

BEYOND CHEMICAL ROCKETS: THE INVESTMENT CASE FOR NUCLEAR SPACE PROPULSION

Our Investment Thesis

Human exploration of Mars has long been a tantalizing goal, but the significant technological hurdles that come with interplanetary travel have made it a daunting task. One crucial component that could revolutionize space travel to distant planets like Mars is space nuclear power (SNP) and propulsion technologies. By harnessing the energy released from atomic fission reactions, SNP offers a virtually unlimited source of power, enabling more efficient and sustainable access to the solar system. We believe that the development of SNP is a critical step toward making the Mars dream a reality, and recent advancements in nuclear thermal and nuclear electric propulsion systems are noteworthy. Moreover, prolonged exposure to cosmic radiation and microgravity poses significant biological risks, while the need for a reliable and efficient propulsion system to facilitate travel to the Red Planet is paramount. Nuclear fission technologies, specifically nuclear thermal propulsion and nuclear electric propulsion, are being explored to overcome these hurdles. **We believe that these innovative propulsion systems, coupled with fission surface power technology, hold the key to establishing a sustained lunar presence and enabling a crewed mission to Mars.**

Our Pick This Month

L3Harris Technologies (NYSE: LHX)



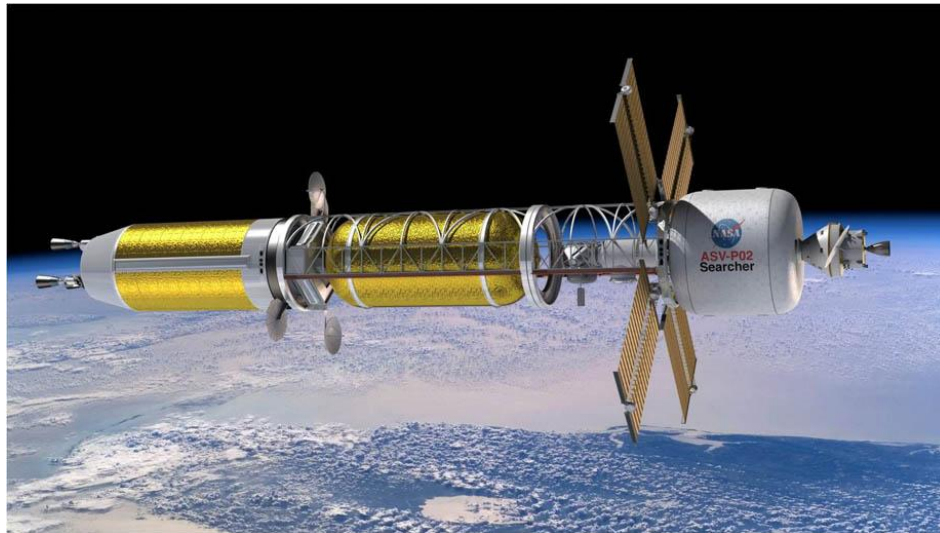
L3Harris Technologies presents a compelling investment opportunity as a leading defense and space innovator with strong exposure to next-gen propulsion and power systems. Its leadership in nuclear thermal and electric propulsion—underscored by collaborations with NASA and the U.S. Department of Energy—positions it to capitalize on the growing demand for space mobility and energy solutions. With robust financial performance in FY2024, a \$34 billion backlog, disciplined capital deployment, and a premium valuation supported by a low PEG ratio (0.33), L3Harris is well-equipped to deliver long-term value through technological leadership and strategic focus in high-priority national security and space domains.

Nuclear technology is poised to transform space transportation because of its ability to propel spacecraft to faraway destinations much more quickly than traditional rockets. This capability could transform our perspective on establishing a human presence on Mars. With chemical rockets, the journey to the Red Planet will take many months, exposing passengers to radiation and reduced gravity risks. Shortening the trip could make settling Mars far more feasible. However, realizing nuclear propulsion as a mainstream technology could face major obstacles. In particular, NASA research is important to achieving this goal, and NASA's budget is going to be cut. Whether the agency's work in the nuclear field will survive is an open question. In addition, Elon Musk, who wields considerable influence on commercial and governmental planning for Mars, has no known plans for nuclear rockets. While there is no confirmed evidence that Musk opposes a nuclear option, his opposition would be problematic.

Space Nuclear Power: The Key to Unlocking the Mars Dream

The concept of space nuclear power is not new; however, recent breakthroughs have reinvigorated the field. **NASA's Space Nuclear Propulsion Office has been actively exploring two primary propulsion systems: Nuclear Thermal Propulsion (NTP) and Nuclear Electric Propulsion (NEP).** Nuclear thermal propulsion, for instance, provides high thrust at twice the propellant efficiency of traditional chemical rockets, allowing for more payload and mission-essential supplies on board. On the other hand, nuclear electric propulsion leverages heat from a fission reactor to generate electricity, which is then used to ionize and accelerate a gaseous propellant, producing thrust. **We believe that these technologies have the potential to significantly reduce transit times to Mars and beyond, making human exploration more feasible.** For example, NASA's Modular Assembled Radiators for Nuclear Electric Propulsion Vehicles (MARVL) project aims to develop a critical component of nuclear electric propulsion, its heat dissipation system, which can be assembled robotically and autonomously in space. This innovation could enable the design of more efficient and scalable nuclear electric propulsion systems, which is essential for long-duration missions to Mars and beyond. Furthermore, NASA's ongoing efforts, including the development of a technology maturation plan for nuclear electric propulsion systems and collaborations with industry partners, demonstrate a strong commitment to advancing SNP technologies. **With over \$100 million invested in SNP research and development, we believe that the prospects for a crewed mission to Mars are becoming increasingly plausible.** The National Academies of Science, Engineering, and Medicine have also recognized the importance of SNP, highlighting the need to address primary technical and programmatic challenges associated with developing an operational space nuclear propulsion system. **As research and development continue to advance, we expect SNP to play a pivotal role in humanity's pursuit of interplanetary exploration.**

Chart 1: Visionary View of a Nuclear Thermal Propulsion Enabled Spacecraft Mission Outward Bound To Mars



Source: NASA/Marshall Space Flight Center

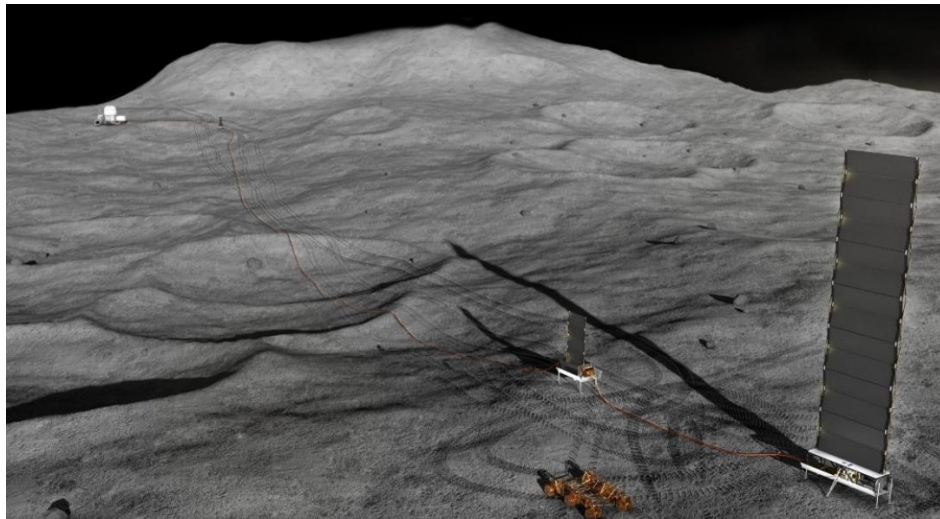
NASA's Pursuit of SNP for Deep Space Missions

NASA is at the forefront of developing space nuclear power and propulsion technologies to enable a sustained lunar presence and propel a crewed mission to Mars. The agency's efforts are focused on NTP, NEP, and FSP systems, which have the potential to significantly enhance the efficiency and duration of deep space missions. **We believe that NTP systems, which utilize a nuclear reactor to heat a propellant and generate thrust, offer a promising solution for future Mars missions.** By leveraging the high energy density of nuclear fission, NTP systems can provide a higher specific impulse (Isp) than traditional chemical propulsion systems, reducing the amount of propellant

required for a given mission. For instance, an Isp of approximately 900 seconds, roughly twice that of conventional chemical systems, is targeted for a human Mars mission. This can be achieved with hydrogen propellant, which has a low molecular weight, corresponding to a temperature of approximately 2700 K when the propellant exits the reactor. However, the development of robust fuel and reactor components that can withstand the extreme thermal, chemical, and mechanical environments associated with NTP remains a significant technological challenge. NASA is actively working to address these issues, including the development of **high-assay low-enriched uranium (HALEU)** nuclear fuels, which have 235U enrichment below 20%. The use of HALEU fuel reduces proliferation concerns and enables university and commercial sector participation in the development of space nuclear systems.

In addition to NTP, NASA is exploring NEP and FSP systems, which have the potential to provide reliable and efficient power for future lunar and Mars missions. NEP systems, which convert the heat generated by a nuclear reactor into electricity, can achieve higher Isp values (2000-8000 seconds) than NTP systems, but at lower thrust levels. FSP systems, on the other hand, offer a modular and extensible design for power production on the surface of other planetary bodies. **We believe that the successful development of NTP and NEP systems will not only reduce trip times to Mars by 25% or more but also provide the necessary power for a sustained lunar presence and a crewed mission to Mars.** A FSP system concept developed by NASA consists of three connected components that generate electricity, convert it to a usable voltage, and serve as a control unit, which can supply 40 kW of electrical power on the lunar surface. These systems share commonalities with NTP reactors, including the need for advanced materials and fuel designs that can withstand the extreme conditions of space. **We believe that the development of these technologies will not only support NASA's deep space missions but also have synergies with terrestrial applications, driving innovation and refinement in the nuclear field.**

Chart 2: NASA Plans a Sustained Presence on the Moon And Eventually Mars



Source: NASA

Space Nuclear Power and Propulsion Technologies: Poised for Breakthroughs

The space nuclear power and propulsion technologies sector is on the cusp of a significant breakthrough, driven by decades of development and innovation. L3Harris executives believe that nuclear electric propulsion and nuclear thermal propulsion solutions can mature and be ready for flight within the next five years. **NASA researchers are working on the Modular Assembled Radiators for Nuclear Electric Propulsion Vehicles (MARVL) project, which aims to develop a heat dissipation system that can be assembled robotically and autonomously in space.** This innovation could enable the design of more efficient nuclear electric propulsion systems, allowing for faster travel times to Mars. The MARVL technology addresses a critical challenge in nuclear electric propulsion, as it

enables the deployment of larger radiators, which are essential for efficient heat dissipation. By dividing the radiator into smaller components that can be assembled in space, the MARVL project could pave the way for more efficient and sustainable nuclear electric propulsion systems. For example, NASA's Langley Research Center is working on a system that could help bring nuclear electric propulsion one significant technology-defining step closer to reality.

Pulsar Fusion, a UK-based startup, is developing a nuclear fusion rocket called Sunbird, which could potentially achieve fusion in orbit for the first time in 2027. The concept could deliver up to 2,000 kilograms (4,400 pounds) of cargo to Mars in under six months, and deploy probes to Jupiter or Saturn in two to four years. This technology has the potential to revolutionize interplanetary travel, enabling faster and more efficient transportation of spacecraft.

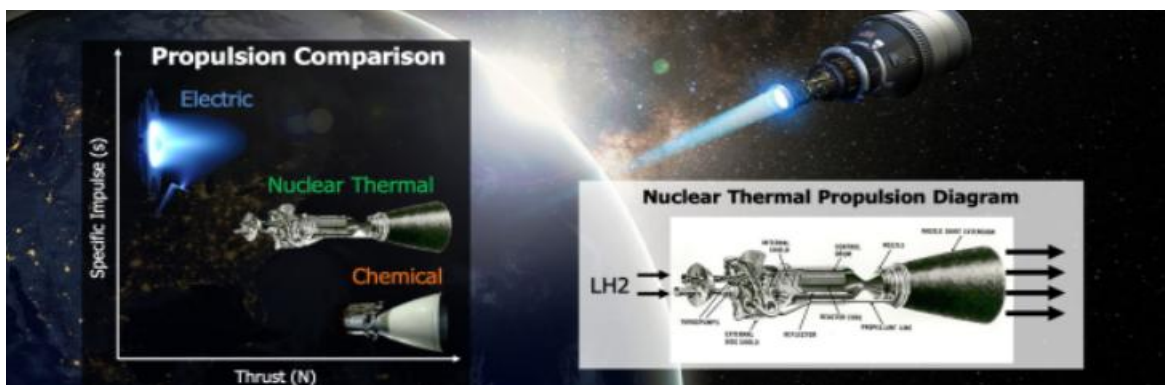
Despite the promising outlook, consistent government investments and leadership are essential to deploy these technologies. The development of space nuclear power and propulsion technologies requires significant funding and technological advancements. However, the potential benefits are substantial, including enhanced strategic mobility, faster travel times, and more efficient transportation of spacecraft. As the space economy continues to grow, the demand for efficient and sustainable propulsion systems will increase, driving innovation and investment in this sector.

Recent Advancements in SNP and Propulsion Technologies

The segment is witnessing significant advancements, with multiple players making notable strides in the development of innovative solutions. Westinghouse Electric Company has been awarded a contract by NASA and the U.S. Department of Energy (DOE) to continue the development of its space microreactor concept through the Fission Surface Power (FSP) project. This project aims to design small, electricity-generating nuclear fission reactors that can provide a reliable power supply for astronauts on the moon and beyond. We believe that Westinghouse's **eVinci microreactor technology** has the potential to play a crucial role in enabling sustainable operations on the lunar surface, given its ability to generate reliable electricity and heating in harsh environments.

The Demonstration Rocket for Agile Cislunar Operations (DRACO) program, a collaboration between DARPA and NASA, is another significant initiative focused on advancing nuclear propulsion technology. Nuclear thermal rockets (NTRs) offer a high thrust-to-weight ratio, making them an attractive option for cislunar and deep space missions. General Atomics Electromagnetic Systems (GA-EMS) has successfully tested nuclear thermal propulsion reactor fuel at NASA's Marshall Space Flight Center, demonstrating the survivability of its fuel design under extreme operational conditions. These tests represent a critical milestone in the development of NTR technology, which could enable rapid, agile transportation for cislunar and deep space missions. We believe that the success of NTR technology could be a game-changer for the sector, enabling more efficient and sustainable space travel.

Chart 3: DRACO seeks to Demonstrate Leap Ahead Propulsion Technology



Source: Civils Daily

Oak Ridge National Laboratory (ORNL) has also made a significant contribution to the development of nuclear thermal propulsion rockets by creating a new high-temperature testbed. This testbed, which includes a high-temperature furnace, can mimic the extreme heat and radiation conditions encountered in space. Researchers have used this environment to test a new zirconium carbide fuel and material coating, which showed promising results under repeated temperature cycles. The development of such testbeds and the advancement of nuclear fuels and materials will be crucial in enabling the creation of nuclear-powered rockets that offer twice the efficiency of chemical rockets and could potentially be used for crewed missions to Mars.

The recent advancements in SNP and propulsion technologies are expected to have a significant impact on the sector, enabling more efficient, sustainable, and reliable space travel. As the sector continues to evolve, we believe that companies like Westinghouse and General Atomics, as well as Oak Ridge National Laboratory will play a crucial role in driving innovation and growth. With NASA's goal of a lunar demonstration within the next decade, the development of SNP and propulsion technologies will be critical in enabling sustainable operations on the lunar surface and beyond. As the sector continues to advance, we expect to see increased investment and collaboration between government agencies, private companies, and research institutions, ultimately driving growth and innovation in the SNP and propulsion technologies sector.

Company Spotlight: L3Harris Technologies, Inc. (NYSE: LHX)

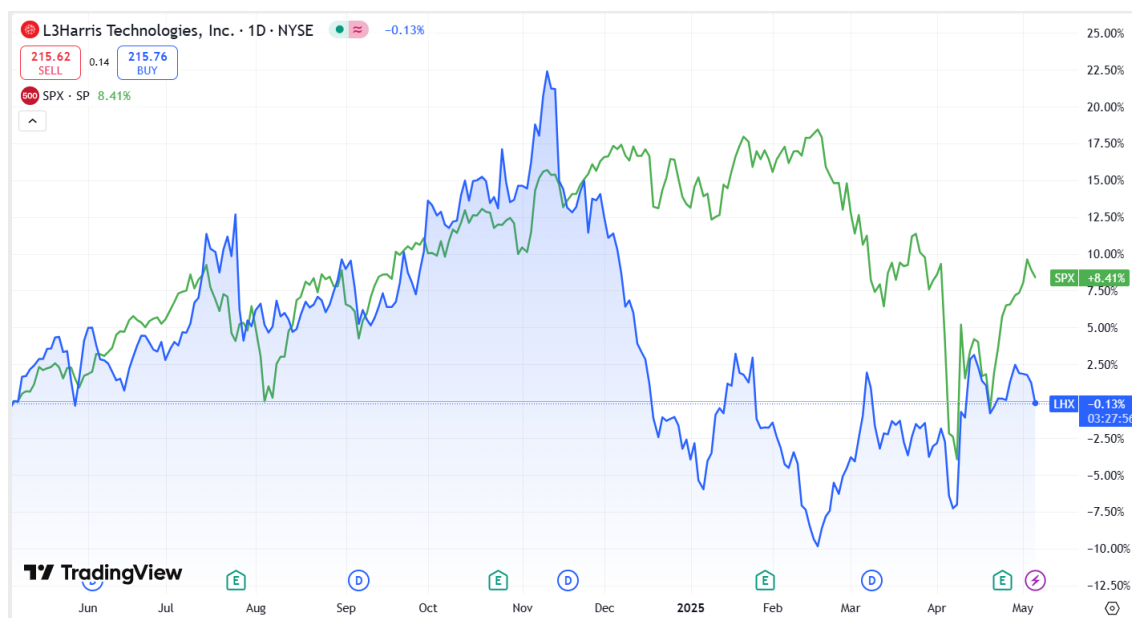
L3 Harris Technologies stands at the forefront of innovation in the space and defense sectors, with a rich history dating back to 1895. As a leading provider of mission-critical solutions for government and commercial customers worldwide, L3Harris operates through four primary segments: Space & Airborne Systems (SAS), Integrated Mission Systems (IMS), Communication Systems (CS), and Aerojet Rocketdyne (AR). The company's extensive domain expertise in spacetech positions it to capitalize on emerging trends and technologies. We believe L3Harris's commitment to advancing nuclear power and propulsion solutions could revolutionize lunar and Mars surface operations, enhance deep space exploration, and improve in-space maneuverability. The company's **recent collaboration with Westinghouse on a Fission Surface Power solution under a phase 1 contract from NASA and the U.S. Department of Energy is a significant development in this area.** This solution involves designing a nuclear-powered reactor capable of generating 40 kilowatts of power, sufficient to continuously power 30 households for 10 years. Such technology has the potential to provide a reliable and sustainable source of energy for future space missions.

