

# Space Industry

## Weekly Intelligence Report

2026-06-13 | 27 articles | 8 countries  
troy-technical.jp

This Week's Keyword

## Space Commercialization

US/EU race for orbital, lunar, deep space

27

articles

Total Articles Analyzed

8

countries

Source Countries/Regions

\$1.8T

by 2035

Space Economy Forecast

35

reuses

Falcon 9 Booster Record

### All 27 Articles This Week — 5-Axis Evaluation Matrix

How to read columns — Tech Novelty: degree of breakthrough Market Proximity: closeness to commercialization Market Impact: industry-wide effect Data Reliability: quantitative data & peer review US/EU Relevance: direct impact on US/European companies & supply chains

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#01	JAXA H3-30 Success	Launch Success	●●●○ ○	●●●● ○	●●●○ ○	●●●○ ○	●●●○ ○	JAXA's H3-30 rocket successfully launched, bolstering Japan's space transport and MMX mission prospects.
#02	NASA JSC Modernization	Infrastructure	●●○○ ○	●●●● ●	●●○○ ○	●●●● ○	●●●● ●	NASA awarded \$300M to modernize Johnson Space Center, upgrading Apollo-era facilities for Artemis missions.
#03	Apex Satellite Production	Corporate Strategy	●●●○ ○	●●●● ○	●●●● ○	●●●● ○	●●●● ●	Apex secured \$200M funding at \$2.3B valuation to scale high-rate satellite production for constellations.
#04	US House Space Force	Policy	●○○○ ○	●●●● ●	●●●● ○	●○○○ ○	●●●● ●	U.S. House mandated Space Force to accelerate commercial technology integration for defense capabilities.
#05	Mantis Space Power Grid	Startup Funding	●●●● ●	●○○○ ○	●●●● ○	●●●○ ○	●●●● ●	Mantis Space secured \$43M to build the first space power grid, beaming solar energy to satellites via lasers.
#06	NASA Artemis III Crew	Mission Announcement	●●●○ ○	●●●○ ○	●●●○ ○	●●●● ○	●●●● ●	NASA announced Artemis III crew for 2027 Earth orbit mission, testing HLS lander docking for lunar return.
#07	NASA Lunar Base Missions	Partnerships	●●●● ○	●○○○ ○	●●●● ○	●●●● ○	●●●● ●	NASA unveiled initial lunar base missions, partnering with firms for ISRU and nuclear power development.
#08	Microgravity Biomanuf.	Research	●●●● ●	●○○○ ○	●●●● ○	●●●● ●	●●●● ●	Microgravity research shows breakthroughs in microbes, plants, and semiconductors for space-based manufacturing.
#09	WEF Space Economy Trends	Market Overview	●○○○ ○	●●●● ●	●●●● ●	●●●○ ○	●●●● ●	WEF predicts a \$1.8T space economy by 2035, driven by iterative services, national sovereignty, and commercial innovation.
#10	US OSC Transparency	Policy	●○○○ ○	●●●● ●	●●●○ ○	●○○○ ○	●●●● ●	U.S. Office of Space Commerce proposed enhancing transparency in commercial space activity authorization.
#11	Canada Space Legislation	Policy Analysis	●○○○ ○	●●●● ●	●●●○ ○	●○○○ ○	●●●○ ○	Canada's lack of commercial space legislation deters investment; urgent need for government 'anchor tenancy' policy.
#12	India AI Star Tracker	Startup Funding	●●●○ ○	●●●○ ○	●○○○ ○	●●●○ ○	●○○○ ○	India's TakeMe2Space secured funding for an AI-powered star tracker, aiming to reduce import dependency.

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#13	Multi-Omics Spaceflight	Research	●●●●○ ○	●●○○○ ○	●●●○○ ○	●●●●● ●	●●●●○ ○	Multi-omics analysis reveals early human spaceflight responses from commercial missions, aiding health risk mitigation.
#14	US Chamber COCOM Access	Policy Support	●○○○○ ○	●●●●● ●	●●●●● ○	●●○○○ ○	●●●●● ●	U.S. Chamber of Commerce backs expanded COCOM direct access to commercial space services for national security.
#15	Coral Capital Anduril	Investment	●●●●● ○	●●●●● ○	●●●●● ○	●●●●● ○	●●●●● ●	Coral Capital joined Anduril's \$5B funding, bolstering US-Japan alliance and Japan's deep tech defense startups.
#16	Twente Smart Surfaces	Research	●●●●● ○	●●○○○ ○	●●●○○ ○	●●●●● ●	●●●●● ●	University of Twente researched microgravity smart surfaces, integrating AM, boiling heat transfer, and electric fields.
#17	Exploration Co. Yrene	Product Development	●●●●● ○	●●○○○ ○	●●●●● ○	●●●○○ ○	●●●●● ●	The Exploration Company announced 'Yrene,' a reusable heavy-lift rocket, boosting European space transport capabilities.
#18	DOE Space Nuclear Power	Overview	●●○○○ ○	●●●○○ ○	●●●●● ○	●●●●● ○	●●●●● ●	U.S. DOE highlighted the history and importance of space nuclear power, with NASA planning a Mars nuclear spacecraft by 2028.
#19	Solidion Gen-ECB Battery	New Product	●●●●● ○	●●●○○ ○	●●●●● ○	●●●○○ ○	●●●●● ●	Solidion Technology unveiled a graphene-enabled extreme-climate battery for orbital AI data centers and deep space.
#20	GF BAE RHBD Chips	Collaboration	●●●●● ○	●●●●● ○	●●●●● ○	●●●●● ○	●●●●● ●	GlobalFoundries and BAE Systems collaborate on radiation-hardened chips for deep space missions like Artemis II.
#21	Orbital Data Centers	Technology Trend	●●●●● ○	●●●○○ ○	●●●●● ●	●●●○○ ○	●●●●● ●	SpaceX's AI1 satellite, AWS, Azure, and Google drive in-space AI training and cloud connectivity for orbital data centers.
#22	EnduroSat EPS-I	New Product	●●●○○ ○	●●●●● ○	●●●○○ ○	●●●●● ○	●●●●● ○	EnduroSat unveiled EPS-I, a modular power system for CubeSats, delivering up to 437W for extended mission lifespans.
#23	NASA SR-1 Freedom	Mission Announcement	●●●●● ○	●●●○○ ○	●●●●● ○	●●●○○ ○	●●●●● ●	NASA plans to launch the nuclear-powered 'SR-1 Freedom' spacecraft to Mars by 2028, accelerating deep space exploration.
#24	SpaceX Reusability	Operational Milestone	●●●○○ ○	●●●●● ●	●●●●● ●	●●●●● ○	●●●●● ●	SpaceX broke a reusability record with its 35th Falcon 9 booster landing, expanding the Starlink constellation.
#25	Stoke Space Nova Stage 1	Product Development	●●●●● ○	●●●○○ ○	●●●●● ○	●●●●● ○	●●●●● ●	Stoke Space completed proto-qualification testing for Nova's first stage, targeting fully reusable, aircraft-like operations.
#26	UFL Laser Origami	Research	●●●●● ●	●○○○○ ○	●●●●● ○	●●●●● ●	●●●●● ●	University of Florida innovates lunar construction with laser 'origami' to 3D print tools and structures from regolith.
#27	CSA ISRU Studies	Research Funding	●●●○○ ○	●●○○○ ○	●●●○○ ○	●●●○○ ○	●●●●● ○	Canadian Space Agency awarded \$2M for Lunar ISRU studies, advancing self-sufficiency and nuclear power for Moon bases.

●●●●○ High ●●●○○ Med-High ●●○○○ Med ●○○○○ Low | Yellow highlight = featured article

## Three Questions That Demand Your Decision This Week

### 1 Is your supply chain exposed to US commercial space policy shifts?

The US House and Chamber of Commerce are pushing for increased commercial integration in defense and space. This could prioritize US firms and create barriers for non-US suppliers. How will this impact your market access or competitive positioning?

### 2 Does the rise of orbital AI data centers make your terrestrial infrastructure obsolete?

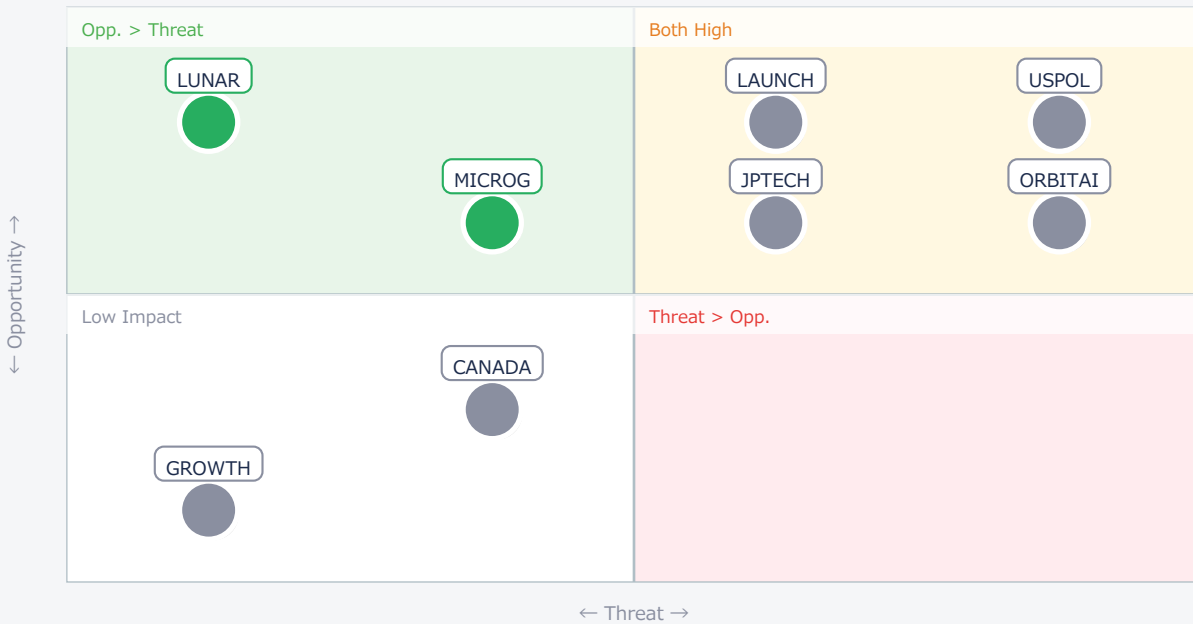
SpaceX, AWS, Azure, and Google are rapidly developing in-orbit AI training and cloud connectivity. This new computing paradigm demands specialized rad-hard chips and extreme-climate power solutions. Are you prepared to compete or collaborate in this new frontier?

### 3 Are you investing enough in foundational lunar/deep space technologies?

NASA, Mantis Space, and universities are advancing space power grids, ISRU, and nuclear power for lunar bases and Mars missions. These long-term, high-impact technologies will define the next era of space. Where are your R&D; efforts in these critical areas?

## Opportunities vs. Threats for US/European Companies

Opportunity vs. Threat Matrix for US/European Companies



Item	Quadrant	↑ Opportunity	↓ Threat
● USPOL	Critical	US market access	Non-US exclusion
● LAUNCH	Critical	US market share	EU/JP catch-up
● ORBITAI	Critical	New computing	Tech barriers
● JPTECH	Critical	Alliance tech	New advanced tech
● LUNAR	Opp.	Foundational market	High R&D; costs
● MICROG	Opp.	Novel materials	Long R&D; cycle
● GROWTH	Ref.	General expansion	Increased competition

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● CANADA	Ref.	Attract talent	Regulatory lag
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## Deep Dive ① — Mantis Space: First-Ever Space Power Grid

#05 | 2026/06/04 | Forbes | Tech Novelty ●●●●● Proximity ●●○○○ Market Impact ●●●●○ Data Reliability ●●●○○ US/EU Relevance ●●●●●

Mantis Space secured \$43M to develop the first space power grid, collecting solar energy in MEO and beaming it to client satellites via lasers. This aims to provide stable power, overcoming limitations of on-board batteries and solar panels.

The company operates a 20,000 sq ft laser optics lab for high-power laser generation, precise beam shaping, and long-distance energy transmission, crucial for extending satellite operational lifetimes and enabling power-intensive missions.

### ► Strategic Analyst's Perspective

Strategic Analyst's Perspective: The concept of a space power grid is a true academic breakthrough (Tech Novelty 5), but the technical barriers are immense. Laser power beaming in MEO requires extreme pointing accuracy, efficient power conversion, and robust thermal management. Regulatory hurdles for energy transmission in space are also undefined. Published numbers for funding are realistic, but commercialization within 5+ years is optimistic for a full grid. [Opportunity] for US/EU materials & component suppliers in advanced optics, high-efficiency solar cells, and power electronics. [Threat] if US/EU companies fail to lead in this foundational space infrastructure, ceding future energy dominance. Next actions: [R&D;] Initiate feasibility studies on laser power beaming and orbital energy storage by Q4 2026. [Strategy] Monitor international regulatory developments for space energy transmission by Q1 2027.

## Deep Dive ② — Orbital Data Centers Accelerate

#21 | 2026/06/09 | Tom's Hardware | Tech Novelty ●●●●○ Proximity ●●●○○ Market Impact ●●●●● Data Reliability ●●●○○ US/EU Relevance ●●●●●

SpaceX unveiled its 'AI1 satellite' design, an in-orbit AI data center with interchangeable chip payloads and a robust 120-150 kW compute payload. SpaceX applied for a million-satellite data center constellation, signaling a shift to commercial-scale deployment.

AWS, Azure, and Google are also deploying space data services, aiming to enable in-space AI training and cloud connectivity. This requires overcoming challenges in power, thermal management, and radiation-hardened semiconductor designs.

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► Strategic Analyst's Perspective

Strategic Analyst's Perspective: The vision of orbital AI data centers is highly novel and impactful (Market Impact 5), but the technical challenges are substantial. A 120-150 kW compute payload in space demands unprecedented power generation and thermal dissipation capabilities. Radiation hardening for long-term reliability is also critical. While major players are investing, widespread commercial deployment is still 3-5 years away. [Opportunity] for US/EU semiconductor manufacturers (e.g., GlobalFoundries, BAE Systems, AMD) in radiation-hardened chips, advanced cooling solutions, and high-density power systems. [Threat] for terrestrial cloud providers if they cannot seamlessly integrate with or offer competitive in-space processing. Next actions: [R&D] Form a task force to evaluate radiation-hardened computing architectures and advanced thermal management for space by Q3 2026. [Business Dev] Explore partnerships with space infrastructure startups for early integration opportunities by Q4 2026.

## Deep Dive ③ — SpaceX Breaks Reusability Record

#24 | 2026/06/08 | Space.com | Tech Novelty ●●●○○ Proximity ●●●●● Market Impact ●●●●● Data Reliability ●●●●● US/EU Relevance ●●●●●

SpaceX achieved a new reusability record, successfully launching and landing a Falcon 9 booster for the 35th time. This mission deployed 29 Starlink satellites, expanding the constellation to over 10,580 active satellites.

This feat dramatically reduces cost per kilogram to orbit, reshaping the space economy and underpinning SpaceX's potential \$1.75 trillion IPO. It nears NASA's Space Shuttle orbiter's record of 39 reuses, validating the reusable rocket model.

### ► Strategic Analyst's Perspective

Strategic Analyst's Perspective: The published numbers are highly reliable and demonstrate SpaceX's continued dominance. The technical barriers for reusability are largely overcome, with focus now on operational efficiency and further cost reduction. The challenge for competitors is not just reusability, but achieving SpaceX's cadence and cost structure. [Opportunity] for US materials & component suppliers who can meet high-volume, low-cost demands for reusable rocket components. [Threat] to European (e.g., ArianeGroup, The Exploration Company) and Japanese (JAXA) launch providers who struggle to match the cost-effectiveness and frequency of reusable systems, risking market share. Next actions: [Strategy] Conduct a competitive analysis of global launch service providers, focusing on reusability and cost-per-launch by end of Q3 2026. [Procurement] Re-evaluate long-term launch contracts to leverage increasing reusability and potential cost reductions by Q4 2026.

## Other Notable Articles

Apex Secures \$200M for Satellite Production (Apex)

Tech Novelty ●●●○○ Proximity ●●●●● Market Impact ●●●●●

US firm scaling high-rate satellite production for proliferated constellations, critical for commercial and defense needs.

NASA Unveils Initial Lunar Base Missions (NASA)

Tech Novelty ●●●●● Proximity ●●○○○ Market Impact ●●●●●

NASA partners with US firms for ISRU and nuclear power, laying groundwork for sustainable lunar habitation.

Microgravity Biomanufacturing and Materials Science Accelerate (ISS National Lab)

Tech Novelty ●●●●● Proximity ●●○○○ Market Impact ●●●●●

Breakthroughs in space-based microbes, plants, and semiconductors promise novel drug development and materials.

Coral Capital Joins Anduril's \$5B Funding (Coral Capital)

Tech Novelty ●●●●● Proximity ●●●●● Market Impact ●●●●●

Japanese VC invests in US defense tech, highlighting 500°C-resistant diamond semiconductors for space/defense.

