ESPI
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THIS MONTH IN THE SPACE SECTOR...

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ENERGY AND SECURITY CRISIS: THE FUTURE OF SPACE FOR EUROPE AT RISK

Dear Friends of ESPI,

Europe is mobilizing unprecedented public funding in response to the geopolitical challenges it is facing. Governments in Europe have earmarked nearly €500 billion to cushion citizens and companies from energy prices. Germany has been setting aside €100 billion, and several countries like Italy have earmarked more than 3% of their GDP to tackle the energy crunch according to Brussels-based Bruegel. The European Commission reckons that EU members have announced plans for €200 billion in additional defence expenditure. The OECD confirms a greater urgency in the transition to greener energy. All of this is on top of critical investment needed to secure the future of a strong and competitive Europe, including in space.

The **current policy focus risks depriving Europe of developing its strategic autonomy and strength in a global space-enabled economy, in which space-based data and services will be all pervasive**. This is particularly critical today, as actors and competitors worldwide prioritize and provide annual space investments of USD100 billion into a market opportunity of USD1 trillion, which will shape the future similar to what the Internet did, and as AI and Quantum technologies will do. McKinsey recently used the growth over the past 10 years of the Internet economy into a multi-trillion market to contextualize the space economy of today and its prospects.

The socio-economic benefits of space already comprise solutions to the energy transition, to reach NetZero, for telemedicine and education, finance, autonomous vehicles, smart cities, aviation and maritime transport, digital sovereignty, connectivity, security and more. This value of space is acknowledged by the majority of Europeans, who also recognize space as a key driver of inspiration, innovation and for mobilizing young talent.

However, there remains a **persistent lack of political awareness in Europe on the strategic role of space,** to perceive space not merely as a cost but as part of a more effective response to energy and security challenges, not as a niche market but as an investment opportunity and key enabler of the future.

Europe missed out on the Internet age, which today is dominated by companies like Amazon with **an annual R&D budget equivalent to about three times the total European investments in space** of about €14 billion. Europe's 15% share of the global public funding for space is already modest. Recent indications from leading European economies for a further reduction below 0.075% of GDP do not reflect the required level of ambition, compared to the 0.25% in the US and above USD 10 billion of private investments outside Europe.

With its low level of public funding for space, **Europe risks missing on the next opportunity for high economic multipliers** at a time when continued support from smart and directed public funding will be essential to raise the share of private investments in Europe. This support is key at a time when the inflation triggered by the current crisis is expected to slow down venture capital flows, threatening the future of many start-ups which Europe just recently created with high hopes.

Therefore, **for Europe to be a part of the (space) powers of the future** it will be crucial to involve the strong support of policymakers. The upcoming ESA Council at the Ministerial level with a significant commercial component and the ongoing negotiations on the EU Secure Connectivity Programme based on public-private partnership and co-investments will provide the opportunity to garner this support.

Yours sincerely,

Hermann Ludwig Moeller
Director of ESPI

POLICY & PROGRAMMES

European Parliament adopts position on the EU Secure Connectivity Programme

The **European Parliament's Committee on Industry, Research and Energy (ITRE) adopted its position on the Secure Connectivity Programme**, providing a review of developments so far and outlining the relevance of EU capacities in satellite telecommunications. ITRE is the EP's responsible committee for this programme proposal. The committee pointed out that the whole European space ecosystem (incl. SMEs and start-ups) should be involved in the programme. In addition, the committee highlighted the need that the planned satellite constellation is sustainable, stating that: "Secure Connectivity needs to be an example of space and environmental sustainability. This program shall set new standards for satellite constellations concerning space debris, light pollution, and carbon footprints". Previously, the European Parliamentary Research Service released a **briefing document** on the EU legislation in progress. The trilateral negotiation (Trialogue) between the European Parliament, the European Commission and the Council of the EU started officially on October 27th and is planned to be finalised in November. Then, the proposal will be submitted to and voted on in the plenary. The adoption is planned in January 2023.

Slovakia becomes ESA Associate Member state

Credit: ESA

Following **signature of the Association Agreement** between ESA and Slovakia on June 14th, **Slovakia's Associate membership came into effect on October 13th**. The membership will last for an initial duration of 7 years. This Association Agreement replaces the European Cooperating State Agreement of 2016. The new agreement includes exchange of experts and information and the provision of a fair industrial return to Slovakia. Now being Associate ESA member, **representatives from Slovakia will be able to attend ESA Council meetings and Slovakia is able to vote on questions** relating to the activities and programmes in which it participates. Specifically, the Slovak Government is planning to subscribe to the Technology, EO and Space Safety programmes at the ESA MC22 in November.

ESA postpones Ariane 6 first flight and selects SpaceX to launch Hera and Euclid

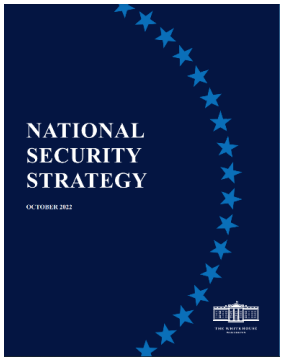
Credit: ESA

ESA announced a delay of the first flight of Ariane 6, now planned in the fourth quarter of next year. Due to the delay of Ariane 6 and the loss of access to Soyuz, **ESA will launch two upcoming missions with SpaceX's Falcon 9**: the Euclid astrophysics mission in 2023 and the Hera asteroid mission in 2024. Initially, Hera was scheduled to launch by the end of 2024 on Ariane 6, while Euclid was one of two ESA missions that were actually planned to launch on Soyuz – the other mission affected by the loss of Soyuz is the Earth science mission EarthCARE, which is now planned to launch on Vega-C. For Euclid, ESA conducted a feasibility study to use Falcon 9, which was **confirmed by NASA** this month. In addition, ESA and EU still need to resume launches of Galileo satellites, which were impacted and put on hold due to the loss of Soyuz and Ariane 6 delays, in late 2023 or early 2024.

