



Astronomy News

KW RASC FRIDAY NOVEMBER 27 2020

JIM FAIRLES

SpaceX's Starship prototype has a successful test — until it lands in a fiery wreck

- ▶ <https://astronomy.com/news/2020/12/watch-spacexs-starship-prototype-has-a-successful-test--until-it-lands-in-a-fiery-wreck>
- ▶ SpaceX's Starship prototype has a successful test — until it lands in a fiery wreck Watch: SpaceX's Starship prototype has a successful test — until it lands in a fiery wreck After an impressive flight and a hard landing, SN8 currently lies in a pile of ash and debris in a Texas field.
- ▶ Referred to by SpaceX as a high-altitude test, the prototype, designated SN8, was meant to fly about 8 miles (12.5 kilometers) into the air. The launch went smoothly and SN8 showed off a series of maneuvers, including what SpaceX calls the “belly flop” — in which the craft flips 90 degrees and freefalls, using atmospheric drag to limit its rate of descent and movable fins to steer. The maneuver will be used in its landing sequence in future spaceflights.
- ▶ A little over an hour after the flight, Musk tweeted, “Fuel header tank pressure was low during landing burn, causing touchdown velocity to be high & RUD, but we got all the data we needed!”



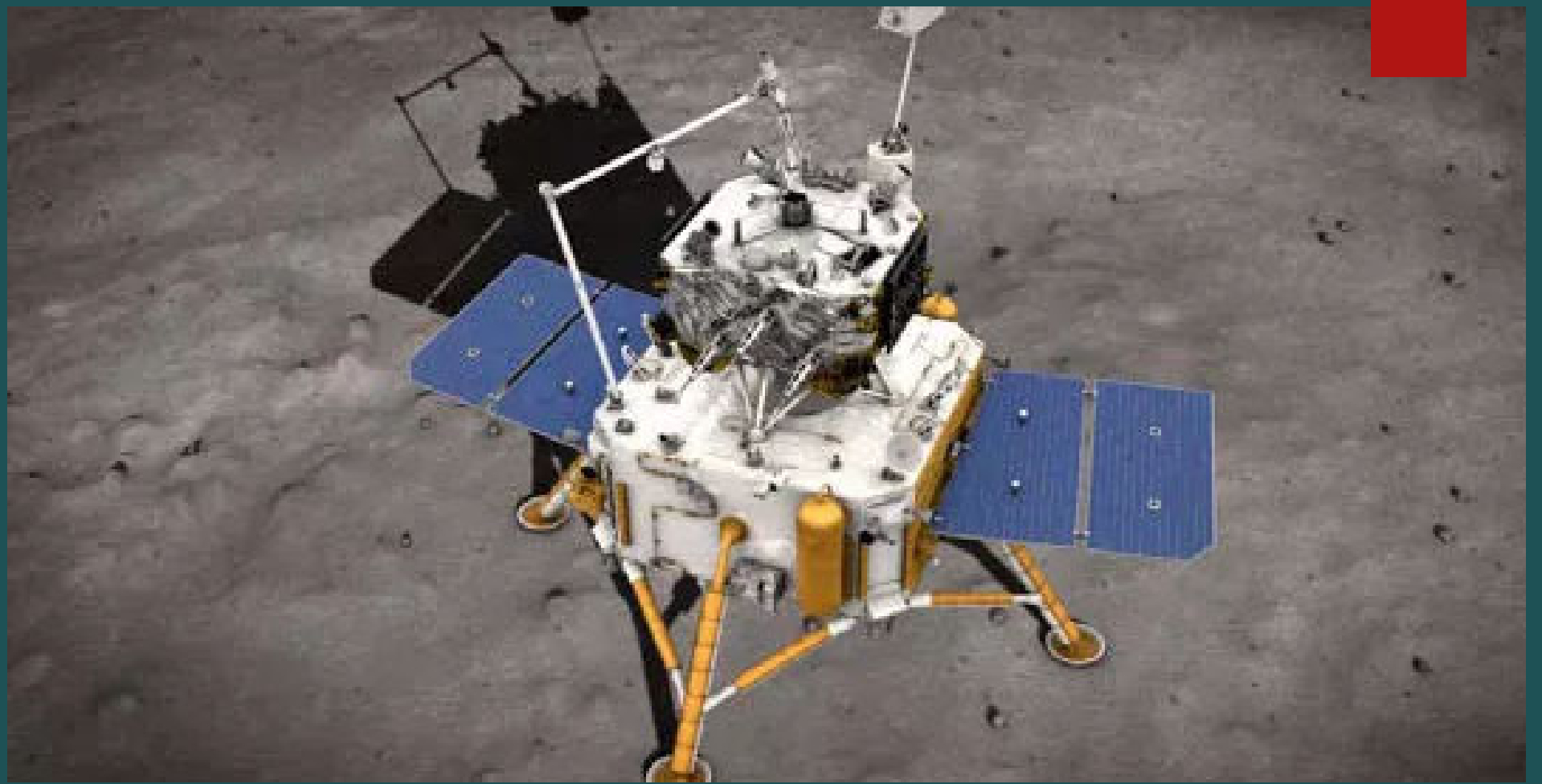
Chuck Yeager, first pilot to break the sound barrier, dies at 97