GlobalFoundries and BAE Systems Collaborate on RHBD Chips (Design And Reuse (via GlobalFoundries))

Tech Novelty ●●●●● Proximity ●●●●● Market Impact ●●●●●

US firms developing radiation-hardened chips for deep space missions, crucial for electronics reliability.

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## Recommended Actions This Week

Action recommendations based on article evaluation matrix and opportunity/threat analysis.

### ■ Immediate (this week)

- [Strategy] Assess how US commercial space policy shifts (Articles #04, #10, #14) impact market access for non-US entities and potential US-based opportunities.
- [R&D;] Initiate a rapid review of radiation-hardened computing and extreme-climate power solutions (Articles #19, #20, #21) for potential integration into future orbital platforms.

### ■ Short-term (1 month)

- [Procurement] Evaluate the competitive landscape of reusable launch services (Articles #17, #24, #25) to identify cost-saving opportunities and diversify launch options.
- [Business Dev] Explore partnership opportunities with US firms in lunar ISRU and nuclear power (Articles #07, #18, #23, #26, #27) for long-term lunar infrastructure projects.
- [Legal/IP] Review intellectual property implications of microgravity manufacturing breakthroughs (Article #08) for novel materials and biopharmaceuticals.

### ■ Medium-long term (quarter+)

- [Executive] Develop a comprehensive strategy for engaging with the evolving space economy (Article #09), including potential investments in orbital AI and space infrastructure.
- [R&D;] Allocate resources for long-term research into laser power beaming and advanced space energy storage (Article #05) to secure future energy independence in orbit.
- [Strategy] Monitor the development of advanced deep tech in allied nations, particularly Japan's diamond semiconductors (Article #15), for potential collaborative defense and space applications.

# 宇宙産業 — Selected Articles

Date: 2026-06-13

Articles: 27

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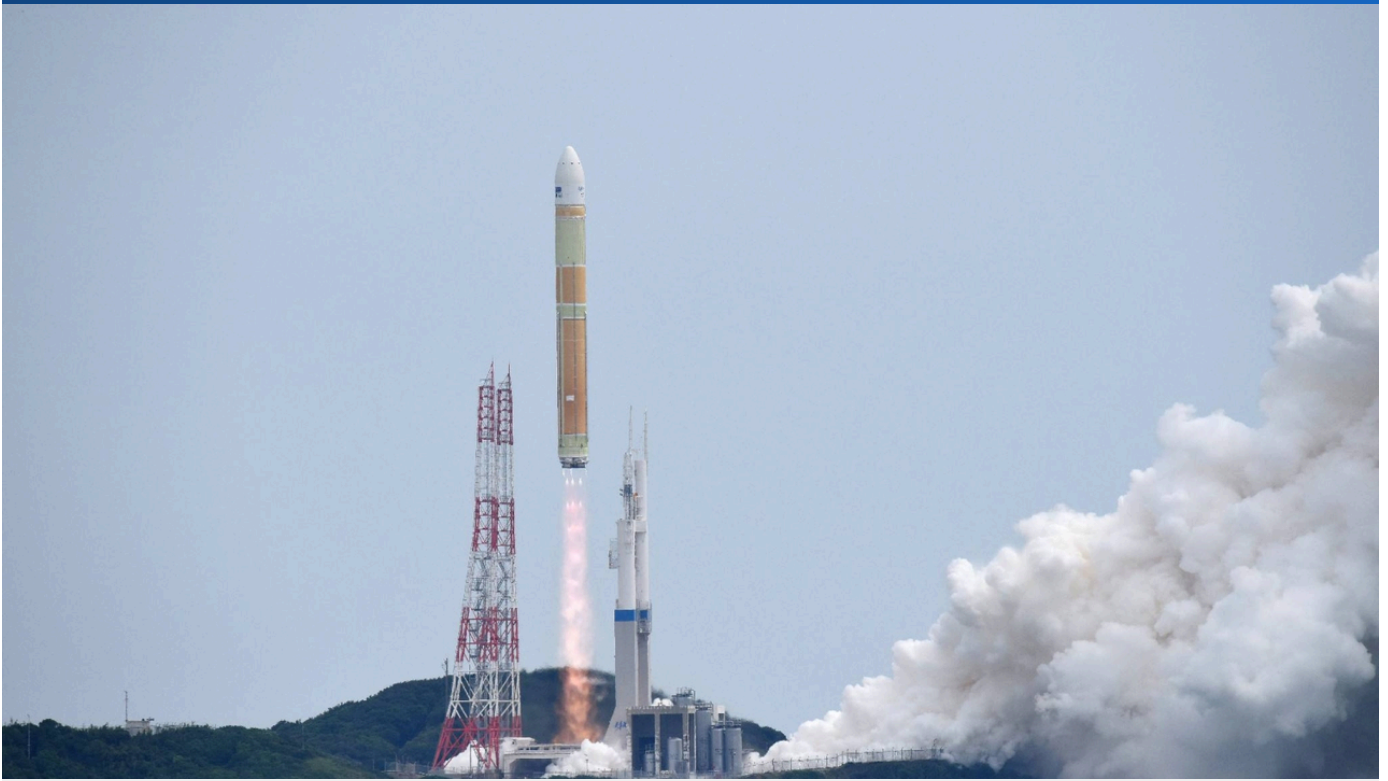
#25 Stoke Space Completes Nova Stage 1 Proto-Qualification Testing for Fully Reusable Rocket, Targeting Aircraft-Like Operational Cadence

#26 University of Florida Innovates Lunar Construction with Laser 'Origami' Technology: 3D Printing Tools and Structures from In-Situ Resources

#27 Canadian Space Agency Awards \$2M for Lunar In-Situ Resource Utilization (ISRU) Studies: Advancing Self-Sufficiency and Nuclear Power for Moon Bases

# JAXA's New H3-30 Rocket Successfully Launches Six Small Satellites, Paving Way for MMX Mission After Previous Failure

Published June 12, 2026   The Japan Times   Japan



## OVERVIEW

JAXA successfully launched its new low-cost H3-30 rocket variant, carrying a VEP-5 test payload and six small satellites into orbit, marking a critical recovery after a previous failure. This configuration, featuring three LE-9 liquid-fueled engines without solid rocket boosters, reached its target orbit of approximately 580 km in 15 minutes. The achievement significantly bolsters Japan's space transportation reliability and competitiveness, opening pathways for future deep-space missions like the Mars Moons eXploration (MMX) program.

## IN DEPTH

### Key Findings

The Japan Aerospace Exploration Agency (JAXA) successfully launched the H3-30, a low-cost variant of its new flagship H3 rocket, on June 12, 2026. This mission represents a crucial recovery for Japan's space transportation capabilities following a launch failure late last year. The H3-30, powered by three LE-9 liquid-fueled first-stage engines without solid rocket boosters, precisely delivered its VEP-5 evaluation payload and six small satellites into a planned orbit of approximately 580 km in about 15 minutes.

### Technical Details

The H3-30 variant is designed to be the lightest and most cost-effective configuration within the H3 rocket family, primarily distinguished by its lack of solid rocket boosters. The launch took place from Tanegashima Space Center in Kagoshima Prefecture around 9:55 AM JST, proceeding without incident. The six small satellites deployed are expected to conduct various technology demonstration and Earth observation missions. The VEP-5 evaluation payload was specifically designed to validate the rocket's performance and gather crucial technical data for future space missions. This success validates the efficacy of the adapter modifications implemented after the previous failure, indicating enhanced reliability for the H3 rocket.

### Background and Industry Context

The development of the H3 rocket is a strategic effort by Japan to counter the escalating international competition in the space sector and provide cost-effective, high-frequency space transportation services. The global launch market has been significantly reshaped by the emergence of reusable rockets, notably SpaceX's Falcon series. This successful H3-30 launch is an indispensable step for Japan to strengthen its domestic space infrastructure and elevate its presence in international space exploration programs. The previous year's failure was a considerable setback, but this rapid recovery demonstrates JAXA's capability to overcome technical challenges and underscores Japan's engineering prowess.

## Future Outlook

The success of the H3-30 rocket is poised to have a substantial impact on Japan's future space activities. The H3 rocket is expected to play a vital role in upcoming deep-space exploration missions, including the Mars Moons eXploration (MMX) mission. The MMX project aims to bring samples back to Earth from Mars' two moons, Phobos and Deimos, a feat that requires a highly reliable heavy-lift rocket like the H3. Furthermore, the cost-effectiveness of the H3-30 could enhance Japan's competitiveness in the commercial satellite launch market, potentially attracting more domestic and international clients. This is expected to stimulate the broader Japanese space industry and foster the creation of new space-related businesses.

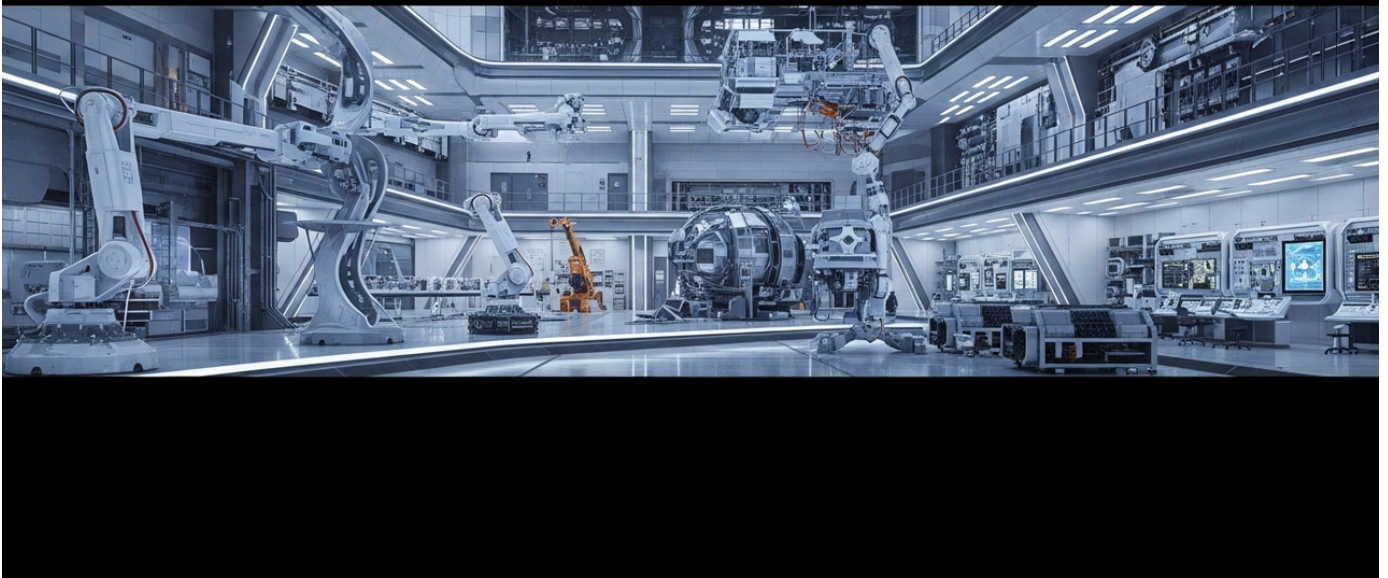
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Source: <https://www.japantimes.co.jp/news/2026/06/12/japan/science-health/japan-h3-rocket-launch/>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# NASA Awards \$300M Johnson Space Center Modernization Contract to Seven Firms, Including Conti Federal, Targeting \$43M in Savings

Published June 09, 2026 Morningstar USA



## OVERVIEW

NASA has awarded a multi-year construction contract worth up to \$300 million to seven companies, including Conti Federal Services, LLC, to modernize aging facilities and infrastructure at the Johnson Space Center (JSC). This initiative aims to upgrade Apollo-era facilities for Artemis lunar missions and future deep-space exploration. The modernization includes energy-efficient lighting, upgraded compressed air systems, water conservation measures, and improved HVAC and lighting controls, projected to save \$43 million in operational costs over 23 years.

## IN DEPTH

### Key Findings

NASA has awarded a multi-year construction contract, known as the Johnson Space Center Multiple Award Construction Contract (JMACC), valued at up to \$300 million to seven firms for the modernization of its aging facilities and infrastructure at the Johnson Space Center (JSC) in Houston. Conti Federal Services, LLC is a key recipient of this contract, tasked with supporting infrastructure requirements across the JSC campus and the White Sands Test Facility. This comprehensive modernization effort is designed to bring Apollo-era facilities up to modern standards and establish a crucial foundation for the Artemis lunar missions and future deep-space exploration.

### Technical Details

The scope of work under the JMACC includes a wide array of critical upgrades. These encompass the replacement of outdated systems with energy-efficient LED lighting, enhancement of compressed air systems for improved operational efficiency, implementation of advanced water conservation measures, and the installation of state-of-the-art heating, ventilation, and air conditioning (HVAC) and lighting control systems. Notably, as part of a Super Energy Savings Performance Contract (ESPC) initiative, these improvements are projected to yield approximately \$43 million in facility operating cost savings over the next 23 years. Such technical advancements are essential not only for reducing JSC's operational footprint but also for boosting the facility's sustainability and optimizing its research and development environment.

### Background and Industry Context

The Johnson Space Center has been central to the history of U.S. human spaceflight, yet many of its facilities were constructed decades ago and have suffered from aging infrastructure. Modern space exploration missions, particularly the ambitious Artemis program aiming for lunar return and eventual human missions to Mars, demand advanced technology and highly reliable ground infrastructure. This significant investment underscores NASA's long-term commitment to securing the necessary support infrastructure to achieve these audacious goals. Furthermore, the engagement of private companies in NASA's infrastructure modernization contributes to the broader development of the space industry through public-private partnerships.

## Future Outlook

The modernization of the Johnson Space Center is a critical component for the success of NASA's future missions. Efficient and state-of-the-art facilities will provide an indispensable environment for astronaut training, mission control operations, and the development of next-generation space technologies. Through this contract, NASA aims to enhance the reliability and safety of its existing infrastructure while simultaneously achieving significant operational cost reductions, thereby freeing up more resources for innovative research and development. This represents a strategic investment to strengthen U.S. space exploration capabilities over the long term and maintain a competitive edge in the global space development race.

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Source: <https://www.morningstar.com/news/business-wire/20260609074897/conti-federal-awarded-johnson-space-center-multiple-award-construction-contract-by-nasa>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# Apex Secures Over \$200M in Funding at \$2.3B Valuation to Scale High-Rate Satellite Production for Proliferated Constellations

Published June 05, 2026 Apex USA



## OVERVIEW

Apex announced over \$200 million in new funding, elevating its valuation to \$2.3 billion, to significantly scale its high-rate satellite production facilities. The capital will enable the expansion of manufacturing infrastructure, vertical integration of key subsystems, and pre-production of satellite platforms to meet surging demand from commercial and national security constellations. Led by Glade Brook Capital Partners with participation from Washington Harbour Partners, this investment allows Apex to utilize an additional 30,000 square feet for accelerated next-generation satellite manufacturing.

## IN DEPTH

### Key Findings

Apex has successfully closed a new funding round, raising over \$200 million and boosting its company valuation to \$2.3 billion. This significant capital infusion is crucial for the company's ambitious plan to substantially expand its high-rate satellite production facilities and meet the rapidly growing demand for satellite constellations across both commercial and national security sectors. Apex intends to leverage this investment to advance the vertical integration of key subsystems and further enhance its high-cadence satellite manufacturing capabilities.

### Technical Details

Apex's strategy is centered on the pre-production of standardized satellite bus platforms, which allows customers to rapidly access customizable satellite solutions tailored to specific mission requirements. The company is activating an additional 30,000 square feet of facility space to optimize its manufacturing processes, aiming for a dramatic increase in production capacity. This expansion reinforces a consistent vertical integration approach from design to manufacturing and testing, designed to reduce both the cost and lead times associated with satellite production. The ability to supply reliable satellites quickly and economically is particularly vital for building extensive constellations.

### Background and Industry Context

The current space industry is experiencing a rapid shift towards 'proliferated constellations,' networks comprising a large number of smaller satellites, for applications in Earth observation, telecommunications, and national security. This trend is driven by the expansion of the data-driven economy and increasing government and military demand for space-based assets. Companies like Apex are responding to this new demand by moving away from traditional, costly custom-made satellite manufacturing models, instead adopting automated production processes and standardized designs. This funding round, led by Glade Brook Capital Partners with participation from Washington Harbour Partners, signifies the market's strong confidence in Apex's business model and its future growth potential.

## Future Outlook

Apex's fundraising and manufacturing expansion are set to solidify its position in the proliferated constellation market. Its ability to supply satellites at high frequency and low cost will cater to both commercial clients and national security agencies like the U.S. Space Force. The company's vertical integration strategy holds the potential to mitigate supply chain risks and accelerate technological innovation. Moving forward, Apex is expected to contribute to the growth of the space economy by deploying more satellites into orbit, thereby enhancing global connectivity, intelligence gathering, and defense capabilities. This exemplifies how new space technologies and business models are rapidly reshaping the industry.

