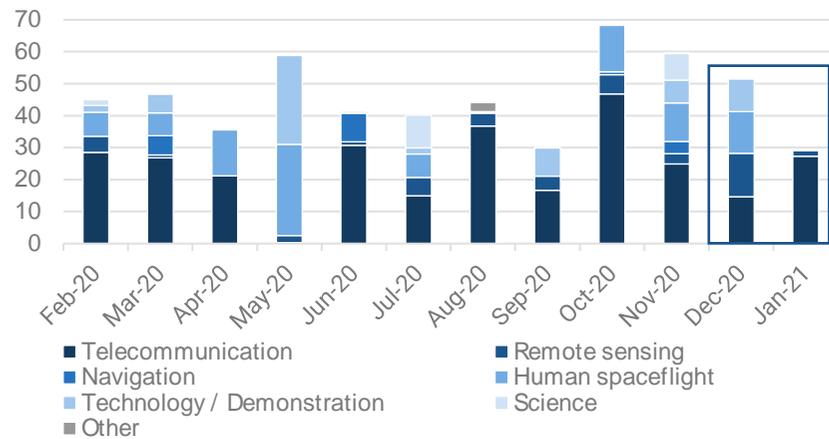
Evolution of the number of launches per launch country



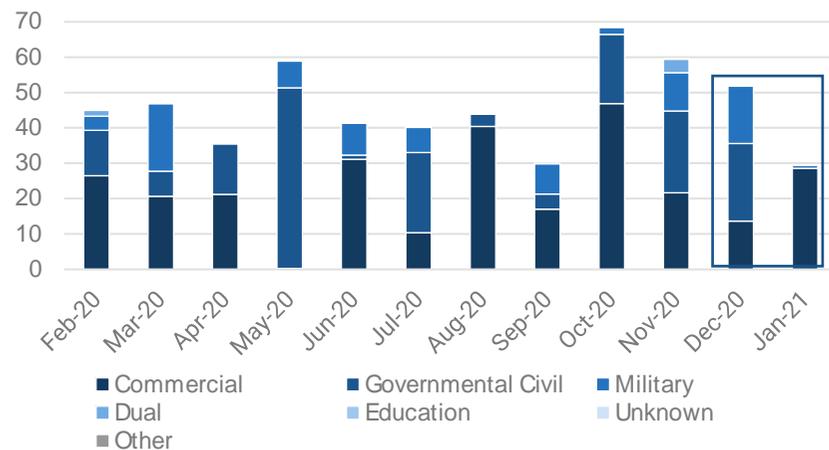
Evolution of launch activity over the year 2020-2021



Satellite missions and markets



Evolution of the total mass launched (tons) per mission (Feb. 2020-Jan. 2021)



Evolution of the total mass launched (tons), per market (Feb. 2020-Jan. 2021)

| Dec 2020-Jan 2021 | Telecom | Remote sensing | Human Spaceflight | Science | Tech/Demo | Other |
|-------------------|---------|----------------|-------------------|---------|-----------|-------|
| Europe            | 5321    | 3817           |                   |         | 57        | 100   |
| USA               | 25 236  | 5747           | 13 090            | 6       | 5044      | 151   |
| Russia            | 840     |                |                   |         | 2047      |       |
| China             | 5450    | 4525           |                   | 320     | 3000      | 5     |
| Japan             |         | 100            |                   |         | 150       |       |
| India             | 1410    |                |                   |         |           |       |
| Others            | 3630    | 1215           |                   | 4       | 5         |       |

Total mass (kg) launched by mission and customer country

| Dec 2020-Jan 2021 | Commercial | Governmental Civil | Military | Education | Other |
|-------------------|------------|--------------------|----------|-----------|-------|
| Europe            | 5726       | 5                  | 3562     | 2         |       |
| USA               | 27 031     | 12 040             | 10 200   | 1.5       | 1.5   |
| Russia            |            | 2882               | 5        |           |       |
| China             | 5450       | 5725               | 2125     |           |       |
| Japan             | 250        |                    |          |           |       |
| India             |            | 1410               |          |           |       |
| Others            | 3643       | 16                 | 1195     |           |       |