The company's expertise in nuclear electric propulsion is another area of focus, with **L3Harris delivering one of three 12-kilowatt Advanced Electric Propulsion System (AEPS) Hall thrusters for NASA's Gateway, a lunar-orbiting space station scheduled to launch in 2027.** The AEPS system offers significantly increased maneuverability for spacecraft exploring outer planets, where the ability to generate electrical power from sunlight is limited. We believe this technology has far-reaching implications for deep space missions, enabling spacecraft to move from one orbit to another and facilitating more efficient and extensive exploration. Furthermore, L3Harris's work on NTP could further enhance strategic mobility by providing faster and more efficient transportation versus chemical propulsion. This capability is crucial for maintaining a strategic advantage and responding rapidly to emerging threats. The company's **Trusted Disruptor strategy** ensures that L3Harris remains agile, fast, and aligned with key defense priorities. This approach is reflected in its disciplined capital deployment, with a focus on investing in the business and returning excess cash to shareholders.

L3Harris Technologies reported strong Q4 2024 results, with \$5.52 billion in revenue (up 3% YoY) and non-GAAP EPS of \$3.47, beating estimates. **Full-year revenue rose 10% to \$21.3 billion, with a record \$34 billion backlog and \$1.13 billion in operating cash flow.** Key segments, including Integrated Mission Systems and Communication Systems, saw solid growth, while **Aerojet Rocketdyne added \$2.35 billion in revenue.** The **company exceeded its \$800 million cost-saving goal and guided 2025 revenue of \$21.8–\$22.2 billion.** Strategic divestitures and operational efficiencies continue to sharpen its focus on core defense and aerospace markets. L3Harris has achieved a 3.0x net leverage target, with a capital expenditure (capex) of approximately 2.0% of revenue and a dividend payout target of 35%-40% of free cash flow (FCF). Additionally, the company has a \$2.8 billion repurchase authorization as of 1Q25.

L3Harris is valued at \$41.36 billion, with an enterprise value of \$53.09 billion. **It trades at 26.24x trailing and 21.23x forward P/E, with a low PEG ratio of 0.33.** Valuation multiples include 1.98x sales, 2.16x book, 2.50x EV/revenue, and 14.41x EV/EBITDA, **reflecting solid growth expectations and a premium defense-sector valuation.** We believe that with its proven expertise in power and propulsion solutions, L3Harris is well-positioned to advance space nuclear power and propulsion systems, supporting power-intensive spacecraft systems and opening new possibilities for space exploration.

Chart 4: LHX vs S&P 500 (1-Year Comparison)



Source: Trading View, Data as on May 05, 2025

INDUSTRY TRENDS

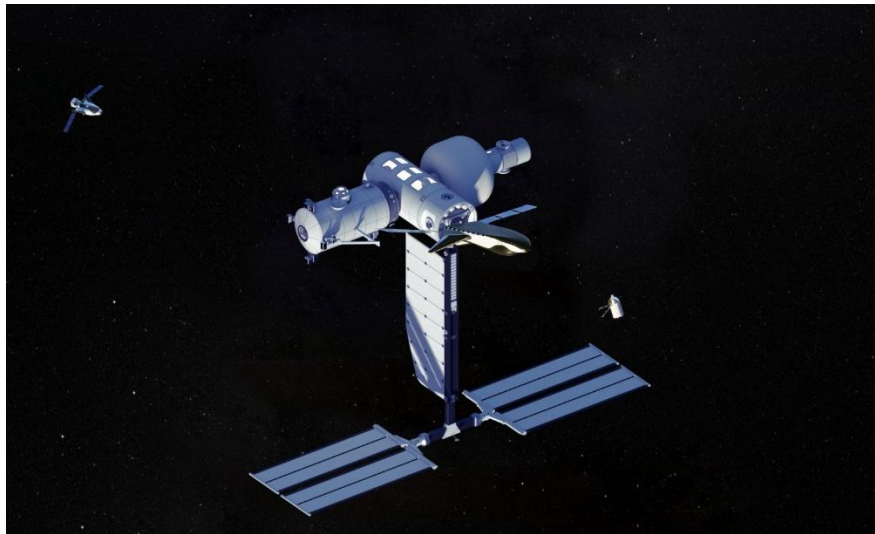
SpaceX launches third mid-inclination rideshare mission. SpaceX launched its third mid-inclination dedicated rideshare mission, Bandwagon-3, carrying only three payloads due to low demand for such orbits. The Falcon 9 rocket lifted off from Cape Canaveral and successfully landed back at the launch site. The Bandwagon series was announced in 2023 to meet demand for mid-inclination launches, but its future is uncertain after the fourth mission scheduled for later this year. Industry sources attribute the low payload count to modest demand and timing of the mission. [Read more.](#) (SpaceNews)

NRO reaches milestone with over 200 satellites deployed in two years. The National Reconnaissance Office (NRO) has reached a milestone by deploying over 200 satellites into orbit in just over two years. The latest launch, NROL-145, was carried out on a SpaceX Falcon 9 rocket and marked the agency's 10th launch of satellites for its proliferated architecture. This strategy involves using numerous smaller satellites to provide comprehensive coverage and resilience against threats. The NRO is currently deploying an extensive network of satellites designed to track ground targets in near real-time. [Read more.](#) (SpaceNews)

First Civilian Space Exchange Deepens U.S.-UK Collaboration. A first-of-its-kind civilian exchange is underway between U.S. Space Systems Command and UK Space Command, marking a new phase in their growing partnership. Tara Browne, Deputy Division Chief for Strategy & Plans at Space Systems Command, has begun a year-long post embedded with UK Space Command to integrate allied Space Enterprise Architecture and align the UK's evolving space enterprise with established U.S. and allied systems. This exchange is part of the Administrative and Professional Exchange Program (APEP) and aims to improve interoperability and technical strategy alignment between the two nations. [Read more.](#) (Orbital Today)

NASA sees progress on Blue Origin's Orbital Reef Design Development. NASA has seen progress in Blue Origin's Orbital Reef design development through a recent human-in-the-loop testing milestone. The test evaluated various aspects of the station's environment, including private crew quarters and research laboratory, to inform key decisions and mitigate risks to crew health and safety. NASA supports commercial space stations like Orbital Reef through Space Act Agreements, aiming to maintain a continuous human presence in Low Earth Orbit as it transitions from the International Space Station. [Read more.](#) (NASA)

Chart 5: A Digital Rendering Of The Baseline Configuration for Blue Origin's Free-Flying Commercial Space Station, Orbital Reef, Which Continues to be Developed as Part of a Space Act Agreement With NASA



Source: Blue Origin

Space Force eases entry for commercial firms with layered launch standards. The U.S. Space Force has introduced a tiered mission assurance system for launch missions under the National Security Space Launch (NSSL) Phase 3 procurement strategy, allowing for more flexibility in evaluating risk and expanding opportunities for newer commercial providers. The system categorizes launches into Lane 1 and Lane 2 based on their risk profile and payload importance, with Lane 1 offering less stringent assurance requirements for companies like SpaceX, ULA, Blue Origin, Rocket Lab, and Stoke Space to compete for lower-mass missions. [Read more.](#) (SpaceNews)

NASA super pressure balloon launches from New Zealand. A NASA super pressure balloon successfully launched from Wnaka Airport in New Zealand on April 17, marking the first of two planned scientific flights for the 2025 campaign. The 18.8 million-cubic-foot balloon is on a 100-day or longer mission around the Southern Hemisphere's mid-latitudes. After six launch attempts were postponed due to weather conditions, favorable winds allowed the balloon to lift off.. [Read more.](#) (NASA)

NASA aims to fly first quantum sensor for gravity measurements. NASA is developing a space-based quantum sensor, the Quantum Gravity Gradiometer Pathfinder (QGGPf), to measure Earth's gravity with unprecedented accuracy. This mission will pave the way for observing petroleum reserves and global water supplies. QGGPf uses ultra-cold rubidium atoms as test masses to track gravitational anomalies, offering increased sensitivity and compactness compared to traditional instruments. The technology validation mission is scheduled to launch near the end of the decade and may lead to groundbreaking observations of Earth and distant planets. [Read more.](#) (NASA Science)

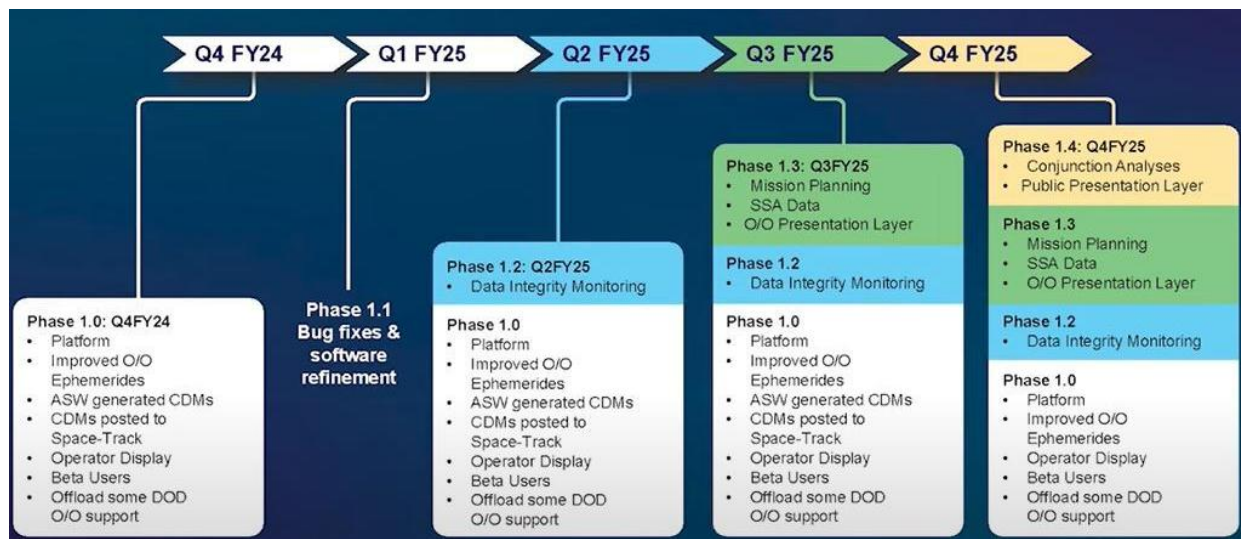
NASA extends seat barter agreement with Roscosmos into 2027. NASA has extended its seat barter agreement with Roscosmos into 2027, allowing for longer Soyuz missions to the International Space Station. Under the agreement, NASA astronauts will fly on Soyuz spacecraft and Roscosmos cosmonauts on commercial crew vehicles to ensure a mix of American and Russian crew members on the station at all times. The agreement also includes

changes in Soyuz mission cadence, with each mission now lasting eight months instead of six. [Read more.](#) (SpaceNews)

NOAA budget proposal would affect weather satellite, other space programs. The White House's budget proposal for NOAA seeks major changes to its space-related activities, including the Geostationary Extended Observations (GeoXO) program, which will develop new weather satellites. The proposal would remove climate-focused instruments and terminate NASA-NOAA cooperation on GeoXO. Additionally, the Space Weather Prediction Center would be transferred to the Department of Homeland Security, and the space traffic coordination system, TraCSS, would be handed over to a non-government entity. [Read more.](#) (SpaceNews)

TraCSS moves into next phase of development. The Commerce Department's space traffic coordination system, TraCSS, has moved into its next phase of development, with full service expected to start in January 2026. The system has upgraded to version 1.1, enabling satellite operators to upload ephemerides and receive on-demand screening for potential conjunctions. TraCSS is being beta-tested by nine operators and will scale up to about 10 times its current capacity this year. A presentation layer website, TraCSS.gov, is under development and expected to be operational in January 2026. [Read more.](#) (SpaceNews)

Chart 6: Parts of the TraCSS roll-out



Source: OSC, Orbital Today

Space Forge sees LEO as key to strengthening U.S. chip independence. Space Forge, a British company, has appointed Atul Kumar to establish a semiconductor business in the U.S., aiming to boost domestic chip production and reduce reliance on foreign suppliers. The venture plans to harness space conditions to produce high-quality semiconductor materials, which could enable new applications in radio frequency, power, photonics, and quantum computing. Space Forge will demonstrate its in-space manufacturing capability with the ForgeStar-1 mission later this year and plans to start selling products developed under suborbital conditions within a few years. [Read more.](#) (SpaceNews)

SpaceX to launch new Intuitive Machines Moon lander, lunar satellites in 2027. Intuitive Machines has partnered with SpaceX to launch its fourth moon lander, IM-4, in 2027 alongside two relay satellites for NASA's lunar communications network. The mission will carry six NASA payloads, including a drill experiment from the European Space Agency to search for water near the moon's south pole. This comes after Intuitive Machines' previous two landers landed on the lunar surface but tipped over, with its third lander set to launch in 2026 as part of the company's strategy to commercialize the Moon. [Read more.](#) (Space.com)

“Everyone is doing AI.”: Space sector urged to catch up. The space industry is urged to accelerate the adoption of artificial intelligence (AI) technologies to remain competitive, with experts warning that it risks falling behind if it doesn't catch up. At a symposium in March, representatives from government agencies, industry leaders, and tech giants like Google and Meta emphasized the importance of AI in spacecraft design and data analysis, citing its potential to improve space domain awareness and extract insights from large datasets. [Read more.](#) (SpaceNews)

Isaacman says NASA should pursue human Moon and Mars programs simultaneously. NASA nominee Jared Isaacman advocated for pursuing both human Moon and Mars programs simultaneously, arguing that they can be done in parallel without a binary decision between the two. He committed to continuing the Artemis lunar exploration campaign and stated his support for space stations, including the International Space Station, which he believes should operate until its retirement date of 2030. Isaacman also addressed concerns about a potential space race with China. [Read more.](#) (SpaceNews)

Space alliances hold strong despite broader geopolitical tensions. U.S. Space Force officials say international space cooperation remains unaffected by broader geopolitical tensions, despite trade disputes and disagreements over Ukraine strategy. Air Marshal Paul Godfrey notes the "business as usual" approach in collaborating with allies, citing the unique nature of the space domain. Gen. Chance Saltzman emphasizes the importance of maintaining partnerships to stay ahead of threats and maintain technological interoperability, highlighting European allies' significant investments in space technologies and commercial industries. [Read more.](#) (SpaceNews)

Space Force to roll out strategy for international collaboration. The U.S. Space Force is finalizing a strategy document to enhance international collaboration and interoperability in space operations. The "International Partnership Strategy" aims to improve information sharing, secure collective interests, and counter hostile actions from countries like Russia and China. The strategy builds on existing efforts and will leverage comparative advantages of different partners to achieve common goals, with a focus on trust, coordination, and shared commitment among nations. [Read more.](#) (SpaceNews)

Space Force announces “Orbital Watch” program to share intelligence with commercial sector. The U.S. Space Force's procurement arm has announced the "Orbital Watch" program, which will share unclassified threat data with over 900 space companies to warn them about potential threats to their orbital assets. The program is designed to ensure that commercial providers can build resilient systems and mitigate evolving space threats such as cyber intrusions, electronic warfare, and adversarial on-orbit activities. Orbital Watch has no requirements for Defense Department contracts or security clearances. [Read more.](#) (SpaceNews)

Space leaders emphasize collaboration amid geopolitical challenges. Amidst geopolitical challenges, international space agencies emphasized the importance of partnerships at the Space Symposium April 9.. Agency leaders stressed that strong cooperative relationships are essential for achieving ambitious missions and ensuring that the space environment remains peaceful. Representatives from Germany, Japan, France, Israel, Australia, and India highlighted shared innovation, scientific research, and infrastructure as critical to addressing global challenges and opportunities in space exploration and technology development. [Read more.](#) (SpaceNews)

Honda Hydrogen Electrolysis System To Be Tested On The ISS. Honda is developing a hydrogen electrolysis system to support life on the Moon, generating oxygen and electricity through regenerative fuel cell technology. The system will use solar energy during the lunar day to produce hydrogen and oxygen from water via electrolysis, then convert this into electricity at night using stored hydrogen and oxygen. The ISS test, in partnership with Sierra Space and Tec-Masters, will assess its performance in microgravity conditions, crucial for lunar exploration. [Read more.](#) (Orbital Today)

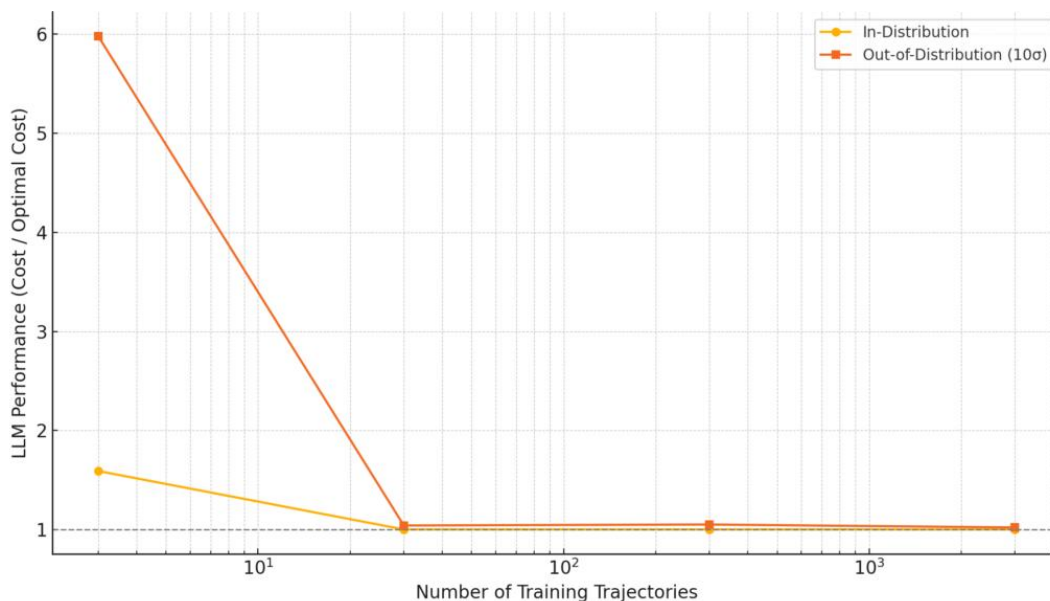
NASA's first crewed flight important step on long-term return to the Moon, missions to Mars. NASA's Artemis II test flight marks a crucial step toward returning humans to the Moon and eventually sending them to Mars. The mission, scheduled to launch from Kennedy Space Center in Florida, will send four astronauts on a lunar flyby trajectory, testing Orion's life support systems, communication, navigation, and propulsion capabilities in deep space. This predecessor to Artemis III aims to pave the way for longer-duration missions to the Moon and beyond. [Read more.](#) (NASA)

