John J. McCarthy Observatory

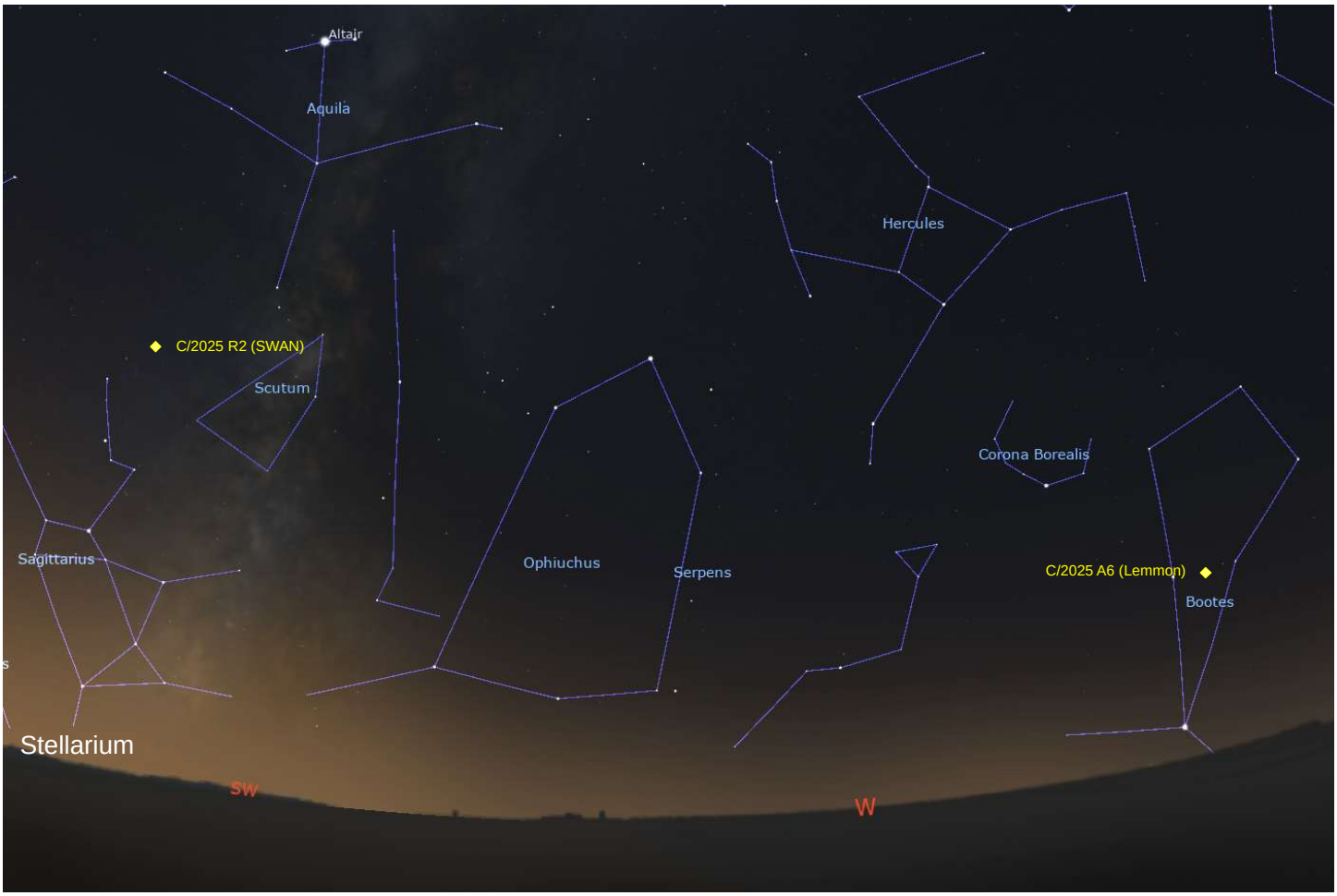
October 2025 Newsburst

International Observe the Moon Night (InOMN) is being celebrated on October 5th this year. The event was first inspired by public outreach activities sponsored by the Lunar Reconnaissance Orbiter (LRO) and Lunar CRater Observation and Sensing Satellite (LCROSS) educational teams at the Goddard Space Flight Center in Greenbelt, Maryland and at the Ames Research Center in Moffett Field, California, in August 2009. In 2010, the Lunar and Planetary Institute and Marshall Space Flight Center joined Goddard and Ames in a world-wide event to raise public awareness of lunar science and exploration.