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Source: <https://www.apexspace.com/blog/apex-announces-additional-fundraising-at-2b-valuation-to-scale-high-rate-satellite-production-for-proliferated-constellations>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# U.S. House Demands Space Force Accelerate Commercial Integration to Strengthen Defense Capabilities with Policy Amendments

Published June 04, 2026 Air & Space Forces Magazine USA



## OVERVIEW

The U.S. House of Representatives formally mandated the Space Force to procure more commercial technologies and services through amendments approved as part of the FY2027 National Defense Authorization Act (NDAA). This legislation requires the Space Force to develop plans for integrating commercial capabilities into critical missions such as space domain awareness, space sensing, satellite communications, and autonomous satellite operations. This policy aims to enhance defense capabilities and secure U.S. supremacy in the rapidly evolving space environment.

## IN DEPTH

### Key Findings

The U.S. House of Representatives has directed the Space Force to accelerate the procurement of technologies and services from commercial entities to bolster its defense capabilities, as formalized through amendments approved as part of the Fiscal Year 2027 National Defense Authorization Act (NDAA). This significant policy shift mandates the Space Force to more actively incorporate innovative solutions from the commercial space industry across its diverse mission sets.

### Technical Details

Specifically, the legislation requires the Space Force to develop detailed plans for integrating cutting-edge commercial technologies into core mission areas, including Space Domain Awareness (SSA), space sensing, satellite communications, and autonomous satellite operations. This encompasses advanced sensor systems for tracking and identifying orbital objects, secure and high-bandwidth data communication networks, and AI-driven operational systems enabling satellites to self-optimize and respond to challenges without direct human intervention. The integration of commercial technology is expected to enhance cost-efficiency while providing rapid innovation and scalability often challenging to achieve with traditional military-centric systems.

### Background and Industry Context

In recent years, the commercial space industry has made remarkable strides across various sectors, including rocket launches, satellite manufacturing, and data services. The proliferation of small satellite constellations and the space application of advanced technologies such as AI and edge computing present new opportunities for the military. While traditional government-led development tends to be time-consuming and expensive, the private sector has demonstrated its ability to develop and deploy technology more rapidly and flexibly. The U.S. Department of Defense, recognizing the rapid advancements in space capabilities by competitors like China and Russia, seeks to leverage this commercial advantage to maintain U.S. strategic superiority in the space domain.

## Future Outlook

This directive from the House is expected to significantly impact U.S. national security space strategy. By increasing reliance on the commercial space industry, the Space Force can more quickly adopt the latest technologies and enhance its responsiveness to threats. This creates new business opportunities for private companies and paves the way for the Space Force to build a more robust and resilient space infrastructure, from Low Earth Orbit (LEO) to deep space. This commercial integration is a crucial step toward ensuring long-term U.S. space dominance and establishing a decisive advantage in future conflicts.

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Source: <https://www.airandspaceforces.com/lawmakers-more-commercial-space-integration-space-force/>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# Mantis Space Secures \$43M to Build First-Ever Space Power Grid and Laser Optics Lab for Trillion-Dollar Frontier

Published June 04, 2026 Forbes USA



## OVERVIEW

Space infrastructure startup Mantis Space raised \$15 million in seed funding and secured approximately \$28 million in non-dilutive state and local capital, totaling \$43 million. The company plans to build the first-ever space power grid, collecting solar energy in Medium Earth Orbit (MEO) and beaming it directly to client satellites via lasers. Mantis Space already operates a 20,000-square-foot laser optics lab, aiming to provide foundational technology for the future trillion-dollar space economy.

## IN DEPTH

### Key Findings

Mantis Space, a startup focused on space infrastructure, has secured approximately \$43 million in total funding, comprising \$15 million from a recent seed round and an additional \$28 million in non-dilutive capital from state and local governments. This capital injection is earmarked to accelerate the development and operation of the first-ever space power grid, which will gather solar energy in Medium Earth Orbit (MEO) and transmit it directly to client satellites using laser beams. The company is already operating a state-of-the-art 20,000-square-foot laser optics laboratory, positioning this innovative power delivery solution as a potential cornerstone for the future trillion-dollar space economy.

### Technical Details

The space power grid under development by Mantis Space is based on technology that captures solar energy using highly efficient solar arrays in orbit, then converts it into tightly focused laser beams for wireless power transmission to recipient spacecraft. This system is designed to provide stable power to satellite constellations, particularly those in MEO, overcoming the limitations of conventional on-board batteries and solar panels. The 20,000-square-foot laser optics laboratory serves as the research and development hub for generating high-power lasers, achieving precise beam shaping, and perfecting long-distance energy transmission. This contactless power delivery method is expected to extend satellite operational lifetimes and enable more power-intensive missions.

### Background and Industry Context

The space economy is experiencing rapid growth across diverse sectors, including telecommunications, Earth observation, space tourism, and resource exploration, projected to reach \$1.8 trillion by 2035. One significant constraint on this growth is the availability of sustainable and efficient power supply in orbit. Existing satellites rely on their own solar panels and batteries, which impose limits on operational duration and capabilities. The advent of space power delivery infrastructure, such as that proposed by Mantis Space, offers a breakthrough solution to this fundamental challenge, potentially enabling larger and more complex space missions. As government agencies and private companies seek more affordable and flexible space infrastructure, Mantis Space's technology holds a highly strategic position.

## Future Outlook

If realized, Mantis Space's space power grid could bring about a revolutionary change in the space industry. Satellite designs could be liberated from on-board power system constraints, allowing for larger payloads and extended operational lifetimes. This technology promises wide-ranging applications, including deep-space exploration, energy supply for lunar and Martian bases, and in-orbit manufacturing activities. Furthermore, it could contribute to mitigating space debris and reducing the cost of spacecraft re-supply. Mantis Space's technology represents a crucial step for space to truly become an economic frontier, offering exciting opportunities for researchers, engineers, and investors alike. Its upcoming technical demonstrations and commercial deployment will be closely watched.

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Source: <https://www.forbes.com/sites/alisoncoleman/2026/06/04/the-space-startup-building-infrastructure-for-a-trillion-dollar-frontier/>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# NASA Announces Artemis III Crew for 2027 Earth Orbit Mission: Accelerating Human Return to Moon with HLS Lander Tests

Published June 09, 2026 NASA USA



## OVERVIEW

NASA announced the crew for the Artemis III mission in 2027, comprising Commander Randy Bresnik, Pilot Luca Parmitano, and Mission Specialists Frank Rubio and Andre Douglas. The mission's primary objective is to demonstrate rendezvous and docking capabilities between the Orion spacecraft and test versions of commercial Human Landing Systems (HLS) being developed by Blue Origin (Blue Moon) and SpaceX (Starship). This mission is a crucial preparatory step for the Artemis IV human landing at the lunar South Pole in 2028, involving three massive rocket launches and two private lunar lander prototypes, making it one of the most complex human spaceflight missions ever.

### Key Findings

NASA has unveiled the crew for its Artemis III mission, slated for Earth orbit in 2027. The selected astronauts include Commander Randy Bresnik, Pilot Luca Parmitano, and Mission Specialists Frank Rubio and Andre Douglas. The primary objective of this mission is to demonstrate the rendezvous and docking capabilities between the Orion spacecraft and test versions of the commercial Human Landing Systems (HLS) currently under development by Blue Origin (Blue Moon) and SpaceX (Starship). This serves as a critically important preparatory phase for the first human landing mission to the lunar South Pole, scheduled for Artemis IV in 2028. Artemis III is anticipated to be one of the most complex human spaceflight missions ever undertaken, involving three massive rocket launches and two private lunar lander prototypes.

### Technical Details

The Artemis III mission will focus on testing rendezvous and docking maneuvers in Low Earth Orbit (LEO) between the Orion spacecraft and the HLS. Specifically, the Space Launch System (SLS) rocket will launch the Orion spacecraft, followed by a separate launch of the HLS test vehicle for orbital rendezvous. NASA is currently transporting the final booster segments for the Artemis III SLS rocket to Kennedy Space Center; the twin boosters and core stage engines of the SLS rocket together generate over 8.8 million pounds of thrust. This intricate sequence is designed to validate the essential technologies and operational procedures required for astronauts to safely transfer from Orion to the lunar lander, and ultimately to the lunar surface, in future lunar landings. The mission is planned to last approximately two weeks.

## Background and Industry Context

The Artemis program aims to return humans to the lunar surface after more than half a century and establish a sustainable lunar presence. The lunar South Pole region, in particular, is scientifically and strategically significant due to evidence of water ice, which could be vital for future lunar base construction and as a staging point for Mars exploration. The Artemis III mission represents a critical milestone towards achieving this ambitious goal. The involvement of private companies like SpaceX with its Starship and Blue Origin with its Blue Moon contributes to NASA's efforts to reduce costs and accelerate innovation, establishing a new model of space development through public-private partnerships. Through these efforts, the U.S. seeks to re-establish its leadership in space exploration and further promote international cooperation.

## Future Outlook

The success of the Artemis III mission will open doors for Artemis IV and pave the way for future crewed missions to Mars. The data and experience gained from these advanced rendezvous and docking operations will be crucial for planning and executing more complex deep-space missions. The selected crew members are undergoing rigorous training for these sophisticated maneuvers, and their experiences will inform future astronaut training programs. Beyond expanding humanity's presence in space and deepening scientific discovery, the Artemis program holds immense potential to foster new space industries and stimulate technological innovation.

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Source: <https://www.nasa.gov/news-release/nasa-marches-toward-artemis-iii-mission-in-2027-names-crew-members/>

# NASA Unveils Initial Lunar Base Missions: Partnering with Astrolab, Lunar Outpost, Blue Origin, and Firefly Aerospace to Advance ISRU and Nuclear Power

Published June 08, 2026 NASA USA



## OVERVIEW

In May 2026, NASA announced its first three Moon Base missions (Moon Base I, II, III) and new partnerships to support sustainable lunar exploration. Astrolab and Lunar Outpost were selected for the initial phase of lunar rover development, Blue Origin for delivering these rovers to the Moon, and Firefly Aerospace for building spacecraft to transport NASA's MoonFall drones. These initiatives accelerate In-Situ Resource Utilization (ISRU) for water ice and metal extraction, and the development of Fission Surface Power systems, aiming for long-term lunar habitation and scientific exploration.

## IN DEPTH

### Key Findings

As part of the Artemis program, aimed at humanity's sustainable return to the Moon and the establishment of long-term lunar operations, NASA announced its first three lunar base missions (Moon Base I, II, and III) in May 2026. To support these missions, NASA has forged new partnerships with several private companies, including Astrolab, Lunar Outpost, Blue Origin, and Firefly Aerospace. This strategic move is designed to accelerate the development of In-Situ Resource Utilization (ISRU) and nuclear power systems on the lunar surface, thereby laying the groundwork for future lunar habitation and scientific exploration.

### Technical Details

Specifically, Astrolab and Lunar Outpost have been selected for the initial phase of developing lunar rovers tailored for operations in the lunar environment. These rovers will play a crucial role in testing ISRU technologies, enabling the extraction of water ice and other valuable resources from lunar regolith (lunar soil). Blue Origin is tasked with providing the landing systems for safely and efficiently delivering these rovers to the lunar surface. Furthermore, Firefly Aerospace will manufacture the spacecraft responsible for transporting NASA's MoonFall drones to the Moon. Regarding power supply, a radioisotope power system named 'Harmonia' is being developed in collaboration with Zeno Power to sustain operations during the harsh lunar night. Blue Origin's 'Blue Alchemist' program, adopted by NASA's Tipping Point initiative, is a commercial system for manufacturing solar panels from lunar regolith, contributing to the construction of self-sufficient infrastructure on the Moon. For the long term, the plan outlines the deployment of solar arrays and radioisotope power plants in Phase 2, followed by fission surface power systems in Phase 3, aiming for an evolved lunar power infrastructure capable of providing stable electricity even during extended lunar nights.

## Background and Industry Context

Lunar exploration is gaining increasing strategic importance as a stepping stone for human deep-space exploration and as a preparatory measure for potential depletion of Earth's resources. Establishing a sustainable presence on the Moon necessitates not just reliance on Earth-based supply chains, but maximized utilization of local resources through ISRU technologies, coupled with robust power systems capable of enduring the long, cold, and dark lunar nights. NASA's current partnerships aim to overcome these challenges by accelerating technology development and leveraging the expertise and capabilities of the commercial sector. Such public-private collaborations are seen as a new model for reducing the costs of space development and fostering innovation.

## Future Outlook

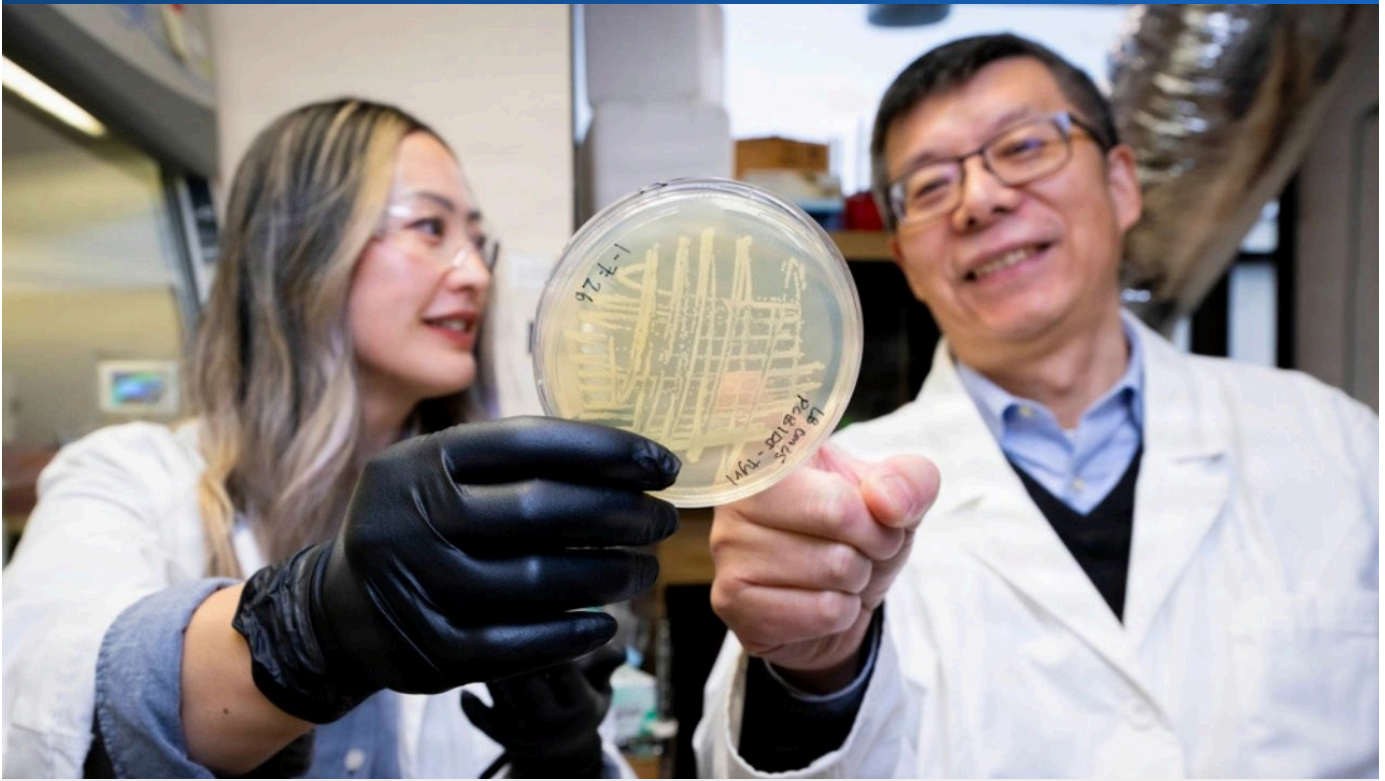
These lunar base missions and partnerships hold the potential to dramatically expand the scope and sustainability of human lunar activities. Advancements in ISRU and nuclear power technologies are essential for achieving self-sufficiency in food, oxygen, fuel, and construction materials on the Moon, thereby increasing the feasibility of future lunar cities and crewed missions to Mars. This initiative will not only accelerate scientific discovery but also contribute to the creation of a new space economy. Specifically, resolving the challenge of long-term lunar night power supply will enable continuous scientific observation and exploration, marking a significant step toward the commercial utilization of water ice in the Moon's polar regions.

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Source: <https://www.nasa.gov/reference/moonbase-about/>

# Microgravity Biomanufacturing and Materials Science Accelerate: Breakthroughs in Microbes, Plants, and Semiconductors Unlocked in Space

Published June 04, 2026 ISS National Lab USA



## OVERVIEW

Research in microgravity biomanufacturing and materials science is accelerating, yielding innovative results in fields like microbes, plants, and semiconductors. ISS National Lab-supported studies revealed that microgravity hinders microbial nutrient uptake but offers vital clues for designing future space-based biomanufacturing systems. UC San Diego developed methods for astronauts to produce medicines on-demand using plants, while Space Forge demonstrated semiconductor production in microgravity with properties unattainable on Earth. These breakthroughs significantly impact drug development, disease modeling, and high-quality material creation.

## IN DEPTH

### Key Findings

Research in microgravity biomanufacturing and materials science is rapidly advancing, with innovative results reported in drug development, disease modeling, and the creation of high-quality materials and semiconductors. A study supported by the International Space Station (ISS) National Laboratory and conducted by the U.S. Naval Research Laboratory (NRL) identified a 'missing link': microgravity hinders nutrient uptake by engineered microbial cells, thereby limiting their capacity to produce useful materials. However, this finding simultaneously suggests crucial clues for designing next-generation biological production systems for future space-based biomanufacturing.