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             |
|-------------|----------------|-------------------------|------------------------|---|----------------------|--|----------------------|--------------------|------------------------------|--------------------|
| 02/12/2020  | France         | Soyuz-ST-A Fregat-M     | Falcon Eye 2           | UAE Armed Forces                              | United Arab Emirates | Airbus   | France               | 1190               | Earth Observation            | Military           |
| 03/12/2020  | Russia         | Soyuz-2-1b Fregat       | ERA-1 / Kosmos 2548    | Ministry of Defense of the Russian Federation | Russia               | Central Scientific Research Institute of Chemistry and Mechanics | Russia               | 5                  | Tech / Demo                  | Military           |
|             |                |                         | Gonets-M (20, 21 & 22) | Roscosmos                                     | Russia               | ISS Reshetnev  | Russia               | 280 (each)         | Telecommunication            | Governmental Civil |
| 06/12/2020  | USA            | Falcon-9 v1.2 (Block 5) | Bishop                 | Nanoracks                                     | USA                  | Nanoracks  | USA                  | 1090               | Space Station Infrastructure | Commercial         |
|             |                |                         | Dragon CRS-21          | NASA  | USA                  | SpaceX   | USA                  | 12000              | Cargo Transfer               | Governmental Civil |
| 06/12/2020  | China          | CZ-3B/G5                | Gaofen 14              | CNSA  | China                | CAST   | China                | 2400               | Earth Observation            | Governmental Civil |
| 09/12/2020  | China          | CZ-11                   | GECAM (A & B)          | CAS   | China                | CAS  | China                | 150 (each)         | Astronomy                    | Governmental Civil |
| 10/12/2020  | USA            | Delta-4H (upg.)         | Orion 10 / USA 311     | NRO   | USA                  | Northrop Grumman   | USA                  | 5200               | Signal Intelligence          | Military           |
| 13/12/2020  | USA            | Falcon-9 v1.2 (Block 5) | SXM 7                  | SiriusXM                                      | USA                  | Maxar  | USA                  | 7000               | Telecommunication            | Commercial         |
| 14/12/2020  | Russia         | Angara-A5 Briz-M        | IPM 2                  | Khrunichev                                    | Russia               | Khrunichev   | Russia               | 2042               | Tech / Demo                  | Governmental Civil |
| 15/12/2020  | USA            | Astra Rocket-3          | Astra Rocket-3.2       | Astra Space                                   | USA                  | Astra Space  | USA                  | 0,01 (rocket test) | Tech / Demo                  | Commercial         |
| 15/12/2020  | New Zealand    | Electron KS             | StriX-α                | Synspective                                   | Japan                | Synspective  | Japan                | 150                | Tech / Demo                  | Commercial         |
| 17/12/2020  | India          | PSLV-XL                 | CMS 01 / GSat 12R      | Insat   | India                | ISRO   | India                | 1410               | Telecommunication            | Governmental Civil |
| 18/12/2020  | Russia         | Soyuz-2-1b Fregat       | OneWeb (36 satellites) | OneWeb Ltd.                                   | United Kingdom       | OneWeb Satellites  | France               | 147 (each)         | Telecommunication            | Commercial         |
| 19/12/2020  | USA            | Falcon-9 v1.2 (Block 5) | USA 312 & 313          | NRO   | USA                  | Unknown (USA)  | USA                  | 2500 (each)        | Tech / Demo                  | Military           |
| 22/12/2020  | China          | CZ-8                    | ET-SMART-RSS           | ESSTI   | Ethiopia             | Smart Satellite Technology                                       | China                | 10                 | Earth Observation            | Governmental Civil |
|             |                |                         | Haisi 1                | CETC  | China                | Spacety Co.  | China                | 185                | Earth Observation            | Military           |
|             |                |                         | Tianqi 8               | Guodian Gaoke                                 | China                | Guodian Gaoke  | China                | 50                 | Telecommunication            | Commercial         |
|             |                |                         | XJY 7                  | CNSA  | China                | CAST   | China                | 3000               | Tech / Demo                  | Governmental Civil |
|             |                |                         | Yuanguang              | Hubei University of Technology                | China                | Spacety Co.  | China                | 20                 | Space Science                | Governmental Civil |