Photo: Bill Cloutier

Mare Humorum (Sea of Moisture) will be a conspicuous feature along the southern terminator on the 5th. The basaltic lava that fills this ancient impact basin forms a roughly circular plain over 260 miles (420 km) in diameter and is estimated to be several miles (km) in depth. As the lava cooled and contracted, the mass of material at the center of the basin induced stress fractures along the edges. On the eastern side of the mare are three rilles, concentric to the center of the basin, created by the subsidence (identified as Rimae Hippalus after a nearby crater). Interrupting the basin's northern rim is the crater Gassendi with its two central peaks. Although its rim appears complete, the floor of this 69 mile (111 km) diameter impact feature exhibits extensive flooding, likely from widespread volcanism in the area. An impressive array of fracture lines crisscross the crater floor, while a smaller crater breeches its northern rim.

Comet Hunting



Location of the two comets that may be visible in the days around October 20th, should predictions of their brightening hold. The view, using the software Stellarium, was generated for 8 pm local time. A clear horizon to the west will be necessary, particularly for C/2025 A6 Lemmon which will be setting shortly thereafter.

Predicting comet performance is like forecasting the weather in New England – it can, and does, change without warning. However, should good fortunes prevail, sky watchers may have the opportunity to spot two comets in the sky in the days around the 20th of October.

Comet C/2025 R2 (SWAN) was discovered on September 11th, just a day before its closest approach to the Sun (perihelion). The long-period comet was detected by the Solar and Heliospheric Observatory's Solar Wind Anisotropies instrument (SWAN), used to map the solar wind's mass flux distribution from the equator to the poles from the Sun-Earth L1 Lagrange point, 932,000 miles (1.5 million km) from Earth in the direction of the Sun. The comet will make its closest approach to Earth around October 20th. Although not anticipated to be exceptionally bright, the comet is currently exceeding expectations. On the night of the 20th, the comet can be found on the boarder of the constellations Sagittarius and Aquila.

Discovered in January by the Mount Lemmon Survey in Arizona, Comet C/2025 A6 (Lemmon) will make its closest approach to Earth on October 21st. Current predictions are for the comet to brighten to magnitude 4, about the limit of visibility in a dark sky in western Connecticut. On the night of the 20th, the comet can be found in the constellation Bootes.

You can follow the progress of these two comet, as well as others, on the website "Weekly Information about Bright Comets," at http://www.aerith.net/comet/weekly/current.html.

6,000 Exoplanets

The official number of exoplanets has exceeded 6,000. The milestone comes 30 years after the first exoplanet around a sun-like star was discovered and just three years after the total surpassed 5,000. There are another 8,000 candidates awaiting confirmation.

The vast majority of discoveries (74%) were made with the Transit method, where planets passing in front of their star dims its light by a measurable amount. Nineteen percent of discoveries relied upon the Radial Velocity technique where an orbiting planet induces a wobble in their host star, with an observable shift in the observed spectrum. Microlensing and direct imaging comprise the remaining 6% of discoveries, although advances in the use of a coronagraph to block the blazing light from host stars should increase the opportunities for imaging much dimmer planets.

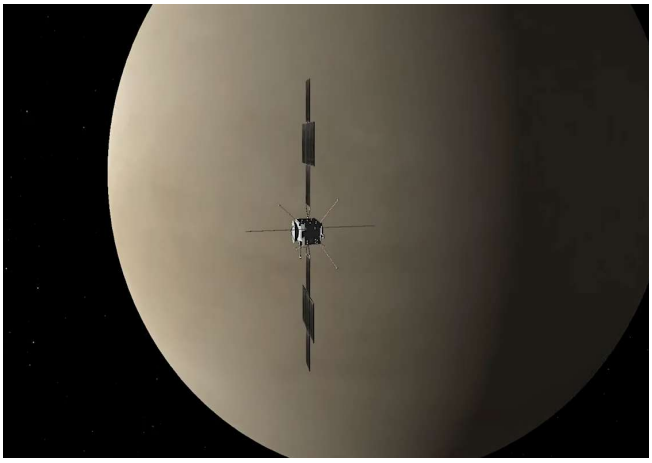
A technology demonstration instrument called the Roman Coronagraph on the future Nancy Grace Roman Space telescope will test new applications for blocking starlight to reveal faint planets.

Image Credit: NASA

Juice Flies by Venus

Europe's Jupiter Icy Moons Explorer (Juice) probe completed its Venus flyby on August 31st, the first of three gravity assists that will propel the spacecraft towards Jupiter. The spacecraft will fly by Earth twice, in September 2026 and January 2029, gaining velocity each time so as to keep it on schedule to reach the Jovian system in July 2031.

The Venus flyby was a success despite a sudden communication failure upon approach. The loss of contact with the spacecraft was eventually traced to a software timing bug which had switched off the amplifier used by Juice to communicate with Earth. No images of Venus were taken by Juice's instruments as they had been turned off to prevent any damage from the intense solar heat at Venus.