### Technical Details

- **Microbial Biomanufacturing:** NRL researchers studied *E. coli* genetically engineered to produce melanin, a pigment protecting cells from radiation and stress, aboard the ISS. This research demonstrated that microgravity significantly impacts microbial metabolism and biosynthesis efficiency, highlighting the need for new strategies to enhance nutrient uptake efficiency in space bioproduction. Subsequent projects, like the MELSP project launched to the ISS in November 2023, aim to overcome these challenges and pave the way for manufacturing materials that protect astronauts and spacecraft systems.
- **Plant-Derived Pharmaceuticals:** Research by engineers at the University of California San Diego demonstrated the potential for astronauts to produce medicines on-demand using plants during long-duration space missions. This study developed a simple method to grow and repeatedly harvest pharmaceuticals from plants under space-like conditions without destroying the plants or generating significant waste. This could revolutionize pharmaceutical self-sufficiency for missions in remote space.

- **High-Value Materials Science:** The microgravity environment, by suppressing buoyancy-driven convection and gravitational sedimentation, has been shown to enable the creation of superior quality crystals and fiber microstructures unattainable on Earth. A paper in the International Journal of Engineering Research & Technology explored how microgravity offers commercially viable manufacturing advantages over terrestrial processes for three high-value material systems: protein crystal growth for pharmaceutical drug discovery, ZBLAN heavy metal fluoride glass optical fibers, and pharmaceutical polymorph engineering. Companies like Space Forge are focusing on producing next-generation semiconductors with properties unachievable on Earth under microgravity, having secured £10 million in funding from the European Space Agency and demonstrated their technology with the ForgeStar®-1 mission.

## **Background and Industry Context**

The microgravity environment provides unique physical conditions unattainable on Earth, holding the potential for new breakthroughs in materials science, bioengineering, and pharmaceutical development. Decades of research on the International Space Station (ISS) have indicated applications across various fields, including antibody-drug conjugates, more targeted cancer therapies, disease modeling, tissue engineering, and therapeutic development. However, with the commercialization and eventual retirement of the ISS approaching, there is an increasing need for microgravity research on more diverse commercial platforms. This 'microgravity goldrush' indicates that space is being recognized not just as a frontier for exploration but as a new realm for industry and economic activity.

## Future Outlook

These advancements in microgravity research will profoundly impact future space exploration missions, the construction of lunar and Martian bases, and terrestrial industries. Space-based biomanufacturing offers new means to produce high-quality pharmaceuticals and materials more efficiently, fostering innovation across a wide range of sectors including medicine, electronics, and aerospace. Notably, the ability for astronauts to autonomously produce medicines during long-duration missions significantly enhances the feasibility of human deep-space exploration. Furthermore, high-value materials manufactured in microgravity could bring new competitive advantages to Earth-based industries. These breakthroughs are integral to shaping the expansion of the Low Earth Orbit (LEO) economy and the future of space-based innovation.

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Source: <https://issnationallab.org/press-releases/microbes-reveal-missing-link-in-space-manufacturing/>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# World Economic Forum Identifies Three Commercial Trends Driving the Space Economy Towards \$1.8 Trillion by 2035

Published June 10, 2026 World Economic Forum Switzerland



## OVERVIEW

The World Economic Forum predicts the space economy will reach \$1.8 trillion by 2035, identifying three key commercial trends driving its growth. These include space companies creating value through iterative services like connectivity, intelligence, and surveillance; national sovereignty driving long-term procurement and infrastructure spending for independent space capabilities; and commercial space firms outpacing government agencies in innovation due to lower costs, software-driven development, and specialized supply chains. These trends signal the space industry's transition from an experimental phase to a mature market.

### Key Findings

The World Economic Forum projects that the space economy will expand to a staggering \$1.8 trillion by 2035, identifying three major commercial trends that are propelling this significant growth. These trends highlight that space is no longer solely the domain of government-led exploration but is rapidly emerging as a vibrant commercial frontier deeply integrated with the terrestrial economy.

### Technical Details

The three commercial trends are as follows:

1. **Value Creation Through Iterative Space Services:** Space companies are increasingly focusing on recurring service models that deliver direct value to Earth-based customers, such as satellite internet connectivity, Earth observation intelligence, and space domain awareness surveillance. This shift fosters the growth of businesses generating continuous revenue streams rather than one-off launch or development projects.
2. **National Sovereignty Driving Space Capability Investments:** Nations worldwide consider independent access to and capabilities in space as a critical component of national sovereignty. This perspective stimulates long-term government procurement contracts and substantial investments in foundational space infrastructure, including launch services, satellite manufacturing, and ground station networks. This trend is particularly evident among emerging space nations.
3. **Rapid Innovation from the Commercial Sector:** Commercial space companies are demonstrating significantly faster development and deployment cycles compared to traditional government agencies. This acceleration is achieved through leveraging lower-cost launch solutions, adopting software-driven development approaches, and utilizing specialized supply chains. Consequently, new products and services are brought to market quickly, accelerating the overall evolution of space technology.

These trends are effectively breaking down conventional barriers to space development, enabling a broader array of players to enter and thrive in the space market.

## Background and Industry Context

The growth of the space economy is underpinned by technological innovation, increased investment, and rising global demand. Advances in small satellite technology and reductions in launch costs, in particular, have democratized access to space and enabled new business models. Historically, space development was dominated by high-cost, high-risk projects led by national agencies. Today, private companies like SpaceX are increasingly taking on this role, accelerating market-driven innovation. This shift indicates that the space industry is moving its focus from purely military and scientific domains towards commercial services that directly impact terrestrial life and economies.

## Future Outlook

These commercial trends are expected to continue driving the expansion of the space economy robustly. Companies are anticipated to integrate terrestrial technologies such as data analytics, AI, and cloud computing with space technologies to create even higher-value services. From a national security perspective, the utilization of commercial space services will become indispensable, further deepening public-private partnerships. For investors, the growth of the space economy signifies opportunities for substantial returns, with companies featuring sustainable and innovative business models poised for success. The space industry is transforming from a mere frontier into an integral component of the global economy.

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Source: <https://www.weforum.org/stories/2026/06/3-commercial-trends-driving-space-market/>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# U.S. Office of Space Commerce Publishes Latest Proposal to Enhance Transparency in Commercial Space Activity Authorization Process

Published June 09, 2026   Office of Space Commerce   USA



U.S. Office of Space Commerce (OSC)  
its latest proposals  
enhancing the transparency  
in commercial space  
activity approval processes

## OVERVIEW

The U.S. Office of Space Commerce (OSC) has released its latest proposal regarding the authorization process for commercial space activities. This proposal aims to significantly improve regulatory transparency and efficiency to further support the burgeoning commercial space sector. The OSC's Director of Policy and Advocacy discussed this proposal at the 'Space Policy Show' in March, explaining its key changes and potential impacts on the industry. This is expected to lower barriers to entry for space businesses and foster innovation.

## IN DEPTH

### Key Findings

The U.S. Office of Space Commerce (OSC) has publicly released its latest proposal concerning the authorization process for commercial space activities. This proposal aims to significantly enhance regulatory clarity, efficiency, and transparency to further support the rapidly growing commercial space sector. The OSC's Director of Policy and Advocacy discussed this proposal in detail at the 'Space Policy Show' in March 2026, outlining its objectives and potential impacts on the industry.

### Technical Details

The published proposal includes specific changes designed to streamline the authorization application process for commercial space missions. These likely include simplifying application forms, reducing review timelines, and clarifying the legal and regulatory frameworks for companies launching new space activities. The focus is on alleviating regulatory uncertainties faced by companies deploying satellite constellations or offering in-orbit services such as repair, refueling, and debris removal. This initiative aims to create an environment where technological innovation can be rapidly commercialized without being hindered by regulatory delays.

### Background and Industry Context

The U.S. government increasingly views the commercial space industry as a vital engine for economic growth and is actively reinforcing its support for its development. Historically, space activities were predominantly conducted by government agencies and military sectors. However, with the rise of private companies like SpaceX and Blue Origin, the space economy has entered a new phase. A key challenge has been that existing regulatory frameworks have struggled to keep pace with rapidly evolving technologies and diverse commercial activities. The OSC's current proposal is part of a strategic effort to bridge this regulatory gap and maintain U.S. leadership in the global commercial space market.

## Future Outlook

If adopted, this proposal will make operating commercial space businesses in the U.S. more predictable and efficient. This will enable startups to more easily introduce new technologies and services to the market, and investors to find more attractive investment opportunities. Improved authorization processes could also positively impact international cooperation in areas such as space debris management, space traffic management (STM), and in-orbit services, ensuring the sustainability and safety of space activities. The OSC's initiative is expected to be a crucial step in enhancing the competitiveness of the entire U.S. space industry ecosystem and fostering future growth in the space economy.

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Source: <https://space.commerce.gov/2026/>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# Canada's Lack of Commercial Space Legislation Deters Investment: Urgent Need for Government 'Anchor Tenancy' Policy

Published June 10, 2026 Macdonald-Laurier Institute Canada



MLI

## OVERVIEW

Canada's absence of a dedicated legal framework for commercial space activities deters investors and leads promising space companies to relocate to other countries with more favorable regulatory environments. The Macdonald-Laurier Institute emphasizes that a government 'anchor tenancy' policy, where the government acts as the first customer for new technologies and services, is crucial for fostering the space economy. This policy aims to cultivate not only technology but also the market itself, with the Canadian government's 'Comprehensive Startup Strategy Package' (May 2026) including pilot implementation and operational enhancement of this model.

### Key Findings

A critical issue facing Canada's burgeoning space sector has been highlighted: the absence of a dedicated legal framework for commercial space activities. This regulatory void is making domestic and international investors hesitant to fund Canadian space startups, resulting in many promising space companies relocating to other nations that offer more conducive regulatory environments. An analysis by the Macdonald-Laurier Institute suggests that implementing a government 'anchor tenancy' policy, where the government acts as the initial customer for new space technologies and services, is paramount for nurturing Canada's space economy and boosting its global competitiveness.

### Technical Details

The concept of 'anchor tenancy' involves the government providing long-term procurement contracts and support to help commercial space companies mitigate the risks associated with early-stage technology development and market entry. This mechanism provides private companies with a stable customer base and funding source, allowing them to concentrate on developing innovative space technologies, such as advanced satellite communications, Earth observation systems, and in-space resource utilization techniques. The model aims to cultivate not only the technology itself but also the market, thereby building a healthy domestic space industry ecosystem within Canada. From a legislative perspective, this calls for establishing comprehensive regulatory guidelines for commercial space activities, including launch and re-entry, satellite operations, space debris management, and liability issues.

## Background and Industry Context

Many nations are actively focusing on nurturing their space industries as new pillars of economic growth and national security, with the development of rapid and clear regulatory environments being key to competitive advantage. Countries like the United States, Europe, and Japan have been proactively introducing policies and legal frameworks to support their commercial space sectors. For instance, the U.S. has leveraged private companies like SpaceX as key partners in government procurement to accelerate innovation. While Canada's space industry possesses high technological potential, its existing legal framework, primarily the Remote Sensing Space Systems Act, is largely focused on research and development activities and is inadequately equipped to handle commercial and competitive space operations. This regulatory gap has been a major contributor to investment stagnation and company emigration.

## Future Outlook

There are signs of a policy shift, with the Canadian government incorporating the pilot implementation and operational enhancement of this anchor tenancy model into its 'Comprehensive Startup Strategy Package,' announced in May 2026. If successful, this initiative is expected to put Canada's space industry on a new growth trajectory. Clear legislation and active government engagement as a customer will provide the confidence necessary for domestic space companies to make bolder investments and compete in the global market. Through these efforts, Canada has the potential to transform from merely a technology-developing nation into a vibrant commercial space power, reaping both economic and national security benefits.

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Source: <https://macdonaldlaurier.ca/failure-to-launch-canadas-urgent-need-for-commercial-space-legislation-adam-a-janikowski-for-inside-policy/>

# India's TakeMe2Space Secures IN-SPACE Funding for AI-Powered Star Tracker to Reduce Import Dependency

Published June 11, 2026 E Scow India

## OVERVIEW

Indian space technology startup TakeMe2Space has secured funding from IN-SPACE (Indian National Space Promotion and Authorization Centre) to develop an AI-powered star tracker. Star trackers are essential components for artificial satellites to accurately determine their orientation and attitude in space. This project aims to reduce India's import dependency on critical space supply chain components and enhance indigenous technological self-reliance. This funding marks a significant step forward in fostering India's space technology ecosystem.

## IN DEPTH

### Key Findings

TakeMe2Space, an Indian space technology startup, has successfully secured funding from IN-SPACE (Indian National Space Promotion and Authorization Centre) for the development of an AI-powered star tracker. This strategic financial support is intended to bolster indigenous technological self-reliance within India's space industry and to reduce the nation's reliance on imported star trackers—a critical component essential for the precise navigation of artificial satellites.

### Technical Details

An AI-powered star tracker plays a crucial role in a spacecraft's attitude control and orbit determination systems. While conventional star trackers determine orientation based on pre-programmed star maps and known star positions, the integration of AI dramatically enhances real-time data processing capabilities. This allows for quicker and more accurate attitude correction, even in the event of unforeseen changes in the space environment or system malfunctions, thereby increasing mission reliability.

TakeMe2Space's AI technology is expected to improve spacecraft autonomy by enhancing star identification, space debris avoidance, and resilience against solar light interference. Furthermore, this technology is adaptable for missions involving CubeSats and other small satellites, which demand compact and lightweight solutions.

### Background and Industry Context

India is committed to strengthening its domestic capabilities in the space industry and enhancing its competitiveness in the global market. Historically, India has relied on imports for many high-precision space instruments. However, from the perspective of national security and economic self-reliance, indigenization of critical components has become an urgent priority. IN-SPACE was established by the Indian government to foster the commercial space sector and provides support for domestic startups and companies developing innovative space technologies. Funding for companies like TakeMe2Space is positioned as a key strategy to reinforce India's space ecosystem and increase the proportion of indigenous components in future space missions.

## Future Outlook

The development of an AI-powered star tracker by TakeMe2Space will significantly contribute to India's technological autonomy in the space industry. Successful implementation of this technology would enable India to substantially reduce its import dependency on spacecraft attitude control systems, leading to cost reductions for space missions. Moreover, highly autonomous star trackers are indispensable for future deep-space exploration and the operation of large satellite constellations. This funding is expected to be a significant milestone for TakeMe2Space to gain competitiveness in the international market and for India to establish itself as a global supplier of space technology.

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Source: <https://www.e-scow.org/first-dry/TakeMe2Space-Secures-INSPACE-Funding-to-Develop-AIPowered-Star-Tracker-Reducing-Import-Dependence-34-199>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# Multi-Omics Analysis Reveals Early Human Spaceflight Responses Across Commercial Missions Ax-2 and Ax-3, Illuminating Adaptation Pathways

Published June 04, 2026 bioRxiv Unknown



## OVERVIEW

A new study, released on bioRxiv, establishes a multi-omics integrated analysis of early human spaceflight responses from two independent commercial missions, Ax-2 and Ax-3. This research provides a foundational resource for understanding the impact of spaceflight on initial cellular and molecular adaptations. The insights gained are expected to contribute to developing novel strategies for mitigating health risks in future space travel, thereby enabling safer and more sustainable human deep-space exploration. This is critically important for addressing medical challenges as commercial spaceflight expands.

## IN DEPTH

### Key Findings

A pioneering study, published as a preprint on bioRxiv, has established a multi-omics integrated analysis of early human spaceflight responses from two independent commercial space missions: Ax-2 and Ax-3. This research offers a foundational resource for comprehensively understanding the initial adaptive processes that spaceflight induces in the human body at cellular and molecular levels. The insights gleaned are poised to be indispensable for mitigating health risks in future space travel and developing novel strategies for achieving safer and more sustainable human deep-space exploration.

### Technical Details

The study employed an integrated analysis of multiple omics datasets, including genomics, transcriptomics, proteomics, and metabolomics. This approach enabled a detailed mapping of changes in gene expression, protein levels, and metabolic products from astronaut samples such as blood, urine, and saliva. Although the Ax-2 and Ax-3 missions were of short duration, this research identified changes in biomarkers during the early stages of spaceflight, suggesting alterations in cellular stress responses, immune function, and early changes in bone density and muscle mass. Comparative analysis revealed commonalities in adaptation patterns, despite individual variations, indicating that these data can inform future astronaut selection criteria, personalized medicine strategies, and the development of countermeasures.

### Background and Industry Context

As the era of commercial spaceflight fully dawns, the prospect of a more diverse range of individuals, including private citizens, traveling to space is increasing. However, the space environment, particularly microgravity, radiation, and confined-habitat stress, is known to induce various physiological effects on the human body. Traditional space medicine research has primarily been limited to government agency astronauts, but data from commercial missions provide valuable opportunities to understand the health impacts of spaceflight across a more diverse population. This research, akin to how ISS studies contribute to improved drug development, disease understanding, and high-quality material creation, accelerates biotechnology and medical breakthroughs in space.