Lunar lander operators cite growing demand beyond NASA. Lunar lander operators are citing growing demand for missions beyond NASA's Commercial Lunar Payload Services (CLPS) program. Companies like Intuitive Machines are diversifying revenue streams by collecting scientific data on the lunar surface, which will pave the way for commercial missions, such as resource extraction and mining. International space agencies and companies are contributing to CLPS missions, with some even purchasing rideshares from private operators. The growing demand is expected to make lunar flights more affordable and less risky, opening up opportunities for cislunar communications and other business ventures. [Read more.](#) (SpaceNews)

Industry eyes continuous satellite production to keep pace with demand. The U.S. space industry is facing a surge in demand for satellites, with plans to build 650% more over the next five years than were previously planned. Prime contractors such as Lockheed Martin and Boeing are scaling up production, but face challenges from outdated security practices that inhibit collaboration and knowledge sharing. To meet this demand, companies are leveraging partnerships, automation, and new technologies to increase efficiency and reduce costs. [Read more.](#) (SpaceNews)

Language models show promise as spacecraft controllers. Researchers at MIT have found that fine-tuned large language models can generate high-precision commands for space missions, outperforming traditional control algorithms in some cases. The study tested models like Meta's Llama-2 on simulated spacecraft tasks, such as orbital transfer and lunar landing, and found they required less training data to generalize effectively while maintaining precision up to 10 significant digits. [Read more.](#) (Space Insider)

Chart 7: Effectiveness of LLM's in Space Control Systems



Source: OSC, Orbital Today

CLPS companies seek expanded opportunities for commercial lunar landers. Lunar lander companies, including Firefly Aerospace, Astrobotic, and Intuitive Machines, are urging NASA to revise the Commercial Lunar Payload Services (CLPS) program to allow for larger landers, block buys of missions, and stable funding commitments. The changes would enable a steady cadence of two to three missions per year, while also enhancing supply chains and investing in testing facilities and communications services. Companies are also advocating for CLPS 2.0, which could include delivering infrastructure to the Moon and serving multiple government agencies. [Read more.](#) (SpaceNews)

NASA makes progress on Advanced Drone Safety Management System. NASA is developing an advanced drone safety management system called In-Time Aviation Safety Management System (IASMS) to predict and mitigate hazards in real-time. The system will monitor, assess, and alert drone operators of potential risks, ensuring safe operations. NASA has conducted extensive testing through simulations and flight tests with various partners, including

universities and government agencies, to refine the IASMS's performance and prepare for its integration into routine drone flights by 2027. [Read more.](#) (NASA)

Space biology seen as next innovation frontier, with Earth-side benefits. A new editorial in *Experimental Physiology* argues that space biology is a crucial area of research for deep space missions and could drive advances in healthcare, aging, and biotechnology on Earth. Researchers warn that without targeted funding, ambitions for long-duration missions to Mars may remain out of reach. The study highlights the need to understand how space affects human biology, particularly the kidney's vulnerability to radiation and microgravity, which could unlock breakthroughs in medicine and longevity research. [Read more.](#) (Space Insider)

SPACETECH NEWS

GOVERNMENT POLICIES

Space Force to unveil international space partnership strategy. Space Force Chief of Space Operations General Chance Saltzman announced an upcoming International Partnership Strategy at the recent Space Symposium, aiming to unify allies in space warfare capabilities. The strategy's three pillars include leveraging partner strength, enhanced data capturing and system operations, and service-level force development across allied nations. It will act as a roadmap for a seamless multinational space coalition, addressing critical evolution in space-based warfare assets and advancements in technology. [Read more.](#) (Orbital Today)

U.S. Space Command chief calls for new combat capabilities while emphasizing deterrence. Gen. Stephen Whiting, commander of U.S. Space Command, warned that the U.S. is racing to defend its orbital assets against growing threats from China. He emphasized deterrence and preparation for a potential war in orbit, citing China's accelerated development of terrestrial and on-orbit space weapons. The U.S. is prioritizing advanced surveillance tools, maneuverable satellites, and defensive/offensive systems to send a clear message to adversaries and maintain dominance in the militarized space domain. [Read more.](#) (SpaceNews)

FCC moves to update satellite power limits amid push for adaptive regulations. The Federal Communications Commission (FCC) is updating decades-old satellite power limits to modernize and streamline regulations, amid efforts to improve broadband access in rural areas. The FCC plans to review how non-geostationary (NGSO) and geosynchronous orbit (GSO) operators share spectrum, with a vote tentatively scheduled for April 28. The update aims to provide more flexibility for NGSO operators like SpaceX while protecting GSO networks from interference. [Read more.](#) (SpaceNews)

CAPITAL MARKETS

Northwood raises \$30 million to establish ground station network. Northwood Space has secured \$30 million in Series A funding from investors, including Alpine Space Ventures and Andreessen Horowitz, to establish a global network of ground stations. The company, co-founded by Bridgit Mendler, aims to provide high-performance ground stations at an affordable price point through vertical integration. Northwood plans to deploy 2 sites per month, with each site capable of offering up to 100 gigabits per second backhaul capacity, and establish a network on six continents by 2026. [Read more.](#) (SpaceNews)

Surge in NATO spending to benefit space sector. NATO allies may pledge to spend up to 3.5% of their GDP on defense, a significant increase from the current 2%, which could add \$400 billion annually to military budgets. This surge in investment is expected to benefit the space sector, with commercial space companies able to operationalize it quickly and at scale. NATO leaders are also reevaluating their defense plans, prioritizing space-based capabilities and cybersecurity measures in response to emerging threats from Russia's invasion of Ukraine. [Read more.](#) (SpaceNews)

Space Force to revamp training for a new era of space conflict. The U.S. Space Force is revamping its training program to prepare for a new era of space conflict, with a focus on countering emerging threats from Russia and China. The service plans to invest over \$600 million in the Operational Test and Training Infrastructure (OTTI)

program, which seeks private contractors' technologies to create realistic training environments that simulate space-based conflict. This includes physical testing ranges, synthetic battle environments, and cyber testing ranges to enhance Guardians' readiness for high-end fights against adversaries. [Read more.](#) (SpaceNews)

Aetherflux raises \$50 million for space-based solar power. Aetherflux, a startup developing space-based solar power technology, has raised \$50 million in a Series A funding round led by Index Ventures and Interlagos. The company plans to launch a constellation of satellites that collect solar power and beam it to Earth using lasers, a departure from traditional concepts involving microwaves. With the new funding, Aetherflux aims to accelerate its demo mission slated for 2026 and explore early markets such as defense, where it can provide power to forward operating bases. [Read more.](#) (SpaceNews)

GOVERNMENT CONTRACTS

U.S. Space Force awards \$13.7 billion in new national security launch contracts to Blue Origin, SpaceX and ULA. The US Space Force has awarded \$13.7 billion in new national security launch contracts to Blue Origin, SpaceX, and United Launch Alliance (ULA) as part of the National Security Space Launch (NSSL) Phase 3 program. The contracts will be issued over a five-year period beginning in FY25, with SpaceX receiving about 60% of the missions, ULA getting 40%, and Blue Origin receiving seven missions. [Read more.](#) (Spaceflight Now)

Chart 8: Blue Origin's New Glenn, SpaceX's Falcon 9 and ULA's Vulcan rockets launch from their respective pads.



Source: Blue Origin, SpaceX, United Launch Alliance, Spaceflight Now

NanoAvionics secures €122.5 million contract for SpinLaunch's Global Broadband Constellation. NanoAvionics has secured a €122.5 million contract with SpinLaunch to supply satellites for its Meridian Space broadband constellation, which aims to deliver global, secure broadband via low-cost microsatellites. The partnership includes two initial prototype missions and will scale to at least 1,200 satellites. NanoAvionics will expand manufacturing capacity in Vilnius to meet the production schedule, leveraging automated processes for efficient scaling. [Read more.](#) (Space Insider)

SAIC wins \$55 million Space Development Agency contract for satellite network integration. Science Applications International Corp. (SAIC) has secured a \$55 million contract from the Space Development Agency to serve as program integrator for SDA's low Earth orbit satellite constellation. The five-year contract will enable SAIC to lead system engineering and integration support for Tranche 3 of the Proliferated Warfighter Space Architecture, which

aims to enhance the U.S. military's ability to detect and counter missile threats with approximately 194 satellites. [Read more.](#) (*SpaceNews*)

Texas Space Commission awards \$26 million to five companies. The Texas Space Commission has awarded over \$26 million to five companies, including Aegis Aerospace, ICON Technology, Interlune, KULR Technology Group, and Venus Aerospace Corporation, for various space-related projects. The grants will support the development of advanced materials, lunar regolith simulant production, and rocket engine testing, among other initiatives. The awards are part of a \$150 million appropriation made by the Texas Legislature in 2023 to stimulate the state's space industry. [Read more.](#) (*SpaceNews*)

ALTEC receives €61M contract to support ESA space station activities. The European Space Agency (ESA) has awarded Italy's ALTEC a €61 million contract to provide training, logistics, and operations support services for the International Space Station and the Gateway space station from 2025 to 2029. ALTEC will train ESA astronauts and ground crews, manage end-to-end logistics for payloads and experiments, and provide operational support for missions. The contract also covers support for human exploration beyond Low Earth Orbit, marking a new era in space exploration. [Read more.](#) (*European Spaceflight*)

Pangea Aerospace secures €7.27M to develop its Aerospike engine. A consortium led by ITP Aero has secured €7.27 million in funding from the Spanish government to develop Pangea Aerospace's ARCOS Aerospike engine. The project, part of Spain's Space Technology Program, aims to create a reusable upper stage engine capable of producing 750 kN of thrust and enabling reentry and reuse. Pangea Aerospace will lead development, while ITP Aero contributes propulsion expertise and partners Sener and Aenium Engineering provide additional components and materials. The €7.27 million grant covers only part of the estimated €11.6 million project cost. [Read more.](#) (*European Spaceflight*)

SpaceX secures majority of NSSL Phase 3 fiscal year 2025 missions. SpaceX has secured seven National Security Space Launch (NSSL) missions worth \$845.8 million under the Phase 3 Lane 2 contracts, including three for the National Reconnaissance Office and four for the U.S. Space Force. United Launch Alliance (ULA) received two contracts valued at \$427.6 million. The allocations represent a portion of the 54 missions, worth \$13.7 billion, to be distributed among SpaceX, ULA, and Blue Origin through fiscal year 2029. [Read more.](#) (*SpaceNews*)

GITAI Establishes GITAI Defense and Space LLC to expand U.S. Government contracting opportunities. GITAI USA has established a new subsidiary, GITAI Defense and Space LLC, in Delaware to qualify for prime contractor roles with the U.S. Department of Defense and NASA. The company's voting trust structure meets citizenship requirements for select federal solicitations, with 51% ownership by a U.S. trust company and 49% ownership by GITAI USA. The subsidiary will focus on satellite buses and on-orbit robotic servicing for national security missions, expanding GITAI's U.S. government portfolio beyond DARPA and commercial space contracts. [Read more.](#) (*Space Insider*)

Space Systems command awards SpaceX, United Launch and Blue Origin billion-dollar contracts. Space Systems Command has awarded three National Security Space Launch Phase 3 Lane 2 contracts worth approximately \$5.9 billion for SpaceX, \$5.4 billion for United Launch Services, and \$2.4 billion for Blue Origin to support critical national security missions between FY27 and FY32. The dual-lane acquisition strategy aims to enhance launch resiliency, industrial base strengthening, and assured access to space with 84 total missions. [Read more.](#) (*Space Insider*)

NATO contracts ICEYE to provide Earth Observation data. NATO has awarded a contract to Finnish Earth observation company ICEYE to supply Synthetic Aperture Radar (SAR) data to its Situation Centre in Brussels. ICEYE, with over 40 satellites in orbit, provides near real-time insights in virtually all weather conditions. The contract adds to ICEYE's growing list of defence customers, including Saab and Rheinmetall, and cements the company's significance in the European defence space. [Read more.](#) (*European Spaceflight*)

COMPANY NEWS

Iridium shields supply chain as higher tariffs loom. Iridium is taking steps to shield its supply chain from potential import tax hikes due to escalating global trade tensions. The company, which imports satellite equipment primarily

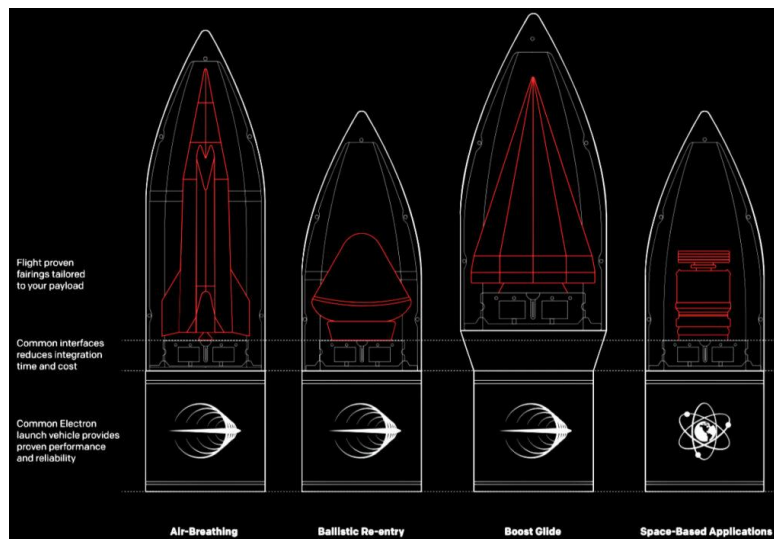
from Thailand, is diverting non-US shipments through a European logistics partnership to avoid tariffs of up to 36%. Iridium estimates that current US trade policies could cost it \$3 million this year, but the company plans to absorb these costs without raising prices to customers. [Read more.](#) (SpaceNews)

Spirit Electronics expands U.S. semiconductor capacity with acquisition of SMART Microsystems. Spirit Electronics has acquired SMART Microsystems, a microelectronic assembly supplier located at Lorain County Community College in Ohio, to expand its U.S. semiconductor capacity and foster academic-industry collaboration. The acquisition will serve as a hub for advanced research and education in materials, MEMS, and packaging technologies, including 2.5D and 3D integration. This move supports Spirit Electronics' mission to strengthen domestic semiconductor manufacturing and invest in the future talent pipeline. [Read more.](#) (SpaceNews)

Rocket Lab sees demand for Electron despite rideshare competition. Rocket Lab CEO Peter Beck asserts that his company's dedicated launch service for small satellites does not compete with SpaceX's rideshare missions, citing different customer needs and preferences. Rocket Lab has seen growing demand for its Electron rockets from companies seeking control over their schedule and orbit. Despite competition from other small launch vehicles, Beck believes there is enough demand to support multiple players in the market, but notes that it's a challenging entry point due to high development costs and risks. [Read more.](#) (SpaceNews)

Rocket Lab's HASTE Rocket joins U.S. and UK defence missions. Rocket Lab has announced its participation in two multi-billion-dollar government programs, one with the U.S. Air Force's Enterprise-Wide Agile Acquisition Contract and another with the UK Ministry of Defence's Hypersonic Technologies & Capability Development Framework. The company will utilize its HASTE launch vehicle for hypersonic test launches and other services, providing both governments with advanced capabilities. The HASTE vehicle can lift a 700kg payload at speeds of up to 7.5km per second, supporting the development of sovereign hypersonic technology in both nations. [Read more.](#) (Orbital Today)

Chart 9: HASTE: A Versatile, Cost-Effective Launch Platform for Diverse Hypersonic Missions



Source: Satnews

Northrop Grumman expands its manufacturing facility in Alabama. Northrop Grumman has expanded its manufacturing facility in Madison, Alabama, with a new 129,500 square foot integration centre. The Enhanced Production and Integration Centre (EPIC) will support the U.S. Army's air and missile defence plans by scaling production and manufacturing. The expansion adds capacity for up to 96 Engagement Operation Centrrtd, 96 Integrated Collaborative Environments, and 192 Integrated Fire Control Network relays per year, meeting growing demand under the Integrated Battle Command System (IBCS). [Read more.](#) (Orbital Today)

L3Harris expands space manufacturing as companies vie for position in “Golden Dome.” L3Harris Technologies is expanding its manufacturing facility in Fort Wayne, Indiana, investing \$125 million to increase production of infrared sensing payloads for the Golden Dome missile-defense shield. The initiative, established through executive order, aims to create a comprehensive shield against multiple missile threats, using space-based capabilities and advanced sensors. Competition is intensifying as companies position themselves for roles in the ambitious program, with SpaceX emerging as a leading contender with its proposed subscription-based model and partnership with Palantir and Anduril. [Read more.](#) (SpaceNews)

Vast signs three more payload partners for Haven-1. Vast, a commercial space station developer, has signed three new payload partners for its Haven-1 station set to launch in May 2026. Japan Manned Space Systems Corporation, Interstellar Lab, and Exobiosphere will fly research payloads on the station, joining Redwire and Yuri as partners. The partnerships aim to leverage microgravity research capabilities for transformative breakthroughs, with a focus on life sciences, pharmaceuticals, and healthcare experiments. [Read more.](#) (SpaceNews)

Apogee Semiconductor teams with Arrow Electronics to expand distribution of space-grade Technologies. Apogee Semiconductor has partnered with Arrow Electronics to expand distribution of its space-grade technologies. The collaboration will bring high-reliability integrated circuits and radiation-tolerant solutions to a broader market in aerospace and defense. With Arrow's trusted channels, customers will benefit from fast delivery and technical support for mission-critical needs. Apogee's rad-hard ICs enable designers to improve system-level reliability without sacrificing cost-effectiveness or performance. [Read more.](#) (SpaceNews)

Redwire and ispace U.S. to collaborate on lunar missions. Redwire and ispace U.S. will collaborate on future lunar missions, aiming to tap into growing interest from companies and governments. The two companies signed a Memorandum of Understanding during the 40th Space Symposium, agreeing to jointly pursue NASA's Commercial Lunar Payload Services (CLPS) program missions. They will leverage Redwire technologies and facilities in Colorado to develop landers and spacecraft for various applications, including cislunar space situational awareness and lunar resource utilization. [Read more.](#) (SpaceNews)

