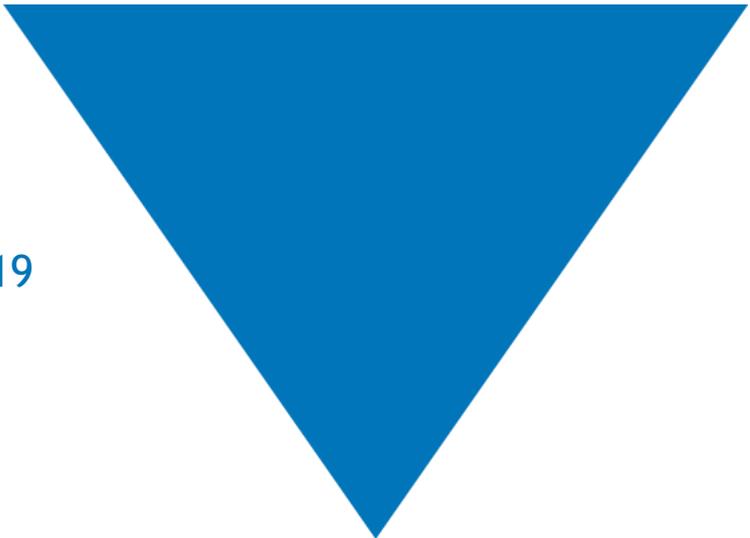


# ESPI Insights

The Global Space Activity Monitor



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# SPACE POLICY AND PROGRAMMES

## FOCUS

### Decisive year for U.S. Space Force: the state of play

The signature by President Donald Trump of the [Space Directive-4 \(SPD-4\)](#) for the creation of a U.S. Space Force as a sixth branch of the U.S. Military on the 19<sup>th</sup> of February 2019 marks a major milestone in a complex, multi-layered institutional process. Should this initiative come to fruition based on the initial intents - “[...] to safeguard American dominance in space”, this will mean an eventual transfer of all existing military space-related assets and capabilities of other offices into a new space-dedicated branch (“[Department of the Space Force](#)”).

During the transition period, the U.S. Space Force will be placed under the authority of the U.S. Air Force. The scope of such an endeavor implies a reconfiguration involving major U.S. space and defense actors (notably the Department of Defense, U.S. Air Force, space-related agencies and private stakeholders), combined with scrutiny from all branches of government. Furthermore, SPD-4 re-establishes the U.S. Space Command (USSPACECOM) to lead space warfighting with forces provided by the U.S. Space Force and other U.S. Armed Forces, effectively moving space operations from a support function to a fully operational role.

The signing of SPD-4 represents for the Presidency the most cogent political action towards the effective creation of the U.S. Space Force: it is now the responsibility of Congress and space actors to discuss and shape the architecture of this future military branch.

### Aims and Scope of the SPD-4

SPD-4 is inscribed within a broader context of the Trump administration to make the U.S. Armed Forces adapt to a changing military space landscape, while achieving space dominance and control. Although no mention of a Space Force was made before the [2019 National Defense Authorization Act](#), initial signals of internal intensification of military space applications within the Department of Defense (DoD) could be found in the NDAA 2018, for instance regarding the reorganization of the [Space Rapid Capabilities Office](#) (SpRCO - part of the U.S. Air Force). In August 2018, a few short days prior to the signing of NDAA 2019, the [DoD detailed the potential internal procedures](#) (including staffing) for an eventual creation of a new space-dedicated branch - or at least, how to rationalize space operations across DoD branches.



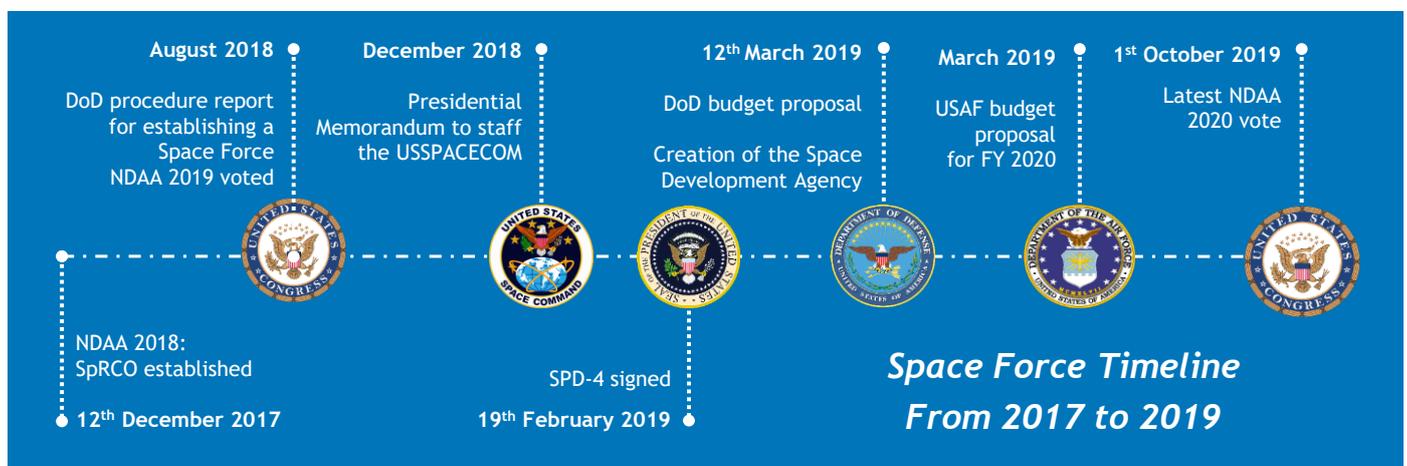
## Reactivation of USSPACECOM

In December 2018, a [presidential memorandum](#) formally relaunched the U.S. Space Command as a new Unified Combatant Command, which takes over space-related responsibilities previously assigned to the U.S. Strategic Command. The effective establishment of USSPACECOM was confirmed in the NDAA 2019 (\$83.8 million), and later, on the 26<sup>th</sup> of March 2019, President Trump nominated General John W. Raymond (U.S. Air Force) as the [head of USSPACECOM](#). Gen Raymond gave an opening speech at the 35<sup>th</sup> Space Symposium in Colorado Springs in April, reaffirming the crucial necessity of “[space superiority](#)”. At this stage, the exact scope and definitive role of USSPACECOM within the U.S. Space Force (in terms of jurisdiction and staffing) depends on provisions contained in NDAA 2020 regarding the other potential institutions which could serve as the “building blocks” of a Department of a Space Force.

## The Space Development Agency (SDA)

The overall political climate and the high complexity of the reforms warrants a step-by-step process in order to properly address the transfer and convergence towards a unified U.S. Space Force. The DoD adopted a progressive approach by setting up on a [Space Development Agency \(SDA\)](#) on the 12<sup>th</sup> of March, under the supervision of Undersecretary of Defense for Research and Engineering Michael Griffin. This new Agency is to be headed by [Fred Kennedy](#), former director of DARPA’s tactical technology office. The mission of the SDA is to “define and monitor the DoD future threat-driven space architecture and will accelerate the development and fielding of new military space capabilities”. Furthermore, the SDA “will be responsible for overall programmatic policy development and execution for next-generation military space capabilities”, with a clear intent to achieve “the DoD space vision and reduce overlap and inefficiency”.

The DoD requested for the SDA in its [budget proposal](#) to Congress for FY2020 \$149.8 million, along with the staffing of around 100 staff for the new agency. According to the Undersecretary Griffin, the [first task of the SDA](#) will be to develop a “proliferated LEO sensor and communications transport layer”: a constellation of low-cost, LEO satellites to be used as a stepping stone for further potential military setups. As the debate around the scope of the SDA unfolded, Shanahan declared that the [National Reconnaissance Office](#) could be part of the Space Force: an illustration of the “streamlined and integrated” ambitions that are at stake in the coming congressional proceedings. The question of the location of the SDA remains open for debate at this stage: representatives from [New Mexico](#) reached out to the Presidency to establish the Agency in their home state.



## DoD and U.S. Air Force proposals

DoD proposals were formalized on the 1<sup>st</sup> of March through a [legislative proposal](#) detailing bureaucratic and legal provisions for the effective establishment of a Space Force within its organization: this proposal will be examined and eventually amended by Congress over the course of the year. In parallel, Patrick Shanahan, the Deputy Defense Secretary, at the time and Acting Secretary of Defense since January 2019, put forward the need for the DoD to intensify already [existing space capacities](#) in order to avoid redundancy and leverage mature commercial space efforts in October 2018. As of March 2019, both the Trump administration and the DoD seem keen on [deploying assets in space](#): \$235 million are requested for the Fiscal Year 2020 for research of defensive satellites to be put in orbit by 2023. In parallel, the U.S. Air Force [requested an increase](#) of \$2 billion for space activities for the Fiscal Year 2020, to be added to the current \$10.3 billion in funds for the development and procurement of space technologies.

## Next critical sequence: negotiations towards NDAA 2020

On top of the critical NDAA 2020 vote (1<sup>st</sup> October 2019 at the latest), which will determine the viability of the U.S. Space Force transition timeline set by the DoD (2020 to 2024), key appointments made by the Presidency are under review by the Senate. Notably, the appointment of Chris Scolese, former director of NASA's Goddard Space Flight Center - as the new director of the National Reconnaissance Office (NRO - handling space-related operations for the US Intelligence Community) on the 7<sup>th</sup> of February.

As the reality of a Space Force takes shape, some actors within the military community vocalized potential strategic postures to adopt, notably the idea of "[space deterrence](#)", with the possibility of live testing. The Space Symposium offered indeed a stage for the ongoing DoD "space proposal" to Congress, with the notable contention from Air Force Secretary Heather Wilson, who pointed out that the "one size fits all" approach of the SDA proposed by Shanahan - privileging small satellites - could be "[disastrous](#)". Within the same week, the [United States Senate Committee on Armed Services](#) took place, allowing the different "sides" of the [debate on the SDA](#) to unfold (mainly, whether it is redundant with already existing structures or if it can deliver low-cost procurement solutions). The National Defense Authorization Bill for FY 2020 will be considered this summer (starting July 2019). Congressional debates should be completed by the 1<sup>st</sup> of October.

In May, the [House Defense Appropriations Subcommittee](#) issued a version of the Bill which declined the proposed \$72 million from the DoD to establish the Space Force headquarters, instead providing \$15 million to "study and refine plans for the potential establishment of a Space Force". Finally, the subcommittee clearly states in the Bill that "nothing in this provision shall be construed to authorize the establishment of a Space Force" and that the budget for the NRO could not be directed towards a Space Force. (Title II, 8).

Additional information on the European posture on space defense issues are available at [ESPI webpage](#).



*What is a Policy Directive?*

- A Presidential order, revocable at discretion.
- Does not require congressional approval.
- Usually issued for internal, administrative matters.

*United States Space Command (USSPACECOM)*



- A Unified Combatant Command.
- Created in 1985.
- Disbanded in 2002 and reactivated in 2018 .
- Provides joint command of all space activities of all branches of the US armed forces.



*Air Force Space Command (AFSPC)*

- Supports U.S. military with space operations
- Currently the **primary space force of the U.S. armed forces**.
- Under SPD-4, it could gradually be integrated in USSPACECOM.

*What is the NDAA?*



- Formal name of the annual budget of the U.S. Department of Defense.
- Debated from February to 1<sup>st</sup> October of each year.
- FY2019 voted in August 2018, named in honour of the late Senator from Arizona John S. McCain.

## EUROPE

11<sup>TH</sup> European Space Policy Conference

Late in January, the 11<sup>th</sup> European Space Policy Conference took place in Brussels, on the theme “Space for Europe, European Space in the World”. During this two days event, major European space stakeholders and policy makers presented and exchanged their views and positions on key strategic, technological and financial factors in the context of the rapidly evolving global space sector and the development of a comprehensive European space policy regulation.

Detailed proceedings of the conference, including panel discussions are available on [ESPI website](#) for download.



Credit: ESPI

## EU programmatic roadmap: towards a comprehensive Regulation of the European Space Programme

### “Space Programme Envelope” European Commission 2021-2027

€16 billion  
(+€4.9B from 2014-2020)



Galileo and EGNOS: €9.7 billion  
(2014-2020: € 6.8 billion)

Copernicus: €5.8 billion  
(2014-2020: €3.8 billion)



GOVSATCOM and SSA: €500 million

The draft Regulation shaping the future [European Union Space Programme](#) was adopted by a large majority (560 in favour, 63 against and 32 abstentions) in the European Parliament on the 17<sup>th</sup> of April.

Ministers of EU Member States are seeking to develop a comprehensive legislative and operational framework to implement a European Space Programme for the next budgetary period running from 2021 to 2027. A common understanding on the main policy directives was reached earlier in March between the EP and the Presidency of the Council of the EU. The approved text of the Regulation aims primarily at defining the core objectives of the future overarching European space Programme and at establishing the new European Union Agency for the Space Programme.

