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THIS MONTH IN THE SPACE SECTOR…

EUROPEAN PRIVATE SPACE INVESTMENTS: CREATING GROWTH AND RESILIENCE IN A CONTESTED MARKET

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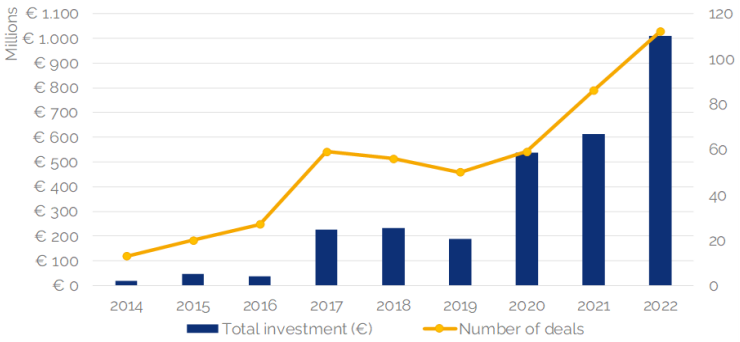
EUROPEAN PRIVATE SPACE INVESTMENTS: CREATING GROWTH AND RESILIENCE IN A CONTESTED MARKET

Private investment in space is one of the key enabling components for the accelerated growth of the space sector and for increasing the benefits for society and the economy. ESPI is about to publish its 5th edition of the Space Venture Europe Report, providing a complete overview of private investment trends in the European space sector. 2022 marks a ground-breaking year for Europe with over €1B invested into European space startups in over 112 deals, more than 65% up since 2021. This is a conservative estimate as it does not include the volume of investment of another 23 undisclosed transactions. Private space investment in Europe has seen a compound annual growth rate (CAGR) of close to 60% since 2014, with a real step-change since 2020. Over that period, European space start-ups have raised a total of €2.9B (not including OneWeb). While significant, it remains minimal when compared to what has been raised in the rest of the world and notably in the U.S., which saw a total invested amount into New Space companies of about €8B in 2022.



Investment value and number of deals per year (OneWeb not included)

In an ESPI Executive Brief, ESPI elaborated on changing structural conditions that could put the New Space model and financing notably in Europe at risk. The Brief anticipated that a combination of supply chain shortages, worldwide inflation, geopolitical tensions and an aggressive rise in interest rates could adversely impact the growth in the industry. Additionally, the sharp increase in interest rates and the poor performance of recently publicly listed space companies was seen as triggering a shift away from space towards sectors associated with lower risks, potentially constraining the influx of capital into the space sector. Yet, in early 2023, Europe has seen an unprecedented backing in some of the more established New Space actors:

- On January 19th, ClearSpace announced a €26.7M series A financing round.
- On February 2nd, The Exploration Company announced a €40.5M Series A.
- On February 7th, Exotrail announced a €54M series B round.
- On March 28th, Isar Aerospace announced a Series C round of €155M.

Beyond these larger deals, Europe has also seen a range of pre-seed and seed deals as well as a few acquisitions. This positively coincides with a few larger scale ESA and national contracts for space startups, and illustrates the critical role of public actors, as risk takers, early adaptors and anchor customers. However, moving forward, Europe's New Space sector needs to navigate a complex landscape characterised by remarkable growth in private investments, while simultaneously adapting to continued uncertainties arising from supply chain disruptions, inflation, and geopolitical unrest. In light of this, questions arise regarding the suitability of Venture Capital alone to support the scale-up required in the coming years. The market is undergoing a fundamental transformation, and traditional investment approaches that prioritise shorter term profitability are likely to increasingly shy away from a sector characterised by high risk, long development cycles, substantial capital requirements, and limited exit opportunities. European space startups and emerging New Space actors should promptly explore alternative sources of investment that may be better suited for the years ahead and take note of best practices from around the world. This should include government-backed loans, corporate venture capital, pension funds, and strategic partnerships. Conversely, European institutions must recognise that, in order to effectively support the further growth of this sector, increased flexibility and new tools are required as part of their support strategies. This is also essential at a time when Direct Foreign Investment becomes a concern in a changing geopolitical context and to institutional programmes.

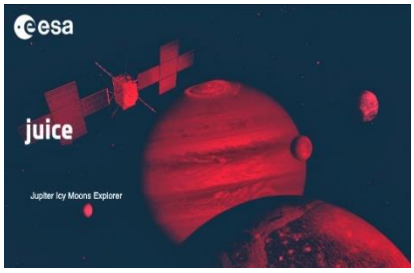
Only by introducing also alternative ways of private investment and public support, Europe can maintain its momentum in the New Space revolution and ensure long-term stability and resilience in a rapidly growing and highly competitive market.

Yours sincerely,

Hermann Ludwig Moeller
Director of ESPI

POLICY & PROGRAMMES

Exploring the gas giant: ESA's Jupiter Icy Moons Explorer (JUICE) mission launches



Credit: ESA

On April 24th, ESA's Jupiter Icy Moons Explorer (JUICE) mission launched aboard an Ariane 5 rocket from Europe's spaceport in Kourou. On April 15th, ESA reported that the JUICE spacecraft has sent first "selfies" (monitoring camera images) from space. In reaction to the launch, ESPI gave an interview for an article for space.com on the JUICE mission. End of April, it was reported that the JUICE spacecraft's ice-penetrating Radar for Icy Moons Exploration (RIME) antenna was not yet deployed as planned – so far only a third of its full intended length (16 meters), as movements of the antenna are monitored on a daily basis. The ESA Mission Control Center (ESOC) in Darmstadt is trying to solve the issue, with an engine burn and a series of rotations to shake the spacecraft as a next step to fully deploy the antenna.

The mission's objective is to study Jupiter and its three biggest moons Ganymede, Callisto and Europa, which are expected to harbour big liquid-water oceans beneath their icy shells, to investigate whether there are habitable environments. The JUICE mission carries a set of 10 science, remote sensing, geophysical and in situ instruments, includingan optical camera system, spectrometers, a radar sounder, a laser altimeter, a magnetometer, and particle analyzers.

During the mission, the JUICE will conduct four separate "gravity assist" planetary flybys, with the first to take place in August 2024, involving the Earth and Moon – which makes JUICE the first spacecraft ever to perform such a "lunar-Earth gravity assist". The second gravity assist from Venus will is scheduled in August 2025. Then JUICE will swing by Earth for two more gravity assists in September 2026 and January 2029. After this final Earth encounter, the solar-powered probe will reach Jupiter in July 2031, followed by another flyby of JUICE to insert itself into Jupiter's orbit. Then the three moons will be observed over the course of 35 flybys between 2031 and 2034.

ESA, SNSA and Axiom Space sign agreement to send an ESA astronaut to the ISS


Credit: Axiom Space

On April 18th, at the Space Symposium in Colorado Springs, ESA, the Swedish National Space Agency (SNSA) and Axiom Space signed a Letter of Intent to send a Swedish ESA astronaut to the ISS on an upcoming Axiom Space mission for a 10-day visit, focusing on scientific research and educational outreach. The mission and the astronaut's name will be announced after the approval of NASA, other international ISS partners and Axiom Space. ESA will be the mission's crew provider, will prepare the required operational support for the flight, and will sign an agreement with Axiom Space for the definition and implementation of the mission jointly designed by ESA and the SNSA. The agreement marks a first commercial human spaceflight for an ESA astronaut. ESA Director General Josef Aschbacher stated that "the ESA astronaut policy was developed for exactly these opportunities, flying on commercial flights in partnership as we transition Europe's access to space and diversify the space market".

April sees a boost for Indian space ambitions

Indian Space Policy 2023 was approved

Credit: Vectomart

In April, the Indian Cabinet Committee on Security and the Central Government of India approved the Indian Space Policy 2023, which was published on April 20th. The policy aims to provide a framework for India's space sector for the next decade, boost research, academia, start-ups, and industry and provide a boost to India's space missions. With regard to India's space governance, the policy aims to enhance the role of the Department of Space, boost ISRO's activities and delineate the roles and responsibilities of (1) the Indian Space Research Organisation (ISRO), (2) the public sector undertaking/commercial arm of the Department of Space NewSpace India Limited (NSIL), and (3) the public-private mediator the Indian National Space Promotion and Authorization Center (IN-SPACe), which was recently created. In particular:

- ISRO will focus on R&D of advanced space technologies.
- IN-SPACe will be the interface between ISRO and non-governmental entities.
- NSLI will carry out strategic activities related to the space sector in a demand-driven mode and will conduct the operational part of ISRO's missions.

With regard to commercialisation and involvement of the private sector, the policy aims to further open up the Indian space sector to private players by facilitating private sector participation in the Indian space sector. In particular, this will allow India's private sector participation in end-to-end space activities, including the development and manufacturing of satelliteslaunch vehicles, data collection and dissemination. Beyond the new policy but related to the commercialisation objectives of the policy: the Indian space economy is projected to grow to $600B (from $447B in 2020) by 2025, according to estimations and forecasts published by Ernst & Young**.**

The G20 Space Economy Leader Meeting took place in India

Furthermore April saw India host the G20 Space Economy Leader Meeting that - as a precursor event under India's G20 Presidency. -, ESPI Director H. Ludwig Moeller presented the HLAG report on Revolution Space and its call for Europe to also step up its ambition, while linking it with the perspective of India. Moreover, according to ISRO, India is currently considering to sign the U.S.-led Artemis Accords, with ISRO having submitted an internal report to the Indian government.

