

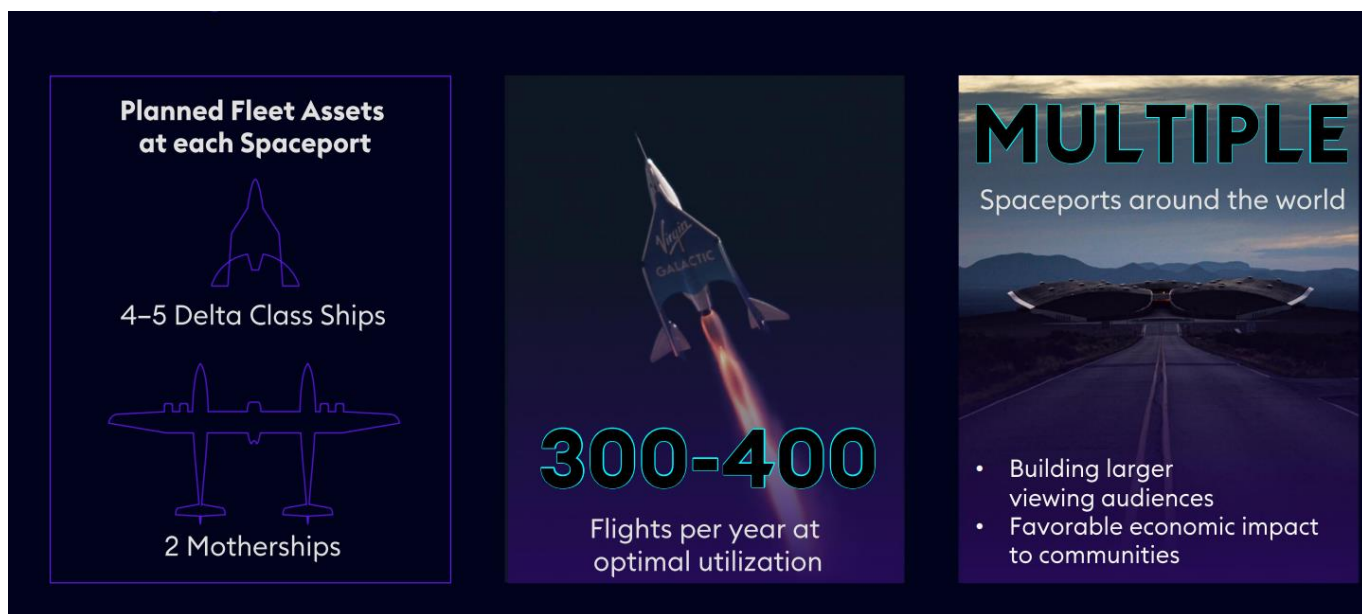
The Bridge

Monthly SpaceTech Update

FLYING HIGHER: VIRGIN GALACTIC'S MILESTONES AND FUTURE PLANS

On February, 27, Virgin Galactic released its earnings report for the fourth quarter of 2023. The company successfully flew six human spaceflights in six months in 2023. In the fourth quarter of 2023, the company witnessed a **significant revenue surge**, reaching \$2.8 million, marking a remarkable **322% increase year-over-year**. Similarly, full-year 2023 revenue rose to \$6.8 million, reflecting a solid **294% increase from 2022**. Despite these gains, Virgin Galactic reported a net loss of \$104 million in Q4 2023, narrowing 31% from the previous year. However, for the full year 2023, the company's net loss stood at \$502 million, marginally higher than the loss in 2022. In 2023, Virgin Galactic's financial performance showcases a positive trajectory with notable revenue growth and narrower net losses. Despite these improvements, achieving sustainable profitability remains a work in progress. Nonetheless, the company's enhanced adjusted EBITDA and improved cash flow management compared to previous years signify progress toward this objective. Notable business updates include the **scheduled Galactic 07 spaceflight mission for the second quarter of 2024**. Additionally, progress on the **construction of the spaceship factory in Arizona** remains on schedule, with the facility expected to open in mid-2024.

Chart 1: Building Assets to Scale the Business



Source: Intro-act, Virgin Galactic

2023 was a transformative year for the company, marked by the successful launch of its commercial space line and ambitious future plans. The year saw Virgin Galactic make history with **24 people flown to space**, showcasing operational efficiency and expanding access to space travel. One distinguishing feature of Virgin Galactic's offerings is the **"Overview Effect"** experienced by travelers when they see the Earth from a distance. Looking forward, the introduction of Delta class spaceships, scheduled for testing in 2024 and commercial service in 2026, underscores the company's commitment to scaling operations and making the space environment more accessible. With a substantial cash balance of nearly \$1 billion, Virgin Galactic is well-positioned to achieve its goals. Delta-class ships carry six passengers compared to the current Unity-class ships' capacity of four. Another notable development is that Virgin Galactic is **raising its ticket prices from \$450,000 per ticket to \$600,000 per ticket**, which should support its margins. Strong seat sales despite high prices reflect robust market demand for space travel experiences and the company's pricing power. By increasing flight frequency through a growing fleet of spaceships, Virgin Galactic is poised not only to meet this demand but also to significantly impact the space tourism market. For more on Space Tourism, refer our whitepaper [here](#).

INDUSTRY TRENDS

Falcon 9 launches PACE Earth science mission. A SpaceX Falcon 9 placed a NASA Earth science satellite into orbit on a launch that was the first of its kind for the U.S. government in more than 60 years. PACE carries instruments to study ocean color as a means to monitor biological activity like phytoplankton as well as clouds and aerosols in the atmosphere. The mission, developed at the Goddard Space Flight Center in Maryland with a total cost including reserves of \$964 million, is designed to last three years, although scientists anticipate it operating for at least a decade. [Read more](#) (Space News)

Collins Aerospace tests NASA space station suit in weightlessness. Collins Aerospace recently completed a key NASA design milestone as the company works to develop a next-generation spacesuit for use on the International Space Station. The milestone—a pressure garment system fit and functionality test in a microgravity-like environment—marked an important step toward developing a suit for NASA that can be used for continuing operations and advancing scientific discovery in Low Earth Orbit. The Collins test was conducted aboard a commercial microgravity aircraft to provide brief periods of weightlessness. [Read more](#) (NASA)

Chart 2: Collins Aerospace Tests NASA Space Station Suit in Weightlessness



Source: Intro-act, Collins Aerospace, NASA

AI spurs space sector innovation. The pace of innovation in the space sector is picking up thanks in part to artificial intelligence and machine learning. Amazon Web Services customers, for example, are designing spacecraft parts with generative AI. The parts are then 3D-printed and run through a battery of tests. The process leads to rapid iteration of designs that are “very intuitive and very innovative at the same time,” Alistair McLean, AWS Satellite Solutions principal architect, said at the SmallSat Symposium. [Read more](#) (Space News)

Greece signs Artemis Accords. Greece became the latest country to sign the Artemis Accords outlining best practices for sustainable space exploration. In a ceremony at the U.S. State Department, Giorgos Gerapetritis, Greece’s foreign minister, formally signed the Accords. The signing took place as part of a U.S.-Greece Strategic Dialogue meeting. Greece is the 35th country to do so since the Accords were announced in 2020. [Read more](#) (Space News)

NASA collaborates in an international air quality study. NASA and international researchers are studying the air quality in Asia as part of a global effort to better understand the air we breathe. In collaboration with Korea's National Institute of Environmental Research (NIER), the Airborne and Satellite Investigation of Asian Air Quality, or ASIA-AQ mission, will collect detailed atmospheric data over several locations in Asia. Utilizing aircraft, satellites, and ground-based instruments, the ASIA-AQ team will gather and share data with air quality and government agencies. [Read more](#) (NASA)

India targets a surge in civil and commercial launches. India is planning up to 30 launches over a 15-month period, indicating the country's ambition for a significant rise in both civil and commercial launch activities. The launch plans are a mix of scientific, commercial, user-funded, and technology demonstration missions across the fourth quarter of fiscal year 2023-24 and the fiscal year 2024-25. Seven test launches will serve India's Gaganyaan human spaceflight project, with nine others under the aegis of the Indian Space Research Organization (ISRO). [Read more](#) (Space News)

NGA goes big on commercial satellite data with \$290 million 'Luno' program. The National Geospatial-Intelligence Agency is supercharging its use of commercial satellite imagery and analytics with a new procurement program dubbed "Luno." The Luno program seeks to leverage commercial satellite imagery and data analytics to enhance NGA's global monitoring capabilities. The agency in January issued a solicitation for Luno "Part A" bids, and proposals are due in late March. [Read more](#) (Space News)

Scientists reveal SUV-sized camera that will change our grasp of space. A revolutionary telescope will come online in 2025. Mounted to it will be a giant camera built to capture extraordinary views of space. The United States' SLAC National Accelerator Laboratory is finishing the over 5.5-foot-tall, 6,200-pound (1.65-meter and 2,800-kilogram) LSST Camera, which will snap cosmic images at the much-anticipated Vera C. Rubin Observatory located in the lofty Chilean mountains. The lab posted new images online showing the over 12-foot-long (3.7 m) camera, with its imposing lens, in a clean room. [Read more](#) (Satellite News Network)

Chart 3: Scientists Reveal SUV-Sized Camera That will Change Our Grasp of Space



Source: Intro-act, Satellite News Network, Mashable

The Odysseus Moon Lander sent one final photo before its power ran out. The Odysseus lander, sent to the moon by space exploration company Intuitive Machines on February 22, was the first lunar landing by the United States in over 50 years — the last was Apollo 17. It also became the first commercial-sector company and NASA CLPS (Commercial Lunar Payload Services) provider to successfully land and transmit scientific data to and from the Moon. And while it landed less than one mile from its target location, another impressive feat, it didn't land cleanly — it landed on its side. As such, communication and power generation were inhibited. [Read more](#) (PetaPixel)

Beijing government releases commercial space action plan. Beijing's municipal government has released an action plan to foster an innovative commercial space ecosystem in the city over the next five years. The Beijing Action Plan for Accelerating the Innovation and Development of the Commercial Space Industry (2024-2028) includes 18 policy measures. The action plan focuses on mapping the commercial aerospace industry chain and supporting cutting-edge research and development. It includes enhancing development guarantees and fostering a high-quality industrial ecosystem. [Read more](#) (*Space News*)

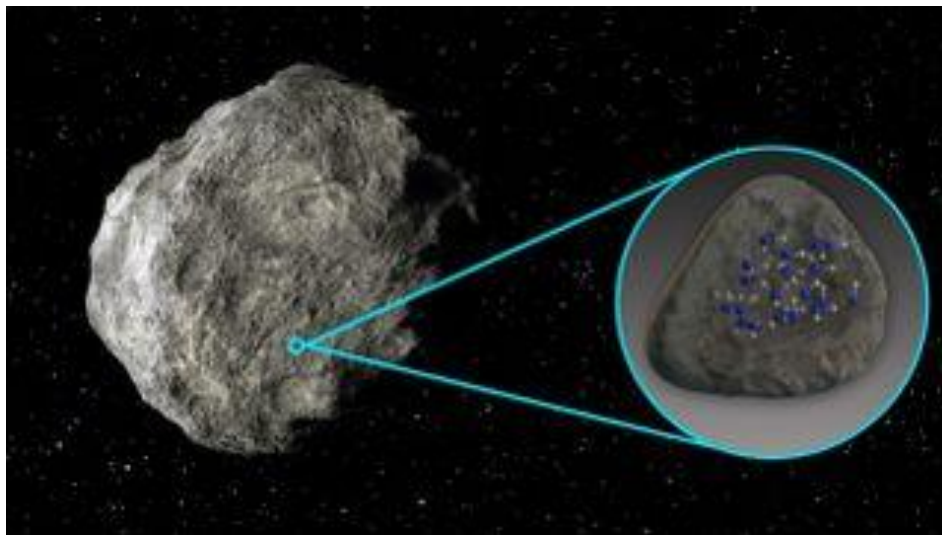
Satellite operators join forces to chase direct-to-smartphone opportunity. A group of satellite operators has joined forces to push the fledgling direct-to-smartphone market to adopt services using their radiowaves, rather than spectrum derived from terrestrial mobile network operators. Viasat, Terrestar Solutions, Ligado Networks, Omnispace, and Yahsat announced the creation of the Mobile Satellite Services Association (MSSA), a nonprofit aiming to harmonize Mobile Satellite Services for integrating with standardized devices. [Read more](#) (*Space News*)

NASA selects university teams to explore innovative aeronautical research. NASA has selected another five university teams to participate in real-world aviation research challenges that could help transform flight in the skies above our communities. Research topics range from safeguarding automated aircraft against cyberattacks to finding ways to help aircraft operations across the nation more quickly recover from delays due to major storms or technical problems. A key ULI goal is for faculty-led student teams to gain experience by participating in aeronautics research on a multidisciplinary team. [Read more](#) (*NASA*)

879 days! Russian cosmonaut breaks record for total time spent in outer space. The spaceflight record books have just been rewritten. Russian cosmonaut Oleg Kononenko set a new mark for most total days spent off Earth, eclipsing the 878 days, 11 hours and 30 minutes of his countryman Gennady Padalka, according to Russia's state-run TASS news agency. Kononenko launched to the International Space Station (ISS) last September for a stay that was scheduled to last a full year, and he will continue to add to his newly set record for a while yet. [Read more](#) (*Space.com*)

Water found on the surface of an asteroid for the first time ever. Water molecules have been detected on the surface of an asteroid for the first time, revealing new clues about the distribution of water in our solar system. Scientists studied four silicate-rich asteroids using data gathered by the now-retired Stratospheric Observatory for Infrared Astronomy (SOFIA), a telescope-outfitted plane operated by NASA and the German Aerospace Center. [Read more](#) (*Space.com*)

Chart 4: Data Collected by The Faint Object Infrared Camera (FORCAST) Instrument on The Now-Retired Stratospheric Observatory for Infrared Astronomy (SOFIA)



Source: Intro-act, Space.com, NASA/Carla Thomas/SwRI

GSOA and ESA to foster 5G & 6G space-based systems. The Global Satellite Operators Association (GSOA) and the European Space Agency (ESA) have announced the signing of a Memorandum of Intent (MOI). The MOI, signed by Isabelle Mauro, Director General at GSOA, and Francisco-Javier Benedicto Ruiz, Acting Director of Connectivity & Secure Communications at ESA, solidifies the commitment of both organizations to work closely together in the pursuit of their shared goals in this area. [Read more](#) (*Spacewatch Global*)