ESA plans to demonstrate LEO PNT satellites

ESA's Navigation Directorate is planning an **in-orbit demonstration to investigate a new multi-layer satellite navigation system-of-systems approach for PNT with new LEO PNT satellites** to be part of the FutureNAV programme, supplementing the 23 Galileo satellites. The FutureNAV programme will be proposed for decision at the upcoming ESA CM22.

U.S. National Security Strategy and National Defense Strategy was released



Credit: White House

On October 12th, the White House released the long-delayed **National Security Strategy (NSS) -** planned to be released in spring this year but delayed due to reconsiderations in response to Russia's invasion in Ukraine. The strategy highlights the tripolar race and competition with China and Russia, while emphasising the need of enhanced collaboration with allies to address transnational and global challenges, such as climate change, terrorism, food insecurity and energy shortages. **Related to space,** the NSS highlights the value of space tech for climate monitoring and surveillance, the U.S.' role to ensure sustainability, safety, stability, and security of and in space, including space governance, STM/SSA, space norms and arms control.

In addition, on October 7th, the **White House released an updated "National Strategy for the Arctic Region", laying out a 10-year roadmap plan**. Related to space the **strategy document** recommends investments in infrastructure to monitor the region and to improve connectivity through space-based communications and Earth monitoring, recommending investments in modernisation/improvement of: (1) domain awareness for detection/tracking of potential airborne and maritime threats; (2) sensing and observational capabilities for sea ice, ship traffic, weather; (3) communications and PNT capabilities by developing communications and data networks capable of operating in the northern latitudes; (4) arctic observing and weather, water, and sea ice forecasting; (5) satellite coverage for efficient commerce as well as maritime and air safety.

On October 27th, the U.S. DoD released the unclassified **National Defense Strategy (NDS)**, the Nuclear Posture Review (NPR) and the Missile Defense Review (MDR). The **NDS document** is related to the broader Nationsl Security Startegy.

The National Defense Strategy defines 4 key priorities for the U.S, defense:

- Defending the homeland, paced to growing multi-domain threat posed by China
- Deterring strategic attacks against the U.S., allies and partners
- Deterring aggression, while being prepared to prevail conflict when needed, prioritising the PRC challenge in the Indo-Pacific region and Russia in Europe
- Building a resilient Joint Force and defense ecosystem.

To address these priorities, 3 approaches are identified: (1) Integrated deterrence; (2) Campaigning; (3) Building enduring advantage.

Related to space, the **NDS calls for diverse, resilient and redundant space networks and satellite constellations**. The strategy outlines that since the domains cyber and space empower the armed force, resilience in these areas needs to be prioritised, and validates the plan to develop a multi-layer missile defence and missile-tracking satellites network as well as to add commercial systems to complement military space networks – thus increasing collaboration with the commercial space industry. Also, the NDS warns that China and other rivals could target U.S. satellites in a conflict.

Luxembourg DoD and Virgin Orbit sign agreement for responsive space capabilities

On October 17th, the Luxembourg Directorate of Defence and Virgin Orbit signed an agreement (Letter of Intent) for **collaboration on developing responsive space capabilities**, including a mobile launch infrastructure that would be based in Luxembourg, available and of benefit for NATO partners and other European Allies.

European Commission released proposal to strengthen resilience of European critical infrastructure and defines space as prioritised key sector

On October 18th, the **European Commission unveiled a proposal to strengthen the resilience of EU critical infrastructure for a Council Recommendation**. The **draft Recommendation** aims to accelerate the efforts to protect critical infrastructure in the three priority areas (1) preparedness, (2) response and (3) international cooperation. Among others, such as energy, digital infrastructure and transport, space is one of the prioritised key sectors.

Crew-5 reaches ISS and Roscosmos supports continued ISS cooperation with NASA

Credit: NASA

On October 5th, the **NASA's SpaceX Crew-5 mission was launched** from Launch Complex 39A at Kennedy Space Center in Florida, and arrived at the International Space Station (ISS). The Dragon Endurance spacecraft launched with Falcon-9 carried the NASA astronauts Nicole Mann and Josh Cassada, the JAXA astronaut Koichi Wakata - and Roscosmos cosmonaut Anna Kikina.

After that crew-5 launch, the head of human spaceflight programs of Roscosmos **Sergei Krikalev stated that Russia would continue cooperation on the ISS for the foreseeable future** and emphasized long-running cooperation between the U.S. and Russia in civil space: "We just continue what we started many years ago in 1975 when the Apollo-Soyuz crew worked together, and now we continue our cooperation".

SDA awards contracts for experimental satellites for T1DES and NExT programs

The **U.S. Space Development Agency (SDA) awarded York Space Systems a $200M contract** of the Tranche 1 Demonstration and Experimentation System (T1DES) program for building and operating 12 satellites with experimental military Ultra-High Frequency (UHF) and S-band communications payloads for the T1DES system – which are currently providing mobile wireless services from geostationary satellites. The goal of the SDA's experiment is to explore whether these payloads can perform the same service from LEO.