## Future Outlook

The results of this multi-omics analysis are expected to guide new approaches to human health management and performance optimization during spaceflight. Specifically, elucidating the mechanisms of early adaptation can contribute to the development of intervention strategies for long-duration missions and the improvement of rehabilitation protocols for astronauts returning to Earth. Furthermore, these findings will serve as crucial guidelines for establishing safety standards in commercial spaceflight, supporting the sustainable growth of the entire space industry. For future lunar bases and crewed missions to Mars, on-demand medical care and personalized preventative measures will be essential for maintaining astronaut health, thus comprehensive biological data from research like this is expected to play a decisive role in expanding humanity's deep-space exploration frontiers.

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Source: <https://www.biorxiv.org/content/10.64898/2026.06.01.729304v1.full>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# U.S. Chamber of Commerce Strongly Backs Expanded COCOM Direct Access to Commercial Space Services, Enhancing National Security

Published June 11, 2026 U.S. Chamber of Commerce USA



## OVERVIEW

The U.S. Chamber of Commerce, in a letter to Congress regarding the DoD's FY2027 appropriations bill, expressed strong support for expanding combatant commands' (COCOM) direct access to commercial space services. This policy aims to promote investment in commercial technologies and services for critical missions like surveillance, reconnaissance, and tracking (SRT), securing operational advantages. By providing real-time critical information to warfighters, especially in contested environments, it enhances national security, signaling the recognition of the commercial space industry as an integral component of defense.

## IN DEPTH

### Key Findings

The U.S. Chamber of Commerce has conveyed a letter to Congress regarding the Department of Defense's (DoD) Fiscal Year 2027 appropriations bill, expressing strong support for expanding combatant commands' (COCOM) direct access to commercial space services. This endorsement underscores the critical importance of integrating commercial space technologies into vital missions such as surveillance, reconnaissance, and tracking (SRT) to enhance national security, particularly in contested environments. Investing in commercial SRT capabilities is expected to provide warfighters with real-time, crucial information, thereby ensuring operational superiority.

### Technical Details

Expanded direct access for COCOMs to commercial space services will enable the utilization of various advanced technologies for national defense. These include high-resolution Earth observation, broadband satellite communications, space domain awareness, and autonomous in-orbit services. For instance, commercial satellite constellations can provide high-frequency, global coverage imagery and data, facilitating real-time intelligence gathering that traditional military satellites often struggle to achieve. This capability allows COCOMs to make rapid decisions and execute tasks more effectively, such as tracking targets, monitoring troop movements, and assessing adversary activities. Furthermore, commercial space services offer advantages in faster development and deployment cycles, alongside being more cost-effective than traditional military systems.

### Background and Industry Context

In the current geopolitical landscape, space is increasingly recognized as a critical domain for conflict, making space superiority a top national security priority. The U.S. Department of Defense acknowledges the rapid development of space capabilities by competitors like China and Russia and is actively seeking to integrate commercial space innovation into its national security strategy. The U.S. Chamber of Commerce's support indicates that the commercial space industry is perceived not merely as an economic asset but as an indispensable strategic partner in national defense. This deepening public-private partnership is a crucial step for the DoD to build a more robust and resilient space infrastructure.

## Future Outlook

Expanding COCOMs' direct access to commercial space services is expected to significantly enhance U.S. national security capabilities. This will allow the DoD to more quickly adopt the latest commercial technologies and implement innovative solutions. Concurrently, for commercial space companies, this policy shift, effectively establishing the government as an 'anchor tenant,' provides a stable revenue stream and long-term growth opportunities. This pivot is anticipated to stimulate investment across the entire space industry, accelerate technological innovation, and ultimately lay a critical foundation for securing U.S. space dominance. As space-based information will play a decisive role in future conflicts, this commercial integration holds immense strategic significance.

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Source: <https://www.uschamber.com/security/u-s-chamber-support-for-cocom-direct-access-to-commercial-space-services>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# Coral Capital Joins Anduril's \$5 Billion Series H Funding Round, Bolstering Japan's Space & Defense Startups to Strengthen US-Japan Alliance

Published June 10, 2026 Coral Capital Japan



## OVERVIEW

Coral Capital participated in the \$5 billion Series H funding round for Anduril Industries, a U.S. next-generation defense technology company. This investment is strategically significant for strengthening the US-Japan alliance and maintaining peace and stability in the Indo-Pacific. Japanese startups are also innovating in defense tech, producing 500°C-resistant diamond semiconductors for space communications and radar. Coral Capital is accelerating this trend by expanding investments in deep tech startups in Japan, fueling the growth of Japan's defense and space industries.

### Key Findings

Coral Capital, a Japanese venture capital firm, has announced its participation in the \$5 billion Series H funding round for Anduril Industries, a leading U.S. next-generation defense technology company. This strategic investment is seen as a pivotal moment for strengthening the US-Japan alliance and contributing to peace and stability in the Indo-Pacific region. Simultaneously, Japanese deep tech startups are making remarkable progress in the defense technology sector, including the development of innovative technologies such as 500°C-resistant diamond semiconductors for space communications and radar systems. By supporting such technological advancements in Japan, Coral Capital is actively accelerating the growth of the nation's defense and space industries.

### Technical Details

Anduril Industries is renowned for developing defense solutions that integrate AI, autonomous systems, and sensor technologies. This latest funding round will enable the company to expand its product portfolio and accelerate its global deployment. Concurrently, the 500°C-resistant diamond semiconductors developed by Japanese startups hold the potential to significantly enhance the reliability and performance of electronic devices in extreme environments. Such high thermal resistance is crucial for communication satellites, radar systems, and exploration probes operating in space or high-temperature, high-radiation conditions. Diamond semiconductors offer superior thermal conductivity, higher electric field strength, and radiation resistance compared to silicon-based counterparts, making them essential foundational materials for next-generation space and defense systems. Coral Capital aims to bridge technological gaps and reinforce industrial competitiveness through investments in Japanese startups possessing these cutting-edge technologies.

## Background and Industry Context

The security environment in the Indo-Pacific region is rapidly evolving, making the assurance of technological superiority a key to national defense. The US-Japan alliance is a cornerstone of stability in this region, and defense technology cooperation between the two nations is becoming increasingly vital. The U.S. government is accelerating the adoption of innovative commercial defense technologies, with companies like Anduril at the forefront. Concurrently, the Japanese government is also strengthening support for deep tech startups through initiatives like the 'Comprehensive Startup Strategy Package' to revitalize its defense industry. Coral Capital's investment captures this global trend and the opportunity for Japan to contribute to international security through its unique technological strengths.

## Future Outlook

The investment in Anduril and ongoing support for Japanese deep tech startups will mutually strengthen the defense capabilities of both the U.S. and Japan, playing a crucial role in maintaining technological superiority. Specifically, technologies developed by Japanese startups, such as high-thermal-resistant semiconductors, will enable new defense applications and operations in harsher space environments. This is expected to contribute to enhanced security in space communications, improved radar detection capabilities, and the construction of future space defense infrastructure. This collaboration paves the way for Japan's space and defense industries to be deeply integrated into international supply chains and innovation ecosystems, creating new growth opportunities.

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Source: <https://coralcap.co/2026/06/accelerating-japan-with-anduril/?lang=en>

# University of Twente Integrates Additive Manufacturing, Boiling Heat Transfer, and Electric Field Control in Microgravity Smart Surface Research

Published June 05, 2026 University of Twente Netherlands



## OVERVIEW

A research team at the University of Twente, led by Davoud Jafari, completed a series of parabolic flight experiments to investigate advanced smart surfaces under rapidly changing gravity conditions. This groundbreaking campaign successfully integrated three critical technologies—additive manufacturing, boiling heat transfer, and electric field control—into a single experimental setup. The findings offer new insights into thermal management and materials manufacturing techniques in microgravity, potentially contributing to the design of future spacecraft and lunar bases, particularly paving the way for more efficient heat exchangers and adaptive materials.

## IN DEPTH

### Key Findings

A research team from the University of Twente in the Netherlands, under the leadership of Davoud Jafari, successfully completed a series of parabolic flight experiments to investigate the behavior of advanced smart surfaces in microgravity environments. This innovative research is groundbreaking in its integration of three previously studied, critical technologies—additive manufacturing (3D printing), boiling heat transfer, and electric field control—into a single experimental platform. This integrated approach has provided new perspectives on addressing thermal management and materials manufacturing challenges in space.

### Technical Details

Parabolic flights are an experimental method that creates temporary microgravity conditions as an aircraft traces a parabolic trajectory. In this campaign, specially designed experimental setups were used to evaluate the performance of smart surfaces under rapidly changing gravity. Specifically, microstructured surfaces were created using additive manufacturing techniques, and boiling heat transfer processes were observed on these surfaces. Furthermore, electric field control technology was integrated to actively manipulate liquid behavior and the formation and movement of bubbles by applying external electric fields. This integrated experiment yielded valuable data on how microgravity affects these physical phenomena and how they can be optimized. The insights gained are directly applicable to improving the efficiency of heat exchangers and developing smart materials adapted to extreme environments in future spacecraft and lunar bases.

## Background and Industry Context

With the acceleration of long-duration space exploration and the push towards constructing lunar and Martian bases, efficient thermal management and reliable materials manufacturing in space environments have become critically important challenges. In microgravity, the absence of buoyancy-driven convection significantly alters heat transfer mechanisms compared to Earth. Moreover, advanced heat exchange technologies are essential for stabilizing the internal environments of spacecraft and habitat modules. This research holds the potential to offer innovative solutions to these challenges by combining optimized surface structures produced through additive manufacturing with fluid manipulation via electric field control. This aligns with the European Space Agency (ESA)'s initiative to strengthen European leadership in in-space operations and services.

## Future Outlook

The findings from the University of Twente's research are expected to have a significant impact on the design of thermal management systems for future space missions and the advancement of sophisticated manufacturing processes in space. Smart surfaces with improved heat transfer capabilities will contribute to the miniaturization and weight reduction of spacecraft, decreased power consumption, and enhanced system reliability in harsh space environments. This is particularly relevant for improving the performance of cooling systems and energy conversion devices utilized on the lunar and Martian surfaces. The knowledge gained from this research will not only improve astronaut comfort and safety and increase the sustainability of deep-space exploration but also has potential applications in terrestrial industries, such as electronics and energy systems operating under extreme conditions.

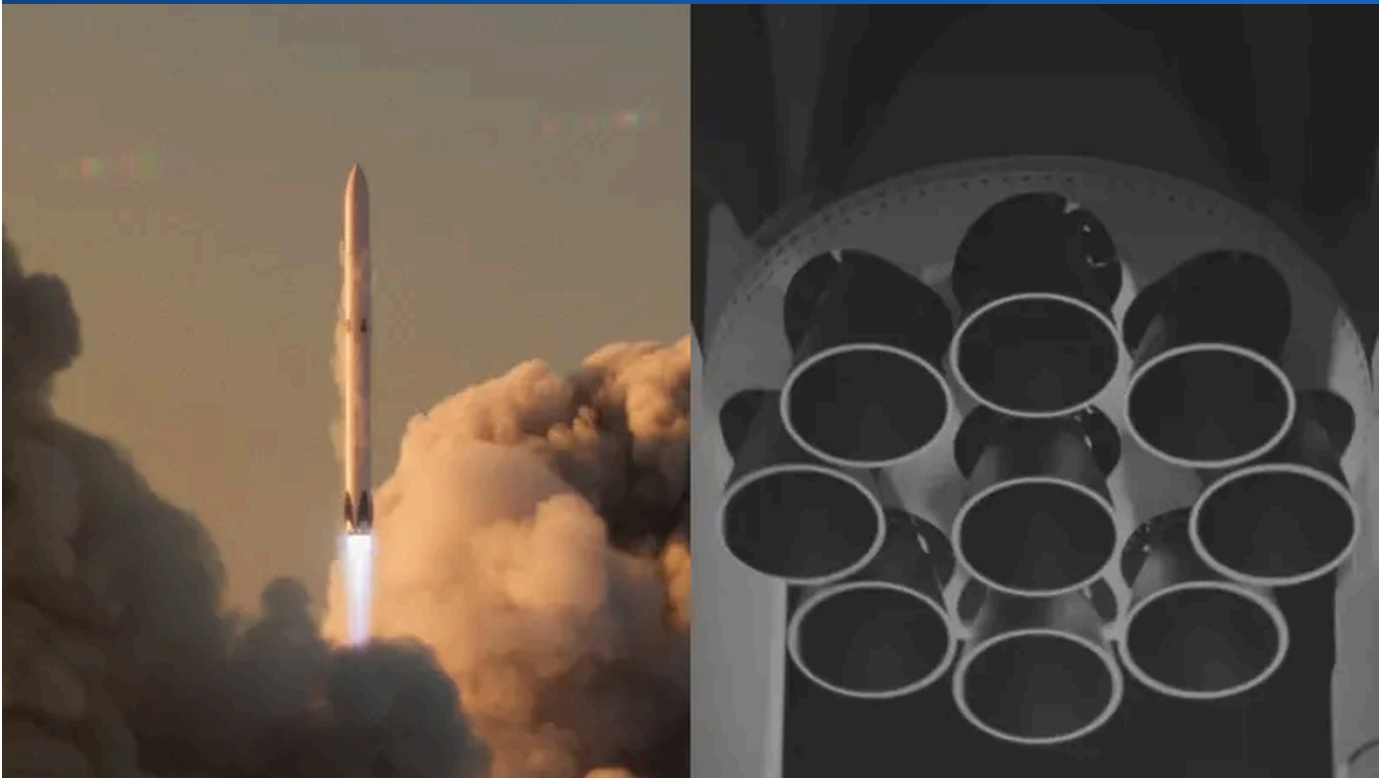
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Source: <https://www.utwente.nl/en/news/2026/6/938933/testing-smart-surfaces-in-zero-gravity>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# The Exploration Company Unveils 'Yrene' Reusable Heavy-Lift Rocket and Storm Engine to Bolster European Space Access

Published June 04, 2026 European Spaceflight ヨーロッパ



## OVERVIEW

European aerospace firm The Exploration Company has announced the development of 'Yrene,' a reusable heavy-lift rocket powered by its proprietary Storm engine. This initiative, revealed via a website update, aims to bolster Europe's self-sufficiency in space launch and transport services, making access to space more affordable and sustainable. The company, already developing its reusable Nyx space capsule, plans to formally unveil the Storm engine at the International Aerospace Exhibition on June 10.

## IN DEPTH

### Key Findings

The Exploration Company, a prominent European space firm, has announced its embarkation on the development of 'Yrene,' a reusable heavy-lift rocket powered by its proprietary Storm engine, through updates on its website. This new development proceeds in parallel with the ongoing development of the reusable 'Nyx' space capsule, marking a significant step towards bolstering Europe's self-sufficiency and competitiveness in space launch and transport services. The Storm engine is scheduled to be publicly unveiled for the first time at the International Aerospace Exhibition on June 10, 2026.

### Technical Details

The reusable heavy-lift rocket 'Yrene' is projected to feature multiple high-performance, liquid-fueled 'Storm' engines, developed by The Exploration Company. These engines are designed to combine high efficiency with reliability, aiming to maximize rocket reusability and significantly reduce launch costs. The design philosophy of the Yrene rocket, similar to SpaceX's Falcon 9 and Starship, centers on the reusability of the first-stage booster through vertical landing. This approach minimizes the time and cost associated with refurbishing rocket components and enables increased launch frequency. Furthermore, the company's existing 'Nyx' reusable capsule, which possesses capabilities for in-orbit cargo transfer and payload return to Earth, aims to provide a more comprehensive space transportation solution when integrated with Yrene.

### Background and Industry Context

Currently, the global space launch market is predominantly led by U.S. companies like SpaceX, with Europe trailing in indigenous heavy-lift rocket development and reusable technologies. While the European Space Agency (ESA) and national governments are advancing next-generation rockets like Ariane 6, there's growing recognition that private-sector innovation and the adoption of reusable technologies are indispensable for securing truly 'autonomous access to space.' The emergence of startups like The Exploration Company and the development of reusable heavy-lift rockets such as Yrene are viewed as strategic moves for Europe to bridge this gap and regain competitiveness in the global market. This initiative is expected to contribute to the revitalization of the entire European space industry ecosystem.

## Future Outlook

The development of the Yrene rocket by The Exploration Company holds the potential to significantly transform Europe's space transport capabilities. The realization of an affordable, reusable heavy-lift rocket would dramatically reduce the cost for European government agencies and commercial clients to access space, enabling a wider array of missions. While Yrene is currently conceptualized as a long-term project, the company is taking steady steps toward its realization by focusing on the Nyx capsule and propulsion technology development in the short to medium term. This success is a crucial element for Europe to establish self-sufficiency and global leadership in the space sector, and its future development progress will be closely watched by the international community.