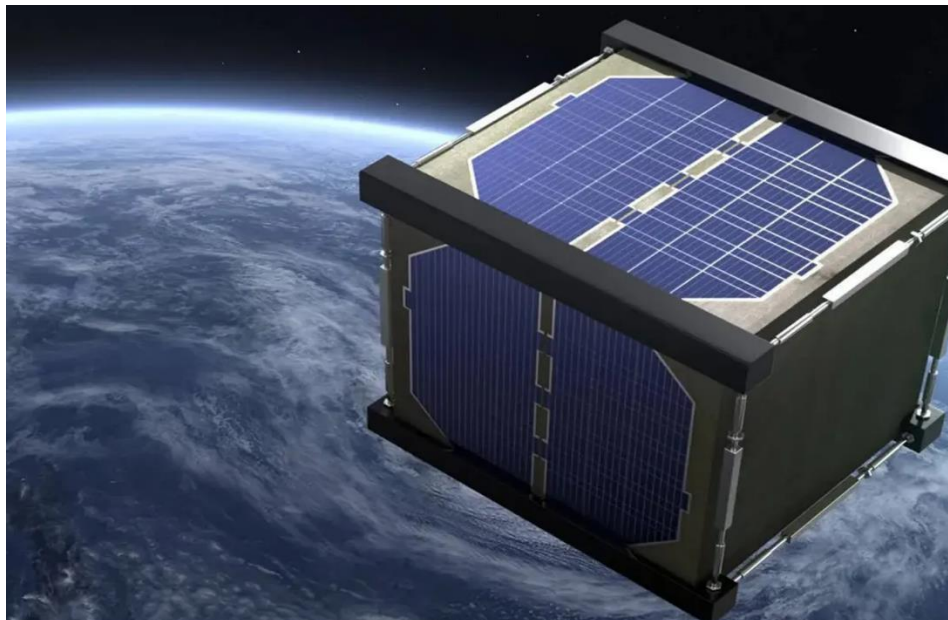
NATO to strengthen partnership with space industry, launches APSS. The North Atlantic Treaty Organization (NATO) has announced a strengthening of its partnership with the commercial space industry. NATO Deputy Secretary General Mircea Geoană made the announcement during NATO's first Space Reverse Industry Day, 20 February 2024, as he highlighted the importance of cooperation with the commercial space industry to ensure Alliance security. [Read more](#) (*Spacewatch Global*)

NASA seeking applicants for its next simulated year-long mars surface mission. NASA is currently on the lookout for individuals who are interested in taking part in a simulated year-long Mars surface mission. This mission, the second part of three ground-based missions referred to as CHAPEA (Crew Health and Performance Exploration Analog), aims to gather information for the agency's future human exploration plans for the Red Planet. The mission is set to commence in the spring of 2025. [Read more](#) (*Orbital Today*)

T-Minus engineering to launch first European mission of 2024. While the continent prepares for the maiden launch of Ariane 6, a small company from the Netherlands is getting ready to perform what could be Europe's first rocket launch of 2024. T-Minus Engineering is preparing to launch a pair of its DART rockets from the Esrange Space Centre in Sweden. The two rockets will be carrying payloads for the Swedish Royal Institute of Technology (KTH). DART is a single-stage suborbital solid fuel rocket that stands at around 3.5 metres tall. [Read more](#) (*European Spaceflight*)

Japan builds world's first-ever wooden satellite for eco-friendly space exploration. A group of Japanese researchers have developed a peculiar spacecraft, known as the LignoSat probe, that is constructed entirely out of magnolia wood. After carrying out experiments on the ISS, the researchers found that the wood was highly stable and crack-resistant. The team, which consists of research workers from Kyoto University and logging company Sumitomo, is now finalizing plans to launch the wooden satellite via a US rocket later in the summer. [Read more](#) (*Orbital Today*)

Chart 5: Japan Builds World's First-Ever Wooden Satellite



Source: Intro-act, Orbital Today

SPACETECH NEWS

GOVERNMENT POLICIES

U.S. Air Force and Space Force to realign priorities. The Department of the Air Force has unveiled a long-term vision to revamp personnel, operations, and technology efforts with the goal of reshaping the Air Force and newly formed Space Force to concentrate resources squarely on strategic competition with China. Air Force Secretary Frank Kendall said priorities have to change for the era of great power competition. Service leaders discussed a planned series of initiatives during a panel at the Air & Space Forces Association's Warfare Symposium in Aurora, Colorado. [Read more](#) (*Space News*)

U.N. committee to take up issue of satellite interference with astronomy. A United Nations committee will study the interference risks that satellite constellations pose to astronomy, a year after rejecting a similar proposal to do so. At the conclusion of the meeting earlier this month of its scientific and technical subcommittee, the U.N.'s Committee on the Peaceful Uses of Outer Space (COPUOS) agreed to add an agenda item titled "Dark and quiet skies, astronomy and large constellations: addressing emerging issues and challenges" to its meetings in 2025 through 2029. [Read more](#) (*Space News*)

FAA to establish committee to refine launch licensing regulations. The Federal Aviation Administration will establish a committee to get industry input on ways to improve a new launch licensing process, two years before all launch providers must switch to the new regulations. In a speech at the FAA Commercial Space Transportation Conference here, Kelvin Coleman, FAA associate administrator for commercial space transportation, said the agency would establish an aerospace rulemaking committee, or SpARC. [Read more](#) (*Space News*)

CAPITAL MARKETS

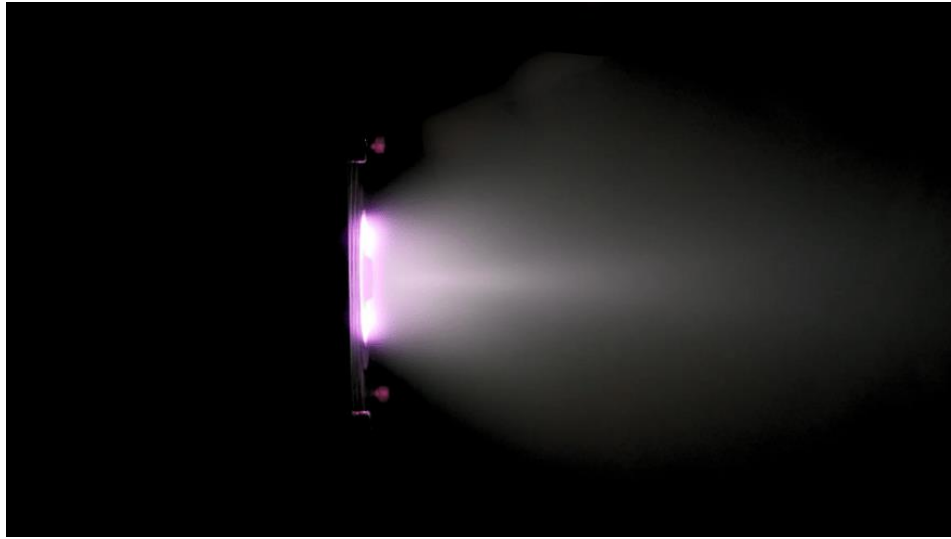
Venture-backed space companies face "Year of Reckoning." The aftermath of a "bubble" of investment in space startups in recent years could cause many companies to struggle to raise additional funding even as overall market conditions improve. That situation is the aftermath of a surge of investment in space companies that peaked at \$47 billion in 2021, including several companies going public through special purpose acquisition company (SPAC) mergers. [Read more](#) (*Space News*)

UKSA contributes £7.4 million to exploration missions from around the world. The UK Space Agency has committed £7.4 million in contributions to eight international missions that will explore the Moon, Mars, Venus, and our Universe. "From exploring water on Mars and the possibility of sustained human activity on the red planet to how galaxies evolved over time, our more than £7 million investment is pushing the boundaries of space discovery and putting the UK at the heart of some of the most important global space missions," said Minister for Space Andrew Griffith. [Read more](#) (*European Spaceflight*)

Space VCs urge startups to pursue government contracts but stay focused on commercial success. Space technology startups should carefully weigh the risks and rewards when bidding on Small Business Innovation Research (SBIR) government contracts, a venture investor said at the SmallSat Symposium in Mountain View, California. The SBIR program provides crucial early funding for young firms, and can be a lifeline for many space entrepreneurs when they're just getting off the ground. But the competitive contracts can also consume outsized time and resources, and keep many companies in a cycle of continuously chasing SBIRs and not putting enough focus on commercialization, said Timur Davis, investment director at Munich Re Ventures. [Read more](#) (*Space News*)

Pale Blue receives grant by MEXT to develop propulsion systems for space debris mitigation. Pale Blue has been awarded a grant by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT) under the Small and Business Innovation Research 3 (SBIR-3) program to develop and demonstrate key technology for space debris mitigation. The grant is worth up to USD 27 million (JPY 4 billion) and will enable the development and demonstration of a miniaturized water-based ion thruster and a water-based hall-effect thruster by fiscal 2027. [Read more](#) (*SatNow*)

Chart 6: Pale Blue is Developing a Water-Fueled Hall-Effect Thruster For 100 To 500-Kilogram Satellites



Source: Intro-act, Space News, Pale Blue

AI startup Synthetica raises \$15 million in Series B funding. Synthetica, a startup that uses artificial intelligence to analyze data from space and air sensors, announced that it had raised \$15 million in Series B funding. The round was led by Lupa Systems and TitledTownTech, with participation from IBM Ventures and Booz Allen Hamilton. Wisconsin-based Synthetica made headlines a year ago when it used artificial intelligence and Planet Labs' satellite imagery archive to independently track the Chinese spy balloon's path across the United States before it was shot down. [Read more](#) (Space News)

NASA updates equity action plan, adds focus on STEM Education and more. NASA published its 2023 Equity Action Plan, which outlines key accomplishments in increasing equity across the agency, and new commitments to continue removing inequitable barriers and challenges facing underserved communities. The equity plan is part of the Biden-Harris Administration's whole-of-government approach to advancing equity. It supports the President's Executive Order 14091 on "Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government." [Read more](#) (NASA)

LeoLabs raises funding to deliver space operations insights. LeoLabs has raised an additional \$29 million in financing to scale up the delivery of insights to commercial and Government operators by further investing in advanced end-user applications and partner integrations. The round saw new investors, including GP Bullhound, 1941, and Dolby Family Ventures. This extension also enjoyed strong support from existing investors, including Insight Partners, Velvet Sea Ventures, Space Capital, MDSV Capital, and the AngelList Syndicate. [Read more](#) (Spacewatch Global)

Greece announces €60 million Earth Observation microsatellite constellation. The Greek Ministry of Digital Governance has announced that the country is going ahead with the development of a €60-million Earth observation microsatellite constellation. Once operational, the data collected by the constellation of satellites will be utilized by a number of the country's agencies, including the Ministries of Environment and Energy, Shipping, and Climate Crisis and Civil Protection. A particular focus of its operation will be monitoring the environment and the effects of climate change. [Read more](#) (European Spaceflight)

UKSA commits £3.5M to the development of satellite servicing tech. The UK Space Agency has announced that it has committed £3.5 million in funding to further the development of technology aimed at extending the life of satellites. The Satellite Applications Catapult will receive £2 million of the total amount to upgrade its In-Orbit Servicing and Manufacturing (IOSM) facility. The Satellite Applications Catapult was established in December 2012 as one of nine Catapult centres set up by Innovate UK to conduct research and development across a number of different industries. [Read more](#) (European Spaceflight)

GOVERNMENT CONTRACTS AND PARTNERSHIPS

BlackSky inks \$50 million deal to supply imagery services and satellites to Indonesia. BlackSky, an Earth observation and data analytics firm, will provide satellite imagery services and imaging spacecraft to the Republic of Indonesia under a \$50 million deal announced. BlackSky will work with Thales Alenia Space to establish the building blocks of a sovereign Earth imaging satellite network tailored to Indonesia's national security needs. Thales Alenia Space was selected in December to deliver a dedicated Earth observation constellation to the Indonesian Ministry of Defense, combining both radar and optical sensors. [Read more](#) (Space News)

Chart 7: Rendering of the Republic of Indonesia's Earth Imaging Constellation



Source: Intro-act, Space News, Thales Alenia

Intelsat to produce multi-orbit satellite terminals for U.S. military aircraft. Satellite operator Intelsat will produce satellite terminals for the U.S. Air Force that can connect to multiple networks in space, providing more consistent broadband communications for military aircraft. The company's terminal, called ROAM (Resilient Multi-orbit Arborne Module) can seamlessly switch connections between Intelsat's and Viasat's fleet of satellites in geosynchronous orbit, and SpaceX's Starlink satellites in Low Earth Orbit, said David Broadbent, Intelsat's president of government solutions. [Read more](#) (Space News)

Breakthrough software for hypersonic missile detection from space. The Space Development Agency (SDA) has chosen EpiSci, a California-based artificial intelligence (AI) company, to create a software tool that can detect hypersonic missiles from space. Hypersonic missiles fly at least five times faster than the speed of sound, making them hard to track and intercept by existing defense systems. SDA plans to deploy up to 100 missile-tracking satellites as part of this network. [Read more](#) (Hyscaler)

Contract awarded for development of future UK space control system. Lockheed Martin and UK company Rhea will develop a satellite control system as part of Project Beroe, which will help control the country's future ISTAR constellation. Project Beroe will underpin government control of future satellite constellations, further enhancing the UK's multi-domain integration efforts. The contracts, worth £4 million (US\$5 million), are for the development of software for satellite system management, designed to capture and process onboard system data to control and monitor the performance of the satellite. [Read more](#) (Shephard Media)

Hughes' networking software selected for Air Force satellite Internet experiment. Hughes Network Systems announced it will supply modems and other ground-based technology to SES Space & Defense for a military experiment aimed at establishing a multi-vendor mobile communications network. SES is planning a demonstration

under the U.S. Air Force's DEUCSI (Defense Experimentation Using Commercial Space Internet) program. Mobile network tests in this demonstration will include ground and air platforms. [Read more](#) (*Space News*)

Saudi Space Agency partners with LeoLabs and NorthStar for SSA. On the sidelines of the Space Debris Conference in Riyadh, the Saudi Space Agency signed memoranda of understanding (MoUs) with LeoLabs and NorthStar, respectively. The MoU with LeoLabs aims to build a cooperative relationship in the field of space monitoring. Both agreements aim to exchange expertise and knowledge related to space situational awareness and explore future collaboration opportunities between the Saudi Space Agency and both NorthStar and LeoLabs. [Read more](#) (*Spacewatch Global*)

NASA signs agreement with Nikon to develop lunar Artemis camera. When NASA sends astronauts to the South Pole region of the Moon for the first time with its Artemis campaign, they will capture photos with a handheld camera to help advance scientific research and discovery for the benefit of all. NASA and Nikon Inc. recently signed a Space Act Agreement that outlines how they will work together to develop a handheld camera that can operate in the harsh lunar environment for use beginning with Artemis III. [Read more](#) (*NASA*)

NASA awards contracts for flight, payload integration services. NASA has selected 15 companies to provide flight and payload integration services to advance technologies and procedures for operating in space, including testing in high-altitude, reduced gravity, or other relevant environments. Examples of payloads include NASA science instruments or technology demonstrations. The indefinite-delivery/indefinite-quantity base contract awards are firm-fixed-price with a total combined value of \$45 million and a performance period of five years. [Read more](#) (*NASA*)