- ▶ <https://astronomy.com/news/2020/12/chuck-yeager-first-pilot-to-break-the-sound-barrier-dies-at-97>
- ▶ His wife, Victoria Yeager announced his death on Twitter: "It is w/ profound sorrow, I must tell you that my life love General Chuck Yeager passed just before 9pm ET. An incredible life well lived, America's greatest Pilot, & a legacy of strength, adventure, & patriotism will be remembered forever."
- ▶ Yeager joined the U.S. Army Air Forces (USAAF) out of high school and became a fighter pilot in the European theater of World War II, where he was credited with downing at least 11 German planes.
- ▶ After the war, he took on test pilot duties. In 1947, Yeager became the first person to travel faster than the speed of sound, flying the experimental, rocket-powered, bullet-shaped Bell X-1 airplane. The feat demonstrated that the "sound barrier" — the dramatic increase in drag and buffeting as an aircraft approaches the speed of sound — could be broken, paving the way for supersonic aviation.



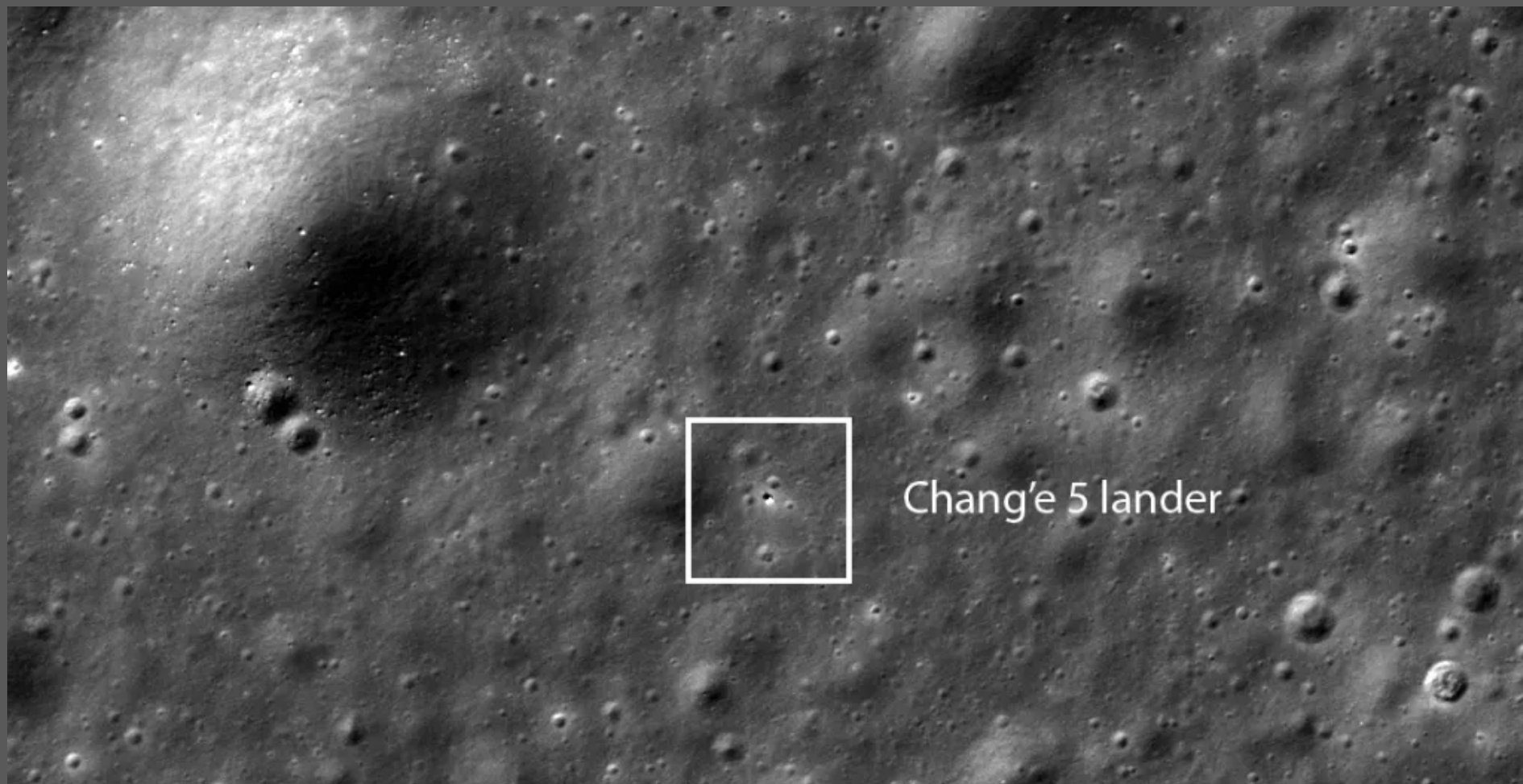
Arecibo radio telescope finally collapses following cable failures

- ▶ <https://astronomy.com/news/2020/12/arecibo-radio-telescope-finally-collapses-following-cable-failures>
- ▶ The legendary Arecibo radio telescope in Puerto Rico was destroyed this morning (Dec 1) Shortly before 8 a.m. local time, Arecibo's 900-ton receiving platform collapsed, crashing down onto its 1000-foot-wide (305 meter) dish below.
- ▶ No one was injured in the collapse, announced the U.S. National Science Foundation (NSF), which owns the facility.
- ▶ The collapse brings the illustrious career of one of astronomy's most powerful instruments to a close. Over the past 57 years, Arecibo was a pioneer in a dizzying array of astronomical fields — observing pulsars and fast radio bursts, tracking potentially hazardous near-Earth asteroids, and even searching for extraterrestrial intelligence.



