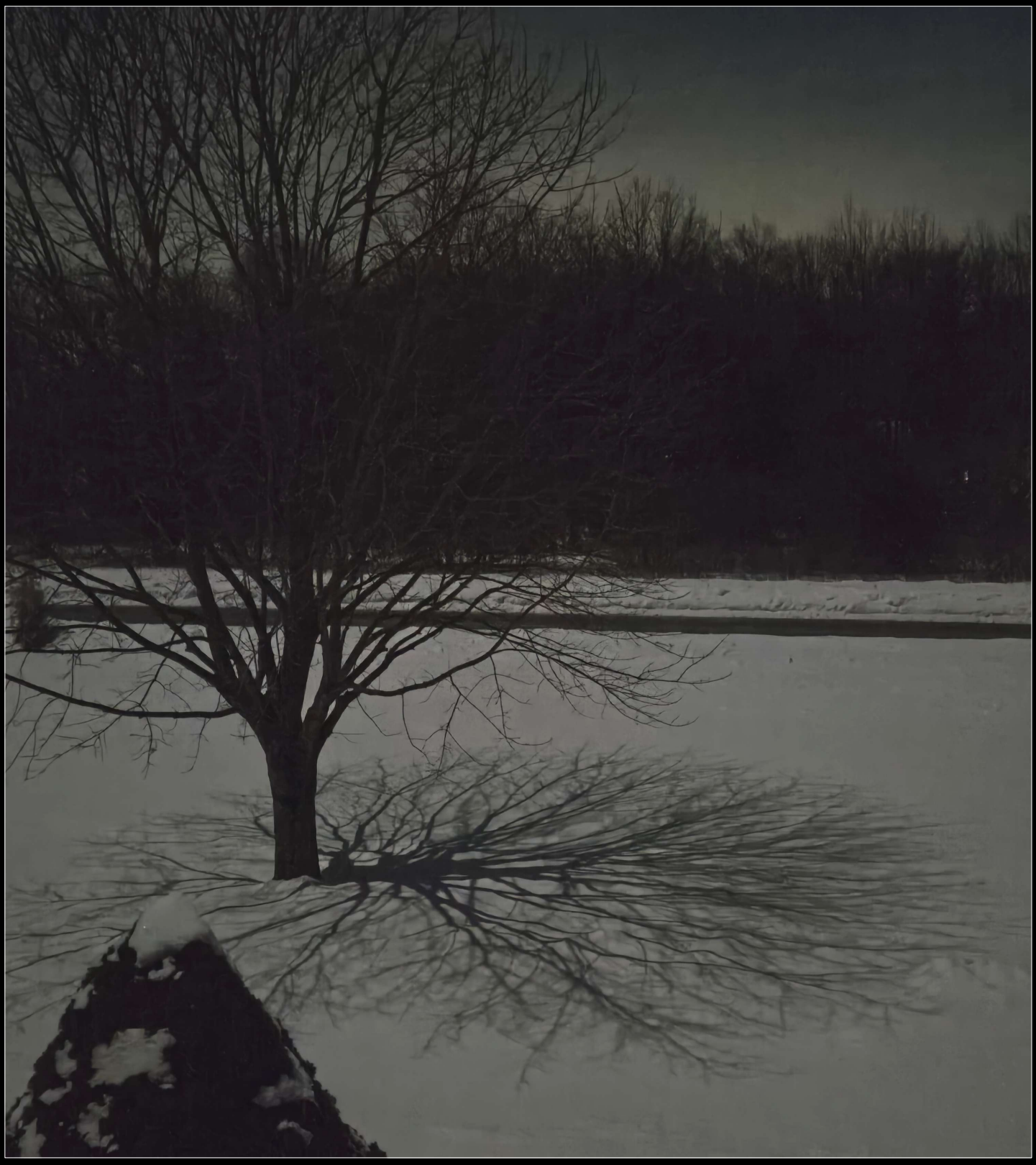
John J. McCarthy Observatory

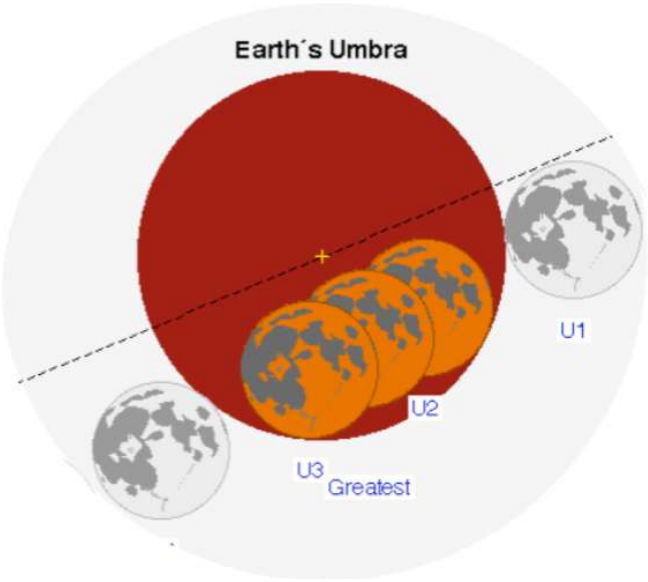
March 2026 Newsburst



February's Full Moon Casing Shadows on the Freshly Fallen Snow