UNOOSA and Exolaunch sign agreement to launch CubeSats. The United Nations Office for Outer Space Affairs (UNOOSA) and Exolaunch GmbH (Exolaunch) have signed an agreement to provide free launch opportunities for Cube Satellites (CubeSats) to offer more countries access to space. The collaboration is part of UNOOSA's Access to Space for All initiative, which aims to foster capacity-building in space science and technology by providing hands-on and educational opportunities. [Read more](#) (*Spacewatch Global*)

PLD Space wins ESA contract to develop payload system. PLD Space has signed a Boost! contract with the European Space Agency (ESA) for the development of a payload accommodation system on MIURA 5 that will provide greater flexibility to its customers. The project, in collaboration with OCCAM Space, is worth 1.3 million euros. In addition, it is part of ESA's Boost! program that aims to boost commercial space transportation initiatives. [Read more](#) (*Spacewatch Global*)

COMPANY NEWS AND EARNINGS

Lynk Global finalizes SPAC merger deal. Lynk Global has agreed to a merger that would raise money for the direct-to-smartphone operator and list its shares on Nasdaq, the venture said in a regulatory filing that details its revenue projections for the emerging market. The deal is with Slam Corp., a publicly traded shell company led by former professional baseball player Alex Rodriguez. Slam, which has been hunting for an investment opportunity for three years, values Lynk at \$800 million. [Read more](#) (*Space News*)

Viasat's hobbled ViaSat-3 F1 satellite to enter service next quarter. Satellite operator Viasat will enter its ViaSat-3 F1 satellite into service next quarter, despite the new machine offering far less bandwidth than planned after a deployment issue. ViaSat-3 F1 is intended to be the first in a constellation of three geostationary Ka-band communications satellites. F1 is intended to cover the Americas, with future satellites covering the EMEA and APAC regions. The satellites are each expected to have a throughput of more than 1Tbps and download speeds of 100+ Mbps. [Read more](#) (*Data Center Dynamics*)

Astroscale successfully launches world's first debris inspection spacecraft, ADRAS-J. Astroscale Japan Inc., a subsidiary of Astroscale Holdings Inc., the market leader in satellite servicing and long-term orbital sustainability across all orbits, confirmed the successful launch of its commercial debris inspection demonstration satellite, Active Debris Removal by Astroscale-Japan (ADRAS-J), from Rocket Lab's Launch Complex 1 in Mahia, New Zealand on February 18, at 2:52 pm UTC. The ADRAS-J spacecraft was selected by the Japan Aerospace Exploration Agency for Phase I of its Commercial Removal of Debris Demonstration program. [Read more](#) (*Astroscale*)

Chart 8: Launching of ADRAS-J



Source: Intro-act, Astroscale

L3Harris demonstrates digital phased array antenna system. L3Harris Technologies announced the results of a three-month demonstration of a compact Digital Beamforming Phased Array Antenna System (DPAAS). During the demonstration in Fairbanks, Alaska, the DPAAS prototype handled an average of more than 300 satellite contacts per day, including up to eight simultaneous contacts. Government and commercial customers are seeking innovative ground systems to communicate with large satellite constellations in LowEarth Orbit. [Read more](#) (Space News)

Astra founders reduce offer to take company private. The founders of satellite propulsion and launch vehicle company Astra have sharply cut their offer to take the company private, warning of “imminent bankruptcy” if the company doesn’t accept their new proposal. Founders Kemp and London cited several reasons for cutting the share price. They included continued cash burn by the company since they tendered the original offer and higher “non-operating expenses” as the company used multiple third-party advisers to assess options. [Read more](#) (Space News)

Starlab Space selects SpaceX’s starship for historic launch. Starlab Space LLC, the transatlantic joint venture between Voyager Space and Airbus, has selected SpaceX to launch the Starlab commercial space station into LowEarth Orbit (LEO). Starship, SpaceX’s fully reusable transportation system designed to carry both crew and cargo to Earth orbit, the Moon, Mars and beyond, will launch Starlab in a single mission prior to the decommissioning of the International Space Station. [Read more](#) (Spacewatch Global)

Vast to Bid on private astronaut missions to the ISS. Vast announced its intention to compete for NASA contracts to organize private astronaut missions to the ISS—a role that has been filled exclusively by Axiom Space since the flights commenced in 2022. Vast would bid for NASA’s fifth and sixth private astronaut missions. Vast sees the private astronaut mission contract as an opportunity to gain experience in customer sales, training, medical, and general mission operations ahead of its own habitat deployment, while also stoking competition—a key motivator for NASA. [Read more](#) (Payload Space)

BAE Systems secures regulatory approvals for acquisition of Ball Aerospace. Further to the announcement of 17 August 2023, BAE Systems has now received the necessary regulatory approvals and will be executing steps in the coming days to complete the acquisition of Ball Aerospace from Ball Corporation. The final transaction is expected to close at a purchase price of \$5.5 billion (approximately £4.4 billion), which will be funded through existing cash and new external debt. [Read more](#) (BAE Systems)

After months of being stuck in orbit, space drugs are finally coming home. The Federal Aviation Administration (FAA) issued a reentry license to Varda Space's manufacturing capsule, allowing the first batch of space drugs to return back to Earth. California-based Varda Space Industries had been struggling to land its first orbital factory, which was originally meant to return to Earth in September 2023 but was denied reentry. Varda's first in-space manufacturing capsule launched in June, designed to manufacture products in a microgravity environment (to avoid gravity-induced defects) and transport them back to Earth. [Read more](#) (Gizmodo)

Blue Canyon Technologies to deliver Oracle-M spacecraft for US Air Force cislunar mission. Blue Canyon Technologies, a subsidiary of Raytheon Technologies, is set to deliver the Oracle-M spacecraft for a U.S. Air Force Cislunar Mission, demonstrating satellite mobility and navigation capabilities in the cislunar region of space. This collaboration between Blue Canyon and the Air Force Research Laboratory underscores the strategic role of innovation in maintaining U.S. air dominance and the potential of unmanned aerial capabilities in shaping the future of the U.S. Air Force. [Read more](#) (BNN Breaking)

Chart 9: Rendering of Blue Canyon Technologies' Saturn Satellite Buses



Source: Intro-act, Space News, Blue Canyon Technologies

Space tech startup True Anomaly set to launch its first satellites. Space startup True Anomaly is preparing for the launch of its first two satellites, designed to maneuver in close proximity to other objects, inspect them and take pictures. Two Jackal spacecraft, each about 300 kilograms, are scheduled to launch on a SpaceX Falcon 9 rocket in the upcoming Transporter-10 rideshare. The company, based in Centennial, Colorado, focuses on the military market, aiming to deploy Jackal satellites in support of U.S. Space Force activities. [Read more](#) (Space News)

Firefly Aerospace doubles Texas footprint to support testing of Antares 330, MLV rocket. In the months following its fourth flight of its Alpha rocket, Firefly Aerospace continues to push forward with work on two new rockets in partnership with Northrop Grumman. The expansion, which boosted its manufacturing space from 92,000 to 207,000 square feet, also includes a new engine test stand, with can withstand up to 230,000 pounds of thrust. This addition supports the test campaign for Firefly's Miranda and Vira engines. [Read more](#) (Spaceflight Now)

Avanti Partners with Telesat to Boost LEO Capabilities. Avanti Communications signed an agreement with Telesat to test and develop LEO services. Avanti plans to incorporate Telesat's services into its network to improve its broadband connectivity for customers. This is Avanti's first low-latency LEO constellation agreement. The collaboration will serve the growing connectivity demands of Avanti's customers once the Telesat Lightspeed constellation is operational in 2027. Telesat's global network will be comprised of 198 LEO satellites and on-ground networks, and MDA is building the constellation. [Read more](#) (Via Satellite)

ispace Signs MoU with mu Space for future lunar missions. ispace, inc. (ispace) has signed two memoranda of understanding related to payload services and strategic cooperation with mu Space and Advance Technology Co., Ltd., (mu Space) a satellite manufacturer and satellite communication service provider. The collaboration marks the first step toward future lunar missions between the two companies. According to the agreements, the companies have entered negotiations for future payload services to lunar orbit and the lunar surface. [Read more](#) (*Spacewatch Asia Pacific*)

D-Orbit to build European Responsive Space Systems Architectures. D-Orbit has been selected to join the Responsive European Architecture for Space (REACTS) project under the European Defence Fund (EDF) 2022. As part of this innovative collaboration, D-Orbit will focus on the use of orbital transfer vehicles (OTVs) within responsive space systems. REACTS aims to enhance European defense capabilities through a robust, scalable network of Responsive Space Systems (RSS). [Read more](#) (*Spacewatch Global*)

ViaSat wins Northrop Grumman contract to support AFRL initiative. Viasat, Inc. has won a contract from Northrop Grumman to support the U.S. Air Force Research Laboratory (AFRL) initiative, called the Defense Experimentation Using Commercial Space Internet (DEUCSI) Call 003 program – better known by its nickname ‘Global Lightning.’ As a result, the company’s high-capacity geostationary satellites will support the program, which is connecting commercial space Internet services for military users. [Read more](#) (*Spacewatch Global*)

Iridium connectivity adopted by South Korean Military. Iridium Communications Inc. has announced that the Republic of Korea (ROK) Ministry of Defense (MOD) has adopted Iridium connectivity for strategic use within its military operations. The ROK Army will consequently leverage a full suite of Iridium products and services to enhance operations, including real-time position-tracking capabilities for soldiers. Iridium service provider Arion Communication Co. Ltd. and the ROK MOD’s Defense Acquisition Program Administration (DAPA) supported the implementation by providing the ROK Army with over 1,000 Iridium Connected™ SAT-PRE (Position Reporting Equipment) devices. [Read more](#) (*Spacewatch Global*)

Thales Alenia Space marks major milestone in space station construction. Europe’s Thales Alenia Space has marked a significant milestone in the construction of the Axiom Hab One (AX-H1) commercial space station module. Thales Alenia Space is one of few companies in the world that boasts significant experience in the development of space station modules. The company developed and built the International Space Station’s Harmony, Tranquility, and Columbus modules. Thales Alenia Space announced that it had successfully mated the forward cone to the cylinder bulkhead of the AX-H1 pressure vessel. [Read more](#) (*European Spaceflight*)

Chart 10: Thales Alenia Space – Space Station Construction



Source: Intro-act, European Spaceflight, Thales Alenia Space

SPACETECH FUNDING ACTIVITY

Chart 11: Recent Funding Activity in the SpaceTech Sector (February 2024)

Company	Latest Fund Raise (\$ Mn)	Round	Use of Funds	Investors
Shanghai Spacecom Satellite Technology	943	Series A	To begin construction of its 12,000-satellite strong “G60” constellation.	National Manufacturing Transformation and Upgrading Fund (NMTUF), Shanghai Alliance Investment, CASSTAR, Guosheng Capital, Hengxu Capital and CAS Capital.
Synthetaic	15	Series B	Bringing this technology to market so that companies across all industries can find the seemingly impossible answers locked inside their visual datasets.	Lupa Systems, TitledownTech, IBM Ventures and Booz Allen Hamilton.
Pale Blue	27	Government Grant	To upgrade its water-based propulsion technology for larger spacecraft	Japan
Skylo	37	Not specified	To help nail down the partnerships it needs to enable more smartphones to connect to satellites for texting and other low-bandwidth services	Intel Capital, Innovation Endeavors, BMW i Ventures, Samsung Catalyst, Next47 and Seraphim Space
Orien Space	83.5	Series B	Research and development of its first liquid propellant rocket.	Liangxi Science and Technology Innovation Industry Fund of Funds, Hongtai Fund, Xin Ding Capital, CMBC International Holdings, Shanhang Capital and Shenyin & Wanguo Investment.
Gilmour Space	36	Series D	The funding supports the small launch vehicle startup's campaign to manufacture, test and begin launching rockets and satellites from the Bowen Orbital Spaceport in North Queensland.	Queensland Investment Corporation, Blackbird, Main Sequence, HostPlus and Australian pension fund HESTA.
Space Circling	13.9	Series A	The funding will mainly go toward construction of an industrial base for the company's rocket engines, including mass production.	Changsha Kaifu District Zhongxin High-tech Fund, Mianyang Kefa Fund, Xi'an Fulao Fund, SIRI New Materials and Xi'an Talent Fund
Elve	15	Series A	To speed up manufacturing of millimeter-wave amplifiers	Lockheed Martin Ventures, TomEnterprise Private AB, Green Sands Equity, Yu Galaxy and Cambium Capital
Leo Labs	29	Additional Funding	To scale up the delivery of insights to commercial and Government operators by further investing in advanced end-user applications and partner integrations.	GP Bullhound, 1941, Dolby Family Ventures, Insight Partners, Velvet Sea Ventures, Space Capital, MDSV Capital, and AngelList Syndicate
Connected	2.17	Pre-Seed	Expand its team and accelerate the development of its proprietary technology, whose first tests in space will tentatively happen by the end of 2024.	Shilling VC, Iberis Capital, FundBox, Amena Ventures, Keith Willey, Octopus Ventures
Unseen Labs	92.26	New Fundraising Round	Intensify its technological innovations and expand its service offering while strengthening its goal as a global leader in RF signal detection.	Supernova Invest, ISA LT via its Strategic Transition Fund, UNEXO, 360 Capital, OMNES, Bpifrance, Breizh Up managed by UI Investissement, and S2G Ventures.
ATMOS	1.41	Extension of Seed Funding	Fund Development of Phoenix Return Capsule	Amadeus APEX Technology Fund, OTB Ventures, High-Tech Gründerfonds, Seraphim, E2MC, VENTIS, and another.vc.

Source: Intro-act, Multiple Web Source

SPACETECH GOVERNMENT CONTRACT AWARDS

Chart 12: Government Contracts and Grants (February 2024)

Awardee Company	Awarding Agency	Country	Contract Value (in \$ mln)	Project / Program
lackSky Technology	Republic of Indonesia	U. S	50	Provide satellite imagery services and imaging spacecraft to the Republic of Indonesia
Intelsat	U.S. Air Force	U.S.	Not Disclosed	Produce satellite terminals for the U.S. Air Force that can connect to multiple networks in space, providing more consistent broadband communications for military aircraft.
EpiSci	Space Development Agency	U. S	1.6	To develop a software tool capable of detecting hypersonic missiles in flight from satellite data, a challenging task given the extreme speeds of these weapons.
Rhea Group	U.K. Ministry of Defense	U. S	2.5	To develop satellite control systems for the nation's future remote-sensing constellation
Lockheed Martin		U. S	2.5	
Hughes Network Systems	SES Space & Defense	U. S	Not Disclosed	U.S. Air Force's DEUCSI Program
PLD Space	ESA	Europe	1.41	Development of a payload accommodation system on MIURA 5 that will provide greater flexibility to its customers.

