

John J. McCarthy Observatory

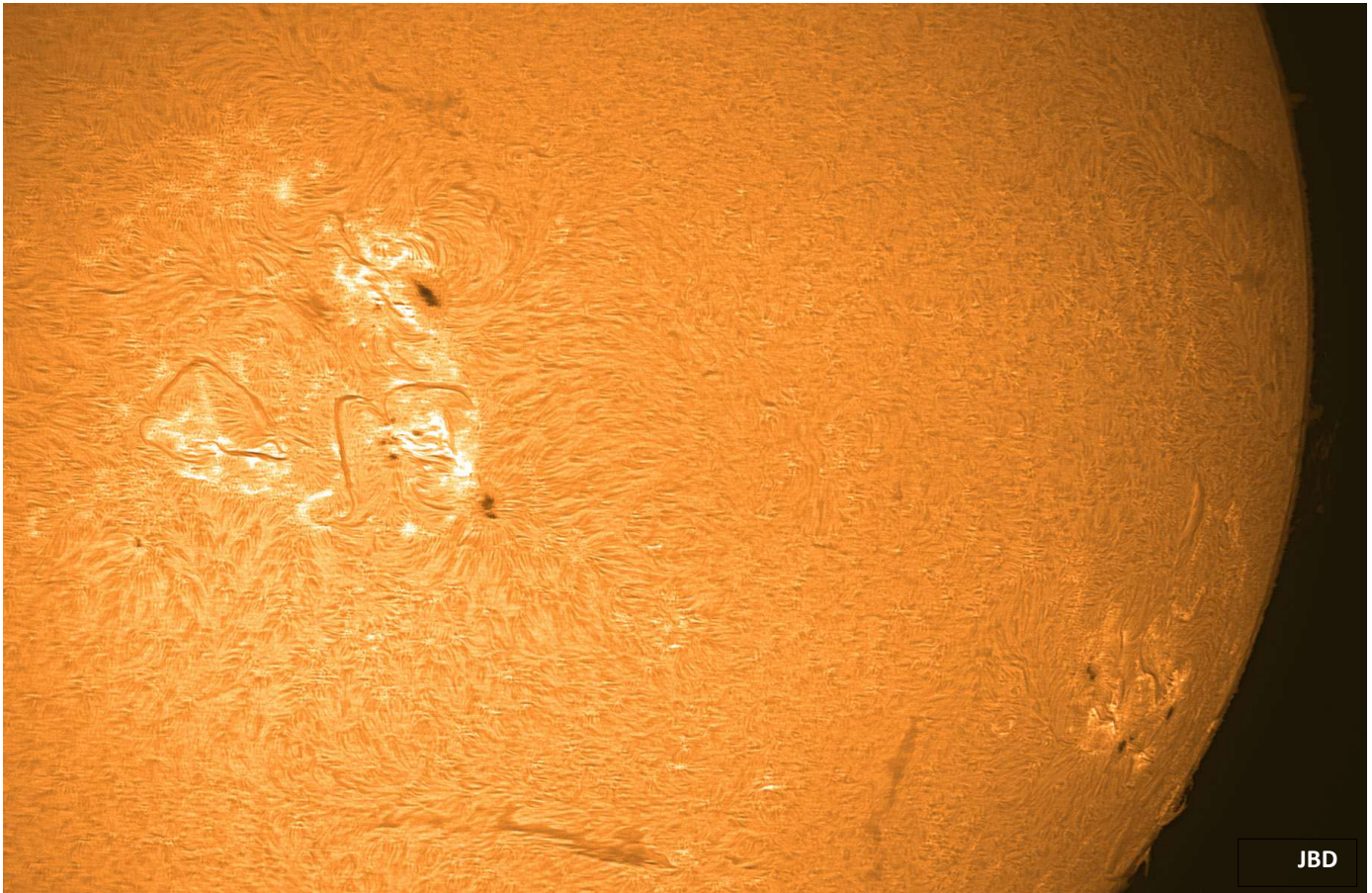
November 2025 Newsburst



Comet C/2025 A6 (Lemmon) shines in the October evening sky. The long period comet was discovered by the Mount Lemmon Survey in January 2025. It has an inbound orbital period of about 1,350 years and will pass nearest to the Sun on November 8th (perihelion). The close encounter with the Sun will modify its orbit and shorten its period to 1,150 years.

