

Debris mitigation concerns bumped NASA cubesat from rideshare launch

A NASA cubesat was removed from a recent rideshare launch opportunity on a U.S. Space Force mission because the spacecraft could not meet guidelines for deorbiting at the end of its life.

The GTOSat mission, developed by NASA's Goddard Space Flight Center, was manifested to fly as a secondary payload on the Atlas 5 launch of the SBIRS GEO-6 missile-warning satellite. The SBIRS satellite was successfully launched Aug. 4.

However, GTOSat and a second, unidentified rideshare payload were not included on the launch. Space Force officials said in a prelaunch briefing that the satellites were not compliant with orbital debris mitigation guidelines but did not elaborate.

In an Aug. 8 presentation about GTOSat at the Small Satellite Conference, John Lucas of NASA's Katherine Johnson Independent Verification and Validation Facility said the issue was with the requirement that satellites deorbit no more than 25 years after the end of their mission.

"We had worked on a number of deorbit analysis issues, trying to meet the 25-year rule," he said. That was particularly challenging for GTOSat, a 6U cubesat that would be placed in a geostationary transfer orbit to study the dynamics of the Earth's outer radiation belt.

Meeting the 25-year timeline, he said, was highly sensitive to when the spacecraft launched because of the complex orbital dynamics. A final slip in the launch of SBIRS GEO-6 "pushed us above the limit."

Lucas said GTOSat and the other payload sought waivers to the 25-year deorbit rule, and went so far as to make the last-minute addition of a retroreflector to the spacecraft to aid in the tracking of the satellite. Ultimately, though, the spacecraft could not get waivers and were removed from the launch.

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Two secondary payloads, including a NASA space science cubesat, lost a rideshare launch opportunity on the SBIRS GEO-6 launch because they could not meet guidelines for deorbiting after the end of their missions.

The mission is now working with NASA's Conjunction Assessment Risk Analysis program, becoming what Lucas called a "pathfinder" for dealing with debris analysis issues. The spacecraft itself is being returned to Goddard, where it will be put into long-term storage "while we look for a new ride" with the support of NASA's Cubesat Launch Initiative.

The 25-year rule has become controversial in part because some believe leaving defunct satellites in orbit for that long is unwise. Some space sustainability advocates have pushed for shortening that timeframe, perhaps to as little as five years.

A recent White House report could prompt action on that issue. The Office of Science and Technology Policy (OSTP) issued in July a National Orbital Debris Implementation Plan, which outlined activities to address issues in orbital debris mitigation and remediation.

One element of that plan calls for a short-term study to be led by NASA "to better understand the impact of changing deorbit requirements" for the U.S. government, including "the potential benefits and cost in reducing the deorbit timelines." The report, though, did not specify by how much deorbit timelines should be shortened. **SN**

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Blue Canyon Technologies has the best pointing accuracy of any small satellite manufacturer in the world. With our revolutionary fleet of spacecraft and components, we're bringing our passion for the stars down to earth by equipping your team to build, test, launch and operate all from the comfort of gravity.

FIGURE 1

XB12 CLASS CUBESAT



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Secretive NovaWurks reveals contracts, expansion plans and ‘Space Legos’

After a series of spaceflight demonstrations followed by years of secrecy, NovaWurks is ready to discuss contracts, customers and expansion plans.

NovaWurks made a splash nearly a decade ago when the Southern California startup proposed constructing spacecraft with identical box-shaped modules weighing about six kilograms. The modules, now trademarked as Slegos (short for Space Legos), provide the functions of conventional components like pointing, information processing and data storage.

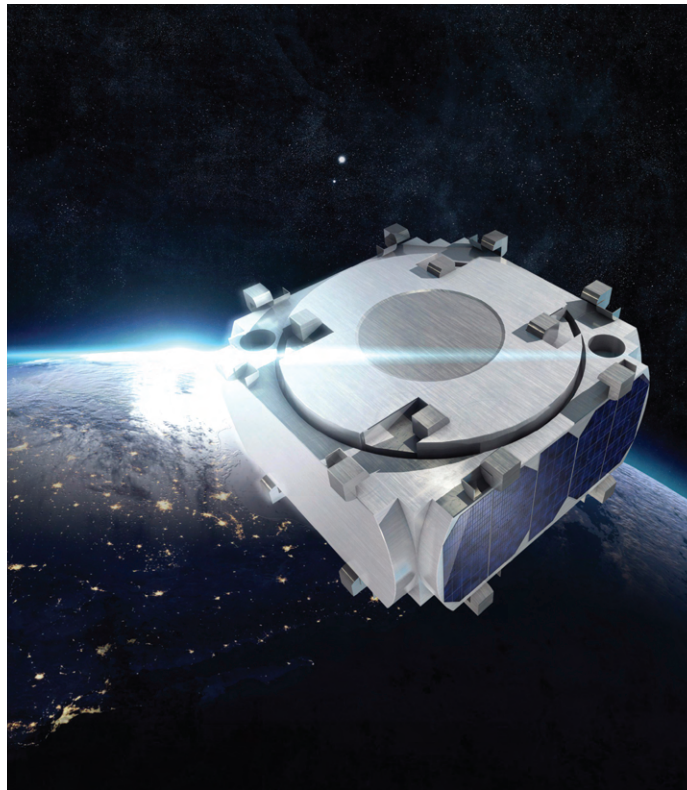
Designed to operate in geostationary orbit for 15 years, Slegos offer “tons of capability,” Talbot Jaeger, NovaWurks founder and chief technologist, told *SpaceNews* at the Small Satellite Conference.

