



February 2022

Update

**Oklahoma Space  
Alliance**

A Chapter of The  
National Space Society

A free email newsletter of the Oklahoma Space Alliance

## Tianwen-1 Orbiter Above Mars



**February 2022 OSA Meeting**

**Saturday, February 12, 2022**

**2:00 PM**

**Cliff & Claire McMurray's  
House**

2715 Aspen Circle, Norman, OK 73072

405-863-6173

Program— Space News and  
Events

Website: <http://osa.nss.org>



## Quote of the Month

*"I walked on the Moon. What can't you do?" – Gene Cernan*

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# Oklahoma Space Alliance Update

February 12, 2022

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# 100 Landings

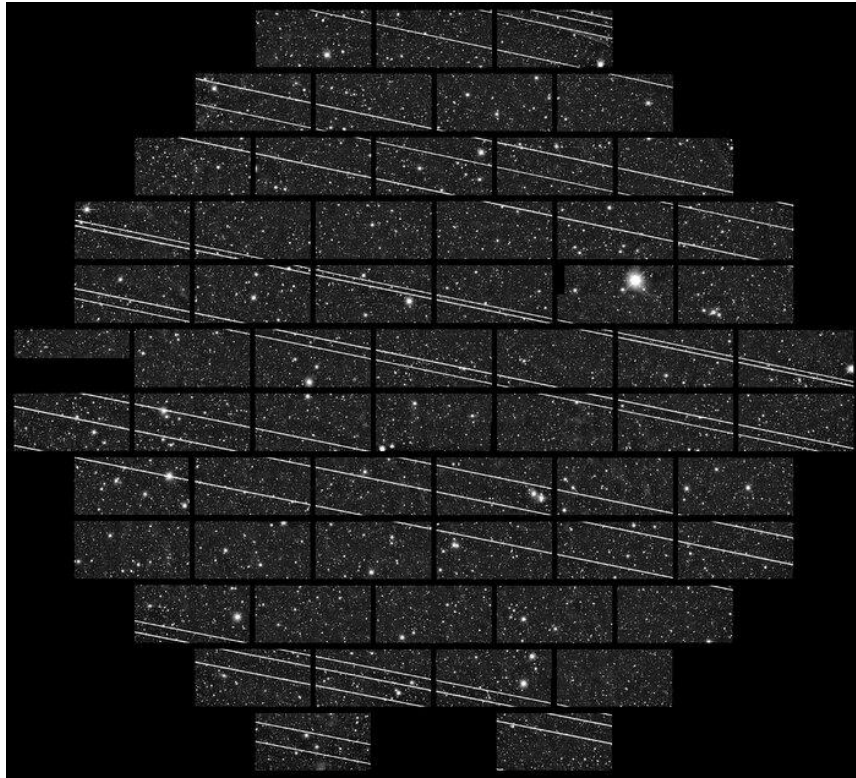


My, how time flies. The 100<sup>th</sup> successful landing of a Falcon 9 first stage took place six years to the day after the first successful landing. The mission was CRS-24, the last Falcon launch of 2021. It launched on December 21, lofting a Dragon supply capsule with about 3,000 kg. of supplies to ISS. Only one of the 31 Falcon 9 boosters launched in 2021 failed to land successfully.

Articles <https://www.space.com/spacex-dragon-crs-2-launch-100th-rocket-landing-success>