Source: Intro-act, Multiple Web Sources

SPACETECH ETFs

ARK Space Exploration & Innovation ETF (ARKX)

Closing Price (03/04/24)	\$14.53	1-Week NAV Change	0%	NAV Change (YTD)	-3.39%
AUM (as of 03/04/24)	\$249.67Mn	Fund Inception	3/30/2021	Expense Ratio	0.70%

ARKX is an actively managed Exchange Traded Fund (ETF) that seeks long-term growth of capital by investing under normal circumstances primarily (at least 80% of its assets) in domestic and foreign equity securities of companies that are engaged in the Fund's investment theme of Space Exploration and Innovation. The advisor defines "Space Exploration" as leading, enabling, or benefitting from technologically enabled products and/or services that occur beyond the surface of the Earth, including 1) Orbital Aerospace Companies: companies that launch, make, service, or operate platforms in orbital space, including satellites and launch vehicles; 2) Suborbital Aerospace Companies: companies that launch, make, service, or operate platforms in suborbital space; 3) Enabling Technologies Companies: companies that develop technologies used by Space Exploration-related companies for successful value-add aerospace operations, including AI, robotics, 3D printing, materials, and energy storage; and 4) Aerospace Beneficiary Companies: companies whose operations stand to benefit from aerospace activities, including agriculture, Internet access, GPS, construction, imaging, drones, air taxis, and electric aviation vehicles."

Monthly Market Performance (Month Ending 02/29/2024)

One Month	Three Months	Six Months	YTD	One Year	Inception
-1.30%	1.26%	-0.21%	-3.79%	4.18%	-28.72%

Quarterly Market Performance (Quarter Ending 12/31/2023)

One Month	Three Months	Six Months	YTD	One Year	Inception
7.84%	11.83%	2.12%	24.78%	24.37%	-24.09%

Top 10 Holdings (Updated as of 03/05/24)

Ticker	Company	% of Funds	Market Value
TRMB	TRIMBLE INC	10.41%	\$25,678,964.25
AVAV	AEROVIRONMENT INC	8.44%	\$20,811,499.80
KTOS	KRATOS DEFENSE & SECURITY	8.35%	\$20,595,060.00
IRDM	IRIDIUM COMMUNICATIONS INC	6.34%	\$15,635,038.47
LHX	L3HARRIS TECHNOLOGIES INC	5.33%	\$13,134,687.20
PRNT	THE 3D PRINTING ETF	4.84%	\$11,928,776.60
6301	KOMATSU LTD	4.79%	\$11,825,578.21
TER	TERADYNE INC	4.49%	\$11,080,401.00
PATH	UIPATH INC - CLASS A	3.80%	\$9,361,386.58
ACHR	ARCHER AVIATION INC-A	3.58%	\$8,823,297.28

For more information on ARKX visit: <https://ark-funds.com/funds/arkx/>

SPACETECH ETFs

Procure Space ETF (UFO)

Closing Price (03/04/24)	\$	1-Week NAV Change	-0.76%	NAV Change (YTD)	-7.75%
AUM (as of 03/04/24)	\$ 35.32 Mn	Fund Inception	4/10/2019	Expense Ratio	0.75%

The Procure Space ETF (UFO) is comprised of a portfolio of companies involved in space-related industries. UFO is an exchange traded fund (ETF) seeking investment results that correspond generally to the performance, before fund fees and expenses, of the S-Network Space Index (SPACE) developed by S-Network Global Indexes. Although there is no legal definition of “space,” a commonly accepted definition is that the edge of space begins at the Kármán Line, which is 100 kilometers (62 miles) above the Earth’s surface.

Monthly Market Performance (Month Ending 02/29/2024)

One Month	Three Months	Six Months	YTD	One Year	Inception
-0.65%	2.49%	-8.72%	-7.37%	-16.38%	-32.96%

Quarterly Market Performance (Quarter Ending 12/31/2023)

One Month	Three Months	Six Months	YTD	One Year	Inception
13.50%	11.34%	-2.10%	-4.16%	-2.96%	-25.76%

Top 10 Holdings (Updated as of 03/04/24)

Ticker	Company	% of Funds	Market Value
SATS	ECHOSTAR CORP	8.06%	\$2,820,287.70
TRMB	TRIMBLE INC	6.40%	\$2,239,227.45
MDA CN	MDA LTD	6.23%	\$2,177,619.87
9412 JP	SKY PERFECT JSAT H	6.06%	\$2,119,950.16
SESG FP	SES SA	5.41%	\$1,891,329.40
GRMN	GARMIN LTD	5.37%	\$1,879,120.18
GSAT	GLOBALSTAR INC	4.52%	\$1,582,530.29
RKLB	ROCKET LAB USA INC	4.51%	\$1,577,469.84
SIRI	SIRIUS XM HOLDINGS INC	4.24%	\$1,481,734.44
ETL FP	EUTELSAT COMMUNICATION	4.23%	\$1,478,202.76

For more information on UFO visit: <https://procureetfs.com/ufo/>

SPACETECH ETFs

Chart 13: ARKX vs. S&P 500



Source: Intro-act, Yahoo! Finance

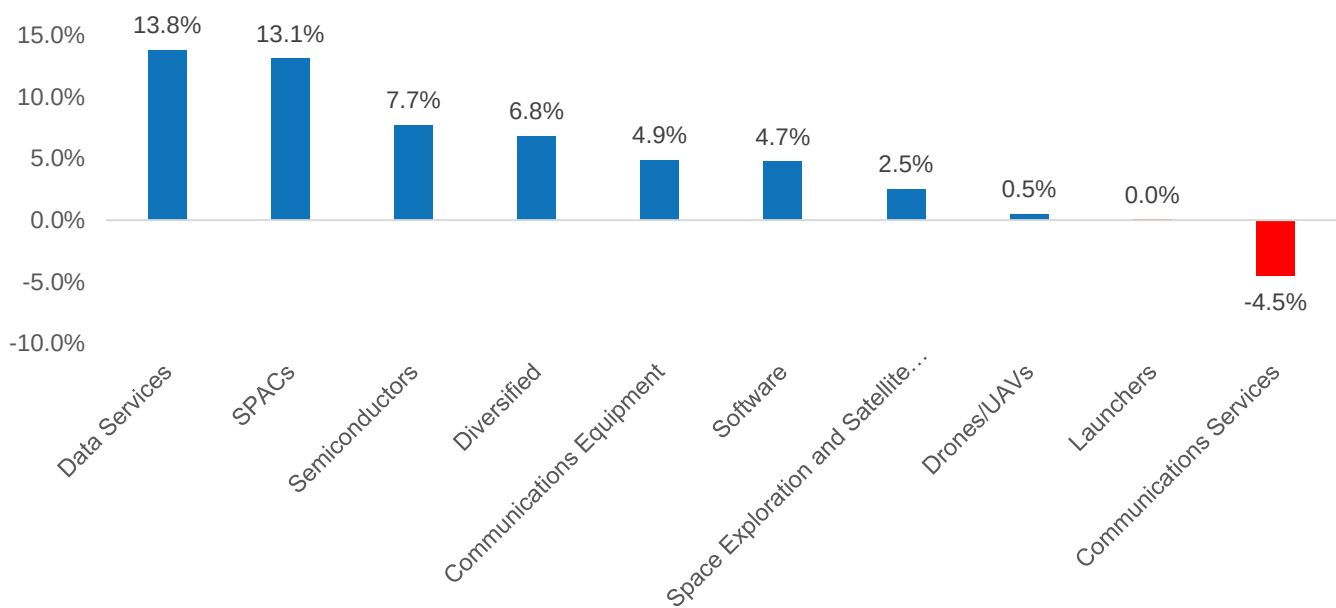
Chart 14: UFO vs. S&P 500



Source: Intro-act, Yahoo! Finance

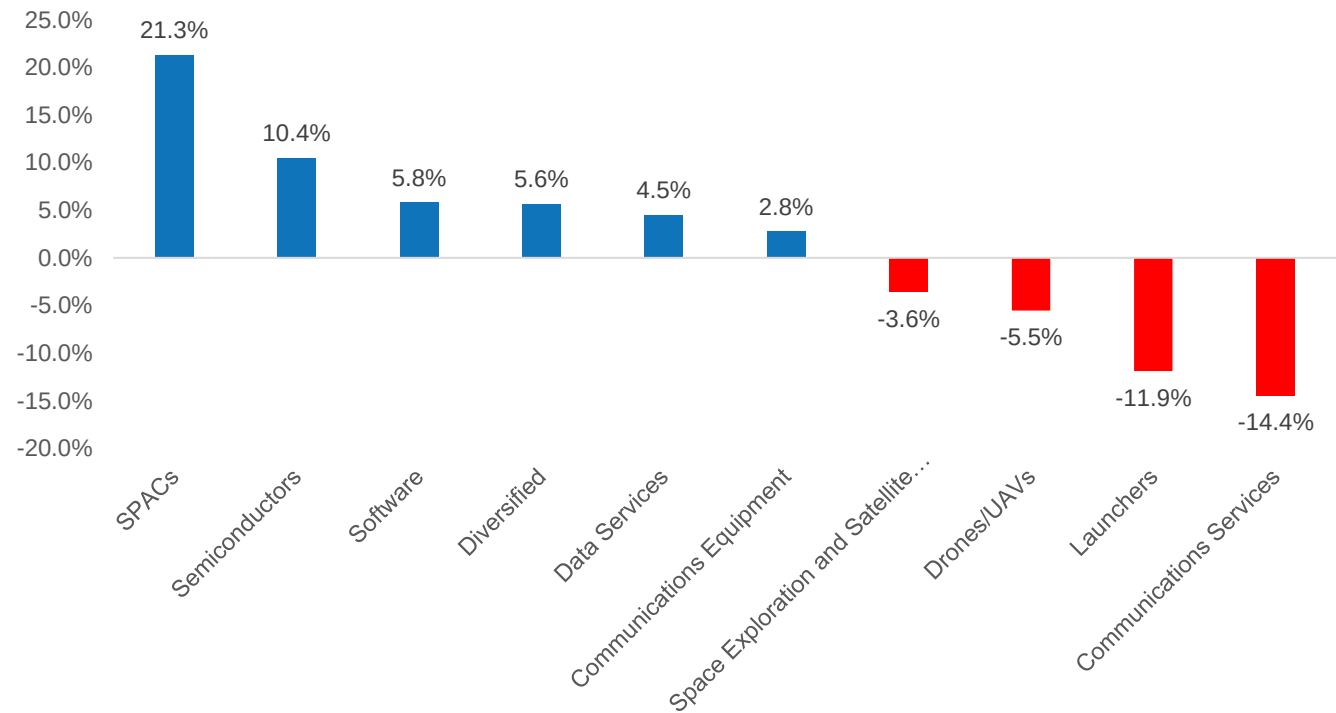
LEADERS AND LAGGARDS – SPACETECH SEGMENTS

Chart 15: M/M Returns by SpaceTech Segments



Source: Intro-act, FactSet. Data as of February 29, 2024

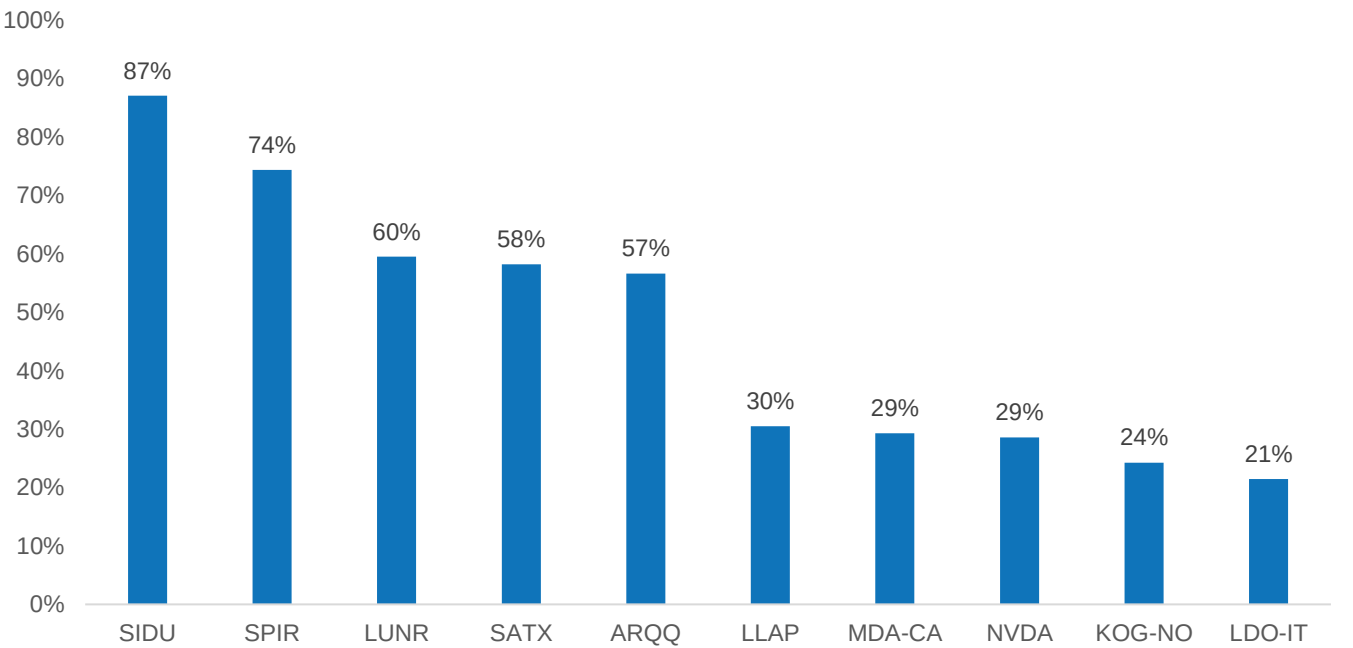
Chart 16: YTD Returns by SpaceTech Segments