Artist conception of Venus flyby by the Juice spacecraft

Image credit: ESA

2025 FA22 Observing Campaign

A potentially hazardous asteroid, 2025 FA22, flew by the Earth on September 18th, traveling at more than 24,000 mph (38,600 km/h). Estimated to be between 427 and 951 feet (130 and 290 meters) across, the asteroid came within 520,000 miles (835,000 kilometers) of Earth (a little more than two lunar distances).

While there was no risk of collision with the Earth, the International Asteroid Warning Network used the close approach as an opportunity to practice its emergency protocols for a future impactor. This exercise involved observatories across the globe, including the McCarthy Observatory, measuring as many of the asteroids' characteristics, as accurately as possible, over a several day campaign.

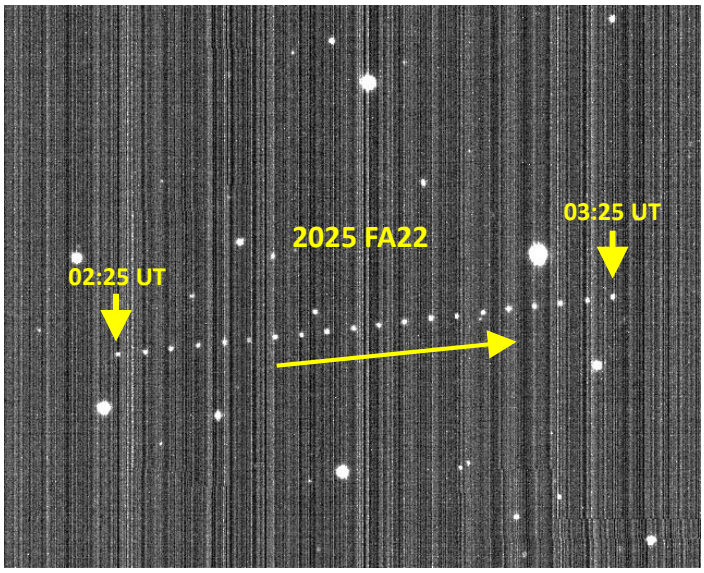
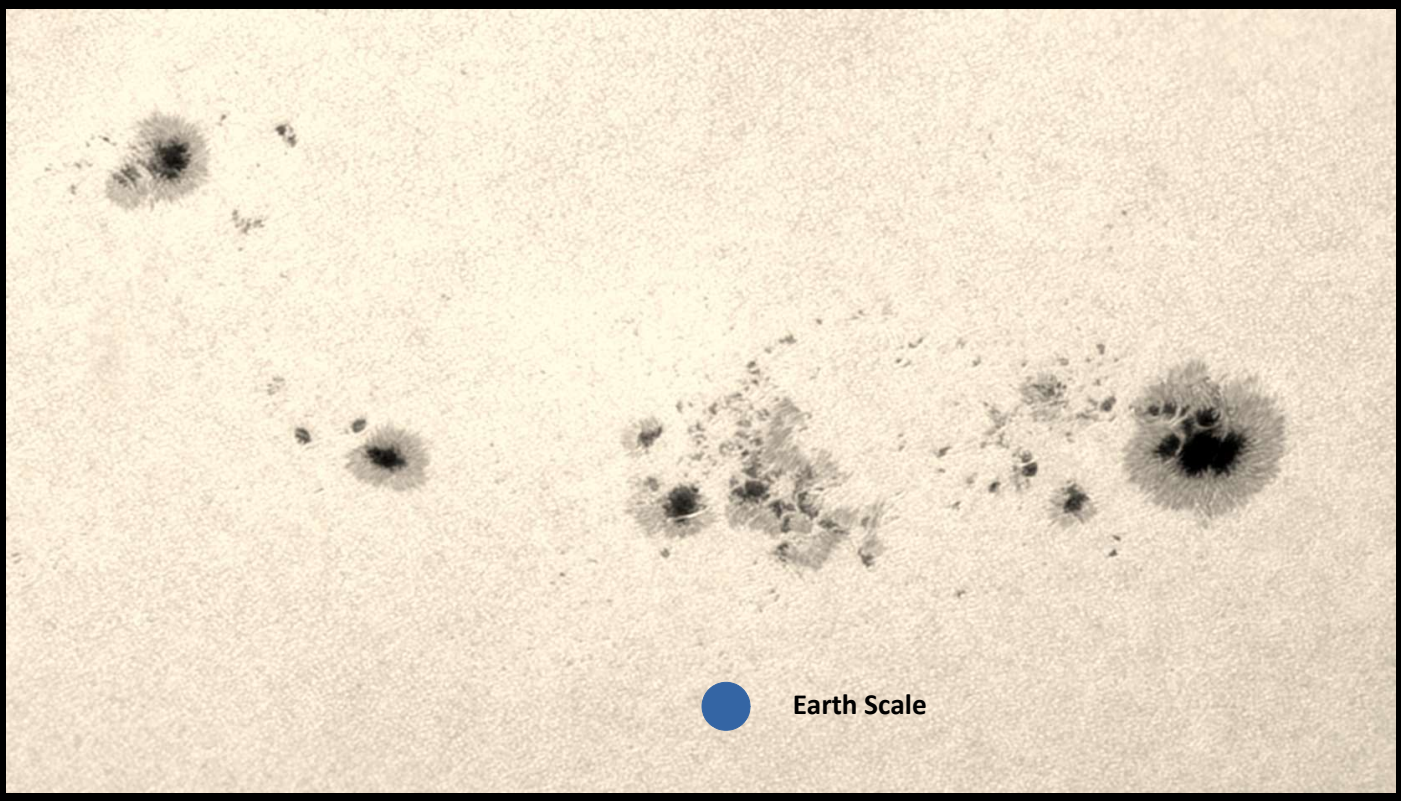
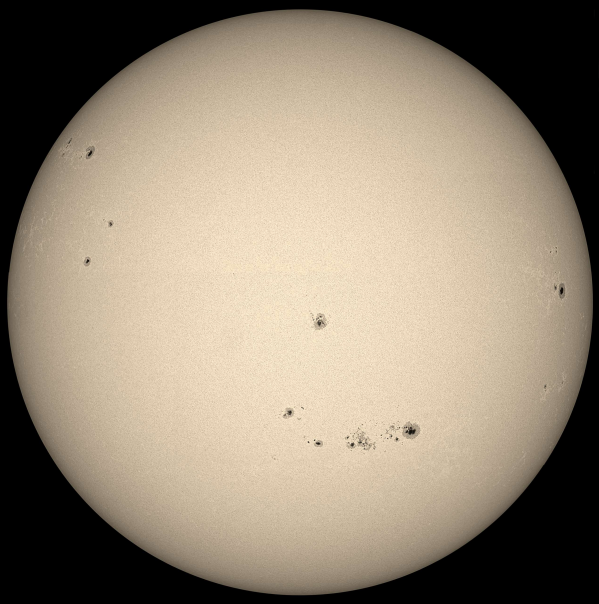