India successfully landed a reusable space plane prototype for the first time

Also in April, India successfully landed a reusable space plane prototype for the 1st time. This "Reusable Launch Vehicle Autonomous Landing Mission (RLV LEX)" operated in a test facility of India's Defence Research and Development Organisation, is the second of four experiments designed to get its robotic Reusable Launch Vehicle (RLV) ready for space.

The French MoD allocates €6B of the LPM for military space budget for 2024-2030

France's 7-year Military Program Law (LPM) published on April 4th with a €413B military programme budget, allocates €6B on military space programmes between 2024 and 2030. This encompasses previously announced investment in ground- and space-based technologies to defend and protect from satellites approaching French military space assets. The 7-year Military Program Law (LPM) published April 4 foresees a total military program budget of 413 billion euros, including several billion euros in aid to Ukraine.

IRIS² Kick-off: The way forward for European industrial cooperation

A newly formed consortium of European space and telecommunications companies signed a partnership agreement to bid for the European Commission's call for tender for the European satellite constellation IRIS². The consortium is led and coordinated by Airbus D&S, Eutelsat, Hispasat, SES and Thales Alenia Space and further consists of Deutsche Telekom, OHB, Orange, Hisdesat, Telespazio, and Thales, while remaining open for other participants, encouraging start-ups and SMEs to join. The consortium will create a multi-orbital state-of-the-art satellite constellation which is interoperable with the terrestrial telecoms ecosystem, will provide commercial services and will link commercial and government infrastructure provide commercial services. The objective of the IRIS² programme is to provide initial services in 2024 by using already existing satellite infrastructure, with full service delivery in 2027 - relying on the progress of Ariane 6 to launch the large satellites.

The Swiss Federal Council adopts its 2023 Space Policy

The Swiss Federal Council adopted the Swiss Space Policy 2023 - an updated version of a policy last revised in 2008. The published Space Policy document provides a general framework for Switzerland's commitment to space, considering various strategic documents, and will provide benefit for the Swiss society, science, businesses. The policy will boost innovation in and competitiveness of Switzerland. Prioritised topics and applications are Environmental Monitoring, Weather Observation, PNT, Communication, Research and Innovation, and Space Exploration. The policy defines the Federal Council's role and responsibilities in the space sector. The policy will be implemented by the different departments in their areas of responsibility, and programmes and projects will be funded through targeted instruments. The several departments will submit a progress report on the implementation of the policy by end of June 2027 to the Federal Council.

The policy outlines 3 strategic priorities and subordinated for each priority 2 areas of activity:

1. Access and Resiliency
- Securing access
- Strengthening security
- Promoting sustainability in outer space

2. Competitiveness and Relevance
- Promoting excellence in science
- Strengthening competitiveness
- Intensifying cooperation

3. Partnerships and Reliability
- Strengthening international law and global governance
- Contributing to shaping European space governance
- Developing national framework conditions

Russia allocates over $3.1B for space in 2023 and plans to use the ISS until 2028

According to a statement of Russia's president Vladimir Putin during a meeting with the Head of Roscosmos Yury Borisov on the current state and future development of the space sector, Russia will allocate a $3.1B budget for space activities. In 2022 the budget for space was $2.7B. Moreover, Russia stated that it plans to use the ISS until 2028. Last year, Russia stated to quit the ISS at some time after 2024.

NASA and CSA appoint astronauts for Artemis II, Canada to develop lunar rover

Credit: NASA

On April 3rd, the NASA and the Canadian Space Agency (CSA) announced the 4 astronauts for the first crewed Artemis mission Artemis II, Commander Reid Wiseman (U.S.), Pilot Victor Glover (U.S.), Mission Specialist 1 Christina Hammock Koch (U.S.), and Mission Specialist 2 Jeremy Hansen (Canadian). The crew will conduct tests and demonstrations during the 10-days flight test around the Moon which is planned to launch in late 2024 to prove *i.a.* the life-support systems of the Orion spacecraft.

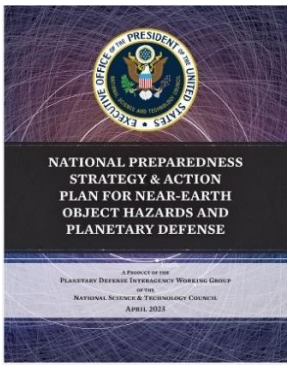
Moreover, beyond Canada's contribution to the Gateway by the provision of the Canadarm3 robotic arm system, the Canadian government announced in the frame of the release of the federal budget the objective to spend $1.2B from 2024 over a period of 13 years, to develop a robotic lunar **rover** ("lunar utility vehicle") in order to support human Moon exploration in Artemis.

The White House publishes new Planetary Defense Strategy

In April, the White House Office of Science and Technology Policy released the National Preparedness Strategy and Action Plan for Near-Earth Object Hazards and Planetary Defense 2023. The new strategy is an updated version of the first U.S. first comprehensive Near-Earth Object Preparedness Strategy and Action Plan from 2018.

The new strategy outlines 6 key goals for the next decade:

- EnhancingNEO detection, tracking, and characterisation capabilities;
- Improving NEO modeling, prediction, and information integration;
- Developing technologies for NEO reconnaissance, deflection, and disruption missions;
- Increasing international cooperation on NEO preparedness;
- Strengthening and routinely exercising NEO impact emergency procedures and action protocols;
- Improving The U.S.'s management of planetary defense through enhanced interagency collaboration.



Credit: White House

Australia contracts industry to enhance domestic defence space capabilities

Australian Department awards Lockheed Martin $2.8B space defence contract

Moreover, the Australian Department of Defence directly awarded the U.S. company Lockheed Martin Australia's biggest ever defence space contract worth $2.8B to build a satellite and ground station architecture for Australia's first military satellite programme JP 9102. The new system which will is expected to enhance the resilience, agility, and flexibility of the Australian defence's military satellite capability.

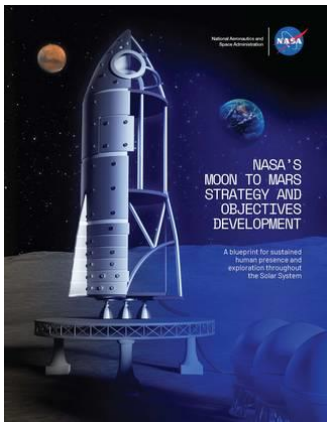
Australia's Defense Space Command awards Fleet Space $4.2M contract for ASCEND2LEO

The Australian Defense Space Command contracted the Australian company Fleet Space Technologies with a $4.2M contract for the ASCEND2LEO programme, which will use Space Fleet's commercial Centauri satellites for the development and demonstration of a LEO satcom system, focused on tactical communications and data transmission in situations and areas of limited connectivity.

Additionally, the consortium, composed of the Defence Science and Technology Group (DSTG), Fleet Space Technologies, University of South Australia, Rice Satcom Pty Ltd, and SmartSat CRC, use R&T to demonstrate military LEO capabilities. This contract marks Fleet Space's first defence contract.

NASA progresses with Moon-to-Mars ambitions

NASA unveils refined Moon-to-Mars Exploration Strategy and details on planned architecture



Credit: NASA

During the Space Symposium, NASA released an updated Moon to Mars strategy "NASA'S Moon to Mars Strategy and Objectives Development - A blueprint for sustained human presence and exploration throughout the Solar System", describing NASA's plans for the Artemis missions to the moon and how these plans find their place in a set 63 final objectives for NASA's long-term Moon to Mars human spaceflight mission plans, with a crewed Mars mission tentatively scheduled for the late 2030s/early 2040s. The defined objectives cover 4 areas: (1) science, (2) transportation and habitation, (3) lunar and Martian infrastructure, and (4) operations. The strategy sets out 3 categories of benefit: (1) Science, (2) National Posture, and (3) Inspiration. The revised strategy is based on the Moon to Mars Objectives published in September 2022, and a result of a public consultation as part of NASA's overall Moon to Mars strategy, which seeks to develop a roadmap with U.S. and global space stakeholders' input.

Complementary to the revised strategy, NASA released the Moon-to-Mars Architecture Definition Document and several White Paper documents on the technical architecture of its plans, including the Architecture Concept Reviews (ACR) 2022. The ACR 2022 sets out areas of cooperation in (1) power infrastructure and distribution, (2) communication and navigation, (3) lunar environment mitigation, (3) robotics and mobility, (4) logistics, (5) utilization operations, (6) lunar sampling and curation, (7) habitation and crew health systems, (8) exploration systems and operations analog testing.

