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SmallSat Market Weighed Down by Heavier Models

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Thruster Production in U.S.

Impulse Space Unveils
GEO Rideshare Program

SmallSat Conference Moves
to Salt Lake City in 2025

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From Plano, TX to the Planets: How Apogee Semiconductor is Transforming the Use of COTS for Space



Apogee Semiconductor, an integrated circuit (IC) product company based in Plano, Texas, is at the forefront of electronic innovation in the space industry. “Our mission is to introduce products that have transformative potential, particularly in how the industry utilizes Commercial Off-The-Shelf (COTS) components in space systems,” says Mark Hamlyn, CEO of Apogee Semiconductor. Apogee was the first to release a standalone Voter IC in the space market, and the AP54RHC301 has since become the first Voter IC to be flown in volume by commercial constellation operators. Apogee’s pioneering approach to system reliability, exemplified by its RelBridge™ technology, offers a cost-effective solution for integrating COTS components into high-reliability systems without sacrificing performance. “By significantly reducing the risk of total system failure, we enable satellite operators to maintain robust and resilient systems, even in the face of the harsh and unpredictable conditions of space,” Hamlyn adds.

“In addition, our team’s long and rich industrial experience in high-reliability electronics ensures that we are uniquely equipped to advance cutting-edge technology and continue leading in the dynamic space market,” Hamlyn concludes.

Apogee Semi Introduces RelBridge™ Technology

Apogee Semiconductor’s RelBridge™ approach to system reliability offers a cost-effective solution for integrating COTS components in high-reliability systems. By strategically incorporating RelBridge™ components at fault containment boundaries, satellite operators can significantly reduce the risk of total system failure without dramatically increasing costs.

Due to the unpredictable reliability of COTS components in harsh and radiation-rich environments, it’s important to design a system that can tolerate failures using fault containment boundaries. When designed properly, a fault containment boundary allows for the failure of circuitry within the boundary to be isolated, preventing the fault from prop-



agating through the entire system. This makes it essential for the components used to create such boundaries to be extremely reliable as required for the mission profile. The RelBridge™ component family is designed with these boundary interfaces in mind.

Apogee Semi Adds AP54RHC288 to the RelBridge™ Family

The latest addition to the RelBridge™ family is the AP54RHC288, another industry first component Apogee has named the Arbiter. While the AP54RHC301 provides voting and error detection in Triple Modular Redundancy (TMR) systems utilizing COTS, effective for preventing errors from crossing fault containment boundaries, the Arbiter is designed to prevent two control signals from simultaneously being on. This makes the Arbiter particularly effective at isolating faults in power supply, motor control, and other half-bridge and full bridge applications by ensuring that FET drivers do not receive conflicting control signals. The Arbiter thus complements the AP54RHC301’s capabilities and further enhances fault tolerance and system performance.

“Since its founding, Apogee Semiconductor has been focused on changing the economics of space and enabling small satellite and large constellations. Our RelBridge™ family is an extension of our founding philosophy” states Anton Quiroz, CRO of Apogee Semiconductor, “The goal of the RelBridge™ family is to enable the use of COTS and reduce the cost barrier of entry for the commercial space companies while not compromising on the overall system reliability. As the space industry continues to grow, solutions like these will play a pivotal role in expanding the capabilities and reach of satellite technologies.”

In line with its commitment to advancing system reliability, Apogee Semiconductor is preparing to release a series of comprehensive white papers on system-level fault containment, written in close collaboration with the Jet Propulsion Laboratory (JPL). The first white paper, scheduled for release this week, will provide an overview of fault containment, including practical application examples and financial justification for implementing these strategies, reflecting Apogee’s leadership in this critical area.

SmallSat relocates to Salt Lake in 2025



Above: The Salt Palace Convention Center in Salt Lake City, the new home of the Small Satellite Conference starting next year. The 39th Small Satellite Conference will be held Aug. 11-15, 2025. Book rooms beginning Oct. 1 for the best rates at www.smallsat.org.

After nearly four decades in Logan, the Small Satellite Conference is moving to Salt Lake City in August 2025.

Conference Chair Pat Patterson announced during the opening session of the 38th annual conference that starting next year, SmallSat will be held at Calvin

L. Rampton Salt Palace Convention Center. Patterson cited the need for larger, more modern facilities to accommodate the growing number of attendees and exhibitors as key factors behind the move. Hosted by the Space Dynamics Lab and

Utah State University since 1987, SmallSat has outgrown Logan's infrastructure.

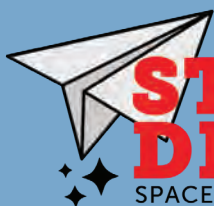
Logan's lodging limitations prompt relocation

The college town two hours north of Salt Lake City has struggled

in recent years to provide adequate lodging for the increasing number of attendees. Patterson noted that Logan has just 1,020 hotel rooms, meaning that most of SmallSat's 4,000 attendees >

BRIAN BERGER

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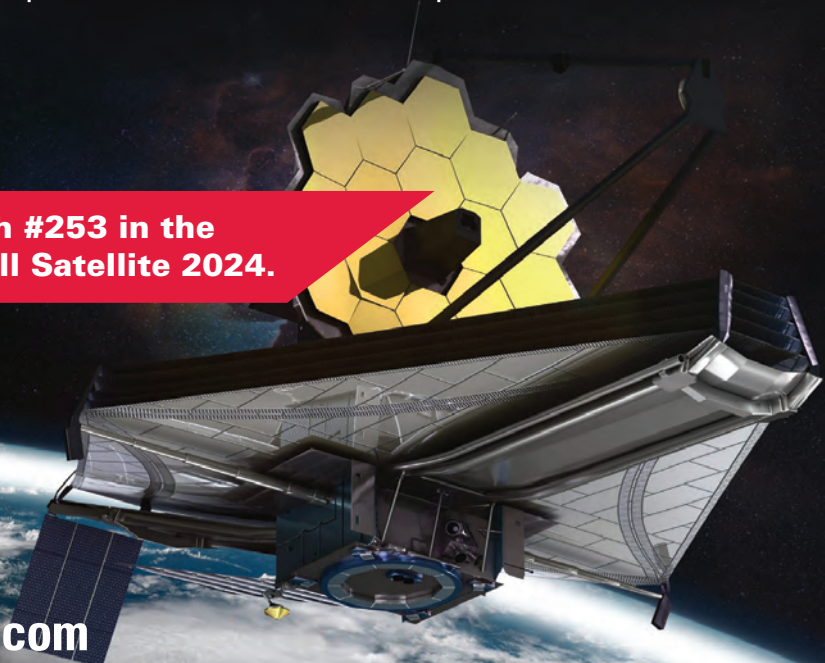
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Intuitive Machines and SEOPS partner on lunar rideshare services



Above: SEOPS will buy payload space on future Intuitive Machines lunar missions, reselling that capacity to rideshare customers.

Smallsat launch services company SEOPS is partnering with Intuitive Machines to provide lunar rideshare opportunities.

The companies announced an agreement Aug. 5 whereby SEOPS will buy space on future Intuitive Machines lunar missions that it will then offer to customers who want to send smallsats to the moon or other destinations in cislunar space, including geostationary orbit. The agreement covers launches after Intuitive Machines' IM-3 mission in 2025.

"We've seen a significant increase in interest from both our government and commercial customers in lunar missions," Chad Brinkley, chief executive of SEOPS,

JEFF FOUST

said in a statement. "It makes financial sense to take advantage of the excess capacity on Intuitive Machines' lunar missions, while also supporting our customers' goals for lunar exploration."

SEOPS currently offers rideshare services on missions to Earth orbit such as SpaceX's Transporter line of dedicated rideshare missions. SEOPS flew seven satellites on the Transporter-10 mission in March and has five scheduled to launch later this month on Transporter-11.

New Options for 'Last Mile' Delivery

For the lunar missions, SEOPS will also offer customers the option to use an orbital transfer vehicle it is developing to provide "last mile" delivery of their satellites after deployment.

"It makes financial sense to take advantage of the excess capacity on Intuitive Machines' lunar missions, while also supporting our customers' goals for lunar exploration."

— **Chad Brinkley, CEO of SEOPS**

"SEOPS entrusting us with the delivery of its customer's payload to space highlights our capabilities to provide the essential infrastructure and services that support all groundbreaking commercial ambitions in space," Steve Altemus, chief executive of Intuitive Machines, said in a statement.

Intuitive Machines has offered rideshare opportunities on its own for the upcoming IM-2 and IM-3 missions. It is flying NASA's Lunar Trailblazer spacecraft, which will orbit the moon to search for water ice, on IM-2, along with the Brokkr-2 smallsat by asteroid mining startup AstroForge. The company plans to fly its own lunar communications satellites as rideshares on IM-3.

"We take satellites to a translunar injection orbit and drop them off," said Trent Martin, senior vice president of space systems at Intuitive Machines, during a panel at the AIAA ASCEND conference Aug. 1, using excess capacity on the Falcon 9 rocket launching the company's lunar lander.

"We found that to be quite an interesting market," he said of those rideshare offerings. "We managed to full up both IM-2 and IM-3 with rideshare payloads," but added there was a little bit of room left for rideshares on IM-3. **SN**

Thales Alenia-led DIANE to put a spin on CNES smallsat servicing demo



Left: A rendering of an EROSS servicing mission, highlighting the advanced technologies that will be utilized in the upcoming DIANE mission. The servicer spacecraft, equipped with a robotic arm, is designed for satellite inspection, attitude control takeover, and potential refueling operations in low Earth orbit.

France has awarded a Thales Alenia Space-led group a contract to capture and inspect a spinning small satellite in a demonstration mission, DIANE, slated for the end of the decade.

Supported by undisclosed funding from French space agency CNES and state-owned investment bank Bpifrance, the mission would use a pair of spacecraft due to launch before the end of 2028.

Building on EROSS

The DIANE mission builds on technologies developed under the European Robotic Orbital Support Services (EROSS) program, which has received funding from the European Commission. EROSS aims to test rendezvous and servicing capabilities in low Earth orbit with a one-cubic-meter-sized client

Key Technologies: DIANE Mission

DIANE, which stands for “Démonstration d’Inspection et Amarrage Novatrice Embarquée” in French, translates to “Innovative Onboard Inspection and Docking Demonstration” in English.

Robotic Arm: For satellite inspection, attitude control, refueling, and payload assembly/exchange.

Unprepared Configuration Handling: Grabbing parts of the satellite not specifically designed for servicing.

Spinning Target Management: Using cameras to inspect and slow down spinning satellites, moving them to safer locations.

Building on EROSS: Utilizes technologies developed under the European Robotic Orbital Support Services program.

Close-Range Inspection: High-resolution cameras for detailed analysis and condition assessment of satellites.

International Collaboration: Integration of expertise and technology from France, Germany, and Italy for enhanced mission capabilities.

satellite and a servicer about three times as big with a robotic arm.

EROSS demonstrations include inspection, attitude control takeover, refueling, and the assembly/exchange of payloads, performed after the robotic arm grabs a part of the client satellite that was not specifically designed for an on-orbit servicer.

Handling Unprepared and Spinning Targets

Similarly, the DIANE mission will use the client satellite’s “unprepared” configuration, meaning the robotic arm will also grab a part of the satellite that was not specifically designed for servicing. However, unlike EROSS, the DIANE mission will additionally simulate conditions where the client satellite is put into a spin to represent a target that has lost attitude and orbit control.

“In the DIANE contract, the servicer uses its cameras (both on the platform and on the robotic arm) to perform a close-range inspection of the satellite,” Behar-Lafenêtre said via email July 19.

“In operational conditions, the servicer can be used to, in addition to inspection, slow down the

JASON RAINBOW

spinning of the satellite and move it towards a more appropriate location. This prefigures active debris removal. Debris being, here, old spacecraft.”

She said the EROSS servicer currently under development would need a software update to handle a spinning target, which could be uploaded on the ground or while the spacecraft is in orbit.

“It is the objective of the first few months of the project to make this kind of decisions,” she said.

International Collaboration and Future Steps

The timeline for DIANE depends on the availability of the EROSS assets, she added, but in principle, the mission could start as soon as the initial EROSS demonstration is over.

The French division of Thales Alenia Space, a joint venture between Thales of France and Leonardo of Italy, is responsible for DIANE’s overall mission. French engineering firm Magellium Artal Group is providing the image processing capabilities needed for vision-based position determination and local inspection.

German aerospace research agency DLR is developing the robotic arm. The French unit of European space mission integrator Telespazio is tasked with organizing a customer service offering, including the creation of a processing and visualization center for inspection data.

Behar-Lafenêtre said consortium members are still deciding whether to launch the servicer and client spacecraft on the same rocket or separately.

The demonstrations should last three to four months, she said, followed by around five years of operational service for the robotic spacecraft. **SN**

Morpheus Space expands propulsion production



Above: Morpheus Space employees at the opening of the company’s new factory in Dresden, Germany.