<https://spacenews.com/falcon-9-launches-cargo-dragon-lands-100th-booster/>

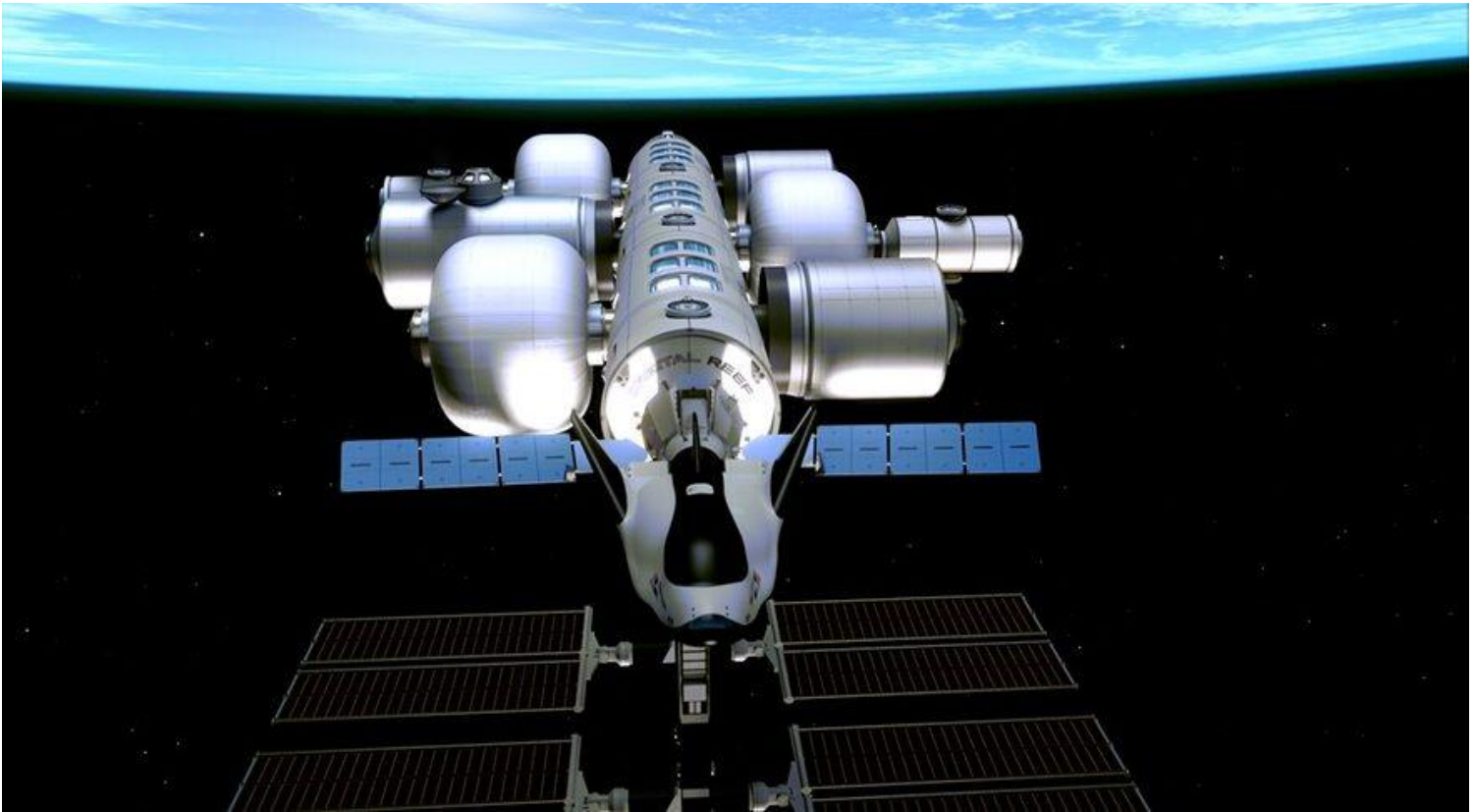
## Paving the Sky with Starlink



Is ground-based optical astronomy doomed? More than 2,000 satellites in LEO from a single company. On January 18, SpaceX launched another 49 Starlink satellites for its internet broadband network, bringing the total number of Starlinks placed in orbit to 2,042. Another 49 were launched on February 3, but a geomagnetic storm is in the process of causing 40 of those to be lost due to atmospheric drag. Not counting the February 3 launch, 1,879 Starlinks are still in orbit, and 1,469 are active. The current Starlink constellation has been authorized for 4,408 satellites, all in LEO at around 550 km. SpaceX is pursuing an FCC license for a second-generation network of **30,000 satellites**, to be deployed by Starship when it becomes operational. Megaconstellations of comsats also pose a problem for radio astronomy.

