

John J. McCarthy Observatory

October 2026 Newsburst

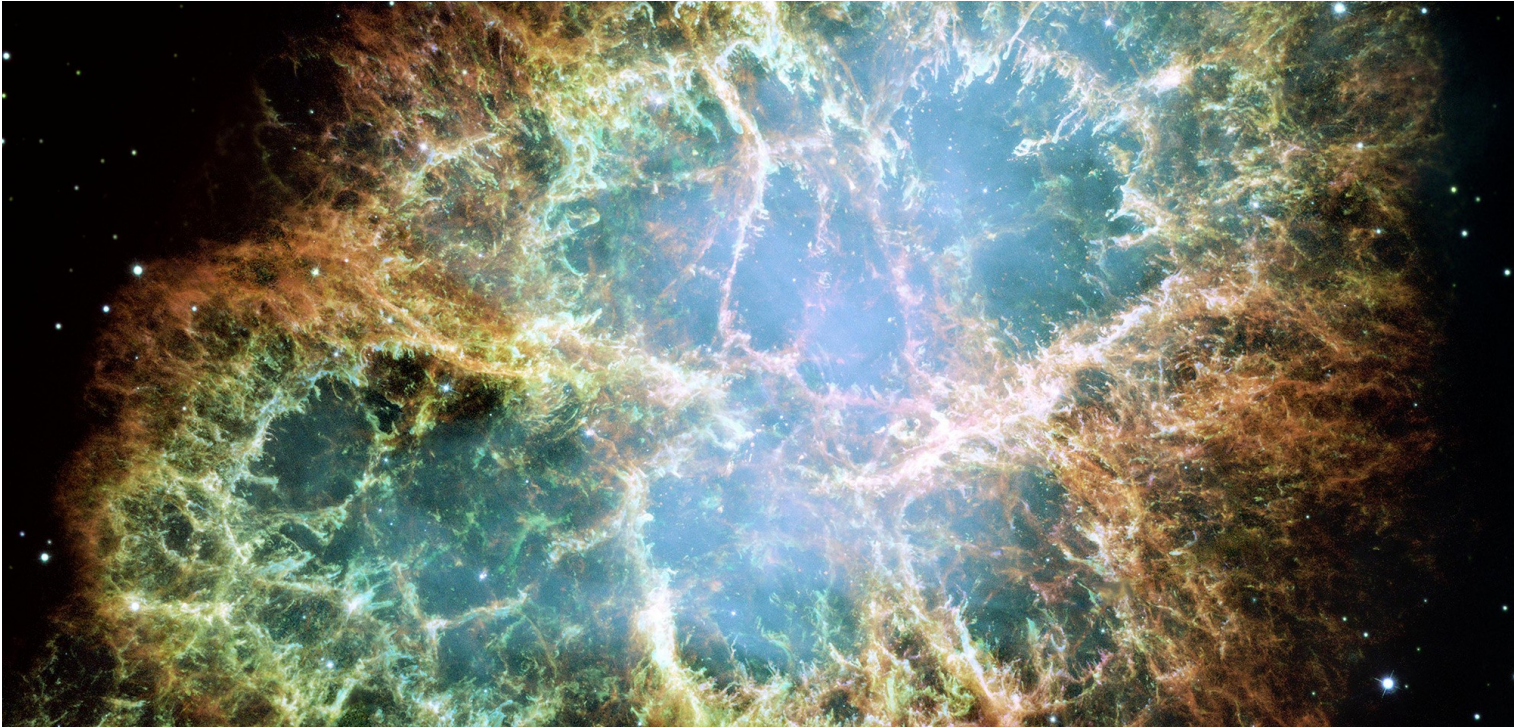


NASA's Earth Observatory's released a Landsat photo on September 8th to celebrate the 60th anniversary of Star Trek's television debut in the US. The photo features the Vasquez Rocks region where sedimentary rocks are thrust up out of the desert landscape at 50 degree angles - giving the area an alien appearance. A favorite filming location for science fiction stories, the Vasquez Rocks provided the backdrop for the Metron world in the Star Trek episode, the "Arena."