Source: Intro-act, FactSet. Data as of February 29, 2024

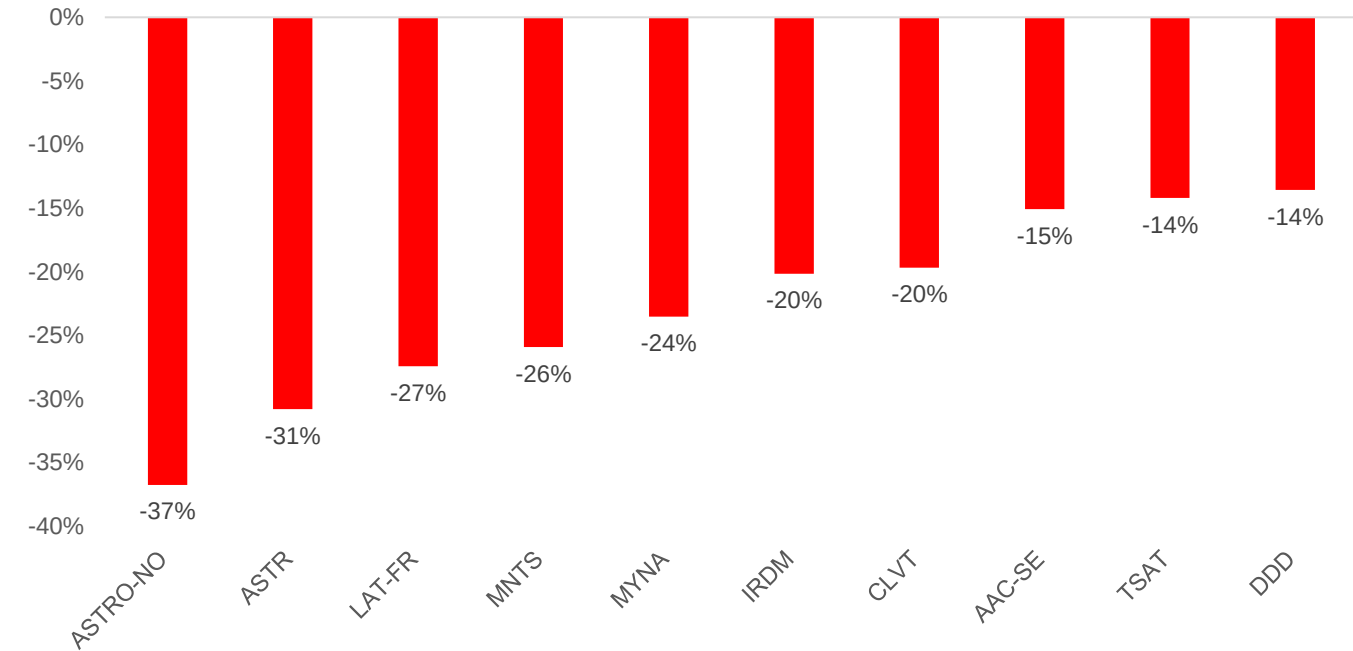
LEADERS AND LAGGARDS – SPACETECH STOCKS

Chart 17: M/M Top 10 SpaceTech Gainers



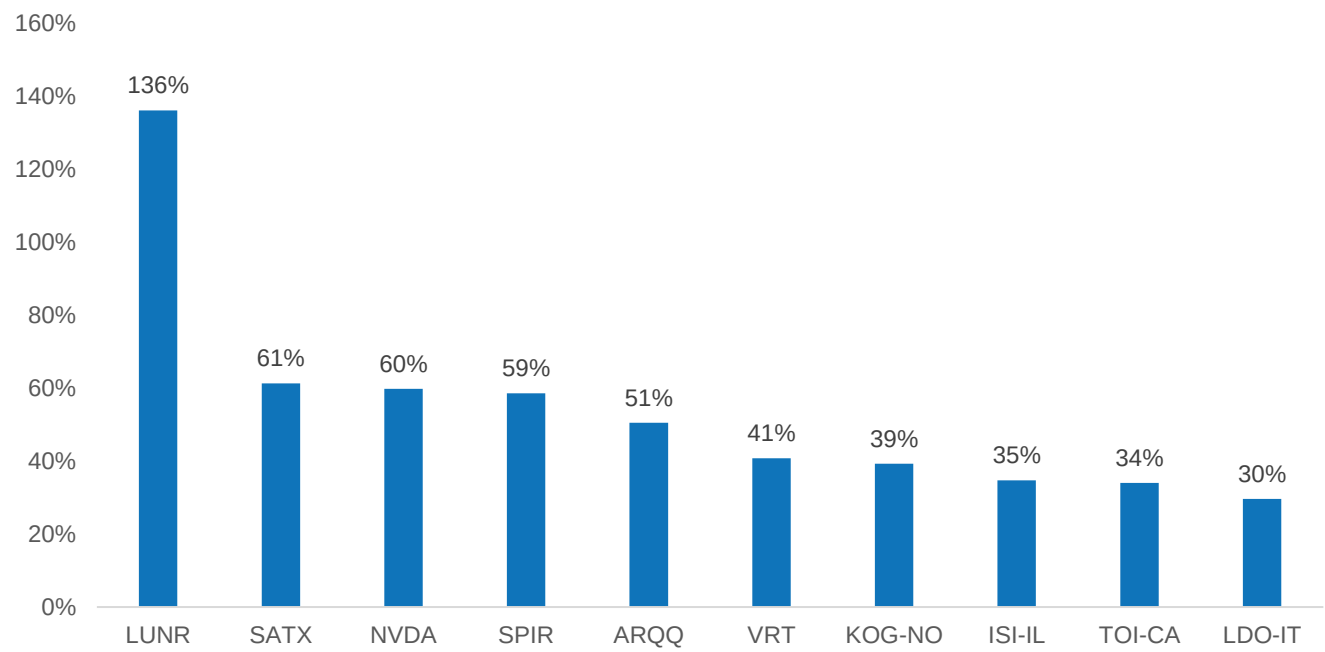
Source: Intro-act, FactSet. Data as of February 29, 2024

Chart 18: M/M Top 10 SpaceTech Losers



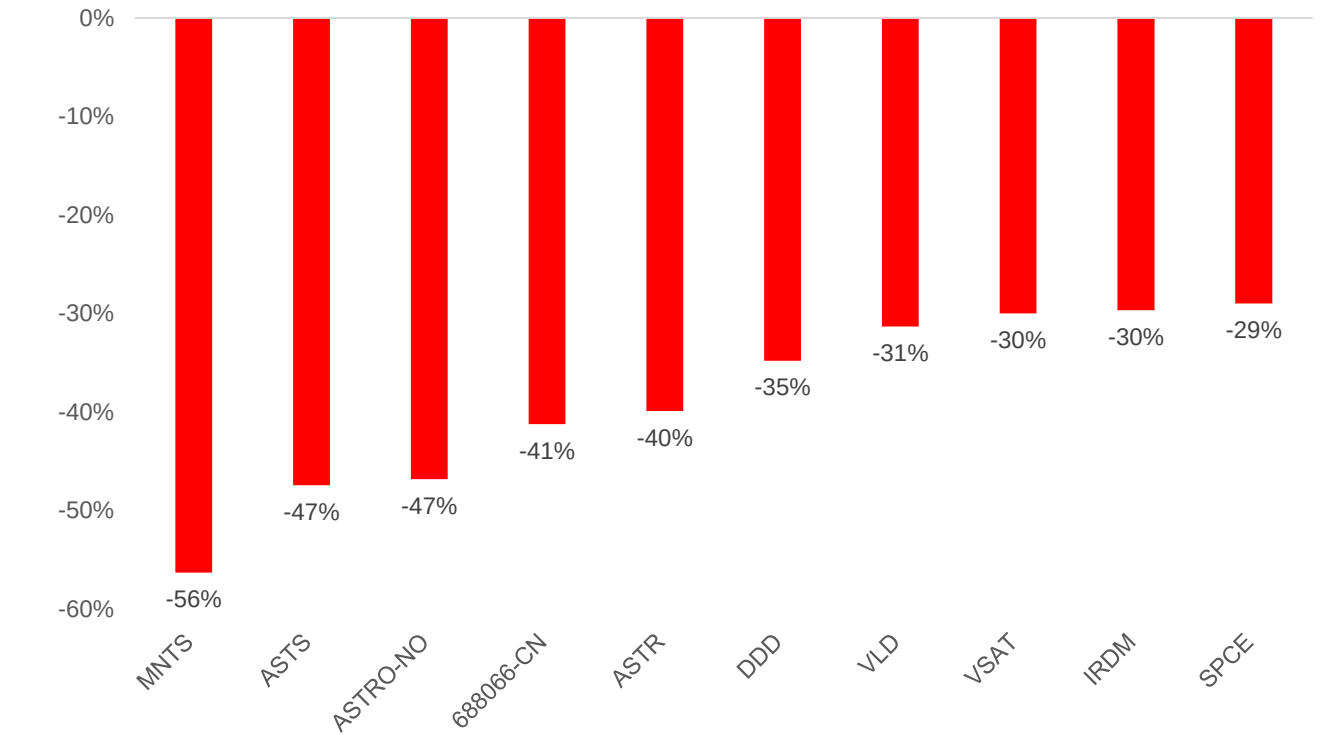
Source: Intro-act, FactSet. Data as of February 29, 2024

Chart 19: YTD Top 10 SpaceTech Gainers



Source: Intro-act, FactSet. Data as of February 29, 2024

Chart 20: YTD Top 10 SpaceTech Losers



Source: Intro-act, FactSet. Data as of February 29, 2024

SPACETECH EVENTS CALENDAR

Chart 21: SpaceTech Industry Events Calendar

S. No.	Event Name	Place	Date
1	Satellite 2024 Conference and Exhibition	Washington DC	March 18, 2024
2	Aerospace and Aeronautical Engineering-2024	Florence, Italy	March 21, 2024
3	Greek Space Tech Forum 2024	Athina, Greece	March 21, 2024

Source: Intro-act, Multiple Web Sources

SPACETECH LAUNCH CALENDAR – UPCOMING MONTH

Chart 22: Space Launches Across the Globe (as of March 05, 2024)

Date	Company	Rocket	Mission	Launch Site
March 9/10	Rocket Lab	Electron	'Owl Night Long'	Pad B, Launch Complex 1, Mahia Peninsula, New Zealand
March 20	Rocket Lab	Electron	NROL-123	Launch Complex 2, Wallops Flight Facility, Virginia
March 21	Russian Government	Soyuz	Soyuz MS-25	Baikonur Cosmodrome, Kazakhstan

Source: Intro-act, Spaceflight Now

SPACETECH SPACs

Chart 23: SpaceTech – Active SPACs

SPAC Name (Ticker)	Trust Size (\$ Mn)	Status	Target (If announced)	EV (\$ Mn)	Announced Date	Estimated Closing Date
Broad Capital Acquisition Corp. (BRAC)	102	Definitive Agreement	Openmarkets Group	90	-	3/13/2024
Aurvandil Acquisition Corp. (AURV)	250	S-1 Filed	-	-	-	-
Deep Space Acquisition Corp. I (DPAC)	210	S-1 Filed	-	-	-	-
Mission Control Acquisition Corp.	100	S-1 Filed	-			
Slam Corp	< 99	Definitive Agreement	Lynk Global	800	-	12/25/2024

Source: Intro-act, Boardroom Alpha. Status as of 03/01/24.

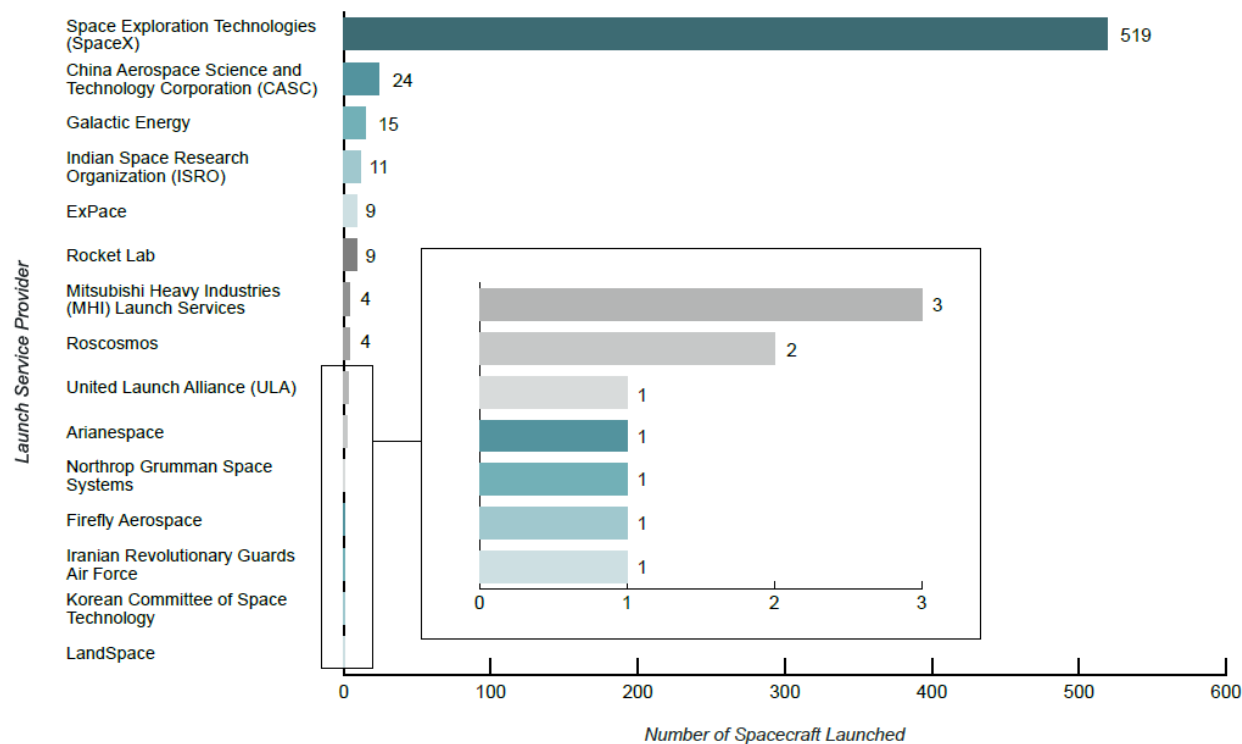
Chart 24: SpaceTech SPACs – Completed Transactions

DE-SPAC (Ticker)	SPAC	Segment	Announced Date	Closing Date	EV (\$ Mn)	Current EV (\$ Mn)
Virgin Galactic (NYSE: SPCE)	Social Capital Hedosophia	Space Exploration	9-Jul-19	25-Oct-19	1,502	103
Momentum (NSDQ: MNTS)	Stable Road Acquisition Corp.	Satellite & Components	7-Oct-20	12-Aug-21	1,200	(2)
AST SpaceMobile (NSDQ: ASTS)	New Providence Acquisition Corp.	Communication Services	16-Dec-20	6-Apr-21	1,392	356
Astra Space (NSDQ: ASTR)	Holcity, Inc.	Satellite Launch Services	2-Feb-21	30-Jun-21	2,123	18
BlackSky (NYSE: BKSJ)	Osprey Technology Acquisition Corp.	Satellite & Components	18-Feb-21	9-Sep-21	1,106	185
Rocket Lab (NSDQ: RCLB)	Vector Acquisition Corp.	Satellite Launch Services	1-Mar-21	25-Aug-21	4,082	1,936
Spire Global (NYSE: SPIR)	NavSight Holdings, Inc.	Data Services	1-Mar-21	16-Aug-21	1,230	172
Redwire Space (NYSE: RDW)	Genesis Park Acquisition Corp.	Satellite & Components	25-Mar-21	2-Sep-21	615	355
Arqit Quantum (NSDQ: ARQQ)	Centricus Acquisition Corp.	Data Services	12-May-21	3-Sep-21	1,026	40
Planet Labs (NYSE: PL)	dMY Technology Group, Inc. IV	Data Services	7-Jul-21	7-Dec-21	2,250	370
Satellogic (NSDQ: SATL)	CF Acquisition Corp. V	Data Services	6-Jul-21	25-Jan-22	850	73
Terran Orbital (NYSE: LLAP)	Tailwind Two Acquisition Corp.	Satellite & Components	28-Oct-21	28-Mar-22	1,575	278
Eve Holding, Inc. (NYSE: EVEX)	Zanite Acquisition Corp.	Data Services	21-Dec-21	9-May-22	2,372	2,047
SatixFy (NYSEAMERICAN: SATX)	Endurance Acquisition Corp.	Communication Services	8-Mar-22	27-Oct-22	632	94
Intuitive Machines (Nasdaq: LUNR)	Inflection Point Acquisition Corp.	Space Exploration	16-Sep-22	14-Feb-23	416	674