Articles: <https://spacenews.com/spacex-passes-2000-starlink-satellites-launched/>  
<https://www.space.com/spacex-starlink-satellites-lost-geomagnetic-storm>  
<https://www.space.com/spacex-starlink-affects-search-for-life-radio-observatory>  
<https://spacenews.com/nasa-outlines-concerns-about-starlink-next-generation-constellation-in-fcc-letter/>

# Sierra Space Raises Big Bucks



Sierra Nevada Corp spun off its space division in 2008 as Sierra Space. Until now, all the investment money for SS came from from SNC's founders, Fatih and Eren Ozmen. They've poured more than \$1B into developing Dream Chaser (a truer name never bestowed). Now, instead of going public in a SPAC arrangement like many other space companies, they've made a Series A private funding round that netted \$1.4B, on a company valuation of \$4.5B. SS claims the round is the second largest private capital round ever in the aerospace and defense sector. Two-thirds of the money will go to further Dream Chaser development, including development of a crewed version that could make its first flight as soon as 2025 (the unmanned version is set to make its first cargo delivery to ISS late this year). The other one-third of the money will go toward development of its 300 m<sup>3</sup> Large Integrated Flexible Environment (LIFE) inflatable module. LIFE and Dream Chaser are part of the Orbital Reef commercial space station concept which SS, with its partners Boeing, Blue Origin and Redwire, hopes to have on orbit and ready for customers by 2027. SS currently has about 1,100 employees, which they expect to double in the next 18 months.

Article: <https://spacenews.com/sierra-space-raises-1-4-billion/>

<https://www.generalatlantic.com/media-article/sierra-space-secures-record-1-4-billion-series-a-growth-investment-and-achieves-4-5-billion-valuation/>



# NASA Now Owns the BEAM Inflatable Module



NASA announced that Bigelow Aerospace “transferred title and ownership of the BEAM to NASA Johnson Space Center” in December upon expiration of its engineering contract. NASA said that the transfer of ownership was one of the terms of the sustaining engineering contract NASA awarded Bigelow in 2017, and involved no exchange of funding or other considerations between NASA and BA. On January 18, NASA announced it awarded a sole-source contract to ATA Engineering of San Diego, California, to provide engineering support services for BEAM

Whither Bigelow? It laid off its entire workforce in March 2020, citing restrictions imposed by the Nevada state government that closed nonessential businesses in the early weeks of the pandemic. Since then, Bigelow has made no public comments about its future. It wasn’t among the “interested parties” that participated in meetings last year for NASA’s Commercial Low Earth Orbit Destinations program to support development of commercial space stations, and is not a part of any of the three teams that received NASA awards in December. Is BA dead, or just sleeping? Stay tuned...

Article: <https://spacenews.com/bigelow-aerospace-transfers-beam-space-station-module-to-nasa/>

## Latest Contender for SSTO



Single stage to orbit (SSTO). The dream never dies. A new company, Radian Aerospace, announced on January 19 that it has raised \$27.5 million in seed funding for the development of Radian One, a crew-carrying SSTO space plane. The company is based in Washington, and currently has 20 employees, looking to ramp up. The vehicle will operate like an airplane, taking off horizontally (with a boost from a sled) and landing horizontally. Dylan Taylor, chairman and CEO of Voyager Space (you may remember he was a paying passenger on the recent New Shepard flight) is an early personal investor in Radian. In addition to carrying crew and cargo to LEO, Radian One aims for the ability to deliver up to 5,000 lb. anywhere on Earth in under an hour.

Articles: <https://spacenews.com/radian-aerospace-raises-seed-round-to-fund-work-on-spaceplane/>

<https://www.space.com/radian-aerospace-funding-reusable-space-plane>

## Speaking of Point-to-Point...



SpaceX was recently awarded a \$102 million five-year Air Force contract to demonstrate technologies and capabilities for transport of military cargo and humanitarian aid around the world on a heavy rocket. The contract for the Air Force Research Laboratory is the largest contract awarded to date for rocket cargo. There are lots of questions to consider, including launch and landing at “austere sites” (sites other than spaceports), and use of intermodal cargo containers. Greg Spanjers, rocket cargo program manager, said “AFRL will be leveraging several commercial demonstration launches over the next few years to collect the data.” The Air Force “does not drive this schedule but rather will collect data whenever SpaceX flies relevant missions.”