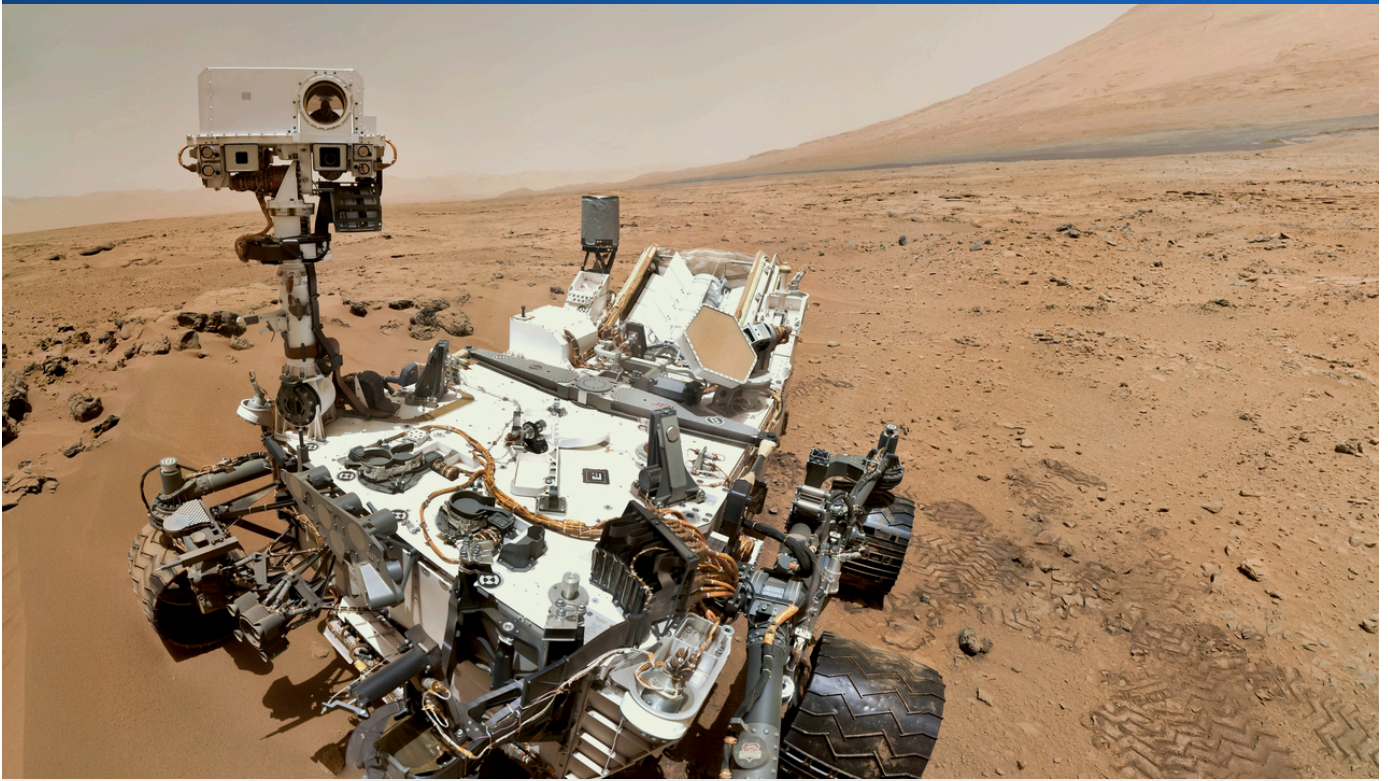
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Source: <https://europeanspaceflight.com/the-exploration-company-is-developing-a-reusable-heavy-lift-rocket/>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# U.S. Department of Energy Highlights History and Importance of Space Nuclear Power, from 1961 Transit 4A to Current Curiosity Rover

Published June 04, 2026   Department of Energy   USA



## OVERVIEW

The U.S. Department of Energy (DOE) detailed the rich history and critical importance of nuclear power in space, spanning from the 1961 Transit 4A satellite's Radioisotope Thermoelectric Generator (RTG) to the current Curiosity Mars rover. RTGs, reliable systems converting plutonium-238 decay heat into electricity without moving parts, are essential for deep-space missions. The article emphasizes the pivotal role of nuclear power in lunar and outer-planet exploration, underscoring the future promise of space nuclear power as NASA plans its 2028 Mars nuclear spacecraft and DOE boosts plutonium production.

## IN DEPTH

### Key Findings

The U.S. Department of Energy (DOE) has provided a detailed account of the long history of nuclear power in space and its indispensable role in deep-space exploration and future lunar and Martian bases. From the first Radioisotope Thermoelectric Generator (RTG) deployed on the Transit 4A satellite in 1961 to the modern Curiosity Mars rover, nuclear power systems have enabled sustained electricity supply in environments beyond the reach of solar energy. This technology offers a decisive advantage for space missions, particularly for outer-planet exploration and long-duration lunar missions, due to its lack of moving parts and high reliability.

### Technical Details

At the core of RTGs is the conversion of heat generated by the radioactive decay of Plutonium-238 (Pu-238) directly into electrical energy using semiconductor thermoelements via the Seebeck effect. Pu-238 has a long half-life of 87.7 years, ensuring a stable heat source over extended periods. This capability allows probes and rovers to receive continuous power in challenging environments such as deep space where solar panels are ineffective, during prolonged lunar nights, or amidst Martian dust storms. Currently, the DOE is expanding its production scale to meet NASA's request for an annual production target of 1.5 kg of Pu-238 by 2026. Furthermore, space nuclear reactor systems are under development, with NASA planning to launch the 'Space Reactor-1 (SR-1) Freedom' nuclear-powered spacecraft to Mars by late 2028. These systems are expected to provide significantly more power than conventional RTGs, contributing to nuclear electric propulsion (NEP) that drastically reduces travel times to Mars and to lunar surface power systems.

## Background and Industry Context

The history of space nuclear power spans from early scientific missions, powering lunar experiments during the Apollo program, to deep-space probes like Pioneer, Voyager, Galileo, Cassini, and Mars rovers Perseverance and Curiosity, underpinning numerous successes. These missions have demonstrated the extreme reliability of RTGs as a power source. However, after the Cold War, plutonium production scaled down, leading to limited supplies. The new frontiers of space exploration today, especially initiatives like the Artemis program aiming to establish a sustainable human presence on the Moon and Mars, are creating a renewed demand for more robust, high-power space nuclear systems. In response, the DOE is re-invigorating plutonium production and paving the way for the development of next-generation space nuclear technologies.

## Future Outlook

Space nuclear power is a technology that will fundamentally transform the possibilities of future space exploration. The continued use of RTGs and the development of higher-power space nuclear reactors will enable missions to remote destinations previously unreachable by humans, long-duration deep-space travel, and sustainable base operations on the Moon and Mars. Nuclear-powered spacecraft like NASA's 'SR-1 Freedom' will reduce travel times to Mars by several months, expanding options for scientific payloads and human missions. Lunar fission surface power systems will also provide stable energy during the long, cold, and dark lunar nights, dramatically increasing the potential for lunar In-Situ Resource Utilization (ISRU) and scientific observation. The advancement of this technology is expected to contribute to the overall development of the space industry and accelerate humanity's expansion into the cosmic frontier.

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Source: <https://www.energy.gov/articles/history-nuclear-power-space>

# Solidion Technology Unveils Graphene-Enabled Extreme-Climate Battery (Gen-ECB) for Orbital AI Data Centers, Lunar, and Deep Space Applications

Published June 04, 2026   Dallas Innovates   USA



## OVERVIEW

Dallas-based Solidion Technology announced its 'Generation Extreme-Climate Battery (Gen-ECB)' platform, designed for orbital AI data centers, lunar infrastructure, crewed spacecraft, and deep-space exploration. This innovative battery leverages graphene's high thermal conductivity and radiation resistance to provide reliable power delivery across extreme temperatures from  $-80^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ . Solidion's CEO emphasizes this technology's crucial role in supporting expanding commercial space activities, including SpaceX's IPO and NASA's Artemis program, by addressing the harsh conditions of space.

### Key Findings

Dallas-based Solidion Technology has unveiled its 'Generation Extreme-Climate Battery (Gen-ECB)' platform, specifically engineered for deployment in extreme space environments, including orbiting AI data centers, lunar infrastructure, crewed spacecraft, and deep-space exploration. This groundbreaking battery technology harnesses the superior thermal conductivity and inherent radiation resistance of graphene, enabling it to deliver unparalleled reliability and stability across an extreme temperature range of  $-80^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ .

### Technical Details

The core innovation of the Gen-ECB battery platform lies in its adoption of graphene as a primary material. Graphene is recognized as one of the world's most thermally conductive materials, a property that significantly contributes to managing severe thermal cycling in space. Furthermore, graphene offers excellent radiation resistance, protecting battery cells from ionizing radiation caused by solar flares and cosmic rays, thereby substantially extending reliability and lifespan for long-duration missions. Similar to EnduroSat's CubeSat Electrical Power System (EPS), which aims for up to 437W of continuous power with configurable Li-Ion battery packs, the Gen-ECB integrates comprehensive protection features against overvoltage, undervoltage, and overcurrent, along with passive and active thermal management capabilities. This ensures battery health and achieves the required extended mission life.

## Background and Industry Context

The space industry is undergoing a rapid expansion phase, driven by an increasing number of ambitious missions such as mega-constellations in Low Earth Orbit (LEO), lunar base construction, and deep-space exploration. These missions present new challenges that conventional space technologies cannot adequately address, particularly concerning long-term power supply in extreme environments and the reliability of electronics in high-energy radiation fields. Solidion Technology's Gen-ECB offers a direct solution to these challenges, providing technical underpinning for large-scale commercial and governmental endeavors like SpaceX's IPO and NASA's Artemis program. Current orbital data centers also face issues with sufficient power supply, thermal management, and radiation hardness; technologies like Gen-ECB are key to resolving these bottlenecks.

## Future Outlook

Solidion Technology's Gen-ECB battery holds significant potential to shape the future of the space industry. Reliable extreme-climate batteries will accelerate the realization of orbital AI data centers, enhance spacecraft autonomy, and make crewed missions to the Moon and Mars safer and more sustainable. Specifically, stable power supply and effective thermal management are crucial for running power-intensive AI workloads in space. This technology will further push the boundaries of space exploration, creating a foundation for new scientific discoveries and commercial opportunities. Solidion is actively collaborating with aerospace partners to integrate Gen-ECB into next-generation spacecraft and infrastructure, thereby accelerating this innovation.

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Source: <https://dallasinnovates.com/dallas-based-solidion-unveils-battery-tech-for-orbiting-ai-data-centers-the-moon-and-space/>

# GlobalFoundries and BAE Systems Collaborate on Radiation-Hardened 'RHBD' Chips, Ensuring Electronics Reliability for Deep Space Missions Including Artemis II

Published June 04, 2026   Design And Reuse (via GlobalFoundries)   USA



## OVERVIEW

GlobalFoundries and BAE Systems are collaborating to develop Radiation Hardened By Design (RHBD) semiconductor solutions capable of withstanding the harsh radiation environments of deep space. This technology is essential for ensuring the reliability of electronics in future crewed and uncrewed deep-space missions, including Artemis II. Their platforms offer high-performance, secure, low-power, and robust solutions for space applications, developing both RHBD and Radiation Hardened By Process (RHBP) technologies. This initiative addresses the challenges of space environments in semiconductor manufacturing, expanding the possibilities for space exploration.

## IN DEPTH

### Key Findings

GlobalFoundries and BAE Systems have established a strategic collaboration for the development of high-performance and highly reliable Radiation Hardened By Design (RHBD) semiconductor solutions, engineered to withstand the extreme radiation environments encountered in deep space exploration. This partnership ensures that electronics will consistently function under continuous radiation exposure, from current critical projects like the Artemis II lunar flyby mission to future lunar and Mars exploration endeavors. This initiative fundamentally strengthens the 'resilience, predictability, and reliability' of electronics in space.

### Technical Details

Beyond its RHBD technology portfolio, GlobalFoundries is also developing Radiation Hardened By Process (RHBP) techniques, which further enhance radiation tolerance through optimized doping implants and substrate materials. The RHBD approach integrates radiation immunity at the chip design stage, employing methods such as error correction codes, redundancy, and triple modular redundancy (TMR) to mitigate the risks of transient malfunctions (soft errors) and permanent damage (hard errors) caused by radiation events. Conversely, RHBP optimizes the semiconductor manufacturing process itself to suppress material degradation and characteristic changes due to radiation. The integration of BAE Systems' expertise in space-grade electronic system development with GF's semiconductor manufacturing technology delivers solutions for space applications characterized by high performance, security, low power consumption, and robust reliability.

## Background and Industry Context

The deep space environment, lacking the protection of Earth's magnetosphere, is extremely harsh, constantly exposed to high-energy ionizing radiation from solar proton events, galactic cosmic rays, and the Van Allen belts. This radiation can induce single-event effects (SEE) and total ionizing dose (TID) damage in semiconductor devices, leading to malfunction or failure. For crewed missions like the Artemis program, the absolute necessity for mission-critical electronic systems to operate accurately at all times is paramount, alongside astronaut safety. Therefore, conventional commercial off-the-shelf (COTS) components are insufficient, and the demand for specialized radiation-hardened chips is rapidly increasing. This challenge is also common in the development of orbital data centers and computer chips for autonomous spacecraft, with companies like AMD, Aitech Systems, and VORAGO Technologies also focusing on developing similar solutions.

## Future Outlook

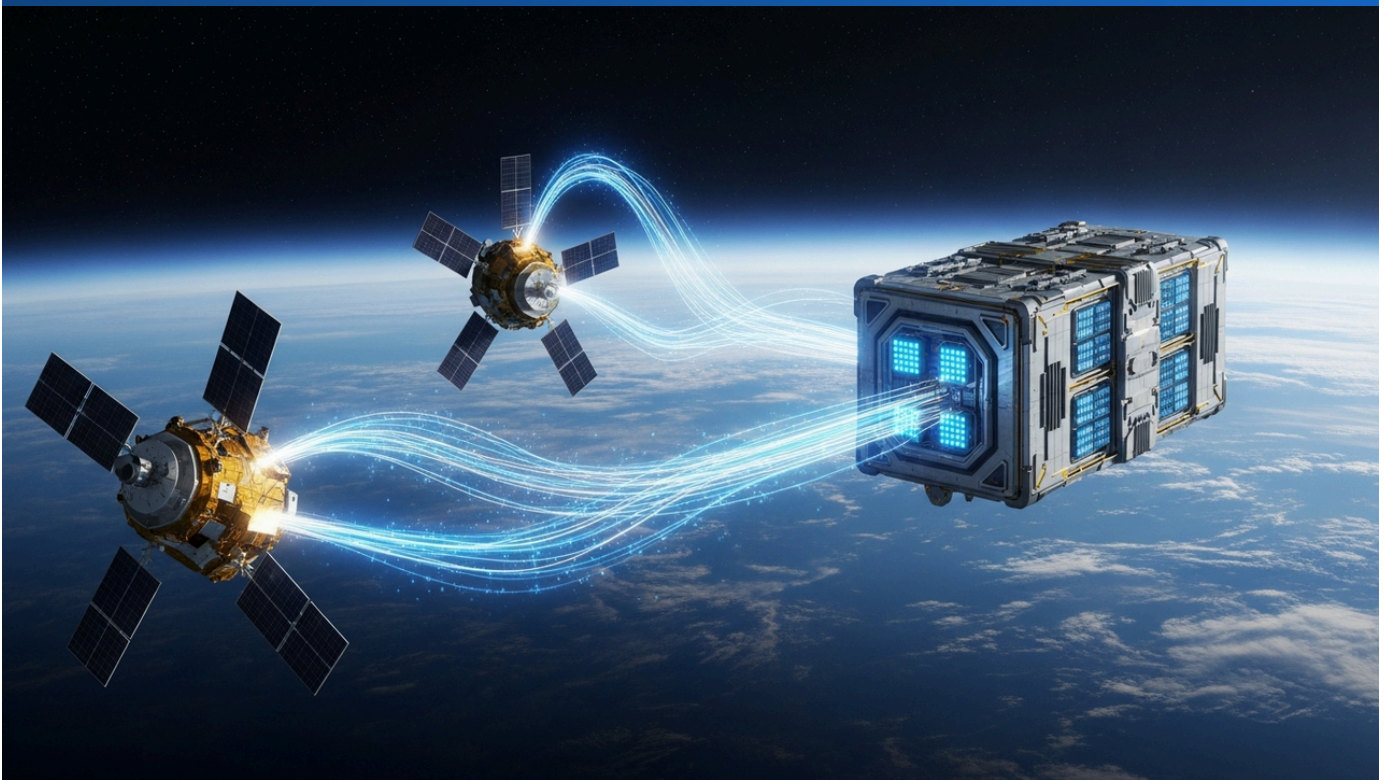
The collaboration between GlobalFoundries and BAE Systems will significantly expand the feasibility of future deep-space exploration. Advances in radiation-hardened chips will enable the design of more complex and longer-duration missions, fundamentally improving the reliability of electronic equipment for lunar bases and crewed missions to Mars. This not only enhances astronaut safety but also extends the operational life of scientific instruments, allowing for the collection of more scientific data. Furthermore, this technology will foster the application of edge computing and AI in space, contributing to the evolution of autonomous spacecraft. Ultimately, this initiative is expected to strengthen the technological foundation for humanity to safely and effectively expand its frontiers in space.