Morpheus Space is ramping up electric propulsion production in its new Dresden, Germany, factory.

In the 1,260-square-meter factory, Morpheus will initially produce 100 GO-2 Field Emission Electric Propulsion-based propulsion systems per year. With additional personnel and equipment, Morpheus could produce 500 GO-2 units annually.

Morpheus executives decided to expand production after hearing current and prospective customers complain of waiting a year for propulsion deliveries, Morpheus CEO Daniel Bock told *SpaceNews*.

“Nobody has the time to wait a year for any subsystem,” Bock said. “And propulsion is one of

the few subsystems that typically are not produced in-house because it’s quite complex.”

The in-space propulsion business is undergoing significant change in response to growing demand to supply commercial and military constellations.

“The supply chain didn’t keep up with the growth of the satellite and mission trajectory,” Bock said. “We hope that we can contribute to solving that issue.”

Mass Production

Bock recognizes that scaling up production is often a challenge for propulsion manufacturers. In the past, Morpheus produced slightly more than a dozen propulsion systems a year.

“If you want to produce higher numbers, you need to follow a different approach,” Bock said. “You need to establish clear processes and reduce the manual work as much as possible.”

Guiding Morpheus through this transition is Chief Operating Officer Martin Kelterer, whose previously work at Mercedes-Benz included heading production engines.

Morpheus’ GO-2 propulsion, which is scheduled to be flight tested in 2025, is designed for satellites ranging from six-unit cubesats to 250-kilogram satellites. For satellites with a mass greater than 250 kilograms, GO-2 “might be an interesting option for secondary propulsion,” Bock said. **SN**

DEBRA WERNER

Promises and potential pitfalls

SDA's disruptive approach to satellite acquisitions could revolutionize U.S. military space architecture, but significant hurdles remain

An in-depth analysis of U.S. military efforts to deploy a proliferated, networked system of smaller satellites highlights the promise and potential pitfalls of the program.

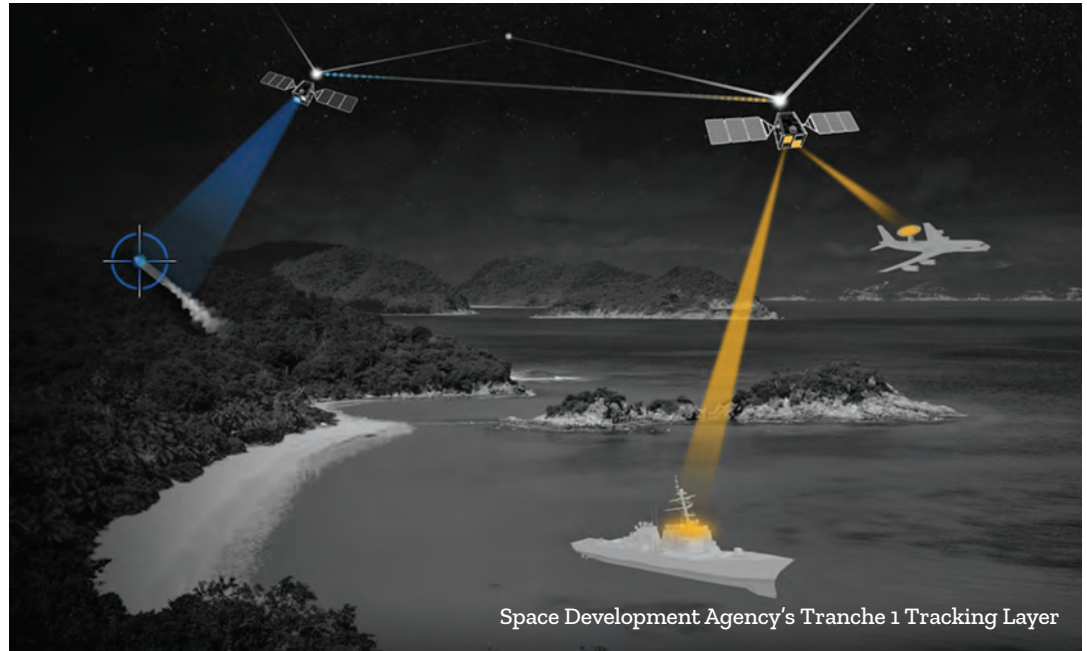
In a report released July 25, the Aerospace Corporation examines the Space Force's Space Development Agency's initiative to transform the U.S. military space architecture using a disruptive approach to satellite acquisitions.

"The Space Development Agency and the Future of Defense Space Acquisitions" was written by Andrew Berglund, senior policy analyst at the Aerospace Corporation's Center for Space Policy and Strategy. Aerospace is a nonprofit organization operating a federally funded research and development center focused on space and launch systems.

Berglund's analysis delves into SDA's approach to acquiring and deploying a vast network of low Earth orbit satellites. The agency set a goal to launch approximately 500 satellites within four years as part of a Proliferated Warfighting Space Architecture (PWSA), a move designed to enhance resilience against threats from anti-satellite weapons.

SDA is projected to invest about \$9 billion every two years in the PWSA that includes a Transport Layer of data communications satellites and a Tracking Layer of missile-warning sensor satellites.

The paper credits the SDA for creating a distinct acquisition



Space Development Agency's Tranche 1 Tracking Layer

\$9 BILLION INVESTMENT

SDA aims to launch 500 satellites within four years, investing \$9 billion every two years in a network of data communication and missile-warning satellites.

SUSTAINABILITY CONCERNS

Challenges include proving system capabilities at scale, managing an ambitious launch schedule, and maintaining a competitive industrial base

model that enables rapid delivery of new capabilities, breaking away from traditional, often slower procurement methods. This approach, Berglund argues, could have far-reaching implications for future defense space acquisitions.

However, the study also highlights potential hurdles the SDA must overcome. "While the SDA has shown early promise, it has yet to demonstrate its systems' capabilities at scale," Berglund writes. He emphasizes that

proving the effectiveness of the proliferated satellite architecture is crucial for maintaining support and funding.

Another significant challenge identified in the paper is the agency's ambitious launch schedule. "Managing this increased launch frequency without compromising on quality or encountering logistical bottlenecks will be a major challenge," the report states.

Berglund also raises questions about the sustainability of SDA's

competitive industrial base and the agency's ability to maintain its innovative approach as it scales up operations.

The paper notes that other defense acquisition organizations may face difficulties in adopting SDA's model due to differences in operational structures and constraints. This observation underscores the unique position of the SDA within the broader defense acquisition landscape.

While the study commends the SDA's progress, it also points out that relatively little is known about the performance of the agency's 33 currently orbiting satellites. "Operational success will go a long way to validate SDA's acquisition model and the flexibility the DOD and Congress have granted the organization," Berglund concludes.

SANDRA ERWIN

Competition concerns

The study also looks into the complexities of SDA's strategy to foster competition by engaging multiple prime contractors, including commercial firms new to Pentagon satellite projects.

"Some of the acquisition challenges SDA is trying to address will benefit industry as well as DoD," Berglund told *SpaceNews*. "But I expect a few challenges to emerge."

One concern is whether SDA's model will lead to sustainable competition, he said. "There will be an inherent tension between the most successful primes trying to maximize their share of the architecture and SDA trying to sustain a dynamic, competitive market."

The analysis raises questions about the feasibility of integrating satellites from diverse manufacturers, a key aspect of SDA's approach. "There is no precedent for a DoD space system that requires such seamless operational integration between so many vendors," Berglund said. "Demonstrating and sustaining that integration is the biggest test of industry's support for SDA's goals and strategy."

Supply chain issues have already disrupted SDA's ambitious timelines, with manufacturers struggling to ramp up production quickly enough. Berglund anticipates these challenges will persist, particularly due to SDA's schedules that compel vendors to rapidly secure parts and components after contract awards.

He suggests that vendors' willingness to stockpile parts in advance will hinge on their confidence in winning contracts. "We will see whether approaches such as vertical integration provide an advantage, which may reduce the number of competitive primes." **SN**



Countering adversary threats

A Mitchell Institute report calls for increased smallsat deployment to strengthen Space Force

The U.S. military has begun to recognize the utility of small satellites, with programs like the Space Development Agency's Proliferated Warfighter Space Architecture leveraging smallsats for missile tracking and communications. However, a new report argues that the U.S. Space Force has yet to fully commit the resources to capitalize on this technology at scale.

"The Space Force, Congress, and the industrial base must adjust old paradigms built around large, legacy space systems with long and costly development timelines and move toward a hybrid approach that includes both smallsats and large, exquisite satellite systems," says a report released July 25 by the Mitchell Institute for Aerospace Studies.

SANDRA ERWIN

The report calls on the U.S. military to fully leverage the innovations in small satellite technology to enhance its space capabilities and maintain superiority in a contested domain.

Smallsats have become increasingly popular in both commercial and military applications due to their lower cost, faster production times, and ability to be deployed in large numbers. This proliferation allows for greater resilience and redundancy in space operations, the report says, arguing that proliferation is crucial to maintaining what the military terms "space superiority" — the ability to operate freely in space while denying adversaries the same capability.

Smallsats, typically weighing less than 1,200 kg, have gained significant traction in recent years. Commercial players like SpaceX and Planet have

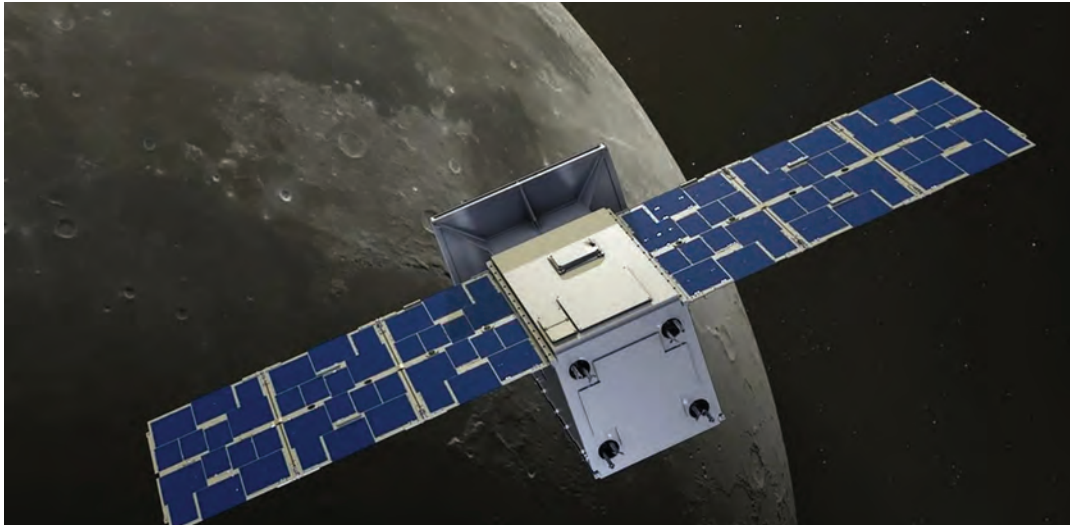
Above: General Atomics' line of small satellites

demonstrated the power of large constellations of small satellites for various applications, from global internet coverage to Earth observation.

Charles Galbreath, lead author of the report, says the Space Force must embrace the smallsat revolution or risk losing the high ground in space. "Our adversaries, particularly China and Russia, are developing sophisticated counterspace weapons aimed at our legacy satellite systems. SmallSats offer a way to enhance our resilience and operational capabilities in this new environment."

The report recommends the Department of Defense boost production rates, strengthen supply chains, and increase funding to support large-scale smallsat deployment. **SN**

NASA's CAPSTONE testing "Autopilot" software suite for cislunar operations



Left: CAPSTONE, NASA's cislunar pathfinder cubesat

Sent moonward over two years ago, NASA's Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment — shortened to CAPSTONE — is busy as ever, presently trial-running techniques to enhance spacecraft operations in cislunar space.

Launched on June 28, 2022, aboard a Rocket Lab Electron booster from New Zealand, CAPSTONE, a microwave oven-sized cubesat weighing a modest 25 kilograms, is on task and operational in Near Rectilinear Halo Orbit (NRHO) around the moon.

NRHO is the intended orbit of NASA's cislunar Gateway space station, which is meant to serve as an outpost for long-term human exploration of the moon and beyond. It will also allow crews to access the lunar

"Essentially, it's the only software test platform in cislunar space."

—Thomas Gardner, Chief Engineer, Advanced Space

south pole — an early priority zone for the space agency's Artemis program.

Overcoming early glitches

It has not been all smooth sailing for CAPSTONE. Early in its mission, a balky thruster sent the probe into rapid tumble mode. It also overcame a propellant freeze, among other glitches.

Having overcome those technical problems, the spacecraft is now slated for cislunar space operations for several more months, said Thomas Gardner, chief engineer for Advanced Space of Westminster, Colorado, which owns and will operate CAPSTONE for the entirety of its mission.