Article: <https://spacenews.com/spacex-wins-102-million-air-force-contract-to-demonstrate-technologies-for-point-to-point-space-transportation/>



## Stratolaunch Flies Again

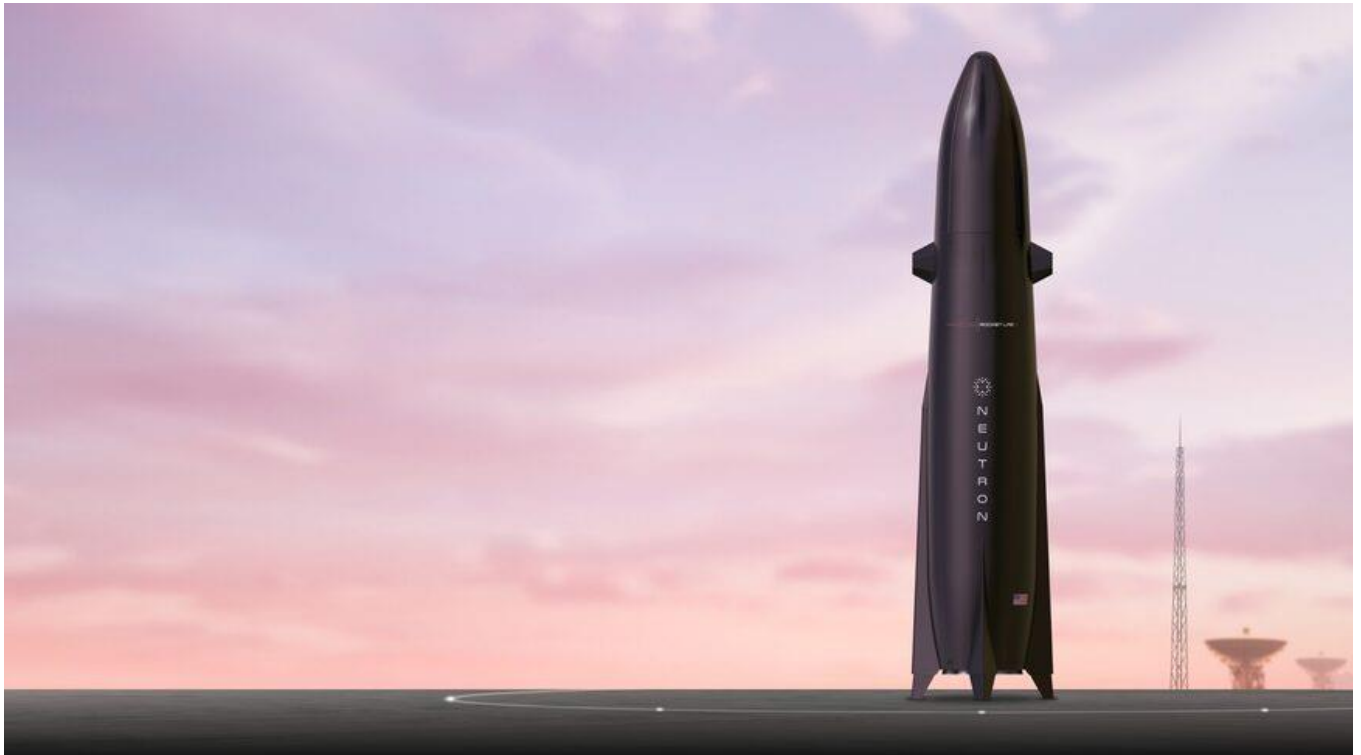


Burt Rutan's last aircraft design isn't dead yet. The behemoth Roc, which Rutan designed for Paul Allen's Stratolaunch LLC, came close to death after it had flown only once, Allen died in 2018. The company has since found new owners and a new direction: testing of hypersonic vehicles. Roc made its third flight on January 16, nine months after the last one. After qualification through a series of envelope-expanding test flights in the months ahead, Roc will be the launch platform for a series of hypersonic vehicles called Talon, also being developed by Stratolaunch. TA-0, the first prototype vehicle, will be flown sometime ;ater this year for a drop test over the Pacific Ocean. That will be followed by the first powered vehicle, TA-1, perhaps before the end of this year.