Source: Intro-act, Hogan Lovells. EV = Pro-forma enterprise value when the transaction agreement was announced

SPACETECH LAUNCH TRENDS – Q32023

Chart 25: In Q3, SpaceX launched 519 spacecraft, The Most of Any Launch Provider



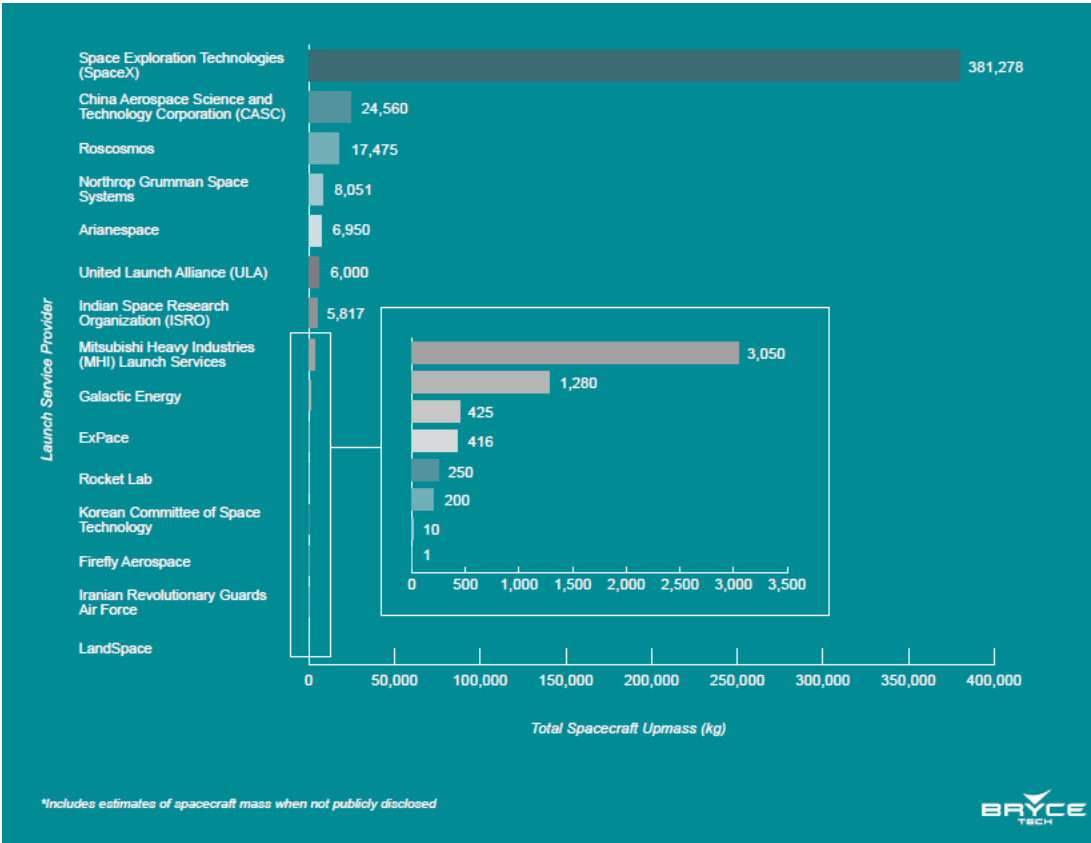
Source: Intro-Act, ByrceTech

Chart 26: U.S. Providers Conducted 32 Launches, While Chinese Providers Conducted 20 Launches



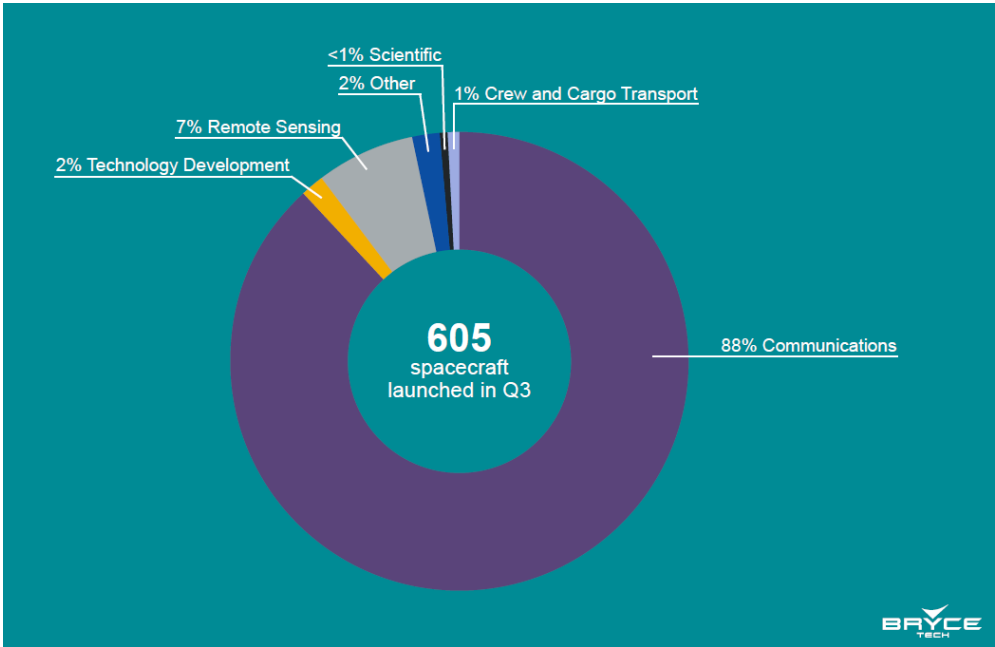
Source: Intro-Act, ByrceTech

Chart 27: Spacecraft Upmass Carried by Launch Provider



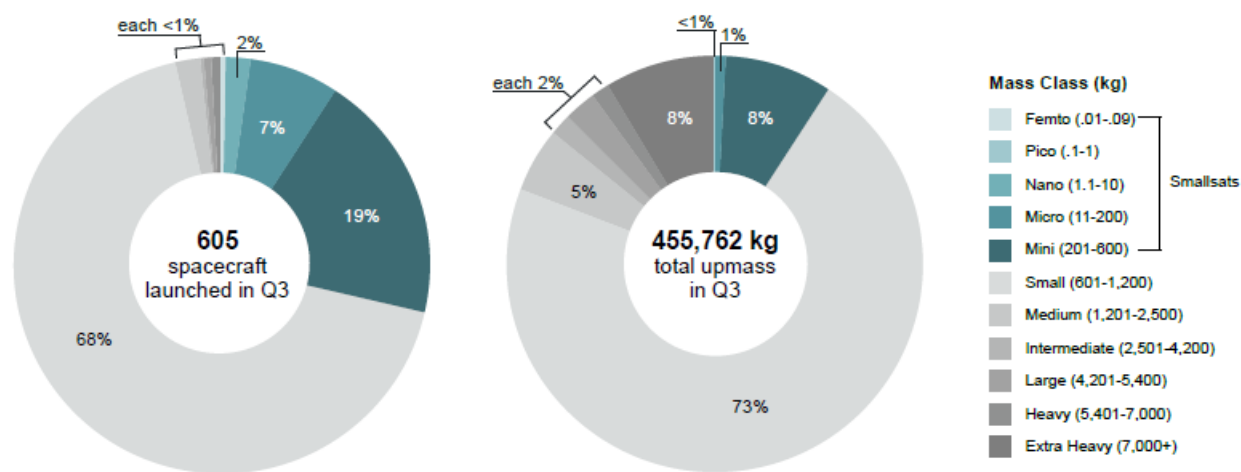
Source: Intro-Act, BryceTech

Chart 28: Most Spacecraft Launched in Q3 Were Communications Satellites



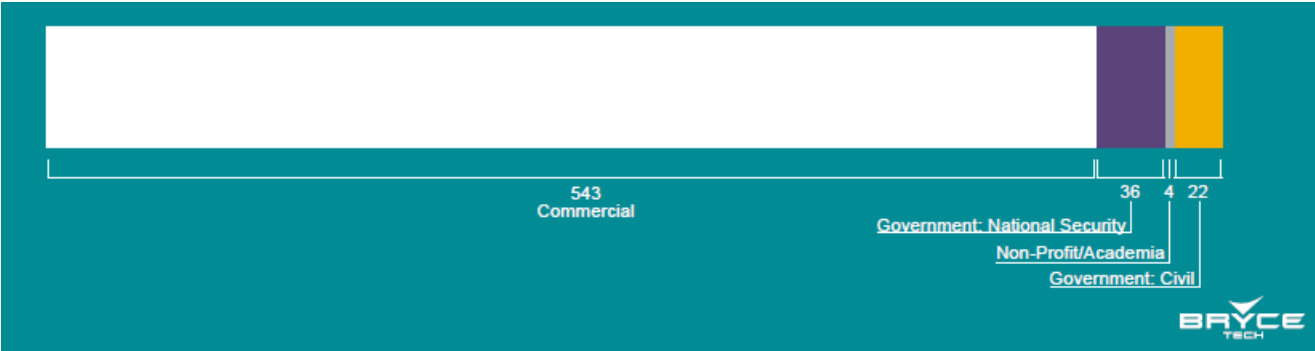
Source: Intro-act, BryceTech

Chart 29: Smallsats Represented 29% of Spacecraft Launched in Q3, 9% of Total Upmass