Credit: SDA

In addition, the **SDA awarded Ball Aerospace a $176M contract** to build and operate 10 experimental satellites of SDA's NExT program, scheduled to launch in 2024 and 2025. The National Defense Space Architecture Experimental Testbed (NExT) aims to demonstrate low-latency data transport and beyond line-of-sight command and control. Specifically, the contract includes Ball Aerospace's manufacture of the satellites, the integration of the payloads, the procurement of rideshare launches, provision of the ground control system as well as the operation of the satellites.

Canada contributes to NASA's Atmosphere Observing System program

Credit: NASA

The Canadian government agreed to spend more than **$200M (Canadian) on High-altitude Aerosols, Water vapor and Clouds (HAWC) for NASA Atmosphere Observing System (AOS) mission**, which will provide measurements to understand aerosol and cloud processes driving extreme weather and climate change. As part of HAWC Canada will contribute a satellite with two instruments and a third instrument (on a NASA satellite) for the AOS mission -both will be launched in 2031. In addition to Canada's contribution, JAXA is providing a satellite and CNES will contribute two instruments.

UK Space Agency plans £15M investment in satellite communications

During a meeting with ESA DG Josef Aschbacher in Rome, **the UK Science Minister Nusrat Ghani unveiled a new £15M funding package for UK businesses for satellite communications technology**, which will be funded through the UKSA's leading role in the ESA Advanced Research in Telecommunications Services (ARTES) programme. The **competition** called "UK National Delegate support for the ESA ARTES Partnership Programme Phase 1 call for ideas" will run until spring next year and participating organisations can come-up with ideas for creating new satellite constellations, ground systems, or for delivering new services to customers. The call opened on October 17th and the deadline for submission of Expressions of Interest is November 17th.

Air Force Research Laboratory plans to develop cyber training range for space domain

The **U.S. Air Force Research Laboratory (AFRL) plans to develop a cyber training range** for the Space Force and subordinated organisations (such as the SSC and SDA), to conduct realistic exercises in a replicated real-world satellite operations center - simulating cyberattacks against satellites and ground system, by using 4 experimental cubesats planned to launch to LEO in 2024. AFRL is working with the company Stephenson Stellar Corp. specialised in cybersecurity. According to AFRL additional funding of approx. $18M is needed for the launch of the satellites and for the development of the cloud-based ground stations.

Zimbabwe, Uganda and Oman prepare to launch their first satellites in November

Zimbabwe and Uganda finalised launch preparations for the launch of their first satellites, the 1U CubeSats ZimSat-1 and PearlAfricaSat-1 which are scheduled to launch on November 6th. The satellites will launch as part of the BIRDS-5 constellation from the Mid-Atlantic Regional Spaceport aboard Northrop Grumman's NG-18 Cygnus commercial cargo resupply services to the ISS - from where they will be deployed into orbit. The satellites are part of Joint Global Multi-Nations Birds Satellite project of JAXA and the Kyushu Institute of Technology.

In addition. **Oman is preparing to launch the first Omani satellite "Aman" with Virgin Orbit's LauncherOne rocket** to be deployed into LEO from Cornwall, UK in November. The CubeSat Aman resulted from an international collaboration project between the Sultanate of Oman, the U.S., and Poland, comprising Omani company ETCO, U.S. Virgin Orbit, Polish nanosat manufacturer SatRev, and the company TUATARA.

In other news

UK, South Korea and Australia join U.S.-led ASAT test ban: This makes in total eight countries contributing to the initiative. Germany and Japan joined the initiative last month.

Russia warns it could target space networks operated by companies to support Ukraine: In particular, Russia addressed Starlink which provides connectivity for the Ukrainian armed forces and civil society. In addition, the deputy director of the Russian foreign ministry's department for non-proliferation and arms, Konstantin Vorontsov critizised during a UN meeting the use of commercial satellites in military operations by Western nations.

Germany and New Zealand sign space collaboration arrangement: The agreement for a safe, secure and responsible use of outer space that was signed between the German Federal Ministry for Economic Affairs and Climate Action (BMWK) and the New Zealand Space Agency enables closer research, policy, regulatory, space security and commercial collaboration.

Albania sign 3-year agreement with Satellogic for an EO satellite constellation for responsive satellite imagery capabilities: This enables Albania to address i.a. agriculture, traffic management, wildfire and environmental monitoring, and border security issues. Albania will have priority access to Satellogic's satellites Albania-1 and -2, which will be launched by SpaceX.

NASA's data analysis confirmes that the DART mission changes asteroid Dimorphos' orbit: Therefore, the DART mission conducted two weeks ago, marking the first planetary defence mission, successfully achieved its mission goal.

Kick-Off event for new German National Space Strategy takes place in Berlin: The event moderated by the Coordinator for Aerospace of the German government Anna Christmann, was comprised of six workshops on the topics and challenges to be addressed, including climate change, NewSpace and commercialisation, security, and space sustainability/space debris.

Virgin Orbit completes preparation for UK's first orbital launch but waiting for launch license: The launch from Spaceport Cornwell on a Virgin Orbit LauncherOne mission is planned in November. The outstanding launch license needs to be provided by the UK government, through its Civil Aviation Authority (CAA).

The European Commission publishes results of Horizon Europe space-related Calls 2021-22: The projects selected by the EC will reinforce competitiveness and technological non-dependency of the EU space sector, consolidate EU flagship programmes, develop new downstream applications and evolution schemes for services of the EU Space Programme, highlight European access to space and future technologies connected to space.