Article: <https://spacenews.com/stratolaunch-plane-flies-again-as-company-prepares-for-hypersonic-tests/>

<https://www.wired.com/story/stratolaunch-airplane-burt-rutan-paul-allen/>

## Rocket Lab's Next Vehicle Will Be Bigger



Rocket Lab originally targeted the microlauncher market; its Electron booster can loft only 300 kg. to LEO. Now it's going after the market for midsize payloads. CEO Peter Beck unveiled the new design in a video briefing in December. The Neutron rocket will stand 130 ft. tall, with a 23-ft-diameter base, and weigh 490 metric tons at launch. Neutron will be able to lift 8,000 kg (about 18,000 lb), to LEO in the reusable mode, or it could launch humans and/or payload to the moon and Mars; the maximum payload for a lunar trip is 2,000 kg. As in the case of Electron, both the engine and the body will be 3-D printed. The first stage, with an integrated payload fairing that opens like a flower, is fully reusable. The engines will burn LOX-methane. The new design is targeted for a first launch in 2024.

Articles: <https://spacenews.com/rocket-lab-updates-neutron-design/>

<https://www.space.com/rocket-lab-neutron-rocket-reusability-development-update>

## Astra Makes Orbit on Fourth Try



...then fails on the fifth. The first three launches of Astra's rocket, from September 2020 through August 2021, all failed to reach orbit. It finally succeeded on November 20, 2021, carrying a dummy payload on a test flight for the U.S. military. On February 10, after several launch delays and a pad abort when the engines shut down seconds after ignition, Astra tried for its first operational mission (and the first from Cape Canaveral; the first four were all launched from the Pacific Spaceport Complex in Alaska) with four NASA-sponsored cubesats as payload. But telemetry showed the upper stage tumbling after stage separation, possibly related to separation of the payload fairing. The reaction of the stock market to these teething troubles has been brutal. In February of last year, Astra stock was near its high of \$22.47; as of yesterday, it's sitting at \$3.27, down 83.02%.

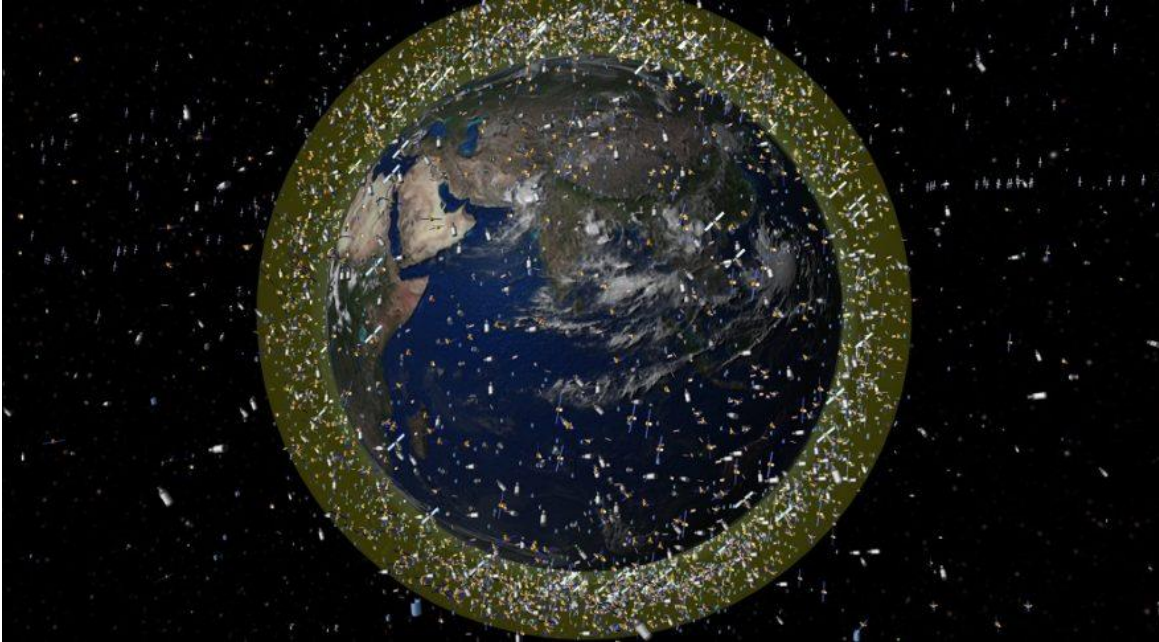
Articles: <https://spacenews.com/astras-rocket-3-3-reaches-orbit-on-fourth-attempt/>