## Launches & Satellites

|            |             |                         |                             |   |             |   |             |             |                     |                    |
|------------|-------------|-------------------------|-----------------------------|---|-------------|---|-------------|-------------|---------------------|--------------------|
| 28/12/2020 | China       | CZ-4C                   | Weina Jishu Shiyan          | Shanghai Engineering Center for Microsatellites | China       | Shanghai Engineering Center for Microsatellites | China       | 5           | Other               | Governmental Civil |
|            |             |                         | Yaogan 33R                  | People's Liberation Army DGA                    | China       | SAST  | China       | 1040        | Earth Observation   | Military           |
| 29/12/2020 | France      | Soyuz-ST-A Fregat-M     | CSO 2                       |   | France      | Airbus  | France      | 3562        | Earth Observation   | Military           |
| 08/01/2021 | USA         | Falcon-9 v1.2 (Block 5) | Türksat 5A                  | Turksat   | Turkey      | Airbus  | France      | 3500        | Telecommunication   | Commercial         |
| 17/01/2021 | USA         | LauncherOne             | CACTUS 1                    | Capitol Technology University                   | USA         | Capitol Technology University                   | USA         | 2,8         | Tech / Demo         | Governmental Civil |
|            |             |                         | CAPE 03                     | University of Louisiana                         | USA         | University of Louisiana                         | USA         | 1,3         | Tech / Demo         | Education          |
|            |             |                         | ExoCube 2                   | Cal Poly  | USA         | Cal Poly  | USA         | 3,2         | Earth Science       | Governmental Civil |
|            |             |                         | Fox-1E                      | AMSAT-NA  | USA         | AMSAT-NA  | USA         | 1,3         | Radio Amateur       | Amateur            |
|            |             |                         | MiTEE 1                     | University of Michigan                          | USA         | University of Michigan                          | USA         | 3,4         | Tech / Demo         | Governmental Civil |
|            |             |                         | PICS (1 & 2)                | Brigham Young University                        | USA         | Brigham Young University                        | USA         | 1,35 (each) | Tech / Demo         | Governmental Civil |
|            |             |                         | PolarCube                   | University of Colorado Boulder                  | USA         | University of Colorado Boulder                  | USA         | 3,9         | Tech / Demo         | Governmental Civil |
|            |             |                         | Q-PACE                      | University of Central Florida                   | USA         | University of Central Florida                   | USA         | 2,76        | Space Science       | Governmental Civil |
|            |             |                         | TechEdSat 7                 | San Jose State University                       | USA         | San Jose State University                       | USA         | 2,5         | Tech / Demo         | Governmental Civil |
| 19/01/2021 | China       | CZ-3B/G3                | Tiantong-1 03               | China Satcom                                    | China       | CAST  | China       | 5400        | Telecommunication   | Commercial         |
| 20/01/2021 | USA         | Falcon-9 v1.2 (Block 5) | Starlink (60 satellites)    | SpaceX  | USA         | SpaceX  | USA         | 260 (each)  | Telecommunication   | Commercial         |
| 20/01/2021 | New Zealand | Electron KS             | GMS-T                       | Thales Alenia Space                             | France      | OHB   | Germany     | 50          | Tech / Demo         | Commercial         |
| 24/01/2021 | USA         | Falcon-9 v1.2 (Block 5) | ARCE-1 (A, B & C)           | University of South Florida                     | USA         | University of South Florida                     | USA         | 1 (each)    | Tech / Demo         | Governmental Civil |
|            |             |                         | ASELSAT                     | Aselsan   | Turkey      | Istanbul Technical University                   | Turkey      | 5           | Tech / Demo         | Military           |
|            |             |                         | Astrocast 1. (5 satellites) | Astrocast                                       | Switzerland | Astrocast                                       | Switzerland | 5 (each)    | Telecommunication   | Commercial         |
|            |             |                         | Capella (3 & 4)             | Capella Space                                   | USA         | Capella Space                                   | USA         | 100 (each)  | Earth Observation   | Commercial         |
|            |             |                         | Charlie                     | Aurora Insight                                  | USA         | NanoAvionics                                    | Lithuania   | 8           | Tech / Demo         | Commercial         |
|            |             |                         | Flock-4s (48 satellites)    | Planet  | USA         | Planet  | USA         | 5 (each)    | Earth Observation   | Commercial         |
|            |             |                         | GHGSat-C2                   | GHGSat Inc.                                     | Canada      | UTIAS/SFL                                       | Canada      | 15          | Earth Observation   | Commercial         |
|            |             |                         | Hawk 2 (A, B & C)           | HawkEye 360                                     | USA         | UTIAS/SFL                                       | Canada      | 25 (each)   | Signal Intelligence | Commercial         |
|            |             |                         | Hiber 4                     | Hiber   | Netherlands | ISIS  | Netherlands | 4           | Telecommunication   | Commercial         |