Image Sequence from September 22nd: McCarthy Observatory

Solar Activity Increasing





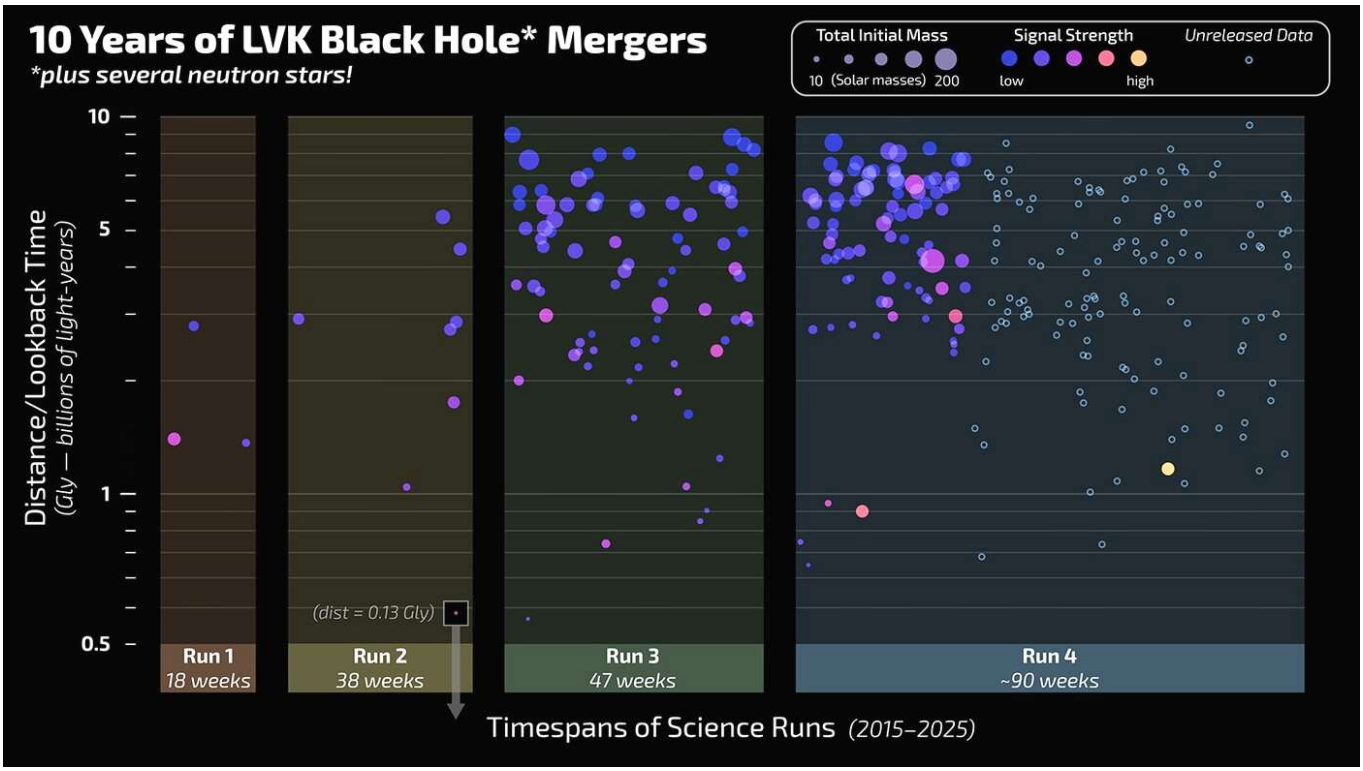
Large sunspot complex crossing the solar disk on August 31st