To build new weather satellite instruments, L3Harris opts for automated manufacturing. L3Harris Technologies is investing \$125 million in a 9,290-square-meter facility in Fort Wayne, Indiana, to modernize weather satellite instrument development, production, and testing. The paperless facility will use automated manufacturing, increasing efficiency and quality. L3Harris has a long history with the location and has built instruments for NOAA's Geostationary Operational Environmental Satellite R Series and Joint Polar Satellite System. They are also working on the next-generation GeoXO program and supplying Japan Meteorological Agency's Himawari-10 satellite. [Read more.](#) (SpaceNews)

Umbra to develop maritime surveillance satellites for U.S. military. Umbra, a California-based manufacturer, has been selected to develop next-generation sensor satellites for the U.S. military under a public-private agreement worth up to \$60 million. The satellites will enhance maritime and open-ocean search capabilities in the Indo-Pacific region, utilizing synthetic aperture radar (SAR) technology that can see through clouds and darkness. Government funding from organizations such as SpaceWERX and private investors will support the project, which aims to demonstrate comprehensive SAR coverage for search and rescue missions. [Read more.](#) (SpaceNews)

Novaspace marks one year as a unified brand — built on 40+ years of space expertise. Novaspace, a unified brand formed through the merger of Euroconsult and SpaceTec Partners, marks its first year as an independent global consulting firm. With over 40 years of combined heritage, Novaspace offers strategic, technical, economic, and policy expertise to governments, space agencies, and industry leaders navigating the space industry's transformation. Its platform integrates four core pillars: management consulting, technology consulting, market intelligence, and executive summits, enabling stakeholders to drive impact across the space value chain. [Read more.](#) (SpaceNews)

GomSpace and Neuraspace partner to advance satellite collision avoidance. GomSpace, a Danish smallsat maker, has partnered with Portugal's Neuraspace to integrate its space traffic management tools into GomSpace's satellite operations platform. This integration combines AI-driven satellite tracking capabilities with automated spacecraft management tasks, providing real-time collision alerts and optimized maneuver recommendations. The partnership aims to reduce manual workload and operational costs, making collision avoidance a more streamlined part of daily satellite operations in increasingly congested orbits. [Read more.](#) (SpaceNews)

Astroscale U.S. to refuel two Space Force spacecraft on 2026 mission. Astroscale U.S. will launch its Refueler spacecraft, APS-R, in 2026 to refuel two U.S. Space Force spacecraft in geostationary orbit. The mission will demonstrate on-orbit logistics capabilities by transferring hydrazine and performing a leak check using a hyperspectral sensor. APS-R will also refuel itself from an Orbit Fab depot before completing the second refueling operation, with a design life of two to three years. [Read more.](#) (SpaceNews)

Boeing's Millennium Space expands production to meet defense demand. Boeing subsidiary Millennium Space Systems is expanding its satellite manufacturing capacity to meet growing defense demand. The company aims to increase production from one or two satellites monthly to six to 12, driven by a \$414 million contract for missile-tracking satellites and a nearly billion-dollar order for the U.S. Space Force. Millennium's growth is also fueled by classified contracts and a shift toward reliable production, with Tony Gingiss at the helm. [Read more.](#) (SpaceNews)

Aitech unveils IQSat, a picosatellite for AI applications. Aitech Systems has unveiled IQSat, a picosatellite designed for AI applications. The satellite will enable pattern-of-life recognition and can be used in various constellations to detect space debris, observe terrestrial activity, or monitor electronic signals. IQSat incorporates Intuidex Watchman's AI and machine-learning algorithms and is a commoditized platform that allows users to leverage space-based capabilities without significant expense or expertise. Launch of the first IQSats is scheduled for 2026. [Read more.](#) (SpaceNews)

PLD Space to launch D-Orbit missions aboard Miura 5. PLD Space has partnered with Italian company D-Orbit to launch payloads aboard its Miura 5 rocket. The agreement will enable direct access to equatorial orbits from French Guiana and marks a significant milestone for PLD Space, which aims to conduct six launches in 2026 and eleven in 2027. The partnership also includes the launch of D-Orbit's ION orbital transfer vehicle missions aboard Miura 5 flights. This agreement follows similar partnerships with Orbex and Isar Aerospace, expanding D-Orbit's launch offerings. [Read more.](#) (European Spaceflight)

RTX's Blue Canyon Technologies introduces new reaction wheel. Blue Canyon Technologies, a subsidiary of RTX, has introduced its largest reaction wheel to date, the RW16. This motor-driven flywheel enables attitude control for spacecraft without external propulsion and provides 16 Newton-meter seconds of momentum, suitable for spacecraft over 400 kg. The new component offers low-jitter attitude control and can command torque for longer durations, enabling larger spacecraft or augmenting smaller ones to support multiple payloads. [Read more.](#) (SpaceNews)

Chart 10: RTX's Blue Canyon Technologies Unveils Next-Generation Reaction Wheel for Enhanced Satellite Precision



Source: Space News

Viasat adds Telesat Lightspeed LEO connectivity to multi-orbit mix. Viasat has signed a contract with Telesat to use its Low Earth Orbit constellation, Lightspeed, to provide connectivity services. The deal spans maritime, aviation, government, and enterprise markets, where SpaceX's Starlink has been gaining traction. Viasat will upgrade its existing GM-40 antennas to take full advantage of Lightspeed's capabilities when it launches in 2027. This multi-orbit approach aims to counter competition from Starlink by combining geostationary satellites' global reach with LEO's low-latency benefits. [Read more.](#) (SpaceNews)

LeoLabs unveils mobile radar for space surveillance. LeoLabs, a California-based space object tracking company, unveiled "Scout," a mobile surveillance radar system for military customers. The portable system can be rapidly repositioned to emerging hotspots and is designed to fill gaps in the U.S. military's existing space surveillance network. Scout will integrate with LeoLabs' global network of phased array radars and support missile defense activities, enhancing its appeal to military customers. [Read more.](#) (SpaceNews)

Axiom Space to launch orbital data centers on Kepler satellites. Axiom Space is partnering with Kepler Communications to launch two Orbital Data Center (ODC) nodes on Low Earth Orbit satellites. The ODC nodes will enable real-time processing of satellite data, artificial intelligence analysis, and cybersecurity capabilities. This partnership is a step toward developing space-based cloud computing services that leverage Axiom's work on commercial space stations. Customers include those interested in commercial, civil, and national security applications, with plans to expand capacity and move to larger systems in the future. [Read more.](#) (SpaceNews)

Voyager Technologies to acquire LEOcloud. Voyager Technologies plans to acquire LEOcloud, a startup specializing in space-based cloud computing. The acquisition will integrate LEOcloud's Space Edge platform into Voyager's portfolio, enhancing capabilities in AI-driven analytics, satellite communications, and real-time data processing. This move aims to reduce latency for mission-critical applications and enable autonomous operations for satellites, space stations, and lunar missions, supporting the growing commercial space economy. [Read more.](#) (SpaceNews)

Startups demonstrate in-orbit satellite autonomy. NOVI and Sedaro startups have successfully demonstrated edge autonomy in a small spacecraft, enabling it to analyze data and make decisions independently without ground control. The satellite's onboard computer used Sedaro's mission simulation software as a digital twin, allowing the spacecraft to be "self-aware" and autonomously execute tasks based on its environment and status. This technology can adjust orbits, manage power consumption, or optimize communication links, with potential military applications for detecting tracking or targeting. [Read more.](#) (SpaceNews)

SpinLaunch announces plans for broadband satellite constellation. SpinLaunch, known for its unconventional launch system, has announced plans to develop a broadband satellite constellation called Meridian Space. The company will produce 280 satellites with Kongsberg NanoAvionics, investing \$136 million and receiving a \$12 million investment from Kongsberg Defence and Aerospace. SpinLaunch's technology enables high-performance small satellites that minimize launches, providing low latency and high reliability for enterprise and government customers. [Read more.](#) (SpaceNews)

Washington Harbour Partners invests in startup Turion Space. Washington Harbour Partners has invested in Turion Space, a California-based startup developing spacecraft and mission software for space situational awareness, debris removal, and in-orbit services. The investment aims to expand Turion's capabilities in critical technologies such as space domain awareness, missile warning, orbital debris management, and collision avoidance. This move aligns with increasing federal interest in commercial satellite capabilities and follows a \$32.6 million contract from the U.S. Space Force for non-Earth imaging applications. [Read more.](#) (SpaceNews)

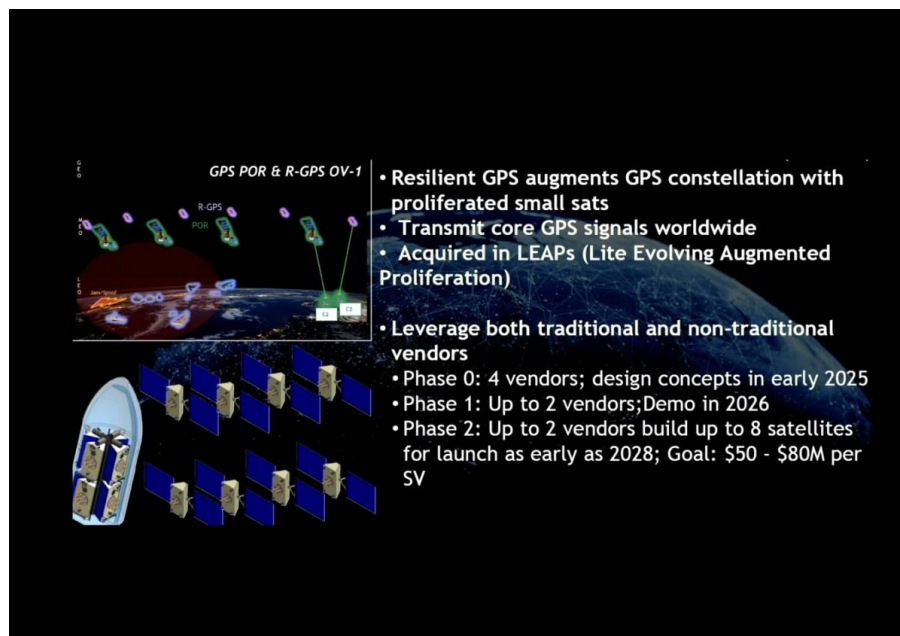
Slingshot adapting satellite "fingerprinting" technology for military applications. Slingshot Aerospace has secured a U.S. Air Force contract to refine "fingerprinting" technology for satellites using photometric data and AI. The technique, known as photometric fingerprinting, creates unique signatures for each space object, based on its brightness over time. Slingshot's extensive database tracks 14,500 active satellites and debris objects, generating over 4.5 million observations nightly to refine digital fingerprints. This technology will aid U.S. Space Command in detecting adversary satellite maneuvers and identifying newly launched foreign satellites. [Read more.](#) (SpaceNews)

U.S. Space Force picks Rocket Lab and Stoke Space to compete for national security launches. The U.S. Space Force has selected Rocket Lab and Stoke Space to compete for national security launches, awarding them "National Security Space Launch (NSSL) Phase 3 Lane 1 contracts" on March 27. The two companies join SpaceX, Blue Origin, and United Launch Alliance as NSSL providers, expanding the military branch's launch options and access to space. Rocket Lab's Neutron rocket and Stoke Space's Nova rocket will be used for LEO launches, with each company receiving a \$5 million task order to assess their capabilities. [Read more.](#) (Space.com)

Pentagon approves Vulcan Centaur, ending SpaceX's solo military launch streak. The United Launch Alliance's (ULA) Vulcan Centaur rocket has received official certification from the U.S. Space Force, marking a significant milestone in its development. The certification process involved meeting 52 criteria and undergoing two demonstration flights. Vulcan replaces aging Atlas V and Delta IV systems, combining BE-4 engines with ULA's Centaur upper stage for precise defense-related missions. Its arrival adds capacity to the military launch market, reducing reliance on SpaceX's Falcon 9 rocket. [Read more.](#) (Orbital Today)

Sierra Space demonstrates GPS satellite technology for U.S. Space Force satellite program. Sierra Space has successfully demonstrated its Resilient GPS (R-GPS) technology for the U.S. Space Force's Quick Start program, generating all key GPS navigation signals. The R-GPS system aims to develop smaller, affordable, and jamming-resistant GPS satellites to counter emerging threats. This milestone positions Sierra Space for Phase One of the program, following a successful contract award in 2024. The technology targets increased resilience against adversarial threats like jamming and spoofing of current GPS infrastructure. [Read more.](#) (Space Insider)

Chart 11: Illustration by the U.S. Space Force's Space Systems Command



Source: Space News

MDA Space buys SatixFy to boost constellation production. MDA Space has acquired Israeli satellite chipmaker SatixFy in a \$269 million deal to boost its constellation production capabilities. The acquisition will strengthen MDA's supply chain and support the development of next-generation satellites, with SatixFy's technology used in various applications beyond satellites. MDA plans to pay off SatixFy's \$76 million debt and expects regulatory approvals for the transaction by the third quarter of 2025. [Read more.](#) (SpaceNews)

SPACETECH FUNDRAISING ACTIVITY

Chart 12: Fundraising Activity (April 2025)

Company	Fund Raise (\$ Mn)	Round	Use of Funds	Investors
Northwood Space	30	Series A	Establish global network of ground stations	Alpine Space Ventures, Andreessen Horowitz
Aetherflux	50	Series A	Accelerate demo mission for space-based solar power and explore early defense markets	Index Ventures, Interlagos

Source: Intro-act, Multiple Web Sources

SPACETECH GOVERNMENT CONTRACT AWARDS

Chart 13: Government Contracts and Grants (April 2025)

Awardee Company	Awarding Agency	Country	Contract Value (in \$ mn)	Project / Program
SpaceX, ULA, Blue Origin	Space Systems Command (NSSL Phase 3)	USA	13,700.0	National Security Space Launch (NSSL) contracts (60% SpaceX, 40% ULA, 7 missions Blue Origin)
SpaceX	U.S. Space Force (NSSL Phase 3)	USA	845.8	National Security Space Launch (NSSL) missions
NanoAvionics	SpinLaunch	Lithuania	132.3	Meridian Space broadband constellation (1,200 satellites)
ALTEC	European Space Agency (ESA)	Italy	65.9	ISS & Gateway space station support (training, logistics, operations)
Creotech Instruments	European Space Agency (ESA)	Poland	56.2	CAMILA satellite constellation (3 Earth Observation satellites)
SAIC	Space Development Agency (SDA)	USA	55.0	Program integrator for SDA's LEO satellite constellation (Proliferated Warfighter Space Architecture - Tranche 3)
Aegis Aerospace, ICON Technology, Interlune, KULR, Venus Aerospace	Texas Space Commission	USA	26.0	Various space-related projects (lunar regolith simulant, rocket testing, etc.)
Pangea Aerospace (Consortium)	Spanish Government	Spain	7.9	ARCOS Aerospike engine development
GITAI Defense and Space LLC	U.S. DoD / NASA (via new subsidiary)	USA	Not Disclosed	Expansion into U.S. defense contracts (satellite buses, robotic servicing)
ICEYE	NATO	Finland	Not Disclosed	Synthetic Aperture Radar (SAR) data for NATO Situation Centre

Source: Intro-act, Multiple Web Sources

SPACETECH ETFs

ARK Space Exploration & Innovation ETF (ARKX)

Closing Price (05/05/25)	\$19.29	1-Week NAV Change	3.38%	NAV Change (YTD)	-2.03%
AUM (as of 05/05/25)	\$257.23 Mn	Fund Inception	3/30/2021	Expense Ratio	0.75%

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 04/30/25)

One Month	Three Months	Six Months	YTD	One Year	Inception
4.45%	-11.03%	14.57%	-4.92%	28.94%	-5.9%

Quarterly Market Performance (Quarter Ending 03/31/2025)

One Month	Three Months	Six Months	YTD	One Year	Inception
-2.98%	20.31%	9.43%	26.61%	18.98%	-4.02%

Top 10 Holdings (Updated as of 05/05/25)

Ticker	Company	% of Funds	Market Value
KTOS	Kratos Defense & Security	9.58%	\$26.30M
IRDM	Iridium Communications Inc	8.81%	\$24.20M
RKLB	Rocket Lab USA Inc	7.57%	\$20.78M
ACHR	Archer Aviation Inc-A	6.68%	\$18.35M
AVAV	Aerovironment Inc	6.01%	\$16.49M
PLTR	Palantir Technologies Inc-A	5.97%	\$16.40M
TRMB	Trimble Inc	5.70%	\$15.65M
TER	Teradyne Inc	4.65%	\$12.78M
LHX	L3harris Technologies Inc	4.52%	\$12.40M
AMZN	Amazon.com Inc	3.70%	\$10.15M

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

SPACETECH ETFs

Procure Space ETF (UFO)

Closing Price (05/05/25)	\$ 22.8	1-Week NAV Change	1.29%	NAV Change (YTD)	-2.69%
AUM (as of 05/05/25)	\$ 51.74 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 04/30/25)

One Month	Three Months	Six Months	YTD	One Year	Inception
1.22%	-9.11%	18.01%	-3.79%	43.2%	-10.55%

Quarterly Market Performance (Quarter Ending 03/31/2025)

One Month	Three Months	Six Months	YTD	One Year	Inception
-6.40%	-4.64%	15.61%	-4.64%	32.07%	-3.04%

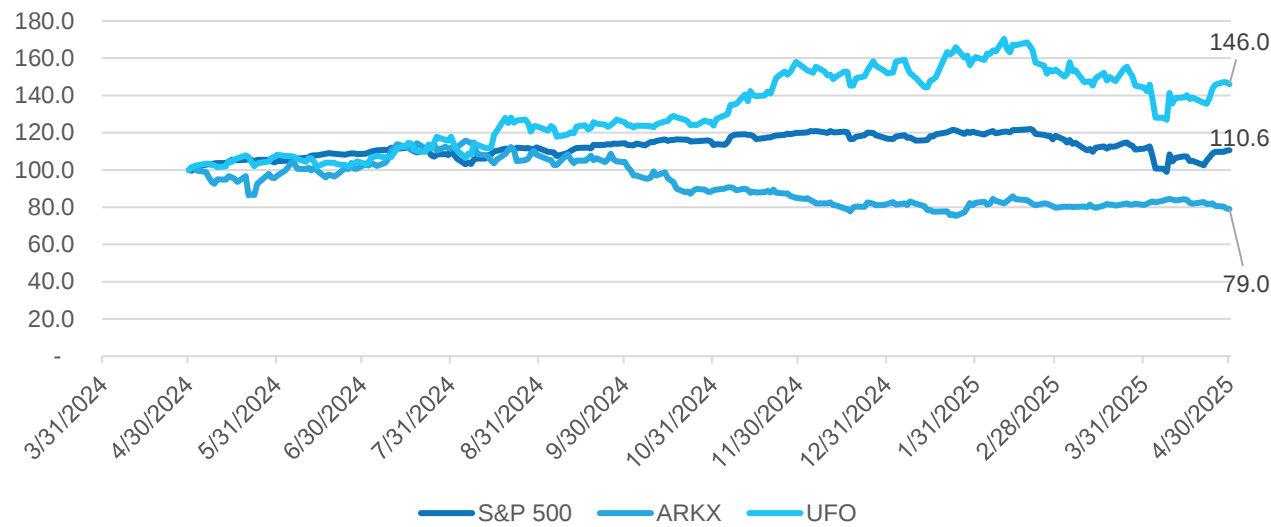
Top 10 Holdings (Updated as of 05/05/25)