Rather than custom-designing spacecraft to accommodate payloads, NovaWurks arranges Slego building blocks in different configurations.

“We’re not designing; we’re configuring,” Jaeger said. “Configuration doesn’t spend money on all that nonrecurring engineering.”

NovaWurks performed its first in-orbit demonstration in 2017 on the International Space Station. An astronaut assembled a small satellite by combining six modules, then called HISats, with deployable solar arrays and an electro-optical imager in the NASA-sponsored Satlet Initial Proofs and Lessons mission.

In 2018, NovaWurks’ Payload Orbital Delivery Satellite, PODSat-1, a mission funded by the Defense Advanced Research Projects Agency, reached a geostationary transfer orbit. PODSat-1’s four Slegos with radio and antenna traveled to geostationary transfer orbit on a SpaceX Falcon 9 rocket as a hosted payload that was later deployed from a Hispasat



“We’re not designing; we’re configuring. Configuration doesn’t spend money on all the nonrecurring engineering.”

Talbot Jaeger, NovaWurks founder and chief technologist, on the company’s Lego bricks-inspired Slegos modular spacecraft components.

communications satellite.

NovaWurks again demonstrated its modular approach through the 2018 eXperiment for Cellular Integration Technology, or eXCITE, mission. Another Falcon 9 sent eXCITE, one of 64 payloads on the rideshare flight, to low Earth orbit.

Taken together, the demonstrations provided NovaWurks with the information engineers needed to refine their approach. For more than two years, company

executives revealed little about the company’s spaceflight demonstrations or future plans. At the time, NovaWurks engineers were busy upgrading Slegos.

“With all that testing, fixing, correcting, adjusting, we have a product now that is ready, and we’ve got people interested,” Jaeger said. “It was hard to turn science fiction into fact. It took a lot of money and time, but it was worth it because we can change space.”

Early in-orbit demonstrations have led to contracts. To keep up, NovaWurks plans to increase its staff by the end of the year from 20 to 50 people.

For example, NovaWurks is working with Saturn Satellite Networks to jointly develop Saturn’s NationSat, a small geostationary communications satellite.

NovaWurks also is working with NASA, the National Oceanic and Atmospheric Agency and the U.S. Space Force Space Systems Command on a mission to measure solar energy reflected and absorbed by Earth. Data will be gathered with a small telescope attached to NovaWurks Slegos. The project, called Athena, is a test of NovaWurks’ quick-turn-around capability.

During the pandemic, NovaWurks provided the Space Force with another demonstration of its quick-turn-around strategy. The Space Force gave NovaWurks three different spacecraft payloads with different thermal and field-of-view requirements. The idea was that once the Space Force selected one of the three payloads to fly, NovaWurks would have only 60 days to configure the spacecraft.

“When we said that was easy, they made 30 days a stretch goal,” said Bill Crandall, NovaWurks business development vice president.

The Space Force then selected one of the three payloads. NovaWurks spent five days configuring a spacecraft to accommodate it. The response from the Space Force was, “Okay, take that one apart and build another one,” Crandall said.

Again, even though the requirements and design were very different, it took less than five days. NovaWurks captured the process on video to share with the Space Force “because they didn’t believe it,” Jaeger said. **SN**

DEBRA WERNER

Blue Canyon Technologies to build Tomorrow.io microwave satellites

Blue Canyon Technologies won its largest constellation order to date, a contract with weather technology company Tomorrow.io.

Under a contract announced Aug. 9, Blue Canyon, a Raytheon subsidiary, will provide products and services for 18 Tomorrow.io cubesats with microwave sounders. In addition to providing cubesat buses and payloads elements, Blue Canyon will support payload integration, conduct space vehicle testing and handle pre-launch mission operations services.

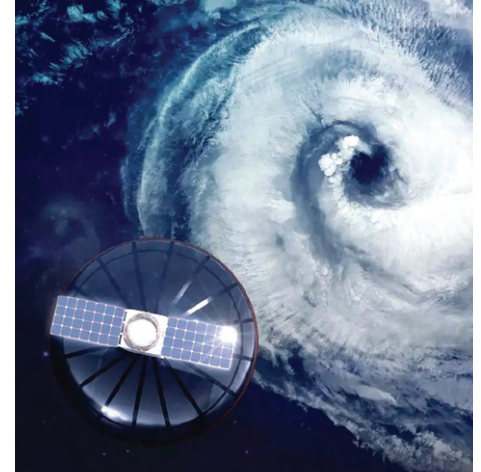
"Our cubesat and components teams are looking forward to building at a larger scale, in a new facility, with improved payload interfaces and standardized designs," John Carvo, Blue Canyon executive director of cubesats, said in a statement. "Raytheon Technologies'

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continued investment has allowed us to increase inventory and acquire new testing equipment and facilities, so we can continue providing innovative products and the agility to move quickly to ensure rapid delivery to our customers."

Tomorrow.io plans to begin gathering radar and microwave observations to feed weather models by the end of 2024. Tomorrow.io has not yet disclosed the manufacturer for its 200-kilogram radar satellites.