NASA Earth Observatory

Vasquez rock photo and filming site of the Star Trek episode: Bill Cloutier

Flight Crews Face Unregulated Occupational Radiation Hazards from Space



The Crab Nebula is an expanding remnant of a stellar supernova explosion. The initial detonation was seen by sky watchers in the year 1054 – the remnant is now approximately 11 light-years in width.

Credit: NASA, ESA, and the Hubble Heritage Team (STScI/AURA)

A star undergoes a cataclysmic detonation in a distant part of the sky, unleashing high energy particles that stream outward at near light speed in every direction. Called “cosmic rays,” the space invaders are comprised of atomic nuclei (primarily protons with a small population of heavier atomic nuclei and electrons). If they are not blocked or deflected by the Sun’s or Earth’s magnetic fields, cosmic rays penetrate the Earth’s atmosphere, crashing into gas molecules. The collisions produce a secondary shower of new particles including neutrons, fundamental subatomic particles, gamma-ray photons, electrons, and positrons produced by the decay of certain short-lived particles, in addition to leftover protons.

Fortunately for ground-dwellers, Earth’s atmosphere and magnetic field offer considerable protection from space radiation. This is not the case for individuals who travel outside the atmosphere, astronauts living in low-Earth orbit, and humans that will someday venture into deep space. The general public is exposed to higher levels of radiation when they travel by air. Low altitude flights near the equator incur the least exposure, while high latitude flights (for example, on polar routes) at high altitudes incur the greatest exposure. Our Sun is also complicit, bathing the Earth in waves of charged particles, particularly in periods of high activity.

A recent study published in the Journal of the American Medical Association reviewed the death certificates from nearly 13 million decedents across 503 occupations, including 14,000 pilots and 7,000 flight attendants. The researchers found that flight attendants and pilots had the highest rate of mortality for radiation-related cancers (ranked 1 and 2, respectively). Radiation-related cancers analyzed included breast cancer, central nervous system cancers, multiple myeloma, leukemia (except chronic lymphocytic leukemia), lymphoma, thyroid cancer, prostate cancer, melanoma, and non-melanoma skin cancers. The research team excluded lung cancer to reduce any potential contributions from smoking.

While exposure from any one flight might be low, flight crews are subject to a cumulative exposure over the course of their careers. Unlike other agencies, like the Nuclear Regulatory Commission and Department of Energy, the Federal Aviation Administration does not regulate the radiation exposure of flight crews, despite recognizing that radiation exposure is an occupational hazard. The agency recommends compliance with internationally accepted occupational limits, but also acknowledges that, without mandates, voluntary compliance is unlikely.

Mercury Bound



Mercury's north pole as seen by the ESA/JAXA BepiColombo spacecraft during its sixth Mercury flyby in January 2025

Credit: ESA/BepiColombo/MTM

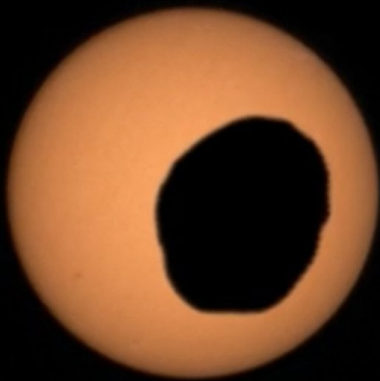
After nearly eight years of flight, the Mercury Transfer Module has completed its task of delivering the BepiColumbo spacecrafts to Mercury. Launched in 2018 from Kourou, French Guiana, the joint mission of the European Space Agency (ESA) and the Japan Aerospace Exploration Agency (JAXA), involved nine total flybys of Earth, Venus and Mercury so as to shed the velocity needed to match Mercury's orbital velocity as the Module fell towards the Sun.

The two orbiter stack, consisting of ESA's Mercury Planetary Orbiter and JAXA's Mercury Magnetospheric Orbiter, will enter a polar orbit around Mercury on November 21st. Sometime around December 9th, the two spacecraft will separate with each moving into their own science orbits at optimal altitudes.

The orbiters will survey the innermost planet under the intense heat of the Sun, mapping the surface in detail while collecting data on Mercury's internal structure, composition, as well as its magnetic field and exosphere (a wispy gaseous envelope surrounding the planet). Mercury's massive core, compared to the rest of the planet, is almost as large as Earth's moon and comprises nearly 70 to 80 percent of its total mass. Science operations are scheduled to begin for both orbiters in April of 2027.