China's Chang'e 5 mission: Sampling the lunar surface

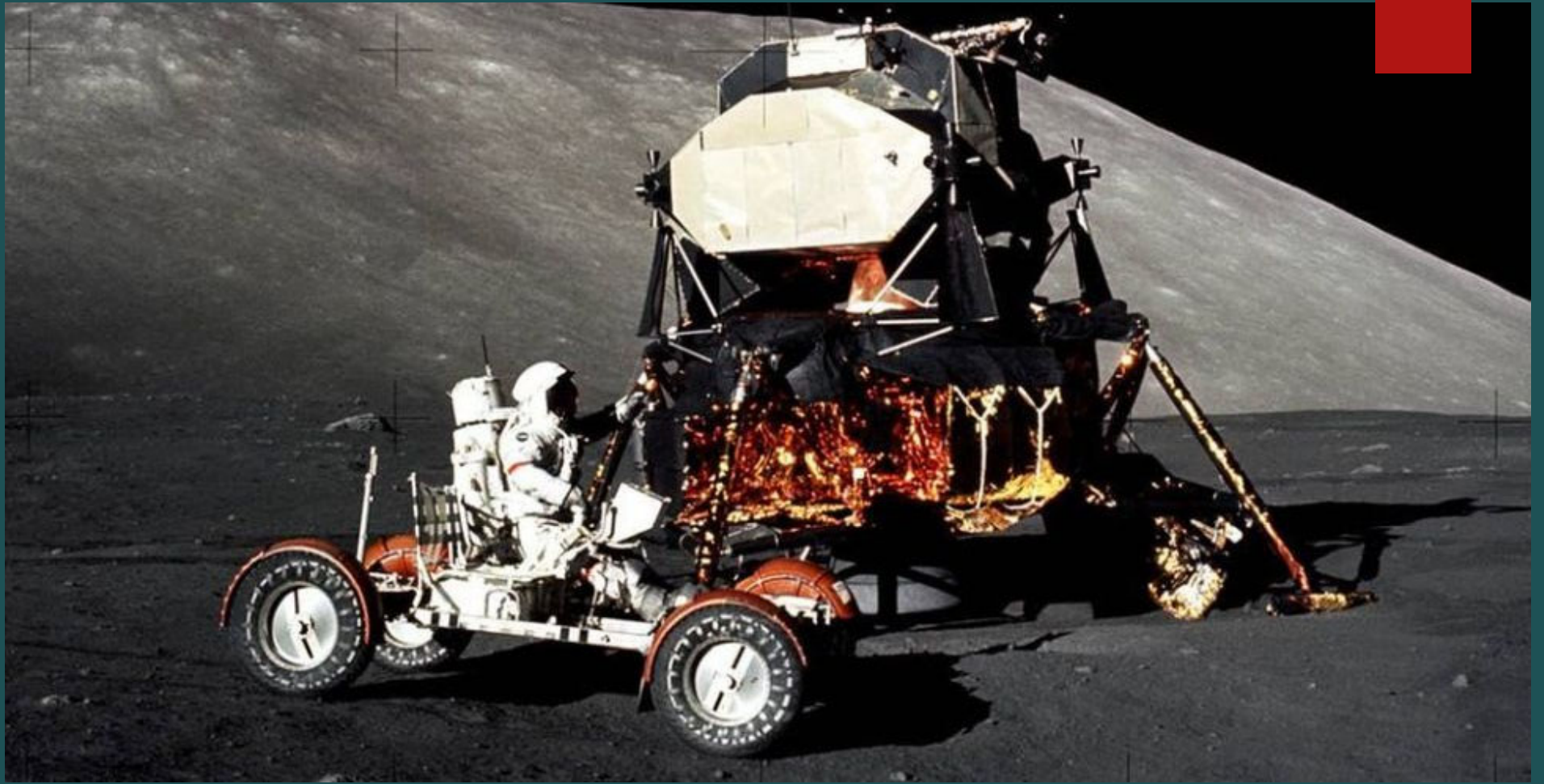
- ▶ <https://www.space.com/change-5-mission.html>
- ▶ The Chang'e 5 probe launched on Nov. 23, 2020 from Wenchang Space Launch Center in Hainan province atop a Long March 5 rocket. Weighing in at 18,100 lbs. (8,200 kilograms), the spacecraft consists of four modules, two of which remained in lunar orbit.
- ▶ The other two — the sample collector and an ascent vehicle — landed on the moon on Dec. 1 near a massive mountain called Mons Rümker. The mountain is situated in the Oceanus Procellarum ("Ocean of Storms"), a vast volcanic plain that has been explored by a number of other moon missions, including Apollo 12.
- ▶ On Dec. 3, just two days after landing, Chang'e 5 placed its samples in the ascent vehicle, which then launched from the moon's surface back to lunar orbit. The module docked with an orbiter on Dec. 5, conducting the first fully robotic docking around the moon in history. The lunar samples were passed to a return capsule on the orbiter, which will remain in orbit for about a week before heading back to Earth.