Photo: Bill Cloutier

H-alpha Light from the Chromosphere

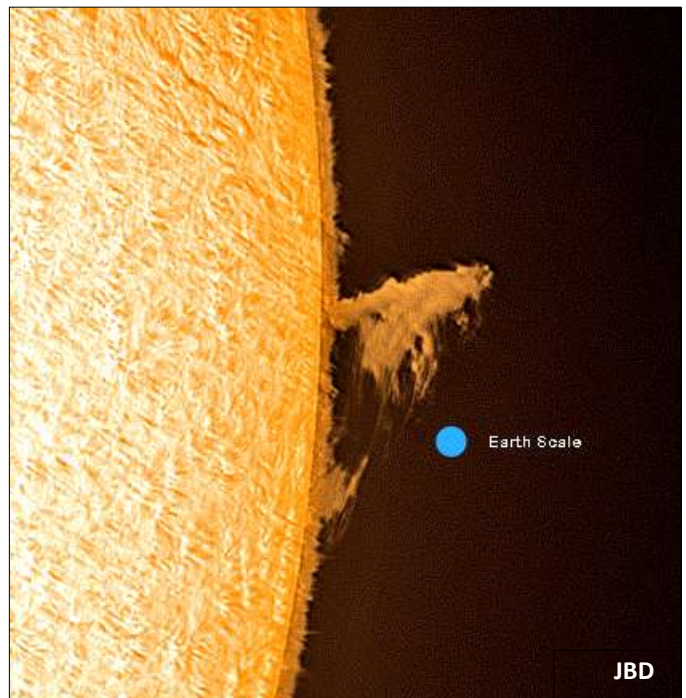


The long filaments and other darker patches are plasma-related phenomena in the Sun's chromosphere. They can be revealed with a H-alpha solar filter

Photos: Bill Cloutier

A broad-spectrum "white-light" solar filter captures images of the Sun's photosphere and excels in revealing visual details of sunspots - areas where a strong magnetic field concentration inhibits convection from the Sun's interior and therefore are cooler and appearing darker than the surrounding "surface."

A hydrogen-alpha filter focuses on a much narrower portion of the spectrum to reveal details in the Sun's chromosphere (the layer above the photosphere). The filter is effective in showing filaments - long, dense and relatively cooler (therefore darker) threads of plasma. These ribbons of ionized gas are suspended above the photosphere by magnetic forces. When in profile on the limb, the filaments appear as prominences.



A prominence on the solar limb compared to the size of the Earth, captured with the Observatory's Dancer antique telescope (JBD)

Photos: Bill Cloutier

Case for Ocean Life

Twenty years ago, NASA's Cassini spacecraft discovered evidence of a vast salty ocean hidden beneath the icy crust of Saturn's moon Enceladus. Since that mission concluded, scientists have been revisiting the data received from the Cassini's multiple passes through the plumes erupting from the moon's south pole and Saturn's E-ring which is fed by the emissions. In new research, recently published in the Journal Nature Astronomy, scientists have identified large complex organic molecules, including compounds with oxygen and nitrogen that, on Earth, are required for life. The discovery was found in the data from a 2008 flyby of Enceladus when Cassini flew straight through the plumes. The icy grains that hit the spacecraft's Cosmic Dust Analyzer instrument had been ejected from the surface only minutes before.

The discovery, combined with evidence of liquid water and hydrothermal activity, strengthens the possibility of life in the subsurface ocean. The European Space Agency is planning a mission to Enceladus, which could include a landing on the moon's south pole for sample collection.