Martian Moon Transits Observed by a Martian Rover

**Phobos
Transit**



**Deimos
Transit**



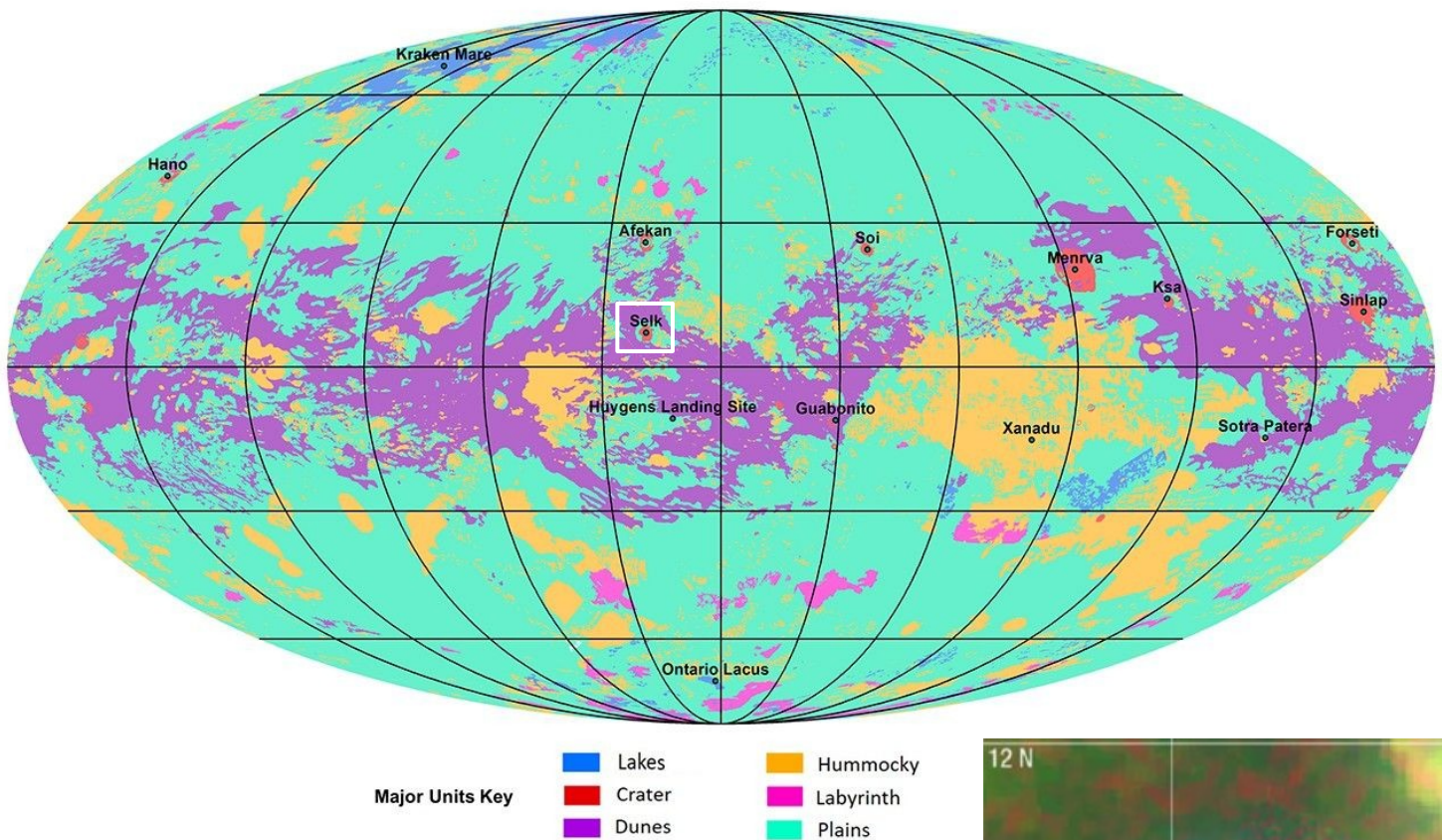
The photos show the Martian moons transiting the Sun, as recorded by the Perseverance rover's Mastcam-Z camera. The rover observes the Sun approximately once a day as a means of measuring dust in the atmosphere. On occasion, its images can capture transiting moons, as well as large sunspots.