Chang'e 5 lander

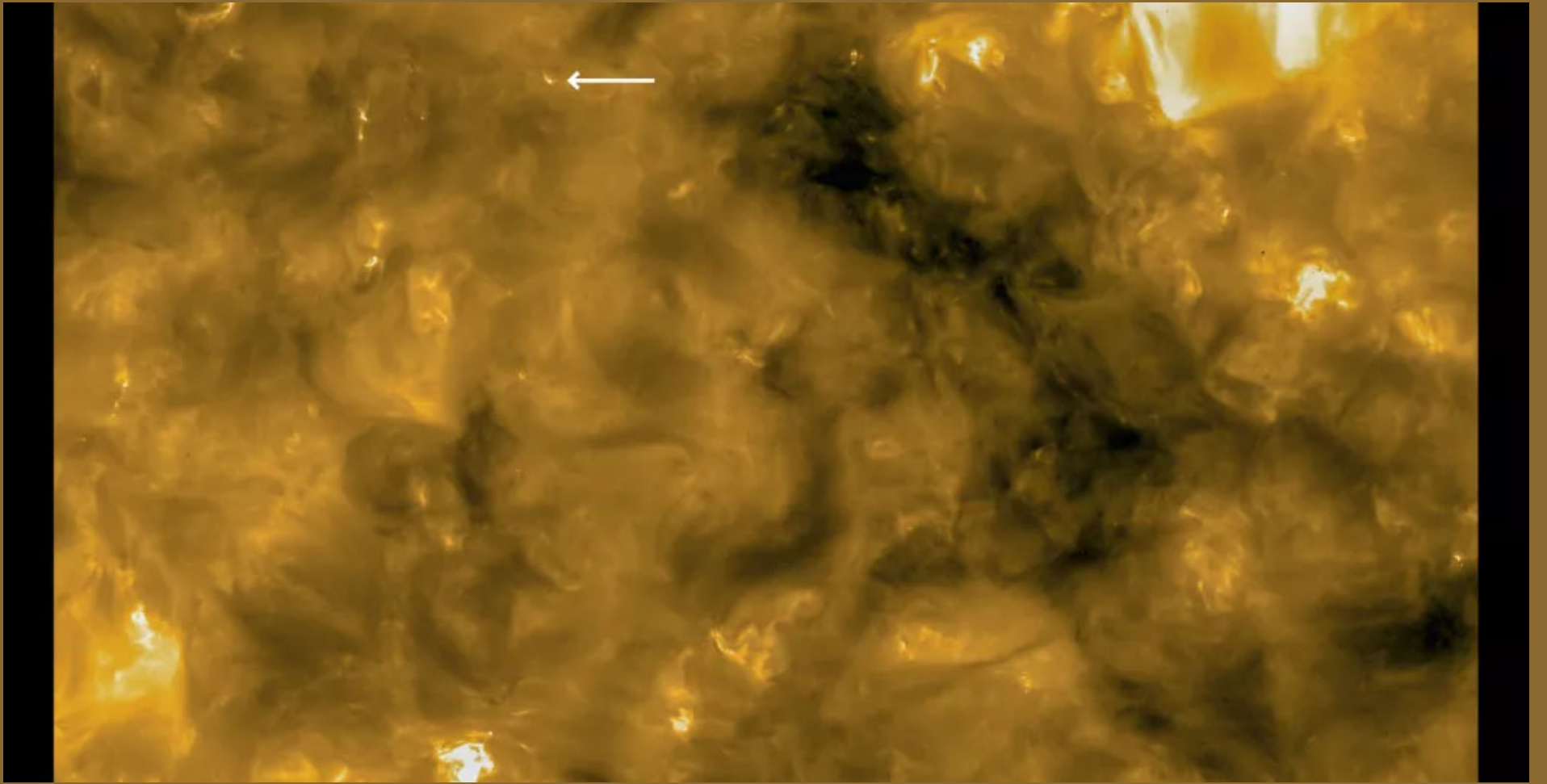
NASA's spacecraft spots China's Chang'e 5 lander on the moon