Blue Canyon has been expanding rapidly in recent years. Earlier this week, the Colorado-based small satellite manufacturer and mission services provider held a grand opening for its new cubesat factory in Boulder, Colorado. The 2,880-square-meter facility allows Blue Canyon to increase annual production from 50 to 85 cubesats, the company said in an Aug. 4 news release. **SN**



Tomorrow.io plans to monitor global weather with dozens of mini-fridge-size satellites in LEO.

Student payloads to fly on RocketStar suborbital test flight in September



TriSept employees integrate student-built payloads with RocketStar's Cowbell suborbital launch vehicle.

Two experimental payloads built by university students have been integrated with a RocketStar suborbital test flight set for next month. Students at Brigham Young University and the University of Central Florida provided the experimental payloads, which TriSept Corp. integrated with New York-based RocketStar's 10-meter-tall, aerospike-powered Cowbell rocket.

The UCF payload is designed to simulate asteroid particle activity during the suborbital flight. Students, who have flown a similar payload on the

International Space Station, are investigating particle collisions inside a device they developed.

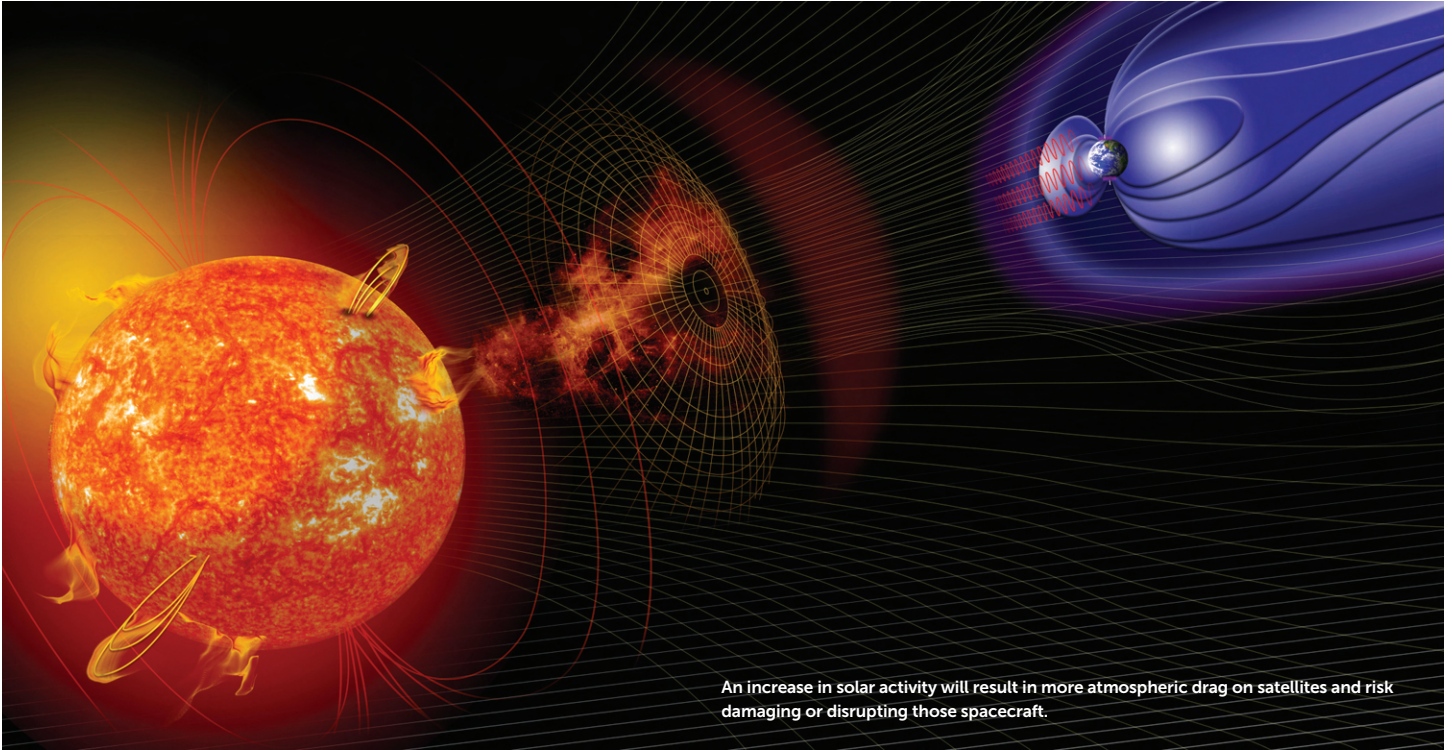
BYU College of Engineering students provided a sensor suite to measure motion, acceleration and vibration aboard the launch vehicle. "We are excited to work with TriSept and RocketStar to put our flight motion payload to the test and to work with flight-grade security software on its maiden voyage in space," David Long, BYU Center for Remote Sensing engineering professor, said in a statement.

Data from the student payloads will help RocketStar characterize the flight environment for future payload customers, RocketStar CEO Chris Craddock told *SpaceNews*.

In its quest to develop a single-stage-to-orbit launch vehicle, RocketStar has conducted nine suborbital launches, flying Cowbell as high as 15 kilometers. In March 2023, RocketStar plans to return to Cape Canaveral Space Force Station in Florida for a flight test of a larger rocket with a payload capacity that "may be upwards of 150 kilograms," Craddock said.