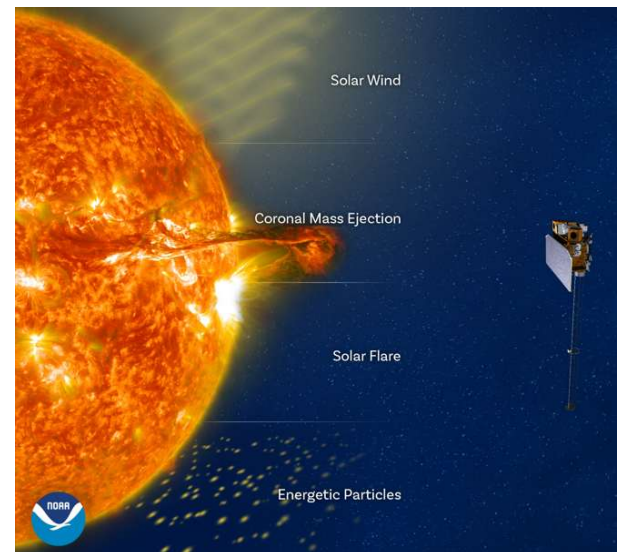
Illustration showing plumes of water vapor and ice erupting from fractures near Enceladus' south pole

Image credit: NASA/JPL-Caltech

Space Weather Satellite Launched

The National Oceanic and Atmospheric Administration (NOAA) Space Weather Follow-On Lagrange 1 (SWFO-L1) spacecraft was successfully launched on September 24th. The spacecraft is expected to reach Lagrange Point 1 in January 2026, at which time it will complete commissioning and transition to science operations. The SWFO-L1 satellite will be dedicated to monitoring the Sun's outer atmosphere for coronal mass ejections and solar wind streams, providing early warning of space weather events that could threaten orbiting satellites, Earth industries that are susceptible to geomagnetic disturbances, and present a hazard to astronauts. SWFO-L1 is able to transmit continuous real-time data.

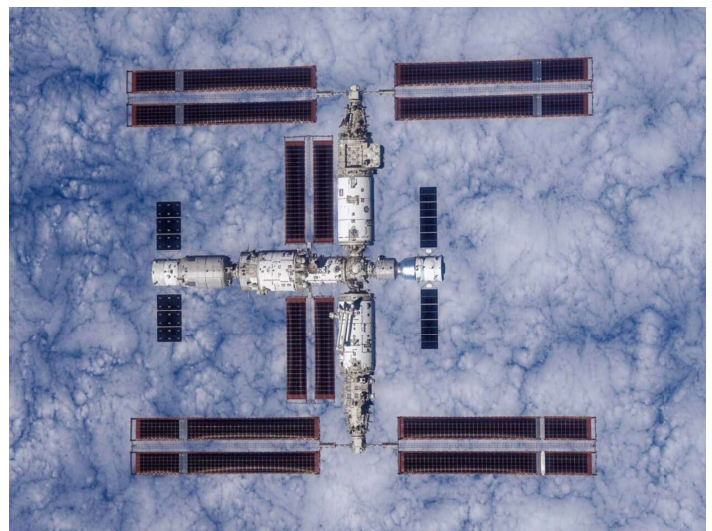
With a nominal five-year prime mission, the spacecraft has sufficient consumables on board to last 10 years.



NOAA's SWFO-L1 satellite will give Earth advanced warning of energetic solar events

Mutant Space Threat

A bacteria, unknown on Earth, has been identified in samples collected by the crew of the Chinese Tiangong space station. The first new microbial discovery, named "Niallia tiangongensis," was found in the station's habitation module and shares genetic similarities with Niallia circulans, a terrestrial soil bacterium. However, this new variant has demonstrated unique characteristics that allow it to adapt to conditions on the station, including microgravity and elevated radiation levels. It is also unique in its spore formation capabilities – allowing it to surround itself with a protective shell during times of environmental stress. The discovery has health implications for long-term spaceflight where rapidly evolving microbes could threaten crews with weakened immune systems.



Credit: China National Space Administration

Harvest Super Moon

The full moon on October 6th was the first “supermoon” of 2025. A full moon is considered a “supermoon” when the moon is within 90% of its closest point to the Earth in its elliptical orbit (perigee). In October, perigee occurred on the 8th, just about two days after the moon reached its full phase. A supermoon can appear up to 14 percent bigger and 30 percent brighter than a full moon at apogee (farthest from Earth in its orbit). October’s full moon is the first of three consecutive supermoons in 2025 (including November 5th and December 4th).