- ▶ <https://www.space.com/change-5-moon-lander-photo-lunar-reconnaissance-orbiter>
- ▶ NASA's Lunar Reconnaissance Orbiter captured an image of China's Chang'e 5 lander on the moon just hours after its historic landing.
- ▶ The Chang'e 5 lander set down on the lunar surface last Tuesday, Dec. 1. Thanks to China's prompt release of the stunning Chang'e 5 landing video, the Lunar Reconnaissance Orbiter Camera (LROC) team were able to locate the roughly 4-ton spacecraft in Oceanus Procellarum, the "Ocean of Storms," and prepare for when LRO would pass overhead the next day.
- ▶ The image shows the Chang'e 5 lander in the center of three craters. Automated systems had helped the spacecraft avoid these hazards to land safely.



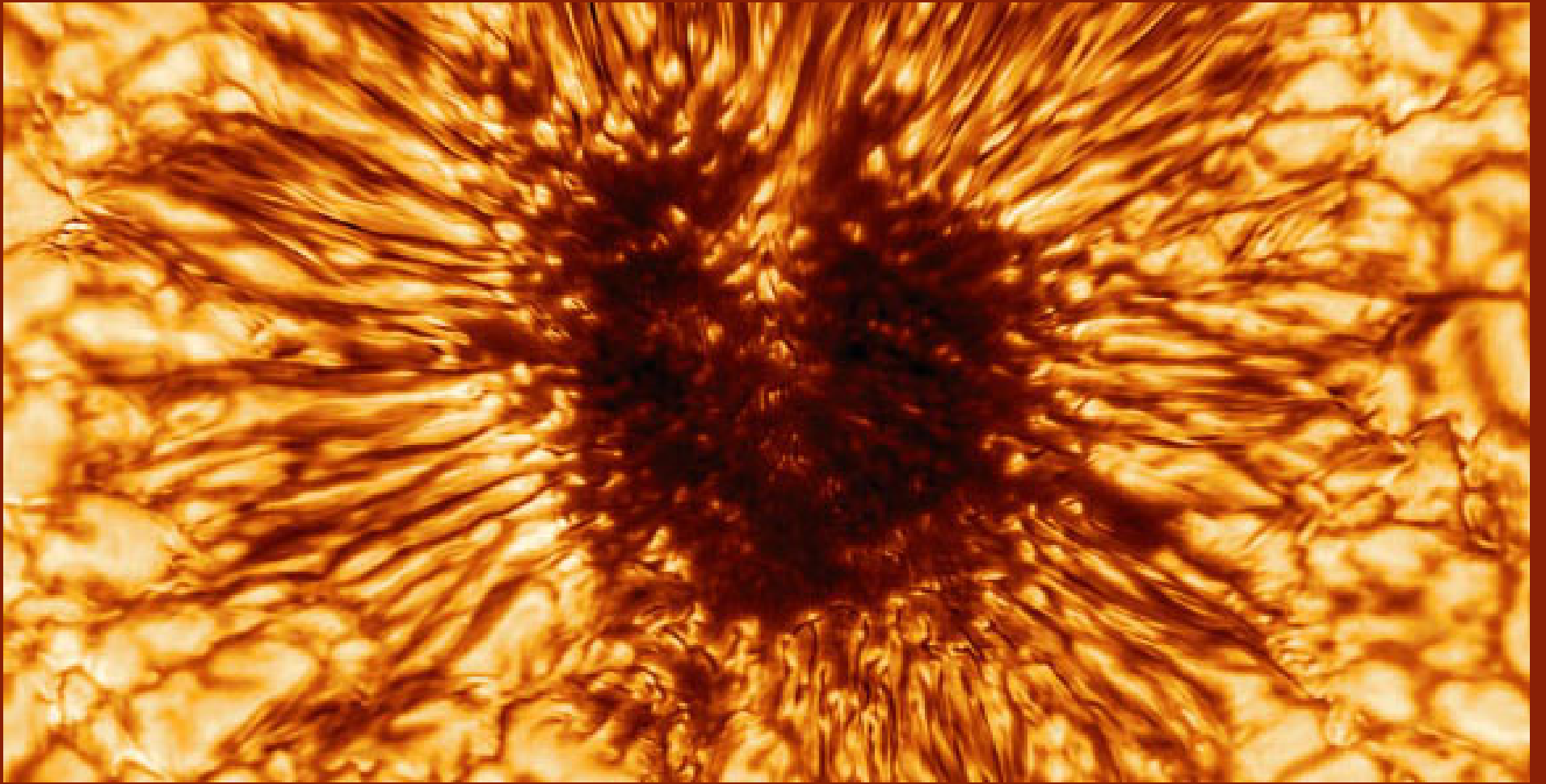
On This Day in Space! Dec. 11, 1972: Apollo 17 astronauts land on the moon