The DIU and the U.S. Air Force select five companies for military weather modeling project: The selected companies Muon Space, Tomorrow.io, Windborne Systems, Greensight and NextGen Federal Systems will support building weather models by using data from satellites, aerial and terrestrial sensors and demonstrate the integration of commercial data into the Weather Virtual Private Cloud of the U.S. Air Force.

Indian ground stations lose communication with Indian Mars orbiter declared non-recoverable: The eight-year mission of the orbiter Mangalyaan (MOM) reached the end of its operational life. Reportedly, the breakdown of communication might be due to the pointing away of MOM's Earth-facing antenna.

INDUSTRY & INNOVATION

Privateer launches real-time space debris collision prevention platform

The Hawaiian company Privateer announced the **launch of "Crow's Nest"**, a free, real-time satellite data fusion and debris visualisation platform with the aim of providing global transparency on space traffic. The tool, which integrates into the Wayfinder application, employs NASA´s CARA (Conjunction Assessment Risk Analysis) tools for conjunction probability analysis across the entire catalogue of tracked space objects. With a view to enhance operations safety, Privateer signed agreements with **OMEGA in March 2022** and with **SCOUT in September 2022**. Their joint efforts will allow the mapping of space objects in orbit with unprecedented accuracy and transparency, a critical pursuit to keeping space safe and accessible for all humankind.

Credit: Privateer

Inmarsat receives $980M U.S. Navy contract for global communications services

Inmarsat Government, a U.S.-based subsidiary of the UK Inmarsat, **won a 10-year $980M contract** awarded by the Defense Information Systems Agency (DISA) to provide broadband satellite and terrestrial communications services to the U.S. Navy for fixed sites and mobile platforms, integrating Inmarsat Global Xpress Ka-band, as well as C-, Ku- and X-band frequencies. Furthermore, the agreement covers commercial teleport services, backhaul connectivity, monitoring and control, operations, information assurance and cybersecurity. Inmarsat is requested to build a network that is interoperable with military Ka-band satellite systems, and to provide coverage in the Arctic region, which will be available next year when Inmarsat launches two satellites on Space Norway's Arctic Satellite Broadband Mission (ASBM).


Credit: U.S. Navy

Rivada Space Networks signs MoU with SpeQtral for ultra-secure communications

On October 18th, the Munich-based **Rivada Space Network (RSN) and the Singaporean SpeQtral signed a partnership agreement** to provide quantum-secure communication for companies and governments worldwide. Their joint efforts aim to demonstrate the technical compatibility of adding a Quantum Key Distribution (QKD) encryption layer to enhance the security of communications over low earth orbit (LEO) satellite constellations. Between 2024 and 2028, **RSN will start the launch of 600-satellite laser-connected constellation** with four precursor satellites, while SpeQtral will launch its QKD satellite, SpeQtral-1. This will allow the two companies to establish quantum-secure data links over the RSN precursor satellites and validate both the space and ground station terminals required for QKD-enabled encrypted traffic on the Rivada Space Networks constellation.

SES draws closer to claim $3.7B payout after new launch to near-GEO

On October 4th, satellites SES-20 and SES-21 of the France-based SES were launched onboard the NASA-owned Atlas V rocket with the aim of delivering TV, radio and other critical transmission services. Together with three other satellites, SES-18, SES-19 and SES-22, they are part of a broader **Federal Communications Commission (FCC) programme to clear a portion of C-band spectrum** to enable wireless operators to deploy 5G services across the contiguous US (CONUS).

The FFC proceedings will enable SES to claim $3.7B if it manages to fully vacate the lower 300 MHz slice of C-band by December 5th, 2023, by moving broadcast customers to the upper 200 MHz of the band.

LuxSpace and University of the Bundeswehr sign contract for SeRANIS mission

Credit: UniBW

OHB SE's subsidiary LuxSpace and the University of German Armed Forces Munich (Universität der Bundeswehr München - UniBW) **signed a contract for the "Seamless Radio Access Network for Internet of Space" (SeRANIS) small satellite mission**, which will provide an orbital accessible multifunctional experimental laboratory and will use LuxSpace's Triton-X heavy platform for the payload integration on one platform. The mission consists of 15 experiments to explore future technologies in areas, such as 6G mobile communication systems, IoT and laser communication. The SeRANIS mission aims to enables the Bundeswehr's access to new capabilities in LEO and to provide the German research community with an orbital lab.

DLR inaugurates new optical ground station at DLR site in Oberpfaffenhofen

On October 12th, the **German Aerospace Center (DLR) inaugurated a new optical ground station** at its site in Oberpfaffenhofen, Munich. The new ground station enables to test and develop different possibilities of optical free-space communication. Optical communication technology enables data rates in the terabit range, the use of quantum communication technologies and high-precision satellite navigation systems. Specifically, the new optical ground station includes a new telescope (a Coudé focus telescope) with a diameter of 80 centimetres, in which the light collected by the telescope is guided via mirrors directly into a laboratory below in the ground station.

Credit: DLR

NASA awards KSAT Inc. and SpaceLink for communications studies

NASA awarded KSAT Inc. a $162.000 contract and SpaceLink a $190.000 contract to carry out studies on direct-to-Earth and lunar-space-relay communications, as part of NASA's campaign which aims to investigate commercial sources for future space communications services. NASA's Near Space Network includes commercial and government-owned, contractor-operated space communications infrastructure and provides space communications and tracking services.