"Advanced Space is working with other potential customers within NASA and other government agencies, like the Air Force Research Laboratory, to provide testing opportunities for their experiments," Gardner told *SpaceNews*.

These experiments are primarily focused on autonomous Precision Navigation and Timing, said Gardner, and other operations in the cislunar domain including communication relay services as well as the rendezvous, proximity operations and docking of spacecraft. According to NASA, the price tag of the mission is roughly \$30 million, which includes a \$10 million launch vehicle

procurement from Rocket Lab. The spacecraft was built by Terran Orbital (formerly Tyvak Nano-Satellite Systems) under a commercial subcontract with Advanced Space.

Software test platform

CAPSTONE relies on the Cislunar Autonomous Positioning System (CAPS), a real-time system for estimating absolute position and velocity for spacecraft operating in the cislunar environment.

The cubesat is outfitted with a JPL-provided, onboard chip scale atomic clock to precisely determine the spacecraft's coordinates in space and time. Gardner explained that Advanced Space has successfully demonstrated the CAPS autonomous navigation technology using both two-way ranging with NASA's moon-circling Lunar Reconnaissance Orbiter and one-way uplink ranging with JPL's Deep Space Network.

In addition to testing the CAPS navigation system software, Gardner said there's an ongoing effort to evaluate a broad suite of software-based capabilities as well, which involves tapping an additional computer onboard CAPSTONE. That computer allows ground controllers to run software without interfering with spacecraft operations.

LEONARD DAVID

“Essentially, it’s the only software test platform in cislunar space,” said Gardner.

Deep space maneuvering

Among the software being tested, Gardner said, is the Neural Networks for Enhanced Planning software, which calculates optimal maneuvers for autonomous station keeping — keeping an active spacecraft in the same orbit as another vehicle — and also validates safe and predictable maneuvers for satellites that use electrical or chemical propulsion.

There’s also a SigmaZero software package that identifies anomalies in a spacecraft’s behavior, determines what is causing the error, and classifies the anomaly data so that operators can make informed course-correcting decisions.

In addition, a Flight Dynamics System is appraising the ability to provide rapid-turnaround navigation and maneuver planning for deep space and cislunar missions.

“We’re testing each software system independently, then as an ensemble to see how the spacecraft responds,” Gardner said.

The combined capabilities of these three algorithms will be an integrated suite called Autopilot, said Gardner.

“By testing maneuver planning, flight board operations and cislunar autonomy,” Gardner added, “we’ll ultimately end up with a spacecraft that knows where it is, what time it is, how to maneuver correctly and how to validate maneuvers with integrity.”

Lessons from lunar orbit

Meanwhile, the NASA Gateway team is receiving briefings on

the lessons learned about operations in NRHO from Advanced Space.

Gardner says that there are several key takeaways for small spacecraft operating in deep space. For one, providers need to make certain they understand system requirements well before preliminary design review.

“Commercial off-the-shelf products often are not developed as advertised,” Gardner advised. “Understand clearly how your system will interact with ground systems — for example, the Deep Space Network. Plugging into them is not as simple as advertised,” he said.

Another lesson learned is to allow extra time to obtain the appropriate regulatory approvals, Gardner said, that often require far more time and resources than expected.

Obtaining other approvals can affect spacecraft operations as well, such as getting the go-ahead to use certain radio frequencies, or addressing matters of planetary protection and orbital debris. Then there are range-safety requirements for launch, and export control if a payload is sent spaceward from an overseas provider.

Lastly, “read your telemetry carefully to determine what’s happening based on the data you are receiving,” Gardner said.

CAPSTONE’s Continued Mission

Ultimately, Gardner said, the CAPSTONE and ground support teams are eager to continue making use of the spacecraft to support and showcase various tasks in the unique cislunar environment for the rest of its mission. **SN**

SLC, from page 1

< > have to stay at least a 30-minute drive from Logan.

In contrast, the Salt Lake metro area boasts 20,000 hotel rooms, 5,000 of which are within five blocks of the Salt Palace, Patterson said. The Salt Palace regularly hosts large-scale events. It offers more space for technical sessions, exhibits, side meetings and meals, all in one centralized location, Patterson said, making it an ideal choice for growing the SmallSat conference.

Maintaining the collegial vibe

SmallSat is known in the space industry for its collegial feel. In contrast to conferences with numerous ticketed lunches spread hither and yon, all SmallSat participants gather under tents set up on the quad for a daily buffet lunch. Patterson said the conference will maintain that feel in its new, larger venue. While outdoor receptions are part of the plans for SmallSat in Salt Lake, lunches will be served indoors — a relief to conference attendees who don’t love Utah’s August heat.

“What I am a little nervous about is we have had something special here. This community together has created this thing that we have here called SmallSat and we have to make sure that we take that something special with us to Salt Lake City. And that’s not just about the way we run the conference. It’s about the spirit and enthusiasm that all of our attendees will bring,” Patterson said.

But ice cream?

Another SmallSat tradition is its afternoon ice cream socials. Patterson confirmed that the ice cream socials featuring Aggie’s ice cream, a locally made favorite, will continue at SmallSat 2025 in Salt Lake City.

“Absolutely, we’ve already been working through that. There will be Aggie ice cream,” Patterson said.

Conference venues tend to have existing vendor contracts that affect what a conference can or cannot bring to a hotel, and The Salt Palace is no exception. “There’s some contractual stuff we have to go through. There will be Aggie’s ice cream. It’s just a lot harder.”

Cost considerations for 2025

Patterson said it will cost more to exhibit at SmallSat in 2025, but exhibitors should find that the increase is offset by savings on lodging. Badged attendees and students, however, should be able to spend less to attend SmallSat in Salt Lake.

“Our exhibit prices will increase slightly. Hotel prices will go down dramatically. And we are not raising rates one dollar on attendees. And we are not raising rates one dollar on students,” Patterson told *SpaceNews* in an interview ahead of the announcement. “[W]e’ve done several [analyses] over the years, and we believe that actually the cost will be a wash for the exhibitors. It will go down for attendees.”

Looking ahead to a new era

Despite the venue change, Patterson said the mission of the Small Satellite Conference remains unchanged: to provide a premier platform for sharing advancements and fostering collaborations in the small satellite industry. He said organizers are committed to maintaining the high standards of the conference and ensuring that it continues to be a cornerstone event for the space community. “We will do our best to make it as technical as possible and we will do our best to make it fun,” Patterson added. **SN**



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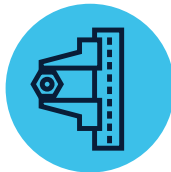
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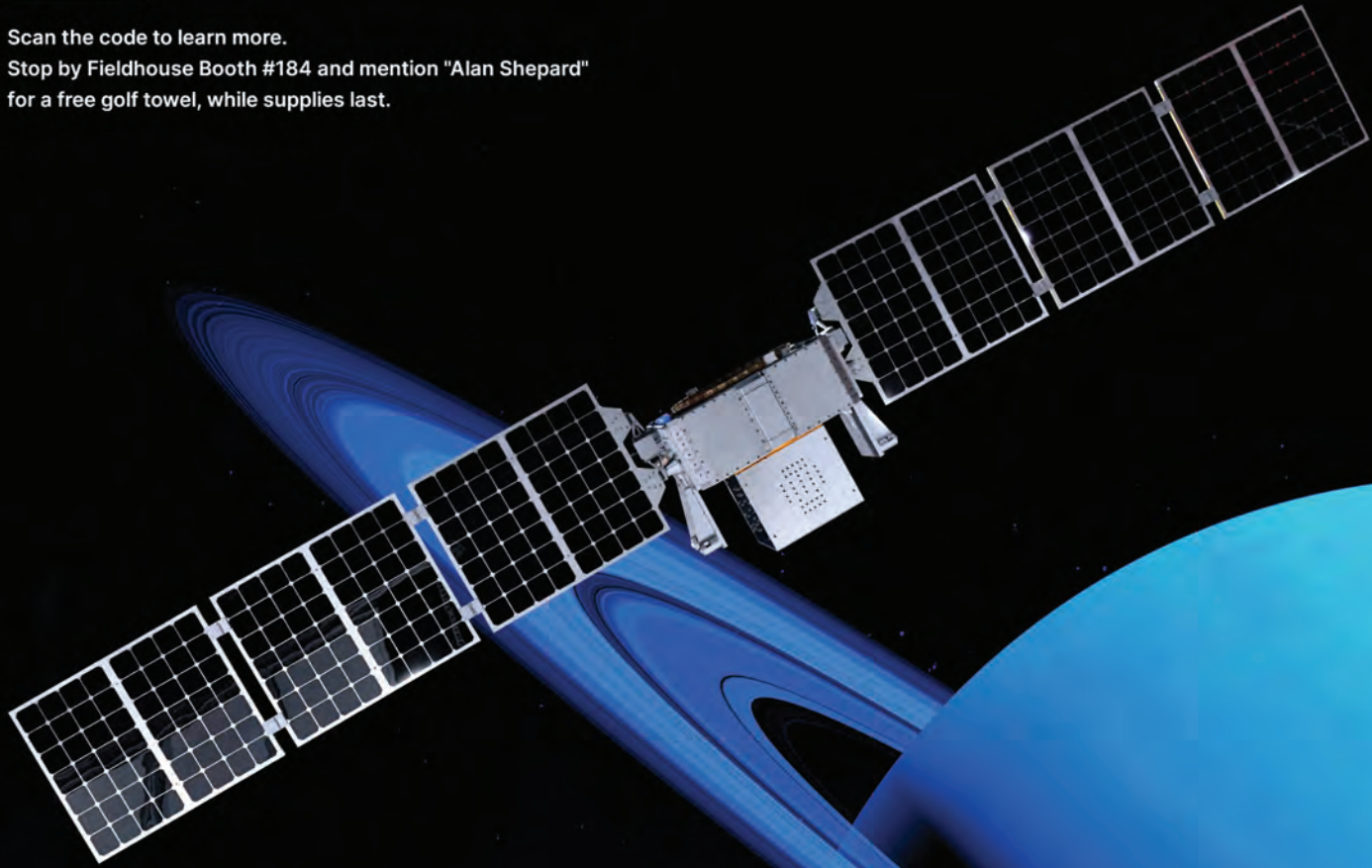


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SPACE AWAITS.

Impulse Space partners with Exolaunch for 2027 GEO rideshare

Orbital transfer vehicle developer Impulse Space will offer rideshare services for spacecraft going to geostationary orbit using its Helios tug and an upgraded version of its Mira vehicle.

Impulse Space announced at the Small Satellite Conference that it is working with Exolaunch on its GEO Rideshare Program. The first mission, using Impulse Space's Helios vehicle on an undisclosed dedicated launch, is scheduled for 2027.

Impulse announced plans in January to develop Helios, a high-energy kick stage powered by liquid oxygen and methane propellants. The company billed Helios as a way to quickly transport satellites from low Earth orbit to GEO and other higher orbits, with the ability to carry satellites weighing up to 5,000 kilograms from LEO to GEO within a day.

Tom Mueller, founder and chief executive of Impulse Space, said in an interview that the company initially looked for larger GEO

satellites for Helios. "But as we talked with customers, we saw that there are a lot of these half-ton to one-ton GEO satellites," he said. Those satellites had limited options for getting to GEO, which led Impulse Space to pursue a rideshare initiative.

"We're going to gauge the demand and see if it's real," he said ahead of Impulse Space's discussion of the rideshare program at the conference. We think there are a lot of companies looking at this."

Collaboration with Exolaunch

As part of the rideshare program, Helios will support multiple ports, each able to host at least 300 kilograms of payload, to take spacecraft to GEO. Exolaunch will market payload opportunities and provide deployment systems.

"Impulse's introduction of the GEO Rideshare Program marks a transformative milestone for the satellite industry, making cost-effective and timely access to GEO a reality," said Kier Fortier, vice president of global business development at Exolaunch, in a



Above: Impulse Space will collaborate with Exolaunch to provide GEO rideshare missions using its Helios tug.

statement. The company has arranged rideshare launches for hundreds of smallsats, including a 16U cubesat delivered to GEO on a 2023 launch.

Upgraded Mira Vehicle

Impulse is pairing the GEO rideshare service it is offering using Helios with an upgraded version of its smaller Mira vehicle. That spacecraft flew for the first time in November 2023 on the SpaceX Transporter-9 rideshare mission, deploying a cubesat and conducting maneuvers in LEO

before concluding its LEO Express mission in July. Those maneuvers included one where Mira raised its apogee by 150 kilometers in only 75 seconds.

Mueller said the mission went well, other than problems with communications and software. "Even with the comms issues we had, we had a really great mission," he said. Those problems have been corrected for the second Mira spacecraft, which will launch on SpaceX's Transporter-12 >

Story continues, p. 3

JEFF FOUST

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Satellite startup Muon Space raises \$56.7 million

Muon Space, a Silicon Valley-based startup developing small satellites for Earth monitoring and other applications, announced Aug. 5 it has secured \$56.7 million in Series B funding.