|            |       |       |                          |  |         |                                  |             |            |                                 |                    |
|------------|-------|-------|--------------------------|--|---------|----------------------------------|-------------|------------|---------------------------------|--------------------|
|            |       |       | ICEYE (X8, X9 & X10)     | ICEYE  | Finland | ICEYE                            | Finland     | 85 (each)  | Earth Observation               | Commercial         |
|            |       |       | IDEASSat                 | National Central University                        | Taiwan  | National Central University      | Taiwan      | 4          | Earth Science                   | Governmental Civil |
|            |       |       | ION-SCV 2                | D-Orbit  | Italy   | D-Orbit                          | Italy       | 100        | Other                           | Commercial         |
|            |       |       | Kepler (8 satellites)    | Kepler Communications                              | Canada  | Kepler Communications            | Canada      | 16 (each)  | Telecommunication               | Commercial         |
|            |       |       | Lemur-2 (8 satellites)   | Spire  | USA     | Spire                            | USA         | 4 (each)   | Earth Observation               | Commercial         |
|            |       |       | PIXL 1                   | DLR  | Germany | GOMSpace                         | Denmark     | 4          | Tech / Demo                     | Governmental Civil |
|            |       |       | Prometheus-2 10          | Los Alamos National Lab.                           | USA     | Los Alamos National Lab.         | USA         | 2          | Tech / Demo                     | Governmental Civil |
|            |       |       | PTD-1                    | NASA   | USA     | Tyvak Nano-Satellite Systems     | USA         | 11         | Tech / Demo                     | Governmental Civil |
|            |       |       | QPS-SAR 2                | iQPS   | Japan   | iQPS                             | Japan       | 100        | Earth Observation               | Commercial         |
|            |       |       | Sherpa-FX                | Spaceflight Inc.                                   | USA     | Spaceflight Inc.                 | USA         | 150        | Other                           | Commercial         |
|            |       |       | SOMP 2b                  | TU Dresden   | Germany | TU Dresden                       | Germany     | 2          | Tech / Demo                     | Education          |
|            |       |       | SpaceBEE (36 satellites) | Swarm Technologies                                 | USA     | Swarm Technologies               | USA         | 1 (each)   | Telecommunication               | Commercial         |
|            |       |       | Starlink (10 satellites) | SpaceX   | USA     | SpaceX                           | USA         | 260 (each) | Telecommunication               | Commercial         |
|            |       |       | UVSQ-SAT                 | Université de Versailles Saint-Quentin-en-Yvelines | France  | ISIS                             | Netherlands | 1          | Tech / Demo                     | Governmental Civil |
|            |       |       | V-R3x (1, 2 & 3)         | NASA   | USA     | NASA                             | USA         | 1 (each)   | Tech / Demo                     | Governmental Civil |
|            |       |       | YUSAT 1                  | National Taiwan Ocean University                   | Taiwan  | National Taiwan Ocean University | Taiwan      | 2          | Automatic Identification System | Governmental Civil |
| 29/01/2021 | China | CZ-4C | Yaogan 31-02 (A, B & C)  | People's Liberation Army                           | China   | CAST                             | China       | 300 (each) | Signal intelligence             | Military           |