Quantum Space announces first cislunar mission

Credit: Quantum Space

On October 26th, the U.S. company Quantum Space, which develops spacecraft platforms in cislunar space, **unveiled plans for a first cislunar smallsat pathfinder mission, the QS-1 spacecraft**, which will carry a payload provided by GEOST to collect SSA and SDA data. QS-1 is scheduled to launch in October 2024. The costs of QS-1 are not disclosed but Quantum Space stated that the mission is fully funded through launch.

Chinese company Changguang Satellite doubling size of Jilin-1 constellation

Reportedly, the Chinese commercial company **Changguang Satellite Technology announced to expand its Jilin-1 constellation which is currently under development from 138 (first phase) up to 300 satellites (second phase)** – doubling the constellation's size. The first phase is planned to be completed by 2023 and the second phase (expansion to 300 satellites) by 2025.

OneWeb unveils Innovation Challenge competition

OneWeb having **launched 36 satellites with ISRO from India** this month, is inviting individuals, companies and academic organisations to **propose applications (beyond communications) for its LEO satellite constellation**, as part of OneWebs Innovation Challenge competition backed by ESA. Divided into two categories "industrial" and "academic/researcher" the winners from both categories will receive the opportunity to cooperate with OneWeb. The proposals for the challenge are due to November 11th, and awards will be announced in January 2023.

In other news

New Ariane 6 upper stage successfully completes first hot-fire test conducted by DLR: At its side in Lampoldshausen, DLR carried out the test on the ESA P5.2 test stand on behalf of ArianeGroup.

Arabsat signs a contract with SpaceX to launch its 7A satellite: Arabsat 7A aims to expand its services over the Middle East, Africa and beyond. Arabsat has selected SpaceX already before - the first launch took place in 2019 with the deployment of Arabsat 6A and the launch of Arabsat's BADR-8 satellite is also planned to be launched with SpaceX next year.

Ororatech completes significant review in the ESA InCubed program for CubeSat FOREST-3: This milestone is a next step towards the delivery of FOREST-3 which will be the first satellite of a planned thermal satellite constellation with an expected revisit time of 30 minutes by 2026.

The company Advanced Space restores normal attitude control of the CAPSTONE spacecraft: CAPSTONE went into safe mode after having suffered a problem during a trajectory correction maneuver last month.

Kongsberg NanoAvionics announces multi-million investment plan for supply of smallsat constellation: plan is aimed at supporting the goal of becoming the prime supplier for smallsat constellations globally by increasing the production capacity over the next two years and by ramping up its R&D program.

E-Space appoints Karim Michel Prior Sabbagh as Managing Director for Europe and the Middle East: Prior to this, Sabbagh was the former President and CEO of SES.

ECONOMY & BUSINESS

YEESS welcomes new members Exolaunch, Unseenlabs and U-Space

Credit: YEESS

The European NewSpace platform "Young European Enterprises Syndicate for Space" (YEESS) **welcomed three new members: The German Exolaunch, the French Unseenlabs and the French U-Space.**

The non-profit association was founded in 2021 by the European space enterprises Satlantis, Anywaves, Exotrail, Pangea Aerospace, Aerospacelab, and ConstellR, with the goal to boost the competitiveness and raises awareness of the innovation potential, services and solutions of the European space sector. YEESS engages with the ESA Commercialisation Directorate and with ESA's NewSpace Advisory Board (NAB).

Astra receives deficiency notice from NASDAQ

On October 6th, the California-based **Astra received a deficiency notice from the NASDAQ exchange** because its shares had traded at a price of below $1 for more than 30 days. Astra has now 180 days to get the share price above $1 for at least 10 consecutive days.

Astra CEO Chris Kemp said at the Satellite Innovation conference that **the company has "lots of different strategies"** to address the delisting. Astra finds appropriate to raise its share price is shipping electric propulsion systems for satellites to customers and to continue to provide reliable lowest cost-per-launch services.

Orbex secures £40.4M in funding

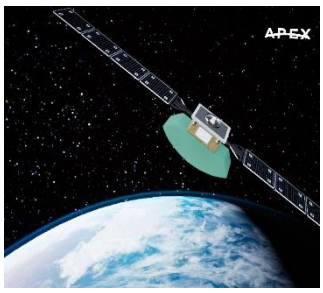
The UK-based spaceflight company Orbex **secured £40.4M in its Series C funding round**, led by the Scottish National Investment Bank, a new investor. Orbex will use the new funding to scale up its resources, especially for the first vertical launch from UK soil, and to support future projects with additional funding.

Credit: Orbex

Solestial closes $10M seed funding round

On October 11th, the Arizona-based company Solestial **closed a $10M seed round** led by Airbus Ventures with participation of AEI HorizonX, GPVC, Stellar Ventures, Industrious Ventures and other investors. Solestial, intending to supply solar panels for spacecrafts and space-based infrastructure, will use the funding to validate this technology and prepare the transition of the company towards mass production.

Apex raises $7.5M seed funding round



Credit: Apex Space

The **U.S. start-up Apex raised a $7.5M seed round of funding**, led by the venture capital firm Andreessen Horowitz. Several other funds participated in the round, including XYZ, J2, Lux Capital and Village Global. With the funding, Apex plans to enter the satellite manufacturing market with the 103 kg smallsat bus "Aries", which designed to support i.a. EO and communications missions and is able to host payloads of up to 94 kg. Furthermore, Apex plans to gradually ramp up to mass production of those satellite buses, with the first bus planned to launch in 2023 as demonstration.