In the light of the need to ensure a continuous improvement and further enhancement of the crucial infrastructure - Galileo, EGNOS, Copernicus and GOVSATCOM - enabling the provision of space-based services to maximize the socio-economic benefits, the Regulation also articulates the roles

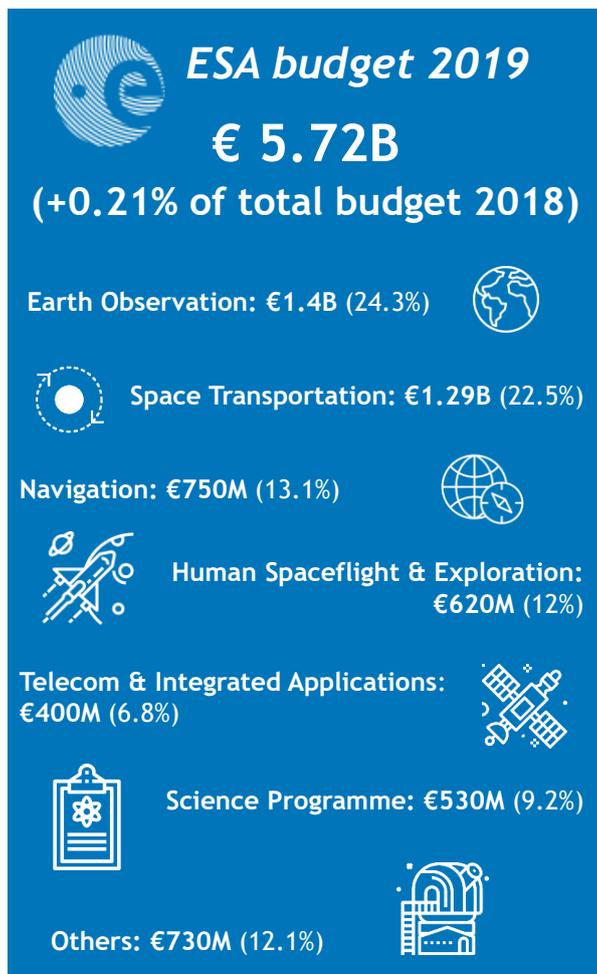
and responsibilities of the cooperating players: the European Commission, Member States, European GNSS Agency, ESA and other parties. The budgetary aspects of the Commission’s proposal related to space are embedded into the Multiannual Financial framework (MFF) and will thus follow a different approval path requiring the unanimity of the Council and the approval of the European Parliament, to be enshrined ideally before the 2019 European Parliament elections in May.

## EDA GOVSATCOM GSC demo project ready to cater to Member States' need for secured communications

On 15<sup>th</sup> January with the first meeting of the Project Arrangement Management Group led by Spain and held in Madrid, the Governmental Satellite Communications' (GOVSATCOM) [Pooling and Sharing demonstration project \(GSC demo\)](#) initiated its implementation phase. The project is now qualified to meet the GOVSATCOM demands of MS for military services through a set of pooled capabilities (bandwidth/power and/or services) in line with the 2018 Capability Development Plan and its Capability Development Priorities. The projects integrate the EDA's [EU Satcom Market Project](#), established in 2012 to provide MS with secured and cost-effective commercial satcoms and CIS services.



## Programme Advancements: Copernicus, Galileo, ExoMars



In January, the European Commission allocated additional €96 million to ESA for the [Copernicus Earth-observation programme](#) for the next two years. The funding will serve the development of the Sentinel-6 mission and of the new European Copernicus Data Access and Information Services. This brings the total ESA budget for the Copernicus space component for the 2014-2021 timeframe to €3.24 billion.

The [Munich Satellite Navigation Summit](#) on the 25<sup>th</sup> of March was an opportunity to showcase the performance and advancements of European GNSS. Executive Director of the European GNSS Agency, Carlo des Dorides, stated that the number of global Galileo users amount to 700 million. EGNOS capacities also continue to improve, with a coverage extended to northern Scandinavia, concurrent with ongoing accuracy experiments, such as in [Antarctica](#).

Collaboration between ESA and the European Commission is poised to develop further in order to answer strategic challenges: in April, DG CONNECT and ESA announced plans to create a Europe-wide [quantum communication](#) infrastructure, for which the space-based component (SAGA - Security and cryptoGrAphic mission) would be developed by ESA's Advanced Research in Telecommunications Systems (ARTES) programme.

ESA is also addressing the strategic 5G infrastructure, with the funding of the [Swedish hybrid satellite router company](#)

[Forsway](#) through ARTES.

The ESA-Roscosmos [ExoMars joint Programme](#) reached a new step in its development: the rover, named after British chemist [Rosalind Franklin](#) as a result of an ESA Member States-wide competition, was put to the test this March in the Atacama Desert (Chile). This ExoMars-like Field Testing ("ExoFit") was monitored

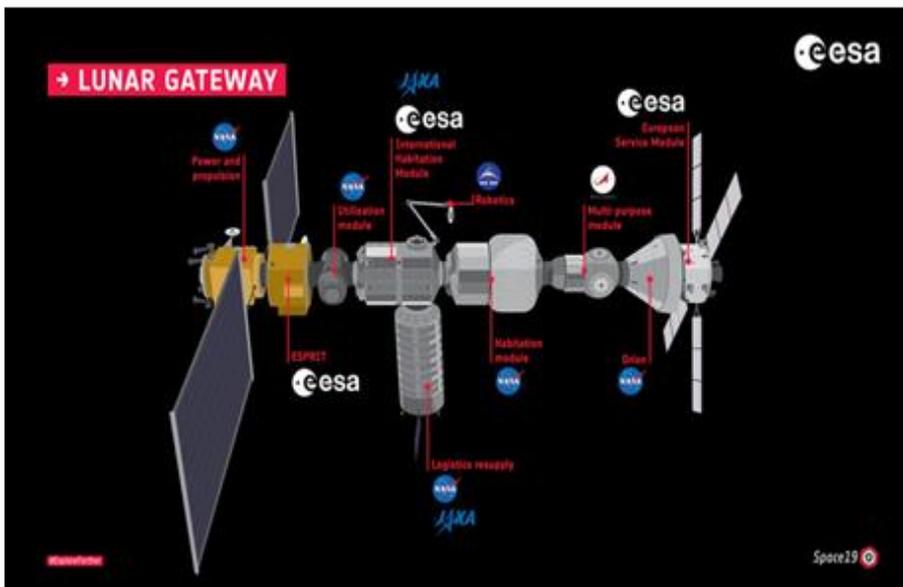
by the ExoMars team in the UK, in order to finalize preparations for a launch in 2021. Shortly after, the landing platform for the rover, Kazachok (developed by Roscosmos), [arrived in Europe](#) to be assembled and tested by the Italian division of Thales Alenia Space. The ExoMars carrier module [finalized its pre-launch testing](#). This a phase has been widely anticipated since the announcement in 2016 that the ExoMars programme would not be ready by 2018 - the original planned date of launch. The programme was therefore delayed to 2020. Now that the programme appears to be on track to meet its schedule, ESA Director-General Jan Wörner commented that a new postponement in the Martian programme [would risk the loss of support](#) from European member countries.



Credit: ESA

### European Space Agency: partnerships continue to flourish

This quarter, the ESA's partnership strategies continued to unfold. ESA, in cooperation with the German Aerospace Centre (DLR), is helping to finalize the Matroshka AstroRad Radiation Experiment (MARE), an anti-radiation vest developed by the Israel Space Agency-backed startup StemRad to embark on [Orion's first test mission](#) around the Moon. The capsule will also carry ESA's Active Dosimeter Mobile Unit Radiation Detector (successfully tested on the ISS from 2004 to 2011).



Credit: ESA

ESA transatlantic cooperation (such as the [ESA-MIT Lunar Village project, unveiled](#) this April) is anticipated to further develop. On the 28<sup>th</sup> of March, during the National Academies' Space Science Week in Washington DC, a [Statement of Intent](#) (Sol) to coordinate joint science research was signed between the ESA Director of Human and Robotic Exploration, David Parker, and the Associate Administrator for NASA's Science Mission Directorate, Thomas Zurbuchen. This Sol reinforces the shared belief of the necessity to integrate private-sector capabilities. In this perspective, ESA is currently part of the Lunar Gateway project, [through various modules](#). Additionally, bilateral agreements between NASA and individual European States (such as Greece) continue to expand. ESA's lunar ambitions are also another opportunity to boost European startups' capacity. The Berlin-based [PTScientists](#) is benefitting from ESOC experts' consultancy on flight dynamics for the development of a lunar rover to be launched in 2020. The integration of private expertise in ESA's framework will be further pursued at the Space19+ Ministerial Council next November, where the design team of the planetary defense test mission Hera (lead by GMV in Spain) will present how it will attempt at surveying the [Didymos asteroid](#), a stepping stone towards the Asteroid Impact & Deflection Assessment (AIDA) Mission.

On the 5<sup>th</sup> of March, ESA's Science Programme Committee approved the implementation of the Solar wind Magnetosphere Ionosphere Link Explorer (SMILE), a joint [ESA-China scientific mission](#). This partnership builds on the successful Double Star/TanCe Earth observation satellites collaboration (2003-2008). The project will be carried out by the Mullard Space Science Laboratory (UK) and the National Space Science Center (NSSC) - State Key Laboratory of Space Weather (China).

Launched in October 2018, the ESA-JAXA Mercury orbiter [BepiColombo](#) officially entered its operational phase last March. The orbiter is planned to arrive to Mercury in 2025.

### Renewed support for European space SMEs and training

The economic potential of nanosatellites is also a market where ESA lends a hand in supporting SMEs. The [CubeSat Systems Unit](#), within the European Space Research and Technology Centre in the Netherlands, aims to find low-cost solutions. This year marks a turning point in this initiative, with the approaching launch of missions designed within the “CubeSat Central”. ESA pursues its engagement in spurring a new breed of space entrepreneurs through a wide network of Business Incubators, augmented now with the opening of [Galaxia](#), a permanent ESA training and learning facility located in Belgium designed for the younger population (pupils, students, and teachers).

### UK Space Agency leverages COMPASS project for international cooperation

Beyond regular ESA participation, the [UK Space Agency](#) continues to develop bilateral partnerships for space applications, such as with the [Mexican Ministry of Agriculture](#) in January 2019. A declaration of intent, signed on 20<sup>th</sup> January, aims at establishing a five-year, €178 million International Partnership Programme to provide satellite data to improve the outcomes of the ongoing COMPASS project aiming at developing a space-based data tool to optimize crop management.

### France multiplies international cooperation

During a Chinese state visit to France on 25<sup>th</sup> March, the National French Space Agency (CNES) and the China National Space Administration (CNSA) signed an agreement to cooperate for [the Chang’e 6 Moon sampling mission](#) in 2023-2024, a future joint Earth-Observation mission, and the Space Climate Observatory (SCO).

This first quarter is further marked by a certain French outreaching effort on the global scene, as it hosted on 1<sup>st</sup> February the first international meeting to establish the [Space Climate Observatory \(SCO\)](#), bringing together 25 national space agencies and the European Commission, the African Union and relevant bodies of the United Nations System. A French delegation in Africa signed cooperation agreements with the [African Union](#), [Senegal](#), [South Africa](#), [Ethiopia](#), and [Kenya](#) to further define the programmatic roadmap for the concrete establishment of the SCO. Moreover, by the end of February, the strategic partnership secured last year with the newborn Australian Space Agency (ASA) has been consolidated through [three applicative agreements](#) with: the Commonwealth Scientific and Industrial Research Organisation (CSIRO) for the implementation of the SCO, InSpace innovation institute of the Australian National University (ANU) and the Australian Nuclear Science and Technology Organisation (ANSTO), to conduct joint research on the biological effects of radiation



## Italy's PRISMA pride



Credit: Arianespace

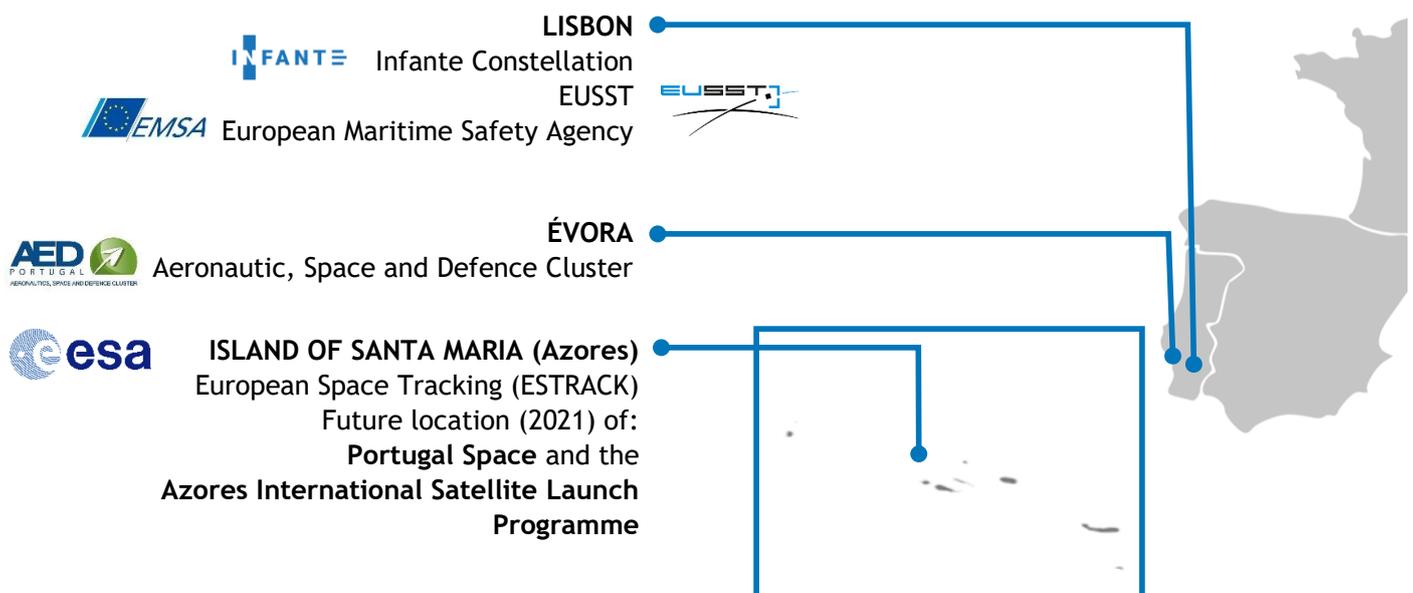
The successful launch of [PRISMA](#) (PRecursores IperSpettrale della Missione Applicativa - Hyperspectral PRecursor of the Application Mission) demonstrator mission, on 22<sup>nd</sup> March, allows for the Italian Space Agency (ASI) to expand its Earth Observation segment, but also confirms the effectiveness of ASI's partnerships.