Photo: Bill Cloutier

A new paper presented in The Astrophysical Journal Letters (Jamie M. Jasinski and Marco Velli 2025 ApJL 990 L55) advances that the Sun is becoming more active, despite the past solar cycle 24 being the weakest on record.

Data from NASA's ACE and Wind missions show increases in solar wind proton parameters, including speed, mass flux, density, temperature, thermal pressure, dynamic pressure, energy flux, interplanetary magnetic field magnitude, and the radial component of the magnetic field.

Space weather events can damage power grids, disrupt communications networks, interfere with GPS systems, and increase radiation levels for space travelers. With NASA planning to return to the Moon, an increase in solar storm activity is cause for concern, particularly, for extravehicular activities on the lunar surface.



This chart shows the frequency of discoveries made by gravitational detector network (LIGO in the US, Virgo in Italy and KAGRA in Japan, or the LVK network) since 2015. The detections are primarily from black hole mergers, with a small number involving either black hole-neutron star collisions or neutron star-neutron star collisions.

Credit: LIGO/Caltech/MIT/R. Hurt (IPAC)

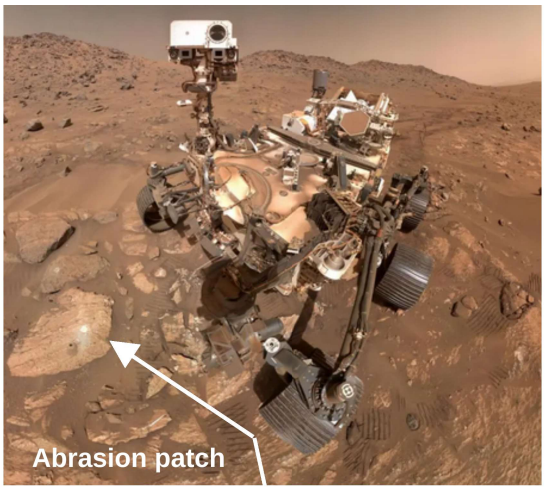
Gravity Wave Detections Accelerate

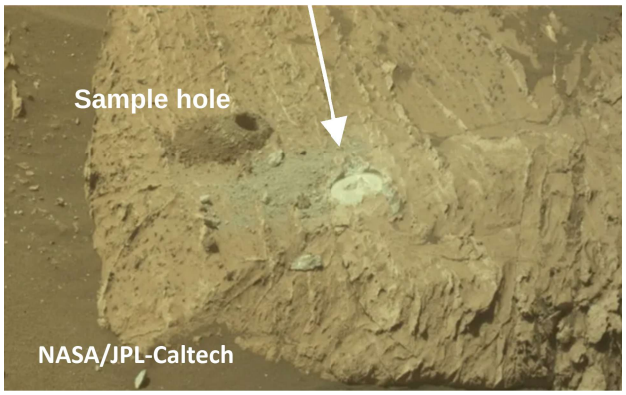
On September 14, 2015, the twin detectors of the US National Science Foundation's Laser Interferometer Gravitational-Wave Observatory (NSF LIGO) detected gravitational waves for the first time - generated from the merger of two black holes. Since that time, the sensitivity of the detectors have been upgraded and additional gravitational-wave detectors added across the globe. As a result, detection of these space-time distortions have become more frequent, and with greater clarity. Today, the LIGO detectors in both Hanford, Washington and Livingston, Louisiana, routinely observe black hole mergers every three days.