Photo: Bill Cloutier

Total Lunar Eclipse

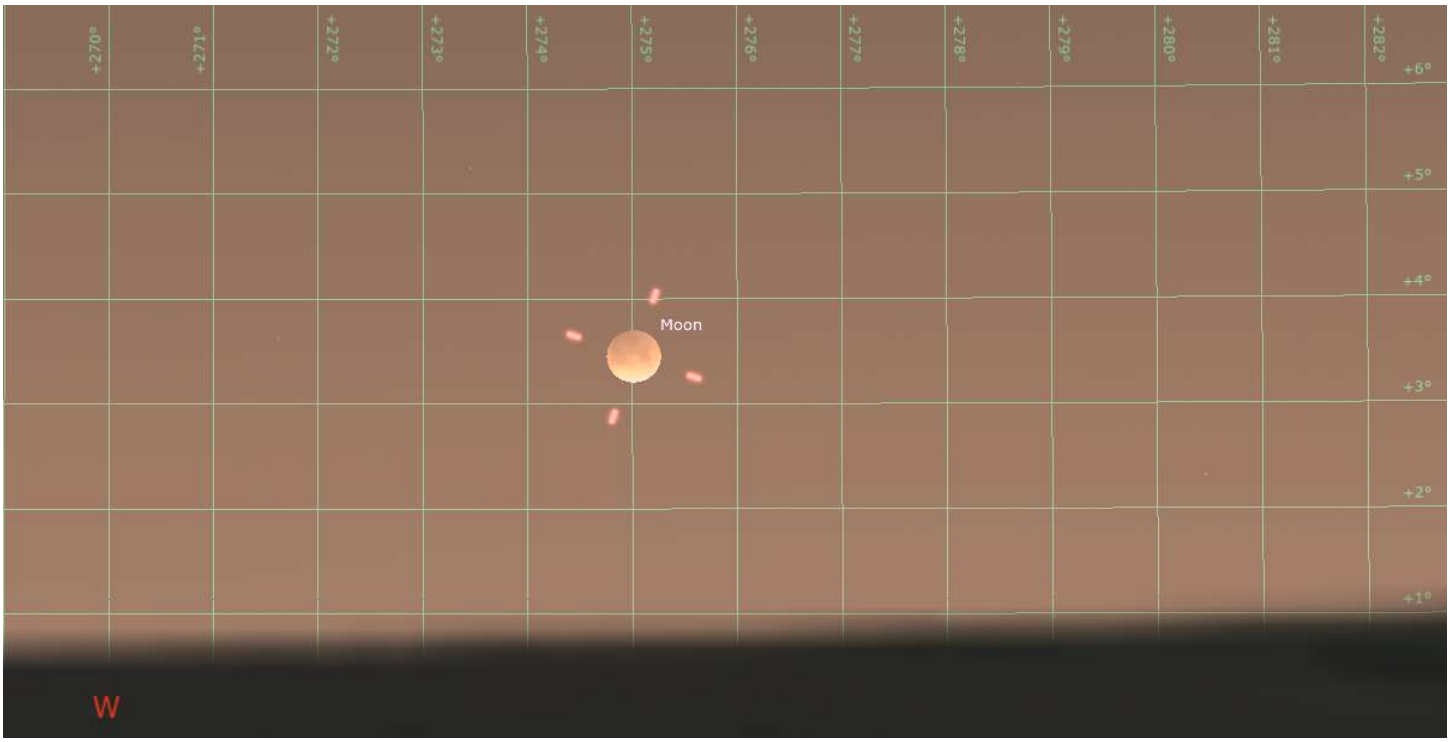


The passage of the Moon through the Earth's shadow or Umbra on the morning of March 3rd