<https://www.space.com/astra-reaches-orbit-first-time-lv0007>

<https://www.cnbc.com/2021/11/22/astra-stock-surges-after-rocket-builder-reached-orbit-successfully.html>

<https://spacenews.com/astra-launch-of-nasa-sponsored-cubesats-fails/>

## A Hit and a Near-Miss on Chinese Satellites



The Yunhai-1 (02) satellite orbiting in a Sun-synchronous orbit around 783 km. high, broke up into 137 trackable pieces on March 18, 2021. The 18th Space Control Squadron of the U.S. Space Force reports with “moderate confidence” the breakup of this meteorological spacecraft was caused by an accidental collision with a small, mission-related debris object 1-10 cm. in size associated with the Zenit-2 launch vehicle which launched of the Russian Cosmos 2333 military sigint satellite in 1996. This would be the fifth confirmed collision between two cataloged objects. Another Chinese satellite suffered a near miss of under 100 meters. The Space Debris Monitoring and Application Center of the China National Space Administration (CNSA) reported the Tsinghua Science satellite and one of more than 1,500 trackable pieces of debris from Russia’s November 15 ASAT test passed within 14.5 meters of each other (error bar not reported) on January 18. ESA’s Space Debris Office estimates there are 36,500 objects greater than 10 cm. and 1,000,000 objects ranging from greater than 1 cm. to 10 cm. in orbit.

Articles: <https://spacenews.com/breakup-of-chinas-yunhai-1-02-satellite-linked-to-space-debris-collision/>

<https://spacenews.com/chinese-satellite-in-near-miss-with-russian-asat-test-debris/>



## UAE Heading for the Asteroids



The mission doesn't even have a name yet, and the science payload and exact destination haven't been selected, but the UAE Space Agency knows where it's heading next: the asteroid belt. In 2028, it announced, the UAE will send a probe whose design will draw heavily on the successful Hope spacecraft, now in Mars orbit. The new mission aims to visit multiple asteroids and land on one of them.

Article: <https://www.space.com/uae-asteroid-mission-goals-challenges>

# New Astrophysics Probe Series Announced



NASA announced a new series probe-class astrophysics missions, roughly analogous to the New Frontiers line of NASA planetary science missions, with a cost cap of \$1 billion (excluding launch costs). This follows the recommendations of the latest astrophysics decadal survey, Astro2020, which was published in November. These missions are intended to fill the gap between the current astrophysics flagship missions JWST and the Roman Space Telescope, (currently scheduled for launch in mid-2027) with the series of flagship missions recommended by the decadal survey. The first of those future flagship missions, a large ultraviolet, optical and infrared telescope, could launch in the early 2040s as projected by the decadal. NASA will limit proposals for the first probe competition to two concepts: a far-infrared imaging and spectroscopy space telescope or an X-ray mission that would complement Athena, an ESA X-ray telescope scheduled for launch by the mid-2030s. Two or three proposals for Phase A concept studies, valued at \$5 million each, will be selected in early 2024, and the winning mission will be announced in mid-2025.

Article: <https://spacenews.com/nasa-to-start-astrophysics-probe-program/>

## Beer and Ketchup: The Possibilities are Endless



"As I have had the opportunity to travel to various museums. I have noticed that some that have partnered with local craft breweries on creating a beer," said Jim Remar, president and CEO of the Cosmosphere, in an interview with collectSPACE. "So I sort of had beer envy." So now the Cosmosphere has its own craft beer called Space Race, a Hazy IPA (an IPA is a type of light-colored beer similar to bitter, typically with a higher than average alcohol and hop content) brewed by Hutchinson's own Salt City Brewing Company. It will be brewed with Galaxy hops, which is an actual thing. A line of merchandise offers the same artwork on t-shirts, hats and glass tumblers. A portion of the proceeds from the beer and the other products will go to supporting the Cosmosphere and its programs. "We talked about it internally and think that the proceeds going towards our camp scholarship fund would be the best use," said Remar. Meanwhile, Heinz recently unveiled its "Marz Edition" ketchup, made from the same premium-quality tomatoes as used in its regular ketchup, but grown in the same harsh conditions as found on Mars. The Mars-ready condiment is the product of two years of research conducted by a team of astrobiologists at the Florida Institute of Technology's Aldrin Space Institute.