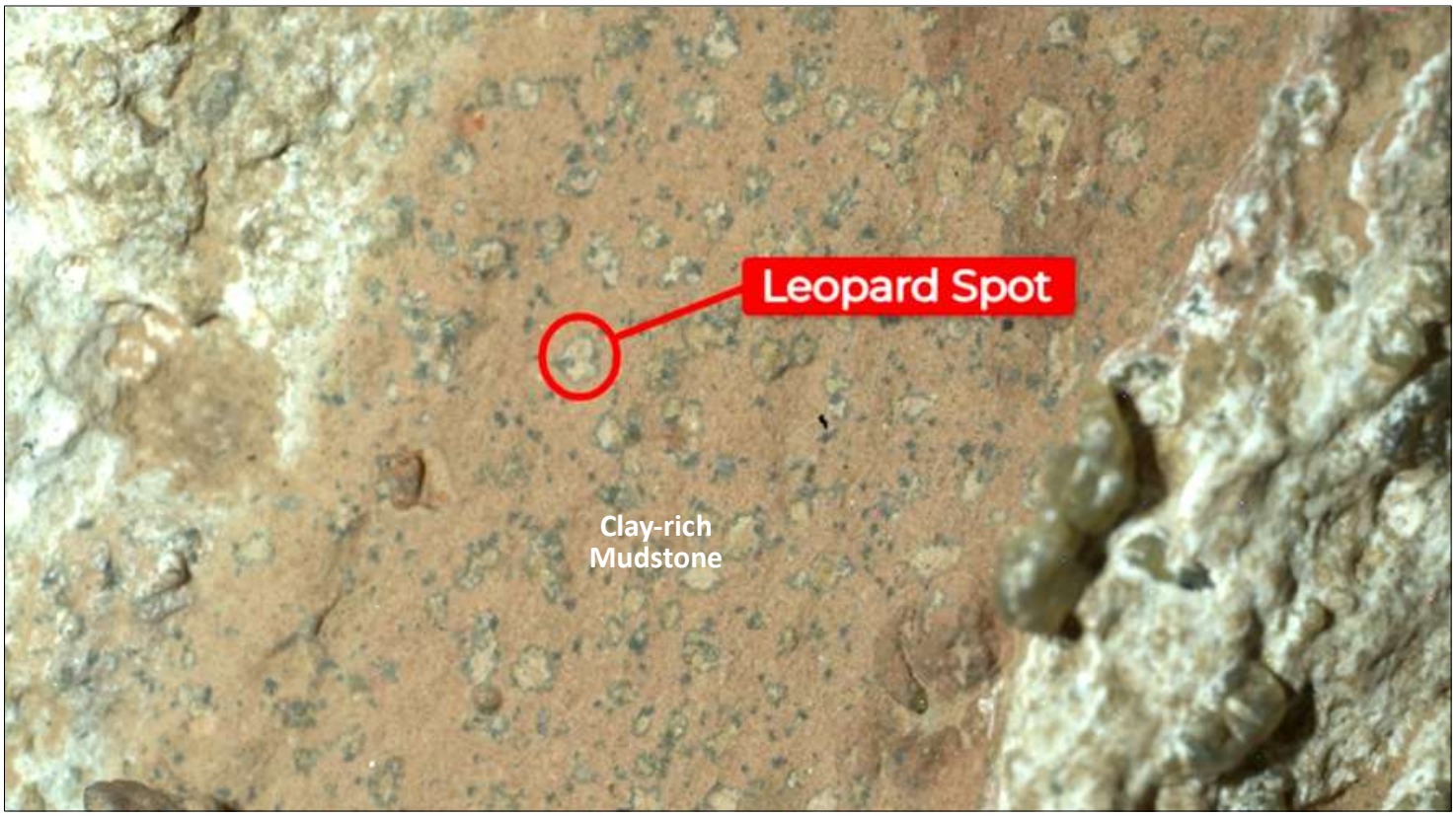
Martian Biosignature?

In July 2024, NASA's Mars Perseverance rover acquired a rock core from the Bright Angel rock formation. According to a recent paper published in the journal Nature, the "Sapphire Canyon" core (as sample No. 25 is named) contains potential biosignatures. The sample presents the strongest evidence to date of past microbial life.

Magnified images of the sedimentary rock reveal colorful spots - distinct patterns of minerals including two iron-rich minerals (vivianite or hydrated iron phosphate and greigite or iron sulfide). On Earth, vivianite can be found in sediments, peat bogs, and around decaying organic matter. Likewise, microbial life on Earth can produce greigite.