- ▶ <https://www.space.com/39251-on-this-day-in-space.html>
- ▶ With two astronauts on board, the lunar module Challenger touched down in an area called the Taurus-Littrow valley, where they spent three days doing moonwalks and collecting samples.
- ▶ Commander Gene Cernan was the last person to set foot on the lunar surface as he followed the lunar module pilot, Harrison Schmitt, back into the spacecraft on the last day. Ronald Evans, the command module pilot, never got the chance to walk on the moon like his crewmates did, because he had to hang out by himself in lunar orbit.
- ▶ The Apollo 17 mission launched to the moon on Dec. 7, 1972 and returned to Earth on Dec. 19.



The Solar Orbiter is watching a new sun weather cycle begin. Scientists are thrilled.

- ▶ <https://www.space.com/solar-orbiter-scientists-excited-solar-cycle-25>
- ▶ Just two weeks after the sun produced its first medium-size flare of the new solar cycle, scientists offered an update on what the newest sun-studying spacecraft has been up to.
- ▶ The Solar Orbiter, a partnership between NASA and the European Space Agency, launched in February on a seven-year mission to photograph the sun up close, with unprecedented views of the star's poles. And conveniently, that was just around the time when the sun began to enter a new cycle of activity, dubbed Solar Cycle 25.
- ▶ "I think we timed it exactly right. I'd love to say we planned it that way," Tim Horbury, a physicist at Imperial College London in the U.K. who leads one of Solar Orbiter's instrument teams, said during a news conference held virtually at the annual fall meeting of the American Geophysical Union. "We clearly didn't, but I think it's gone exactly right."



Inouye Solar Telescope Captures Its First Image of Sunspot

- ▶ <http://www.sci-news.com/astronomy/inouye-solar-telescope-first-image-sunspot-09125.html>
- ▶ An image of a sunspot captured by NSF's Daniel K. Inouye Solar Telescope clearly shows the potential of the telescope and its set of state-of-the-art instruments to revolutionize solar astronomy.
- ▶ The largest optical solar telescope in the world, is located on the island of Maui in Hawai'i.
- ▶ The telescope delivers spatial resolution and sensitivity that enable astronomers to unravel many of the mysteries that the Sun presents, including the origin of solar magnetism, the mechanisms of coronal heating and drivers of the solar wind, flares and coronal mass ejections.
- ▶ Its state-of-the-art adaptive-optics system provides diffraction-limited imaging and the ability to resolve features approximately 20 km (12.4 miles) on the Sun.
- ▶ Achieving this unprecedented spatial resolution is critical for the ability to observe solar magnetic fields at small spatial scales.