Articles: <https://www.space.com/mars-heinz-tomato-ketchup>

<https://www.ksn.com/news/dont-miss-this/the-cosmosphere-gets-into-the-science-of-beer/>

<http://www.collectspace.com/news/news-011922a-space-race-ipa-beer-cosmosphere.html>



## Hijacked



By hook or – literally – by crook. Congressional Democrats, desperate to pass “voting rights” legislation, have found a way to bypass the Senate filibuster of same. H.R. 5746 was intended to extend NASA’s authorization to enter into what are known as enhanced use leases, or EULs. It was introduced in October by Rep. Don Beyer (D-Va.), chair of the House Science Committee’s space subcommittee, and passed by a voice vote in December. The Senate then amended the bill and passed it by unanimous consent, sending it back to the House. So far, so normal. But then the Democratic leadership of the House, in an “unusual move,” took the Senate-amended bill and stripped out the NASA provisions, replacing it with the text of two voting rights bills and now called the “Freedom to Vote: John R. Lewis Act.” Since H.R. 5746 had already passed the House and Senate, the amended version can go directly to the Senate floor without the threat of a filibuster from Senate Republicans. Beyer says he’s fine with having the bill he introduced for NASA magically transformed into something completely unrelated to what both houses of Congress have previously voted for. “Though I did not expect this outcome when I first introduced the NASA Enhanced Use Leasing Extension Act, if my legislation will help overcome the filibuster, the Senate can finally have the long-overdue debate on voting rights this country deserves. I would be honored to make this unexpected contribution to the cause of protecting our democracy.”

Article: <https://spacenews.com/nasa-leasing-bill-transformed-into-voting-rights-legislation/>