PRISMA was launched on a Vega rocket, operated by Avio, while mission control (operated by Telespazio) were located at Fucino Space Centre and data acquisition and processing at the ASI Matera Space Centre. PRISMA is planned to last 5 years in orbit, and was developed by OHB Italia SpA (formerly Carlo Gavazzi Space S.p.A.).

## Establishment of the Portuguese Space Agency: Data is King

In March, the Portuguese Council of Ministers approved the [constitution of the Portugal Space Agency \(Portugal Space\)](#), to be headquartered in Santa Maria in the Azores - where ESA (ESTRACK) satellite monitoring services already operates and viability studies were conducted for a potential spaceport focused on the launch of microsatellites.

The first General Assembly of the Agency took place on the 22<sup>nd</sup> of March, in Lisbon. It finalized the appointment of [Chiara Manfretti as President and Luís Ramalhão Santos as Vice President](#) of the new born Agency. The first point of order is to carry out the [Portugal Space 2030 plan](#), which is articulated along three main strategic goals: exploiting space data and signals, improving and developing space equipment (notably data generation services, monitoring systems and Micro Launchers), and finally building national capacities. Portugal is currently developing a specialized regulatory framework to accommodate its Space sector, pending a legislative approval in June 2019. Public funding will also be discussed this year: in the context of the upcoming EU Multiannual Financial Framework 2021-2027, [Portugal aims to attract 2%](#) (€320 million) of European funding.



### Belgium and Luxembourg prepare for Beyond Earth

In January, Luxembourg and Belgium signed a [joint declaration](#) to collaborate in the development of an international framework for the exploration and utilization of space resources, such as water, aluminum, cobalt, iron and manganese. This partnership leverages the already existing SpaceResources.lu initiative.

## U.S.A.

### Space exploration gets a boost through ISS plans and SPD-1

Shortly after the 5 weeks shutdown of the federal government which impacted [NASA](#) (payments and non-essential procurements on hold), the U.S.A. seems to be keen on continuing their Human Spaceflight programme as part of an on-going discussion on ISS extension. The [Advancing Human Spaceflight Act](#) (bill S.584) was introduced on the floor of the U.S. Senate on the 27<sup>th</sup> of February. Its central provision authorizes an extension of operations of the ISS from 2024 to 2030.

The 26<sup>th</sup> of March was marked by the [5th National Space Council](#). In line with SPD-1, Vice-President Mike Pence set 2024 as a date for Humans to return to the Moon, imparting a [compelling acceleration](#) of the current timeline. To note, the Vice President acknowledged the new landscape and the success of new private operators, and aligned with the Commerce Department's vision to make "[OldSpace and NewSpace](#)" collaborate - the U.S. Department of Commerce positioning itself as a "[liaison for space operators](#)".

### SPD-2 makes its way through Congress

U.S. reforms of commercial space activities (defined by the [Space Directive-2](#), signed a year ago) continue to unfold. Although the [Space Frontier Act](#), introduced in July 2018 to fund a Bureau of Space Commerce, failed to pass congressional approval, US commercial space reforms continue to be debated. The Space Frontier Act [was reintroduced in](#) March of this year. As such, Kevin O'Connell, Director of the Office of Space Commerce, was heard by the [Senate Commerce Committee](#) on the 13<sup>th</sup> of March on "The New Space Race: Ensuring U.S. Global Leadership on the Final Frontier." O'Connell emphasized the need to push for regulatory reforms in a context of intense foreign competition, and at the same time leverage internal (between U.S. agencies) and international cooperation.

Read further information on SPD-2 and its implications for Europe in the [ESPI Brief 27](#).

### SPD-3 discussed among stakeholders

Following the approval of the U.S. [Space Policy Directive-3](#) on a National Space Traffic Management Policy on the 18<sup>th</sup> of June 2018, a debate arose within the U.S. Congress on potential responsibilities, either resting on the Department of Commerce (DoC) or the Federal Aviation Administration (FAA). This point of contention led the implementation of the directive to somewhat of an [impasse](#). In parallel, institutions and industry continue to exchange views on the future of on-orbit safety rules in the context of a [Request for Information \(RFI\)](#) issued by the DoC on commercial capabilities for SSA and space traffic management (STM) services. The on-going consultation suggests that, although some items which have been put on the table - such as satellite tracking/ID beacons or a reduction of the 25 year de-orbiting rule - are finding widespread support in the industry, some resistance towards new regulation also emerges, [among new comers](#) in particular.

## Congress takes a closer look at Chinese space ambitions

The Trump administration's tough stance towards China in its foreign trade policy seems to spill over to the commercial space sector. The question of China as a competitor in space was tackled during a hearing at the [U.S.-China Economic and Security Review Commission](#) in Congress on 25th of April, on the theme: "China in Space: A Strategic Competition?". This hearing took place a couple of days after the news that [China would be exploiting U.S. satellite equipment](#) to further its domestic policy. Lines between strictly commercial matters and geopolitical consideration will likely blur further, as the [President of Taiwan](#) publicly stressed her will to cooperate with U.S. launch providers for its Earth Observation satellites.

## 35<sup>th</sup> Space Symposium in Colorado Springs

In the beginning of April, the [35<sup>th</sup> Space Symposium](#) took place in Colorado Springs, where various news and announcements were made from public and private space organizations: the signing of an SSA sharing agreement between [USSTRATCOM and the Polish Space Agency](#), as well as with the [Romanian Space Agency](#); the qualification of Virgin Orbit, Vector Space and an unnamed startup of a \$34 million (€30.2 million) [challenge organized by DARPA](#), among others. The Symposium was also a venue for the [3<sup>rd</sup> Meeting of the National Space Council User's Advisory Group](#), which called for better budgetary and programmatic visibility of the lunar programme.



*Credit: The Space Foundation*

## Institutional affairs: NASA budgeting, procurements and nominations

President Trump appointed the former CEO of AccuWeather Inc., Barry Myers, as the new head of [National Oceanic and Atmospheric Administration](#). This nomination intervenes as the presidential budget proposal for FY2020 includes an [18% cut](#) to NOAA's \$5.4 billion (€4.8 billion) FY2019 budget, potentially bringing the agency's budget to \$4.5 billion (€4 billion).

Following the presidential request to speed up programmatic plans to bring American astronauts back to the Moon by 2024, [NASA amended its budget](#) request in early May by adding \$1.6 billion (€1.43 billion) and therefore reaching a total of \$22.6 billion (€20.2 billion) request for FY2020.

## CANADA

### Space plans and budgets announced

Canada released its [space policy strategy](#). It is mainly geared towards reinforcing satellite-based applications (health, security, environment monitoring), developing the private space sector, exploiting space-based data strengthening outreach to youth for an increased skill development. It also puts forward Canada's participation in the Lunar Gateway Programme with the Deep Space Exploration Robotics (DSXR) initiative, or "Canadarm3" - which the [Canadian Space Agency](#) is pushing despite U.S. programme changes. This space policy announcement was accompanied by possibilities of future international partnerships, including with [Russia](#).



*Credit: Canadian Space Agency*

The new Canadian federal budget, published on 20<sup>th</sup> March, reveals [new funding](#) to secure LEO satellite capacity is part of the much broader €3.35 to 4 billion proposed investment in rural broadband over 10 years. Of that funding, €1.13 billion is earmarked for a new Universal Broadband Fund which includes the

LEO satellite capacity initiative. Canada further proved this quarter to consider space as a key sector for its security, notably for its arctic surveillance, through the [acquisition](#) of three satellites and polar radars, along with an international partnership ([Swedish Space Corporation](#)).

## RUSSIA

### Launch of a new remote constellation amidst “communications revolution”

Early this quarter, Russian State Corporation Roscosmos announced the creation of a constellation of remote sensing satellites dubbed the Sovereign's Eye (“[Gosudarevo Oko](#)”). By 2020, Russia's planned Earth Observation constellation is expected to include at least 15 satellites, including six Canopus-Vs, which are capable of highly accurate remote sensing. A capacity Roscosmos head Dmitri Rogozin qualified as “strategic” for Russian digital economy, agriculture and cybersecurity, among others.

During the Annual Presidential Address to the Federal Assembly in February, President Vladimir Putin further announced this constellation would be part of a “[communications revolution](#)”, which would be undertaken by a new National Space Centre to be created in Moscow, with the aim of “upgrading of the entire space industry”.



*Credit: Joser Fortado CC BY-SA4.0*

### Russian Human spaceflight carries on through the year and beyond

On the 14<sup>th</sup> of March, the [Soyuz MS-12 crew transfer](#) bringing the members of American-Russian Expedition 59 to the ISS lifted off from the Baikonur Cosmodrome. Roscosmos announced the [two new modules](#) - Orbital Piloted Assembly and Experiment Complex - OPSEK; and the Nauka Multipurpose Laboratory Module - will dock with the station in 2021 and 2022 respectively. Roscosmos is further working on the development of a [new Soyuz MS spacecraft](#), which capabilities could allow manned missions to the Moon. This development project is estimated to cost around €356 million.

### Russian space sector adapting to the new global launcher market

The Russian government is making steps towards the flourishing [market of reusable rockets](#) (with the private company S7 AirSpace Corporation). Although this venture remains at a comparatively early stage, the proposed light reusable launch vehicle based on the Soyuz-5 carrier rocket is envisioned to be launched from the mobile maritime launch platform Sea Launch, which may be relocated from California to the [Sovetskaya Harbor](#), on the Pacific front of Russia. Other private projects include [space tourism](#) or the successful launch of OneWeb satellites, operated by [Glavkosmos](#), a private subsidiary of Roscosmos.

### Russian space heritage confronted by financial reality

As the Russian federation celebrated its [space history](#) (27<sup>th</sup> of March: Yuri Gagarin and Vladimir Seregin Memorial Day), it was announced that the historical pad “Gagarin’s start” will be soon [decommissioned](#) for lack of funds, as it has become incompatible with the new Soyuz-2 launchers.

## JAPAN

## Japanese achievements reinforce confidence in private and public partnerships

JAXA successfully conducted the final touchdown of the asteroid explorer [Hayabusa-2 on Ryugu](#) on 28<sup>th</sup> February. Beyond this technical achievement, [observers](#) pointed out that the relatively low budget of JAXA (€1.47 billion) and of the overall cost of the programme (€23.5 billion) allows to demonstrate an efficiency in execution, particularly with international and private partners.

JAXA is indeed involved in the development of the [Lunar Gateway](#) (participation in 20<sup>th</sup> March in the Multilateral Coordination Board Joint Statement towards the development of the Gateway) - with the European Space Agency for the International Habitation Module, and with NASA for the Logistics Resupply module. Already, [Toyota](#) and [Bridgestone](#) signed agreements to collaborate on the Japanese lunar rover.