Credit: F. Espenak, NASA Goddard Space Flight Center

The Moon just above the western horizon (below) at the beginning of totality on the morning of March 3rd

Credit: Stellarium



The very beginning of totality (the phase of a Total Lunar Eclipse when the Moon is completely submersed within the Earth's shadow) will be visible from western Connecticut on the morning of March 3rd. The Full Moon enters the darkest part of the Earth's shadow (umbra) around 4:50 am EST (U1). Over the next 74 minutes, the Moon will travel into the heart of the shadow making it more difficult to see with the brightening sky.

Totally begins (U2) at 6:04:23, about 20 minutes before the Moon sets in the west and the Sun appears above the horizon in the east.

You will need a clear view to the west to experience totality as the Moon will be less than 4° above the horizon at the start. Observers on the west coast will be able to experience the entire eclipse.

Center for NEO Studies Gets an Upgrade

The Meade 16 inch LX200 on its original mount (left) and the Meade optical tube installed on the new PlaneWave L-Series Direct Drive Mount (right)

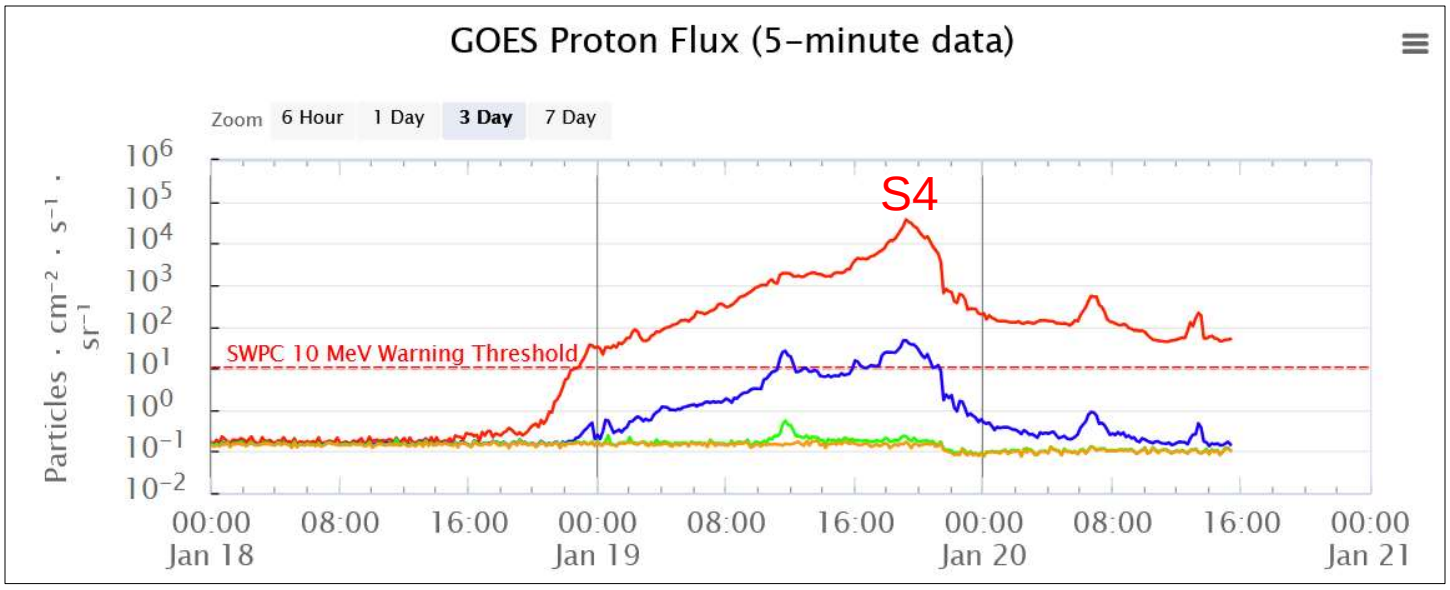
The McCarthy Observatory's recently completed Center for NEO (Near-Earth Objects) Studies is online and making observations of newly discovered Near-Earth and Potential Hazardous asteroids. The observations are being made with the once-retired, now repurposed, Meade 16" LX200 that had been the Observatory's primary instrument for almost 24 years.