The fundraising round was led by Activate Capital, with participation from Acme Capital and existing investors Costanoa Ventures, Radical Ventures, and Congruent Ventures.

The company said it plans to use the new capital to accelerate the development of its Halo low-Earth orbit satellite platform and scale operations.

Muon Space reported it has secured over \$100 million in committed customer contracts in 2024 for its smallsats.

Coinciding with the funding announcement, Muon Space revealed a new agreement with aerospace and defense contractor Sierra Nevada Corporation (SNC) to produce three satellites for SNC's Vindlér commercial radio-frequency remote sensing system. The first Vindlér satellites are scheduled for launch in 2025.

Gregory Smirin, president of Muon Space,

SANDRA ERWIN



Above: Render of Muon Space climate-monitoring satellite in low-Earth orbit. Credit: Muon Space

said the Series B funding round “underscores investors’ confidence in Muon Space’s technology and market potential. With this capital raise, Muon Space plans to scale its operations, expand its product offerings, and continue to pioneer advancements in space-based sensing and analytics.”

The satellites for SNC’s Vindlér system will be used to detect and geolocate specific

objects from low-Earth orbit based on targeted radio frequency emissions. SNC partnered with Spire Global to launch the first four satellites of the planned Vindlér constellation.

Muon Space in May announced an agreement with the nonprofit Earth Fire Alliance to build a constellation focused on wildfire prevention and monitoring. **SN**

Continues from p. 1

<> mission in the fall.

The upgraded version of Mira retains its propulsion system but features radiation hardening as well as an improved power supply and avionics. It will support a range of configurations for smallsats and hosted payloads, such as nine 16U cubesat dispensers.

Impulse Space envisions combining Mira with Helios, with Mira being deployed from Helios on GEO rideshare missions to then maneuver to desired orbits. The company cited rendezvous and proximity operations and space situational awareness as potential applications for Mira when used on GEO rideshare missions. With a full 300-kilogram

“As access to GEO continues opening up, we’re seeing demand shift from static to dynamic operations for assets in these high-energy orbits.” — Tom Mueller, CEO and Founder of Impulse Space

payload, Mira will provide up to 500 meters per second of delta-V, or change in velocity, increasing to as much as 1,200 meters per second with a minimal payload.

Impulse Space will also use the upgraded Mira on LEO missions, with its first mission slated to launch in late 2025. Among Mira’s customers is the in-space refueling company Orbit Fab, which will host a fuel depot on a Mira vehicle in 2026 as part of a mission to refuel the U.S. Space Force’s

Tetra-5 satellite in GEO.

As it rolls out the upgraded Mira vehicle, Impulse Space is moving into development of Helios. This includes preparing to begin tests of the powerpack for the engine that will power the stage and working on tanks for the vehicle. Helios will also reuse avionics created for Mira.

“Last year was mostly about Mira and getting that LEO Express 1 mission up,” Mueller said. “This year is mostly about Helios.” **SN**

Perceptive Space raises \$2.8 million for space weather platform

Space weather startup Perceptive Space raised \$2.8 million in a pre-seed investment round announced Aug. 6.

Toronto-based Perceptive Space promises “space weather predictions that are more accurate and have better lead times than what NOAA and other government agencies provide today,” Padmashri Suresh, Perceptive founder and CEO, told *SpaceNews*. “We are using AI to extract more signal from the same data.”

The National Oceanic and Atmospheric Administration (NOAA) monitors solar activity and provides space weather forecasts and warnings. Perceptive Space models ingest data from NOAA, NASA and private partners. “We are leveraging decades worth of space weather data and operations data to predict space weather and its impact,” Suresh said.

Since Perceptive Space was established in stealth mode in 2022, the company has developed “lightweight” AI models to run on-board satellite edge processors. “You will be able to seamlessly integrate our models and predictions into the systems,” Suresh said.

Targeted Forecasts

Perceptive Space also is known for tailoring forecasts for clients. The impact of a geomagnetic storm on a satellite operating at an altitude of 200 kilometers, for example, will be different from its impact on a satellite at 400 kilometers.

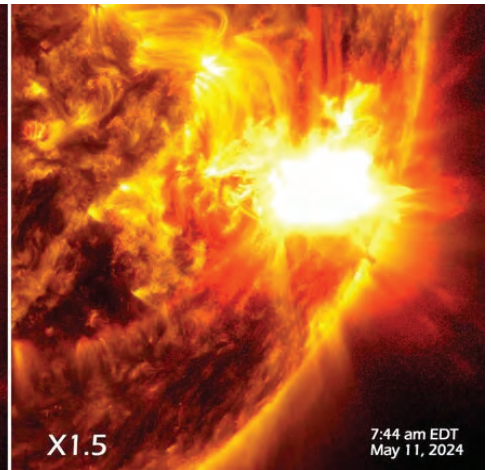
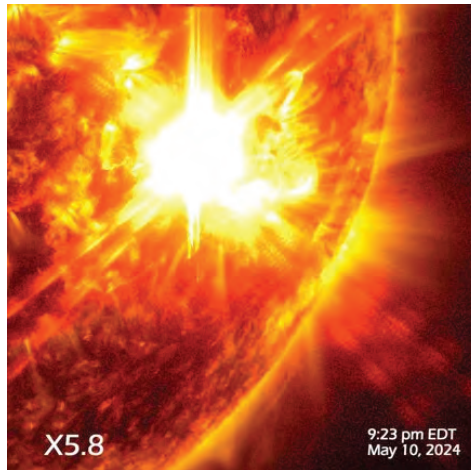
Perceptive’s “data products tell you how space weather will impact the health of your particular mission and different subsystems,” Suresh said. “We give that kind of tailored information and decision intelligence about space weather impact.”

Investment Round

Investors participating in Perceptive Space’s funding round include Panache Ventures, Metaplanet, 7Percent Ventures, Mythos Ventures and AIN Ventures.

With the money, Perceptive Space plans

DEBRA WERNER



Above: These images of X-class solar flares were obtained May 10 and 11, 2024, by NASA’s Solar Dynamics Observatory. Flares are classified by their intensity with X-class being the strongest. **Right:** Padmashri Suresh, Perceptive founder and CEO

to introduce its space weather platform to space and defense organizations in the United States and allied countries. Perceptive Space has “secured early commitments from several satellite operators and launch providers, including a pilot,” according to the news release. Suresh declined to name the early customers. Perceptive Space’s first product is scheduled for release in 2025.

In addition, Perceptive Space will hire “more engineers and scientists to help us get out products and attract early adopters,” Suresh said.

The Backstory

Prior to founding Perceptive, Suresh worked in data science, spacecraft engineering and technology policy.

“All of these experiences helped me build an understanding of all the different ways space weather impacts our sensors or operations or launch, which led me to explore the idea of using machine learning to better predict space weather for my PhD,” Suresh said. Suresh earned her PhD at Utah State University, home of this week’s SmallSat



Conference, in 2016.

Ultimately, Suresh founded Perceptive Space “because I believe humanity is going to be a multiplanetary civilization. To ensure that our systems and all of us don’t become burnt toast getting there, we need better space weather information with better lead times.”

To date, space-related startups have tended to focus on terrestrial rather than space weather. Suresh was already establishing Perceptive Space when SpaceX lost 49 satellites in a 2022 geomagnetic storm.

“That was the catalyst I was looking for because everybody in industry realized that, yes, we need better space weather forecasts,” Suresh said. “People are seeing the impact on their bottom lines from space weather.” **SN**

Viasat developing small satellite constellation management service



Left: Viasat's team that is presenting the Multi-Mission Orchestration service at the Smallsat Conference in Logan, Utah.

Viasat plans to demonstrate automated constellation management software in 2026 to help small satellites operate independently in increasingly congested low Earth orbit (LEO).

The Multi-Mission Orchestrator's (MMO) algorithms would draw from publicly available orbital data and information from participating satellite operators to reduce the need for ground-based control crews, the geostationary fleet operator announced Aug. 5.

These algorithms could run terrestrially or hosted onboard small satellites, according Viasat, enabling spacecraft to cooperate and coordinate operations across the fleet and orbital domain.

"MMO is designed to consider individual satellite capabilities and resources, and then provide insight on how best to optimize and coordinate space vehicle

schedules for maximum mission utility," Michael Maughan, vice president of space and mission systems for Viasat's government division, told SpaceNews.

Specifically, MMO would generate an operational schedule for every satellite within a constellation while optimizing mission performance from a global perspective.

"This advanced system enables a simultaneous search for each satellite's schedule through the fulfillment of operational tasks," Maughan added, "ensuring coordination between cooperative systems and guiding the solver to a mission-realistic and optimized schedule."

While the software can be combined with artificial intelligence to control satellite operations more dynamically, it does not require it.

Maughan described MMO as "fundamentally a decision engine" that optimally allocates task fulfillment responsibilities to each satellite within the constellation.

MMO is "fundamentally a decision engine that optimally allocates task fulfillment responsibilities to each satellite within the constellation."

— **Michael Maughan**, Vice President of Space and Mission Systems, Viasat

"These task fulfillment decisions apply to virtually any mission where decisions have a quantitative impact or measurable performance," he added.

The algorithms are currently undergoing testing on flight-representative hardware.

"This feature is crucial for real-time decisions and effective resource management that can optimize network communications and data storage to better support mission execution."

Viasat declined to comment on how much it would charge for MMO.

The service is one of multiple constellation management tools that have recently emerged to address the increasing complexity of operating in space — and the growing threat of debris-causing collisions.

In March, Portuguese startup Neuraspace released a free version of its online space traffic management platform to foster more satellite operator collaboration. **SN**

Data relay support

Viasat plans to validate MMO in conjunction with a demonstration in 2026 of its Integrated Space Access Network (ISAN) service, which aims to offer near-Earth mission operators improved relay communications via Viasat's satellite and ground-based networks.

"The MMO solution will leverage cross-linking behavior that allows for more strategic use of resources across the constellation," Maughan said.

Viasat's Multi-Mission Orchestrator (MMO)

Launch Date: Demonstration planned for 2026

Purpose: To help small satellites operate independently in low Earth orbit (LEO)

Key Features:

- Uses algorithms from publicly available orbital data and satellite operators
- Reduces need for ground-based control crews
- Can run terrestrially or onboard small satellites
- Generates optimized operational schedules for satellite constellations

JASON RAINBOW

NASA budget pressures creating new opportunities for smallsats

Tight NASA budgets could provide new opportunities for small satellites, which have increasingly demonstrated their capability to perform low-cost science missions.

During a NASA town hall meeting held during the Small Satellite Conference here Aug. 5, agency officials argued that smallsats have become a key part of the agency's overall portfolio of missions to study the Earth, solar system and universe.

"Enabled by low-cost access to space, smallsats have revolutionized space sciences," argued Peg Luce, acting deputy associate administrator for programs for NASA's Science Mission Directorate (SMD). "We can pack more science into packages smaller than we could have imagined 25 or even 10 years ago."

Acceptance Across Various Fields

She and other NASA officials at the town hall outlined how smallsats have become widely accepted in fields such as Earth science, heliophysics and astrophysics. David Cheney, program executive for heliophysics at NASA Headquarters, noted that the "fleet chart" of missions in that division is now dominated by small satellites. "Heliophysics is leaning very much forward into small satellites."

Luce argued that smallsats are attractive not just because of the lower costs and faster development times but also the ability to use them to conduct

missions not feasible with larger satellites, like constellations. "For many science questions, smallsats provide the ideal architecture," she said. "The ability to develop smallsat constellation missions has led to advances in the way we design missions to accomplish really grand research objectives in space."

NASA, she said, "has leaned into smallsats as part of a balanced portfolio."

Budget Pressures and New Opportunities

That portfolio, though, is facing budget pressures as NASA grapples with reductions of about \$1 billion for science in fiscal years 2024 and 2025, as well as challenges with some individual programs, like Mars Sample Return. "Across SMD we're in a budget crunch right now," Luce acknowledged during the town hall.

Those budget pressures, though, could provide a new chance for small satellites to demonstrate their ability to do quality science at low costs. "I would look at it as an opportunity," she said when asked if that budget crunch was a threat or opportunity for smallsat programs.

Growing Capabilities of SmallSats

She didn't elaborate on specific opportunities, but others noted the growing capabilities of smallsats. "We're able to go bigger and bigger but do it frugally," said



Above: Peg Luce, acting deputy associate administrator for programs for NASA's Science Mission Directorate, speaking Aug. 5 at SmallSat.

Sachidananda Babu, manager of NASA's In-space Validation of Earth Science Technologies program, which supports smallsat development. "It provides an opportunity for creativity."