Source: Intro-act, BryceTech

Chart 30: Most Spacecraft Launched in Q3 Are Operated by Commercial Companies



Source: Intro-act, BryceTech

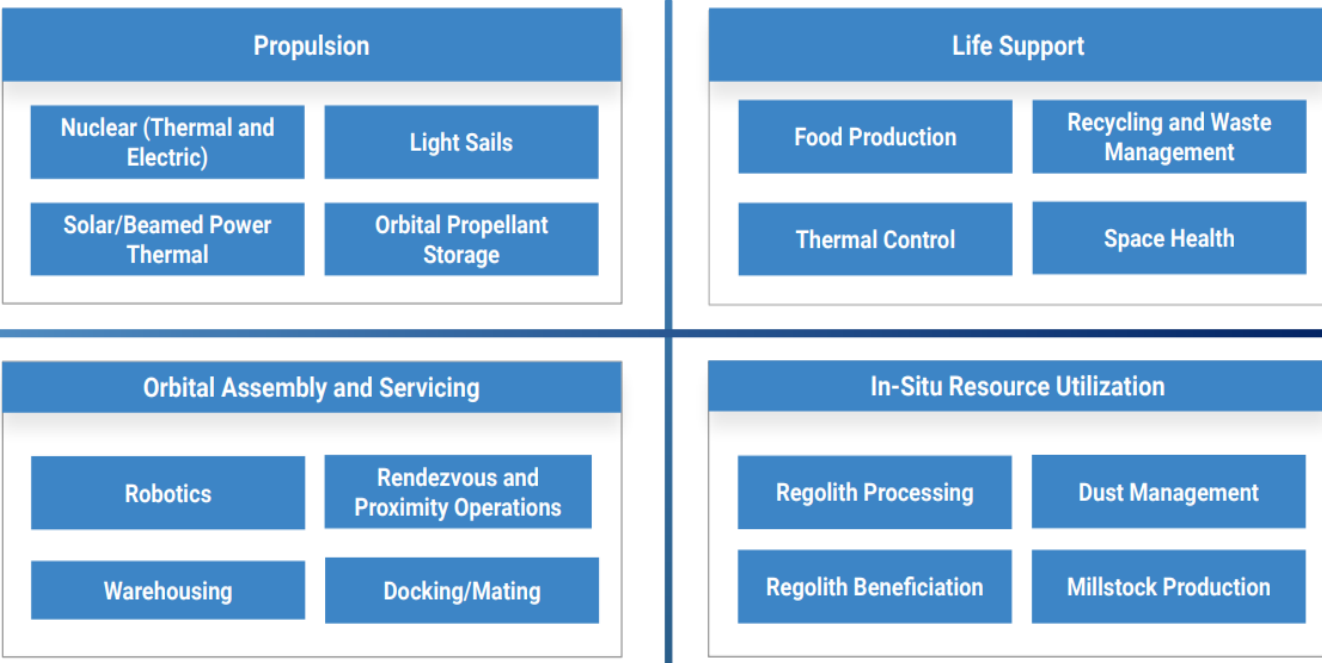
SPACETECH – ECOSYSTEMS

Chart 31: SpaceTech Landscape Framework



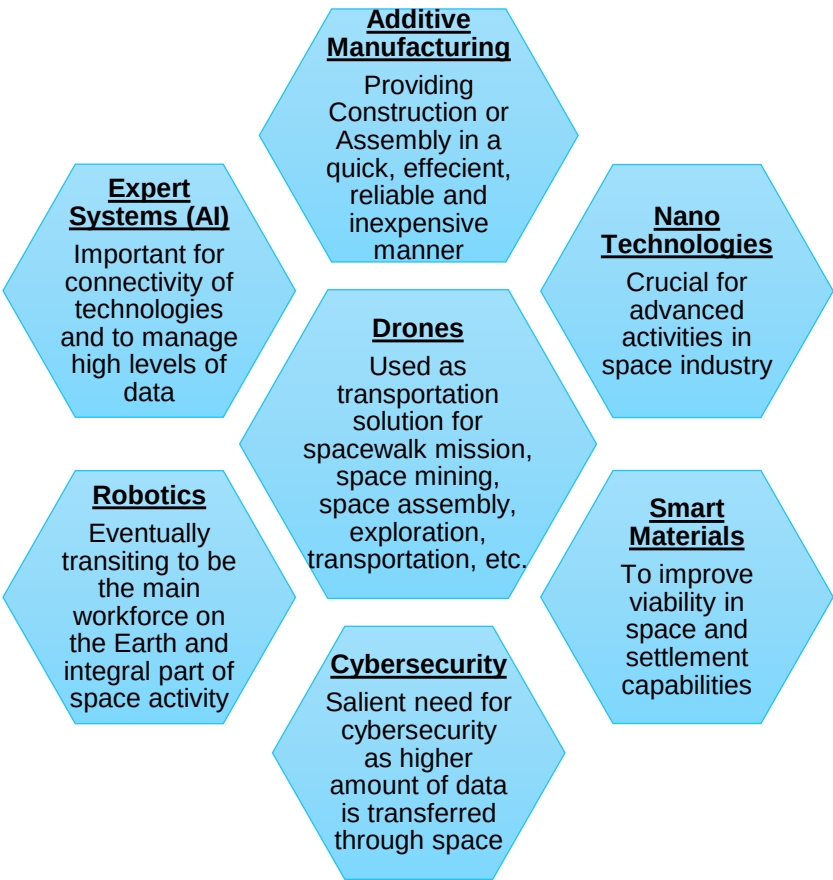
Source: Intro-act, SpaceTech Analytics

Chart 32: Space Applied Businesses



Source: Intro-act, SpaceTech Analytics

Chart 33: Advanced Space Technologies



Source: Intro-act, SpaceTech Analytics

Chart 34: Seraphim SpaceTech Ecosystem Map 2023 - In-Space Economy



Source: Intro-act, Seraphim

Chart 35: Seraphim SpaceTech Ecosystem Map 2023 – Upstream Players



Source: Intro-act, Seraphim

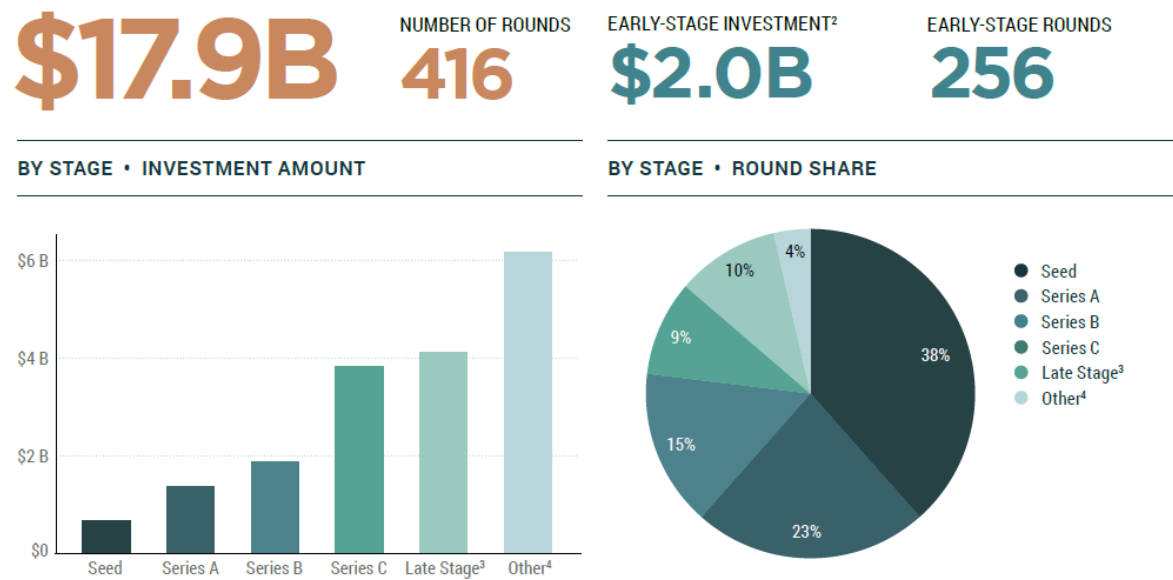
Chart 36: Seraphim SpaceTech Ecosystem Map 2023 – Downstream Players



Source: Intro-act, Seraphim

SPACETECH - FUNDING

Chart 37: Year to Date Private Market Equity Investment



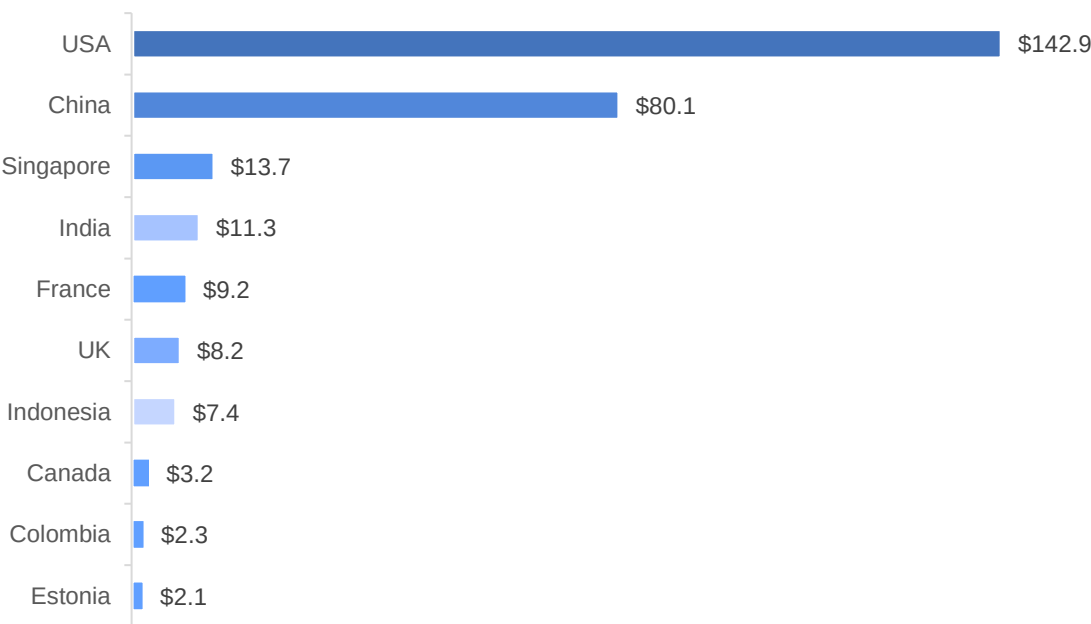
Source: Intro-act, Space Capital, Q4 2023

Chart 38: Top SpaceTech Investment Deals, 4Q23

Company	Stage	Amount (\$ millions)
Firefly Aerospace	Series C	300
Galactic Energy Aerospace Technology	Series C	154
Mangata (Communications and Networking)	Series B	115
Stoke Space	Series B	100
Qosmosys	Seed	100
True Anomaly	Series B	100
GE Si Hang Tian	Series A	83
Skykraft	Series A	67
Pachama	Series B	64
Destinus	Series B	55

Source: Intro-act, Seraphim Space

Chart 39: SpaceTech Equity Investment by Geography: Leading Countries (January 2014–December 2023)



Source: Intro-act, Space Capital

Chart 40: SpaceTech Institutional Owners League (Current)

Rank	Institution Name	# SpaceTech Positions	Invested in SpaceTech (\$ Mn)	Q/Q Change in Volume (\$ Mn)	% of Instit Ownership
1	The Vanguard Group, Inc.	90	638,403	(22,203)	11.5%
2	BlackRock Fund Advisors	85	358,557	(13,340)	6.4%
3	SSgA Funds Management, Inc.	91	306,111	(21,289)	5.5%
4	Fidelity Management & Research Co. LLC	80	208,318	(860)	3.7%
5	Geode Capital Management LLC	93	152,331	(2,350)	2.7%
6	T. Rowe Price Associates, Inc. (Investment Mgt	53	128,617	(8,643)	2.3%
7	Capital Research & Management Co. (World In	30	100,222	(400)	1.8%
8	Capital Research & Management Co. (Global In	23	82,729	(4,767)	1.5%
9	JPMorgan Investment Management, Inc.	74	76,576	2,216	1.4%
10	Capital Research & Management Co. (Intl. Inv.)	29	75,106	(5,806)	1.3%
11	Wellington Management Co. LLP	57	74,015	(2,949)	1.3%
12	Northern Trust Investments, Inc. (Investment M	85	71,327	(778)	1.3%
13	BlackRock Advisors (UK) Ltd.	75	52,616	(1,290)	0.9%
14	Charles Schwab Investment Management, Inc.	85	52,190	(1,866)	0.9%
15	BlackRock Investment Management (UK) Ltd.	73	49,704	(6,237)	0.9%
16	Massachusetts Financial Services Co.	37	47,868	(2,939)	0.9%
17	Morgan Stanley Smith Barney LLC (Investment	70	43,736	(1,689)	0.8%
18	AllianceBernstein LP	78	39,882	(1,364)	0.7%
19	Goldman Sachs Asset Management LP	75	38,789	(372)	0.7%
20	Managed Account Advisors LLC	46	37,646	(2,311)	0.7%
21	Columbia Management Investment Advisers LL	63	37,083	(1,493)	0.7%
22	Legal & General Investment Management Ltd.	76	35,684	(1,060)	0.6%
23	Parametric Portfolio Associates LLC	74	34,525	(1,616)	0.6%
24	TIAA-CREF Investment Management LLC	67	32,404	(1,590)	0.6%
25	Amundi Asset Management US, Inc.	46	29,582	1,881	0.5%
26	Jennison Associates LLC	19	28,983	(87)	0.5%
27	The Bank of New York Mellon Corp. (Investmen	65	28,731	(1,288)	0.5%
28	Mellon Investments Corp.	78	28,574	(2,795)	0.5%
29	Fisher Asset Management LLC	35	28,505	(460)	0.5%
30	Dimensional Fund Advisors LP	76	26,511	(1,078)	0.5%
	Other		2,621,619	(102,666)	47.1%
	Total		5,566,945	(211,489)	

Source: Intro-act, 13F Filings

The Bridge – Monthly SpaceTech Update

			Price Performance							Sales			EBITDA		Book Value		
			2/29/2024	Share Price	Mkt Cap (\$ Mns)	Ent Val (\$ Mns)	% to High	% to Low	% YTD	LTM	NTM	EV/Sales	LTM	NTM	EV/EBITD A	Book/ Share	P/ Book
Peer Set																	
SPACE EXPLORATION AND SATELLITE MANUFACTURING																	
1	RAYTHEON TECHN	RTX	89.67	118,977	151,961	17%	-24%	4%	74,305	78,887	1.9 x	11,236	12,583	12.1 x	45.07	2.0 x	
2	HONEYWELL INT	HON	198.73	129,608	143,526	6%	-12%	-5%	36,662	38,562	3.7 x	9,545	10,031	14.3 x	24.31	8.2 x	
3	LOCKHEED MART	LMT	428.24	103,481	116,616	19%	-8%	20%	67,571	69,514	1.7 x	10,017	9,742	12.0 x	28.48	15.0 x	
4	AIRBUS GROUP	AIR-FR	165.50	130,824	127,671	2%	-26%	30%	71,009	77,810	1.6 x	8,802	10,452	12.2 x	24.32	6.8 x	
5	BOEING	BA	203.72	124,297	163,082	31%	-13%	1%	77,794	89,768	1.8 x	1,411	6,628	24.6 x	(28.27)	-7.2 x	
6	NORTHROP GRUM	NOC	461.02	69,169	82,714	8%	-10%	19%	39,290	41,099	2.0 x	3,894	5,662	14.6 x	98.56	4.7 x	
7	DASSAULT SYS	DSY-FR	46.73	62,456	61,069	13%	-24%	-20%	6,472	6,966	8.8 x	2,301	2,634	23.2 x	6.39	7.3 x	
8	SYNOPSYS	SNPS	573.73	87,519	86,647	10%	-39%	56%	6,131	6,742	12.9 x	2,131	2,678	32.4 x	43.73	13.1 x	
9	L3HARRIS TECHN	LHX	211.66	40,238	54,048	3%	-24%	-1%	19,419	21,087	2.6 x	3,651	3,924	13.8 x	98.86	2.1 x	
10	BAE SYSTEMS	BA-GB	15.71	47,573	52,228	2%	-32%	111%	27,963	35,382	1.5 x	3,554	4,732	11.0 x	4.40	3.6 x	
11	AMETEK	AME	180.18	41,624	43,097	1%	-27%	23%	6,597	7,389	5.8 x	2,022	2,243	19.2 x	37.80	4.8 x	
12	THALES	HO-FR	148.31	31,176	32,007	7%	-10%	76%	18,540	19,741	1.6 x	2,778	3,015	10.6 x	36.93	4.0 x	
13	KOMATSU	6301-JP	29.04	28,277	34,617	5%	-23%	28%	26,492	25,204	1.4 x	4,631	5,003	6.9 x	20.03	1.4 x	
14	BALL	BALL	64.02	20,207	28,983	2%	-33%	-33%	14,029	13,240	2.2 x	2,110	2,054	14.1 x	11.94	5.4 x	
15	MITSUBISHI ELECT	6503-JP	15.91	34,166	32,448	2%	-31%	29%	36,125	34,013	1.0 x	3,564	3,575	9.1 x	10.87	1.5 x	
16	TELEDYNE TECH	TDY	427.27	20,242	22,963	5%	-15%	-2%	5,636	5,866	3.9 x	1,368	1,456	15.8 x	194.82	2.2 x	

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17	TERADYNE	TER	103.59	15,858	15,212	15%	-22%	-37%	2,676	2,714	5.6 x	654	596	25.5 x	16.54	6.3 x
18	IDEX	IEX	235.90	17,845	18,741	2%	-22%	0%	3,274	3,346	5.6 x	900	932	20.1 x	46.76	5.0 x
19	HEICO	HEI	193.40	10,591	29,599	4%	-21%	34%	3,244	3,928	7.5 x	824	1,012	29.3 x	23.61	8.2 x
20	LEONARDO-FIN	LDO-IT	21.38	12,360	16,989	5%	-50%	201%	16,636	17,623	1.0 x	1,792	2,128	8.0 x	13.89	1.5 x
21	IHI	7013-JP	22.02	3,406	7,093	29%	-21%	12%	8,893	9,697	0.7 x	1,125	(82)	-	14.04	1.6 x
22	SPIRIT AEROSYST	SPR	28.60	3,319	6,917	26%	-49%	-34%	6,048	7,471	0.9 x	176	666	10.4 x	(4.31)	-6.6 x
24	MOOG	MOG.A	149.95	4,312	5,723	2%	-41%	85%	3,416	3,511	1.6 x	378	487	11.7 x	53.51	2.8 x
25	VIRGIN GALACTIC	SPCE	1.74	696	152	255%	-21%	-87%	7	11	13.5 x	(427)	(342)	-	1.26	1.4 x
26	3D SYSTEMS	DDD	4.14	552	643	179%	-15%	-81%	488	482	1.3 x	(37)	(3)	-	3.13	1.3 x
27	PROTO LABS INC	PRLB	36.43	937	855	15%	-37%	-29%	504	520	1.6 x	83	82	10.4 x	27.03	1.3 x
28	OHB SWEDEN	OHB-DE	46.75	898	1,162	2%	-31%	15%	-	1,229	0.9 x	105	116	10.0 x	17.28	2.7 x
29	MARKFORGED HOLD	MKFG	0.67	133	51	243%	-9%	-88%	99	89	0.6 x	(49)	(43)	-	0.86	0.8 x
30	VELO3D INC	VLD	0.27	58	66	1156%	-31%	-97%	106	-	-	-	-	-	0.51	0.5 x
31	REDWIRE CORP	RDW	3.23	209	384	32%	-27%	-52%	234	240	1.6 x	(7)	17	23.2 x	(0.45)	-7.3 x
32	MOMENTUS INC	MNTS	0.76	9	4	5298%	-30%	100%	0	3	1.3 x	(76)	(51)	-	1.59	0.5 x
33	HEXCEL Corp	HXL	74.46	6,284	6,919	6%	-21%	44%	1,578	1,987	3.5 x	297	406	17.0 x	20.41	3.6 x
34	AAC CLYDE SPACE	AAC-SE	4.56	26	25	75%	-47%	-72%	21	45	0.6 x	(3)	3	7.8 x	11.24	0.4 x
35	GOMSPACE	GOMX-SE	0.46	65	71	25%	-78%	-45%	19	-	-	(22)	-	-	0.09	5.4 x
36	LATECOERE SA	LAT-FR	0.01	170	428	3015%	-23%	-92%	505	-	-	(11)	-	-	(0.01)	-1.0 x