The composite image was captured with the McCarthy Observatory’s antique refractor (JBD). At the time, the moon was approximately 2,250 miles (3,600 km) from its closest point to Earth in its 27-day orbit. The image shows the nearside of the moon with a western longitudinal libration (caused by a mismatch between orbital speed and rotational speed) of almost 3°, revealing a sliver of the moon’s farside, including Lacus Autumi and Lacus Veris, the dark lava deposits between the impact rings of Mare Orientale located beyond the western limb.



Mare
Orientale

NASA's Carruthers Geocorona Observatory

NASA's Carruthers Geocorona Observatory will study Earth's exosphere, the outermost layer of Earth's atmosphere, and the portion of the atmosphere that emits ultraviolet light, using two far-ultraviolet cameras.

The spacecraft has been positioned at the gravitationally-stable Lagrange Point 1, about 932,000 miles (1.5 million km) from Earth in the direction of the Sun, after its launch on September 24th. Its instruments are designed to observe the exosphere's response to space weather, for example, how geomagnetic storms from solar eruptions develop, propagate and dissipate, as well as play a role in the loss of our atmosphere to the vacuum of space.

The diminutive spacecraft, weighing only 531 pounds (240 kg) will use NASA's Deep Space Network to send data back to Earth twice a week over its two year prime mission (the spacecraft carries enough fuel to operate for 10 years or longer).

The mission was named in honor of Dr. George Carruthers. Dr. Carruthers, a pioneer in ultraviolet instrumentation, designed and built the compact ultraviolet camera/spectrograph carried to the Moon by the Apollo 16 astronauts. It provided scientists the first view of Earth's geocorona.



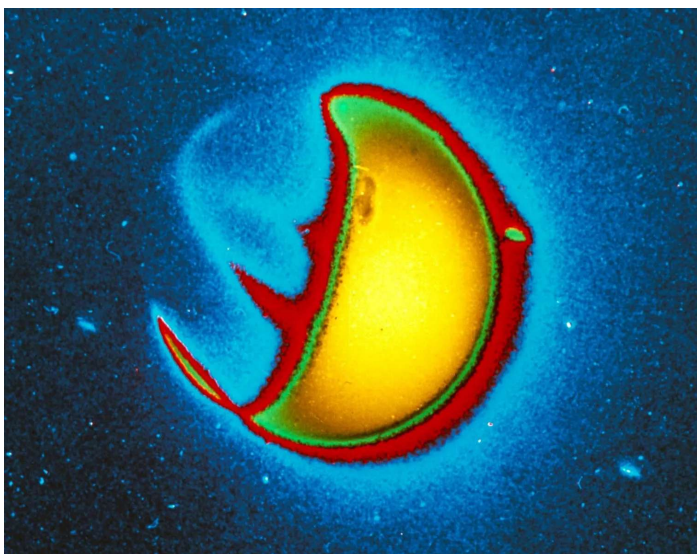
A BAE Systems technician inspects the Carruthers Geocorona Observatory satellite after the integration of the ultraviolet (UV) spectrometer onto the satellite bus.

Credit: NASA/BAE Systems Space & Mission Systems



Dr. Carruthers (on the right), with the gold-plated ultraviolet camera/ spectrograph developed for the Apollo 16 mission in 1972