The September suborbital launch is the first suborbital test for TriSept's new satellite security operating system. The operating system, called TriSept Security Enhanced Layer, will plug vulnerabilities and protect the overall satellite operation, said Jason Armstrong, TriSept launch and integration services director. **SN**

Increased solar activity creates new challenges for smallsats



An increase in solar activity will result in more atmospheric drag on satellites and risk damaging or disrupting those spacecraft.

A new solar activity cycle that may be stronger than forecast poses challenges for smallsat operators keeping their spacecraft in orbit and functioning.

During a panel discussion organized by the Secure World Foundation at the 36th Small Satellite Conference here Aug. 8, a space weather expert warned that the relatively benign conditions of the last several years are ending.

"Whatever you've experienced in the past two years doesn't matter," said Tzu-Wei Fang, a space scientist at NOAA's Space Weather Prediction Center (SWPC). "Whatever you learned the past two years is not going to apply in the next five years."

"That storm was actually a minor storm in our catalog. It's not a huge storm," she said. SWPC has been working with SpaceX to study that incident, including how models of space weather can be better used to predict atmospheric conditions than can affect satellites. A paper summarizing those findings will be published in a journal soon.

JEFF FOUST

In addition to evaluating models, she said SpaceX is providing orbit data from its Starlink satellites. "We're trying to see how we can utilize this data to improve the density estimations."

Increased atmospheric drag has implications for space traffic management as well. "After one storm, in two days everything goes everywhere," she said, as drag effects vary among satellites and debris. "That's the time to start worrying about collisions."

This rise in solar activity not only coincides with a sharp increase in the number of satellites launched but also comes after the previous 11-year cycle, called Cycle 24 by space scientists, that was relatively mild. That means many satellite operators aren't experienced with the impacts of an active sun.

The new Cycle 25, peaking around the middle of the decade, appears likely to be more active. "If you look at the beginning of this year, things are very crazy. We've had a solar flare almost every week," she said. The current cycle is trending higher than predictions, increasing the chances for more, and more powerful, solar storms over the next several years. "We're already

way beyond where we predicted at this point."

Solar storms can also disrupt satellite operations or even damage components. This could affect smallsats in particular, which have often used commercial-off-the-shelf (COTS) electronics that are more susceptible to solar activity than radiation-hardened components that are more expensive and can take longer to order.

Industry officials at the conference said they have not yet noticed any major shifts by companies and organizations from COTS to rad-hardened electronics for smallsats prompted by concerns about increased solar activity. One option for satellite operators, they said, is to use rad-hardened components on critical subsystems and retain COTS components on other systems that can handle occasional disruptions.

Fang said satellite operators cannot ignore the effects of solar storms. "It's very important that we all be aware of the impact of the space environment, how your satellite is going to mitigate this radiation environment and how you're going to mitigate the drag effects." **SN**

Capella Space unveils Acadia, a new generation of radar satellite

Capella Space intends to offer improved image resolution and quality with a new generation of synthetic aperture radar satellites, called Acadia, scheduled to launch in early 2023.

With Acadia, Capella plans to increase radar bandwidth from 500 to 700 megahertz and power by more than 40 percent.

"If you increase your bandwidth to provide higher resolution products but don't increase your signal strength, you will end up providing a lower quality product at higher resolution," Payam Banazadeh, Capella CEO and founder, told SpaceNews by email. With Acadia, Capella seeks to ensure that its image quality does not suffer at higher resolutions, he added.

Capella also is heavily focused on satellite tasking to shorten the time between customer orders and

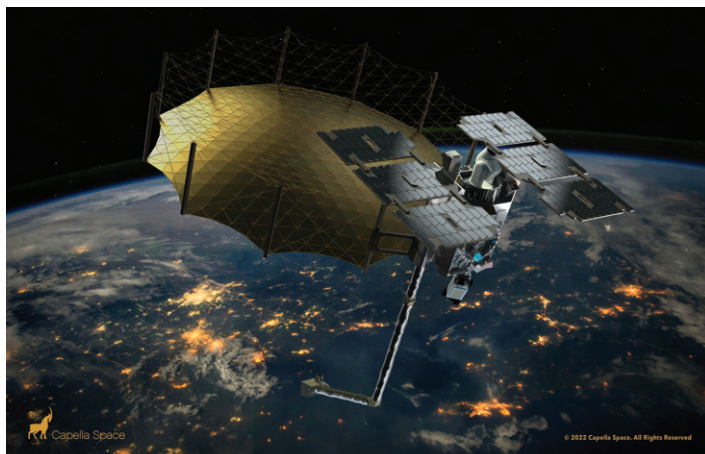
delivery. Tasking orders already travel from the ground to Capella satellites through Inmarsat communications satellites in geostationary orbit.

For Acadia, Capella is upgrading the payload downlink antenna to reduce the time between ground contact and imaging. Acadia satellites also will be equipped with optical communications terminals, a move designed to reduce the time from imagery collection to downlinking, according to the news release.

"Capella designs, builds and operates its own satellites," Banazadeh said. "This vertical integration between satellite design and data delivery allows us to rapidly iterate our designs based on what our product and sales teams see as opportunities in the market."

Capella is not yet ready to reveal how many Acadia satellites the company plans to launch.

"The number of satellites will



Rendering of Capella Space next-generation Acadia satellite.

scale with customer demand, but we have a substantial number of them in production as we speak," Banazadeh said.