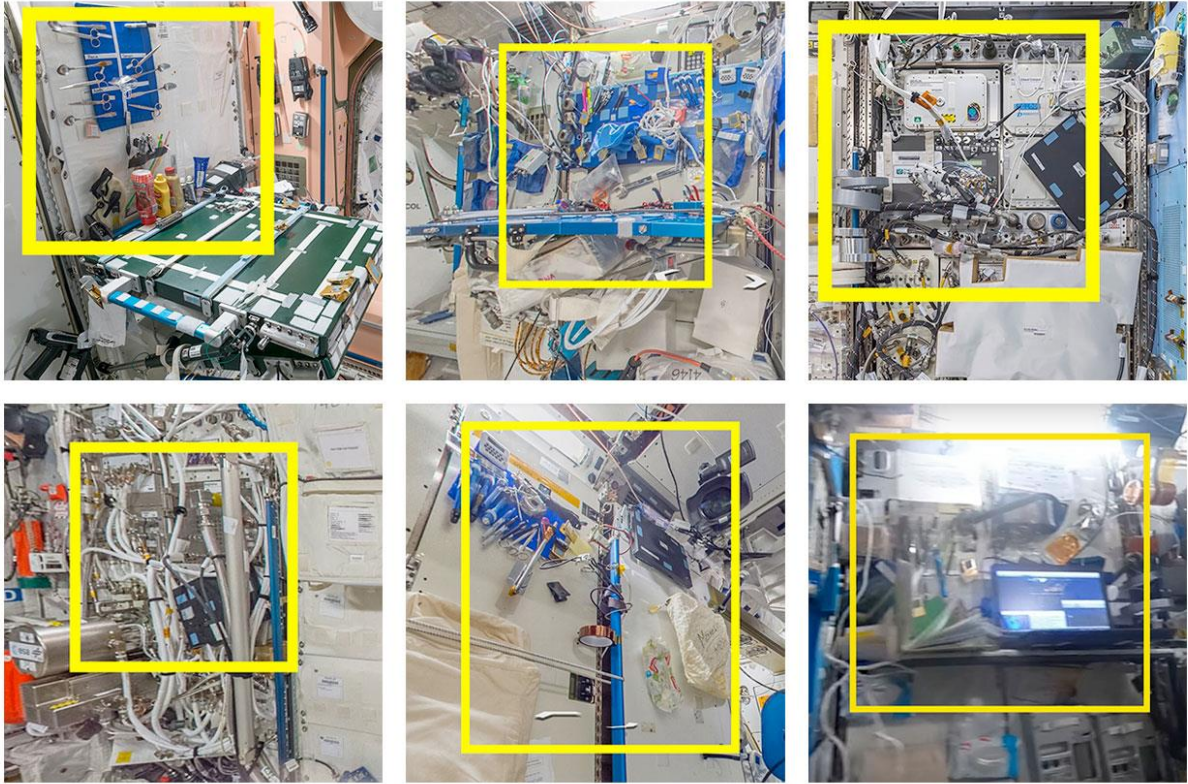
## No Surprise



NASA's new chief scientist, who will also serve as its senior climate adviser, will be a climate scientist. Under the Biden administration, NASA is placing greater emphasis on climate change studies. The agency created the position of senior climate adviser less than a year ago to align itself with the Biden administration's emphasis on climate change. On January 10, NASA announced its selection of Katherine Calvin to wear both hats. Calvin had been an earth scientist at the Pacific Northwest National Laboratory's Joint Global Change Research Institute, where she developed models for exploring interactions between human and Earth systems. "In general, my interest is in trying to connect the climate science research with the rest of the research at NASA," she said.

Article: <https://spacenews.com/new-nasa-chief-scientist-to-focus-on-climate-change/>

## It's a Midden?



"We are extremely excited and proud to announce that the first archaeological study ever performed outside the Earth began today," the Sampling Quadrangle Assemblages Research Experiment (SQuARE) team wrote in a January 14 blog post. "SQuARE is an investigation that aims to document items within six defined locations around the ISS over time," says NASA. "The idea is to look at the ISS as an archaeological site, and each of the squares as a 'test pit.'" Each of the locations is a one-meter square, marked off with tape, and will be photographed each day to document what objects show up there. Among other things, this may help inform future spacecraft designs.

Articles: <https://www.space.com/astronaut-archaeology-space-station-square-project>

<https://www.smithsonianmag.com/smart-news/first-ever-archaeology-project-in-space-studies-how-astronauts-adapt-180979427/>

# Tom Cruise's Orbital Movie Studio



After a couple of years of rumors, it may finally be happening: a Tom Cruise movie filmed on ISS. U.K.-based Space Entertainment Enterprise (SEE), which is co-producing the as-yet-unnamed movie, has commissioned Axiom Space to build an inflatable space station module that contains a production studio, including a sports arena, by December 2024. The 6-meter diameter ball-shaped module will dock on the end of the first module of Axiom's commercial section of the ISS. Axiom aims to launch that module in September 2024. Axiom Station will connect to ISS's Harmony node and will also offer other commercial opportunities, including space tourism. According to a press release, "The microgravity media venue will comprise one-fifth of Axiom Station's initial configuration when it is completed and ready to separate from the ISS" as a free-flying commercial destination before ISS is decommissioned in 2030, and will be available for other movie companies' use. No financial details of SEE's contract with Axiom have been disclosed, nor has a budget for Cruise's movie been announced.

Articles: <https://www.space.com/axiom-space-station-movie-studio-module>

<https://www.cnbc.com/2022/01/20/tom-cruise-movie-producers-sign-axiom-deal-for-space-production-studio.html>

<https://www.wtsp.com/article/tech/science/space/tom-cruise-space-movie-studio-axiom-iss/67-6fa48466-cc84-4275-8755-41279baf6b51>

# This Week At NASA

Videos: [https://www.nasa.gov/multimedia/podcasting/twan\\_index.html](https://www.nasa.gov/multimedia/podcasting/twan_index.html)



# That's All Folks