Acquisition and construction of the ten-foot dome housing the telescope, along with related infrastructure, was made possible, in part, by a grant from The Planetary Society. The grant was awarded for a proposed, remotely operated facility – a goal that the Observatory staff is currently working towards.

While the optical tube (telescope) collects the faint light of distant objects to be analyzed, it is the mount that makes those observations possible, providing a steady platform and smooth, stable tracking. While the Meade mount has been a workhorse, there are newer mounts available that offer an additional measure of reliability and precision so critical to an off-site, remote operation.

A recent and generous gift from an anonymous benefactor has facilitated the acquisition of a new mount for the Meade telescope. The state-of-the-art mount, which was delivered on February 26th, is identical to the one which drives the PlaneWave 17" Corrected Dall-Kirkham telescope in the main dome (offering a shared operating experience and hardware redundancy). The mount exchange (completed by volunteers on the 28th) required the complete dismantling and removal of the older Meade telescope and mount, the heavy lifting and installation of 650 pounds of components for the new mount in a confined space, and the re-installation of the Meade optical tube.

Radiation Storms



NOAA categorizes Solar Radiation Storms using the NOAA Space Weather Scale on a scale from S1 – S5, based on measurements of energetic protons taken by the GOES satellite in geosynchronous orbit

Credit: NOAA

One of the greatest dangers to human spaceflight is radiation. Once you leave low-Earth orbit and the protective confines of the Earth's magnetic field, astronauts are exposed to high energy charged particles from the Sun, as well as from energetic events throughout the galaxy that generate galactic cosmic rays or GCRs. Even in low-Earth orbit, a particular strong radiation storm can send astronauts into the more sheltered areas of the International Space Station.

To date, only the Apollo astronauts have ventured into deep space but, with renewed interest in colonizing the Moon, and eventually Mars, space weather is a significant concern for the health and well-being of future explorers.

In August 1972, between the return of Apollo 16 and launch of Apollo 17, an intense series of solar storms bathed the cislunar space with radiation. While the Apollo Command Module would have shielded the astronauts from the worst of the storms, anyone walking on the Moon at that time would have likely suffered acute radiation sickness.

As NASA prepares to send humans to the Moon and beyond with the Artemis II mission, the National Oceanic and Atmospheric Administration's (NOAA's) Space Weather Prediction Center will be available to provide decision-support services should there be a significant solar radiation storm.

The original launch window for NASA's Artemis II mission opened on February 6th, less than a week after a monster and highly unstable sunspot (AR 4366) erupted with more than two dozen powerful solar flares over a 24-hour period. This followed the most intense solar radiation storm since the Halloween superstorms of 2003 in late January from another sunspot (AR 4341). That event triggered an alert for increased radiation exposure risk for astronauts and airliner flights on polar routes.

Fueling issues with the Artemis II rocket have delayed the launch until April, at the earliest, and the solar activity has markedly decreased in recent days. However, while our predictive model of the Sun's activity continues to improve, this solar cycle has seen sudden and violent outbursts from some of the most innocuous regions.

Fueling Woes

The liquid hydrogen fill line for the core stage is routed through the gray tail service mast umbilical structure. At liftoff, the line disconnects from the rocket and retracts into the structure, providing shelter from the rocket's exhaust.

Credit: NASA/Bill Ingalls

Hydrogen leaks during the fueling of the core stage, similar to those that plagued Artemis I and delayed its launch, foiled the initial launch attempt for Artemis II in February. The leak was traced to an 8-inch quick disconnect in a line that supplies the rocket with liquid hydrogen. The area of concern is in the tail service mast umbilical structure that sits on the deck of mobile launcher.