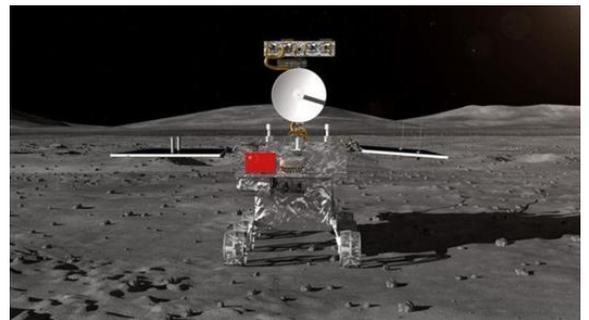


*Credit: JAXA*

## CHINA

## Lunar success and future plans for exploration

The beginning of the year saw the continuation of the Chinese Lunar Exploration Programme (CLEP), through the [landing of Chang'E-4](#) on the Von Kármán crater - the first landing on the dark side of the Moon. Although the mission faced challenges (such as the early termination of the [biosphere experiment](#)), China leveraged its successes in order to secure international cooperation for further Lunar endeavors: a joint mission with [ESA in 2023](#), and an [offer to carry a 10kg payload](#) to non-Chinese partners. Chinese plans for the Moon aim high: the China National Space Administration announced it aims at building of a [research station](#) on the surface of the Moon in a decade. The technical achievements of the lunar mission (in particular the Yutu-2) will serve as a step [towards Mars](#) (200kg rover) and eventually Jupiter.



*Credit: CNSA*

Read further about Chinese Lunar ambitions and its implications for Europe in [ESPI Brief 28](#) “China is One Step Closer to the Moon... And Europe?” on our website.

## Chinese space programme scales up

China achieved a milestone in the deployment of its Earth observation and monitoring [constellation](#) by putting in orbit Gaofen-5 and Gaofen-6. This year also marks for the Chinese Space programme a landmark in the operational phase of the BeiDou Navigation Satellite System (BDS): as the [44th BDS-3 satellite](#) was delivered to GEO in April, China aims at making the BDS a vector of international cooperation. BDS applications were indeed showcased during the [2nd China-Arab States Cooperation Forum](#), in a wider context of a “[Space Silk Road](#)”. In parallel, China continues to forge regional agreements in advanced space domains: in April, [China and Pakistan](#) signed an agreement to cooperate on Human spaceflight.

## INDIA

## Mission Shakti gets everyone's attention

The Indian ASAT test conducted on a LEO satellite ("Mission Shakti") dominated the news in the end of March. Repercussions of this event - both in terms of orbital debris and geopolitical considerations - are still unfolding.

To read more on this topic and more specifically on the stakes for Europe, visit the ESPI's website and read the [ESPI Brief 39: India's ASAT Test Amidst Global Ambiguity](#).

## Indian boosts Human spaceflight

The Indian Space Research Organization is targeting additional funding for its [Human spaceflight programme](#), set for 2022 (with [unmanned missions](#) planned for 2021). This additional funding would amount to €1.28 billion, and comes at the cost of [reducing the budget](#) allocated to the development of INSAT/GSAT satellites for 2019-2020. The Indian Human Spaceflight programme is a core national initiative, as reflected by the inauguration of the [Human Space Flight Centre](#) late January, in Bengaluru.

## Space legal framework in the works

In parallel, the Indian Congress continues to discuss a bill to establish a regulatory frame for space activities ([in discussion since 2017](#)), which will [likely be introduced this year](#). It will notably introduce a system of fines (up to €128,575 and even imprisonment (up to three years of jail) to enforce a strong space licensing regime.

## EMERGING SPACE NATIONS

## UAE Space programme taking shape

March marks a turning point in the United Arab Emirates space programme. Following the approval of the [UAE National Space Strategy 2030](#), the UAE Space Agency in the frame of a newly signed charter establishing an "Arab Space Coordination Group", announced a three-year plan to develop an advanced earth observation [satellite called 813](#). As the UAE is gearing towards [its first astronauts](#) by the end of 2019, the country continues to intensify its space-capacity building through international partnerships, notably with the [Australian Space Agency](#), private companies (with [The Spaceship Company](#)) and NGOs ([Xprize](#)). In February, an agreement was signed with the [CNES](#) for a joint hyperspectral Earth-observation mission.

## Israel's lunar highs and lows



Credit: Spacell

After [successfully reaching lunar orbit](#), Spacell's lander Beresheet ("In the Beginning", in Hebrew) did not manage to land safely on the Moon. The spacecraft was [declared lost on 11<sup>th</sup> April](#), but the founder of the private Israeli company Morris Kahn announced that [another lunar lander will be developed](#) to repeat this endeavor. The overall positive [international reactions](#) (with the notable outreach from [NASA's administrator](#)) highlights the widespread interest of commercial space exploration.

## Australian space programme

The newly created (1<sup>st</sup> July 2018) Australian Space Agency (ASA) released this April its first [Civilian Space Strategy](#) for 2019-2028. Among other domains of competence (launches, SSA, Earth observation), the ASA announces to position itself at the [forefront of space R&D](#) - pointing out that Australia accounted for 6.8% of space-related publications from 2012 to 2016.

The Space Strategy document also outlines the clear objective of bringing up the space sector's contribution to €7.5 billion in two years and to add 20,000 jobs by 2030.



**Australian  
Civil Space Strategy  
2019-2028**

*Phase 1 (2018-2019) €186M annual "space package"*  
Build international cooperation

- sectorial priorities: position & navigation and EO
- Legal reform: amendment of Space Activities Act of 1998, engagement in COPUOS.

*Phase 2 (2019-2021) €9.2M of the International Space Investment initiative*

- Space (Launches and Returns) Act 2018
- "Moonshot" missions

## African space continues its growth, at different pace

Late April, the [2019 Global Conference on Space for Emerging Countries \(GLEC\)](#) took place in Marrakech (Morocco). It was an opportunity for various space actors involved in emerging countries to meet and exchange on the future of the space sector. The European Space Policy Institute was represented by its Director Jean-Jacques Tortora, who joined a panel discussion on Regional Collaboration on Space Applications. During this event, it was mentioned that the African Union (A.U.) is currently taking steps to create a regional space agency, in the framework of the A.U.' [African Space Policy and Strategy](#). Egypt is currently considered as the most probable location for the [headquarters](#) of the AU's space agency. The European Space Policy Institute is working on a publication entitled "Space Supporting Africa", which aims at giving a comprehensive view and in-depth analysis of Africa in the global space sector in terms of private and public endeavors.

The African space sector shows dynamism, but at various stages. International partnerships of African countries seem to continue being the main drive of Africa in space: Russia, for instance, signed a [scientific agreement with Angola](#) (on top of the various agreements conducted by various European countries, notably France). But national space programmes in Africa intensify their capabilities: the [Nigerian space agency \(NASRDA\)](#) inaugurated six space-related complexes to complement its headquarters, including a Space Incubation Centre and a Space Environment Laboratory.

## MULTILATERAL ORGANIZATIONS

### UNGA Committees: the Disarmament Commission

The UN [Disarmament Commission](#) met in New York last April (from the 16<sup>th</sup> until the 25<sup>th</sup>) for an informal meeting. Among other inputs, the Commission discussed a working paper submitted by Nigeria on behalf of the African Group based on the recommendations set out in the Report of the Group of Governmental Experts on Further Practical Measures for the prevention of an Arms Race in Outer Space, which never reached consensus. The Group was been established by the UN General Assembly at its 76<sup>th</sup> plenary meeting with the [Resolution 72/250](#). It has been entrusted with the mandate to make recommendations on substantial elements of an internationally binding instrument preventing a potential arms race in outer space.

The Group, counting experts from 25 Member States, met twice (August 2018 and March 2019) on a two-week session and benefitted from an informal consultative meeting organized by the Chairman to engage in interactive conversations with the broader space community including representatives from national space agencies, academia, the commercial sector, NGOs and the civil society. The draft Report, in line

with the mandate of the Group, investigated the fast-changing space security environment, the existing legal regime, the diverse scenarios leading to and the potential consequences of the weaponisation of, and/or an arms race in outer space.

The text of the draft Report provides a foundation for general principles and definitions and in its conclusions it urges the Conference on Disarmament to begin official negotiations for the closure of a legally binding agreement to prohibit the placement and use of weapons and to prevent an arms race in outer space. It stresses also the importance of transparency and confidence-building measures among space faring nations.

### The UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS)



During the first quarter of 2019, both the [Scientific and Technical Subcommittee](#) (STSC) and the [Legal Subcommittee](#) (LSC) of the UN Committee on Peaceful Uses of Outer space (UNCOPUOS) held their session.

The 56<sup>th</sup> STSC session took place in Vienna from the 11<sup>th</sup> until the 22<sup>nd</sup> of February. The discussion revolved around matters relating to remote sensing including applications for developing countries and monitoring of the Earth's environment, space debris, recent developments in global navigation satellite systems, space weather, near-Earth Objects, physical nature and technical attributes of the geostationary orbit and its utilization and applications, space and global health, use of nuclear power sources in outer space and long-term sustainability of outer space activities. This year's ESPI [Evening Events](#) took place on the during the latest STSC session.

The first half of April was marked by the 58<sup>th</sup> meeting of the LSC. The main topic addressed were: Status and application of the five United Nations treaties on outer space and matters related to the definition and delimitation of outer space, the character and utilization of the geostationary orbit, national legislation relevant to the peaceful exploration and use of outer space, capacity-building in space law, review and possible revision of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space, space debris mitigation and remediation measures (taking into account the STSC's work), legal aspects of space traffic management, application of international law to small-satellite activities, potential legal models for activities in exploration, exploitation and utilization of space resources.

# SPACE ECONOMY AND FINANCE

## SPACE ECONOMY

### United Kingdom: Space economy and industry successes amidst uncertainties

Notwithstanding the concerns Brexit brought for some British space actors - Inmarsat declared to pull its European Aviation Network [out of London](#) by April 2019 and to relocate in Luxembourg - Science Minister Chris Skidmore announced a [record income](#) of €17.33 billion for the UK space industry in 2016/17 with space manufacturing clearly driving the overall growth (27%).

To note, the total exports amounted to €6.44 billion (a third of the total space-related income), with Europe being the primary destination of British Space exports (54%) as well as the main origin of imports (69%).

In February, the UK Space Agency confirmed that four organisations have been [awarded](#) over €408,493 in grant funding for the development of commercial range control services at multiple spaceport sites across the country: Telespazio VEGA UK Ltd (€192,769), Deimos Space UK Ltd (€153,944), Heliaq UK Ltd (€66,031) and Inmarsat Global Ltd (€73,897).

The British Space agency also announced the financing, through the National Space Technology Programme, of a [Synthetic Aperture Radar](#) (developed by Surrey Satellite Technology and Oxford Space Systems).

#### *“Size and Health of the UK Space Industry”*



Ministerial 2018 report  
(data from 2016/2017)

Broadcasting represents 51% of total space sector income in 2016/17

56% of overall growth from 2016 to 2017 concentrated in very large enterprises  
(28% in larger SMEs)

7 organizations hold 76% of overall income.

#### Income per segments:

Space applications: 69.5%  
Space Operations: 14.7%  
Space Manufacturing: 12.7%  
Ancillary Services: 3.1%

UK Space Industry forecasted growth in 2017/18:  
+4.8%

## SPACE VENTURE EUROPE Q1 2019

### METHODOLOGY NOTE

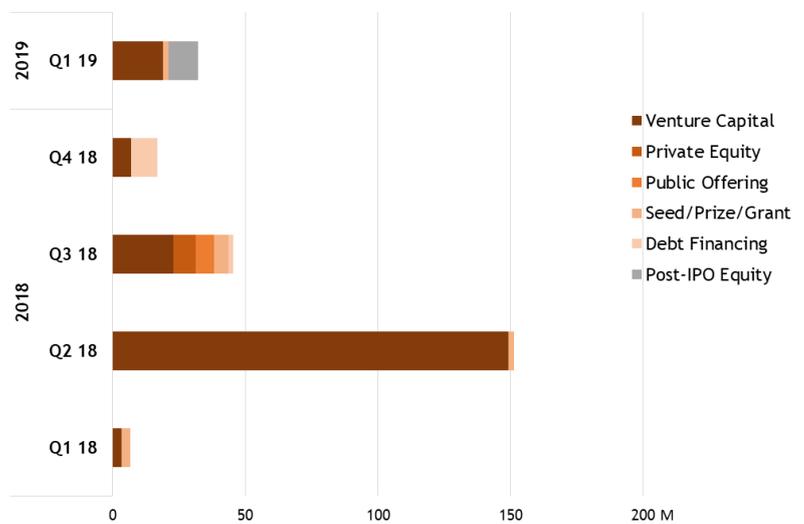
The assessment of private investments provided in this report is based on the ESPI dataset including exclusively publicly available data on announced operations and deals. Information is collected by screening a high number of sources including investment firms', incubators' and accelerators' portfolios, articles and specialized news outlets or specialised sources such as CrunchBase. Cross checking was systematically performed. ESPI database includes deals for the period 2014-2019.