### Launch Highlights

#### Long March 8 flies for the first time

On December 22<sup>nd</sup>, 2020, China launched for the first time its **Long March 8**. With the Long March 5, 6 and 7, it is part of the new generation of Long March launchers, which uses non-toxic propellants. According to CALT, the designer of the launcher, this rocket allows to fill a gap in China's capabilities to launch payloads around 3-4.5 tons in SSO. Among the spacecraft launched during the maiden launch was the first commercial SAR satellite of China, which also carries an iodine electric propulsion system designed by ThrustMe, a French startup. Though the booster used for the launch was thrown away, Chinese authorities ultimately aim at making Long March 8 a reusable launcher.



*Credit: CASC*

#### OneWeb resumes launches

Benefitting from its takeover by the UK Government and Bharti Global after its bankruptcy in March 2020, OneWeb **resumed** the launch of its constellation of satellites aiming at providing broadband to everyone on Earth. On December 18<sup>th</sup>, 2020, a Soyuz rocket launched 36 spacecraft, allowing the company's constellation to reach 110 spacecraft in orbit. With its number of satellites growing, the company plans to launch its regional commercial service in 2021 and its global service in 2022. OneWeb's launch also marked the first purely commercial mission from the Vostochny Cosmodrome, located in the Russian Far East, as all previous missions from this spaceport were for the Russian federal space programme. Moreover, it was the only launch from Vostochny in 2020.

#### Virgin Orbit succeeds for the first time to put a payload in orbit

After a first failed try in May 2020, Virgin Orbit managed to put its **LauncherOne** rocket in orbit for the first time on January 17<sup>th</sup>, 2021. Contrary to other small launch companies, Virgin Orbit offers an air-launch system, meaning that the rocket launches from under a flying plane and not vertically from a spaceport. With this success, LauncherOne is the first liquid fuelled, horizontally launched rocket, to reach orbit. During the mission, Virgin Orbit put in orbit ten spacecraft built by universities and launched in the frame of NASA's Educational Launch of Nanosatellites (ELaNa) programme.



*Credit: Virgin Orbit/Greg Robinson*

#### SpaceX breaks a record in number of satellites launched

On January 24<sup>th</sup>, 2021, SpaceX launched its first dedicated rideshare mission, called **Transporter-1**. The company launched 143 satellites on a single Falcon 9, making it the mission with the most satellites ever launched. The launch carried out **spacecraft** for all the "top" startups of the New Space movement (Planet, Spire, Capella Space, Iceye, Kepler...) as well as two spacetugs and 10 Starlink satellites, the first spacecraft of the constellation to operate in polar orbit and equipped with optical links. This high number of small satellites created concerns in the space traffic management community due to the difficulty of tracking spacecraft of this size. Finally, it is to note that three more satellites were planned but did not launch: Momentus announced that it was postponing the launch of its Vigoride due to delays at the administrative level, and two DARPA satellites, which were supposed to test technologies for the Blackjack project, were damaged during their handling in SpaceX facilities.

## ABOUT ESPI



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