Yahsat acquired minority stake of eSAT Global to connect phones to satellites

On October 11th, the Emirati satellite fleet operator **Yahsat invested in and acquired a minority stake of the Californian IoT connectivity solutions provider eSAT Global Inc.**, which is developing a chip to enable phones to connect to its GEO satellites. The deal (undisclosed amount) includes a long-term commercial agreement for Yahsat's L-band mobile satellite services business Thuraya, to use eSAT's technology for direct connection to phones and low-power IoT devices.

Credit: Yahsat

In other news

Sateliot seeks to raise $10M in pre-Series B: The Spanish satellite operator focusing on IoT connectivity opened a solicitation to raise $10M in a pre-Series B. Sateliot also disclosed that the round of funding is part of a larger $100M Series B to take place in 2023, which the company will use to build its 250-satellite constellation.

Wyvern raises $7M in a seed plus round: the funding round was led by Uncork Capital, with participation of the previous investors MaC Venture Capital and Y Combinator. The funding increased the startup's total financing to approx. $15M, which Wyvern uses to build high-res hyperspectral satellites with telescopes.

Array Labs raises $5M in a seed funding round: the funding round was backed by Seraphim Space and Agya Ventures. With the funding, the Silicon Valley start-up is developing a constellation of radar satellites for 3D-imagery.

Cryptosat completes $3M seed funding: The start-up intends to use the funding to contribute to the goal of building cryptographic applications physically isolated and housed in an orbiting spacecraft.

CYSEC will raise €2M with the support of Karista: The European company specialising in data protection earmarked the additional funding to boost its growth in the NewSpace market, to reinforce its sales teams in France and recruit new workforce.

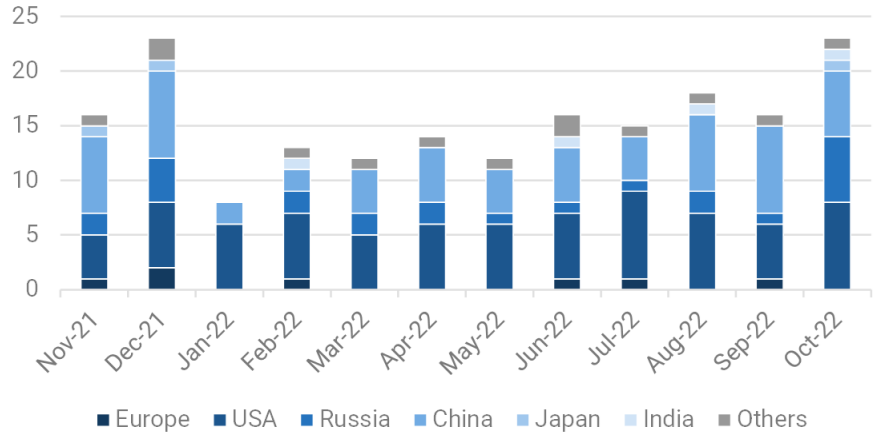
Privateer and Celestron partner to crowdsource the transparency and predictability of space: The crowdsourced data will be shared through Privateer's Wayfinder platform globally.

LAUNCHES & SATELLITES

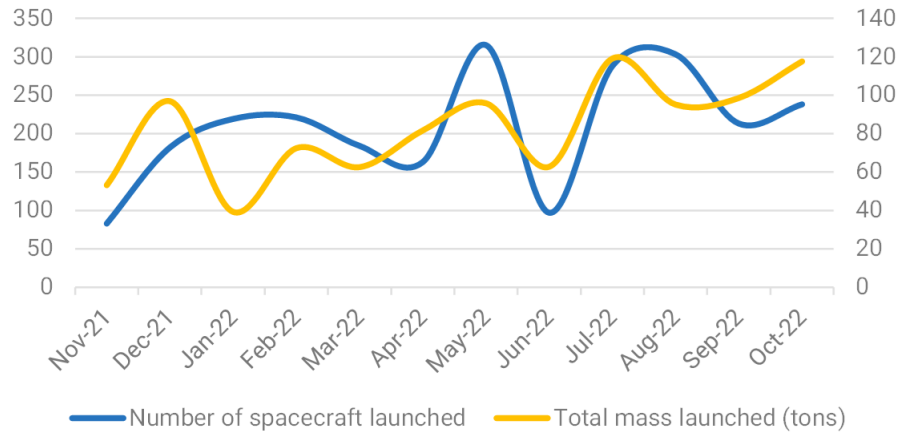
Global space activity statistics

October 2022	USA	Russia	China	Japan	India	Others	Total
Number of launches	8	6	6	*1*	1	1	**23**
Number of spacecraft launched	173	10	9	*9*	36	1	**238**
Mass launched (in kg)	74 043	13 771	23 982	*461*	5292	110	**117 659**