NASA has a long history of using liquid hydrogen as a propellant. As a rocket fuel, it has the highest specific impulse (generates more thrust per unit of mass consumed) and, as the lightest element, it has significantly higher energy per unit of mass. However, it is a very difficult fuel to handle during loading due to the small size of the molecule (able to bypass the smallest flaw in any seal).

The upper stages of the Saturn V were fueled with liquid hydrogen as was the main external tank for the space shuttle. While the Apollo 11 astronauts were being strapped into their command module, technicians were working to stop a significant leak that had developed in a value on a line feeding the third stage of their rocket. Several space shuttle launches were scrubbed due to dangerous hydrogen gas leaks during the propellant loading process.

Following the scrub of the Artemis II launch in February, technicians swapped out the seals in the fueling line. While the first fueling test, where liquid hydrogen is loaded during a practice countdown, experience higher than acceptable levels of hydrogen gas in the loading area, the second test was deemed a success with the launch team initially moving forward with plans to launch in the March window. That optimism was quickly dashed as an issue with the helium system used to pressurize the liquid hydrogen and liquid oxygen propellant tanks developed after the test had been concluded. Unfortunately, troubleshooting the issue required moving the rocket back to the Vehicle Assembly Building. While the March launch window is now lost, NASA is hoping that a quick resolution of the issue will preserve the April opportunity.

The Near Catastrophe of Gemini VIII

Sixty years ago, NASA astronaut Neil Armstrong survived yet another brush with death as he commanded the Gemini 8 mission. The sixth crewed spaceflight in NASA's Gemini program, Armstrong and David Scott rode into orbit on March 16, 1966 atop a Titan II rocket. Their launch followed a launch of an Agena Target Vehicle earlier in the day. Their objective, to hone the skills needed for the Apollo missions, involved the rendezvous and docking of the Gemini capsule with the Agena booster. While the docking was successful (the first time two spacecraft has docked in space), trouble soon followed when the coupled pair began to buck and tumble.

Armstrong, assuming that the Agena was at fault, separated the two vehicles and backed away. However, without the large Agena mass to dampen the erratic motion, the Gemini capsule went into an uncontrolled spin. While Armstrong and Scott worked on diagnosing the problem, the spin continued to increase. Suspecting an issue with one of the orbital maneuvering thrusters, but having no way of turning off individual thrusters, Armstrong shut down the entire system and used the reentry thrusters in Gemini's nose to stop the spin, but using almost 75% of the propellant. Low on fuel, NASA made the decision for the capsule to return to Earth. Completing one more orbit, Armstrong brought Gemini 8 safely down within range of the secondary recovery forces.

The capsule spin rate had approached one revolution per second, blurring the astronaut's vision. Without Armstrong's timely intervention, the crew would have soon become incapacitated and lost in space. While speculative, the loss of the crew and spacecraft would have likely compromised the timeline to reach the Moon or, possibly the entire program.

Armstrong in the Gemini VIII capsule prior to launch (above) and the Titan II rocket booster that carried Armstrong and Scott into orbit (below)

Credit: NASA

David Scott, who would go on the command Apollo 15, remarked "the guy (Armstrong) was brilliant. He knew the system so well. He found the solution, he activated the solution, under extreme circumstances ... it was my lucky day to be flying with him."