The focus of the town hall discussion was on existing smallsat missions and opportunities. Luce noted the upcoming launches of two high-profile smallsat missions. One, ESCAPEDE, is a pair of smallsats that will orbit Mars to study the interaction of the solar wind with the planet's magnetosphere. That is scheduled to launch this fall on the inaugural flight of Blue Origin's New Glenn rocket.

Another is Lunar Trailblazer, which will orbit the moon to scout for water ice. She noted that the mission recently completed

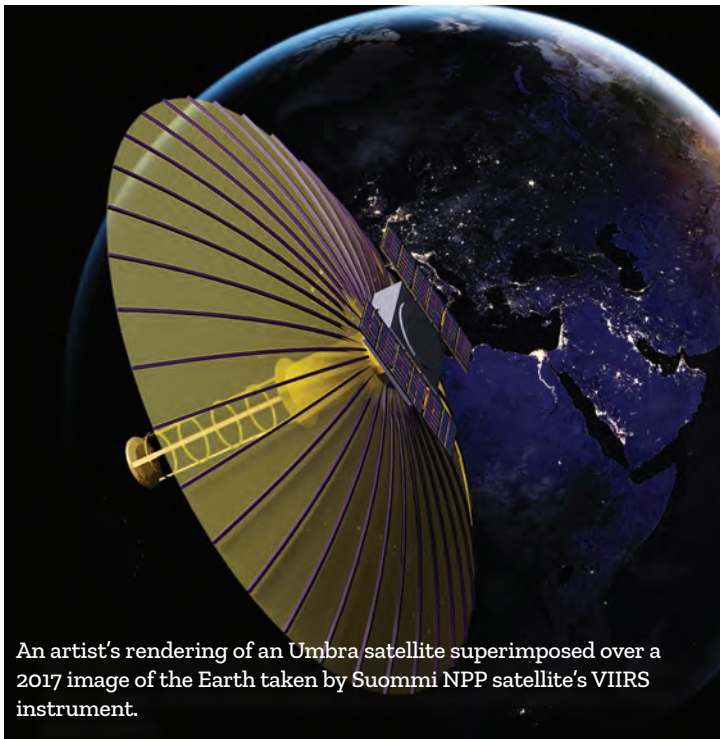
a review at NASA Headquarters and remains on track to launch towards the end of the year as a rideshare on Intuitive Machines' second lunar lander mission.

One near-term milestone involves a smallsat launched earlier this year. NASA flew the Advanced Composite Solar Sail System (ACS3) cubesat in April on a Rocket Lab Electron rocket. The spacecraft has been undergoing tests in orbit before deploying an 81-square-meter solar sail.

That deployment is planned for later this month, said Roger Hunter, manager of the Small Spacecraft Technology program at the agency. Once deployed, ACS3 may become bright enough to be seen with the naked eye. "It is going to be impressive." **SN**

"We can pack more science into packages smaller than we could have imagined 25 or even 10 years ago." — Peg Luce, NASA

JEFF FOUST



An artist's rendering of an Umbra satellite superimposed over a 2017 image of the Earth taken by Suomi NPP satellite's VIIRS instrument.

Umbra's Mission Solutions

Company: Umbra

Founded: 2015

Headquarters: Santa Barbara, California

Current Satellites: 8 SAR satellites in orbit

Planned Constellation: 32 satellites

New Segment: Mission Solutions

Target Audience: U.S. and international governments

Capabilities:

Components, software, and full SAR constellations

Dedicated SAR data access during system build

Government-owned, contractor-operated, or full handoff models

Applications:

Defense and intelligence

Environmental monitoring

Urban planning

Competitors: Capella Space, BlackSky

Umbra expands into custom satellite manufacturing

Umbra Mission Solutions to offer complete SAR systems, components and software to U.S. and international governments

Umbra, a space technology company specializing in synthetic aperture radar (SAR) imaging, is expanding into the satellite manufacturing business.

The company this week announced a new business segment called Mission Solutions aimed at the U.S. and other governments that seek “components, software, and demonstration of mission capabilities through full SAR constellations,” said Jason Mallare, Umbra’s vice president of global solutions.

Founded in 2015, Umbra aims to capitalize on increased interest in radar satellite technology, especially among governments wanting to build and run their own tailored systems.

SAR satellites use radar sensors to create high-resolution images of the Earth’s

surface day and night, penetrating cloud cover. This makes them valuable for a range of applications, from defense and intelligence to environmental monitoring and urban planning.

“We see a growing demand for complete satellite systems as well as other mission capabilities,” Mallare said. Umbra, for example, would provide customers with dedicated SAR data access to the company’s satellites while their systems are being built. “We can also support models like government-owned, contractor-operated or do a full handoff of a system,” he said.

Umbra did not disclose financial details or specific customers for this new business. “We currently see strong demand and active engagement with customers around the globe that need capabilities to support multiple defense, intelligence and civil missions,” said Mallare.

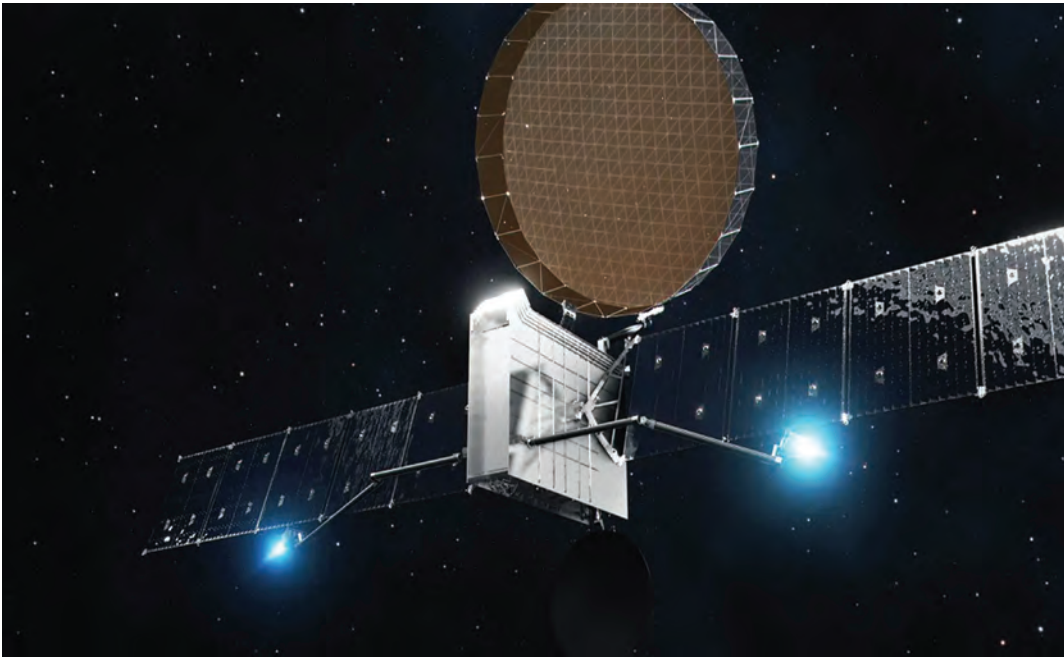
Based in Santa Barbara, California, Umbra currently operates eight SAR satellites in orbit, with plans to expand its constellation to 32. These satellites are designed to work in pairs or clusters, enabling services such as bistatic SAR imaging, where one satellite transmits radar signals and another receives the reflections, potentially improving image resolution and data collection.

Umbra’s new business reflects a broader trend in the space industry, with remote sensing companies increasingly offering end-to-end solutions to attract a wider customer base.

Competitors such as Capella Space and BlackSky have made similar moves, with Capella offering complete SAR systems to governments and BlackSky partnering with Thales Alenia Space to produce a dedicated Earth observation constellation for Indonesia’s Ministry of Defense. **SN**

SANDRA ERWIN

Astranis fully funds Omega with \$200 million fundraiser



Left: An Omega satellite would be around 600kg, compared with 400kg for earlier Astranis generations.

Astranis has raised \$200 million to fully fund its Omega program up to the launch of the first next-generation broadband spacecraft in 2026, the geostationary satellite maker announced July 24.

The venture has raised \$750 million since it was founded in 2015 to provide more cost-effective satellites that, around the size of a dishwasher, are much smaller than classic, school bus-sized geostationary broadband spacecraft.

While Omega would be slightly bigger than previous Astranis generations to deliver five times more throughput, CEO John Gedmark said it could still fit up to 12 on a medium-class rocket such as SpaceX's Falcon 9.

JASON RAINBOW

Investment Participation

Venture capital firm Andreessen Horowitz co-led the Series D funding round with investment firm BAM Elevate. Andreessen Horowitz's growth fund first invested in Astranis in 2023 when it led a \$200 million equity and debt funding round. Investment management firms Blackrock, Fidelity and Baillie Gifford also participated in the Series D fundraiser.

Astranis, which operates the satellites it builds and leases the capacity over their roughly eight-year design life, declined to discuss any potential customers for Omega. The company has only launched one spacecraft so far: Arcturus in April 2023. Arcturus was initially slated to provide broadband services over Alaska for local telco Pacific Dataport, but suffered a

failure of two onboard solar array drive assemblies shortly after deployment.

Resolving Arcturus Issues

Instead, Astranis moved the spacecraft to a geostationary orbital slot over Asia to help Israeli satellite operator Spacecom meet a regulatory deadline for bringing the position into use.

A following batch of four Astranis satellites were due to fly on a Falcon 9 last year but were delayed after the Arcturus issue.

Astranis said it has fixed the issue on these upcoming satellites, collectively Block 2, for a Falcon 9 launch this year but has not provided more details.

Upcoming Satellite Launches

A replacement for Pacific Dataport is one of the four Block

2 satellites. They are due to be followed by five Block 3 satellites slated to launch in 2025 on an undisclosed dedicated rocket.

These nine upcoming satellites are designed to provide 10-12 gigabits per second of throughput for their customers. Integral to an Omega design to provide 50 Gbps of throughput is a large deployable reflector from Louisville, Colorado-based Tendeg.

Larger geostationary broadband satellites can provide significantly more throughput, because they have more room for transponders and power — and are also typically designed to be in service twice as long.

However, Astranis and other small geostationary specialists such as Switzerland's Swissto12 see growing demand for cheaper, more regionally focused spacecraft.

Block 2 also includes a satellite for capacity reseller Orbits Corp of the Philippines and two spacecraft for U.S.-based connectivity specialist Anuvu.

Block 3 comprises another satellite for Orbits Corp, one for Thai fleet operator Thaicom, one for Argentina-based remote connectivity provider Orbith and a pair of spacecraft for Mexican telco Apco Networks. **SN**

Ascending Node Technologies debuts Spaceline at SmallSat Conference

Ascending Node Technologies unveiled mission-visualization software at the SmallSat conference here.

The software, called Spaceline, is a web-based suite of data analysis and visualization tools designed to improve collaboration from mission design through operations and post-mission review.

NASA's Aspera mission was the first test for Spaceline. Aspera, a 60-kilogram satellite to study the evolution of galaxies, is scheduled for launch to low-Earth orbit in 2026.

"Our University of Arizona space team is thrilled to be working with Ascending Node Technologies and leading NASA's Aspera astrophysics mission that seeks to solve the mysteries surrounding how galaxies evolve and obtain fuel for the formation of stars," Carlos Vargas, University of Arizona astronomer and Aspera principal investigator, said in a statement. "Spaceline is a mission-critical tool that's enabling us to simulate, collaborate, and walk through multiple precision iterations of the operation years before we launch."

Collaboration Conundrum

Ascending Node Technologies' founders came up with the idea for Spaceline while working on NASA's Origins, Spectral Interpretation, Resource Identification and Security – Regolith Explorer, OSIRIS-REx, mission.

"Our team was all over the world and it was difficult getting everybody's geometries and data synchronized to collaborate effectively," Sanford Selznick, Ascending Node Technologies chief software architect, told *SpaceNews*. "The solution back then was similar to Dropbox, where people would drop files in. For a mission that size, you're talking thousands of files, naming conventions that weren't adhered to and formats coming from left field."

Selznick, OSIRIS-REx senior science data processing lead, joined forces with Carl



Above: Ascending Node Technologies founders, from left to right, Chief Scientist Carl Hergenrother, Chief Software Architect Sanford Selznick, and Chief Aerospace Engineer John Kidd.

Hergenrother, OSIRIS-REx Astronomy Working Group lead, and John Kidd, OSIRIS-Rex senior science operations planning engineer, to form Ascending Node Technologies in 2018.

"We developed software that could run on the web and allow teams from all over the world to share their information and see their results almost immediately," Selznick said. "We knew we'd need a pretty intense server architecture, a first-class website and tons of security."

Spaceline helps people "control data inputs, inspect data, collaborate and make judgments to improve their plan," Selznick said. "If you don't have this crystal-ball-like things, you're going to end up building a lot of stuff from scratch."