NASA establishes new Moon-to-Mars Program Office at NASA Headquarters

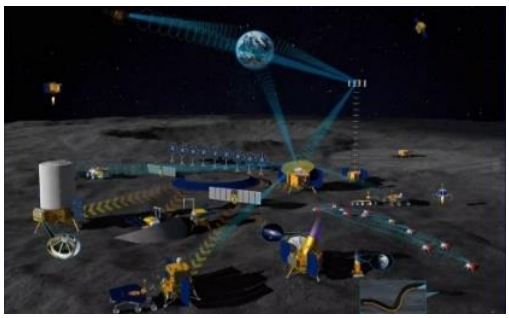
NASA established a new Moon to Mars Program Office at NASA HQ in Washington D.C., which is responsible to carry out NASA's human exploration activities on the Moon and Mars under the Exploration Systems Development Mission Directorate. The new office will lead planning and analysis for developments to support human Mars missions, focusing on hardware development, mission integration, and risk management functions to prepare for human missions to Moon and Mars, including the Space Launch System rocket, the Orion spacecraft, ground systems, human landing systems, Gateway, and spacesuits. The office is led by the Deputy Associate Administrator Amit Kshatriya, former Acting Deputy Associate Administrator for Common Exploration Systems Development.

NASA selects 12 companies for technology development for its Moon-to-Mars ambitions


Credit: NASA

In April, NASA selected 16 proposals from 12 U.S. companies under its 2022 Announcement of Collaboration Opportunity (ACO) to advance technologies and capabilities, such as testing a lunar rover design, developing a robotically assembled power system and an electrically actuated device to join in-space propellant transfer lines, to support to NASA's Moon to Mars objectives. The 12 companies are Aerojet Rocketdyne (2 proposals), Blue Origin (2 proposals), The Boeing Company, Canopy Aerospace, Lockheed Martin Corporation (3 proposals), Maxar, Phase Four, Psionic, LLC, Roccor, LLC (Redwire), Sierra Space, Stratolaunch, Venturi Astrolab. The proposals will run under an unfunded Space Act Agreements, under which NASA will provide access to its facilities and technical expertise. The agreements are supported with a general total estimated value of NASA resources of $14.5M.

China creates organisation for ILRS coordination and invites Venezuela to join ILRS



Credit: CNSA

The China National Space Administration (CNSA) announced to soon establish an organisation to manage and coordinate the China-led International Lunar Research Station (ILRS), formalised by an agreement to be signed by the ILRS founding members before June. On April 25th, the CNSA and the Asia-Pacific Space Cooperation Organization (APSCO) signed a joint statement on ILRS cooperation. Beyond, CNSA signed cooperation agreements with several countries, including Russia, Argentina, Pakistan, the UAE and Brazil.

Also in April, during a bilateral meeting of the Bolivarian Agency for Space Activities (ABAE)'s Executive Director Marglad Bencomo and CNSA's former Deputy Director at China's new national Deep Space Exploration Laboratory (DSEL), China invited Venezuela – as the first country – to join the China-led International Lunar Research Station (ILRS) project, whose construction is planned to start at the beginning of the next decade. The meeting concluded with Venezuela expressing the intent to sign a MoU with China for the ILRS project.

Two calls for proposals by the UK Space Agency

The UK Space Agency (UKSA) has recently released two calls for proposals.

The first call is aimed at the ESA Earth Observation programme, InCubed2, and is soliciting proposals from UK entities interested in creating innovative and commercially feasible products and services that utilise or derive value from Earth observation datasets and imagery. The agency has earmarked £1,4M of funding for projects from both industry and academia and they will be limited to a maximum of 18 months and should demonstrate commercial readiness upon completion.

The second call is for the International Bilateral Fund (IBF), which aims to strengthen the partnerships of the domestic space sector with strategic and emerging space nations. UKSA is investing up to £20 million in IBF projects to contribute to the development of UK capabilities and research base, as outlined in the National Space Strategy. Interested parties can submit proposals of up to £75K for up to 4 months in duration under the concept call.

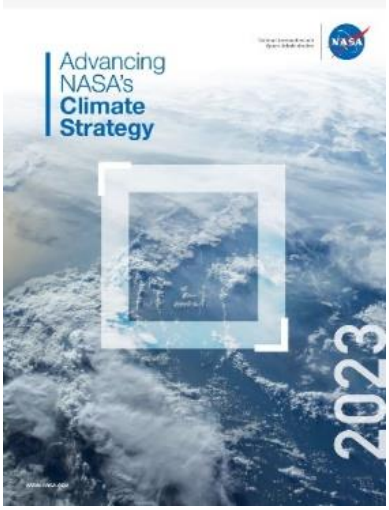
The U.S. and South Korea agree to enhance space cooperation

On April 25th, during a U.S. visit of South Korea's President Yoon Suk-yeol, the U.S. and South Korea signed a "Joint Statement of Intent for Cooperation on Space Exploration and Science" to enhance space cooperation in areas of mutual interest, such as lunar exploration, Earth and space science, space communications and navigation. South Korea and the U.S. are already cooperating on South Korea's first and currently ongoing lunar mission, with the Danuri orbiter carrying the NASA-funded camera instrument "ShadowCam".

Credit: NASA

NASA releases Climate Strategy

NASA published the "Advancing NASA's Climate Strategy" document which declares NASA's "continued commitment to lead on climate" and assesses NASA's climate portfolio, including science and exploration efforts, and beyond NASA mission directorates and facilities.



Credit: NASA

The strategy outlines 4 key priorities:

- Innovate
- Inform
- Inspire
- Partner

This year, new missions will be online to observe air pollution (TEMPO), the Earth's water to improve climate models (SWOT), and the storm intensity (TROPICS).

Moreover, NASA started monitoring air pollution in North America by using satellites. The air pollution monitoring is a joint initiative of NASA, the Centers for Disease Control and Prevention and the National Institutes of Health.

The Netherlands features space in recently adopted security strategy

In April, the Netherlands published the "Security Strategy for the Kingdom of the Netherlands". The strategy is divided in 3 main parts: (1) Threats to national security", (2) Strategic Course, (3) Control over national security. With regard to space, in one of 10 defined priorities for 2023-2029, the strategy declares space as a key sector and calls to "focus on developing technology leadership in key sectors (including the semiconductor, quantum and space industries)".

Poland and the U.S. sign agreement to share SSA data

On April 19th, during the Space Symposium in Colorado Springs, the Polish MoD, the Polish Space Agency, and the USSPACECOM signed an agreement for sharing space situational awareness data to enhance safety, stability, security, and sustainability of space operations.

The Federal Communications Commission (FCC) launches Space Bureau

Credit: FCC

The Federal Communications Commission (FCC) launches Space Bureau. The creation of the new bureau was proposed by Jessica Rosenworcel and approved by the FCC in January. The reorganisation splits the International Bureau into two bureaus: the Space Bureau and the Office of International Affairs (OIA) - with the objective to better handle the FCC's increasing workload in the industry. The OIA is led by Ethan Lucarelli, while the Space Bureau is led by Julie Kearney.

In other news

The Netherlands, Austria and Italy joined the U.S.-led ASAT test ban: The three countries are joining the U.S., Australia, Canada, France, Germany, Japan, New Zealand, South Korea, Switzerland and the UK, bringing the number of committed nations up to 13.

ESPI joins the Paris Peace Forum's Net Zero Space Initiative: The Initiative is a multi-stakeholder platform calling to achieve sustainable use of space by 2030 by taking actions to mitigate the generation of new space debris and remediate existing debris and aiming at raising awareness at a political level and in the public at large.

NASA sets-up In-Space Servicing, Assembly, Manufacturing Consortium COSMIC: The Aerospace Corporation was selected to lead and operate the COnsortium for Space Mobility and ISAM Capabilities (COSMIC). The consortium's Kick-off meeting is planned for fall 2023.

Bahrain's Space Science Agency unveils system to track small space debris: The plans for an AI-driven nanosatellite system were showcased during the International Space Operations Conference hosted by the UAE and includes the ability to analyse data of observed debris objects' size and location and save them on board the spacecraft for transmission to ground stations.

NASA selects Jon B. Olansen to serve as new Gateway Program Manager: He replaces the retiring Dan Hartman. Prior, Olanssen was already contributing to the Lunar Gateway Program by managing the development of the HALO (Habitation and Logistics Outpost) module.

Israel Aerospace Industries (IAI) will supply Azerbaijan with two EO satellites for $120M: This supply was decided because Azerbaijan lost contact to its EO satellite (one year before the end of its mission) and to strengthen defence ties between Israel and Azerbaijan.

ASI and the Italian State Police sign an agreement to tackle cybercrimes: The prevention and fight against computer crimes involves networks and information systems that aim at supporting the institutional functions of the State Police. The agreement develops a structured cooperation between the State Police and the ASI in this field.

Germany's Social Democratic Party published a Position Paper on Germany's role space: The Paper is structured across 4 topics "Economy", "Security", "Mobility", and "Research" and highlights, among others, the need for European autonomous access to space, putting the proposal for a German offshore launch pad in the North Sea back on the table.

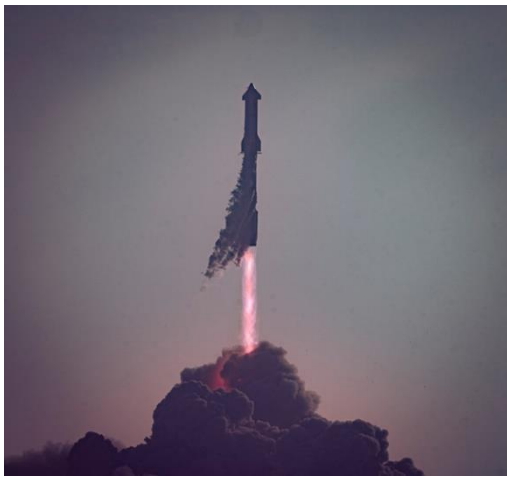
Spain joins the Square Kilometre Array Observatory (SKAO)'s radio telescope initiative: the initiative will provide member country's researchers with access to the SKAO's data. Spain is the SKAO's 9th member. Also, Germany announced its intention to join the organization.