Launch activity over the year

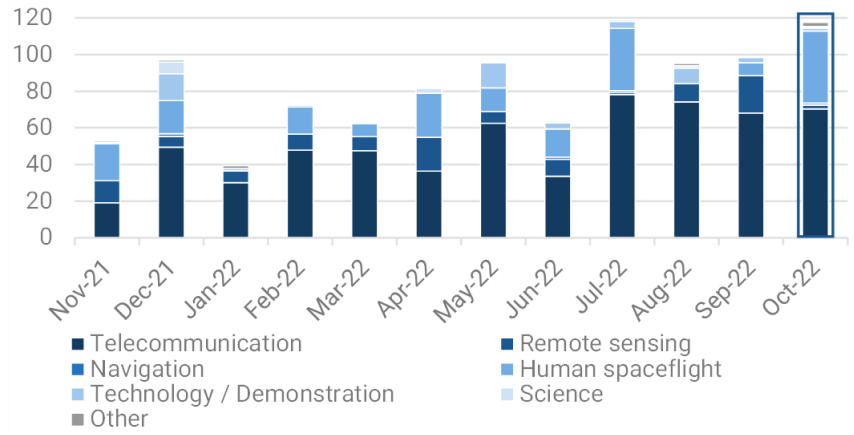


Evolution of the number of launches per launch country



Evolution of launch activity over the year 2021-2022

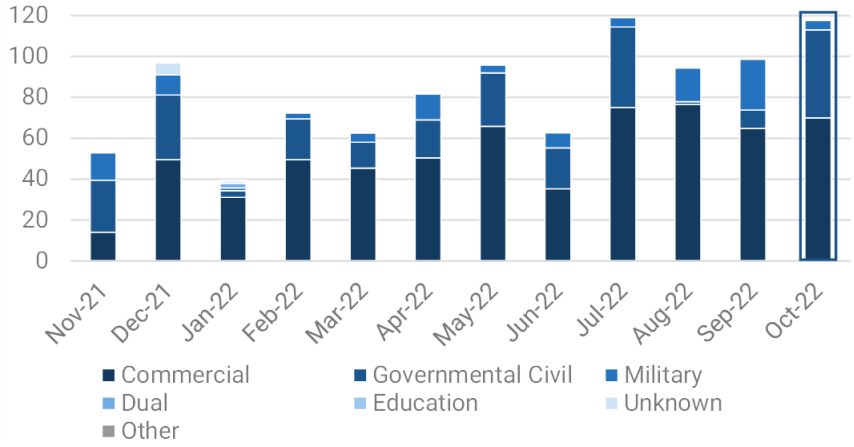
Satellite missions and markets



Evolution of the total mass launched (tons) per mission (Nov. 2021-Oct. 2022)

October 2022	Telecom	Remote sensing	Navigation	Human Spaceflight	Tech/ Demo	Science	Other
Europe	12 992				0.65		0.8
USA	54 364			12 055	29		4
Russia	979	150	962	7280			2400
China		1700		20 000	1394	888	
Japan		340			119.3	1.7	
Others	2000						

Total mass (kg) launched by mission and customer country



Evolution of the total mass launched (tons), per market (Nov. 2021-Oct. 2022)

October 2022	Commercial	Governmental Civil	Military	Education	Other
Europe	12 992.25				1.2
USA	54 364	12 080		8	
Russia		8259	3512		
China	194	22 588	1200		
Japan	340	117.3		3.7	
Others	2000				

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
01/10/2022	USA	Firefly Alpha	Firefly Capsule 2	Purdue University	USA	Purdue University	USA	25	Tech / Demo	Governmental Civil
			FossaSat 1b (2)	Fossa Systems	Spain	Fossa Systems	Spain	0,25	Tech / Demo	Commercial
			Genesis (G & J) / Astroland (1 & 2)	AMSAT-EA	Spain	AMSAT-EA	Spain	0,4 (each)	Radio Amateur	Amateur
			Qubik (3 & 4)	Libre Space Foundation	Greece	Libre Space Foundation	Greece	0,2 (each)	Tech / Demo	Amateur
			Serenity 2	Teachers in Space	USA	Teachers in Space	USA	4	Radio Amateur	Education
			TechEdSat 15	NASA	USA	NASA	USA	4	Tech / Demo	Education
04/10/2022	USA	Atlas-5(531)	SES 20	SES	Luxembourg	Boeing	USA	1500	Telecom	Commercial
			SES 21	SES	Luxembourg	Boeing	USA	1700	Telecom	Commercial
05/10/2022	USA	Falcon-9 v1.2 (Block 5)	Crew Dragon USCV-5	NASA	USA	SpaceX	USA	12055	Crew Transfer	Governmental Civil
05/10/2022	USA	Falcon-9 v1.2 (Block 5)	Starlink (52 satellites)	SpaceX	USA	SpaceX	USA	295 (each)	Telecom	Commercial
07/10/2022	China	CZ-11H	CentiSpace-1 (S5 & S6)	Future Navigation	China	CAS	China	97 (each)	Tech / Demo	Commercial
07/10/2022	New Zealand	Electron KS	Gazelle / Argos-4	General Atomics	USA	General Atomics	USA	110	Telecom	Commercial
08/10/2022	USA	Falcon-9 v1.2 (Block 5)	Galaxy 33 / Galaxy 15R	Intelsat	USA	Northrop Grumman	USA	3654	Telecom	Commercial
			Galaxy 34 / Galaxy 12R	Intelsat	USA	Northrop Grumman	USA	3695	Telecom	Commercial
08/10/2022	China	CZ-2D(2)	ASO-S / Kuafu	CAS	China	CAS	China	888	Astronomy	Governmental Civil
10/10/2022	Russia	Soyuz-2-1b Fregat	Kosmos 2559 / Glonass-K 17L	Roscosmos	Russia	ISS Reshetnev	Russia	962	Navigation	Military
12/10/2022	Russia	Proton-M Blok-DM-3	AngoSat 2	AngoSat	Angola	ISS Reshetnev	Russia	2000	Telecom	Commercial
12/10/2022	Japan	Epsilon-2 CLPS	FSI-SAT	Future Science Institute	Japan	Future Science Institute	Japan	1	Tech / Demo	Education
			KOSEN 2	Kochi National College of Technology	Japan	Kochi National College of Technology	Japan	2,7	Tech / Demo	Education
			MAGNARO A / Tigris	Nagoya University	Japan	Nagoya University	Japan	3	Tech / Demo	Governmental Civil
			MAGNARO B / Piscis	Nagoya University	Japan	Nagoya University	Japan	1,4	Tech / Demo	Governmental Civil
			MITSUBA	Kyushu Institute of Technology	Japan	Kyushu Institute of Technology	Japan	1,7	Other	Governmental Civil
			QPS-SAR (3 & 4)	iQPS	Japan	iQPS	Japan	170	Earth Observation	Commercial