NASA Small Business Innovation Research awards have funded Spaceline development

and testing. A recent SBIR award helped Ascending Node Technologies expand Spaceline to allow "hundreds of users" to simultaneously analyze, iterate and discuss mission simulations and flight data, according to the news release.

Mars Reconnaissance Orbiter

Spaceline applications are not limited to small satellite missions.

"We routinely tested Spaceline against the Mars Reconnaissance Orbiter and OSIRIS-REx," Selznick said. "We can handle hundreds of maneuvers and attitude changes a day without any issues whatsoever."

Support for large missions is thanks, in part, to Amazon Web Services. Ascending Node Technologies joined the AWS Partner Network in 2023. **SN**

"We knew we'd need a pretty intense server architecture, a first-class website and tons of security."
—Sanford Selznick

DEBRA WERNER

GHGSat data earns NASA stamp of approval for methane monitoring



Left: Artist's rendering of the methane emissions-monitoring satellite built, owned and operated by Spire Global for GHGSat.

noncommercial applications through NASA's Earthdata portal.

Expanding portfolio

NASA established the Commercial SmallSat Data Acquisition pilot program in 2017 to see whether commercial observations could augment or complement government datasets.

When principal investigators showed that the data acquired contributed to Earth-observation research and applications projects, NASA began buying datasets.

NASA announced last year that seven companies would compete for contracts with a maximum value of \$476 million over five years.

The companies — Airbus DS Geo, Capella Space, GHGSat, Maxar, PlanetIQ, Spire Global and Umbra — were selected under a fixed-price, indefinite delivery, indefinite quantity contract.

NASA currently acquires data from Airbus U.S., Maxar Technologies, Planet, Spire Global and Teledyne Brown Engineering.

In addition, NASA purchases high-resolution Digital Elevation Models from the EarthDEM Project, which includes the University of Minnesota's Polar Geospatial Center, Ohio State University's Byrd Polar Research Center, and the University of Illinois National Center for Supercomputing Applications. **SN**

Methane-emissions data from GHGSat will be shared for scientific research through NASA's Commercial SmallSat Data Acquisition program.

GHGSat announced last week that the company's data "successfully completed" NASA's "rigorous evaluation process."

"GHGSat is proud to contribute to NASA's efforts to monitor and better understand greenhouse gas emissions worldwide," Stéphane Germain, GHGSat president and CEO, said in a statement.

"GHGSat's unique satellite data and analytics, capable of attributing emissions directly to individual facilities, illuminate a critical piece of the climate puzzle," Germain said. "These insights accelerate global transparency in greenhouse gas emissions, advance critical research, and

DEBRA WERNER

NASA Commercial SmallSat Data Acquisition Program

Established: 2017

Purpose: To determine if commercial observations can augment or complement government datasets.

Contracts: Seven companies competing for contracts worth up to \$476 million over five years.

Current Data Providers:

- Airbus U.S.
- Maxar Technologies
- Planet
- Spire Global
- Teledyne Brown Engineering

develop knowledge in the fight against climate change."

Stamp of approval

In May 2023, NASA asked GHGSat to provide methane emissions data to the NASA Commercial SmallSat Data Acquisition program for evaluation.

In response, GHGSat submitted recent observations and archival data showing anthro-

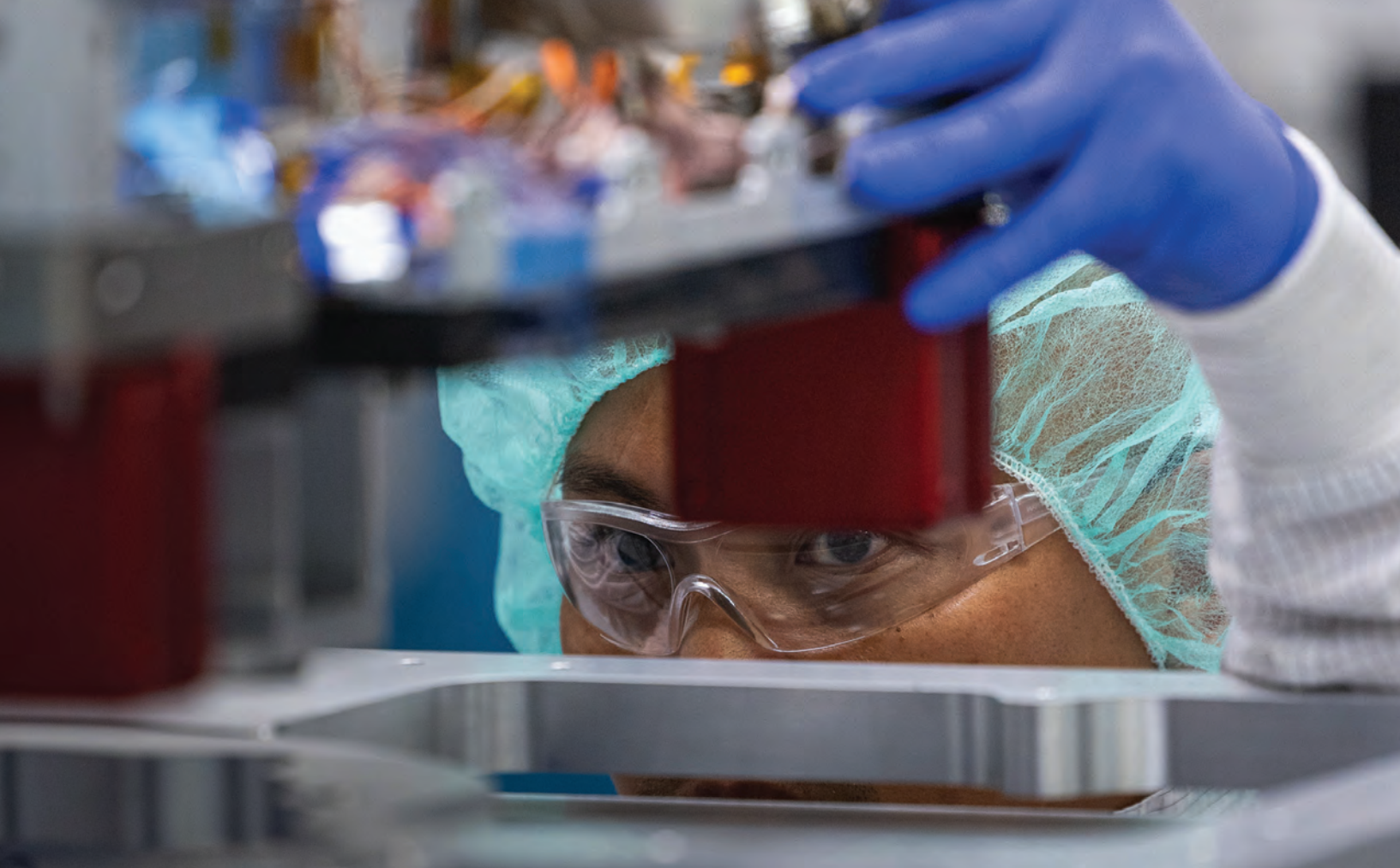
pogenic and natural greenhouse gas emissions detected over land and water in the United States and around the world. The data was evaluated by a panel of researchers from NASA centers, other U.S. government agencies and academia.

Now that the quality has been verified, GHGSat data will soon be available for scientific and other



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Firefly Aerospace secures major launch contract with L3Harris

Firefly Aerospace has won a contract from L3Harris for as many as 20 launches of its Alpha rocket over five years.

Firefly announced Aug. 7 it signed a contract with L3Harris for between two and four launches annually from 2027 through 2031. The contract is in addition to an earlier deal between the companies for three Alpha launches in 2026.

The companies did not disclose the satellites that L3Harris would be launching on Alpha. The rocket, currently operating from Vandenberg Space Force Base in California, can place up to one metric ton into low Earth orbit.



Above: Firefly Aerospace and L3Harris employees gather for a group photo at the Firefly booth at Small-Sat on Wednesday.

Growing List of Multi-Launch Deals

The contract is the second multi-launch deal for Firefly announced in recent months. Firefly announced June 5 it won a contract from Lockheed Martin for between 15 and 25 Firefly launches through 2029.

JEFF FOUST

Alpha has launched five times, most recently July 4 when it placed a set of NASA-sponsored cubesats into sun-synchronous orbits. At the time the company said its next Alpha launch would be a dedicated commercial mission for Lockheed Martin,

although without a specific date set.

That would be followed by a responsive space demonstration mission for the National Reconnaissance Office later in the year on another Alpha, using Firefly's Elytra tug.

Leadership Changes Amid Growing Demand

"The Firefly team is proud to build on our existing relationship with L3Harris and serve as a long-term launch provider >

Story continues, p. 5

KEITH JOHNSON FOR SPACENEWS



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Heavier smallsats weigh down market forecasts

Novaspace forecast: Fewer smallsats in the next decade

The number of smallsats forecasted to launch in the next decade is declining as some satellites get heavier.

In a presentation at a side meeting during the Small Satellite Conference Aug. 7, Gabriel Deville, senior consultant at Novaspace, said his company was forecasting 14,500 smallsats would launch in the next decade. Novaspace, formed earlier this year from the merger of Euroconsult and SpaceTec Partners, defines smallsats as those weighing no more than 500 kilograms.

Starlink's Shift to Heavier Satellites

That number is down from the 23,000 forecasted a year ago by Euroconsult. "It's because, in the meantime, one operator that launched a lot of smallsats is no longer launching any more: Starlink," he said.

SpaceX, of course, is continuing to deploy Starlink satellites, but the "V2 mini" spacecraft the company is now launching weigh about 750 kilograms, well above the cutoff used by the study. Earlier versions of Starlink satellites weighed 300 kilograms or less. Future Starlink satellites will be even heavier.

Deville said that increase in mass is part of a broader industry trend as operators seek to increase performance of their spacecraft, particularly those moving into second-generation



Above: A set of Starlink satellites before their deployment.

constellations.

The average mass of smallsats launched in 2017 was just 19 kilograms, "when the cubesat was still king," he said. By 2023, that grew to 199 kilograms. Even when broadband satellites are excluded, that average mass grew to 44 kilograms in 2023.

Performance Needs Driving Satellite Mass

"A lot of satellites in constellations are seeking more performance, whether it's in Earth observation or in broadband and connectivity," he said, with a "sweet spot" emerging around 200 kilograms.

"Large satellites are not dead

yet, for sure," he concluded. "There will always be room for small satellites and miniaturization, but large satellites, in many use cases, are necessary."

The increase in satellite mass is just one of several challenges facing the smallsat industry. The Novaspace study found several others, from decreasing private investment in the industry in the last few years to a bottleneck in launch access.

Mismatch in Smallsat Manufacturing Supply and Demand

One key one is a mismatch between supply and demand in smallsat manufacturing. Deville

noted that many companies have scaled up production of satellites, with an overall capacity of thousands of smallsats a year to be offered to customers.

However, of the annual average of 1,450 smallsats in the study, more than 90%, or 1,320, are considered captive in some way and not open to competition. That includes smallsats that are built by constellation operators, like Amazon's Project Kuiper, as part of a broader push towards vertical integration.

"We're definitely going towards a situation where supply of satellite manufacturing largely outweighs demand," he said. **SN**

JEFF FOUST

Safran to open U.S. production line for satellite propulsion systems

Colorado facility to manufacture EPS X00 electric thrusters for government and commercial markets

Safran Electronics & Defense will establish a new production line for satellite electric propulsion systems in the United States to serve commercial and U.S. government customers.

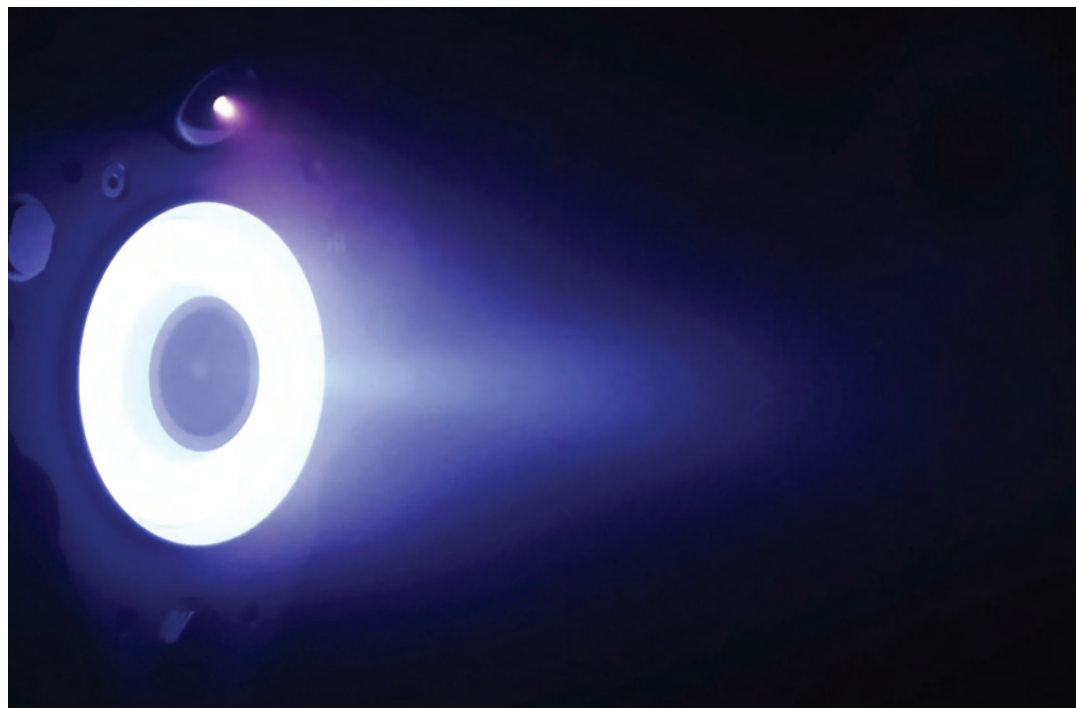
Safran announced Aug. 5 it intends to open a facility in Colorado that it will use to produce its EPS X00 electric thrusters, intended for smaller spacecraft in low Earth orbit. The company expects the first systems to come off that production line in the first quarter of 2026.