ESPI becomes Academia Member of the International Telecommunications Union (ITU): As part of the membership, ESPI plans to continue contributing to the ongoing debates on the current challenges and bringing together space and spectrum regulators from several countries and organisations, to feed into the discussion.

Türkiye's President Erdogan announces Türkiye 's first candidates for human spaceflight: The selected candidates are air force pilot Alper Gezeravci who will fly to the ISS, and Tuva Cihangir Atasever who will serve as a reserve candidate.

INDUSTRY & INNOVATION

SpaceX launches the largest and most powerful launch vehicle ever flown: Starship



Credit: SpaceX

In June 2022, the Federal Aviation Administration (FAA) concluded an environmental review of Starship launches from Boca Chica, Texas. The review allowed launches to proceed, but the FAA required SpaceX to carry out over 75 mitigations to address concerns raised by the review.

As the last step, in April, the FAA issued a launch license to SpaceX for the first integrated test flight of the Starship/Super Heavy launch vehicle. The launch was successful in lifting off from the orbital launch pad for the first time. The vehicle cleared the pad as Starship climbed to an apogee of around 39 km over the Gulf of Mexico, which is the highest of any Starship to date.

However, the vehicle experienced multiple engines malfunctions from the very beginning of the flight test, eventually lost altitude, and began to tumble. As a result, the flight termination system was commanded on both the booster and ship. Following the flight test, the U.S. Fish and Wildlife Service documented its impacts on the neighbouring Lower Rio Grande Valley National Wildlife Refuge. The Agency reported that "at this time, no dead birds or wildlife have been found on refuge-owned or managed lands".

Nevertheless, even though Elon Musk anticipated that SpaceX would be prepared to undertake another launch effort within approximately two months, an optimistic assessment by many accounts, several environmental organisations now lodged a legal action against the FAA, claiming that the agency conducted an inadequate environmental assessment of SpaceX Starship launches.

SES secures €75M contract from German broadcasters and extends services to the Pacific

SES signed multi-year capacity agreements totaling more than €75M in backlog, with various private and public German broadcasters, including QVC Germany, Seven, One Entertainment Group, Media Broadcast Satellite GmbH (MBS), ZDF, and High View. The agreements will allow around 17 million of satellite TV households in Germany to continue watching SD and HD content thanks to the O3b mPower small satellite constellation. In late April, CNT Ecuador and SES announced a major MEO satellite capacity expansion agreement to deliver more life-changing broadband connectivity and 3G/4G/5G mobile services to throughout the Galapagos islands.

Iceye US and Capella Space awarded $7M by NASA to provide SAR data

NASA has awarded both Iceye US and Capella Space Blanket Purchase Agreements (BPA) for their synthetic aperture radar (SAR) data. The five-year agreements give NASA centers access to the companies' SAR data, with each contract not to exceed a value of $7M. The agreements are part of NASA's Commercial Smallsat Data Acquisition Program, which acquires data from commercial sources to augment NASA's own data. Both companies will deliver high-resolution SAR Earth observation data products with associated metadata, data cadence, data latency, area coverage, and data usage policy.

NSO extends 2022 contracts to exploit commercial Radio Frequencies (RF) data

The U.S.-based Aurora Insight, HawkEye 360, Spire Global, and the Luxembourgish Kleos Space have been awarded a Stage II contract options from the U.S. National Reconnaissance Office (NRO) to evaluate their on-orbit capabilities under a previous commercial RF remote sensing data contract signed in September 2022. While the NRO has not disclosed contract specifics, it is known that the Stage II options will run for a two-year period. The NRO uses the companies' RF satellites to monitor the Earth for electronic emissions and can detect GPS interferences, as demonstrated by HawkEye to detect GPS interference in Ukraine where Russian forces were operating.

Credit: HawkEye 360

L3Harris secures $145M to upgrade U.S. Space Force's MOSSAIC system

L3Harris Technologies has been awarded a $145M contract from the U.S. Space Force for the fourth year of the Maintenance Of Space Situational Awareness Integrated Capabilities (MOSSAIC) Program. The programme supports the Space Force's core competency of Space Domain Awareness (SDA) by detecting, tracking, and identifying deep space objects to provide timely and accurate space surveillance information for military, civil, and commercial users. MOSSAIC upgrades will modernise space domain awareness ground systems, including communications infrastructure, to enable the execution of mission tasks associated with emerging threats. The contract was initially granted to L3Harris in 2020 and has a duration of ten years, with the potential to be worth up to $1.2B.

Multiple contracts awarded for the upcoming Italian IRIDE constellation

Following a March 2023 contract worth €141M awarded to Thales Alenia Space to supply the first batch of six SAR small satellites and one optical imager for the upcoming Italian IRIDE constellation, ESA, acting as project manager, contracted the Italy-based D-Orbit and Telespazio to advance the construction of the EO constellation, and Planetek Italia for the downstream section. D-Orbit was awarded a €26M contract to provide a SAR satellite and manage its flight operations, with an option for an additional SAR satellite worth €24M. The Italian radar manufacturer MetaSensing will implement the SAR sensor. In addition, Telespazio won a €21M tender to provide the Flight Operations Segment (FOS) of the IRIDE constellation, including command and control functions, data acquisition, and monitoring and planning for the NIMBUS and PLATiNO platforms. Telespazio will also provide training, ground station network implementation, and commissioning for the IRIDE satellites, as well as flight operation preparations and execution of the Launch and Early Orbit Phase (LEOP). Altogether, IRIDE will consist of 34 commissioned satellites with options for 35 more. As for the Service Segment, the component of the programme that will develop EO services for institutional users, Planetek Italia will be the lead partner of the two industrial teams. The consortia are tasked to develop applications in the areas of water management, weather-climate, air quality, land use and management, and agriculture and forestry, for a total value of €42M.

Credit: RHEA Group

ESA & Thales Alenia Space conduct a demonstration satellite hack on OPS-SAT

Credit: ESA

As part of the third edition of the CYSAT Conference, which ESPI attended, a cybersecurity exercise to test satellite safety and resilience against cyberattacks was conducted. A team of cybersecurity researchers from Thales Alenia Space jointly with the Group's Information Technology Security Evaluation Facility (ITSEF) was tasked to take control of the OPS-SAT demonstration nanosatellite and its system as part of an ethical satellite hacking exercise. The team gained access to the satellite's onboard system and exploited several vulnerabilities, including modifying the satellite's camera images and concealing geographic areas, highlighting the need for high cyber resilience in space operations. Thales employs over 3,500 cybersecurity specialists to enhance the security of national and European space programmes, including the Galileo satellite navigation Programme.

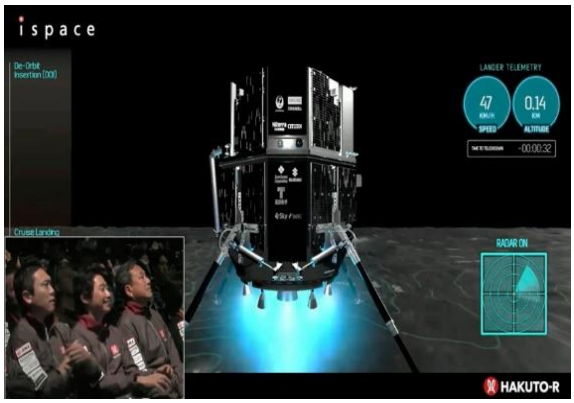
Pangea and Tehiru collaborate to enhance hybrid launch capabilities

Spanish Pangea Aerospace and U.S.-based rocket manufacturer Tehiru have partnered to make Tehiru's thermo-electric rocket booster more sustainable, cost-effective, and reusable. The hybrid rocketwill be capable of carrying 550-kilogram payloads to LEO. Pangea is set to provide Tehiru with its 300 kN ARCOS aerospike engines, which will be utilised to propel the initial stage of the rocket.The partnership expects revenues of up to €50M for Pangea Aerospace in the next 5 years through the supply of its advanced Methalox aerospike engine, ARCOS, to Tehiru's air-launch system. The system can Tsupport payloads up to 550 kg to LEO. This technology will make navigation and return to Earth more sustainable and profitable in conditions for reuse, with a 50% reduction in CO2 emissions compared to conventional engines. Pangea Aerospace has changed its strategy from developing the Meso launch vehicle to supplying propulsion systems for launchers and in-space applications. The company plans to generate a revenue of €300M per year by 2030 through these offerings.

Tokyo-based ispace's lunar lander crashes on moon, stock plummets

The HAKUTO-R M1 lunar lander, developed by Tokyo-based ispace and carrying multiple commercial and government payloads, including the Rashid rover of the UAE Lunar Mission and JAXA's Transformable Lunar Robot, was due to land on the Moon near the Atlas Crater on April 25th.