Prelude to Solar Minimum

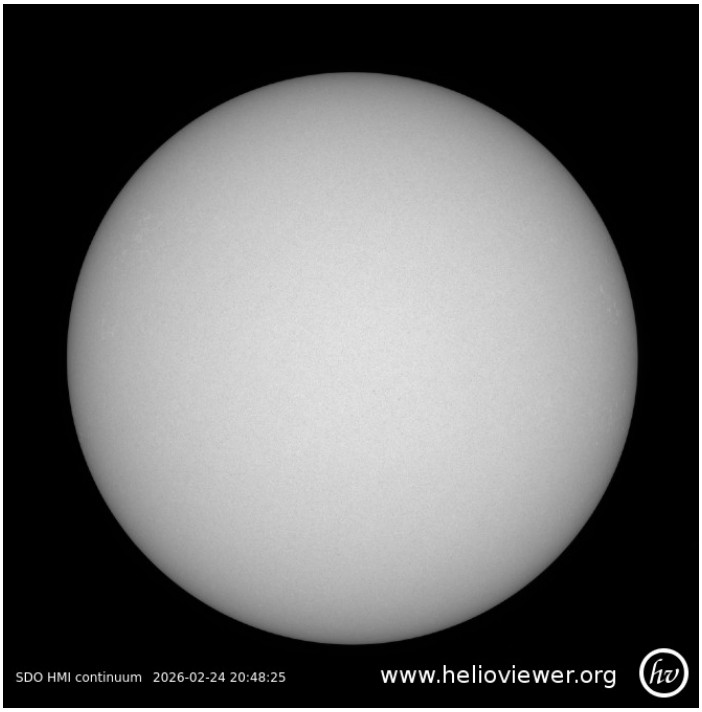
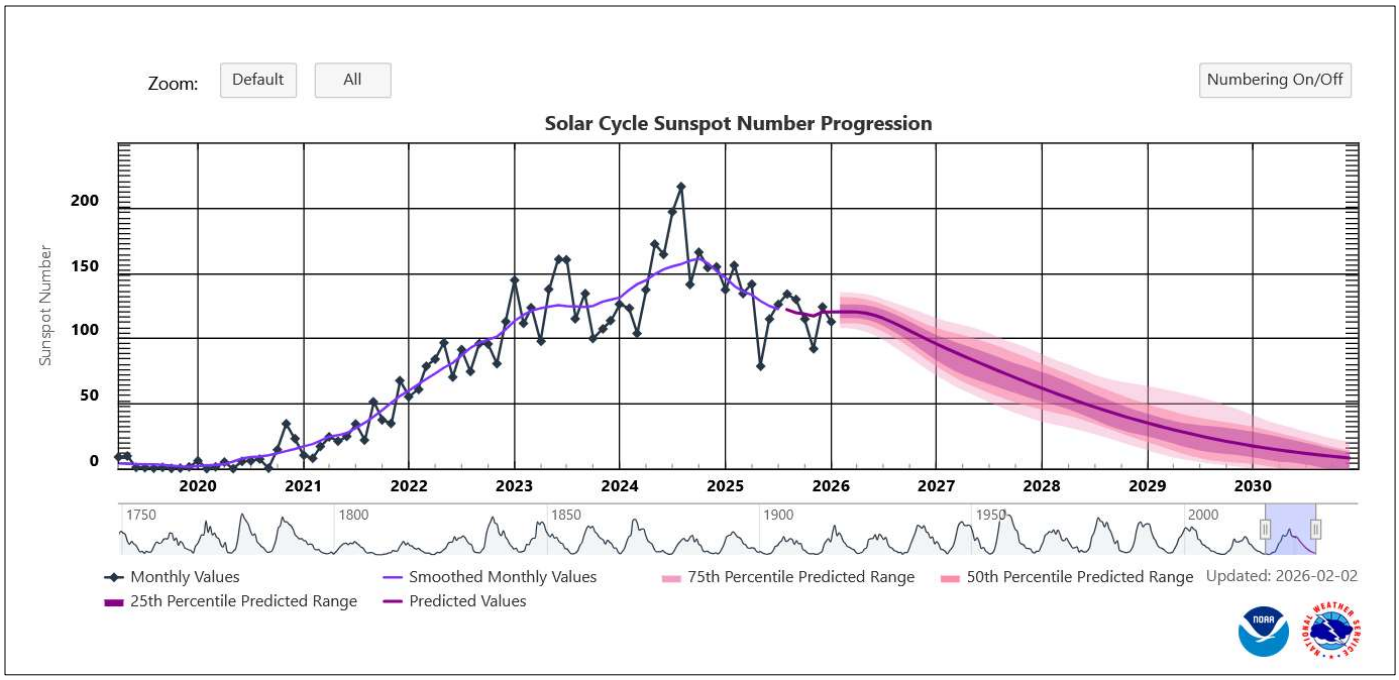


Image of the spotless solar disk captured with the Solar Dynamic Observatory's Helioseismic and Magnetic Imager (HMI) on February 24th. The instrument is designed to study oscillations and the magnetic field at the solar surface, or photosphere.

Credit: NASA/SDO



Solar Cycle Progression for the current solar cycle (Cycle 25) which began in December 2019

Credit: National Oceanic and Atmospheric Administration's Space Weather Prediction Center

Sunspots are a visible indication of solar activity. The number of visible sunspots waxes and wanes with a periodicity of about 11 years (although it can vary from 8 to 14 years to transition between solar minimum and maximum). The polarity pattern of the magnetic field (north/south orientation of a pair of sunspots) reverses with each cycle.