Mirroring French Production Line

The line will be a mirror of an existing line in France for the EPS X00 series, said Alex Thily, senior vice president of sales and marketing for space at Safran, during an Aug. 6 presentation at the Small Satellite Conference here. The French line started producing the thrusters in the second quarter of the year, with the first scheduled to launch on an undisclosed satellite late this year.

The American facility will focus on U.S. government and commercial customers, with the French line focusing on customers in the rest of the world. "With this double manufacturing line, we are able to provide trust and confidence to both U.S. domestic, national

JEFF FOUST



A Safran EPS X00 electric thruster firing. The company will open a second production line for the thrusters in the United States.

programs as well as commercial programs," he said.

The thrusters produced by the two lines will be identical other than the sourcing of components for its power processing unit. The units produced in the United States will use U.S. components while those made in France will use foreign components.

The EPS X00, or "X-hundred," is designed to operate at power levels between 400 and 1,000 watts. The thruster can be configured to use either xenon or krypton as propellant with only

minor changes to hardware. Krypton offers slightly lower performance than xenon but at significantly lower costs.

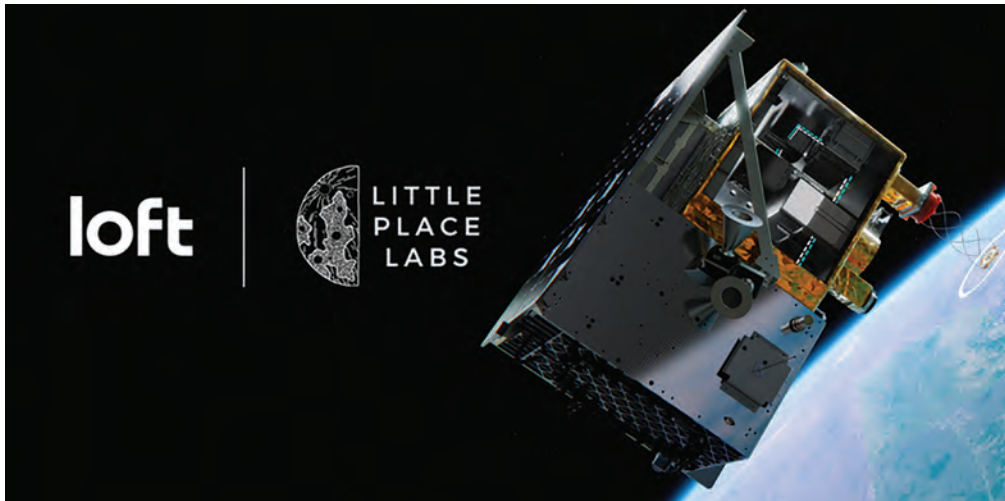
Market Interest and Production Capacity

Safran envisions interest in the thruster from larger LEO satellites as well small GEO satellites, including use on megaconstellations and satellite servicing spacecraft. "We are definitely not trying to address small satellites like those 200 kilograms and less," Thily said.

Each production line is

designed to produce up to 200 thrusters per year, with the ability to surge to double that rate by adding personnel. He said Safran has purchased enough long-lead items to produce 300 thrusters by the end of 2025.

Thily said the company had not settled on a specific location in Colorado for the factory as it weighs several options. The facility will also host other Safran space businesses active in the U.S., including satellite communications and space domain awareness. **SN**



Little Place Labs, Loft Orbital to test analytics in orbit

Houston startup Little Place Labs announced a contract to deploy software to Loft Orbital's YAM-6 satellite.

"We'll pair Loft's low-latency operations, using its space infrastructure, with our cutting-edge analytics to enhance maritime domain awareness," Little Place Labs said in an Aug. 7 blog post.

Funding for the mission comes from Little Place Lab's \$1.8 million Small Business Technology Transfer Phase 2 award from AFWERX.

Little Place Labs, founded in 2020, aims to "push the boundaries of real-time data processing and insight delivery" for terrestrial and space applications, according to the post. To make that possible, Little Place Labs is focused on processing data in orbit and transmitting information via inter-satellite relay systems.

"Our on-orbit data processing solutions, paired with Loft's

satellite platform, allow us to derive and deliver insights in near real-time for time-sensitive situations," Bosco Lai, Little Place Labs co-founder and CEO, said in a statement. "These insights are critical to commercial and national security stakeholders, including those in the U.S. government. This collaboration highlights the new space age, where companies like Little Place Labs and Loft come together, integrating our solutions into powerful capabilities."

The majority of Loft Orbital's business is flying payloads for customers. YAM-6, launched in March, is Loft Orbital's first spacecraft designed for "virtual missions." Customers developing software can take advantage of the spacecraft's capabilities, including cameras, onboard processing and inter-satellite data links.

Little Place Labs, for example, will take pictures with the YAM-6 cameras and analyze the imagery with its onboard software.

Virtual Mission Growth

Loft Orbital will continue to improve "compute capabilities on subsequent missions," Alex Greenberg, co-founder and CEO, told SpaceNews at the Small Satellite Conference here.

The idea of deploying software to someone else's satellite, like it can be deployed in the cloud, is new for the space industry.

"We are one of the first companies to offer that as a commercial service," Greenberg said. "We have in excess of 12 signed customers across legacy players, technology companies, startups and defense companies."

Loft Orbital is committed to offering virtual missions because of "this conviction that more computers are going to space and more people want to fly software on satellites," Greenberg said. "If we make it easier to put software on one of our satellites that will increase the addressable market and increase the number of use cases." **SN**

Continued from p. 1

< > for their robust satellite systems," said Peter Schumacher, interim chief executive of Firefly, in a statement. "Firefly continues to see growing demand for Alpha's responsive small-lift services, and we're committed to providing a dedicated launch option that takes our customers directly to their preferred orbits."

Schumacher stepped in as interim chief executive July 17 after the sudden departure of Bill Weber, who had reportedly been under investigation for having an inappropriate relationship with a female employee. Schumacher also served as interim chief executive for a time in 2022 before Weber was hired.

While Firefly builds up the order book for the Alpha rocket, it is continuing work on larger vehicles in partnership with Northrop Grumman. Firefly is developing the first stage of the Antares 330, replacing the Ukrainian-built first stage and Russian engines of the previous version of that rocket. Antares 330 will swiftly be succeeded by the Medium Launch Vehicle (MLV), which will use the same first stage but a new upper stage also built by Firefly along with a larger payload fairing. MLV will be able to place up to 16 metric tons into LEO.

The company announced July 15 that it performed a full "mission duty cycle" test-firing of the Miranda engine that will be used by the Antares 330 and MLV, running the engine for 206 seconds. That came a day after a 60-second test of the engine.

During a side meeting at the Small Satellite Conference here Aug. 6, representatives of Firefly and Northrop said they expected the first flight of MLV to take place in the second half of 2026. **SN**

DEBRA WERNER



Oxford Space shares pics of Yagi antenna deployment

Oxford Space Systems announced the successful deployment Aug. 7 of its Yagi very high frequency, high gain antenna. The U.K. company released images showing Yagi deploy on the Ymir-1 maritime communications satellite.

“This is a major step for us in demonstrating our deployable technology and increasing the credibility of our solutions,” Juan Castillo, Oxford Space Systems business development manager, told SpaceNews. “This antenna enables ship tracking and communication from low-cost platforms.”

AAC Clyde Space, Saab and Orbcomm collaborated on the Ymir-1 mission. The mission is focused on enhancing maritime communication through the VHF Data Exchange System.

“The successful deployment of the Yagi antenna on Ymir-1 marks a significant step forward in our mission to enhance maritime

communications,” Luis Gomes, CEO of AAC Clyde Space, said in a statement. “This collaboration with Oxford Space Systems is a testament to the innovation and partnership that drive our industry forward.”

Compact Stowage

Oxford Space Systems designed and manufactured the Yagi antenna with proprietary materials and techniques. The antennas can be stowed within a one-unit cubesat, which measures 10 centimeters on a side. When deployed, the antenna operates from the 156.5 megahertz to 162.5 megahertz band.

“We are thrilled to see our Yagi antenna successfully deployed on the Ymir-1 satellite,” said Sean Sutcliffe, Oxford Space Systems CEO, said in a statement. “This achievement not only demonstrates our expertise in deployable antenna technology but also highlights the importance of collaboration in advancing global maritime communication.” **SN**

DEBRA WERNER

Solestial's Expansion

New facility, major partnership with Meyer Burger

Solestial announced a strategic partnership Aug. 5 with Meyer Burger Technology to dramatically expand production of silicon solar technology.

Tempe, Arizona-based Solestial's radiation-resistant solar cells and flexible solar power modules are designed for long-term space applications. Meyer Burger, a publicly traded Swiss company, brings expertise in manufacturing solar cells and modules.

Production Goals: Aiming for 1 Megawatt Annually

Through the partnership, Solestial and Meyer Burger plan to produce 1 megawatt of solar cells annually by mid-2025. For comparison, Solestial currently produces less

than 100 kilowatts per year.

“This is a huge scale up for Solestial,” Andy Atherton, Solestial chief operations officer, told *SpaceNews* by email. “It’s also worth noting that the entire global manufacturing capacity for space-specialized solar is less than 2 megawatts today. So, we’re adding meaningful global scale with this partnership.”

Countering Radiation

With solar technology that relies on sunlight to anneal (or cure) radiation damage, Solestial closed a \$10 million funding round led by Airbus Ventures in 2022. Last year, Solestial announced an agreement to supply solar arrays for space tugs developed by Denver startup Atomos Space.

Through the new partnership, Solestial and Meyer Burger intend

DEBRA WERNER



Above: Solestial manufacturing facility in Tempe, Arizona.

to “revolutionize space solar power” by delivering “ultra-thin, reliable, radiation-hardened cells and modules at unprecedented scale,” according to the news release.

The strategic partnership agreement calls on Solestial to share its proprietary solar cell technology with Meyer Burger. Meyer Burger, in turn, will produce solar cells at its German manufacturing plant and send them to Solestial’s facility in Tempe, AZ for metallization, finishing and integration into flexible solar power modules.

“Meyer Burger stretches into industries that need our proprietary know-how and advanced technologies,” Meyer Burger CEO Gunter Erfurt said in a statement.

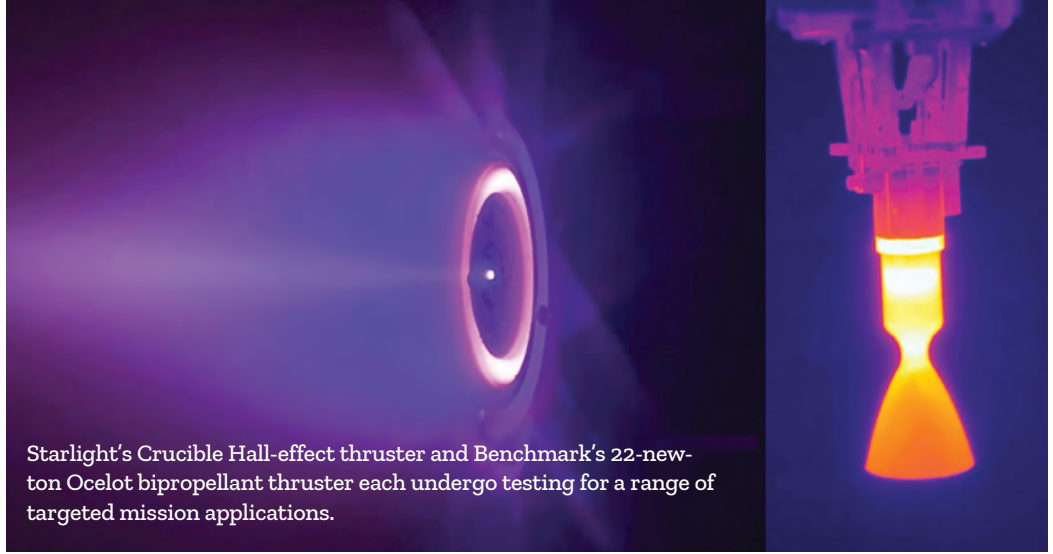
Scaling Production

Solestial CEO Stan Herasimenka said in a statement that the partnership will allow Solestial to “take the next step in scaling production, delivering for our customers and meeting the ever-growing demand for reliable, cost-effective and abundant energy in space.”