The following definitions were applied to delineate the perimeter of the analysis:

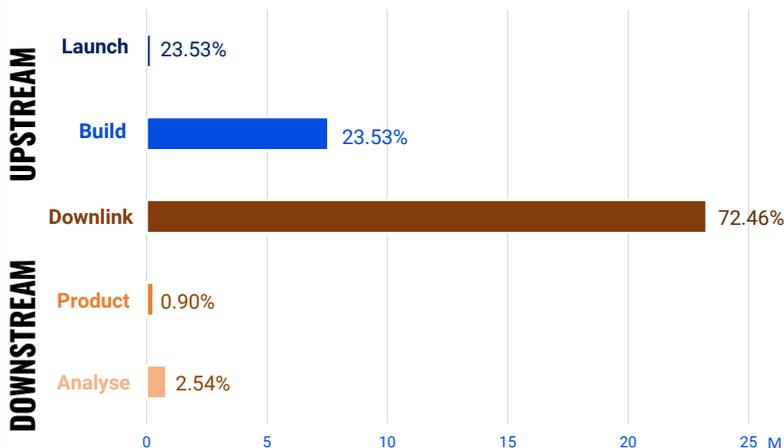
- Start-up: is a company younger than 10 years and who has not yet reached business maturity (defined according to business stage: Public Offering and or Acquisition, annual turnover >€50 million, or number of employees >250);
- Space company: is a company whose main business (in revenue share) is part of the space value chain;
- European company: is a company whose headquarter, or the majority of its business operations is conducted in Europe (EU Member States + ESA Member States).

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

### Q1 2019 private investments in European space start-ups



During the first quarter of 2019, the total recorded amount of private investments in European space start-ups is about **€32 million**, an increase of more than 80% compared to the previous quarter Q4 2018. These numbers include also a major post-IPO Equity operation to the German start-up Mynaric accounting for **€11 million**. Equally, **Venture Capital** in Q1 2019 amounts to more than **€19 million**, 3 times more than in the previous quarter (Q4 2018). The trend highlighted in the Space Ventures 2018 Report, encompassing a growing dynamism of European space entrepreneurship, is still mostly supported by European private funds and it is still experiencing a steady positive growth.



### Private investments across the space value chain:

The UPSTREAM segment includes

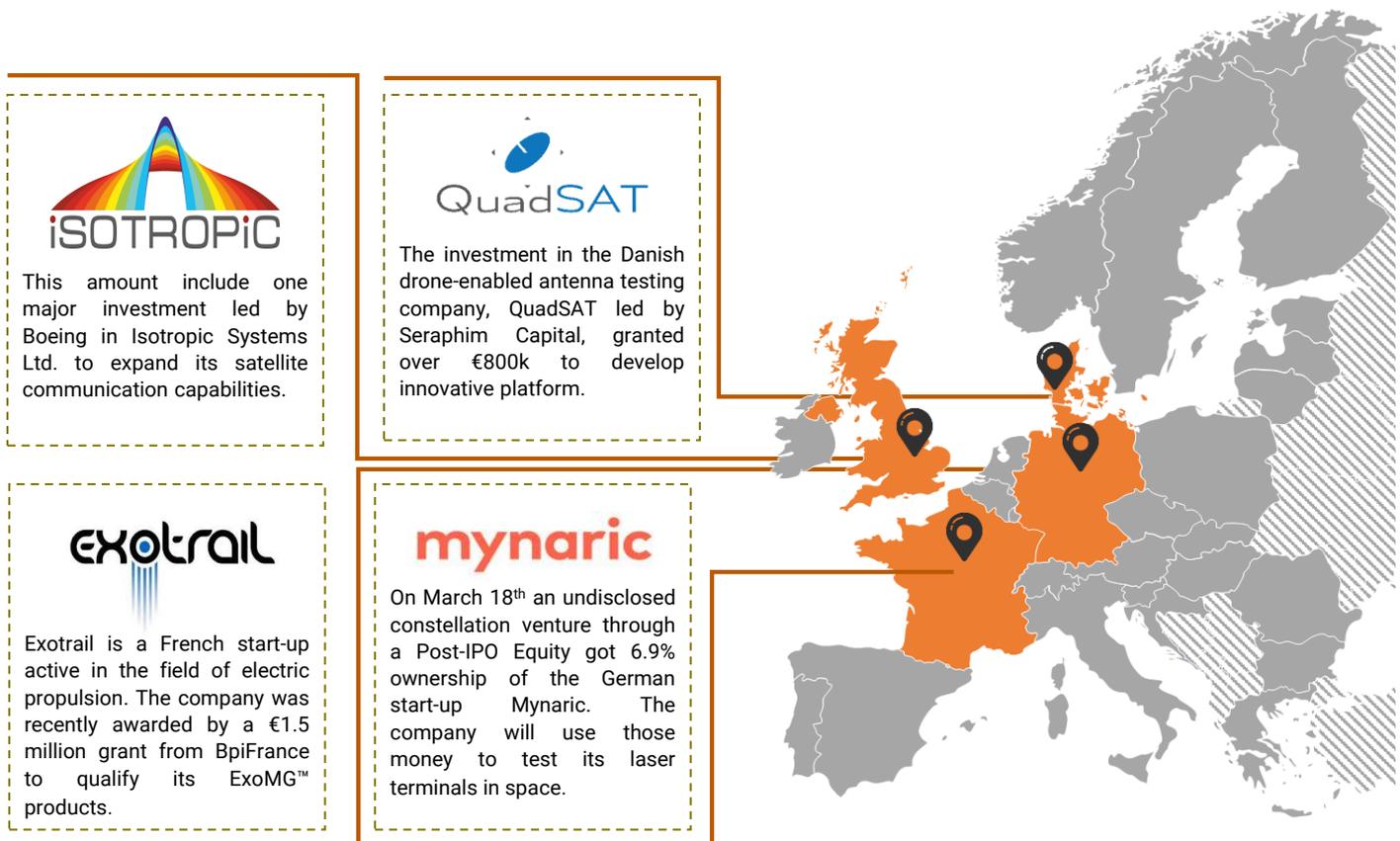
- **Build:** development and manufacturing of space systems (incl. sub-systems, equipment, components or materials) and/or provision of related software and engineering services;
- **Launch:** development and manufacturing of launch systems and/or provision of launch services;
- **Data:** operation of space systems to lease or sell satellite capacity or data.

The DOWNSTREAM segment includes:

- **Downlink:** development and manufacturing of the ground support infrastructure and services (e.g. relay systems, communications, ground terminals, cryptography);
- **Store:** solutions for satellite data storage and processing;
- **Analyse:** solutions for satellite capabilities and data exploitation (e.g. big data analytics, machine learning and AI, algorithms);
- **Product:** space-enabled products to end-users (e.g. mapping & 3D, data platforms, location and tracking).
- Business activities beyond earth orbit (e.g. space exploration, resources, logistics, research) is clustered in a parallel category.

Considering the distribution across the space value chain in Q1 2019, the investments have been primarily directed towards the **downstream** segment, representing the **75.9%** of the total. In particular two major deals have been recorded in this Q1 2019, including the post-IPO equity of Mynaric and the Series A venture round of Isotropic Systems Ltd. This quarter marked a little low in the investments in the upstream segment (24.1%) counting two major concerning two French start-up Exotrail and Syntony GNSS.

## Distribution of Top 4 Transactions in Europe



## Investment Deals

- The London-based OneWeb announced in March a **massive financing round**: €1.1 billion, to continue the development of its constellation. This financing was led by OneWeb's historical investor (the Japanese conglomerate SoftBank) with the participation of returning investors Grupo Salinas, Qualcomm Technologies, along with the government of Rwanda.
- **Orbital Access** collected €182,382 via the specialized crowdfunding platform spacestarters.com. The London-based startup originally aimed at raising €35,000, a goal reached in early in November 2018. On 4<sup>th</sup> January, the company ended its crowdfunding campaign well beyond its target. According to the fundraising page, three contributors each invested at least €10,000. Orbital Access is currently developing the Orbital 500R, a two-stage orbital delivery vehicle for small payloads composed of a MD-11 carrier aircraft, to which will be attached a suborbital spaceplane, from which the payloads (up to 500kg at current stage of development) will be ejected. The company estimates a projected **annual revenue of €577M in 2025**, with a predictive yield of €5.5 million per launch in gross margin contribution.
- The Toulouse-based nanosatellites manufacturer **Nexeya** (€36 million in revenues) was sold to the German Hensoldt, but its space-based activities will be acquired by the French stakeholders of the company through a new structure named Hemeria (following the decision from the French military authority to not transfer strategic activities).



Credit: Orbital Access

- The French equipment manufacturer and industrial contractor CNIM, in its strategy to position itself further in the Defence and Security sector, acquired 85% of [Airstar Aerospace](#) (shared with minority holder Thales Alenia Space).
- The Government of Catalonia (*Generalitat de Catalunya*) awarded €75,000 for 20 Catalan startups, among which [Pangea Aerospace](#), a Barcelona-based micro launcher start-up company specialized in small payloads (150kg to LEO). Last year, Pangea Aerospace was awarded a European Innovation Council's SME Instrument Phase 1 grant.
- PLD Space, the Spanish Micro Launcher company (part of ESA's campaign to develop future micro launchers), reached a milestone with the successful drop test of the first stage of its [MIURA 5](#) rocket.
- The Spanish space pursues a dynamic trend, with the Spanish energy giant Red Eléctrica Corporación's agreement on 12<sup>th</sup> February to buy out Abertis' 89.7% stake in domestic satellite operator [Hispasat](#) for [€949M](#) million.

### Major contracts and agreements

- British accelerator Satellite Applications Catapult and the Japanese satellite communications infrastructure provider [Infostellar](#) signed a [Memorandum of Understanding](#) in order to leverage the Catapult's ground station commercial activity, especially the In Orbit Demonstration (IOD) programme currently supporting the launch of satellite data services. To reinforce the collaboration, Infostellar also announced its intention to open a new European office located within the innovative Harwell Campus focused on business development and regulatory affairs to coordinate the expansion plans.
- This quarter saw promising prospects also for Goonhilly Satellite Earth Station, in Cornwall. Goonhilly Earth Station signed a MoU with the [Shetland Space Center](#), with the aim of building a rocket launch centre on the island of Unst (North of Scotland) along with data centres and space-related infrastructures.
- The British government announced it will guarantee a loan of €289 million to the Turkish company [Turksat](#), which ordered to Airbus the manufacturing and delivery of two satellites and a ground station for €444.7 million. Turksat also signed a [long-term bandwidth contract with Avanti Communications](#), through the exploitation of the Hylas 2 satellite for the next three years. UK's satellite sector pursues its international growth, with the announcement that the Indian partner of Inmarsat, BSNL, obtained an In-Flight and Maritime Connectivity (IFMC) license from the [Indian government](#).
- At the level of SMEs, the Scottish satellite manufacturer Clyde Space announced it will be launching the [Polish space consortium](#) FP Space's 6U satellite, ideally in 2022. Clyde Space also announced it will build CubeSats embarking AIS receivers for [AAC Microtec](#) and [ORBCOMM](#). Another startup from Glasgow, [Alba Orbital](#), announced it will launch seven of its "PocketQubes" with the help of its satellite deployer (the Albapod), with a rideshare on a Rocket Lab Electron.
- A report from the French aerospace industries association GIFAS announced the French sector for 2018 recorded [€65.4 billion in sales](#), among which €44 billion in exports. 77% of the sales come from the civilian sector, and the entire sector supports 195,000 jobs.
- The French satellite sector remains in good shape, with [Eutelsat](#) reporting this quarter €658 million in revenue EBITDA for the six months up to 31<sup>st</sup> December. Eutelsat also declared it will partner with [Seraphim Space Camp](#) for the third edition of the UK-based space accelerator.
- The above mentioned Shetland Space Centre's plans for a spaceport will be considered through a three-month [study of concept and feasibility](#) conducted by Arianespace. The spaceport will be designed from the ground up to be a commercial facility operated by Shetland Space Centre. The manufacturing segment of Arianespace also demonstrates a strong outlook, with the announcement that the French company will be supplying reflectors for the new [Eutelsat HOTBIRD satellites](#).
- CNES continues to set up its strategic private-public partnerships. On 21<sup>st</sup> February a CNES-Arianespace Memorandum of Understanding was signed to launch the joint [acceleration platform](#),

[Arianeworks](#) aiming at intensifying the preparation of innovative future launchers projects in Europe.