In April, Capella Space announced a \$97 million Series C investment round led by NightDragon. At the

time, the company said the funds would help it expand its seven-satellite constellation, enhance its Capella Console data platform and expand its staff to meet the growing demand for synthetic aperture radar imagery and data. **SN**

DEBRA WERNER

MDA eyes UK expansion

Canada's MDA sees a growing opportunity to expand its international space business from the United Kingdom, where it plans to double its team to 80 employees in the next 12 months.

Anita Bernie, who was appointed managing director for MDA's U.K. unit in March, said the company has just moved into a larger, dedicated facility to accommodate this growth in Harwell, England.

"The facility includes substantial cleanrooms and a state-of-the-art development laboratory," Bernie said.

The U.K. seeks a bigger portion of the global space industry to expand its post-Brexit economy. The British government's national strategy to

become a major space power includes investments in emerging technologies and streamlined licensing regimes to foster a more business-friendly environment.

Canada, which entered the space race third behind the Soviet Union and the United States with the launch of its first satellite in 1962, also sees an opportunity to bolster its space industry.

The U.K. and Canada are "working more closely together than ever before," Bernie said.

The countries' respective space agencies signed a memorandum of understanding in October to strengthen ties between their governments, space companies, and academic institutions.

"MDA is a great example" of the

U.K.-Canada relationship, Bernie said, and "provides multiple opportunities for our nations to work more closely together in support of our mutual space interests."

While MDA is best known for developing the robotic Canadarm used on the International Space Station, the company's services span space operations, geointelligence, and satellite systems.

MDA's U.K. unit recently partnered with debris removal startup Astroscale to study the feasibility of a UK Space Agency-funded mission to remove two satellites from low Earth orbit by 2025.

Bernie said work on the Columbus Ka-band (ColKa) antenna installed on the International Space Station's Columbus science module

last year, leveraged capabilities from across MDA's sites in Canada and the United Kingdom. She said ColKa is operational and provides increased bandwidth for the Columbus module by communicating through European Data Relay System satellites.

"We are participating in a range of flagship missions to return to the lunar surface, deliver in-orbit servicing missions and provide communications capabilities for astronauts onboard the International Space station," she added.

Earlier this year, U.S.-based Lockheed Martin said it was looking to set up a satellite manufacturing base in the United Kingdom to expand its global space business.

The aerospace and defense giant has been looking into the feasibility of a facility that could focus on building satellites, their parts or ground networks and could include a research and development center. **SN**

JASON RAINBOW

First cubesat completed for NASA space science constellation

"This is the first time that we'll fly six spacecraft to serve as a single instrument."

Jim Lux, SunRISE project manager at JPL

The Space Dynamics Laboratory (SDL) has completed the first of a constellation of cubesats for NASA that will act as a giant radio telescope in space to study space weather.

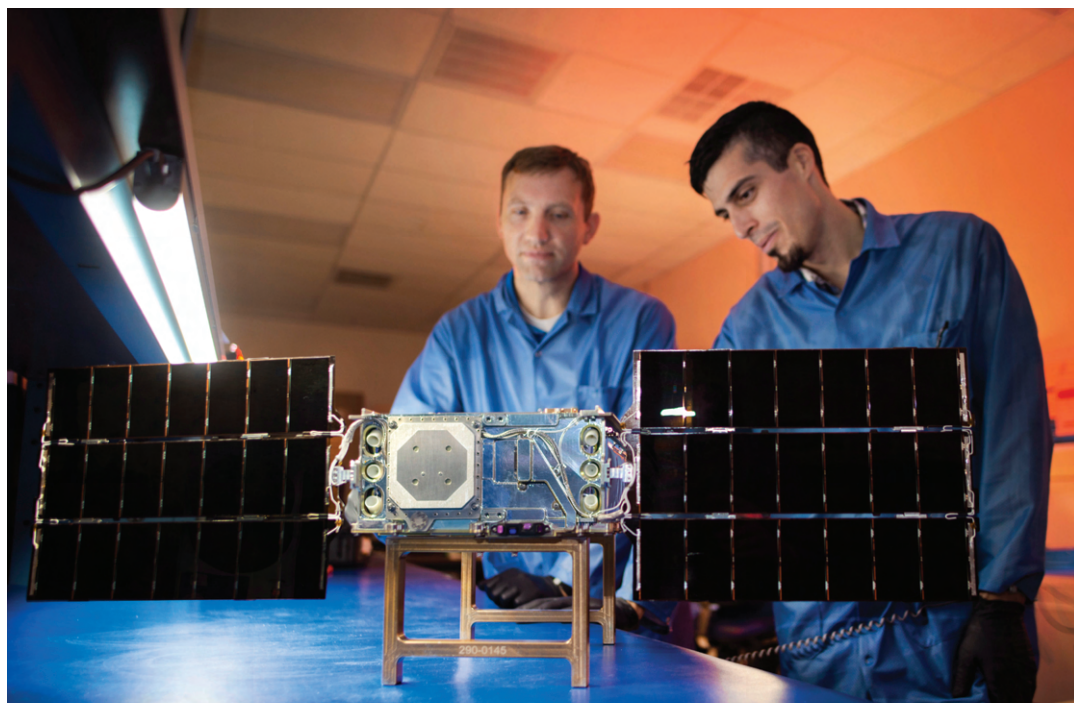
At an Aug. 8 briefing, project officials from SDL and the Jet Propulsion Laboratory showed off the first completed cubesat for the Sun Radio Interferometer Space Experiment, or SunRISE, mission that NASA selected for development in 2020 as a mission of opportunity for its heliophysics Explorer program at a cost of \$62.6 million.