However, controllers lost communication with the spacecraft shortly before its scheduled touchdown, indicating a probable crash during its final descent. More specifically, according to the HAKUTO-R Mission Control Center in Nihonbashi, Tokyo, the lander was in a vertical position during its final approach, but no data was received after the scheduled landing time, and communication was lost soon after the estimated remaining propellant reached its lower threshold, causing a rapid increase in descent speed. Based on this data, it is highly likely that the spacecraft made a hard landing on the Moon's surface.



Credit: ispace webcast

Intuitive Machines bolsters orbital services business line with $719M NASA Award

NASA has awarded Intuitive Machines' joint venture with KBR, Space Networks Solutions LLC, the cost-plus-fixed-fee OMES III contract to support NASA GSFC Engineering and Technology Directorate (ETD) in science mission operations related to the Joint Polar Satellite System and Exploration and In-space Services work. The contract has a minimum ordering value of $8M and a maximum of $719M over a five-year base performance period.

Avio wins new defence contracts while its operations under scrutiny

Credit: Avio

Avio has received €90M in new orders from MBDA Italy for boosters to be used on Aster 30 surface-to-air missiles. This follows an earlier MBDA award of €40M for a pair of contracts to increase booster production for a European and NATO member state in August 2022. While Avio continues to receive contracts in its defence and space verticals, Italian officials have recently questioned several aspects of Avio's operations, including quality control and cost-cutting schemes, following the third Vega failure in December 2022. Notably, Congressman Orlando, MP for the Democratic Party, has submitted a question to the Italian Prime Minister and the Minister for Enterprise on whether the Vega launcher failures are a direct result of a cost-cutting policy that has caused a reduction in quality control.

SES secures multi-million contracts from the U.S. military compartment

The U.S. Space Force has allocated $59M in its 2024 budget to purchase satellite communication services from SES' new MEO-based broadband connectivity constellation called O3b mPower, which will be portioned to the U.S. and Luxembourg's national defence sectors for defense and security purposes. This marks SES' first military contract for its next generation mPower satellites, which provide 10 times more throughput than legacy O3b satellites,. The purchase was made under NATO's Global Commercially Contracted Satellite Communications (GCC SatCom) Support Partnership, whose participating countries are currently limited to the U.S. and Luxembourg. Additionally, SES Space & Defense won a $27.54M contract to provide its satellite communication capabilities to the U.S. Army Warfighter Information Network-Tactical training.

Lockheed Martin demonstrates on-orbit satellite servicing with maneuverable cubesats

Lockheed Martin has demonstrated its ability to maneuver two small satellites closer together in geosynchronous orbit, following the launch of the spacecrafts in November 2022. By February 28th, the satellites, which were initially 750 kilometers apart, had moved within 400 meters of each other, affirming the algorithms that would enable upgrades and servicing while in orbit. The company plans to continue getting the satellites closer together to keep proving out the algorithms. The demonstration was part of the self-funded Lockheed Martin In-space Upgrade Satellite System (LM LINUSS) technology and aims to eventually allow for on-orbit servicing of spacecraft. The ongoing demonstration has allowed the company to develop its computer vision system and artificial intelligence for highly automated manoeuvering, as well as improve technology readiness levels of on-orbit processors, inertial measurement units, and guidance, navigation, and control software.

Credit: Lockheed Martin

Aerojet Rocketdyne to power Orion Spacecraft with $67M Propulsion System Contract

The U.S.-based Aerojet Rocketdyne has been awarded a $67M contract by Lockheed Martin to provide propulsion systems for the Orion spacecraft that will be used in Artemis missions VI-VIII. The contract includes the delivery of additional sets of auxiliary engines and jettison engines, with each auxiliary engine producing 105 pounds of thrust to help maintain Orion's trajectory, and the jettison engine generating 40,000 pounds of thrust to separate the Launch Abort System from the crew module.

Thales Alenia Space to lead Space Factory 4.0 Programme for Italian Space Agency

Credit: Thales Alenia Space

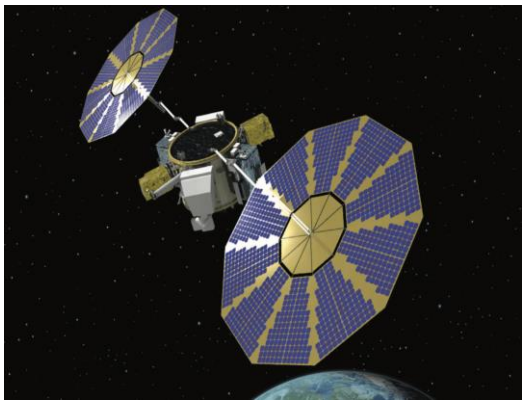
Thales Alenia Space has secured a contract from the Italian Space Agency (ASI) to lead the development of the Space Factory 4.0 Programme, with a consortium including Argotec, CIRA, and Sitael. The partnership aims to create an interconnected system of facilities across Italy that will use advanced automation and digitalisation to build advanced satellites at scale. Operations are scheduled to start by 2026.

The future Space Factory is poised to manufacture satellites from large to small, in large quantities and aims to create an advanced production hub for domestic, European, and international space programs. The total contract value of around €57M, with the same amount co-financed by private participants.

Northrop Grumman competes against Boeing for $2.4B U.S. military contract

Northrop Grumman is developing a geostationary communications satellite for the U.S. military in a contract estimated to be worth $2.4B, competing against Boeing under the U.S. Space Force's Protected Tactical Satcom Programme.

If successful, the satellite would launch as a national security mission aboard a United Launch Alliance (ULA) Vulcan launcher in 2025. Northrop Grumman's Protected Tactical Satcom (PTS) prototype payloads will fly on dedicated spacecraft built on an ESPAStar-HP satellite bus, which provides increased payload size, mass and power allocation, as well as increased ΔV with respect to the company's ESPAStar commercial bus. The PTS aims to provide uninterrupted communications even in the presence of sophisticated jamming threats and, if selected, it will supplement the Advanced Extremely High Frequency (AEHF) satellites that are used for classified-level communications.



Credit: Northrop Grumman

In other news

Rothe Ares secures $814M to manage NASA digital services: the Joint Venture will provide information technology management, customer collaboration and support, information management, and digital communication services for all its centers and headquarters. The contract will run until January 31st 2032.

L3Harris to provide audio systems for first crewed mission to the Moon: under the NASA Artemis II Program, L3Harris will supply an audio control unit within the Orion capsule that runs the whole system, a speaker in Orion that provides audio, and a voice-activated audio interface unit that clips onto the astronauts' suits.

Axiom Space has launched the Axiom Space Access Program: the platform aims to offer countries services to unlock the benefits of on-orbit research without the need to create their own infrastructure. Members include Azerbaijan, Italy, New Zealand, Uzbekistan, and Israel.

SAIC & GomSpace sign MoU: SAIC becomes the exclusive U.S. integrator of the Denmark-based GomSpace's satellites and licensed product distributor, services reseller and space vehicle and mission integrator for GomSpace's U.S. Government customers.

POULSAT awards contract to Eutelsat: Eutelsat will provide high-speed internet to schools in North Africa enabled by Eutelsat ADVANCE.

Private Chinese firm Space Pioneer scores first with liquid-propellant rocket launch: The three-stage Tianlong-2 ("Sky Dragon-2") lifted off following the recent CASC approval of coal-derived kerosene for use in launches.

Astra secures $11.5M contract by the U.S. Space Force under the Orbital Service Program (OSP-4): the company will launch military experimental payloads onboard its Astra 4 vehicle in 2025.

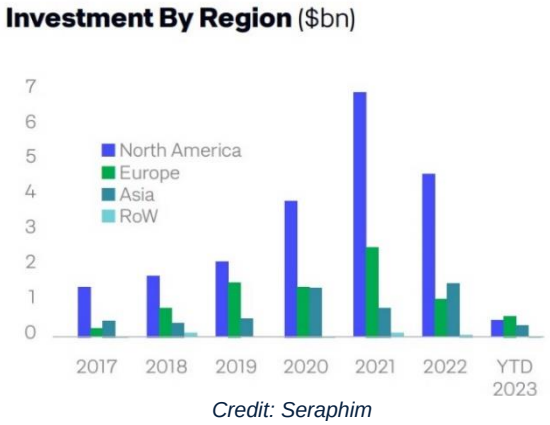
KSAT wins contract extension from the European Maritime Safety Agency (EMSA): The Norwegian company will provide SAR satellite monitoring services to multiple maritime user communities in Europe.

OQ Technology has secured a close to €1M contract with an unnamed oil and gas company: to provide 5G coverage for IoT devices using its world's first constellation of LEO satellites, introducing its new product suite, OQ-Secure, for secure private network connectivity based on 3GPP cellular technology for narrowband-IoT.