Samples of asteroid Ryugu arrive in Japan after successful Hayabusa2 capsule landing

- ▶ <https://www.space.com/hayabusa2-asteroid-ryugu-samples-arrive-in-japan>
- ▶ Japanese scientists are thrilled to finally have asteroid samples arrive Monday (Dec. 7) after a long flight from Australia — and a much longer journey through the solar system.
- ▶ Those rocks originate on a near-Earth asteroid called Ryugu; the Hayabusa2 spacecraft snagged them in 2019 before a yearlong journey to deliver them to Earth in a small sample-return capsule. The capsule landed on Dec. 5 in the Woomera Prohibited Area in South Australia, creating a stunning fireball in the pre-dawn skies. Japanese scientists on site successfully tracked down the capsule and collected the precious cosmic delivery to begin the final leg of its journey.

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- ▶ After the initial inspection, about two dozen staff jumped into action, ferrying the spacefaring capsule into a box for safekeeping, then to a helicopter that carried it to the team's headquarters. There, scientists attempted to draw a gas sample from the capsule, which may still contain gases from Ryugu itself.
- ▶ After Hayabusa2 delivers its samples of asteroid Ryugu to Earth in December, the craft will head off toward a new asteroid target: 1998 KY26, the Japan Aerospace Exploration Agency (JAXA) said in a statement. The spacecraft should reach the new asteroid in 2031.
- ▶ Hayabusa2 reached asteroid Ryugu in June 2018 and spent over a year studying the space rock. The spacecraft left Ryugu in November 2019 and its sample-return capsule will return pieces of the asteroid to Earth with a Dec. 6 landing in the Australian Outback.



Cape Canaveral bases redesignated for Space Force, but in name only (for now)

- ▶ <https://www.space.com/cape-canaveral-bases-named-space-force>
- ▶ They're now Cape Canaveral Space Force Station and Patrick Space Force Base.
- ▶ Headquartered at Patrick Space Force Station, Cape Canaveral Space Force Station includes the historic, now-retired launchpads from where the first U.S. satellite, Explorer 1, was launched in 1958, and from where the first American astronauts lifted off for space and Earth orbit. The site is also where planetary probes have departed for all of the planets in the solar system and points beyond.
- ▶ First established as the Joint Long Range Proving Ground after the base was transferred from the Navy to the Air Force in 1948, the launch site has also been known as the Air Force Missile Test Center (1951), Cape Canaveral Missile Annex (1958) and Cape Kennedy Air Force Station (1963), before becoming the Cape Canaveral Air Force Station in 1973.



Astronomers Discover New 'Celestial Autobahn' in Solar System

- ▶ <http://www.sci-news.com/astronomy/celestial-autobahn-solar-system-09137.html>
- ▶ An international team of astronomers from Serbia and the United States has discovered a new superhighway network to travel through our Solar System much faster than was previously possible.
- ▶ The newly-discovered routes can drive comets and asteroids near Jupiter to Neptune's distance in under a decade and to 100 AU (astronomical units) in less than a century.
- ▶ They could be used to send spacecraft to the far reaches of our planetary system relatively fast, and to monitor and understand near-Earth objects that might collide with our planet.
- ▶ Dr. Nataša Todorović of Belgrade Astronomical Observatory and colleagues observed the dynamical structure of these routes, forming a connected series of arches inside what's known as space manifolds that extend from the asteroid belt to Uranus and beyond.
- ▶ This 'celestial autobahn' acts over several decades, as opposed to the hundreds of thousands or millions of years that usually characterize Solar System dynamics.

Questions?