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37	ASTROCAST SA	ASTRO-NO	0.07	3	34	1049%	-12%	-99%	-	-	-	-	-	-	(0.20)	-0.3 x
38	SIDUS SPACE	SIDU	8.98	24	8	902%	-64%	-98%	7	-	-	-	-	-	10.48	0.9 x
LAUNCHERS																
39	TE CONNECTIVITY	TEL	143.56	44,331	47,472	2%	-20%	-11%	16,024	16,380	2.9 x	3,576	3,849	12.3 x	42.45	3.4 x
40	ROCKET LAB	RKLB	4.59	2,243	2,115	76%	-21%	-63%	245	438	4.8 x	(91)	(88)	-	1.13	4.0 x
41	ASTRA SPACE INC	ASTR	1.37	26	24	502%	-55%	-99%	9	-	-	-	-	-	0.43	3.2 x
42	LILIUM GMBH	LILM	0.96	482	176	98%	-61%	-86%	0	0	-	(255)	(322)	-	0.55	1.7 x
43	AVIO SPA	AVIO-IT	10.66	281	168	5%	-30%	-16%	379	371	0.5 x	28	29	5.7 x	12.43	0.9 x
DATA SERVICES																
44	HEXAGON	HEXA.B-SE	11.73	30,436	35,702	7%	-34%	-26%	5,913	6,220	5.7 x	2,003	2,250	15.9 x	4.01	2.9 x
45	UNITY SOFTWARE	U	29.32	11,142	12,861	71%	-24%	-80%	2,187	1,818	7.1 x	448	413	31.1 x	8.27	3.5 x
46	CLARIVATE PLC	CLVT	7.18	4,784	10,726	62%	-15%	-69%	2,629	2,619	4.1 x	1,117	1,090	9.8 x	6.91	1.0 x
47	BEIJING PIESAT	688066-CN	3.50	914	1,179	229%	-32%	-57%	357	426	2.8 x	62	66	17.9 x	1.43	2.4 x
48	PLANET LABS	PL	2.19	584	327	128%	-9%	-64%	215	248	1.3 x	(63)	(30)	-	1.87	1.2 x
49	MDA	MDA-CA	10.81	1,291	1,511	5%	-58%	44%	595	740	2.0 x	128	147	10.3 x	6.57	1.6 x
50	ARQIT QUANTUM	ARQQ	0.71	117	81	131%	-45%	-97%	20	-	-	(40)	-	-	0.41	1.8 x
51	TERRAN ORBITAL	LLAP	1.08	210	360	134%	-43%	-89%	94	292	1.2 x	(71)	(25)	-	(0.63)	-1.7 x
52	WEATHERNEWS	4825-JP	33.81	400	289	56%	-3%	-57%	-	150	1.9 x	-	-	-	11.49	2.9 x
53	SATELLOGIC	SATL	1.52	115	115	98%	-54%	-84%	6	-	-	-	-	-	0.70	2.2 x

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54	SATREC INITIAT	099320-KR	24.48	268	192	33%	-24%	-37%	-	-	-	-	-	-	10.12	2.4 x
55	IMAGESAT INT	ISI-IL	3.86	236	243	8%	-43%	-	-	80	3.0 x	-	33	7.3 x	2.89	1.3 x
56	BLACKSKY TECH	BKSY	1.42	203	234	67%	-27%	-68%	94	113	2.1 x	(1)	15	16.1 x	0.65	2.2 x
57	SPIRE GLOBAL	SPIR	12.40	262	342	3%	-77%	-54%	100	132	2.6 x	(20)	7	46.2 x	3.72	3.3 x
58	WINDWARD	WNWD-GB	1.36	121	100	17%	-70%	-51%	22	28	3.6 x	(12)	(5)	-	0.09	15.1 x
COMMUNICATIONS EQUIPMENT																
59	MEDIATEK	2454-TW	36.07	57,691	55,195	2%	-42%	-16%	13,768	16,656	3.3 x	2,779	3,738	14.8 x	7.32	4.9 x
60	SAFRAN S.A.	SAF-FR	209.61	89,559	88,647	2%	-36%	75%	20,298	29,465	3.0 x	3,628	5,706	15.5 x	27.84	7.5 x
61	AMPHENOL	APH	109.24	65,528	68,063	3%	-34%	25%	12,555	13,455	5.1 x	2,968	3,368	20.2 x	13.94	7.8 x
62	GARMIN LTD	GRMN	137.35	26,341	24,756	2%	-32%	1%	5,228	5,747	4.3 x	1,271	1,414	17.5 x	36.56	3.8 x
63	TRIMBLE INC	TRMB	61.19	15,034	18,024	2%	-35%	-30%	3,799	3,639	5.0 x	1,001	961	18.8 x	18.26	3.4 x
64	ELBIT SYS	ESLT	223.34	9,928	11,408	1%	-26%	28%	5,855	5,944	1.9 x	586	578	19.7 x	63.97	3.5 x
65	VALEO SA	FR-FR	11.59	2,835	8,466	109%	-5%	-62%	23,919	24,776	0.3 x	2,531	3,085	2.7 x	15.86	0.7 x
66	VERTIV	VRT	67.62	25,829	28,425	9%	-82%	171%	6,863	7,609	3.7 x	1,141	1,419	20.0 x	5.28	12.8 x
67	KRATOS DEFENSE	KTOS	18.24	2,675	2,676	18%	-34%	6%	1,037	1,139	2.3 x	95	105	25.5 x	7.55	2.4 x
68	TOMTOM NV	TOM2-NL	8.03	1,064	723	17%	-33%	-20%	635	643	1.1 x	39	36	19.9 x	1.54	5.2 x
69	ECHOSTAR CORP	SATS	13.11	1,836	3,306	89%	-27%	-50%	5,466	16,032	0.2 x	756	1,774	1.9 x	73.22	0.2 x
70	AMPLITECH	AMPG	1.92	19	14	86%	-22%	-51%	-	-	-	-	-	-	2.80	0.7 x
71	MYNARIC AG	MYNA	4.45	111	136	71%	-32%	-65%	6	16	8.7 x	(72)	(59)	-	0.38	11.8 x

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COMMUNICATIONS SERVICES

72	COMCAST CORP	CMCSA	42.85	169,789	267,326	11%	-19%	-15%	121,572	124,304	2.2 x	37,636	39,006	6.9 x	20.79	2.1 x
73	AT&T INC	T	16.93	121,097	288,811	18%	-21%	-31%	122,428	123,743	2.3 x	43,339	44,804	6.4 x	14.45	1.2 x
74	SIRIUS XM	SIRI	4.42	16,984	26,618	80%	-25%	-30%	8,952	8,873	3.0 x	2,789	2,718	9.8 x	(0.67)	-6.6 x
75	DISH NETWORK	DISH				-	-	-	15,607	15,797	-	1,895	1,934	-	34.21	-
76	IRIDIUM COMM	IRDM	28.95	3,545	4,968	136%	-4%	-30%	791	797	6.2 x	463	465	10.7 x	7.23	4.0 x
77	SES SA	SESG-FR	6.48	2,484	7,393	17%	-22%	-13%	2,198	2,109	3.5 x	1,110	1,068	6.9 x	9.20	0.7 x
78	VIASAT INC	VSAT	19.57	2,453	8,276	142%	-23%	-56%	3,800	4,462	1.9 x	1,206	1,427	5.8 x	40.72	0.5 x
79	EUTELSAT COMM	ETL-FR	3.72	1,767	4,024	92%	-2%	-70%	1,223	1,365	2.9 x	877	738	5.4 x	12.95	0.3 x
80	GLOBALSTAR INC	GSAT	1.56	2,964	3,242	37%	-45%	34%	224	231	14.0 x	117	123	26.4 x	0.20	7.7 x
81	SKY PERFECT	9412-JP	5.94	1,768	1,418	13%	-38%	71%	855	810	1.8 x	321	302	4.7 x	6.19	1.0 x
82	AST SPACEMOBILE	ASTS	3.17	389	380	125%	-18%	-60%	(0)	0	-	(132)	(158)	-	1.43	2.2 x
83	GILAT SATELLITE	GILT	5.83	332	233	23%	-23%	-18%	266	315	0.7 x	25	43	5.4 x	4.69	1.2 x
84	TELESAT CORP	TSAT	8.46	114	2,545	169%	-28%	-71%	-	519	4.9 x	-	377	6.8 x	36.18	0.2 x

SEMICONDUCTORS

85	NVIDIA CORP	NVDA	791.12	1,977,800	1,942,066	11%	-72%	169%	60,922	111,711	17.4 x	37,669	71,361	27.2 x	17.44	45.4 x
86	BROADCOM	AVGO	1,300.49	602,674	563,862	11%	-54%	95%	35,819	50,241	11.2 x	23,213	29,990	18.8 x	57.94	22.4 x
87	TEXAS INSTR	TXN	167.33	152,151	154,377	12%	-17%	-11%	17,519	15,660	9.9 x	8,525	7,109	21.7 x	18.59	9.0 x
88	QUALCOM	QCOM	157.79	176,094	181,152	6%	-36%	-14%	36,297	38,529	4.7 x	13,577	14,462	12.5 x	20.62	7.7 x

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89	INFINEON TECH	IFX-DE	35.81	46,770	49,668	24%	-20%	-22%	17,487	18,167	2.7 x	6,150	5,522	9.0 x	13.30	2.7 x
90	MICROCHIP TECH	MCHP	84.14	45,468	51,320	12%	-18%	-3%	8,541	5,672	9.0 x	4,203	2,225	23.1 x	13.10	6.4 x
SOFTWARE																
91	AUTODESK	ADSK	258.17	55,227	55,942	8%	-27%	-8%	5,497	6,032	9.3 x	1,925	2,253	24.8 x	6.93	37.3 x
92	VERISK	VRSK	241.90	34,686	37,351	4%	-26%	6%	2,681	2,876	13.0 x	1,434	1,567	23.8 x	2.16	111.8 x
93	ANSYS INC	ANSS	334.17	29,079	29,278	9%	-23%	-17%	2,270	2,484	11.8 x	888	1,149	25.5 x	62.03	5.4 x
94	UIPATH INC	PATH	23.75	11,486	11,719	17%	-48%	-45%	1,211	1,459	8.0 x	203	246	47.7 x	3.46	6.9 x
95	TOPICUS	TOI-CA	90.68	7,426	7,822	5%	-33%	-1%	-	1,463	5.3 x	-	421	18.6 x	4.45	20.4 x
96	ENGHOUSE SYS	ENGH-CA	26.16	1,446	1,277	25%	-22%	-32%	336	352	3.6 x	99	111	11.5 x	7.41	3.5 x
DRONES/UAVs																
97	JOBY AV	JOBY	5.62	3,950	2,842	113%	-35%	-23%	0	2	1,894.5 x	(299)	(396)	-	1.48	3.8 x
98	AEROVIRONMENT	AVAV	126.79	3,567	3,578	14%	-32%	104%	706	784	4.6 x	151	137	26.0 x	28.89	4.4 x
99	ARCHER AVI	ACHR	4.83	1,228	1,017	55%	-63%	-25%	0	7	150.3 x	(312)	(355)	-	1.21	4.0 x
100	BLADE AIR MOB	BLDE	3.18	237	86	45%	-35%	-64%	216	237	0.4 x	(19)	(8)	-	3.54	0.9 x
DIVERSIFIED																
101	MICROSOFT	MSFT	413.64	3,073,526	3,035,903	2%	-41%	23%	227,583	260,222	11.7 x	119,646	138,636	21.9 x	32.06	12.9 x
102	AMAZON.COM INC	AMZN	176.76	1,836,073	1,924,115	2%	-50%	6%	574,785	641,050	3.0 x	109,726	131,680	14.6 x	19.44	9.1 x
103	ALPHABET	GOOGL	138.46	815,945	1,634,723	11%	-35%	-4%	307,394	341,757	4.8 x	122,092	140,260	11.7 x	22.74	6.1 x
104	ORACLE	ORCL	111.68	307,000	387,508	14%	-27%	28%	51,629	55,435	7.0 x	27,439	30,375	12.8 x	1.41	79.4 x

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105	KONGSBERG GRUP	KOG-NO	63.83	11,228	11,656	2%	-41%	97%	3,819	4,380	2.7 x	567	668	17.5 x	8.56	7.5 x
106	NANO DIMEN	NNDM	2.85	670	(169)	18%	-28%	-25%	-	-	-	-	-	-	4.20	0.7 x
107	TRANSDIGM GR	TDG	1,177.74	65,490	81,743	3%	-42%	85%	6,977	7,934	10.3 x	3,607	4,141	19.7 x	(63.27)	-18.6 x
108	CONSTELLATION SO	CSU-CA	2,785.70	59,033	62,134	2%	-42%	50%	7,931	9,446	6.6 x	2,050	2,526	24.6 x	77.71	35.8 x

SPACS

109	DHC ACQUISITION	DHCA	11.47	53	142	48%	-13%	18%	-	-	-	-	-	-	2.37	4.8 x
110	GIGCAPITAL5	GIA	11.11	96	99	31%	-69%	12%	-	-	-	-	-	-	1.32	8.4 x
111	BREEZE HOLD	BREZ	11.65	50	50	5%	-11%	14%	-	-	-	-	-	-	0.53	22.0 x
112	TG VENTURE	TGVC	11.20	10	48	9%	-13%	-24%	-	-	-	-	-	-	2.12	5.3 x
113	BROAD CAPITAL	BRAC	11.23	53	87	10%	-7%	-	-	-	-	-	-	-	5.43	2.1 x
114	EVE HOLDING INC	EVEX	5.55	1,495	1,331	99%	-8%	-45%	0	0	23,290.5 x	(133)	(116)	-	0.75	7.4 x
115	SATIXFY	SATX	0.59	47	106	168%	-53%	-94%	-	-	-	-	-	-	(1.11)	-0.5 x
116	INTUITIVE MACH	LUNR	6.03	155	424	228%	-65%	-23%	89	325	1.3 x	(10)	(35)	-	(16.50)	-0.4 x

Data updated as of 02/29/2024.

*Companies for which quarterly NTM and LTM data is not available, yearly numbers are used.

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