- Arianespace continues to secure high profile launch contracts, such as the successful launch of the four [O3b constellation satellites](#).
  - Airbus plans to spend €25 million [revamping facilities](#) in Germany for solar array production and optical satellite instruments. The upgrades, started in February, include expanding a solar array production facility multiplying its surface by 7, from 800 square meters to 5,500 square meters, and introducing a robotic assembly line. Airbus said the improvements should halve time and costs, safeguard 170 jobs, and position the company for work on constellations of satellites.
- 
- Credit: Airbus*
- SENER announced in the beginning of this year that it has secured its involvement in major space projects. The Spanish engineering giant signed five contracts for the development phase of the [Lunar Gateway](#). These include the habitation module (four hatches, the internal secondary structure and interfaces for the robotic arms), the infrastructure and Telecommunications module ESPRIT (assessment of motorized hatch communication antenna and robotic arm interfaces), the lunar landing module (structural design, mechanisms and thermal control), and the S-band deployable antenna to be integrated in the lunar ascent module. For these projects, SENER acts as a subcontractor for Airbus and Thales Alenia Space. This quarter, [TRYO](#), part of SENER group, further cemented its collaboration with the European Space Agency through the Innovation Triangle Initiative, an ESA-funded program to bring disruptive technologies into the space sector.
  - The Danish-Swedish miniature satellite manufacturer GomSpace announced it will resume the production of [200 CubeSats](#) ordered by the British telecommunications company Sky and Space Global, as the delivery was halted as the British firm had not paid approximately a third of its invoice (€3.06 million) due on 30<sup>th</sup> September. This quarter, GomSpace entered a partnership with TESAT and KSAT in order to perform a demonstration of a new [optical telecommunication technology \(PIXL\)](#).
  - In an interview, the founder of the Milan-based space SME [Leaf Space](#) announced its objective to triple the number of ground station locations by next year, betting on the expansion of microsattellites.
  - Kleos Space S.A. also signed a Memorandum of Understanding with the Israeli-based geospatial intelligence company [ImageSat International](#) for the possible exploitation of RF activity-based satellite data.
  - The aerospace engineering company [NanoAvionics](#) announced its M6P and Blue Walker 1 nanosatellites, delivered with an ISRO PSLV-C45, successfully established communications.
  - The Swiss nanosatellite manufacturer [Astrocast](#), which targets the IoT market, announced this quarter that it will be launching 3 new pilots of its new LEO Nanosatellite Network, dedicated to Remote Areas for Marine, Industrial and Water Purification devices. The Lausanne-based company further announced it will be launching 10 of its nanosatellites [in 2023](#) with the Orbex launch vehicle. Beginning of April, Astrocast successfully launched its [second IoT nanosatellite](#).
  - In parallel, the ambitious and controversial Mars colonization company [Mars One Ventures AG](#), incorporated in the canton of Basel-Stadt, announced its liquidation in January.
  - The Swedish ground segment activity continues to demonstrate reliability (through its multi-mission ground network), with a cooperation agreement signed between the SSC and Airbus on the [Pléiades Neo](#) Earth Observation Constellation.

## U.S.A.

## Despite shutdown, U.S. space sector remains attractive and solid

The beginning of the year was marked by the U.S. federal shutdown: all publicly funded agencies considered “non-essential” to the functioning of the U.S. government would be closed. Subcontractors working for federal agencies and programmes were also impacted by this institutional halt which lasted from the 22<sup>nd</sup> of December 2018 until the 25<sup>th</sup> of January 2019. A comprehensive impact assessment on the U.S. space sector is yet to be released, but it is clear that subcontractors suffered from the resulting budgetary cuts. **Tethers Unlimited**, a subcontractor for NASA, announced mid-January to be laying off 20% of its workforce as a direct consequence to the shutdown. **SpaceX** also announced a 10% layoff in the same week, although the company argued the aim was to concentrate on the development of next generation launch systems and satellite constellation.

## Investments deals

- The satellite industry - especially the constellation service providers - seems to be the main driver for private investments this quarter in the U.S.A. The satellite Internet-of-Things start-up **Swarm Technologies** raised €22.2 million in Series A (led by Craft Ventures and Sky Dayton, with the participation of Social Capital, 4DX Ventures and NJF Capital) for the building of a low-cost satellite network.
- Airbus Ventures helped **Cesium Astro** to raise €10.6 million in Series A funding to help it develop advanced antennas and communications systems for satellites.
- The global aircraft tracking and surveillance company **Aireon** announced a €158 million credit facility from Deutsche Bank in order to tackle the cost of the integration, launch and hosting of the AireonSM payload planned on the next Iridium-NEXT satellites. This credit facility occurs as Aireon’s ADS-B system went live in beginning of April.
- Deep Space Industries, originally envisioned as an asteroid mining company and having recently refocused on smallsats, has been acquired by **Bradford Space**.

## Major contracts and agreements

- In parallel, the competition for small launchers seems to be intensifying, with the acceleration of engine testing from **Firefly** and **Vector**, as well as the announcement of Relativity’s first client, Telesat.
- The start-up **Momentus**, capable of delivering up to 400kg to LEO, announced its first client, and is seeking to raise €22.2 million to develop a low-cost solution to higher orbit.
- Alternative launching systems are also making steps to enter the market, with the first successful flight of the **Stratolaunch** aircraft. Virgin Orbit also announced that the LauncherOne system will be operating from the U.S. Air Force Andersen Base on the island of Guam, with the German-based SME Exolaunch as its first client.
- This dynamism seems to be justified by a growing nanosatellite sector: for instance, **Blue Canyon technologies** announced doubling its staff in 2019 to meet future demands.
- Amazon unveiled its plan to deploy a constellation of over 3,000 satellites (**Project Kuiper**).
- Deployment and development of GPS continues to fuel procurement contract: Boeing was awarded a €538.5 million contract for the production of Air Force’s 11<sup>th</sup> WGS (Wideband Global Satellite Communication Space Vehicle).
- **Harris Corporation** was awarded a €75.6 million contract for the production of an experimental satellite to improve the GPS.

- The small geostationary satellite for IoT manufacturer [Astranis announced its first client](#), an Alaskan telecommunication provider. In an interview of its CEO, Astranis announced the exploitation of the satellites will be done from the Pacific Dataport Inc. in Anchorage (Alaska, U.S.A.)
- Space-based data company [Spire Global](#) announced in the context of its new hire for its expending National Security sector that it will host reconnaissance payloads for a defence contractor on its CubeSat constellation (KeyW InSpace initiative). Earth observation applications continues to expand, with the creation of Earth Monitor, from a partnership between [Airbus Defence and Space and Orbital Insights](#). Airbus also signed an agreement with [The Climate Corporation](#) for space-based crop monitoring.
- In the wake of a push for lunar missions in the framework of SPD-1, the XPRIZE Foundation announced the creation of a new €800,000 “[Moonshot Awards](#)”, to encourage private achievements in reaching the Moon. The State of Florida announced providing a €890,000 assistance package for the installation of the private lunar lander company [OrbitBeyond](#).

### CANADA

- This quarter, the Earth observation company [UrtheCast](#) announced lower earnings for 2018, which lead to the decision to make additional [staff cuts in 2019](#) (45% in total).
- The Canadian space sector pursues its overall restructuring with the acquisition by Calian SED of the German [SatService for €6.45 million](#).

### JAPAN

- [Axelspace Corporation](#) and [ODYSSEUS SPACE](#), a Taiwanese company developing innovative space technologies for small satellites, [announced a partnership](#) to provide Earth Observation data in Taiwan from the new AxelGlobe constellation. The first light from the satellite was successfully shared and the commercial service is to begin in May 2019. After that, Axelspace expects to launch 3 more GRUS satellites in 2020 and to complete the entire constellation by 2022.
- The Japanese startup [Synspective](#), which aims at establishing a synthetic aperture radar constellation of 25 satellites, signed a [contract to launch](#) a demonstrator (StriX-α) on a Vega rocket with Arianespace.

### CHINA

The private Chinese NewSpace company OneSpace failed to launch [OS-M](#), its four-stage solid propellant rocket. Despite the announcement of this setback, the commercial use of space seems to be a sector which sparks the interest of Chinese actors: the China Academy of Launch Vehicle Technology (CALT) announced having passed the engine test phase of the [Smart Dragon-1 \(SD-1\)](#). In parallel, other private space companies announced to be almost ready to enter the competition: [Linkspace](#)'s reusable rocket passed a vertical takeoff and landing test, [Landspace](#) announced a successful test engine firing in its “intelligent manufacturing facility”, and iSpace's JD-1 thrust engine also passed an engine firing test, which would allow the company's rocket Hyperbola-2 to be launched in 2020. Among these three major NewSpace companies in China, Landspace announced having secured a €13.1 million contract with the [British Open Cosmos and the Italian D-Orbit](#) for launch service and mission management cooperation, mainly targeted at the CubeSat market.

The interest of Chinese investors seem to gather steam overtime: the Beijing-based Space Transportation Co. announced having raised “[several tens of millions of RMB](#)” (RMB 10 million = €1.3 million) with the help of FinTech venture capital company Source Code Capital. [Galactic Energy](#), founded in 2018, received a €13.9 million investment in series A+ round, in order to develop reusable kerolox engines.

In January, the China Great Wall Industry Corporation (CGWIC) announced a Multiple Launch Services Agreement (MLA) with Argentinian company [Satellogic](#): 13 remote sensing smallsats will be delivered to LEO on a LM-6 rocket this year. This is the first international payload for a Long March launcher.

### EMERGING SPACE NATIONS

#### Australia builds up capacity

The Australian rocket company Gilmour Space Technologies presented its '[One Vision](#)' rocket. A live demonstration of the rocket, featuring the anticipated automated mobile launcher, was planned in February. The company aims to launch its first commercial payload to LEO in 2020.

#### Brazil private sector partnering to enhance services

This quarter, private space ventures took place with the signing of a contract between [Telespazio Brasil](#) and [Petrobras](#) for the applications of Telespazio's COSMO-Skymed satellites data to detect oil spills. In telecommunications, the Brazilian telecommunications TIM Brasil partnered with [Gilat Satellite Networks](#) Ltd. for the deployment of TIM Brasil's 4G network.

#### South-East Asian space companies eye at a growing space sector demand.

Earlier this year, Singapore-based satellite operator [Kacific](#) has announced the signing of a contract worth €8.9 million with communications satellite manufacturer Newtec, for the Newtec Dialog VSAT multiservice platform. [SpaceChain](#), also a Singaporean company, announced it will start operation in Europe through Catapult, in the UK.

Furthermore, Hong Kong-based [AsiaSat](#) announced €163.5 million in revenues for 2018 - underlining that its core fleet of 5 satellites reached an overall fill rate of 72%, which probably predicts the need for additional satellites to join its network.

Finally, Thai NewSpace company [mu Space](#) declared it is fully ready at bidding for NASA's projects as well as lunar exploration contests. The CEO of mu Space pointed out that it is seeking to grab a share of the future [IoT market](#), which he estimates at €96.28B in 2020, and is building partnership with high profile space startups. The Thai space startup announced its first rocket ([Terran 1](#)) will be built using the 3D printing techniques developed by Relativity.

# SPACE INDUSTRY AND INNOVATION

## LAUNCHERS

### P120C booster reaches new landmark

The [P120C solid rocket booster](#) (designed as a booster for Ariane 6 and a first stage for Vega-C), passed a second test with flying colors at Europe's Spaceport in French Guiana last January, where it was fully loaded (142t of fuel) and static fired for 135 seconds. The P120C booster is currently being developed by ESA, CNES and Europropulsion (Avio and ArianGroup joint venture). A second qualification model will be tested later this year for an Ariane 6 configuration.

### European Micro Launchers continues development

In late February, Spanish Minister of Science, Innovation and Universities Pedro Duque inaugurated the new facilities of [PLD Space Propulsion](#) at Teruel Airport, where the MIURA 1 Micro Launcher will be tested. This project is supported by ESA's funding for feasibility studies of projects to be developed by private European industry, as part of its [Future Launchers Preparatory Programme](#) (FLPP). These include the Spanish PLD Space, the joint Spanish-British Deimos and Orbex AZμL project, the German MT Aerospace, and a Vega-derived project from the Italian company Avio.



### SpaceX's "Starship" takes shape

The fully-reusable second stage part of the planned SpaceX BFR rocket, Starship, went through testing phase in the beginning of year. A test model was built to conduct studies on the integration of the Raptor engine. Two firings took place in the beginning April, one [static](#) and another one which [lifted](#) the test vehicle at about a meter.

### Alternatives in fuels being explored

Researchers from McGill University published a paper in [ScienceAdvances](#) which opens the path towards a cleaner, safer rocket fuel which could give an answer to the danger of working with [Hydrazine-based fuels](#). In parallel, NASA signed a \$5.2 million contract with [Auburn University](#) to develop possibilities of improving liquid engine performance.

## EARTH OBSERVATION

### In-Orbit servicing takes a step forward

Innovation in LEO operations also reached a milestone through the announcement of the construction of the [Restore-L project](#), which aims at refueling a satellite in LEO. Developed by Maxar, the payload is scheduled to be put in orbit in 2022. The test mission of the Restore-L project will be to rendezvous with, refuel, and safely release the U.S. Geological Survey's Landsat 7 remote sensing satellite in LEO.