ECONOMY & BUSINESS

Europe surpasses U.S. in space startup funding in Q1 2023

According to the Seraphim space Index, in Q1 2023 European startups have surpassed the U.S. and other global counterparts in funding for the first time, with a significant increase in investment rounds for launch and in-space servicing companies. This is reflected by the recent €165M Series C deal by Isar Aerospace, a German rocket manufacturing company. It is predicted that European investment in 2023 will at least match, if not exceed, 2022 levels, as Q1 is already close to 50% of the overall volume of the previous year. In contrast, U.S. investments have further decreased in comparison to last year, with the volume for Q1 2023 reaching $310M, which represents its lowest point since Q3 2021. While Asia was the only region to experience growth last year, it has dropped to third place in the current quarter and has not maintained this trend. The median size of deals has decreased in all areas. This trend could be attributed to companies opting for smaller extension rounds instead of complete funding rounds, with the aim of prolonging their operations until valuations become more favourable. Additionally, the absence of mega-rounds was notable, with only one round exceeding $100M. In 2021, when markets were more optimistic and supportive of startups raising large rounds, such rounds were more common.



Credit: Seraphim

Kepler raises $92M in Series C funding

Canada based company Kepler Communications has announced on April 13th that it has secured $92 million in Series C funding led by IA Ventures. The company, which is focused on building an internet network for connectivity beyond earth, has raised over $200M in equity since 2016, with backing from investors such as Costanoa Ventures, Canaan Partners, Tribe Capital, and BDC Capital's Industrial Innovation Venture Fund. Kepler plans to use this funding to launch an optical data relay infrastructure by 2024, which will complement its existing network. This new infrastructure will utilise two planes of relay satellites in sun-synchronous orbits with optical inter-satellite links. Kepler expects its optical services to be operational and available to customers by the first quarter of 2025.

SES in talks to combine with Intelsat

Credit: SES

As of March 29th, SES and Intelsat are reportedly in advanced discussions to merge their businesses and create a new satellite giant worth over $10B, including debt. The move is said to be a response to the growing competition posed by SpaceX, with the companies aiming to reach an agreement within the next few weeks, as per unnamed sources. A deal between both companies would continue the consolidation trend in the satellite communications market after the UK Competition and Markets Authority cleared Viasat's plan to acquire the UK-based Inmarsat last month.

Globalstar announces long-term financing of $200M

Globalstarhas announced on March 29th that it has reached an agreement with an affiliate of Värde Partners and other parties for the purchase of senior notes with a total principal amount of $200M. The notes, which will bear interest at a rate of 13% per annum, are set to mature in 2029 and are not convertible, which means that they will not result in any dilution of equity. Goldman Sachs & Co. LLC has served as the exclusive placement agent for Globalstar in connection with the financing. The proceeds from the sale of the notes will be primarily used to pay off all outstanding balances under Globalstar's 2019 facility agreement, which total approximately $148 million, while the remainder will be allocated towards fees and general corporate purposes. This transaction is expected to be completed on or around March 31st.

Mynaric Secures €80M Debt/Equity financing

Mynaric AG has secured a mix of debt and equity financing worth €80.6M to refinance existing debt and support its growth, the company announced on April 25th. The German company is a manufacturer of laser communication equipment. The financing includes a secured five-year term loan facility of €68.2M provided by lenders.

Credit: Mynaric

Additionally, two affiliates will acquire a combined equity stake of approximately 9.1% in Mynaric AG for €12.4M. The net proceeds from the loan and equity investment, totaling €75.1M, will be used to repay the company's existing debt and to support its near-to-medium term business plan. Mynaric AG expects a significant increase in its Optical Communications Terminal Backlog and Cash-in from Customer Contracts for FY23.

Boryung and Axiom Space finalise JV amid U.S.-Korea space cooperation

Credit: Axiom Space/Boryung

After investing $60M as a strategic investor in Axiom Space last year, Boryung has been in discussions since March to form a joint venture with the Us-based company. On April 25, Boryung and Axiom announced the finalization of the joint venture, which is expected to be established in the first half of this year.

The joint venture will be launched in Korea with a 51% investment ratio by Boryung and 49% by Axiom Space. It will explore all business areas utilizing Axiom Space's technology and infrastructure based on Axiom's Station.Axiom Space will have exclusive rights to access private and public space projects in Korea through the joint venture. The key business areas of the joint venture will include the astronaut business, joint manufacturing, construction, and infrastructure-related business, including Korea's next-generation space module, as well as all research and development and experimentation activities at the space station. Boryung will explore various business opportunities through the joint venture by leveraging Axiom Space's space development technology and infrastructure.

NV5 Global acquires L3Harris VIS Business Line

On April 10th, NV5 Global has completed its acquisition of L3Harris Technologies, Inc.'s Visual Information Solutions commercial geospatial technology and software business ("VIS"). The acquisition was first announced in December and has since received regulatory approvals. NV5 Global is a provider of technology, conformity assessment, and consulting solutions and this acquisition further strengthens NV5's position as a leading provider of geospatial data solutions in North America, following the acquisition of Axim Geospatial earlier this year. NV5 intends to expand its subscription-based geospatial product and service model and to support the U.S. defence and intelligence communities through geospatial information management and analytics. The acquisition includes 16 U.S. Patents for geospatial data analytics and ownership of an additional 13 U.S. and non-U.S. Trademark Registrations for popular geospatial software applications with approximately 500,000 global users, such as ENVI, IDL, Jagwire, Amplify, and Helios.

Astranis announces $200 million funding; now valuated $1.6B

Credit: Astranis

On April 14th, it was announced that Astranis Space Technologies Corp. has secured $200M in funding to expand its satellite production. The financing agreement was spearheaded by Andreessen Horowitz's growth fund and comprised a blend of equity and debt. The company's valuation rose to approximately $1.6B following the investment. Astranis specialises in manufacturing compact telecommunications satellites with cost-reduction their primary driver and differentiator.

Ispace market debut saw price of shares skyrocketing

During the market debut of Japan's ispace in Tokyo on April 12th, shares were not traded despite bids exceeding twice the initial public offering price. In the IPO, ispace offered shares at ¥254 ($1,86) each, and bids for the shares reached ¥585 ($4,29) by the end of the trading day, but no stocks were sold. The IPO price values the company at approximately ¥20B ($150M), and ispace raised ¥6.7B ($49M) in new capital. Major stakeholders in the company include founder CEO Takeshi Hakamada with a 19% stake, government-backed Innovation Network Corporation of Japan with 9.75%, and the Development Bank of Japan with 5.57%. On April 13th, bids reached a price of ¥1,135 ($8,33) each, which is more than four times the initial offering. After losing contact to its M1 lander on April 25th, the stock finished the day at ¥1,590 each ($11.90), its worst performance since going public.

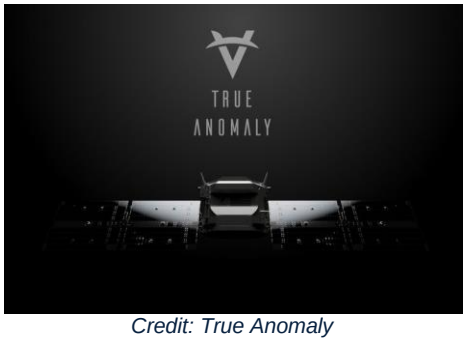
Credit: ispace

CNH Industrial to acquire Hemisphere GNSS for $175M

On March 30th, CNH Industrial has announced its acquisition of Hemisphere GNSS, a satellite positioning technology company owned by Unistrong, a Chinese-incorporated company. Hemisphere specialises in electronic systems and software solutions, with expertise in application-specific integrated circuit chips, circuit boards, radio frequency signal processing, navigation algorithms, and satellite-based correction designs. The company will continue to operate independently through its operations in the U.S., Canada, and Australia, with its knowledge and network incorporated into CNH's Raven Brands' products and services.

True anomaly raises Series A funding of $17M

On April 6th, True Anomaly has revealed its most recent $17M Series A funding round led by Eclipse, in collaboration with Riot Ventures, Champion Hill Ventures, Space.VC, and Narya, which brings the company's total funding received to $30M. The company specialises in producing space materials that provide security and sustainability systems and solutions for space applications.



Credit: True Anomaly

The latest funding will allow True Anomaly to test and verify the technical and operational capacities of its Jackal Autonomous Orbital Vehicle, used for space domain awareness, as well as make investments towards expanding production later in the year.

Astrocast signs $17.5 million agreement with Thuraya

On April 3rd, Swiss company Astrocast has announced that it has signed a Heads of Terms agreement with Thuraya Telecommunications Company. Thuraya is a subsidiary of Al Yah Satellite Communications Company PJSC, the leading provider of satellite solutions in the UAE. The investment agreement will involve a convertible loan worth US$17.5M and is the first investment that Thuraya has made in a LEO satellite constellation.

Furthermore, the two parties plan to extend their technical cooperation agreement for another four years, which was originally signed in 2019. The agreement with a global operator of IoT networks using nanosatellites, Astrocast, is intended to boost Thuraya's standing in the IoT market and accelerate the implementation of its strategy for satellite-enabled IoT.

Credit: Astrocast

Ursa Major secures $100M in funding

On April 26th Ursa Major announced it has secured Series D funding of $100M. The funding concluded in October 2022 and came from BlackRock, Space Capital and Alumni Ventures. The US-based company specializes in rocket propulsion currently offering three engines named Hadley, Ripley, and Arroway. After the recent funding, Ursa Major is valuated at $400M.

In other news

Space Capital launches $65M Fund 3 to continue investing at the intersection of space and tech: The U.S.-based seed stage venture capital firm reiterates its strong commitment to the space sector and the sectors importance within the wider economy.