Ticker	Company	% of Funds	Market Value
RKLB	Rocket Lab USA Inc	6.02	\$10.37B
LUNR	Intuitive Machines Inc Ordinary Shares - Class A	5.51	\$958.19M
9412.T	SKY Perfect JSAT Holdings Inc	4.81	\$2.04B
ASTS	AST SpaceMobile Inc Ordinary Shares - Class A	4.66	\$5.90B
VSAT	Viasat Inc	4.6	\$1.19B
TRMB	Trimble Inc	4.48	\$15.29B
GSAT	Globalstar Inc	4.39	\$2.58B
SIRI	Sirius XM Holdings Inc	4.32	\$7.36B
IRDM	Iridium Communications Inc	4.31	\$2.72B
GRMN	Garmin Ltd	4.22	\$38.65B

For more information on UFO visit: etf.com, Yahoo Finance

SPACETECH ETFs

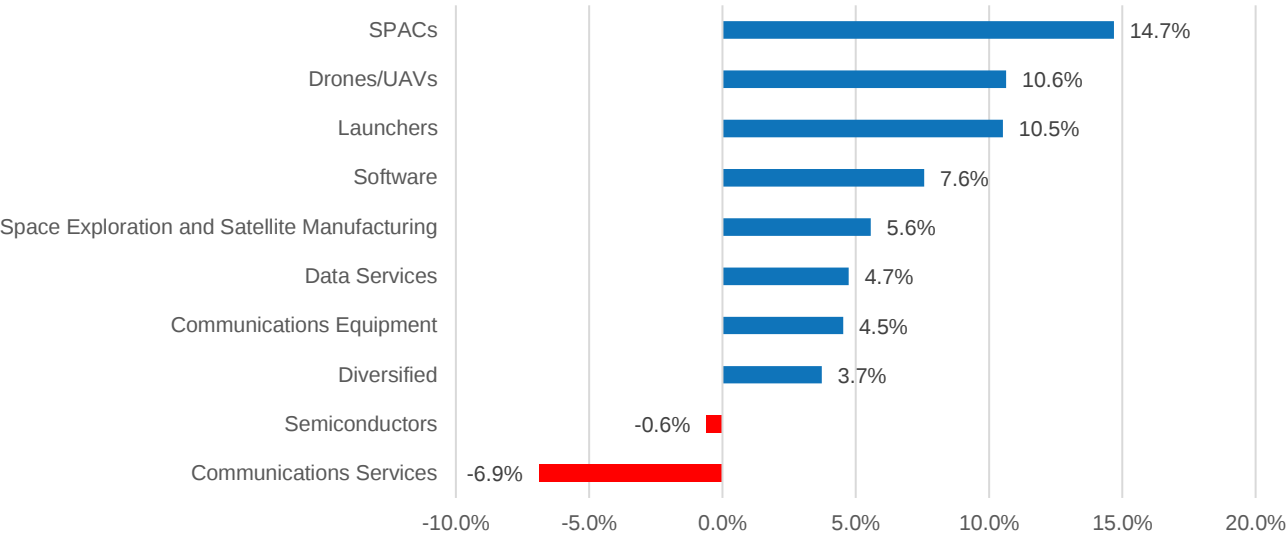
Chart 14: ETFs vs. S&P 500



Source: Intro-act, FactSet, Data as on April 30, 2025

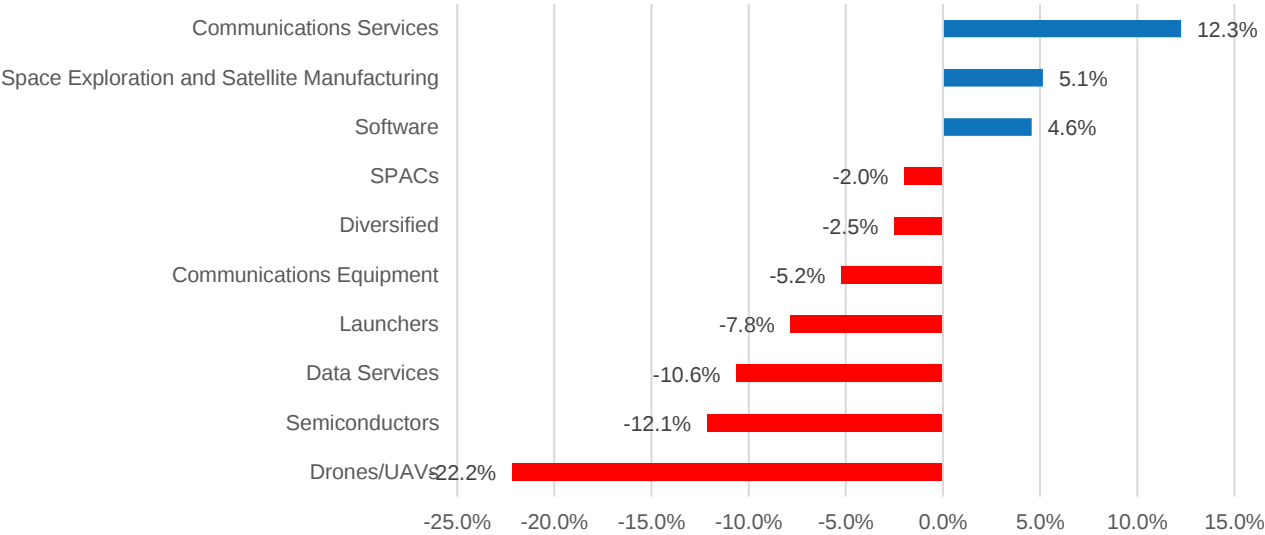
LEADERS AND LAGGARDS – SPACETECH SEGMENTS

Chart 15: M/M Returns by SpaceTech Segments



Source: Intro-act, FactSet. Data as of April 30, 2025

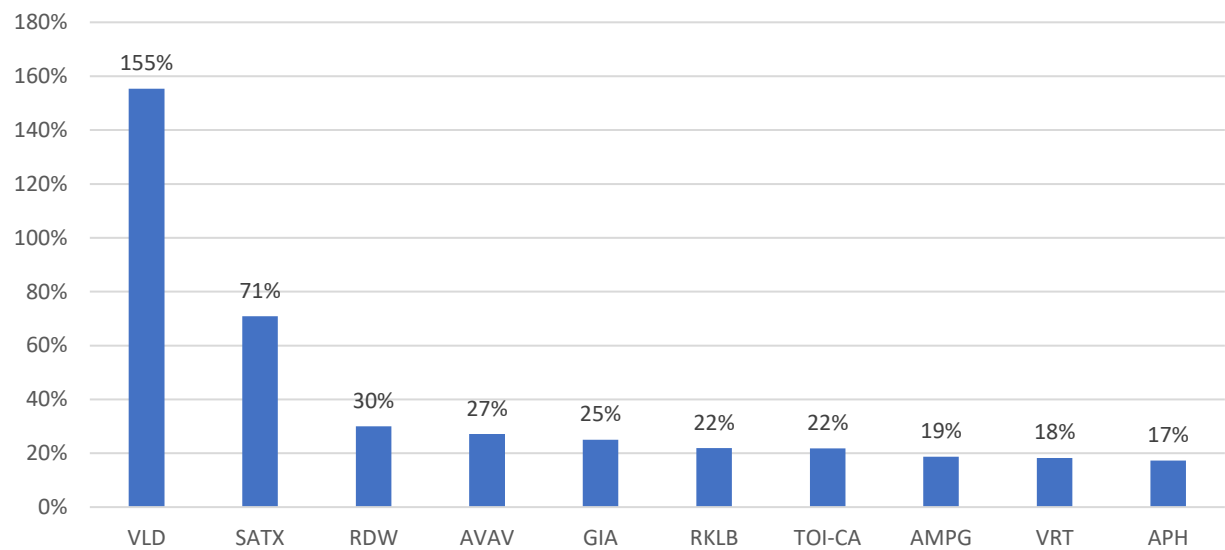
Chart 16: LTM Returns by SpaceTech Segments



Source: Intro-act, FactSet. Data as of Data as of April 30, 2025

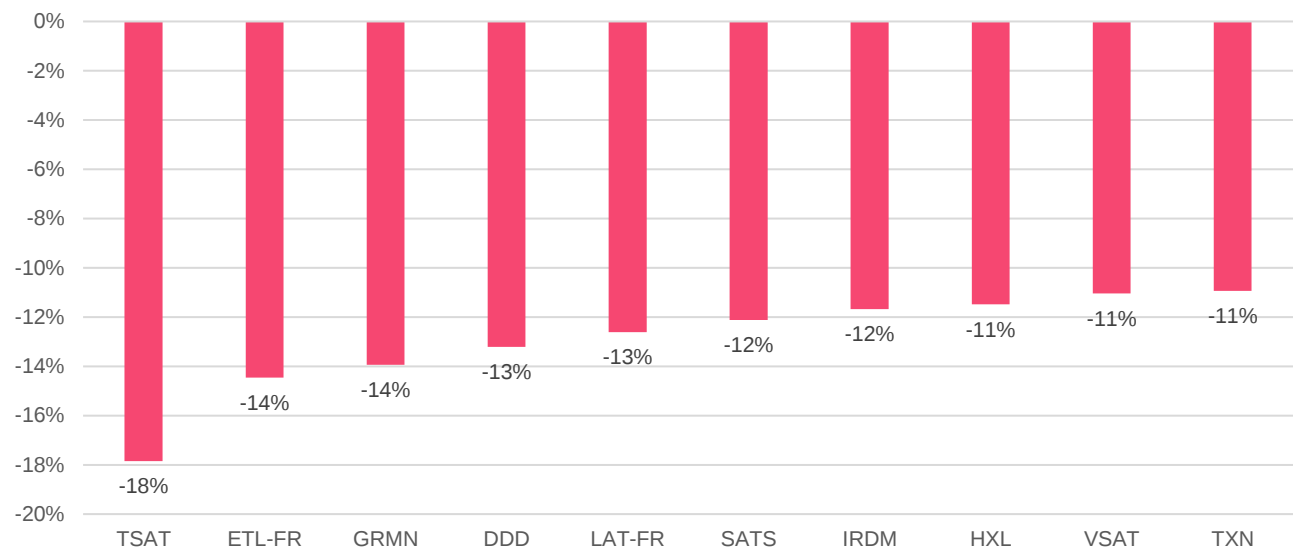
LEADERS AND LAGGARDS – SPACETECH STOCKS

Chart 17: M/M Top 10 SpaceTech Gainers



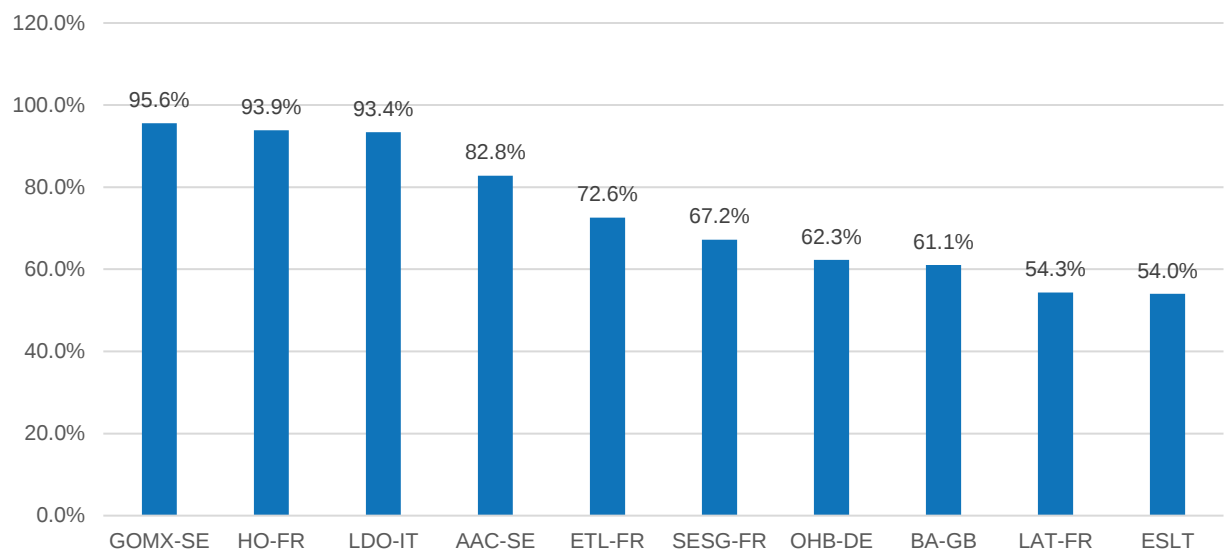
Source: Intro-act, FactSet. Data as of April 30, 2025

Chart 18: M/M Top 10 SpaceTech Losers



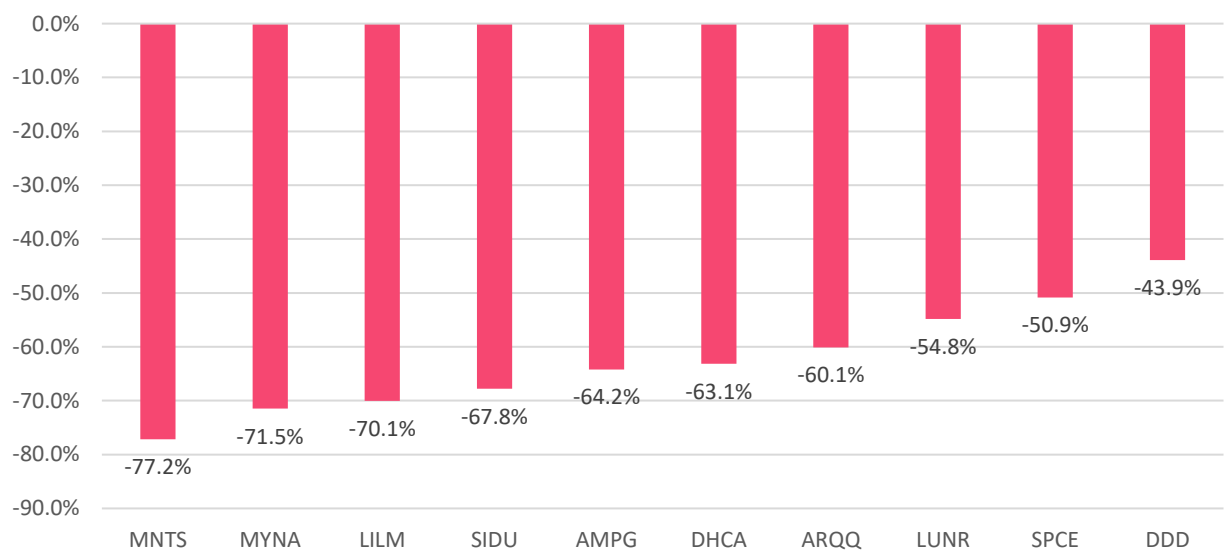
Source: Intro-act, FactSet. Data as of April 30, 2025

Chart 19: YTD Top SpaceTech Gainers



Source: Intro-act, FactSet. Data as of April 30, 2025

Chart 20: LTM Top 10 SpaceTech Losers



Source: Intro-act, FactSet Data as of April 30, 2025

SPACETECH EVENTS CALENDAR

Chart 21: SpaceTech Industry Events Calendar

Sr No.	Event	Place	Date
1	Global Conference on Space Exploration (GLEX) 2025	New Delhi, India	7-May-25
2	EU Space Days 2025	Gdańsk, Poland	27-May-25
3	Humans to Moon & Mars Summit	Washington, D.C., USA	28-May-25
4	Axiom Mission 4 (Crewed ISS Flight)	Kennedy Space Center, Florida, USA	29-May-25
5	Space Tech Expo USA	Long Beach, California, USA	2-Jun-25

Source: Multiple Web Sources

SPACETECH LAUNCH CALENDAR – UPCOMING MONTH

Chart 22: Space Launches Across the Globe (as of May 05, 2025)

Date	Company	Rocket	Mission	Launch Site
6-May-25	SpaceX	Falcon 9	Starlink 6-93	SLC-40, Cape Canaveral Space Force Station, Florida
NET May -25	SpaceX	Falcon 9	Starlink 15-3	SLC-4E, Vandenberg Space Force Base, California
15-May-25	Gilmour Space	Eris	TestFlight1	Pad 1, Bowen Orbital Spaceport
17-May-25	Rocket Lab	Electron	The Sea God Sees	Launch Complex
29-May-25	SpaceX	Falcon 9	Axiom Mission 4 (Ax-4)	Launch Complex 39A, Kennedy Space Center, Florida
31-May-25	SpaceX	Falcon 9	GPS 3 SV-08	SLC-40, Cape Canaveral Space Force Station, Florida

Source: 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
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	-	06/25/2025
Mission Space Acquisition Corp	100	S-1 Filed	-	-	-	-

Source: Boardroom Alpha. Status as of 05/02/25.