### New SAR payload aims at stowage efficiency

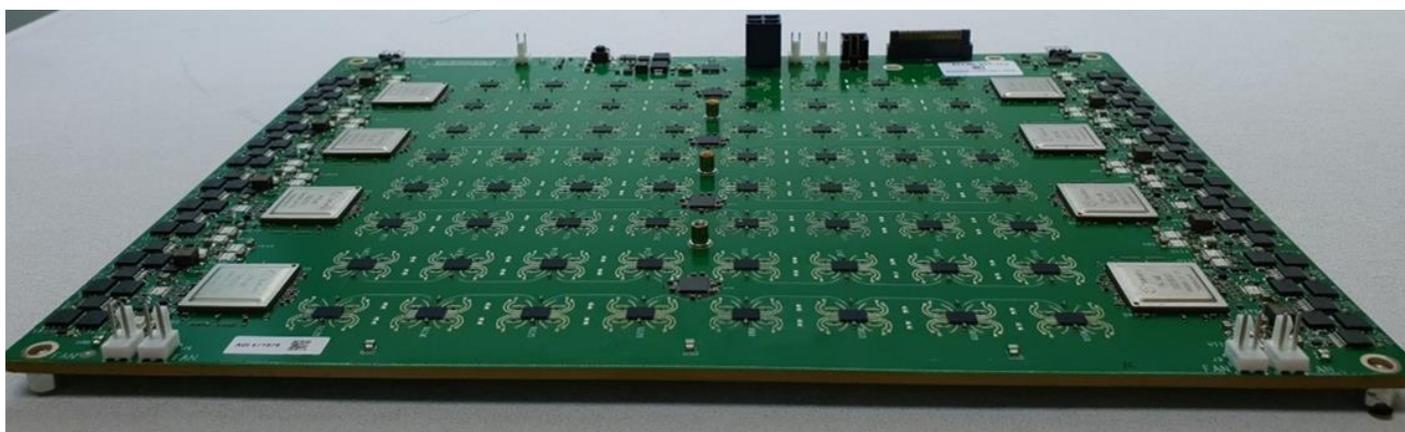
Surrey Satellite Technology Ltd. and Oxford Space Systems have been awarded funding from the National Space Technology Programme to develop a [next-generation of Synthetic Aperture Radar](#). The objective of the system is to achieve cost-efficiency, notably by reducing stowage, and therefore reducing the costs.

## TELECOMMUNICATIONS

### Next-generation laser communication pushed by European stakeholders

The German Aerospace Centre (DLR), in a public-private partnership with Airbus and ESA, passed a milestone in the development of the new generation of global constellation ([European Data Relay System](#)) providing laser communications in space, by successfully making its 20,000<sup>th</sup> optical link. Currently used for Copernicus, it will emit from the International Space Station later this year.

Successful collaboration between the University of Stuttgart and DLR also extend to Earth monitoring, with the first transmission of the Optical Space Infrared Downlink System ([OSIRIS](#)) laser communications



Credits: SatixFy l.t.d.

terminal.

[SatixFy UK Limited](#) is introducing the world's first ESMA (Electronically Steered Multi-Beam Array) Ku-band 256 element array antenna. Using digital beam forming technology allows the antenna to handle wide bandwidth using a large number of antenna elements and without beam squint. Due to its unique digital features, nulls can be directed towards specific interferers.

### MegaMan leverages AI for constellations

2Operate and GomSpace, together with Aarhus University, are working together within the [MegaMan project](#), funded by Innovation Fund Denmark, to evaluate how existing telecom standards and existing artificial intelligence (AI) solutions developed for the terrestrial telecom sector can be leveraged to manage future satellite constellations robustly and efficiently.

### Canada releases satellite imagery to public

In the Earth Observation sector, the Canadian Space Agency released 36.500 images collected by the [RADARSAT-1](#) satellite, under the Canadian Open Government initiative.

### China intensifies space-based communications

The China Academy of Space Technology launched in April a second-generation relay satellite for [space-based communications](#), which is designed to carry twice as much data as its predecessors.

## HUMAN SPACEFLIGHT

### DLR aims at long-term manned presence in space

DLR and the University of Stuttgart, are also working with Airbus to [develop a photobioreactor](#) to be tested on the International Space Station. The experimental system aims at converting CO2 into oxygen and biomass.

### U.S. Human spaceflight marked by setbacks and breakthroughs

NASA's ["twin studies" results](#) was published this April: among the many findings, a key discovery concerns the immune system, which is proven to be working in space exactly as it does on Earth.

The Boeing Starliner will carry aboard for testing the ECLSS ([Environmental Control and Life Support Subsystem](#)), which is designed to provide Earth-like atmosphere for the crew. A first crewed flight is planned this year. Designed by Collins Aerospace, elements of the environmental system will include a range of compact components (from thermal regulation to carbon dioxide removal).

On the other hand, late April, the Dragon Crew Capsule was reportedly lost due to a [malfunction of the SuperDraco](#) thrusters during testing.

### Russian solution to dirty spacesuits?

Energia Space Rocket Corporation announced developing a [washing machine](#) for future lunar expeditions. It would not use water, but rather a high pressure system which would transform the carbon dioxide exhaled by astronauts into a liquid aggregate which could clean the crew's suits.

### Japanese university develops space fire extinguisher

The Department of Mechanical Engineering at Toyohashi University of Technology developed a new system of [fire extinguisher](#) dedicated to space-use. Contrary to the current system in use which sprays CO2 gas, this new Japanese concept "vacuums" the combustible product in order to isolate it and put the fire out. This technique, still in development, is particularly targeted for "unusual fires", notably metal powder fire.

## SCIENCE

### Resistant Material researched to provide new solution for exploration

Scientists at the Central South University in Hunan Province announced having developed a new heat-resistant material dedicated to [hypersonic](#) aircraft, which could withstand temperatures over 3,000 degrees for a sustained period of time.

# SPACE ACTIVITY OVERVIEW

## KEY INDICATORS AND GRAPHS

### METHODOLOGY NOTE

ESPI is tracking all launch events and related data since 2000. The ESPI Space Launch Activity Database encloses those worldwide data allowing for detailed quantitative analysis rendered into graphs and charts.

The database is a repository of publically available information on global space activity such as:

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

The database architecture allows the user to create dedicated field and categories to tailor specific analysis.

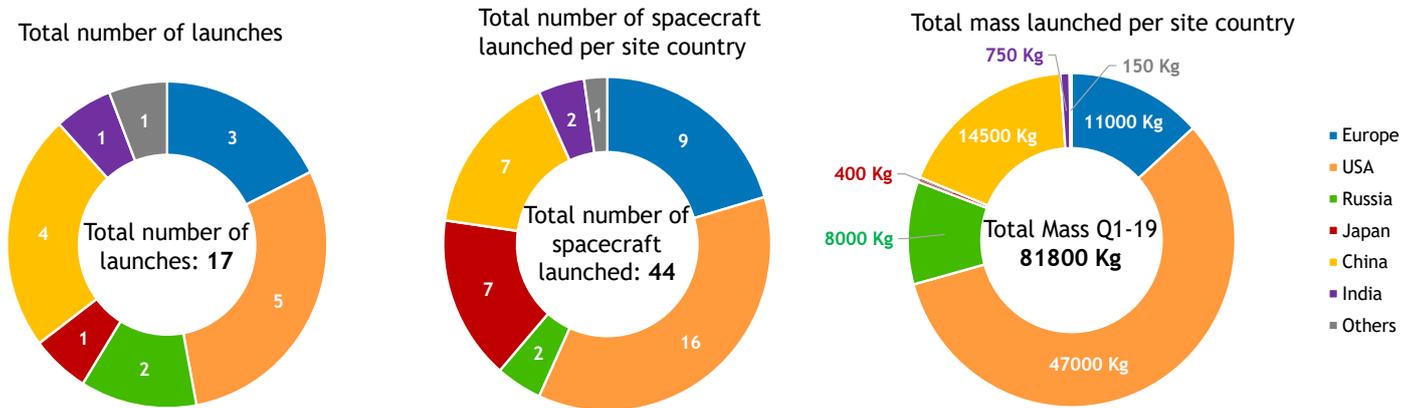
In order to provide the reader with a spacecraft's categorization taking into account both the capacity of the launchers and the different sizes of satellites, ESPI team defined and applied to the dataset the following categories:

<b>Large spacecraft</b> <b>&gt;500kg</b>	Extra heavy-class	>8,000kg
	Heavy-class	2,000-8,000kg
	Medium-class	500-2,000kg
<b>Small spacecraft</b> <b>&lt;500kg</b>	Mini-class	100-500kg
	Micro-class	10-100kg
	Nano-class	<10kg

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

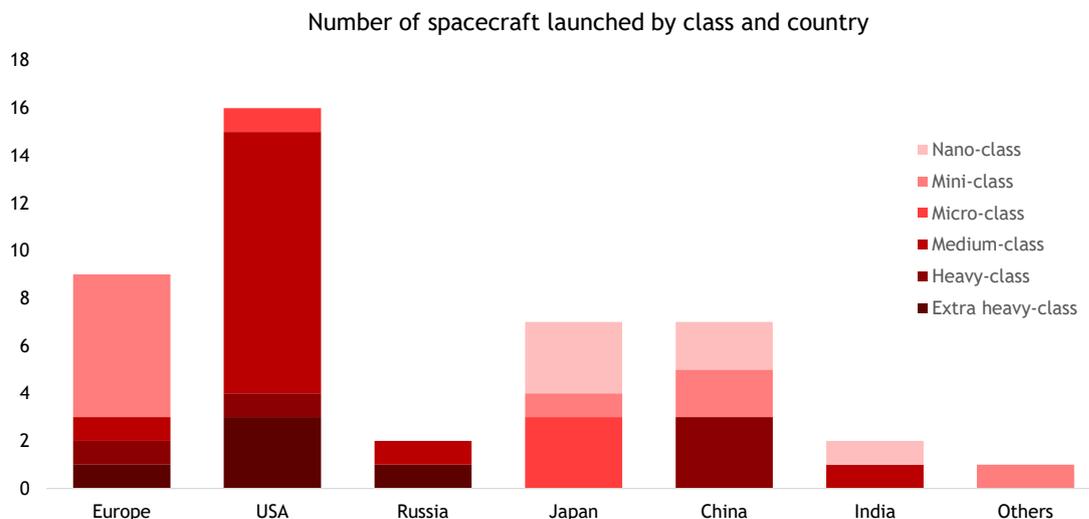
## Launches by country

In terms of mass and spacecraft launched in Q1 2019, the overall launch activity reflects the current state of competition, largely dominated by the U.S. (almost 50t with 16 satellites). Europe, Russia and China share most of the rest of the total satellites launched in orbit (between 8t to 14t), although the number of satellites sensibly differs (9 for Europe, 2 for Russia, 7 for China). Visibly with less than 400 kg of mass launched in orbit Japan deployed a total of 7 satellites in a single launch.



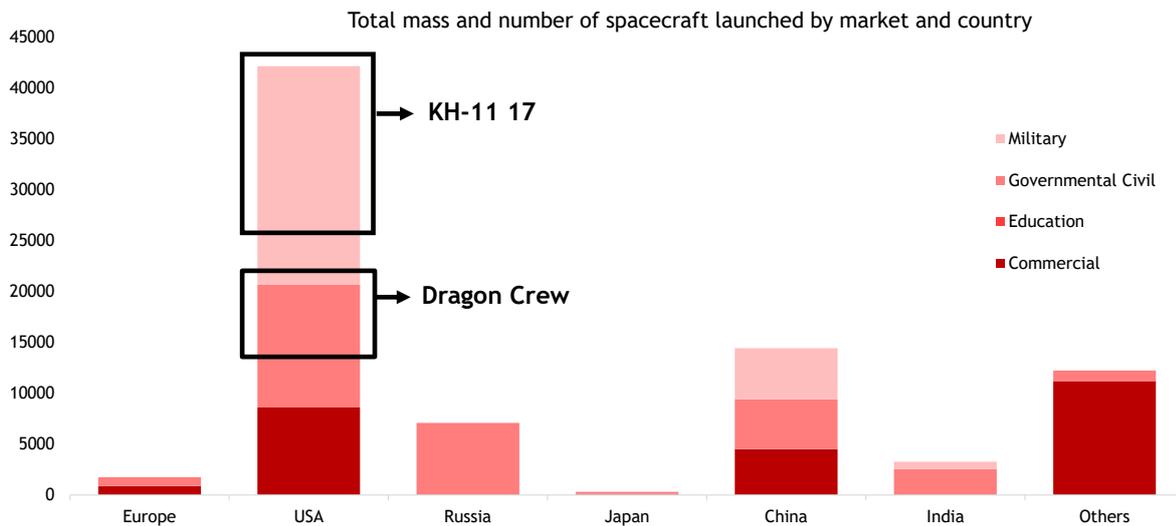
## Spacecraft launched by class

Among the full set of satellites launched during Q1 2019, 5 can be classified as extra heavy class, the heaviest being the KH-117 (15.25t) satellite launched to LEO for the National Reconnaissance Office (U.S.A.). The U.S.A. moreover sent 2 telecommunication satellites to GEO, weighing over 4t: WGS 10 (around 6t), a military telecommunications satellite for the U.S. Air Force, and PSN6 (4.1t) for the Indonesian commercial telecommunication provider PT Pasifik. Similarly, China launched three heavy class satellites to GEO, the heaviest being the Zhongxing-2D (5t) for the People’s Liberation Army. Europe sent one heavy telecommunication satellite for commercial purposes, SaudiGeoSat1 (about 6.5t). 20 Smallsats were launched this quarter, mostly for technology and demonstration purposes. Japan launched 3 Mini, 1 Micro and 3 nanosats in one launch, all from academic/research institutions, including one from the Vietnam Satellite Centre. China launched 2 nanosatellites in one launch, both for commercial purposes.