For the first time in almost three years, there were no visible sunspots reported on the solar disk for days February 22 through the 24. While active regions reappeared after the three day lull, a blank sun is a prelude to what we can expect around Solar Minimum (there were more than 700 spotless days between 2018 and 2020, the last Solar Minimum).

Father of American Rocketry

Dr. Goddard with his liquid oxygen-gasoline rocket "Nell" in its launching frame

Credit: Esther C. Goddard/NASA

On March 16, 1926, one hundred years ago in Auburn, Massachusetts, Robert Goddard launched the first liquid fueled rocket on a flight that lasted only 2½ seconds. A graduate of Worcester Polytechnic Institute, despite discharging a powder rocket in the basement of the physics building, the significance of Goddard's feat is compared by space flight historians to the first aircraft flight at Kitty Hawk.

Among his achievements, Goddard was first to prove that rockets would work in a vacuum and to mathematically explore the practicality of using rocket propulsion to reach high altitudes and even the Moon. While he was eventually banished from the fields of Auburn by the local fire marshal, the site is commemorated by a marker on what is now the Pakachoag Golf Course.

Goddard moved his rocket development work to Roswell, New Mexico in 1930. The move was made possible by modest subsidies from the Smithsonian Institution and, with the backing of Charles Lindbergh, the Daniel Guggenheim Foundation. By 1941, Goddard had launched rockets exceeding the speed of sound to altitudes reaching 9,000 feet (2,700 meters). His work attracted the attention of the U.S. military during the war, subsequently working with U.S. Navy on rocket-assisted takeoff and liquid propellant rocket motors capable of variable thrust. Goodard received 214 patents for his inventions, including for a rocket using liquid fuel, advancements in multi-stage rockets and gyroscope guidance.

He is considered one of the fathers of rocketry along with Konstantin Tsiolovsky and Hermann Oberth. In 1959, NASA celebrated his achievements when they established the Goddard Space Flight Center in Greenbelt, Maryland.

Second Saturday Stars

FREE EVENT

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

March 14th

7:00 - 9:00 pm

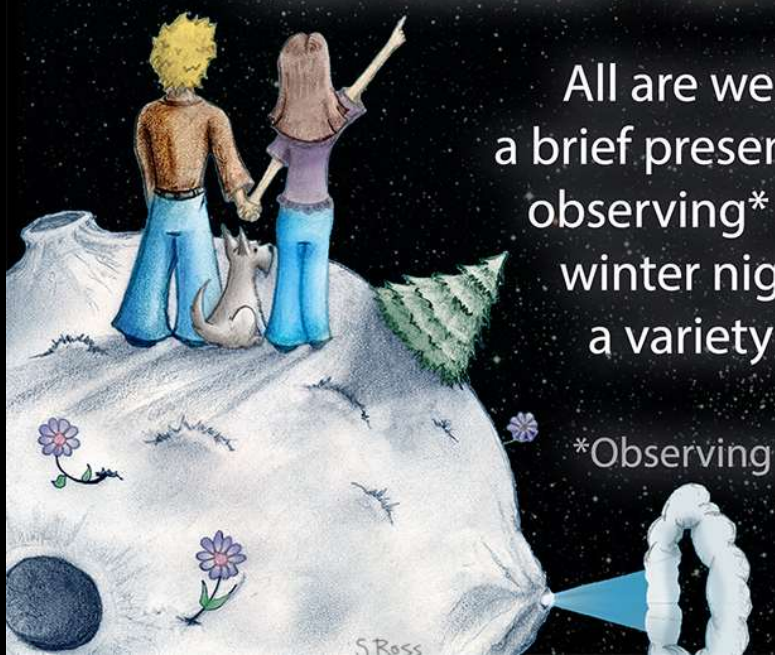
Free Star Party

Featuring:

"Critical Thinking"

Thinking Like a Scientist: Curiosity, Questions, and the Night Sky

Mrs. Bonnell. NMPS STEM teacher K-5



All are welcome to enjoy a brief presentation along with observing* the sights of the winter 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