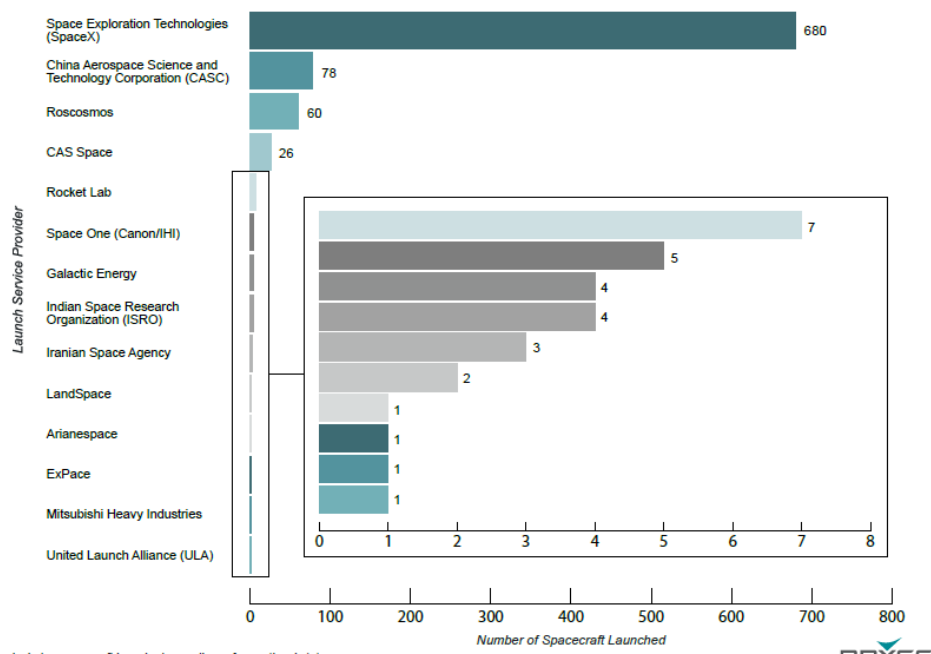
SpaceTech SPACs – Completed Transactions

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

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

SPACETECH LAUNCH TRENDS – Q42024

Chart 24: In Q4, Service Providers Worldwide Launched 873 Spacecraft



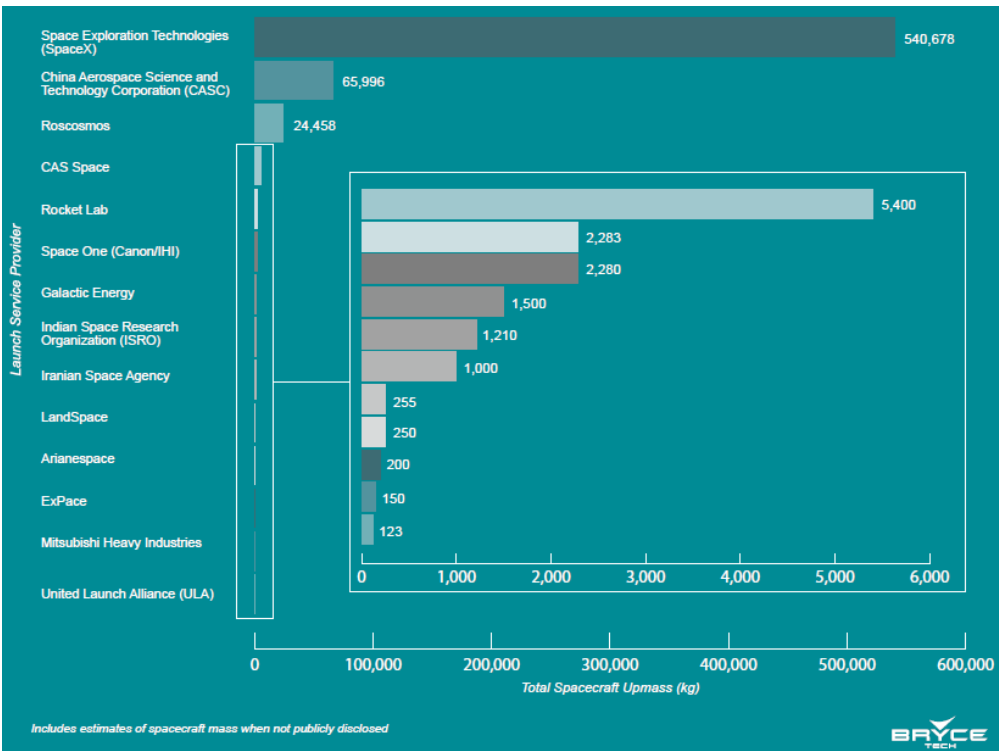
Source: ByrceTech

Chart 25: U.S. Providers Conducted 44 Launches, While Chinese Providers Conducted 22 Launches



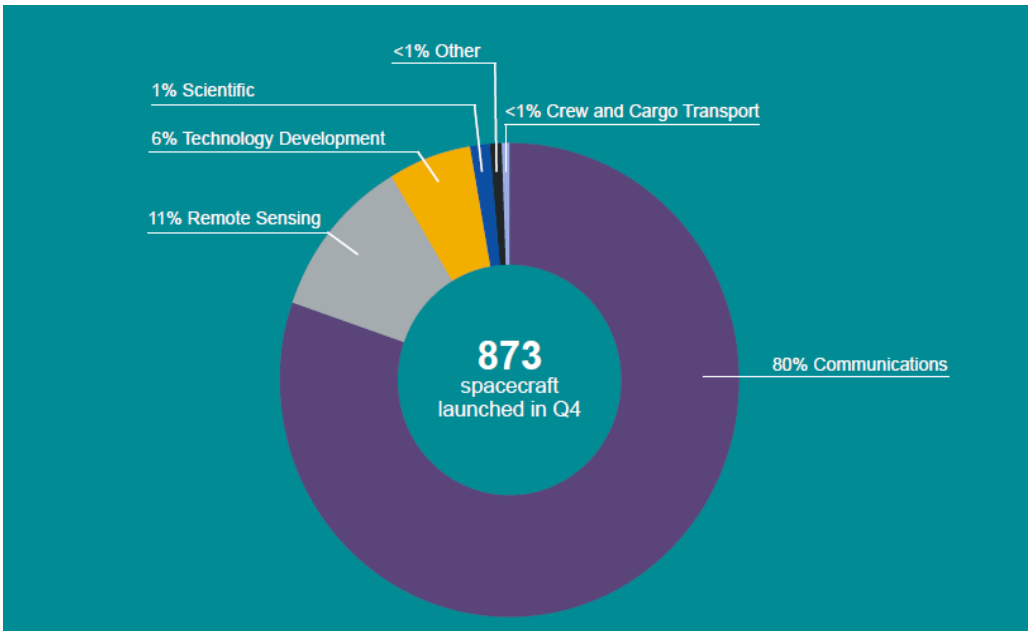
Source: ByrceTech, Rocket Lab is headquartered in the U.S. with a subsidiary in New Zealand. It is counted here as a U.S. company

Chart 26: Spacecraft Upmass Carried by Launch Provider



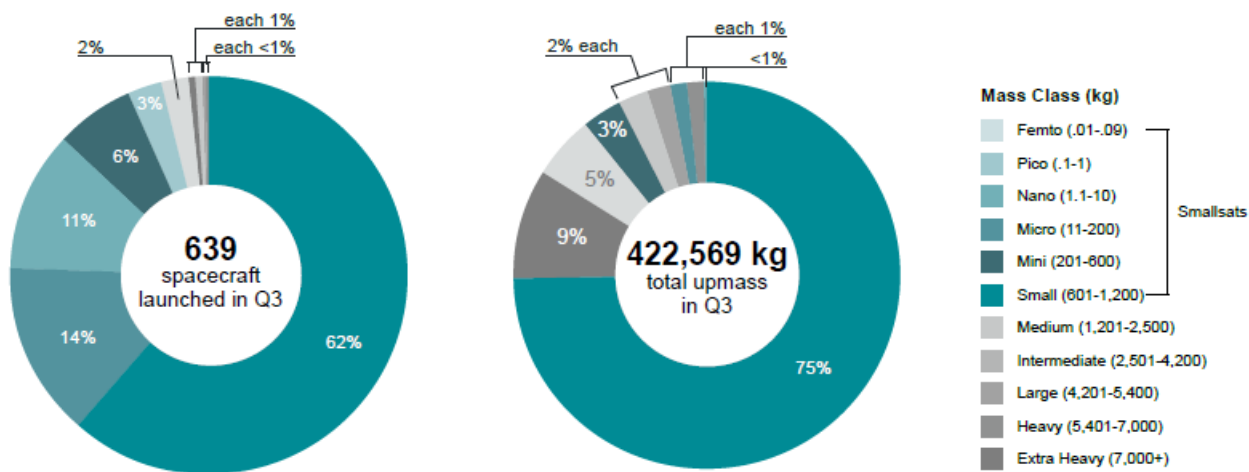
Source: BryceTech

Chart 27: Driven by continued deployment of the Starlink constellation, Most Spacecraft Launched In Q4 Were Communications Satellites



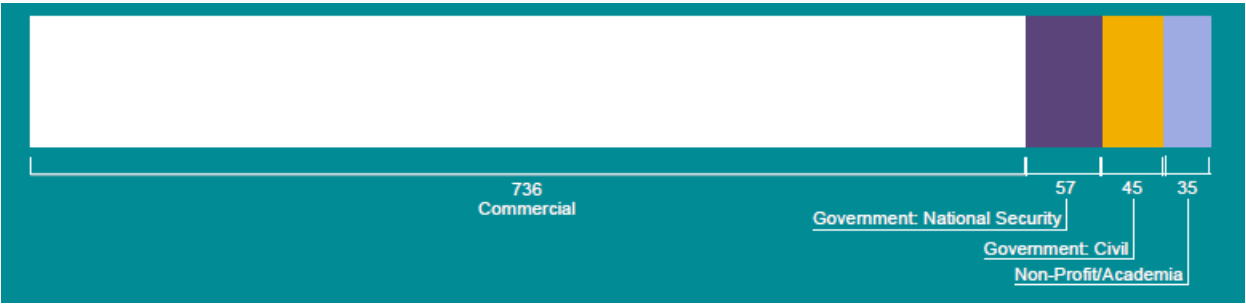
Source: BryceTech

Chart 28: Smaller Satellites (<1,200 Kg) Represented 97% of Spacecraft Launched in Q4, 81% of Total Upmass



Source: BryceTech

Chart 29: Most Spacecraft Launched in Q4 are Operated by Commercial Companies



Source: BryceTech

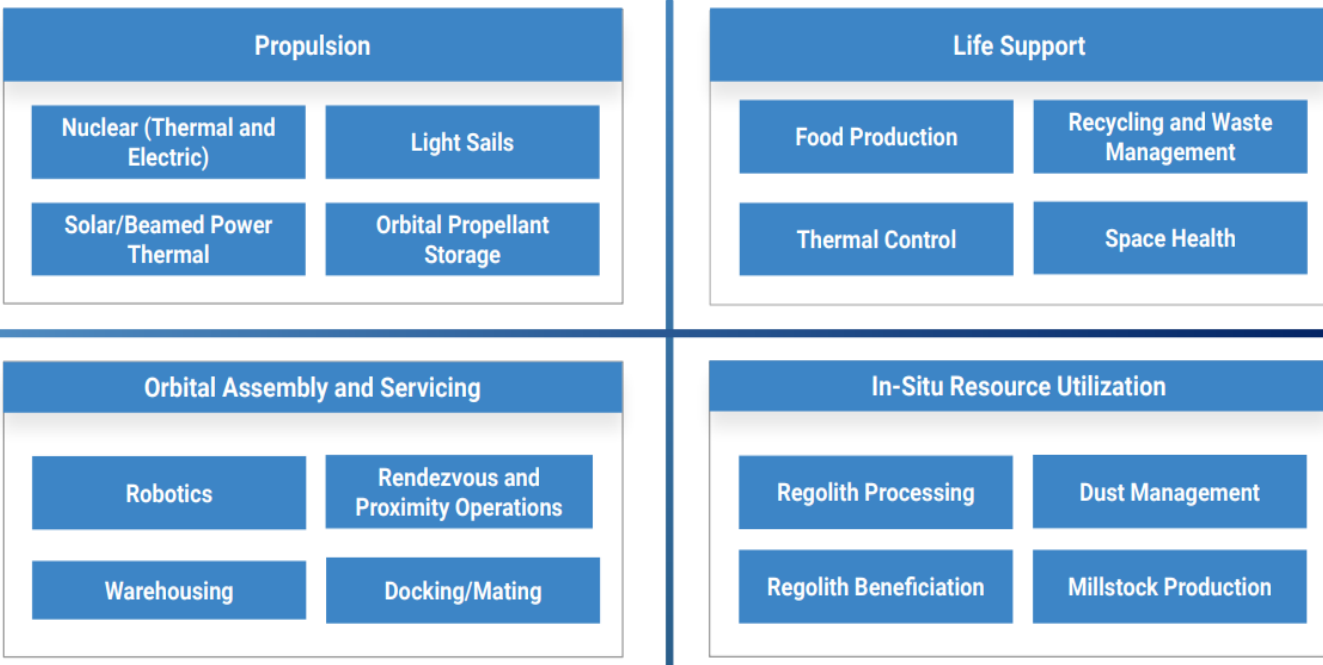
SPACETECH – ECOSYSTEMS

Chart 30: SpaceTech Landscape Framework



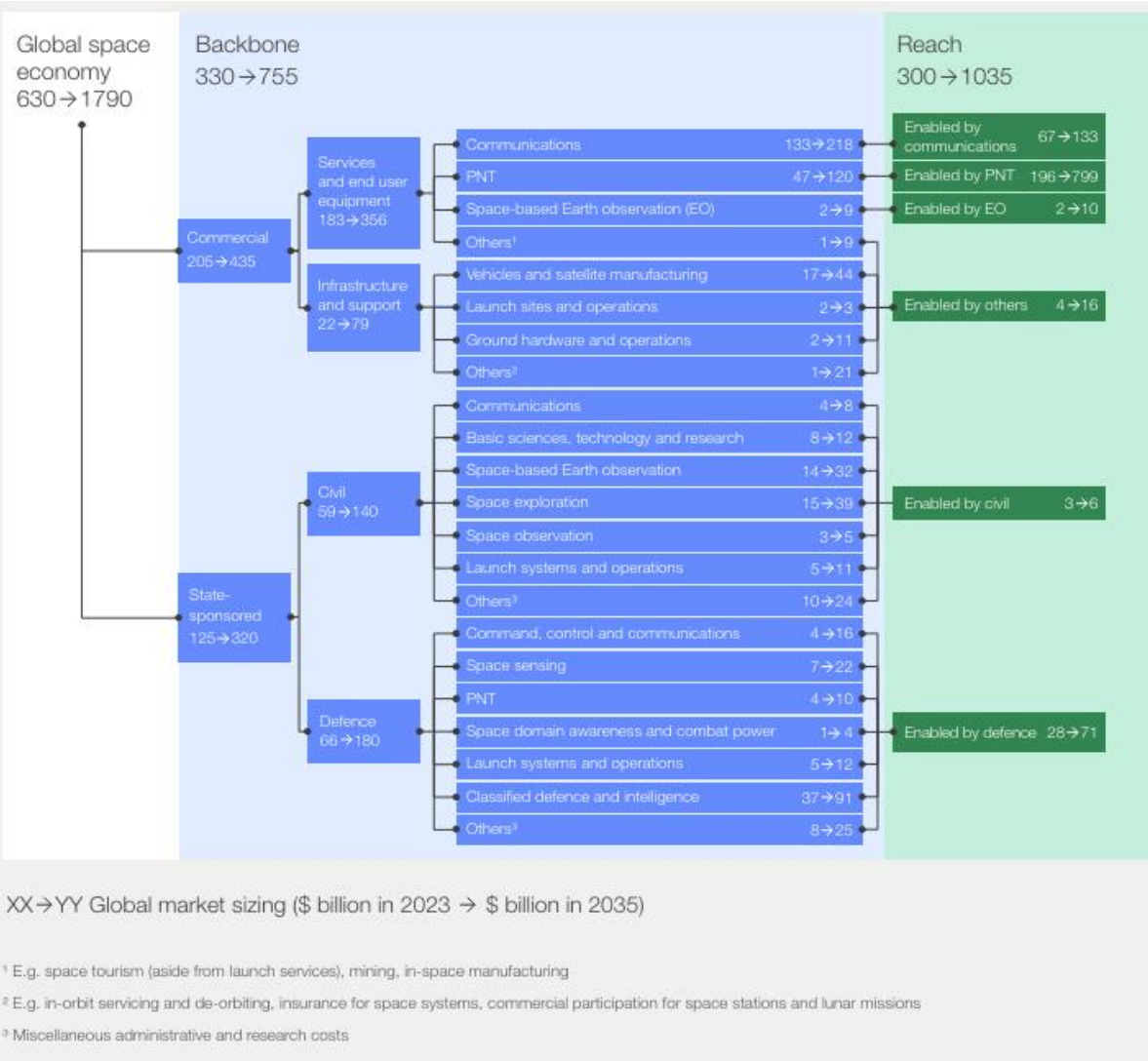
Source: SpaceTech Analytics

Chart 31: Space Applied Businesses



Source: SpaceTech Analytics

Chart 32: Global Space Economy Size (\$ billion)



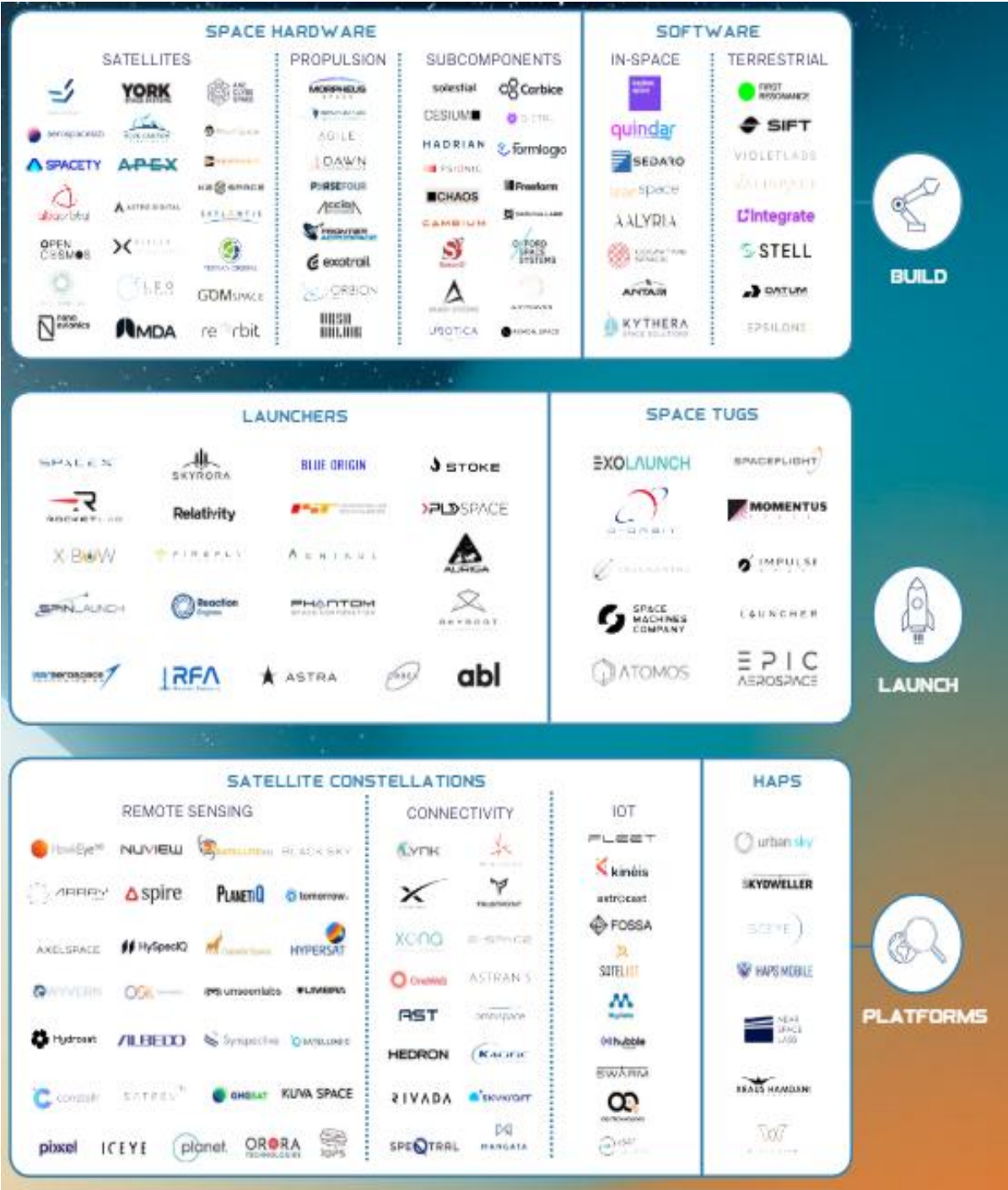
Source: Seraphim Space, Future of Space Economy Research