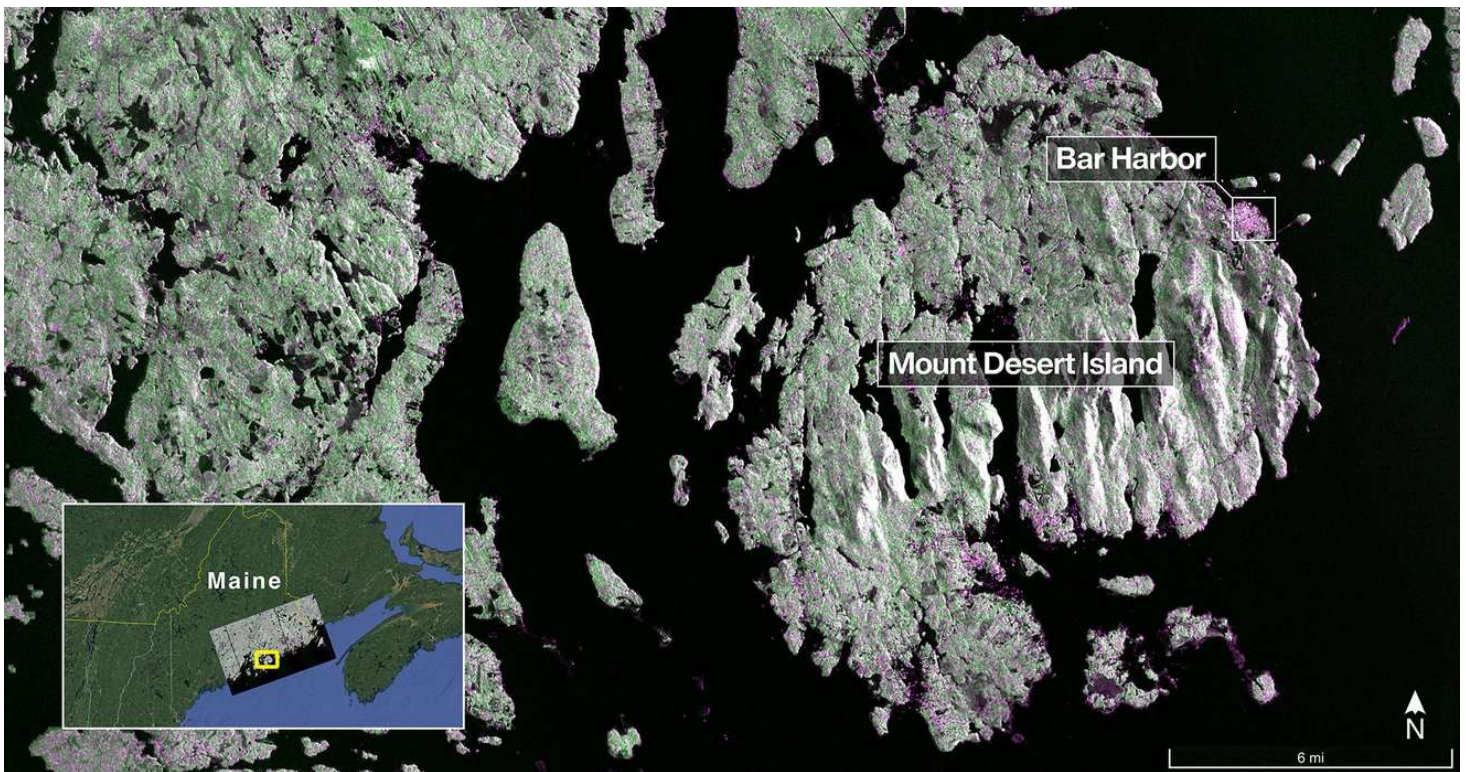
Credit: U.S. Naval Research Laboratory



This colorized image of Earth taken from the surface of the Moon by the Far Ultraviolet Camera/Spectrograph designed and built by Dr. Carruthers

Credit: G. Carruthers (NRL) et al./Far UV Camera/NASA/ Apollo 16

NISAR's First Radar Images of Earth's Surface



Credit: NASA/JPL-Caltech

The first images from the NISAR (NASA-ISRO Synthetic Aperture Radar) Earth-observing radar satellite have been released. The joint mission between NASA and ISRO (Indian Space Research Organisation) was launched on July 30th and is currently in its commissioning phase. The satellite is expected to commence full science operations by year's end.

The image above of Maine's Mount Desert Island was captured by the satellite's L-band synthetic aperture radar (SAR) system, provided by NASA's Jet Propulsion Laboratory. The dark areas represent water, while green areas are forest, and magenta areas are hard or regular surfaces, such as bare ground and buildings.