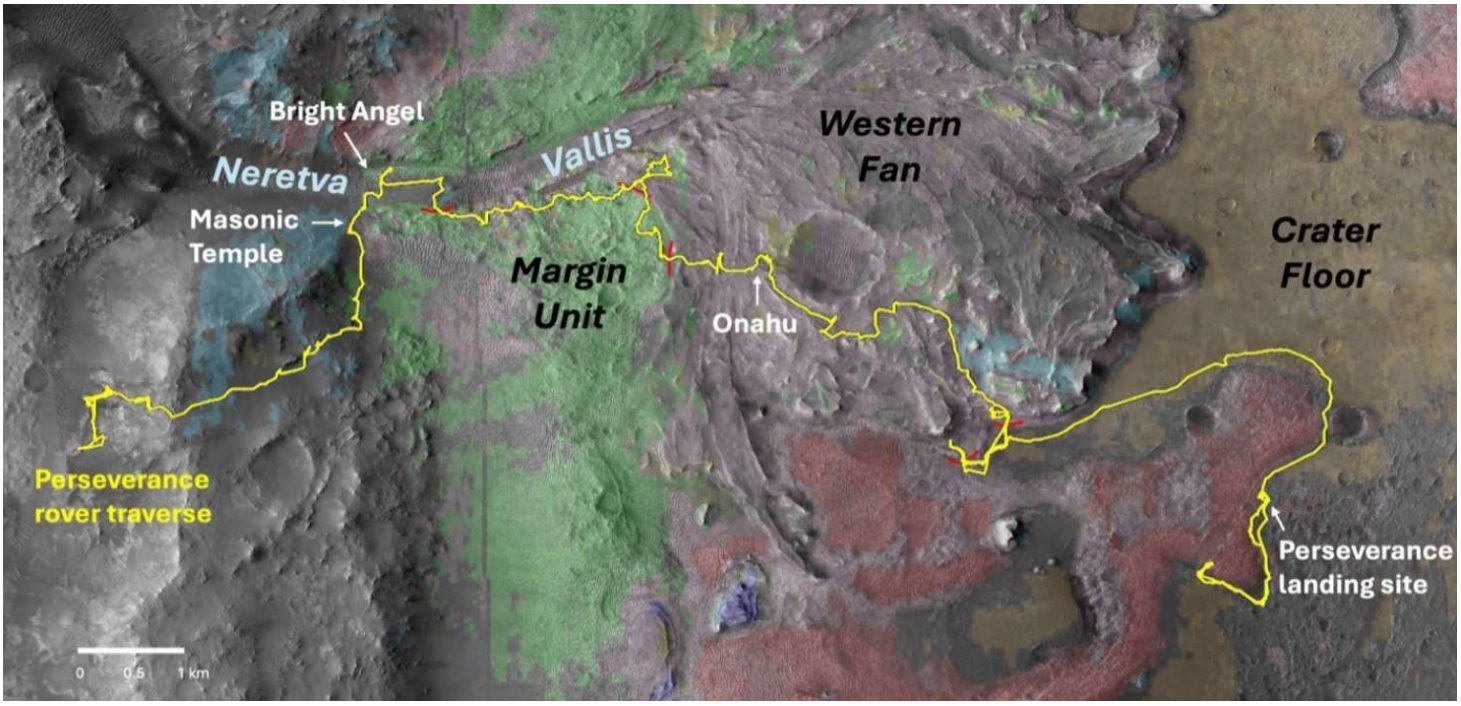






Sedimentary rock from which the Sapphire Canyon sample was extracted
NASA/JPL-Caltech/MSSS

Scientists are intrigued by the millimeter-size, irregularly shaped light patches surrounded by a thin ring of dark material called leopard spots, along with the nearby small dark spots called poppy seeds. These mineral deposits (on Earth) are associated with biologic activity, and microbial life. While this is the strongest biosignature found to date on Mars, ultimately, the sample would need to be returned to Earth for a more detailed analysis to rule out any non-biological processes for the production of these features.



Location of the Bright Angel rock formation in the ancient river valley of Jezero Crater
NASA/JPL-Caltech

Toasted Success

SpaceX's Starship's touches down in the Indian Ocean after completing test flight No. 10.
Credit: SpaceX

Reversing a trend, SpaceX's Starship's tenth test flight completed all its objectives. The rocket lifted off on August 26th from Starbase, Texas. About two and one-half minutes into the flight, the engines on the super heavy booster cut off, followed by ignition of the engines on the second stage (Starship) and stage separation. Fourteen minutes later, Starship opened its payload door to the vacuum of space and successfully deployed eight dummy versions of SpaceX's Starlink satellites (a first).

Just over an hour after lifting off in Texas, Starship completed its reentry through the Earth's atmosphere, coming down approximately 10 feet (3 meters) from its targeted splashdown point. The return was recorded by a camera placed on a buoy in the landing area. The images returned recorded damage to aft skirt/engine compartment and flaps, as well as extensive discoloration of the vehicle. According to SpaceX, the orange staining was from metallic test tiles that had oxidized and the white coating from insulation in areas where tiles had been deliberately removed. Despite the damage, the vehicle was able to execute a controlled descent.