Chart 33: Seraphim SpaceTech Ecosystem Map 2024 - In-Space Economy



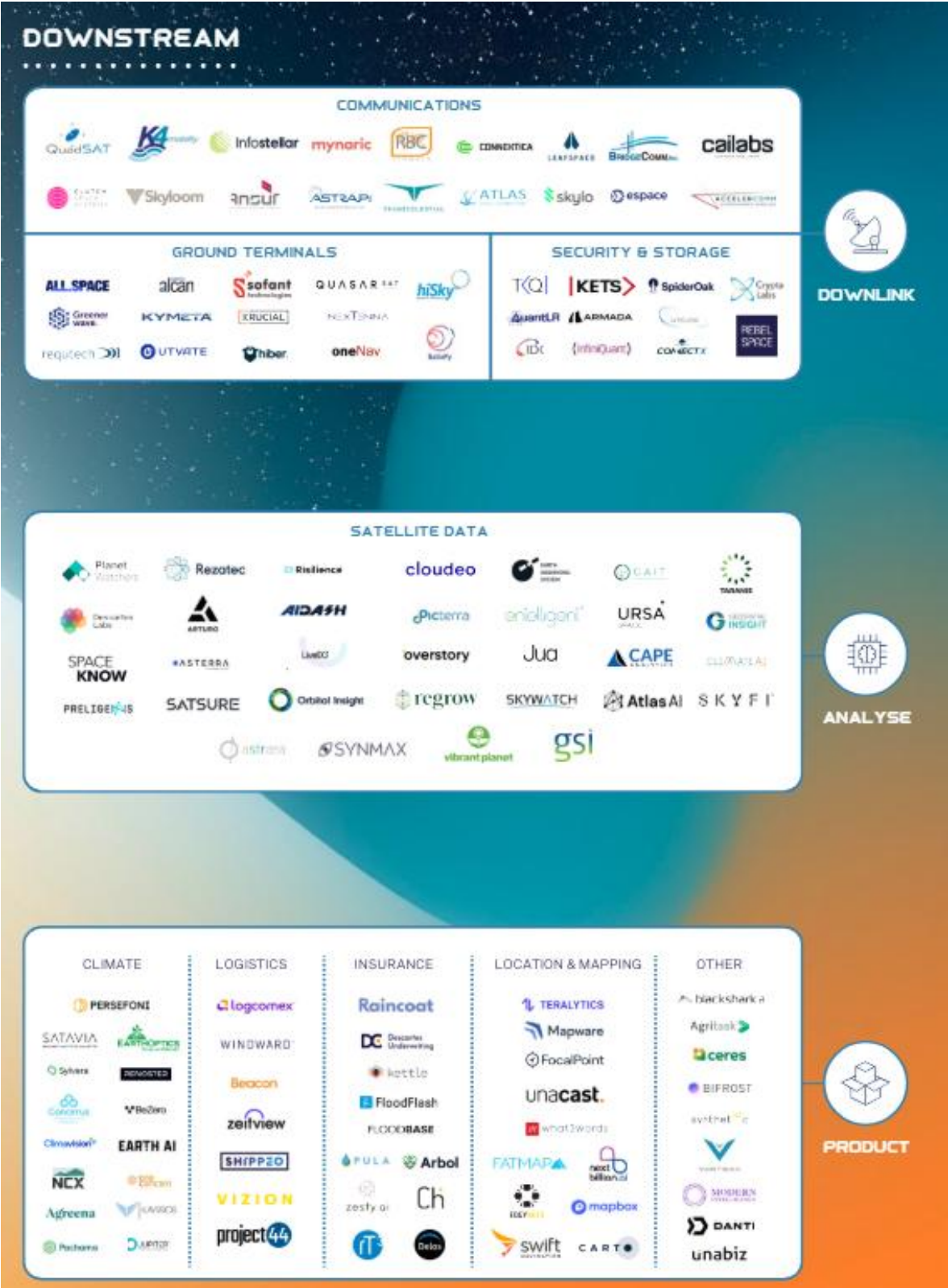
Source: Seraphim

Chart 34: Seraphim SpaceTech Ecosystem Map 2024 – Upstream Players



Source: Seraphim

Chart 35: Seraphim SpaceTech Ecosystem Map 2024 - Downstream Players



Source: Seraphim

SPACETECH - FUNDING

Chart 36: Cumulative Private Market Equity Investment

Equity Investment	SINCE 2009	Q1 2025
TOTAL	\$347.9B 2,197 companies	\$4.3B 104 companies
INFRASTRUCTURE	\$90.7B 733 companies	\$1.7B 60 companies
DISTRIBUTION	\$11.5B 227 companies	\$0.1B 10 companies
APPLICATIONS	\$245.7B 1,237 companies	\$2.6B 34 companies
Exits		
AQUISITIONS	454 (\$210.8B proceeds)	15 (\$4.9B proceeds)
VALUATION STEP-UP	2.1x (median)	2.0x (median)
IPOS	52 (\$34.3B proceeds)	1 (\$0.5B proceeds)
REVENUE MULTIPLE AT IPO	11.6x (median)	8.7x (median)
Companies	MOST VALUABLE	LARGEST ROUNDS
INFRASTRUCTURE	SpaceX \$350.0B	AST SpaceMobile \$400M
DISTRIBUTION	SandboxAQ \$5.6B	Skylo \$30M
APPLICATIONS	Waymo \$45.0B	Saronic \$600M

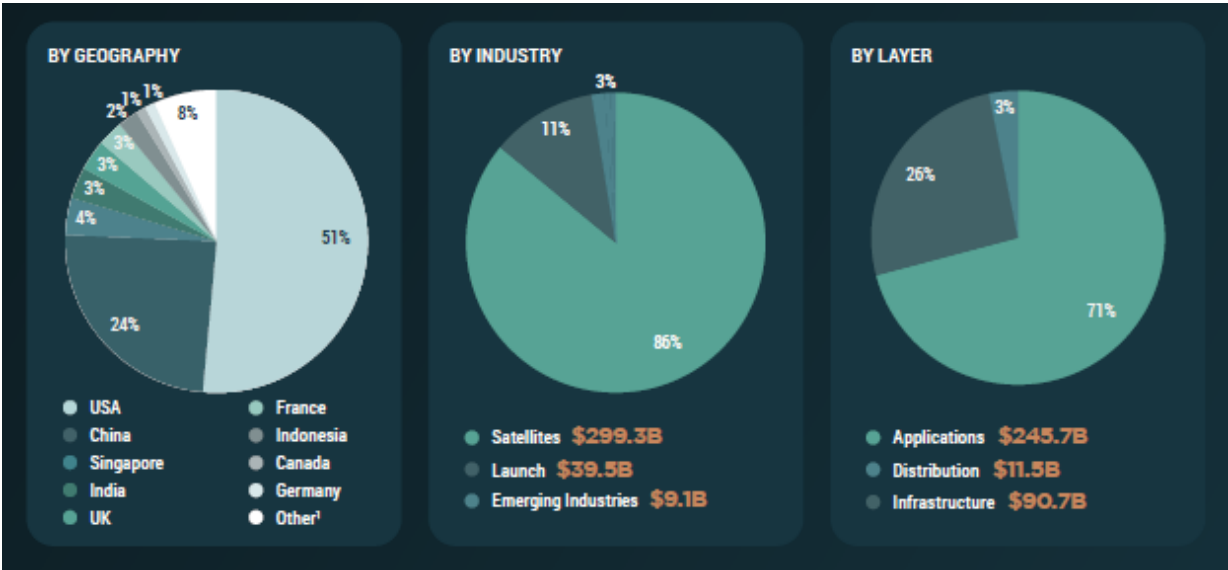
Source: Space Capital, Q1 2025

Chart 37: Top SpaceTech Investment Deals, 1Q25

Company	Stage	Amount (\$ millions)
Stoke Space	Series C	260
Loft Orbital	Series C	170
K2 Space	Series B	110
Axiom Space	Series D+	100
Lynk Global	Series B	85
Sateliot	Series B	75
Castelion	Series A	70
Deep Blue Aerospace	Series B	69
Zhongke Satellite	Series A	69
Zeitview	Series D+	60

Source: Intro-act, Seraphim Space

Chart 38: Cumulative Private Market Equity Investment From 2009 To Present



Source: Space Capital

Chart 39: SpaceTech Institutional Owners League (Current)

Rank	Investor Name	Invested in SpaceTech (\$M)	Q/Q Change (\$M)	Change in Positions (#)	% of Total Spacetechn Inv.
1	The Vanguard Group, Inc.	1,147,040.72	95,101.72	-2	11.9%
2	BlackRock Fund Advisors	653,335.75	55,495.86	0	6.8%
3	SSgA Funds Management, Inc.	542,348.20	41,806.10	0	5.6%
4	Fidelity Management & Research Co. LLC	347,884.64	25,356.51	-1	3.6%
5	Geode Capital Management LLC	293,941.41	25,492.56	0	3.1%
6	T. Rowe Price Associates, Inc. (IM)	195,221.45	18,173.35	-2	2.0%
7	Norges Bank Investment Management	180,773.28	179,387.77	40	1.9%
8	Capital Research & Management Co. (World Investors)	148,158.24	19,318.03	3	1.5%
9	JPMorgan Investment Management, Inc.	146,308.02	14,929.99	5	1.5%
10	Capital Research & Management Co. (Global Investors)	127,609.02	10,748.39	5	1.3%
11	Northern Trust Investments, Inc.(Investment Management)	119,007.06	9,797.92	0	1.2%
12	Capital Research & Management Co. (International Investors)	118,799.65	16,776.46	-3	1.2%
13	BlackRock Advisors (UK) Ltd.	107,902.39	11,037.09	1	1.1%
14	BlackRock Investment Management (UK) Ltd.	99,023.02	15,851.55	0	1.0%
15	Charles Schwab Investment Management, Inc.	95,446.35	8,839.72	-1	1.0%
16	Wellington Management Co. LLP	92,082.76	6,710.91	3	1.0%
17	Morgan Stanley Smith Barney LLC (Investment Management)	74,077.22	5,541.23	-1	0.8%
18	Goldman Sachs Asset Management LP	67,154.42	4,364.62	1	0.7%
19	Parametric Portfolio Associates LLC	65,632.97	6,129.76	0	0.7%
20	AllianceBernstein LP	64,417.65	2,544.23	-2	0.7%
21	Managed Account Advisors LLC	59,457.68	15,136.73	8	0.6%
22	Fisher Asset Management LLC	57,253.17	5,784.07	0	0.6%
23	Columbia Management Investment Advisers LLC	56,271.68	2,893.93	3	0.6%
24	Amundi Asset Management US, Inc.	55,191.75	7,821.26	3	0.6%
25	TIAA-CREF Investment Management LLC	50,151.62	2,283.96	0	0.5%
26	Invesco Capital Management LLC	49,184.14	5,353.49	1	0.5%
27	Jennison Associates LLC	48,173.22	4,759.07	-5	0.5%
28	Vanguard Global Advisers LLC	45,942.98	4,213.82	-1	0.5%
29	Massachusetts Financial Services Co.	45,496.78	605.55	0	0.5%
30	Mellon Investments Corp.	45,229.59	1,797.05	-1	0.5%
	Others	4,421,195.9	336,732.4	5,758.0	46.0%
Total		9,619,712.8	960,785.1	5,812.0	100.0%

Source: Intro-act, 13F Filings

Chart 40: Top 25 SpaceTech Buyers (Q/Q)

Rank	Investor Name	Invested in SpaceTech (\$M)	Q/Q Change (\$)	Change in Positions (#)	% of Total Spacetechn Inv.
1	SBI Securities Co., Ltd.	704.05	704.05	64	0.007%
2	KLP Kapitalforvaltning AS	4,479.12	4,400.15	43	0.047%
3	State Street Global Advisors (Japan) Co. Ltd.	728.48	709.30	41	0.008%
4	Norges Bank Investment Management	180,773.28	179,387.77	40	1.879%
5	Golden State Wealth Management LLC	55.55	55.55	39	0.001%
6	WealthTrak Capital Management LLC	1.58	1.58	35	0.000%
7	Transce3nd LLC	9.85	9.85	34	0.000%
8	Andbank Wealth Management SGIIC SAU	52.70	52.70	33	0.001%
9	Sierra Ocean LLC	7.90	7.90	33	0.000%
10	Parkworth Wealth Management, Inc.	1.60	1.60	33	0.000%
11	The Northern Trust Company of Hong Kong Ltd.	1,053.65	1,053.65	32	0.011%
12	WhippleWood Advisors LLC	11.47	11.47	32	0.000%
13	Caitong International Asset Management Co., Ltd.	6.27	6.27	31	0.000%
14	MUFG Securities Americas, Inc.	188.29	188.29	30	0.002%
15	US Bancorp Asset Management, Inc.	125.21	110.23	30	0.001%
16	Northern Trust Asset Management Australia Pty Ltd.	2,246.23	2,246.23	29	0.023%
17	Nomura Securities International, Inc.	700.27	613.39	28	0.007%
18	Aster Capital Management (DIFC) Ltd.	11.63	11.63	28	0.000%
19	R Squared Ltd. (Hong Kong)	3.99	3.99	27	0.000%
20	Raiffeisen Kapitalanlage-Gesellschaft mbH	1,649.03	1,563.44	26	0.017%
21	Allstate Investment Management Co.	374.74	366.12	26	0.004%
22	SageSpring Wealth Partners LLC	141.65	141.65	26	0.001%
23	Stonebridge Financial Group LLC /PA/	37.08	37.08	26	0.000%
24	Generali Asset Management SpA SGR	912.05	889.45	25	0.009%
25	SVB Wealth LLC	510.02	510.02	25	0.005%

Source: Intro-act, 13F Filings

Chart 41: Top 25 SpaceTech Sellers (Q/Q)

Rank	Investor Name	Invested in SpaceTech (\$M)	Q/Q Change (\$M)	Change in Positions (#)	% of Total Spacetechn Inv.
1	RBC Dominion Securities, Inc.	2.55	(71.02)	-49	0.000%
2	Capital Performance Advisors LLP	17.39	2.22	-44	0.000%
3	State Teachers Retirement System of Ohio	32.11	(5,453.70)	-41	0.000%
4	IFM Investors Pty Ltd.	1.26	(2,299.67)	-31	0.000%
5	BOCI-Prudential Asset Management Ltd.	2.53	(854.17)	-29	0.000%
6	Russell Investments Canada Ltd.	198.49	6.24	-28	0.002%
7	MultiConcept Fund Management SA	0.80	(752.79)	-28	0.000%
8	Clarivest Advisors LLC	6.95	2.69	-27	0.000%
9	MBB Capital Partners LLC	80.73	27.67	-26	0.001%
10	Credit Suisse International (Investment Management)	1.97	(91.03)	-26	0.000%
11	Voisard Asset Management Group	5.02	(0.06)	-25	0.000%
12	Baldwin Wealth Partners LLC	331.75	29.22	-23	0.003%
13	Jyske Bank A/S (Investment Management)	1,130.63	52.87	-22	0.012%
14	ClariVest Asset Management LLC	15.72	(162.66)	-21	0.000%
15	Ashton Thomas Securities LLC	59.35	6.10	-20	0.001%
16	Credit Suisse (Italy) SpA	41.84	(332.05)	-20	0.000%
17	International Assets Investment Management LLC	286.27	(96.81)	-19	0.003%
18	Flaherty Asset Management LLC	6.40	(1.42)	-18	0.000%
19	Summit Trail Advisors LLC	247.16	(35.19)	-17	0.003%
20	Jaffe Tilchin Investment Partners LLC	173.53	20.67	-17	0.002%
21	Invesco Managed Accounts LLC	159.16	74.23	-17	0.002%
22	Catalyst Funds Management Pty Ltd.	40.70	(45.05)	-17	0.000%
23	Reflection Asset Management LLC	9.35	(0.80)	-17	0.000%
24	Chartwell Investment Partners LLC	8.21	(398.30)	-17	0.000%
25	SinoPac Securities Investment Trust Co., Ltd.	6.26	(24.32)	-17	0.000%