The 6U cubesat is the first of six that SDL will build over the next several months, equipped with X-shaped radio antennas to pinpoint the location of radio bursts on the sun and to map the pattern of magnetic field lines, helping scientists link those bursts to activity such as coronal mass ejections that can cause solar storms.

The six satellites will fly together, acting as a single radio antenna with a baseline of 10 kilometers. Each satellite will operate independently, collecting and returning data to the ground weekly, where scientists will combine the data into a single observation of the sun.

"This is the first time that we'll fly six spacecraft to serve as a single instrument," said Jim Lux, SunRISE project manager at JPL.

Called interferometry, this



Above: The first of six SunRISE smallsats is shown at a Utah State University Space Dynamics Laboratory (SDL) clean room being worked on by engineers. Pointed toward the camera is the smallsat's sun-facing side, including its fully deployed solar arrays. Below: Tim Neilsen, program manager for SunRISE at SDL, discusses the design of the cubesat constellation at an Aug. 8 briefing.

approach requires knowledge of where each satellite is when it makes observations. GPS receivers on the satellites will collect that information at a high enough precision to allow the individual satellites' data to be merged effectively without requiring pinpoint control of the satellites' locations relative to one another.

"We don't need to control them really precisely," said Lux. "We just need to nudge them every once in a while to keep them in the right general place." An additional factor aiding that is that the satellites will detect radio waves with wavelengths of tens of meters.

The first satellite served as a pathfinder for producing the rest of the constellation, said Tim Neilsen, program manager for SunRISE at SDL. "It's been through a full suite of

environmental and functional tests" that resulted in only minor adjustments to the design of the satellite.

SDL is now ready to proceed with assembly, integration and testing of the other five satellites, he said. All six satellites should be complete and ready for launch in April 2023.

Lux said the project is still working on launch arrangements for the satellites, with a current plan to launch them in mid-2024. "That could always change because we didn't buy our own ride," he said, instead relying on a rideshare launch opportunity.

The spacecraft will operate about 300 kilometers above geostationary orbit in a region known as the "graveyard," where GEO satellites are retired. "That way, we don't have to do anything special to deorbit at the end of our mission," Lux said. "We just stop talking." SunRISE is designed to



operate for about a year.

There is no schedule pressure to launch by a particular date, he added. "This mission is observing the sun, and the sun will be there tomorrow, and the day after, and the day after that." **SN**

JEFF FOUST

Spaceflight's Sherpa-LTC2 space tug heads ships out for launch

After getting bumped from a SpaceX mission due to a fuel leak, Spaceflight's reworked orbital transfer vehicle is headed back to Cape Canaveral for another shot

Spaceflight shipped its Sherpa-LTC2 orbital transfer vehicle (OTV) Aug. 10 to Cape Canaveral in Florida, where it will make a second attempt to debut the chemically powered space tug on a SpaceX launch.

The Seattle-based company's first Sherpa-LTC, which has more powerful thrusters for dropping satellites off in specific orbits post-launch faster than the other tugs it has deployed, leaked propellant in December after integrating with SpaceX equipment at Cape Canaveral.

That led to SpaceX dropping the OTV from Falcon 9 rideshare mission in January, forcing Spaceflight to find alternative launches for 10 cubesats set to hitch a ride on it.

Benchmark Space Systems provided the non-toxic propulsion subsystems for both OTVs. The upcoming SpaceX launch will be the first time Benchmark's Halcyon Avant bi-propellant thrusters have flown in space.

Spaceflight CEO Curt Blake said Sherpa-LTC2 has "gone through all kinds of checks to get things right" ahead of its launch in September.

Ahead of its four-to-five-day journey via truck from Seattle to Cape Canaveral, the OTV was integrated with a single payload for a customer Blake declined to disclose.

JASON RAINBOW

California-based Astro Digital designed and built the payload, and booked the launch from Spaceflight on behalf of the undisclosed customer for what will be a dedicated mission. Astro Digital also provided the command and control system for Spaceflight's Sherpa-LTC2.

SpaceX is slated to launch the OTV as part of a mission to deploy a batch of Starlink broadband satellites that Spaceflight expects will launch to low Earth orbit this fall.

If the mission goes according to plan, the Sherpa-LTC2 will deploy from Falcon 9 around 310 kilometers above the Earth, from where the OTV will ignite and transport its customer payload to a 1,000-kilometer low Earth orbit.

Frayed SpaceX relationship

Spaceflight has relied on SpaceX launches to deploy its expanding line of next-generation space tugs.

The first of these was a Sherpa-FX, which has no propulsion, that made its debut as part of SpaceX's Transporter-1's rideshare mission in January 2021.