The spacecraft is the first to carry both L- and S-band radars with ISRO's S-band system more sensitive to light vegetation and moisture in snow. The 39-foot (12-meter) wide drum-shaped antenna reflector will monitor Earth's land and ice surfaces twice every 12 days, recording changes to the planet's ecosystem and tracking movement of ice sheets and glaciers.

The satellite was raised into its operational 464-mile (747-km) orbit in mid-September.

NISAR's image of the northeastern North Dakota's Forest River regions. Light-colored wetlands and forests line the river's banks. The dark agricultural plots show fallow fields, while the lighter colors represent the presence of pasture or crops, such as soybean and corn. Circular patterns indicate the use of center-pivot irrigation.

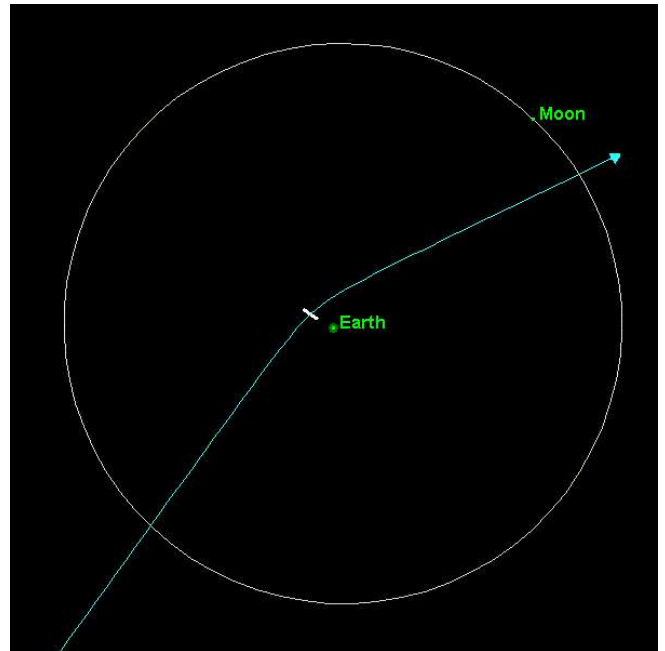
Credit: NASA/JPL-Caltech



Last Minute Reprieve

NASA's OSIRIS-APEX mission, which was one of 19 missions designated to be canceled by the current administration, received a last minute Congressional reprieve and infusion of \$20 million for the next budget year. The spacecraft, which had returned a sample of the asteroid Bennu, had been repurposed after its flyby of Earth in 2023, to intercept the asteroid Apophis. The quarter-mile-wide (400-meter) asteroid will make a close approach to Earth in April 2029, passing within the orbit of geostationary satellites, which are positioned at a distance of roughly 22,000 miles (36,000 km).

Unfortunately, while the mission was reinstated, no money was allocated for science planning, instrument calibration, and spacecraft readiness (launched in 2016). There is also no guarantee that the Administration won't withhold funding despite congressional approval.



Predicted trajectory of 99942 Apophis on April 13, 2029, coming as close as 20,000 miles (32,000 km).