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Source: [https://www.design-reuse.com/blog/56344-from-artemis-ii-to-deep-space-why-space-grade-chips-must-be-built-for-the-harshest-conditions-/](https://www.design-reuse.com/blog/56344-from-artemis-ii-to-deep-space-why-space-grade-chips-must-be-built-for-the-harshest-conditions/)

# Orbital Data Centers Accelerate: SpaceX's AI1 Satellite, AWS, Azure, Google Drive In-Space AI Training and Cloud Connectivity

Published June 09, 2026 Tom's Hardware USA



## OVERVIEW

Leading companies are actively developing and deploying the first generation of orbital data centers and space data infrastructure. SpaceX, in particular, has unveiled the detailed design for its 'AI1 satellite,' an in-orbit AI data center with interchangeable chip payloads and a robust compute payload averaging 120 kW and peaking at 150 kW. Having applied to the FCC for a million-satellite data center constellation, the industry is shifting from experimental to commercial-scale deployment. AWS Ground Station provides 'satellite-as-a-service' infrastructure, Microsoft Azure Orbital offers cloud connectivity to satellites, and Google's Project Suncatcher aims to validate the feasibility of in-orbit AI training by 2027.

### Key Findings

Several major corporations are actively developing and deploying the first generation of orbital data centers and space data infrastructure, spearheading a paradigm shift in computing capabilities in space. SpaceX has unveiled the detailed design for its ambitious 'AI1 satellite,' an in-orbit AI data center, revealing it will feature interchangeable chip payloads and a powerful compute payload averaging 120 kW and peaking at 150 kW. The company has already filed an application with the FCC for a constellation of one million data center satellites, signaling the industry's transition from an experimental phase to commercial-scale deployment. AWS, Microsoft, and Google are also deploying their own space data services, aiming to enable in-space AI training and cloud connectivity.

### Technical Details

SpaceX's AI1 satellite is designed as an orbital aircraft intended to execute AI workloads independently from Earth's power grid, with a deployed wingspan reaching 70 meters, surpassing that of a Boeing 747-8. This large-scale deployment aims to dramatically increase in-orbit computational processing power. The realization of orbital data centers necessitates overcoming several technical challenges. Firstly, securing sufficient power sources, and secondly, advanced thermal management systems are required to efficiently dissipate the intense computational heat to the extreme vacuum and thermal cycles of space. Furthermore, robust radiation-hardened semiconductor designs and redundancy are crucial to ensure long-term reliability in the space radiation environment. Companies like AMD and Aitech Systems are developing solutions for thermal removal, radiation mitigation, and production-scale space-grade computing, while VORAGO Technologies has introduced radiation-tolerant microcontrollers. NEC is also building its first optical communication satellite constellation using AMD technology. Google's Project Suncatcher plans to launch test satellites by 2027 to validate the feasibility of in-orbit AI training.

## Background and Industry Context

Terrestrial data centers are facing limitations in terms of power consumption, cooling infrastructure, and physical security. Orbital data centers offer a potential solution to these challenges. The vacuum and low temperatures of space present opportunities for efficient thermal management, while radiation poses new challenges for electronic component design. The rapidly growing demand for AI and big data analytics increases the value of placing computational resources closer to data sources (satellites). Major cloud providers, AWS Ground Station and Microsoft Azure Orbital, are already offering cloud connectivity services to satellites, advancing the integration of space and terrestrial data ecosystems. This trend indicates that the space economy is being positioned as a new frontier for the data-driven economy.

## Future Outlook

The commercial-scale deployment of orbital data centers will have a revolutionary impact not only on the space industry but also on terrestrial fields such as AI, data analytics, and telecommunications. If platforms like SpaceX's AI1 satellite are realized, a portion of the power-intensive AI training conducted on Earth could be transferred to space, improving sustainability and efficiency. This would give rise to new services, including real-time processing of Earth observation data, more advanced in-space surveillance and analysis, and enhanced autonomy for spacecraft themselves. However, increasing space debris, ensuring cybersecurity, and establishing international regulatory frameworks remain critical challenges for future large-scale deployment. If these challenges are addressed, orbital data centers will become a major infrastructure to dramatically expand humanity's data processing capabilities and potential for space utilization.

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Source: <https://www.tomshardware.com/tech-industry/spacex-details-its-ai1-compute-satellite>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# EnduroSat Introduces Modular 437W EPS-I Power System to Extend CubeSat Mission Lifespans and Capabilities

Published June 04, 2026 satsearch ブルガリア



## OVERVIEW

Bulgarian space technology company EnduroSat has unveiled EPS-I, a modular Electrical Power System (EPS) for 6U to 16U CubeSats, capable of delivering up to 437W of continuous power. Designed to maximize mission lifespan, the system features configurable Li-Ion battery packs, comprehensive overvoltage/undervoltage/overcurrent protection, and integrated thermal management. This robust solution addresses the growing power demands of complex nanosatellite missions, enabling extended operations in challenging space environments.

### Background

In recent years, small satellites, particularly CubeSats and other nanosatellites, have become instrumental across a wide array of space missions, from Earth observation and communications to technology demonstrations. Their appeal stems from significantly lower costs and accelerated development cycles compared to traditional satellites. However, this miniaturization trend, coupled with the increasing sophistication and power demands of advanced payloads, has exposed limitations in conventional Electrical Power Systems (EPSs). These traditional systems often lack the versatility and scalability required for modern, power-hungry nanosatellite missions.

### Key Findings

EnduroSat, a leading Bulgarian space technology company, has introduced its innovative modular Electrical Power System (EPS) named 'EPS-I,' specifically engineered for 6U to 16U CubeSat missions. The EPS-I features configurable lithium-ion battery packs and boasts the capacity to supply up to 437W of continuous power. This system's introduction marks a significant advancement in enhancing the reliability and flexibility of power supply for small satellite missions, thereby enabling the execution of more demanding and complex operations.

### Technical Details

The EPS-I's modular architecture enables flexible configuration of both battery capacity and solar input, allowing it to precisely meet diverse mission power requirements. The system integrates high-performance lithium-ion battery packs, a versatile solar input interface, and an advanced charge and discharge control unit. A critical design feature is the inclusion of comprehensive protection mechanisms against overvoltage, undervoltage, and overcurrent, which are essential for preventing battery damage from overcharging or over-discharging and ensuring safe, reliable operation in the extreme space environment. Moreover, integrated passive and active thermal management capabilities maintain optimal battery operating temperatures, crucial for preserving battery health and achieving its targeted 5-year design lifespan. This robust system is specifically optimized for nanosatellite missions requiring high power delivery, such as those with multiple payloads or demanding onboard equipment.

## Industry Impact and Future Outlook

Modular, high-power systems like EnduroSat's EPS-I directly address this critical power gap, providing a foundational platform for space ventures to unlock new commercial opportunities and execute more complex, data-intensive missions. The advancement of in-space power supply solutions, much like Solidion Technology's extreme-climate batteries or NASA's ongoing development of High-Performance Spaceflight Computing chips, represents a pivotal area for the overall growth and innovation of the space industry. EnduroSat's EPS-I is poised to secure significant competitive advantages within the burgeoning CubeSat market. Its combination of high power delivery, robust protection features, and modular design will be instrumental in enabling more ambitious small satellite missions. This capability will empower research institutions, universities, and commercial entities to deploy advanced space experiments and services with reduced costs and risks. The successful adoption of EPS-I is expected to further expand the small satellite market and could potentially extend its application into deep-space missions, including lunar and Mars rovers or small interplanetary probes. Ultimately, EnduroSat's technology plays a crucial role in democratizing access to space and accelerating the pace of innovation across the global space sector.

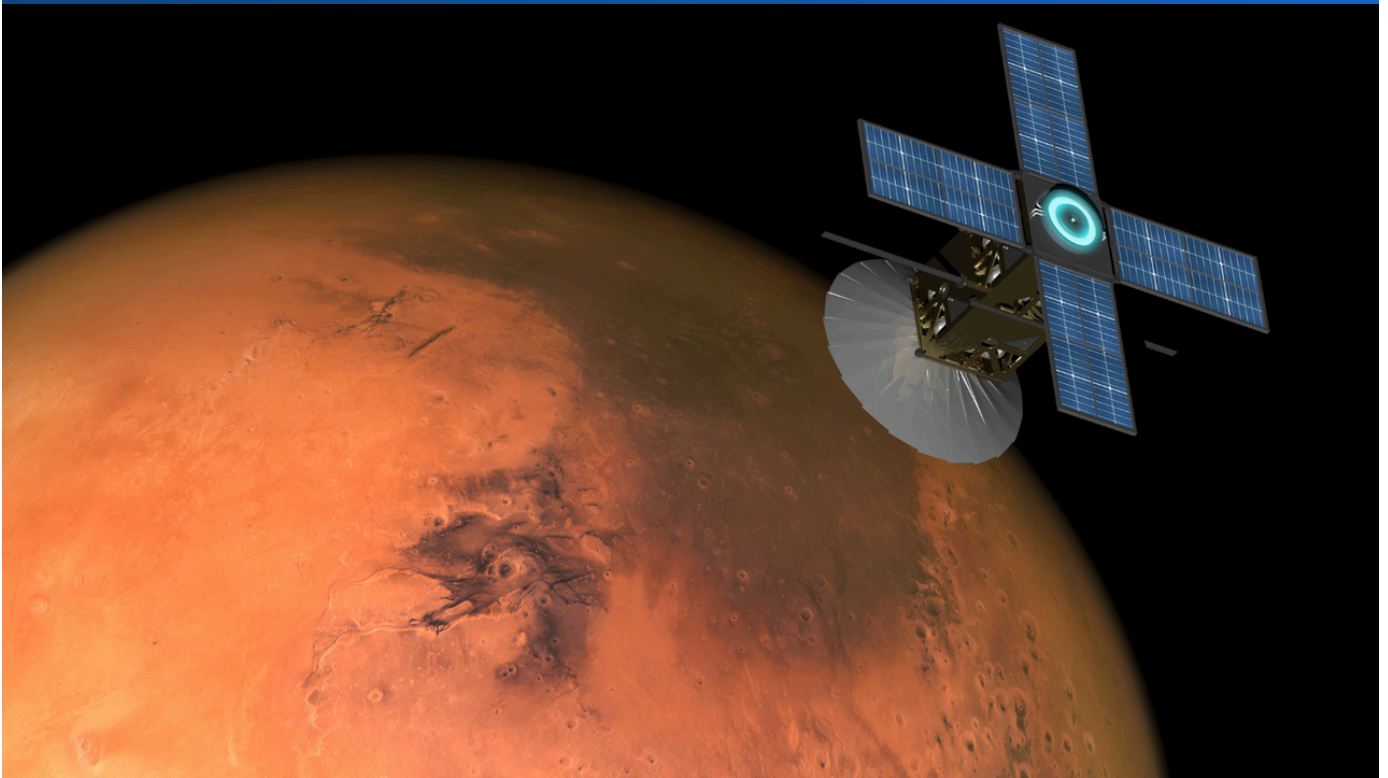
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Source: <https://satsearch.co/products/endurosat-eps-i-electrical-power-system>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# NASA Announces Plans to Launch Nuclear-Powered Spacecraft 'SR-1 Freedom' to Mars by 2028: Integrated Technology to Accelerate Deep Space Exploration

Published June 09, 2026   Space Daily   USA



## OVERVIEW

NASA has announced plans for the 'Space Reactor 1 (SR-1) Freedom' mission, aiming to launch a nuclear-powered spacecraft to Mars by late 2028. This rapid realization is achieved by integrating two previously separate programs: a research reactor from the U.S. Department of Energy and a spacecraft bus originally designed for a lunar space station. SR-1 Freedom will mark the first U.S. launch of a nuclear reactor into space in over 60 years, expected to demonstrate nuclear electric propulsion (NEP) technology, significantly reducing travel times to Mars, and paving the way for future lunar power systems and deep-space exploration as a pioneering design.

## IN DEPTH

### Key Findings

NASA has announced its intention to launch the 'Space Reactor 1 (SR-1) Freedom' mission, a nuclear-powered spacecraft destined for Mars, with a target launch window in late 2028. This groundbreaking project is being fast-tracked through a strategic integration of two previously distinct major programs: a research reactor developed by the U.S. Department of Energy and an existing spacecraft bus initially designed for a lunar space station. The SR-1 Freedom mission is set to be a landmark achievement, marking the first time the U.S. will launch a nuclear reactor into space in over 60 years. It is expected to demonstrate Nuclear Electric Propulsion (NEP) technology, which will significantly reduce travel times to Mars, and serve as a pioneering design for future lunar power systems and deep-space exploration.

### Technical Details

The core of the SR-1 Freedom mission is the integration of an advanced nuclear fission reactor with a Nuclear Electric Propulsion (NEP) system. This reactor will generate a substantial amount of electrical power, which will then feed into electric propulsion thrusters, accelerating the spacecraft with much higher efficiency compared to conventional chemical propulsion systems. NEP holds the potential to reduce transit times to Mars by several months, directly leading to reduced astronaut radiation exposure and optimized consumables usage during missions. The spacecraft bus, by repurposing a robust design originally developed for a lunar space station, significantly cuts down on development time and costs. This integrated approach presents a new model for rapidly realizing complex deep-space missions by combining existing technologies from disparate programs. As nuclear reactors can supply more power, they enable missions to remote areas with weak sunlight and provide reliable power for future lunar and Mars bases.

## Background and Industry Context

While the history of space nuclear power dates back to the RTG (Radioisotope Thermoelectric Generator) on the Transit 4A satellite in 1961, launching nuclear reactors into space has been approached with caution since the Cold War era due to safety and cost concerns. However, the ambitious goals of crewed lunar and Mars missions and the increasing demand for power in deep-space exploration have made the development of new space nuclear power technologies indispensable. The U.S. government is also considering legislation to establish frameworks for NASA to partner with commercial providers to advance space nuclear technologies critical for national lunar-to-Mars objectives. The SR-1 Freedom mission addresses these national strategies and technological imperatives, positioning itself as a crucial step in re-establishing U.S. preeminence in space.

## Future Outlook

The success of the SR-1 Freedom mission has the potential to fundamentally transform human deep-space exploration. Reduced travel times to Mars will not only enhance mission efficiency but also create more frequent exploration opportunities, accelerating the pace of scientific discovery. Furthermore, this technology will lay the foundation for sustainable power supply on the Moon, enabling long-term operations of lunar bases. In the future, NEP technology will be a critical element for missions to even more distant outer reaches of the solar system and for achieving crewed Mars exploration. This integrated approach is expected to provide new guidelines for optimizing resources and rapid execution in future space development projects, stimulating technological innovation across the entire space industry.

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Source: <https://spacedaily.com/sd-nasas-plan-to-put-a-nuclear-reactor-on-a-mars-bound-spacecraft-by-2028-sounds-impossible-until-you-realize-the-agency-is-quietly-stitching-together-two-programs-that-were-never-supposed-to-meet/>

# SpaceX Breaks Reusability Record with 35th Falcon 9 Booster Landing, Expanding Starlink Constellation

Published June 08, 2026   Space.com   USA



## OVERVIEW

SpaceX achieved a new reusability record by successfully launching and landing a Falcon 9 rocket's first-stage booster for the 35th time. This historic mission deployed 29 new Starlink satellites into Low Earth Orbit, expanding the Starlink mega-constellation to over 10,580 active satellites. This Falcon 9 reusability feat approaches NASA's Space Shuttle orbiter's record of 39 reuses, dramatically reduces cost per kilogram to orbit, and is central to SpaceX's potential \$1.75 trillion IPO. This success clearly demonstrates how reusable rocket technology is reshaping the space economy.

## IN DEPTH

### Key Findings

SpaceX has set a new world record for rocket reusability, successfully launching and landing the first-stage booster of its flagship Falcon 9 rocket for the 35th time. This monumental mission deployed 29 additional Starlink satellites into Low Earth Orbit (LEO), expanding the Starlink mega-constellation, SpaceX's global broadband internet service, to over 10,580 active satellites. This achievement unequivocally validates SpaceX's vision of fundamentally transforming the economics of space transportation through rocket reusability.

### Technical Details

The 35th reuse of a Falcon 9 first-stage booster symbolizes an extraordinary advancement in rocket engineering and operations. Following each mission, the booster autonomously returns to Earth, executing a precise vertical landing. This intricate process is achieved through a complex sequence of operations, including a re-entry burn, attitude control using grid fins, and the deployment of landing legs. Reusability eliminates the need to manufacture a new rocket for each launch, significantly reducing manufacturing costs and time. This dramatically lowers the cost per kilogram of payload to orbit, making previously unattainable space missions commercially viable. Starlink satellites are designed to provide low-latency, high-bandwidth internet connectivity, establishing a globally accessible network. This contributes to bridging the digital divide by offering internet services to underserved regions, maritime vessels, and aircraft.

### Background and Industry Context

SpaceX's reusable rocket technology has dramatically reshaped the space economy over the past decade. By 2025, the Falcon 9 had grown to account for approximately 90% of the world's commercial orbital launches, with the most flown booster completing 34 missions. This track record, nearing NASA's Space Shuttle orbiter's reusability record of 39 flights, marks a significant milestone in space transportation history. The company's next-generation fully reusable super heavy-lift launch system, Starship, has been selected as the lunar lander for NASA's Artemis program, and is expected to become a primary means of transport for future deep-space exploration. This reusability is central to SpaceX's potential IPO, valued at approximately \$1.75 trillion, indicating high investor and industry confidence in its business model.