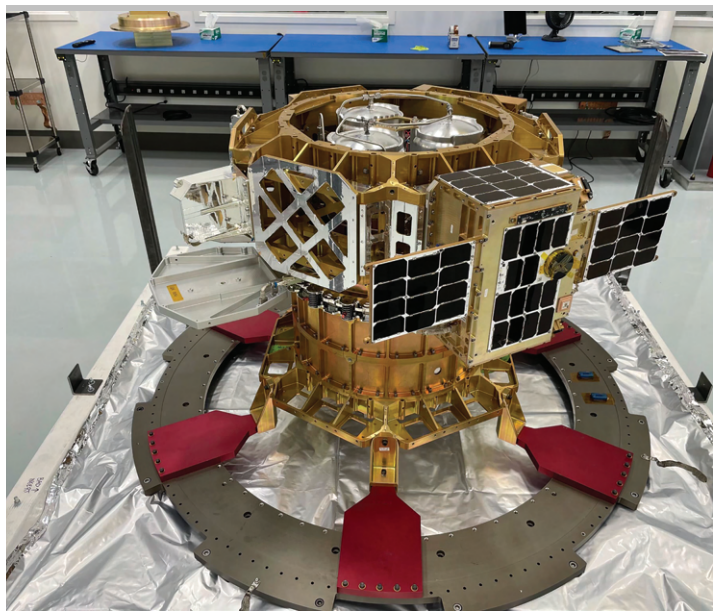
SpaceX's Transporter-2 mission then deployed a Sherpa-FX2 and a Sherpa-LTE — Spaceflight's first OTV with electric propulsion — later that year in June.

After the Sherpa-LTC was removed from SpaceX's Transporter 3 flight in January 2022, Spaceflight had planned to launch a Sherpa-FX on its next rideshare flight in April.

However, SpaceX decided to remove the tug from its Transporter 4 mission following concerns about environmental factors affecting the satellites installed on the OTV.

About a week later, SpaceX said it would no longer work with Spaceflight after currently manifested missions.

Blake declined to discuss Spaceflight's relationship with SpaceX, or



The Sherpa-LTC2 in the process of being crated for shipping.

what would be its last OTV to fly with the company.

To broaden its options, Spaceflight announced Aug. 8 an agreement to launch future space tugs on Arianespace's Vega launch vehicles, including its next-generation Vega C rocket.

Spaceflight said it signed a deal to access Vega with Italy's SAB Launch Services — which also provides launch services on other European launchers — to cover launches starting as soon as next year.

Blake said Spaceflight is "very close to identifying specifics" for the customers and Vega missions that would use Sherpa, with the first launch likely around the end of 2023 or early 2024.

Spaceflight and SAB are also partnering to offer customers access to shared integration and storage facilities across Europe and the United States.

Blake said Spaceflight is talking to "a number of" other launch providers, and "getting close to finalizing deals

to launch OTVs on various launch vehicles."

Growing space tug family

Meanwhile, Spaceflight has been working through its remaining manifest with SpaceX to develop its space tug product line.

In May 2022, the company debuted Sherpa-AC, a version with altitude control for hosting payloads, on SpaceX's Transporter 5 mission.

SpaceX is slated to launch a Spaceflight space tug in mid-2023 when it set to deploy a Sherpa EScape (Sherpa-ES), which is designed to swing around the moon to deliver payloads in geostationary orbit.

According to Blake, its next OTV to fly could be the initial Sherpa-LTC that is under refurbishment.

"It's a possibility," he said, "we've got some customers that want to go, and we're trying to find the capacity right now."

A large portion of those are new vehicles, he added. **SN**

ESA doles out study money for Skimsat demo flight in very low Earth orbit

The European Space Agency awarded Thales Alenia Space funding last month to develop a demonstrator for Skimsat, a small satellite platform designed to operate in very low Earth orbit (VLEO).

Thales Alenia Space said it would use the 2.3 million euros (\$2.4 million) in ESA funding to advance its design of a satellite capable of operating in orbit below 300 kilometers.

The funding includes an 800,000-euro study contract for a demonstrator that would use electrical propulsion to compensate for air drag at these low altitudes, which promise sharper resolutions for Earth observation applications.

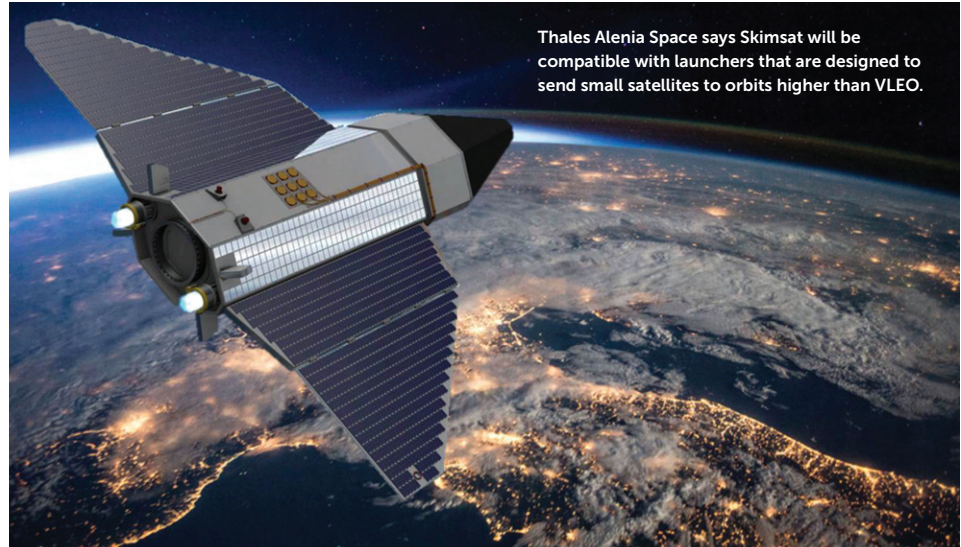
The company secured the funds in partnership with QinetiQ, a British aerospace company planning to provide altitude and orbit control systems, among other capabilities for the platform.