Orbit Fab has secured $28.5M in Series A funding to speed up the development of its first in-space satellite refueling missions: The round was led by 8090 Industries. The firm plans to use the funds to quicken its mission to offer satellite refueling services and boost production of its spacecraft RAFTI port, which enables on-orbit refueling.

ClimateAi has announced the completion of an oversubscribed $22M Series B funding round: it will be used to accelerate its expansion into new markets, including India and Japan, as well as the Global South. The round was led by Four Rivers Group. ClimateAi is a company that uses machine learning for climate forecast and resilience.

Hydrosat announced $5M in government grants and $15M in Series A investment: The Series A round was led by Statkraft Ventures. With the new funding, the geospatial data analytics company will build two satellites, expand its staff and bring a new commercial data fusion and analytics product to market.

Impact Observatory has completed its seed funding round, raising over $5.9M: The funding will be used to expedite the launch of its AI-powered monitoring products for governments and commercial clients. The round included an investment by smart maps company Esri.

VorteX-io has received a €2.5M grant from the European Innovation Council and SMEs Executive Agency (EISMEA): The company was influenced by space technology to develop digital replicas of rivers and streams, which they use to offer an affordable real-time monitoring and prediction service for floods or droughts.

Satellite data company Planet saw $191.3M in full year revenue, a 46% jump from last year: It exceeds the upper limit of its previous estimate range of $188 million to $192 million.

Amazon Web Services announced the selection of 14 American and European startups to take part in their third yearly space accelerator program: It will offer technical services worth up to $100,000 to each participant. The program starts in May and is aimed at supporting early-stage space companies in the field of space sustainability.

InspeCity, an indian space tech startup, has secured $1.5M in a pre-seed funding: The round was led by deep-tech venture capitalist Speciale Invest. InspeCity aims to build enabling technologies, such as robotic platforms for servicing satellites in all orbits, for constructing cities between the Earth and Moon. The recent funding will primarily be used to demonstrate the effectiveness of the companies' technology.

Space Walker has become the first private rocket developer to secure funding from JAXA: The is developing suborbital spaceplanes for manned spaceflight. Space Walker is researching and developing winged reusable rockets as a sustainable means of space transportation.

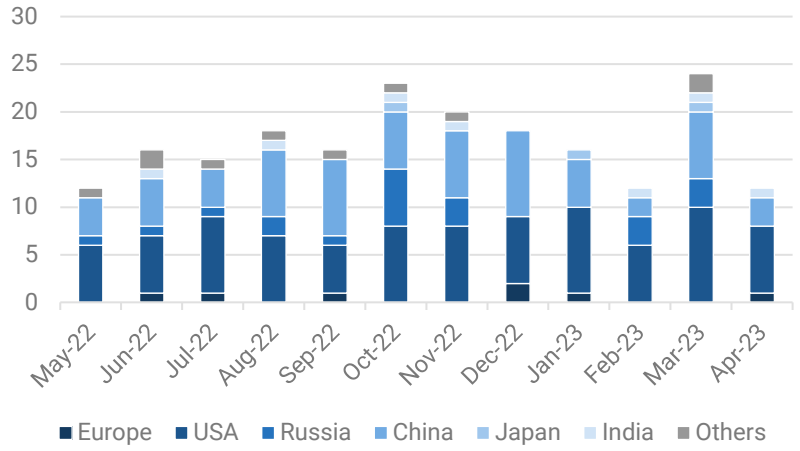
Astroscale granted ¥3B ($22.5M) Loan Agreement by Mizuho Bank: Astroscale will receive further financial assistance through the loan agreement to expedite its business development efforts for both current and future projects.

LAUNCHES & SATELLITES

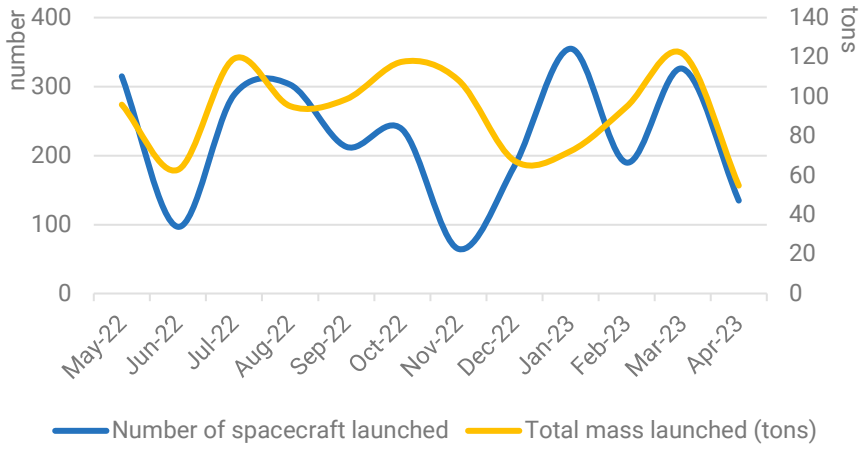
Global space activity statistics

April 2023	USA	Europe	China	India	Total
Number of launches	7	1	3	1	**12**
Number of spacecraft launched	127	1	3	3	**134**
Mass launched (in kg)	44 958	5963	2658	1166	**54 745**

Launch activity over the year

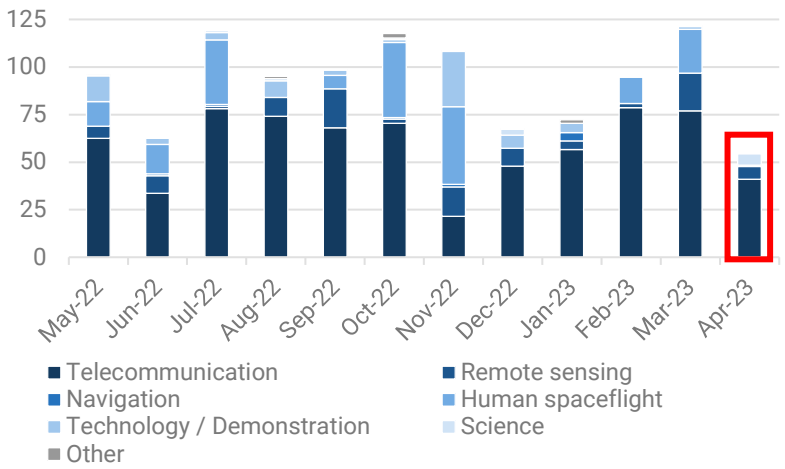


Evolution of the number of launches per launch country



Evolution of launch activity over the year 2022-2023

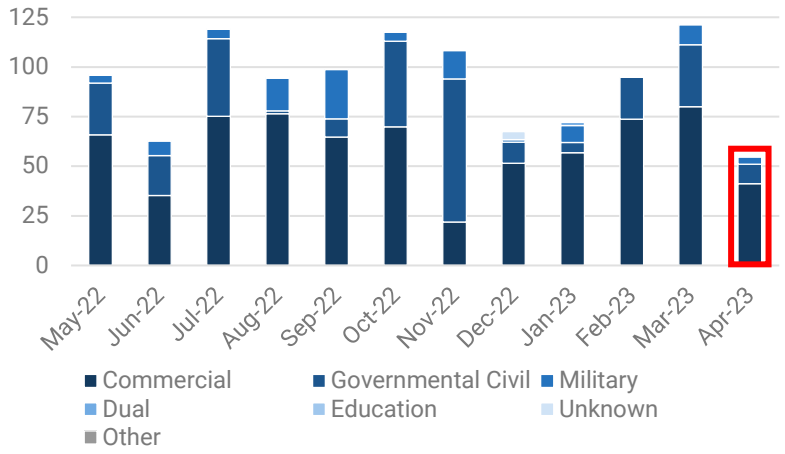
Satellite missions and markets



Evolution of the total mass launched (tons) per mission (May. 2022-Apr. 2023)

April 2023	Telecom	Remote sensing	Technology/ Demonstration	Science	Other
Europe	3403	18	51	5963	108
USA	37 510	2536	23	8	215
China		2500	158		
India			400		
Others	32	1772	49		

Total mass (kg) launched by mission and customer country



Evolution of the total mass launched (tons), per market (May. 2022-Apr. 2023)

April 2023	Commercial	Governmental Civil	Military	Education	Unknown
Europe	3535	6004		4	
USA	36 544	10	3736	2	
China	158	2500			
India		400			
Others	1009	837		7	