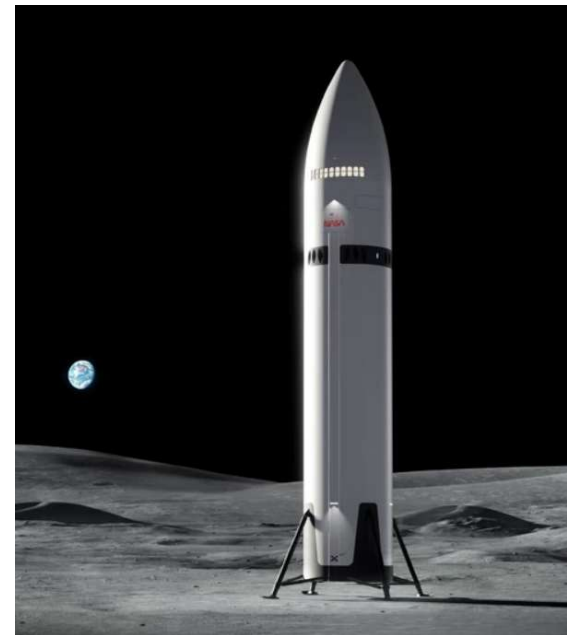
Image credit: NASA/JPL

NASA to Reopen Contract for Lunar Human Landing System

The ultimate goal of NASA's Artemis program is to establish a long-term presence on the Moon. Using the Space Launch System (SLS) rocket, an uncrewed Orion spacecraft was sent into deep space (Artemis I) to test the performance of the booster and crew capsule in November 2022. In February 2026, the launch window opens for Artemis II, a crewed trip around the Moon and back. If successful, this could set up the Artemis III mission, a lunar landing, as soon as mid-2027. Without a landing vehicle, however, the Artemis program will grind to a halt.

NASA contracted with SpaceX for a Human Landing System (HLS) in April 2021. A recent evaluation by NASA's Aerospace Safety Advisory Panel is warning that delivery of SpaceX's HLS could be years late. SpaceX is designing their HLS around their Starship vehicle, which has demonstrated suborbital flight, but is still in the testing phase. Landing on the Moon will require a next generation Starship to be launched into Earth's orbit where it will rendezvous with a number of "tanker" Starships for refueling before it can travel to the Moon to meet up with the Orion spacecraft. Starship will then be used to transport the Orion astronauts down to the lunar surface and serve as a temporary habitat for exploration and, eventually, building a more permanent outpost. Despite impressive progress, the complexity of the HLS has raised questions and concerns from the Administration on SpaceX's ability to support the Artemis schedule (and beat the Chinese to the Moon).

In response, Transportation Secretary and Acting NASA Administrator Sean Duffy announced that NASA would be reopening the HLS contract to other space companies (Blue Origin already has a contract to build a lander, but for later Artemis missions).



SpaceX's lunar version of Starship will need to refuel in Earth's orbit, rendezvous with NASA's Orion spacecraft and Gateway lunar space station (future) and land on the Moon's uneven surface.

Credit: SpaceX

Blue Origin has stated that it would attempt to land an uncrewed prototype of its HLS on the Moon's south pole within the next year, but this vehicle is also early in the development phase.

Full Stack for Artemis II Mission



NASA's Artemis 2 Space Launch System (SLS) is fully stacked inside the Vehicle Assembly Building at the Kennedy Space Center with the addition of the ESA Service Module and the Orion spacecraft (shrouded by the white Launch Abort System at the top). Launch window opens in February 2026.

Image credit: NASA



FREE EVENT

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

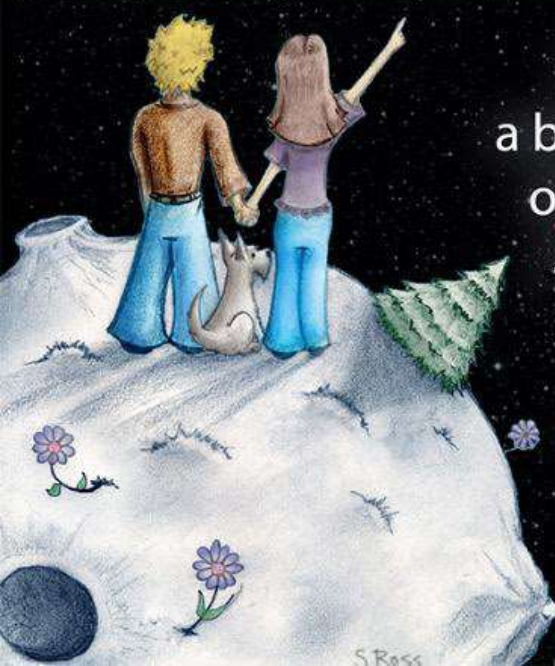
November 8th

7:00 - 9:00 pm

Free Star Party

Featuring:

**Astronomy Fundamentals
(AstroFun) 101: History, Sun and Moon**



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

*Observing if weather permits



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