Their one-year study, led by Thales Alenia Space's U.K. subsidiary and QinetiQ's space division in Belgium, includes the selection of payloads for a future Skimsat mission.

Nigel Towers, head of sales strategy and marketing for Thales Alenia Space in the U.K., did not give a potential launch date for Skimsat, but said the study contract enables the companies to define the mission and platform concept.

The study funds were awarded under ESA's Discovery Preparation and Technology Development activities, and Towers said via email that Skimsat also received approval for 1.5 million euros "for predevelopments."

Skimsat "stands to completely change the



Earth observation market," according to Andrew Stanniland, CEO of Thales Alenia Space in the U.K.

Stanniland said in a statement that Skimsat challenges "the traditional use of high altitudes that avoid air drag" and will create a "new business model for high resolution imaging" through more cost-effective satellites.

Thales Alenia Space has previously secured funds for Skimsat from the British government as part of the platform's role in the Quantum Accelerometer Climate Explorer (Q-ACE) mission.

Following the demonstrator, a Q-ACE consortium led by Thales Alenia Space's British subsidiary plans to use Skimsat for a mission to measure the density of the Earth's thermosphere to improve

climate forecasts.

Q-ACE is also in very early stages of development and does not have a firm target launch date, Towers said.

VLEO, referring to orbits between 250 and 450 kilometers above the Earth's surface, also promises speedier communications for operators able to compensate for air drag.

Multiple companies have been developing VLEO solutions amid growing interest from commercial players and national security agencies.

In May, SpaceX launched a satellite built by Blue Canyon Technologies for MIT Lincoln Laboratory in Lexington, Massachusetts, that aims to test operations in VLEO for several months. **SN**

JASON RAINBOW

In Brief

■ **SpaceLink signed an agreement with the U.S. Army** to explore ways to use the company's data-relay constellation to deliver commercial satellite imagery directly to troops on the ground. Under the five-year agreement with the U.S. Army Space and Missile Defense Command Technical Center, SpaceLink will share proprietary information about its system. In exchange,

it will get insights into the Army's concepts of operations and specific needs.

■ **Maxar won a contract from L3Harris** to manufacture 14 missile-detection satellites for the U.S. Space Development Agency's Tracking Layer Tranche 1. Maxar said Aug. 9 it will supply satellite buses and provide support services as a subcontractor to L3Harris,

which received a \$700 million SDA contract last month. The contract with L3Harris also covers the integration of mission payloads, including optical terminals for mesh networking, Ka-band communications and infrared sensors. The satellites will be completed in 2024 for launch starting in April 2025. The companies did not disclose the value of the Maxar contract.

Q&A



Taking smallsats to the mainstream

Astro Digital started out in 2015 with plans for an Earth observation constellation but pivoted three years later to instead provide its small satellite technology as a service for other operators.

While this service model was unusual at the time, California-based Astro Digital has grown as more companies seek space projects without manufacturing, launch integration, and other burdens that typically come with them.

SpaceNews caught up with Chris Biddy, Astro Digital's co-founder and CEO, at the Small Satellite Conference here.

"Our hypothesis has turned out correct and we've been able to make a real business out of this."

Chris Biddy, Astro Digital CEO

What happened to your constellation plan — are you still considering it?

For the moment, we're not. We took an honest look at the competitive landscape and the ability to raise funds for a large constellation of satellites and decided it was just better for our business to focus on core capabilities. To go out and generate revenue and build a positive cash flow business earlier, compared with having to raise a bunch of money, deploy a lot of satellites, and then generate revenue on the data.

What's the size range of the satellites you're making?

We've been trending larger. We still offer our 6U cubesats on the smaller side, but we've lately been building satellites that are in the 100-kilogram class and, very shortly, stuff that will be exceeding 200 kilograms.

What's driving that?

Available launch capacity has increased quite a bit over the last several years, and I think that takes a little bit of pressure off satellite size constraints. It seems to make it a little easier to

build the satellite bus around the mission and the payload requirements without having to aggressively miniaturize.

Where are you seeing the most demand, and for what applications?

The biggest demand we're seeing right now is still for the small satellite industry's bread and butter applications: remote sensing and communications.

The newer demand and interesting applications we're supporting could probably be categorized as in-orbit infrastructure and transportation. We're supporting our friends at Spaceflight on their Sherpa orbital transfer vehicle, where we're providing some technologies and flight operations.

We've also got some other missions we're working on that we haven't been public about yet around in-orbit infrastructure and transportation.

How has supply chain shortages stemming from the pandemic affected Astro Digital?

It's pushed lead times out a little bit. We've had to design around shortages of parts. It's created

a bit more effort in managing the supply chain, where we're seeking out those hard-to-find components and constantly looking for alternatives. In some cases, we've had to design out parts that we just couldn't get.

How long do you think the industry will face these challenges?

I'm not sure. We're seeing positive signs that it's improving, and my hope is that we're past this by the end of the year — that may be a little bit optimistic, but we're at least seeing positive signs.

What's next for Astro Digital?

Smallsats are now mainstream. They're no longer pure academic or pure technology demonstrations. Our hypothesis has turned out correct and we've been able to make a real business out of this.

We just more than doubled our footprint with another almost 18,000 square feet [1,700 square meters] of facility space, and we've doubled our team in the last 12 to 18 months. Even though we're pretty quiet, we're getting a lot of interest in our products and services. It's a really great time to be in the industry. **SN**



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