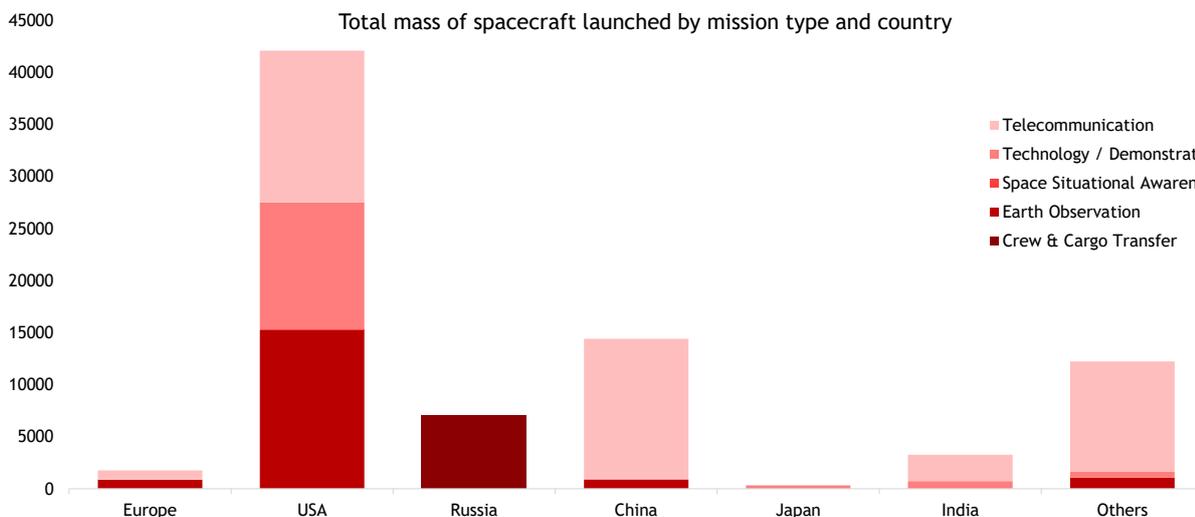
### Spacecraft launched by market

In line with previous trends the global space activity is dominated by the institutional market, with 69% of launched mass dedicated to governmental civil (35%) and military (34%) purposes. The commercial mass at launch takes the rest of the share (31%). The U.S. launched the largest volume of satellites (in mass) in all three segments, due to the launch of extra heavy spacecraft such as the KH-11 and the dragon Crew capsule. In the case of other countries, the mass reflects a concentration of mission type, as well as the diversity of the regional space sector. In the Governmental Civil sector, Europe delivered to orbit only one “Made in Europe” satellite PRISMA (879kg), the other payload being the Indian-made GSAT-31.



### Spacecraft launched by mission

In Q1 2019 the launch activity scene is yet again dominated mainly by telecommunication satellites (51.85% of total mass delivered to orbit), followed by Earth Observation (22.27%) and Technology/Demonstration satellites (17.08%). The U.S. top the share of mass launched for Earth Observation (84.35% - compared to about 15% for Russia, China and Europe combined) and Technology/Demonstration (91%), as well as for telecommunication satellites (44.39%), however closely followed by China (32.07%) and Europe (23.55%). Furthermore, the U.S. is the only spacefaring nation which launched a SSA payload this quarter (for the 0.07% of total mass), while Russia conducted the only crew transfer mission (9% of total mass launched).



## ESPI LAUNCH LOG

Launch date	Launch country	Launcher	Spacecraft name	Main customer	Customer country	Prime manufacturer	Manufacturer country	Mass (kg)	Mission	Market
10/01/2019	China	CZ-3B/G3	ZhongXing 02D / ShenTong	People's Liberation Army	China	CASC	China	5000,00	Telecommunication	Military
11/01/2019	USA	Falcon-9 v1.2	Iridium-NEXT 167, 168, 169, 170, 171, 172, 173, 175,	Iridium	USA	Thales Alenia Space	France	8600,00	Telecommunication	Commercial
15/01/2019	Iran	Safir-2	Amir-Kabir 1	Amir Kabir University of	Iran	Amir Kabir University of	Iran	100,00	Earth Observation	Education
18/01/2019	Japan	Epsilon-4	ALE 1	Astro Live Experiment	Japan	Astro Live Experiment	Japan	68,00	Technology / Demonstration	Commercial
			AOBA VELOX 4	Nanyang Technological University	Singapore	Nanyang Technological University	Singapore	2,00	Technology / Demonstration	Education
			Hodoyoshi 2	University of Tokyo	Japan	University of Tokyo	Japan	50,00	Technology / Demonstration	Education
			MicroDragon	Vietnam National Satellite Center	Vietnam	Vietnam National Satellite Center	Vietnam	50,00	Earth Observation	Governmental Civil
			NEXUS	Nihon University	Japan	Nihon University	Japan	1,00	Technology / Demonstration	Amateur
			Origamisat 1	Tokyo Institute of Technology	Japan	Tokyo Institute of Technology	Japan	4,00	Technology / Demonstration	Education
			RAPIS-1	JAXA	Japan	Axelspace	Japan	200,00	Technology / Demonstration	Governmental Civil
19/01/2019	USA	Delta-4H	KH-11 17	NRO	USA	Lockheed Martin	USA	15250,00	Earth Observation	Military
21/01/2019	China	CZ-11	Jilin-1 Hyperspectral-01, 02	Chang Guang Satellite Technology	China	Chang Guang Satellite Technology	China	900,00	Earth Observation	Governmental Civil
			Lingque 1A	ZeroG Lab		ZeroG Lab		8,00	Technology / Demonstration	Commercial
			Xiaoxiang-1 03	Spacety Co.		Spacety Co.		8,00	Technology / Demonstration	Commercial
24/01/2019	India	PSLV-DL	Kalamsat v2	Space Kidz India	India	Space Kidz India	India	1,00	Technology / Demonstration	Education
			Microsat-R	DRDO		DRDO		740,00	Technology / Demonstration	Military
05/02/2019	France	Ariane-5ECA	GSAT-31	ISRO	India	ISRO	India	2536,00	Telecommunication	Governmental Civil
			HellasSat 4 / SaudiGeoSat 1	ArabSat	Saudi Arabia	Lockheed Martin	USA	6495,00	Telecommunication	Commercial
05/02/2019	Iran	Safir-1B	Dousti 1	Sharif University of Technology	Iran	Sharif University of Technology	Iran	52,00	Earth Observation	Education
21/02/2019	Russia	Soyuz-2-1b Fregat-M	EgyptSat A	National Authority for Remote Sensing and Space Sciences	Egypt	RKK Energia	Russia	1000,00	Earth Observation	Governmental Civil
22/02/2019	USA	Falcon-9 v1.2	Beresheet	SpaceIL	Israel	SpaceIL	Israel	582,00	Technology / Demonstration	Commercial
			PSN 6	PT Pasifik Satelit Nusantara	Indonesia	Space Systems Loral	USA	4100,00	Telecommunication	Commercial
			S5	Air Force Research Laboratory	USA	Blue Canyon Technology	USA	60,00	Space Situational Awareness	Military
27/02/2019	France	Soyuz-ST-B Fregat-M	OneWeb 0006, 0007, 0008, 0010, 0011, 0012	OneWeb Ltd.	United Kingdom	Airbus (0006, 0007, 0008, 0010) OneWeb Satellites (0011, 0012)	France United Kingdom	882,00	Telecommunication	Commercial
02/03/2019	USA	Falcon-9 v1.2	Crew Dragon 1	NASA	USA	SpaceX	USA	12055,00	Technology / Demonstration	Governmental Civil
09/03/2019	China	CZ-3B/G2	ZhongXing 06C	China Satcom	China	CAST	China	4500,00	Telecommunication	Commercial
14/03/2019	Russia	Soyuz-FG	Soyuz-MS 12	Roscosmos	Russia	RKK Energia	Russia	7080,00	Crew Transfer	Governmental Civil
15/03/2019	USA	Delta-4M+	WGS 10	USAF	USA	Boeing	USA	5987,00	Telecommunication	Military
22/03/2019	France	Vega	PRISMA	ASI	Italy	OHB Italia SpA	Italy	879,00	Earth Observation	Governmental Civil
27/03/2019	China	OS-M1	Lingque 1B	ZeroG Lab	China	ZeroG Lab	China	8,00	Technology / Demonstration	Commercial
28/03/2019	New Zealand	Electron	R3D2	DARPA	USA	Northrop Grumman	USA	150,00	Technology / Demonstration	Military
31/03/2019	China	CZ-3B/G2	TianLian 2A	CASC	China	CAST	China	4000,00	Telecommunication	Governmental Civil

## LAUNCH HIGHLIGHTS



### 11<sup>th</sup> January 2019: Finalisation Iridium-NEXT deployment

Iridium Communications Inc. finalized the deployment of its next-generation satellite constellation. A total of 10 satellites were put in LEO on a Falcon-9, from Vandenberg Space Launch Complex 4. This is the eighth and final launch of Iridium’s campaign to replace its original constellation. Total cost of the programme over 3 years: €2.7 billion.

### 19<sup>th</sup> January 2019: Launch of Keyhole satellite for the National Reconnaissance Organization

Originally scheduled for launch in the end of 2018, the new generation (“Block V”) Keyhole-11 17 (NROL-71) electro-optical satellite was delivered to geosynchronous orbit on a Delta-4 Heavy from the Vandenberg U.S. Air Force Base. Manufactured by Lockheed Martin for the National Reconnaissance Office, this 15t satellite is part of constellation deployment, of which another satellite (KH-11 18) is planned to be launched in 2020.



### 24<sup>th</sup> January 2019: Launch of Microsat-R, Indian ASAT target



Developed by the Indian military Defence and Research and Development Organization (DRDO), this 740kg satellite, launched to LEO on a Polar Satellite Launch Vehicle, was destroyed by an ASAT test conducted by the DRDO (“Mission Shakti”) with a Ballistic Missile Defense Interceptor launch from the Odisha coastal test range on 27<sup>th</sup> March. Read [ESPI’s Executive Brief](#) for details on the Indian ASAT Test and its implications for Europe. To go further on specific dimensions of Europe-India space cooperation, a comprehensive report released by EU Ambassador to India Tomasz Kozlowski and edited by ESPI on the occasion of the 5<sup>th</sup> Kalpana Chawa Annual Space Policy Dialogue on 30<sup>th</sup> April 2019 is [available on ESPI’s website](#).

### 27<sup>th</sup> February 2019: OneWeb's first launches a success



Credits: OneWeb

Arianespace performed the first of the planned 21 launches to put in LEO OneWeb's next generation satellites. 6 OneWeb satellites were put into orbit on a Soyuz, from the Guiana Space Centre. The dispenser (purpose-built by Swedish company Ruag Space and installed on the Fregat upper stage) was planned on releasing the first two satellites 63 minutes after liftoff, the last four remaining satellites 29 minutes later. Signal acquisition was confirmed for all satellites shortly after. The satellites are manufactured by OneWeb Satellites, a joint venture between OneWeb and Airbus Defence and Space. More than 600 OneWeb satellites are planned to be manufactured and launched in order to provide global coverage - knowing that the International Telecommunications Union gave the company until 29th November 2019 to start operating in its allocated Ku-band radio spectrum. OneWeb aims at launching 60 satellites per launch ever month, and to that end multiplied launch agreements with various providers, including Blue Origin and Virgin orbit.

### 2<sup>nd</sup> March 2019: U.S.A. one step closer to independent access to ISS

The Crew Dragon is a transfer vehicle designed to dock to the ISS, under the Commercial Crew Integrated Capability (CCiCap) initiative. The 12t unmanned capsule was launched on a Falcon 9 from Cape Canaveral Launch Complex, docked to the ISS the following day, and splash downed to Earth on 8<sup>th</sup> March. This marks a decisive step for the U.S.A. to recover its independent capacity to send crews to the space station. The last U.S. crewed launch dates back to the 135<sup>th</sup> and last Space Shuttle mission (Atlantis), in July 2011.



# About ESPI

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

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

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

More information on ESPI is available on our website: [www.espi.or.at](http://www.espi.or.at)

## About ESPInsights

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

The publication is organised around four thematic sections:

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

Available for download from ESPI website:

[www.espi.or.at](http://www.espi.or.at)

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