Source: Intro-act, 13F Filings

SPACETECH PEER SET

			April 30, 2025	Share Price	Mkt Cap (\$ Mns)	Ent Val (\$ Mns)	Price Performance			Sales		EBITDA			Book Value	
							% to High	% to Low	% YTD	LTM	NTM	EV/Sales	LTM	NTM	EV/EBITDA	Book/Share
SPACE EXPLORATION AND SATELLITEMANUFACTURING																
1	RAYTHEON TECHNO	RTX	126.13	168,504	207,988	8%	-21%	47%	81,809	85,129	2.4 x	13,165	13,462	15.4 x	46.05	2.7 x
2	HONEYWELL INTER	HON	210.50	135,285	157,099	15%	-15%	1%	39,215	40,648	3.9 x	9,982	10,584	14.8 x	27.17	7.7 x
3	LOCKHEED MARTIN	LMT	477.75	111,935	130,251	30%	-12%	34%	71,811	75,009	1.7 x	8,999	10,618	12.3 x	28.68	16.7 x
4	AIRBUS GROUP	AIR-FR	167.26	132,518	128,090	14%	-18%	32%	75,518	85,184	1.5 x	8,802	11,308	11.3 x	28.28	5.9 x
5	BOEING	BA	183.24	138,164	167,724	7%	-30%	-9%	69,444	86,338	1.9 x	(7,707)	5,447	30.8 x	(4.42)	-41.4 x
6	NORTHROP GRUM	NOC	486.50	70,021	84,134	14%	-14%	26%	40,372	42,683	2.0 x	5,278	6,164	13.6 x	104.00	4.7 x
7	DASSAULT SYSTEM	DSY-FR	37.33	50,040	48,096	18%	-12%	-36%	6,814	7,545	6.4 x	2,388	2,725	17.7 x	7.75	4.8 x
8	SYNOPSYS	SNPS	459.01	70,972	67,824	36%	-20%	25%	6,072	7,075	9.6 x	2,413	3,097	21.9 x	60.18	7.6 x
9	L3HARRIS TECHN	LHX	220.02	41,132	53,704	21%	-12%	3%	21,246	21,819	2.5 x	3,987	3,921	13.7 x	101.98	2.2 x
10	BAE SYSTEMS	BA-GB	23.17	69,945	76,330	3%	-40%	221%	27,963	40,857	1.9 x	3,554	5,571	13.7 x	5.30	4.4 x
11	AMETEK	AME	169.58	39,152	41,103	17%	-14%	15%	6,937	7,131	5.8 x	2,204	2,306	17.8 x	43.18	3.9 x
12	THALES	HO-FR	278.39	57,332	60,378	6%	-50%	228%	18,540	24,876	2.4 x	2,778	3,989	15.1 x	41.61	6.7 x
13	KOMATSU	6301-JP	28.75	27,341	34,253	14%	-19%	27%	27,209	28,275	1.2 x	4,631	5,334	6.4 x	24.11	1.2 x
14	BALL	BALL	51.94	14,667	20,222	37%	-16%	-46%	11,795	12,105	1.7 x	1,944	1,978	10.2 x	20.26	2.6 x
15	MITSUBISHI ELECT	6503-JP	19.35	40,897	38,795	6%	-32%	56%	37,048	38,370	1.0 x	3,564	-	-	13.34	1.5 x
16	TELEDYNE TECHNO	TDY	466.03	21,838	23,979	12%	-18%	7%	5,770	6,140	3.9 x	1,392	1,528	15.7 x	211.84	2.2 x
17	TERADYNE	TER	74.21	11,905	11,401	120%	-11%	-55%	2,906	2,994	3.8 x	748	729	15.6 x	17.41	4.3 x
18	IDEX	IEX	173.97	13,142	14,516	37%	-12%	-26%	3,283	3,459	4.2 x	874	957	15.2 x	51.61	3.4 x
19	HEICO	HEI	250.76	13,798	37,518	13%	-17%	74%	3,992	4,385	8.6 x	1,053	1,166	32.2 x	26.96	9.3 x
20	LEONARDO-FINMEC	LDO-IT	52.06	30,100	33,498	7%	-60%	631%	18,969	21,425	1.6 x	1,792	2,666	12.6 x	17.73	2.9 x
21	IHI	7013-JP	78.17	12,091	15,681	4%	-70%	297%	10,538	11,739	1.3 x	1,125	1,539	10.2 x	20.80	3.8 x
22	SPIRIT AEROSYST	SPR	36.00	4,223	8,166	3%	-25%	-16%	6,135	7,744	1.1 x	(444)	726	11.3 x	(27.27)	-1.3 x
23	MOOG	MOG.A	167.25	4,732	6,547	36%	-14%	107%	3,667	3,708	1.8 x	476	546	12.0 x	57.54	2.9 x
24	VIRGIN GALACTIC	SPCE	2.89	116	(7)	876%	-25%	-99%	7	14	-0.5 x	(288)	(280)	-	9.77	0.3 x
25	3D SYSTEMS CORP	DDD	1.84	249	366	172%	-7%	-91%	440	424	0.9 x	(66)	(27)	-	1.30	1.4 x
26	PROTO LABS INC	PRLB	35.16	836	736	33%	-27%	-32%	499	519	1.4 x	75	73	10.0 x	27.63	1.3 x
27	OHB SWEDEN	OHB-DE	80.71	1,551	1,658	18%	-43%	98%	-	-	-	105	-	-	23.56	3.4 x
28	MARKFORGED HOLD	MKFG	4.74	98	77	39%	-67%	-91%	85	-	-	-	-	-	4.19	1.1 x
29	VELO3D INC	VLD	0.43	89	98	1922%	-78%	-100%	-	-	-	-	-	-	0.20	2.1 x
30	REDWIRE CORP	RDW	10.78	831	955	147%	-63%	60%	304	421	2.3 x	(7)	27	35.9 x	(2.82)	-3.8 x
31	MOMENTUS INC	MNTS	1.81	10	9	1478%	-14%	-100%	0	-	-	(76)	-	-	(2.81)	-0.6 x
32	HEXCEL Corp	HXL	48.47	3,898	4,498	52%	-7%	-6%	1,578	1,929	2.3 x	297	361	12.5 x	19.06	2.5 x
33	AAC CLYDE SPACE	AAC-SE	7.67	45	43	20%	-61%	-53%	21	47	0.9 x	(3)	7	6.4 x	12.39	0.6 x
34	GOMSPACE	GOMX-SE	0.76	107	109	24%	-56%	-9%	19	37	3.0 x	(22)	2	60.5 x	0.02	45.6 x
35	LATECOERE SA	LAT-FR	0.02	204	386	61%	-64%	-91%	505	835	0.5 x	(11)	19	20.5 x	0.01	1.7 x
36	SIDUS SPACE	SIDU	1.58	29	20	384%	-28%	-100%	7	-	-	-	-	-	1.47	1.1 x

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LAUNCHERS																
37	TE CONNECTIVITY	TEL	146.38	43,408	46,570	9%	-21%	-9%	16,026	17,187	2.7 x	3,878	4,193	11.1 x	40.67	3.6 x
38	ROCKET LAB USA INC	RKLB	21.79	10,055	11,048	53%	-83%	77%	436	576	19.2 x	(97)	(73)	-	0.76	28.7 x
39	LILIUM GMBH	LILM	0.05	31	(74)	2560%	-52%	-99%	0	-	-	-	-	-	(0.05)	-0.9 x
40	AVIO SPA	AVIO-IT	21.76	574	467	11%	-46%	71%	379	537	0.9 x	28	37	12.6 x	13.62	1.6 x
DATA SERVICES																
41	HEXAGON	HEXA.B-SE	9.71	25,207	29,386	26%	-16%	-38%	5,886	6,373	4.6 x	2,142	2,359	12.5 x	4.59	2.1 x
42	UNITY SOFTWARE INC	U	21.07	8,755	9,698	47%	-34%	-85%	1,813	1,757	5.5 x	390	356	27.2 x	7.79	2.7 x
43	CLARIVATE PLC	CLVT	4.31	2,944	7,241	69%	-29%	-82%	2,529	2,334	3.1 x	1,057	962	7.5 x	7.36	0.6 x
44	BEIJING PIESAT	688066-CN	2.36	616	873	78%	-29%	-71%	357	288	3.0 x	62	53	16.5 x	0.48	4.9 x
45	PLANET LABS	PL	3.29	925	780	104%	-47%	-47%	244	271	2.9 x	(11)	(10)	-	1.47	2.2 x
46	MDA	MDA-CA	19.48	2,379	2,347	9%	-57%	159%	771	1,137	2.1 x	155	220	10.7 x	7.01	2.8 x
47	ARQIT QUANTUM INC	ARQQ	15.50	198	161	241%	-76%	-97%	20	-	-	(40)	-	-	1.02	15.1 x
48	WEATHERNEWS INC	4825-JP	24.85	589	455	9%	-44%	-36%	150	163	2.8 x	-	-	-	6.53	3.8 x
49	SATELLOGIC	SATL	4.12	370	453	33%	-83%	-58%	6	-	-	-	-	-	(0.55)	-7.5 x
50	SATREC INITIATIVE	099320-KR	31.69	347	229	34%	-26%	-18%	-	145	1.6 x	-	16	14.1 x	15.15	2.1 x
51	IMAGESAT INT	ISI-IL	2.77	169	215	56%	-12%	-	-	84	2.6 x	-	29	7.5 x	2.61	1.1 x
52	BLACKSKY TECH	BKSY	8.36	265	319	162%	-54%	-77%	102	132	2.4 x	12	19	16.5 x	3.07	2.7 x
53	SPIRE GLOBAL	SPIR	9.39	291	334	128%	-33%	-65%	106	103	3.2 x	(13)	(18)	-	(0.45)	-20.7 x
COMMUNICATIONS EQUIPMENT																
54	MEDIATEK	2454-TW	42.21	67,606	61,298	14%	-29%	-1%	16,993	20,663	3.0 x	3,617	4,659	13.2 x	7.79	5.4 x
55	SAFRAN S.A.	SAF-FR	264.86	112,204	109,445	7%	-23%	120%	20,298	34,876	3.1 x	3,628	7,087	15.4 x	27.75	9.5 x
56	AMPHENOL CORP.	APH	76.95	93,079	97,065	5%	-29%	76%	16,777	20,487	4.7 x	4,450	5,822	16.7 x	8.52	9.0 x
57	GARMIN LTD	GRMN	186.87	35,980	33,674	32%	-15%	37%	6,450	6,939	4.9 x	1,813	1,961	17.2 x	42.44	4.4 x
58	TRIMBLE INC	TRMB	62.14	14,826	16,070	25%	-22%	-29%	3,683	3,422	4.7 x	1,002	970	16.6 x	23.37	2.7 x
59	ELBIT SYS	ESLT	397.49	17,777	18,814	6%	-56%	128%	6,828	7,643	2.5 x	-	838	22.5 x	73.57	5.4 x
60	VALEO SA	FR-FR	9.85	2,410	7,089	49%	-25%	-67%	22,378	24,317	0.3 x	2,531	3,196	2.2 x	17.40	0.6 x
61	VERTIV	VRT	85.38	32,539	34,443	83%	-37%	242%	8,409	9,758	3.5 x	1,730	2,145	16.1 x	7.00	12.2 x
62	KRATOS DEFENSE	KTOS	33.79	5,179	5,057	9%	-47%	74%	1,136	1,281	3.9 x	106	117	43.2 x	8.96	3.8 x
63	TOMTOM NV	TOM2-NL	5.29	661	421	24%	-22%	-48%	626	617	0.7 x	-	(8)	-	1.32	4.0 x
64	ECHOSTAR CORP	SATS	22.48	3,489	31,204	44%	-36%	-15%	15,826	15,398	2.0 x	1,692	1,546	20.2 x	70.50	0.3 x
65	AMPLITECH GROUP	AMPG	1.84	36	21	249%	-65%	-53%	9	17	1.3 x	(7)	0	286.3 x	1.91	1.0 x
66	MYNARIC AG	MYNA	0.21	5	76	2671%	-99%	-98%	6	-	-	(72)	-	-	(2.18)	-0.1 x
COMMUNICATIONS SERVICES																
67	COMCAST CORP NEW	CMCSA	34.20	127,370	226,839	32%	-8%	-32%	123,560	124,283	1.8 x	38,233	37,906	6.0 x	23.14	1.5 x
68	AT&T INC	T	27.70	199,318	356,261	5%	-40%	13%	122,934	124,747	2.9 x	45,247	46,511	7.7 x	14.42	1.9 x
69	SIRIUS XM	SIRI	21.42	7,238	17,522	94%	-13%	-66%	8,605	8,507	2.1 x	2,712	2,629	6.7 x	33.07	0.6 x
70	IRIDIUM COMM	IRDM	24.13	2,610	4,337	49%	-17%	-42%	842	882	4.9 x	478	500	8.7 x	4.77	5.1 x
71	SES SA	SESG-FR	5.29	2,030	3,594	25%	-45%	-25%	2,187	2,257	1.6 x	1,124	1,159	3.1 x	9.38	0.6 x
72	VIASAT INC	VSAT	9.27	1,197	7,242	188%	-28%	-79%	4,522	4,517	1.6 x	1,530	1,550	4.7 x	36.87	0.3 x
73	EUTELSAT COMM	ETL-FR	4.05	1,926	4,738	148%	-70%	-67%	1,343	1,434	3.3 x	877	759	6.2 x	7.16	0.6 x
74	GLOBALSTAR INC	GSAT	19.22	2,433	2,581	114%	-22%	10%	250	264	9.8 x	135	135	19.1 x	2.84	6.8 x
75	SKY PERFECT JSAT H	9412-JP	8.06	2,400	1,909	6%	-41%	132%	829	876	2.2 x	309	332	5.7 x	6.97	1.2 x
76	AST SPACEMOBILE INC	ASTS	23.21	5,534	4,627	68%	-91%	192%	4	75	61.3 x	(132)	(129)	-	2.30	10.1 x

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77	GILAT SATELLITE	GILT	6.34	361	250	27%	-36%	-10%	305	435	0.6 x	25	51	4.9 x	5.34	1.2 x
78	SATIXFY	SATX-US	2.05	178	231	17%	-74%	-79%	-	30	7.7 x	-	-	-	(1.19)	-1.7 x
79	TELESAT CORP	TSAT	15.47	216	3,254	64%	-55%	-46%	-	297	10.9 x	-	134	24.4 x	34.80	0.4 x
SEMICONDUCTORS																
80	NVIDIA CORP	NVDA	108.92	2,657,648	2,633,095	41%	-20%	270%	130,497	198,696	13.3 x	87,909	130,129	20.2 x	3.24	33.6 x
81	BROADCOM INC.	AVGO	192.47	904,984	962,266	31%	-35%	189%	54,529	64,773	14.9 x	34,824	42,688	22.5 x	14.84	13.0 x
82	TEXAS INSTR	TXN	160.05	145,401	152,282	38%	-13%	-15%	16,049	17,727	8.6 x	7,215	8,370	18.2 x	18.05	8.9 x
83	QUALCOM	QCOM	148.46	163,009	163,578	55%	-19%	-19%	42,140	43,098	3.8 x	15,941	16,406	10.0 x	25.21	5.9 x
84	INFINEON TECH	IFX-DE	32.84	42,887	47,442	28%	-23%	-29%	15,691	17,794	2.7 x	4,720	4,801	9.9 x	14.89	2.2 x
85	MICROCHIP TECH	MCHP	46.08	24,783	30,978	118%	-26%	-47%	4,757	4,096	7.6 x	1,659	1,061	29.2 x	11.22	4.1 x
SOFTWARE																
86	AUTODESK	ADSK	274.25	58,415	59,363	19%	-29%	-2%	6,131	6,925	8.6 x	2,364	2,689	22.1 x	12.25	22.4 x
87	VERISK	VRSK	296.43	41,484	44,581	3%	-21%	30%	2,882	3,066	14.5 x	1,577	1,698	26.3 x	0.71	415.8 x
88	ANSYS INC	ANSS	321.88	28,298	27,666	13%	-15%	-20%	2,583	2,806	9.9 x	1,310	-	-	70.29	4.6 x
89	UIPATH INC	PATH	11.94	5,660	5,057	75%	-21%	-72%	1,430	1,522	3.3 x	265	295	17.2 x	3.33	3.6 x
90	TOPICUS	TOI-CA	119.44	9,922	10,298	2%	-35%	30%	-	1,820	5.7 x	-	535	19.2 x	4.04	29.6 x
91	ENGHOUSE SYS	ENGH-CA	18.14	1,000	821	41%	-12%	-53%	331	379	2.2 x	102	104	7.9 x	7.97	2.3 x
DRONES/UAVs																
92	JOBY AV	JOBY	6.30	4,984	4,039	70%	-26%	-14%	0	8	520.7 x	(299)	(484)	-	1.16	5.4 x
93	AEROVIRONMENT	AVAV	151.52	4,276	4,288	56%	-33%	144%	743	982	4.4 x	107	195	22.0 x	30.51	5.0 x
94	ARCHER AVI	ACHR	8.33	4,573	3,434	50%	-66%	38%	0	36	94.6 x	(369)	(402)	-	1.49	5.6 x
95	BLADE AIR MOB	BLDE	2.65	212	91	95%	-11%	-70%	249	256	0.4 x	1	11	8.6 x	2.79	0.9 x
96	EVE HOLDING INC	EVEX-US	3.56	1,060	888	71%	-35%	-65%	0	0	-	(133)	(169)	-	0.42	8.6 x
DIVERSIFIED																
97	MICROSOFT	MSFT	395.26	2,937,787	2,969,717	18%	-13%	18%	270,010	305,567	9.7 x	152,955	173,446	17.1 x	43.30	9.1 x
98	AMAZON.COM INC	AMZN	184.42	1,957,132	2,000,353	32%	-18%	11%	650,313	709,345	2.8 x	147,799	167,440	11.9 x	28.82	6.4 x
99	ALPHABET	GOOGL	158.80	924,216	1,862,694	30%	-12%	10%	359,713	396,322	4.7 x	157,124	177,094	10.5 x	28.41	5.6 x
100	ORACLE	ORCL	140.72	394,612	472,241	41%	-19%	61%	55,783	62,708	7.5 x	29,877	32,946	14.3 x	5.97	23.6 x
101	KONGSBERG GRUP	KOG-NO	160.85	28,297	27,497	4%	-55%	395%	4,448	5,563	4.9 x	727	920	29.9 x	10.24	15.7 x
102	NANO DIMEN	NNDM	1.56	342	(406)	76%	-14%	-59%	-	-	-	-	-	-	3.95	0.4 x
103	TRANSDIGM GR	TDG	1,413.07	79,251	101,902	5%	-17%	122%	8,156	9,037	11.3 x	4,322	4,844	21.0 x	(111.59)	-12.7 x
104	CONSTELLATION SOFT	CSU-CA	3,596.87	76,223	79,234	2%	-28%	94%	10,065	11,853	6.7 x	2,688	3,210	24.7 x	137.33	26.2 x
SPACS																
105	DHC ACQUISITION	DHCA	0.36	15	17	2248%	-27%	-96%	-	0	-	-	(19)	-	0.07	5.4 x
106	GIGCAPITAL5	GIA	0.75	21	29	29%	-72%	-92%	-	-	-	-	-	-	(0.36)	-2.1 x
107	BREEZE HOLDINGS	BREZ	11.65	40	47	166%	-14%	14%	-	-	-	-	-	-	(2.45)	-4.8 x
108	INTUITIVE MACHINES	LUNR	8.20	961	1,666	204%	-62%	-15%	89	279	6.0 x	(10)	(13)	-	(10.03)	-0.8 x

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