Total mass (kg) launched by market and customer country

Launch Log

Launch date	Launch country	Launcher	Spacecraft name	Main customer	Customer country	Prime manufacturer	Manufacturer country	Mass (kg)	Mission	Market
02/04/2023	China	Tianlong-2	Jinta	Hunan Hangsheng Satellite Technology Co.	China	Hunan Hangsheng Satellite Technology Co.	China	8,00	Tech / Demo	Commercial
02/04/2023	USA	Falcon-9 v1.2 (Block 5)	Tracking Layer Tr.-0 WFOV (1&2)	SDA	USA	SpaceX	USA	1068 (each)	Early Warning	Military
			Transport Layer Tr.-0 A-Cl. (5 spacecraft)	SDA	USA	York Space Systems	USA	200 (each)	Telecommunication	Military
			Transport Layer Tr.-0 B-Cl. (3 spacecraft)	SDA	USA	York Space Systems	USA	200 (each)	Telecommunication	Military
07/04/2023	USA	Falcon-9 v1.2 (Block 5)	Intelsat 40e / TEMPO	Intelsat	USA	Maxar	USA	5540,00	Telecommunication	Commercial
07/04/2023	China	Hyperbola-1	Unknown (China) G	iSpace	China	iSpace	China	150,00	Tech / Demo	Commercial
14/04/2023	France	Ariane-5ECA+	JUICE	ESA	Europe	Airbus	France	5963,00	Planetary Science	Gov. Civil
15/04/2023	USA	Falcon-9 v1.2 (Block 5)	ADLER 2	Austrian Space Forum	Austria	Spire	USA	6,00	Tech / Demo	Gov. Civil
			BRO 9	UnseenLabs	France	UnseenLabs	France	6,00	Signal Intelligence	Commercial
			Brokkr 1	AstroForge	USA	AstroForge	USA	8,00	Tech / Demo	Commercial
			CIRBE	University of Colorado Boulder	USA	University of Colorado Boulder	USA	4,00	Earth Science	Gov. Civil
			Connecta T2.1	Plan-S	Turkey	Plan-S	Turkey	8,00	Tech / Demo	Commercial
			DEWA-Sat 2	Dubai Electricity and Water Authority	United Arab Emirates	Dubai Electricity and Water Authority	United Arab Emirates	8,00	Earth Observation	Gov. Civil
			DISCO 1	Aalborg University	Denmark	Aalborg University	Denmark	1,00	Radio Amateur	Education
			EPICHyper 1	ÅAC Clyde Space	Sweden	ÅAC Clyde Space	Sweden	8,00	Earth Observation	Commercial
			FACSAT 2	Fuerza Aérea Colombiana (FAC)	Colombia	Fuerza Aérea Colombiana (FAC)	Colombia	8,00	Tech / Demo	Gov. Civil
			GHGSat (C6, C7 & C8)	GHGSat Inc.	Canada	UTIAS/SFL	Canada	15 (each)	Earth Observation	Commercial
			GHOSt (1&2)	Orbital Sidekick	USA	Astro Digital	USA	85 (each)	Earth Observation	Commercial
			Hawk 7 (A,B&C)	HawkEye 360	USA	UTIAS/SFL	Canada	25 (each)	Signal Intelligence	Commercial
			Imece	Tubitak Uzay	Turkey	Tubitak Uzay	Turkey	800,00	Earth Observation	Gov. Civil
			INSPIREsat 7	Université de Versailles Saint-Quentin-en-Yvelines	France	Université de Versailles Saint-Quentin-en-Yvelines	France	2,00	Tech / Demo	Education
			ION SCV 010	D-Orbit	Italy	D-Orbit	Italy	100,00	Other	Commercial
			IRIS C	National Cheng Kung University	Taiwan	National Cheng Kung University	Taiwan	4,00	Tech / Demo	Education
			Its about time	TrustPoint	USA	TrustPoint	USA	10,00	Tech / Demo	Commercial

			Kepler (20&21)	Kepler Communications	Canada	Kepler Communications	Canada	16 (each)	Telecommunication	Commercial
			KILICSAT	Gumush Aerospace	Turkey	Gumush Aerospace	Turkey	10,00	Tech / Demo	Commercial
			Lemur-2 (164 & 165)	Orora Technologies	Germany	Spire	USA	4 (each)	Earth Observation	Commercial
			LLITED (1 & 2)	The Aerospace Corporation	USA	The Aerospace Corporation	USA	2 (each)	Earth Science	Gov. Civil
			LS2f	Lacuna Space	United Kingdom	Lacuna Space	United Kingdom	3,00	Telecommunication	Commercial
			NORSAT TD	Norsk Romsenter	Norway	UTIAS/SFL	Canada	35,00	Tech / Demo	Gov. Civil
			ÑuSat (36, 37, 38 & 39)	Satellogic SA	Uruguay	Satellogic SA	Uruguay	38 (each)	Earth Observation	Commercial
			Platform 3	EnduroSat	Bulgaria	EnduroSat	Bulgaria	6,00	Other	Commercial
			Pleiades-Squared	Cal Poly Pomona	USA	Cal Poly Pomona	USA	2,00	Tech / Demo	Education
			REVELA	ARCA Dynamics	Italy	ARCA Dynamics	Italy	4,00	Tech / Demo	Commercial
			RoseyCubesat 1	Orbital Solutions Monaco	Monaco	Orbital Solutions Monaco	Monaco	1,00	Radio Amateur	Education
			Sapling 2	Stanford University	USA	Stanford University	USA	2,00	Tech / Demo	Gov. Civil
			SSS 2B	Tubitak Uzay	Turkey	Tubitak Uzay	Turkey	3,00	Tech / Demo	Education
			Taifa 1	KSA	Kenya	EnduroSat	Bulgaria	5,00	Earth Observation	Gov. Civil
			Tomorrow R1	Tomorrow.io	USA	Astro Digital	USA	86,00	Meteorology	Commercial
			Umbra-SAR 06	Umbra Lab	USA	Umbra Lab	USA	65,00	Earth Observation	Commercial
			VCUB1	Visiona Tecnologia Espacial	Brazil	Visiona Tecnologia Espacial	Brazil	12,00	Earth Observation	Commercial
			Vigoride 6	Momentus	USA	Momentus	USA	215,00	Other	Commercial
			VIREO	C3S	Hungary	C3S	Hungary	4,00	Tech / Demo	Commercial
16/04/2023	China	CZ-4B	FY 3G	National Satellite Meteorological Center	China	SAST	China	2500,00	Meteorology	Gov. Civil
19/04/2023	USA	Falcon-9 v1.2 (Block 5)	Starlink (21 satellites)	SpaceX	USA	SpaceX	USA	800 (each)	Telecommunication	Commercial
20/04/2023	*USA*	*Starship B7/S24*	*Starship S24 F1*	*SpaceX*	*USA*	*SpaceX*	*USA*	*1,00*	*Tech / Demo*	*Commercial*
22/04/2023	India	PSLV-CA(2)	Lumelite 4	National University of Singapore	Singapore	National University of Singapore	Singapore	16,00	Tech / Demo	Gov. Civil
			POEM-2	ISRO	India	ISRO	India	400,00	Tech / Demo	Gov. Civil
			TeLEOS 2	AgilSpace	Singapore	ST Electronics	Singapore	750,00	Earth Observation	Commercial
27/04/2023	USA	Falcon-9 v1.2 (Block 5)	Starlink (46 satellites)	SpaceX	USA	SpaceX	USA	295 (each)	Telecommunication	Commercial
28/04/2023	USA	Falcon-9 v1.2 (Block 5)	O3b mPower (3&4)	SES	Luxembourg	Boeing	USA	1700 (each)	Telecommunication	Commercial

Launch Highlights

JUICE launches to Jupiter on Ariane5

The launch of the Jupiter Icy Moons Explorer (JUICE) mission to explore the three largest icy moons of Jupiter was carried out by teams from ESA and Arianespace. The launch marked the first of two Ariane 5 missions scheduled for 2023 and was the second-to-last flight of the Ariane 5 rocket. JUICE was launched on a trajectory that will lead to its arrival at the Jovian system in the summer of 2031. The launch took place on Friday, April 14th from pad ELA-3 at the Centre Spatial Guyanais (CSG) in Kourou, French Guiana.

Credit: ESA

Starship lifts off but falls short of reaching orbit

Credit: SpaceX

On April 20th, SpaceX conducted a test flight of its first integrated Starship vehicle at its Starbase test site in Boca Chica, Texas. However, shortly after liftoff, the Starship vehicle began to tumble and broke apart. As per the company's timeline, the Raptor engines were supposed to shut down at T+2:49, followed by the separation of the Starship upper stage and ignition of its six Raptor engines. However, the Starship/Super Heavy stack started to tumble, and the flight termination system on both vehicles was activated, causing them to break apart at T+4:00. Elon Musk predicted the next test flight will happen in a couple of months and that SpaceX will attempt four to five Starship launches this year.

Two Singaporean satellites launched on Indian PSLV

On April 21th, the Indian Space Research Organisation (ISRO) launched two Singaporean satellites with its PSLV launcher from the Satish Dhawan Space Centre. For PSLV C55, a new integration process was used, making use of a new mobile launch pedestal (MLP) to support the mission from the First Launch Pad. The two satellites are the TeLEOS-2 radar-imaging satellite, operated by the government of Singapore and ST Electronics, and the smaller Lumelite-4 satellite. Additionally, seven other payloads were attached to the rockets upper stage, which will remain in orbit as an experimental platform after the deployment of the two satellites. The upper stage, named POEM-2, is equipped with solar panels and is expected to operate in this role for about a month.

Credit: ISRO

The Space Development Agency (SDA) starts the deployment of its constellation

The Space Development Agency (SDA) has announced the successful initial launch of Tranche 0 (T0) of the Proliferated Warfighter Space Architecture (PWSA) on April 2nd. The Transport and Tracking Layer satellites, launched on a SpaceX Falcon 9, are designed to demonstrate low-latency communication links for warfighters. This will include tracking of advanced missile threats from LEO. SDA plans to launch a second Tranche 0 satellite mission in June.

ABOUT ESPI

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