## Future Outlook

The record-breaking reusability of the Falcon 9 suggests SpaceX's continued dominance in the space launch market. The ongoing expansion of the Starlink constellation will further enhance global internet connectivity, bolstering service provision to remote communities, maritime vessels, and aircraft. In the future, with Starship becoming fully operational, humanity's plans for lunar and Martian settlement will grow increasingly tangible. Reusable rocket technology reduces the cost and increases the frequency of space exploration, thereby creating new business opportunities in scientific research, resource exploration, and space tourism. SpaceX's success clearly demonstrates that the commercial space sector is becoming an indispensable component of global infrastructure and economy, playing a crucial role in the development of the space economy.

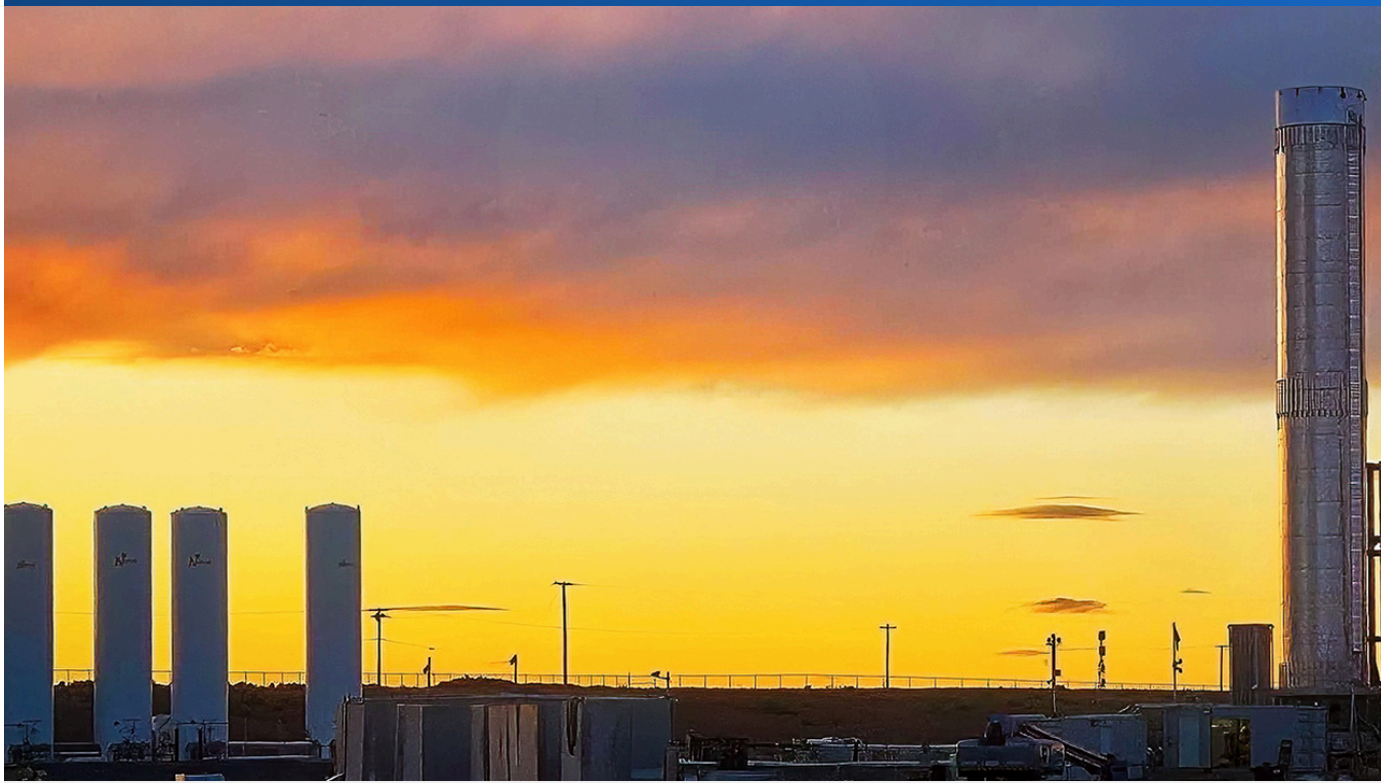
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Source: <https://www.space.com/space-exploration/launches-spacecraft/spacex-starlink-10-35-b1067-ccsfs-asog>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# Stoke Space Completes Nova Stage 1 Proto-Qualification Testing for Fully Reusable Rocket, Targeting Aircraft-Like Operational Cadence

Published June 08, 2026 Stoke Space USA



## OVERVIEW

Stoke Space announced the successful completion of proto-qualification testing for the first stage of its fully reusable Nova rocket. This crucial milestone demonstrates the maturity of Nova's hardware, software, ground systems, and operational approach. Funded by entities including the U.S. Space Force, DIU, NASA, and the National Science Foundation, Stoke Space is developing a fully reusable rocket capable of aircraft-like operational frequency. This achievement is a significant step towards enabling low-cost, on-demand space transportation, dramatically improving accessibility to the space industry.

## IN DEPTH

### Key Findings

Stoke Space has announced the successful completion of proto-qualification testing for the first stage of its fully reusable Nova rocket, currently under development. This critically important milestone clearly demonstrates that the Nova rocket's hardware design, software systems, ground support systems, and operational approach have achieved a high level of maturity and reliability, moving it closer to commercial operations. This achievement represents a major step towards realizing Stoke Space's objective of providing low-cost, on-demand space transportation.

### Technical Details

The proto-qualification testing for Nova's first stage involved extensive ground tests simulating actual flight conditions. These included propulsion system hot-fire tests, structural load tests, avionics system verification, and software integration tests for launch and landing sequences. To achieve Stoke Space's goal of 'aircraft-like operational frequency,' a robust system design is essential, enabling rapid inspection, maintenance, and re-flight. The company's rocket heavily utilizes advanced materials and manufacturing techniques, particularly additive manufacturing, to simplify the production of complex components and reduce costs. Full reusability, akin to SpaceX's Falcon 9, which has successfully launched and landed 35 times, is key to fundamentally transforming the economics of space transportation.

### Background and Industry Context

The space industry is rapidly transitioning to an era demanding low-cost, high-frequency access to space. This enables a diverse range of missions, including satellite constellation deployment, in-orbit services, and deep-space exploration, to become economically viable. Stoke Space aims to meet this need by providing a next-generation transportation solution that replaces traditional expendable rockets. The company has received strategic funding from government entities such as the U.S. Space Force, the Defense Innovation Unit (DIU), NASA, and the National Science Foundation, recognizing the significant value of its technology for both national security and scientific exploration. This public-private partnership facilitates the accelerated development of space technologies.

## Future Outlook

The completion of Nova's first-stage proto-qualification testing suggests that Stoke Space will soon commence orbital flight tests. The realization of the fully reusable Nova rocket holds the potential to revolutionize the entire space industry business model by dramatically reducing the cost of space access and enabling on-demand launches. This will foster the birth of new space service companies and enable existing firms to plan more ambitious space missions. Stoke Space's success is expected to play a crucial role in shaping the future of space transportation and further expanding humanity's frontier of space utilization.

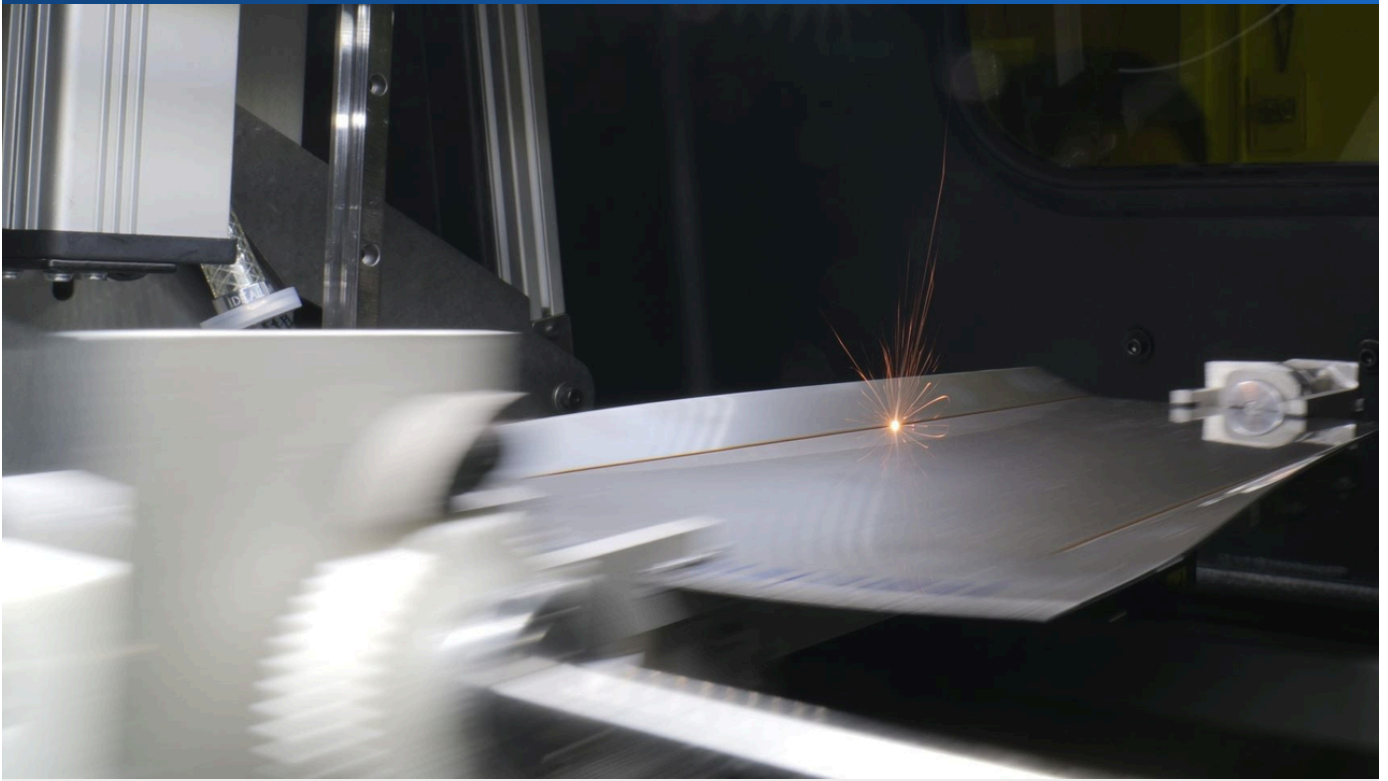
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Source: <https://www.stokespace.com/nova-stage-1-completes-proto-qualification-testing/>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# University of Florida Innovates Lunar Construction with Laser 'Origami' Technology: 3D Printing Tools and Structures from In-Situ Resources

Published June 10, 2026   Universe Today   USA



## OVERVIEW

Researchers at the University of Florida are exploring innovative methods for constructing structures on the Moon using laser-forming technology, dubbed 'laser origami.' This non-contact process precisely bends materials with lasers, investigating the conversion of lunar soil (regolith) into glass or ceramic for building materials. Aligned with In-Situ Resource Utilization (ISRU) philosophy, this technology expands the possibility for astronauts to manufacture tools, spare parts, and even habitat modules directly on the Moon without transporting heavy supplies from Earth, dramatically enhancing lunar base self-sufficiency and sustainability.

## IN DEPTH

### Key Findings

Researchers at the University of Florida are actively exploring innovative methods for constructing structures on the Moon using an advanced laser-forming technique, colloquially referred to as 'laser origami.' This technology enables materials to be precisely bent without physical contact through controlled laser application. It introduces a groundbreaking concept: converting lunar soil (regolith) into architectural materials such as glass or ceramics for construction purposes. This breakthrough holds significant potential to dramatically enhance the self-sufficiency and sustainability of lunar bases.

### Technical Details

The laser-forming technology involves directing specific wavelengths of laser light onto the material's surface, causing it to heat up and bend due to thermal stress. Lunar regolith, primarily composed of minerals like silicon dioxide and aluminum oxide, can be sintered, melted, and transformed into glassy or ceramic-like materials when heated under appropriate temperatures and conditions. This 'laser origami' technology aims to precisely mold regolith-based building materials into components with complex shapes and structures. Potential applications include 3D printing structural elements for lunar habitats, radiation shielding walls, landing pads, and even repair tools or spare parts directly on the lunar surface. This technology would drastically reduce the cost of transporting materials from Earth and significantly enhance the sustainability and flexibility of lunar missions.

### Background and Industry Context

NASA's Artemis program and other international lunar exploration missions aim to establish a long-term human presence on the Moon. To achieve this goal, In-Situ Resource Utilization (ISRU) technologies are indispensable. ISRU is a philosophy that seeks to minimize the cost and risks associated with Earth-based supply by converting available lunar resources (such as regolith and water ice) into food, oxygen, fuel, and construction materials. In current space development, various countries are focusing on this area; for instance, the Canadian Space Agency has awarded \$2 million for lunar ISRU studies. The University of Florida's research proposes an advanced methodology for utilizing lunar regolith directly as a building material as part of ISRU, which is a critically important technology for enhancing the autonomy of lunar bases.

## Future Outlook

Lunar construction using laser 'origami' technology holds the potential to revolutionize the design and operation of future lunar bases. The ability to 3D print structures directly on the Moon would eliminate the need for transporting heavy construction materials from Earth, significantly reducing mission costs and complexity. This makes the construction of larger, more permanent lunar habitats and research outposts a realistic prospect. Beyond enhancing astronaut habitability and safety, enabling longer stays, the advancement of this technology will also expand the scope and efficiency of scientific exploration on the Moon. Furthermore, this technology could be applied to in-situ construction for crewed missions to Mars, marking a crucial step for humanity to expand its presence across the solar system.

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Source: <https://www.universetoday.com/articles/building-in-space-with-laser-origami>

Collected: June 12, 2026 | Automated Research System (Gemini API)

# Canadian Space Agency Awards \$2M for Lunar In-Situ Resource Utilization (ISRU) Studies: Advancing Self-Sufficiency and Nuclear Power for Moon Bases

Published June 09, 2026   SpaceQ   Canada



## OVERVIEW

The Canadian Space Agency (CSA) has awarded a total of \$2 million across four new research contracts for Lunar In-Situ Resource Utilization (ISRU) to explore methods for human survival on the Moon. Canadian Strategic Missions Corporation, SpaceDIRT, and Volta Space Technologies Inc. are among the selected entities, who will research lunar power systems and resource management over the next 10 months. This initiative encompasses extracting usable materials like oxygen and metals from regolith, with an eye towards developing compact nuclear reactor technology for lunar bases. CSA's investment strengthens international efforts to establish a sustainable human presence on the lunar surface.

## IN DEPTH

### Key Findings

The Canadian Space Agency (CSA) has awarded a total of \$2 million across four new research contracts focused on Lunar In-Situ Resource Utilization (ISRU) to support human survival and sustainable activities on the Moon. This significant investment aims to accelerate the development of technologies for extracting resources from lunar regolith and to explore power systems for lunar bases, particularly compact nuclear reactor technology. Selected entities, including Canadian Strategic Missions Corporation, SpaceDIRT, and Volta Space Technologies Inc., will dedicate the next 10 months to addressing challenges in resource management and power generation within the lunar environment.

### Technical Details

The primary focus of ISRU research lies in technologies for extracting and processing usable materials such as water, oxygen, and metals from lunar regolith. For instance, studies are exploring systems to extract water ice by heating regolith and then generating oxygen and hydrogen (usable as rocket fuel) through electrolysis. Techniques for reducing metal components in regolith for construction materials and parts manufacturing are also included. Regarding power systems, a reliable energy source capable of sustaining activities during the prolonged lunar night (approximately 14 Earth days) under extreme cold and darkness is indispensable, making the development of compact fission reactors a critical challenge. Canadian research teams aim to demonstrate the efficiency, scalability, and reliability of these resource utilization and power generation technologies in the lunar environment.

## Background and Industry Context

With global interest in lunar exploration surging, driven by initiatives like NASA's Artemis program, establishing a sustainable human presence on the Moon requires a shift from an 'Earth-dependent model' that relies entirely on supplies from Earth to a 'self-sufficient model' leveraging in-situ resources. ISRU technology is key to drastically reducing transportation costs and enhancing mission independence and flexibility. Furthermore, a stable power supply on the Moon is essential for scientific observation, experiments, communications, and life support systems, with nuclear power being the leading candidate for the lunar night when solar power is unavailable. The Canadian government aims to foster its domestic space industry and play a significant role in international lunar exploration efforts, and this grant demonstrates its strategic commitment.

## Future Outlook

The CSA's \$2 million grant for ISRU research represents a crucial step for Canada to become a major player on the frontier of lunar resource utilization technologies. Successful outcomes from these studies will make the construction, maintenance, and long-term operation of lunar bases more feasible. In particular, the development of compact nuclear reactor technology will revolutionize lunar power supply, providing an essential foundation for extracting water ice at the poles and producing fuel for future crewed Mars missions. This investment is expected to stimulate technological innovation within Canada's space industry and create opportunities for domestic startups and companies to contribute to the international space supply chain. Ultimately, it will play a decisive role in accelerating humanity's sustainable return to the Moon and expansion into the space frontier.

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Source: <https://spaceq.ca/the-canadian-space-agency-awards-2-million-for-lunar-in-situ-resource-utilization-studies/>