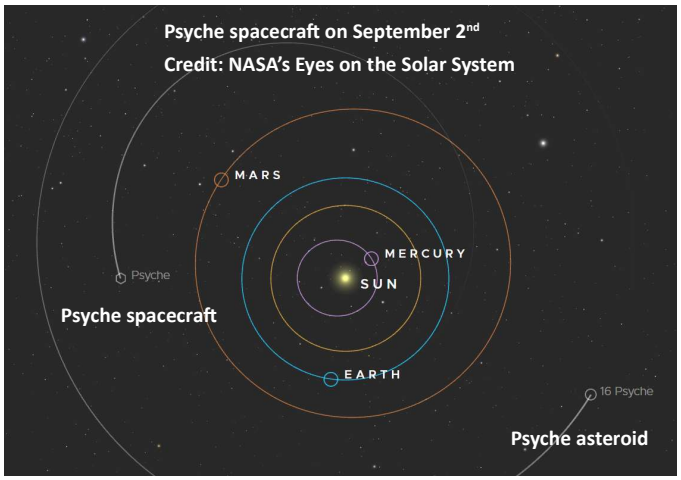
The continuing success of Starship is critical to NASA's lunar ambitions, with a lunar landing version of the vehicle needed to complete the Artemis III mission.

DSOC Prime Mission Ends

The Optical Communications Telescope Laboratory at JPL's Table Mountain Facility beams its laser to the DSOC flight laser transceiver aboard NASA's Psyche spacecraft.

Credit: NASA/JPL-Caltech

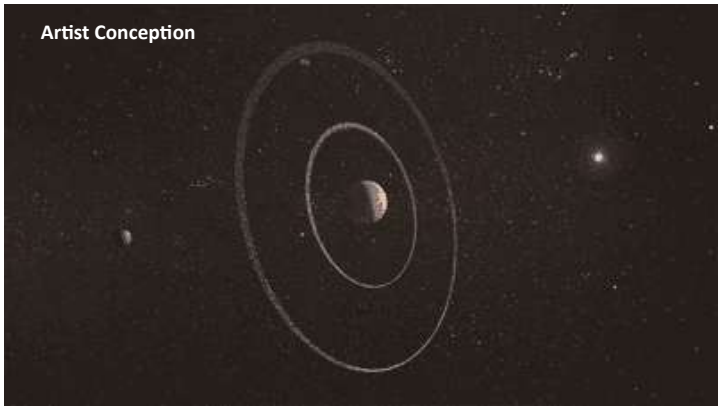
NASA's Deep Space Optical Communications (DSOC) experiment wrapped up its primary mission, reaching out to the Psyche spacecraft for the 65th and final time on September 2nd. The spacecraft, at the time, was 218 million miles (350 million km) from Earth and well on its way to the metal-rich asteroid 16 Psyche. The return signal was received at Caltech's Palomar Observatory. Laser-based communications are expected to improve data transmission rates by a factor of 10 over current radio frequency methods.



Quaoar Mystery

The trans-Neptunian (TNO) world Quaoar is an oddity. Located about 4 billion miles (6.5 billion km) from Earth and seventh in size among TNOs (Pluto and Eris being the largest), with an estimated diameter of 690 miles, or 1,100 km, astronomers have found at least two rings that encircle the tiny world. Quaoar's rings are located well beyond the Roche limit (where the planet's gravity would disrupt the formation of moons). Typically, rings are found inside the Roche distance (e.g., where we find Saturn's).

Quaoar is also orbited by a small moon called Weywot. Recent observations have detected another moon (or very dense ring), adding to the mystery of how this icy world evolved.



Quaoar with its two rings and moon Weywot (on the left)

Credit: ESA

Second Saturday Stars

FREE EVENT

John J. McCarthy Observatory
Behind the New Milford High School
860.946.0312
www.mccarthyobservatory.org

October 11th

7:00 – 9:00 pm

Free Star Party

Featuring:

Near Earth Objects Discovery & Detection

All are welcome to enjoy
a brief presentation along with
observing* the sights of the
night sky through
a variety of telescopes!

*Observing if weather permits

Contact Information

	www.mccarthyobservatory.org
	@McCarthy Observatory
	@McCarthy Observatory
	mccarthy.observatory@gmail.com
	@JJMObservatory
	@mccarthy.observatory

John J. McCarthy Observatory

P.O. Box 1144
New Milford, CT 06776

New Milford High School
388 Danbury Road
New Milford, CT 06776

Phone/Message: (860) 946-0312