By making solar power less costly and more reliable, Solestial intends to support space-based infrastructure.

Industry Impact: Enabling Space Missions

For Starpath, a California company focused on producing rocket propellant with resources on the moon and Mars, Solestial’s technology is critical. “At yesterday’s cost and production scale of space-capable solar, our mission would be prohibitively expensive to accomplish,” Starpath CEO Saurav Shroff said in a statement. “Solestial’s solar technology is an unlock for Starpath and, we believe, for other next-generation space infrastructure. **SN**



Starlight’s Crucible Hall-effect thruster and Benchmark’s 22-newton Ocelot bipropellant thruster each undergo testing for a range of targeted mission applications.

Benchmark adds Starlight thruster to partner network

Benchmark Space Systems announced a strategic partnership Aug. 5 with startup Starlight Engines.

Under the agreement announced at the Small Satellite Conference here, Benchmark will offer hybrid propulsion systems that pair Starlight Crucible Hall-effect thrusters with Benchmark non-toxic chemical thrusters. The hybrid propulsion system is designed for high-endurance or high-specific-impulse missions and spacecraft with a mass of 1,000 kilograms or less.

Kick Stage Development

A promising application for the hybrid propulsion system is a kick stage Benchmark is designing under a NASA Small Business Innovation Research contract. The kick stage needs hybrid technology because chemical propulsion alone does not offer enough range, Chris Carella, Benchmark chief commercial officer, told *SpaceNews*. And electric propulsion alone would “take too long and have to fight

radiation effects.”

At the SmallSat conference, Benchmark displayed an ES-PA-class version of the hybrid propulsion system. Benchmark can fit the hybrid system in space previously reserved for electric propulsion alone because Starlight’s Crucible comes fueled with zinc, which is far more dense than xenon propellant.

The new hybrid propulsion systems, which include four Benchmark Lynx thrusters, can provide “an extra 12 to 20 percent total impulse and it’s all high thrust,” Carella said.

Propulsion Control

Benchmark also offers Modular Adaptive AVionics for Rapid Integration & Configuration, or MAAVRIC, universal control electronics. MAAVRIC’s common interface “greatly reduces integration costs and lead times, and enables seamless dynamic space operations across mission sets and mobility system configurations,” according to the news release.

In addition, Benchmark is known for SmartAIM onboard propulsion control software.

Burlington, Vermont-based Benchmark is continuing to expand its network to include partners focused on attitude determination and control systems, space situational awareness, chemical propulsion, electric propulsion and space services.

Commitment to Space Sustainability

“We are laser-focused on offering a full technology stack that delivers on our commitment to space sustainability and our motto: mobility without compromise,” Carella said in a statement.

Crucible is the first product from Starlight Engines, founded in 2022. The Hall-effect thruster is scheduled to fly for the first time in January 2025.

“We cannot think of a better partner to lead hybrid propulsion integration efforts,” Starlight CEO Todd Bailey said in a statement. “This relationship leverages our complementary strengths to meet the demand for Hall-effect and hybrid propulsion capabilities across commercial and government markets.” **SN**

DEBRA WERNER

PLD Space to start building French Guiana launch facilities next month

As Arianespace ramps up following Ariane 6's July maiden flight from Europe's spaceport in French Guiana, a Spanish venture is preparing to become the first non-institutional launcher to reach orbit from the base next year.

PLD Space plans to start building launch facilities for its Miura 5 rocket in October from the Diamant site at Guiana Space Centre, cofounder and chief business development officer Raúl Verdú told *SpaceNews*.

Rebuilding from Scratch

Diamant has been dormant for decades after once being used for the French rocket of the same name, and "in the area where we are there is nothing," Verdú said, "we have to do everything from scratch."

PLD Space, Germany's Isar Aerospace and a handful of other small European launchers are working with France's CNES space agency to convert the site into a multi-use facility.

In June, the Spanish company announced a 10 million euro (\$11 million) investment plan for 15,765 square meters of space at Diamant, divided between a launch zone and a preparation area comprising an integration hangar, clean room, control center, commercial and work offices.

CNES is providing common infrastructure such as roads and electricity networks.

Verdú said work is already underway to produce Miura 5 rockets at a recently established factory



Above: PLD Space vice president of sales and customers Pablo Gallego (left) with sales manager César Bernal at SmallSat.

near its headquarters in Alicante, Spain, although an official inauguration ceremony for the plant won't be held until after summer.

According to PLD Space, nearly 70% of the 35.7-meter-long rocket's design and technology was validated during the maiden flight of Miura 1, a smaller rocket that lifted off on a brief suborbital trip from the southern coast of Spain in October.

Miura 5's standard two-stage version is designed to lift a nominal payload of up to 540 kilograms to subsynchronous orbit, and up to 1080kg to equatorial orbit.

The first stage is also designed to be recoverable for reuse after separating from the rocket and using parachutes to slow its descent ahead of splashdown.

Funding Progress

PLD Space has raised around 120 million euros from early-stage investors since it was founded in 2011.

In July, the company signed a 31.2 million euro loan with local banks in July to accelerate development.

Unlike an equity venture funding round, debt funding from risk-averse banks does not dilute investments held by existing shareholders.

"Traditional banks usually are not financing companies at our stage," Verdú noted, particularly early-stage launchers.

Key to the financing was the support of Spain's government-backed export credit agency CESCE, which guaranteed the loan against the risk of non-payment to support its domestic industry.

The funds will support Miura 5 factory and launch site activities, and help the company expand from 220 to 300 employees before the end of the year.

Still, PLD Space must clear

multiple technical hurdles to achieve its goal of entering commercial operations in 2026, soon after Miura 5's maiden flight, and ramp up to more than 30 launches annually by 2030.

Before being bogged down by technical issues and external problems — not least the COVID-19 pandemic — Europe had originally planned to debut Ariane 6 in 2020 after beginning development work in 2014.

The 63-meter-tall Ariane 6 rocket ultimately reached orbit July 9, although it experienced an issue with the power unit that enables its upper stage to reignite.

PLD Space is also planning an ambitious maiden flight for Miura 5. Verdú said "we will try to recover part of the rocket from the first mission," but did not give details. **SN**

JASON RAINBOW



Dcubed raises 4.4 million euros for in-space manufacturing

German startup Dcubed raised 4.4 million euros (\$4.8 million) in a Series A funding round.

With the investment, announced Aug. 5, Dcubed will expand production, demonstrate in-space manufacturing and open a U.S. office, Thomas Sinn, DCubed CEO and founder, told SpaceNews at the Small Satellite Conference here.

Dcubed's Westminster, Colorado, office will serve as a sales and distribution hub to support U.S. customers, who make up more than half of the firm's client base, said Andria Fortier, Dcubed U.S. managing director.

To demonstrate in-space

manufacturing, Dcubed is buying SpaceX rideshare launches. "We want to launch at least twice next year with an in-space demonstrator and at least once in 2026," Sinn said.

For the first mission, Dcubed is working with space mobility provider Exotrail. Dcubed's payload will include Solestial's thin, flexible silicon solar blanket. In orbit, Dcubed will unfurl the solar blanket and manufacture support structures for a 100-watt solar array.

Expansion Aerospace Ventures and BayBG Venture Capital led Dcubed's Series A investment round. Also participating were HTGF, Aurelia Foundry, Ventis, Rymdkapital and Decisive Point Europe.

"Together with our global investors, we now have a solid foundation to boost future growth in the booming space market," Sinn said in a statement.

The funding also will allow Dcubed to quadruple production of actuators for space applications.

European and U.S. Investors

Ted Elvhage, Expansion Ventures general manager, said in a statement that his fund is backing Dcubed because it combines "a space-proven product in the rising satellite business with a leading position in the future market of in-space manufacturing."

Dcubed is BayBG's first NewSpace equity investment. "Our decision reflects the crucial role that space technologies play

Above: Dcubed CEO and founder Thomas Sinn (left) standing with Dcubed U.S. managing director Andria Fortier at SmallSat.

in driving all sectors on Earth – from connectivity and mobility to security and sovereignty," Alois Ganter, BayBG investment manager, said in a statement.

Aurelia Foundry, meanwhile, is backing Dcubed because "NewSpace is among the key enablers for solving critical challenges on Earth," general partner Ariel Ekblaw said in a statement. "The U.S. certainly provides the most flourishing ecosystems and is also one of the most competitive. With its already strong U.S. business – having delivered products for a who's who of aerospace customers – Ducted has proven to be a rapid innovator and trusted supplier with immense opportunity to scale." **SN**

DEBRA WERNER

Leaf Space Deploys first Ka-band ground station to meet growing demand

Italian ground segment service provider Leaf Space has deployed its first ground station with a Ka-band link to meet demand for higher data rate applications.

Leaf Space said the triband Ka, X and S-band antenna at its Blönduós, Iceland facility entered service in June following successful tests with a remote sensing customer, which is using the Ka-band link to download larger amounts of data from orbit.

Enhanced Capabilities

Leaf Space's previous 26 antennas only provide services in the S, X and, in a limited number of locations, ultra high frequency (UHF) bands, supporting missions such as Earth observation and monitoring to communications with orbital transfer vehicles.

While X-band enables remote sensing downlinks with data rates up to 1.2 gigabits per second, the Ka-band antenna currently supports data rates up to 6 Gbps, meaning operators can download larger amounts of data per satellite pass.

Market Demand for Higher Data Rates

Jonata Puglia, Leaf Space's CEO, said current and potential customers are demanding faster speeds to downlink increasingly larger amounts of data generated in orbit.

"The remote sensing market is slowly but surely moving



"The remote sensing market is slowly but surely moving towards high data rate applications, even if the Ka-band satellite radios are not yet widely available, expensive and power-hungry."

—Jonata Puglia, Leaf Space's CEO

towards high data rate applications," Puglia said, "even if the Ka-band satellite radios are not yet widely available, expensive and power-hungry."

Strategic Location in Iceland

Leaf Space chose Iceland for its first triband Ka, X and S-band antenna because the country's northern location

provides optimal revisit times and coverage for customers most interested in Ka-band.

Puglia said Leaf Space also recently commenced operations with two antennas in Punta Arenas, Chile.

Expansion Plans

The decade-old company plans to install 10 more antennas before the end of the

year, including two additional Ka-band antennas.

The expansion plan follows a \$22 million Series B funding round last year for Leaf Space, which supports more than 100 satellites with a ground network spanning 18 locations worldwide.

Leaf Space customers include Canada-based connectivity provider Kepler Communications, hyperspectral Earth observation operator Pixxel of India and AST Space-Mobile, a venture developing a direct-to-smartphone network out of Texas. **SN**

Above: The Leaf Space team at the Small Satellite Conference 2024 in Utah.



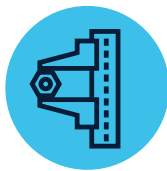
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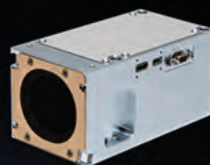


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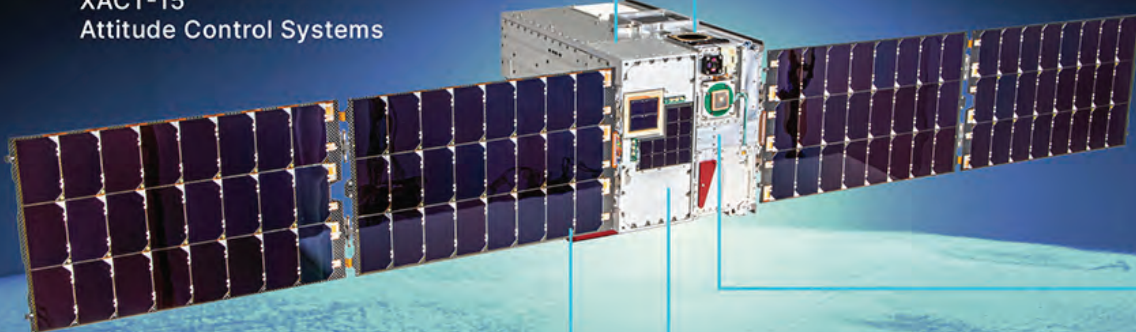
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XACT-15
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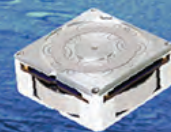
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