			RAISE 3	JAXA	Japan	JAXA	Japan	110	Tech / Demo	Governmental Civil
			Waseda-SAT 0	Waseda University	Japan	Waseda University	Japan	1,2	Tech / Demo	Governmental Civil
13/10/2022	China	CZ-2C(3)	HJ 2E	CRESDA	China	DFH Satellite Co.	China	500	Earth Observation	Governmental Civil
14/10/2022	China	CZ-2D(2)	Yaogan 36-02 (A, B & C)	People's Liberation Army	China	CAST	China	400 (each)	Earth Observation	Military
15/10/2022	USA	Falcon-9 v1.2 (Block 5)	Hotbird 13F	Eutelsat	France	Airbus	France	4500	Telecom	Commercial
15/10/2022	Russia	Angara-1.2	Kosmos 2560 / EO-MKA 3	Ministry of Defense of the Russian Federation	Russia	VNIIEM	Russia	150	Earth Observation	Military
20/10/2022	USA	Falcon-9 v1.2 (Block 5)	Starlink (54 satellites)	SpaceX	USA	SpaceX	USA	295 (each)	Telecom	Commercial
21/10/2022	Russia	Soyuz-2-1v Volga	Kosmos (2561 & 2562)	Ministry of Defense of the Russian Federation	Russia	Unknown (Russia, Private)	Russia	1200	Unknown	Military
22/10/2022	India	GSLV Mk.3(2)	OneWeb (36 satellites)	OneWeb Ltd.	United Kingdom	OneWeb Satellites (USA)	USA	147 (each)	Telecom	Commercial
22/10/2022	Russia	Soyuz-2-1b Fregat	Gonets-M (23, 24 & 25)	Roscosmos	Russia	ISS Reshetnev	Russia	280 (each)	Telecom	Governmental Civil
			Skif-D	Roscosmos	Russia	ISS Reshetnev	Russia	139	Telecom	Governmental Civil
26/10/2022	Russia	Soyuz-2-1a	Progress-MS 21	Roscosmos	Russia	RKK Energia	Russia	7280	Cargo Transfer	Governmental Civil
28/10/2022	USA	Falcon-9 v1.2 (Block 5)	Starlink (53 satellites)	SpaceX	USA	SpaceX	USA	295 (each)	Telecom	Commercial
29/10/2022	China	CZ-2D(2)	Shiyan 20C	Unknown (China, Public)	China	CAS	China	1200	Tech / Demo	Governmental Civil
31/10/2022	China	CZ-5B	Mengtian	CMSA	China	SAST	China	20000	Space Station Infrastructure	Governmental Civil

Launch Highlights

China completes its space station

Credit: SAST

On October 31st, China launched the **last module of its space station**, Mengtian. After a flight of 13 hours, the module docked to the station, although it will reach its final position in the next few months. Mengtian brings 32 more cubic meters for use by the astronauts, and will provide a payload airlock allowing the robotic arm of Tiangong to grab payloads and install them outside of the station. As with other launches, the flight made use of a Long March 5B, whose first stage is expected to make an uncontrolled reentry to Earth.

Firefly controversially succeeds its first launch

Credit: Firefly Aerospace

On October 1st, Firefly Aerospace **managed to reach orbit** with its rocket, Alpha, slightly more than one year after a previous flight ended in a spectacular failure. This is the first success of Firefly, whose rocket is able to lift up to 1300 kg in LEO. The payloads were several experimental satellites for NASA and universities. However, despite the rocket reaching orbit, it was revealed that payloads had been released in a lower orbit than initially planned. As a consequence, their decay was quicker than expected and almost all payloads reentered Earth atmosphere, where they got destroyed. Despite this situation, Firefly reiterated that the launch was a success.

OneWeb launches from India

Credit: ISRO

On October 22nd, OneWeb launched a new batch of 36 satellites from the Satish Dawan Centre, in India. This was the **first fully commercial launch for the GSLV Mk. 3**, which brought a heavy mass to LEO, while it is usually employed to send communication satellites in GEO. This was also the first launch of OneWeb this year, which has suffered from the start of the conflict in Ukraine. Indeed, until then, OneWeb was reliant on Soyuz launches operated by Arianespace. With the invasion of Ukraine and the sanctions that ensued, Arianespace terminated its Soyuz launches. A set of satellites expected to launch in March was "seized" by Roscosmos as a retaliation against the United Kingdom. As a consequence, the company decided to diversify its launch providers, including with Indian providers and SpaceX. An agreement was nonetheless found with Arianespace, keeping the door open to fly part of the second-generation constellation of the company on Ariane 6.

Russia enters the broadband constellation sector

On October 22nd, Roscosmos launched three Gonets telecommunication satellites as well as the Skif-D spacecraft. **Skif-D is a prototype spacecraft** that will allow to test technologies and verify that the chosen orbit (8000 km) is an appropriate one for an upcoming constellation of 12 satellites expected to provide broadband Internet to Russian remote areas, such as the Arctic region.

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