Phobos is the larger and innermost of the two natural moons orbiting Mars. Its irregular shape is roughly 17 x 14 x 11 miles (27 x 22 x 18 kms) in diameter. At an average distance of 3,700 miles (6,000 kms) from the Martian surface, (closest known moon to a planet) the moon orbits Mars three times a day. Traveling faster than the planet rotates, Phobos appears to rise in the west and set in the east. The moon is falling towards Mars at a rate of six feet (1.8 meters) every hundred years and will eventually (in 50 million years or so) impact the planet or break up into a ring of debris.

Deimos measures about 9.3 x 7.5 x 6.8 miles (15 x 12 x 11 kms). At a distance of about 12,500 miles (20,065 kms) from the Martian surface, it takes 30 hours and 18 minutes to complete one orbit.

Credit: NASA/JPL-Caltech/ASU/MSSS/SSI

Dragonfly Landing Site Selected

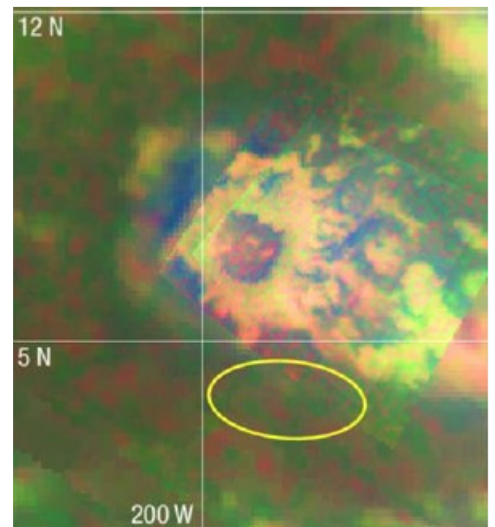


The map of Titan was developed with the Cassini spacecraft's radar data and Imaging Science Subsystem images. The map is centered on 0 degrees latitude and 180 degrees longitude. Annotations show the landing site of the Huygens probe on January 14, 2005, as well as the 50 mile (80 km) diameter Selk crater. NASA's Dragonfly rotorcraft's landing ellipse is just to the south of the crater.

Map credit: NASA/JPL-Caltech/ASU

Closeup view of the Dragonfly exploration region on the right was generated by Cassini's Visual and Infrared Mapping Spectrometer

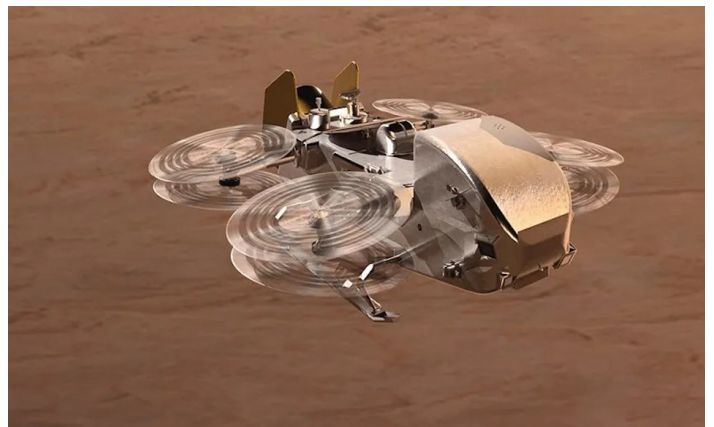
Image credit: NASA/JPL/University of Arizona



Assembly of NASA's Dragonfly dual-quadcopter, destined for Saturn's largest moon Titan, is underway at the Johns Hopkins Applied Physics Laboratory in Laurel, Maryland. The nuclear powered rotorcraft is expected to launch in 2028 and reach Titan in 2034.

Scientists will be searching for organic sediments in the sand dunes at the Shangri-La sand sea landing site, water ice among the nearby interdunes and liquid impact melt around the Selk crater.

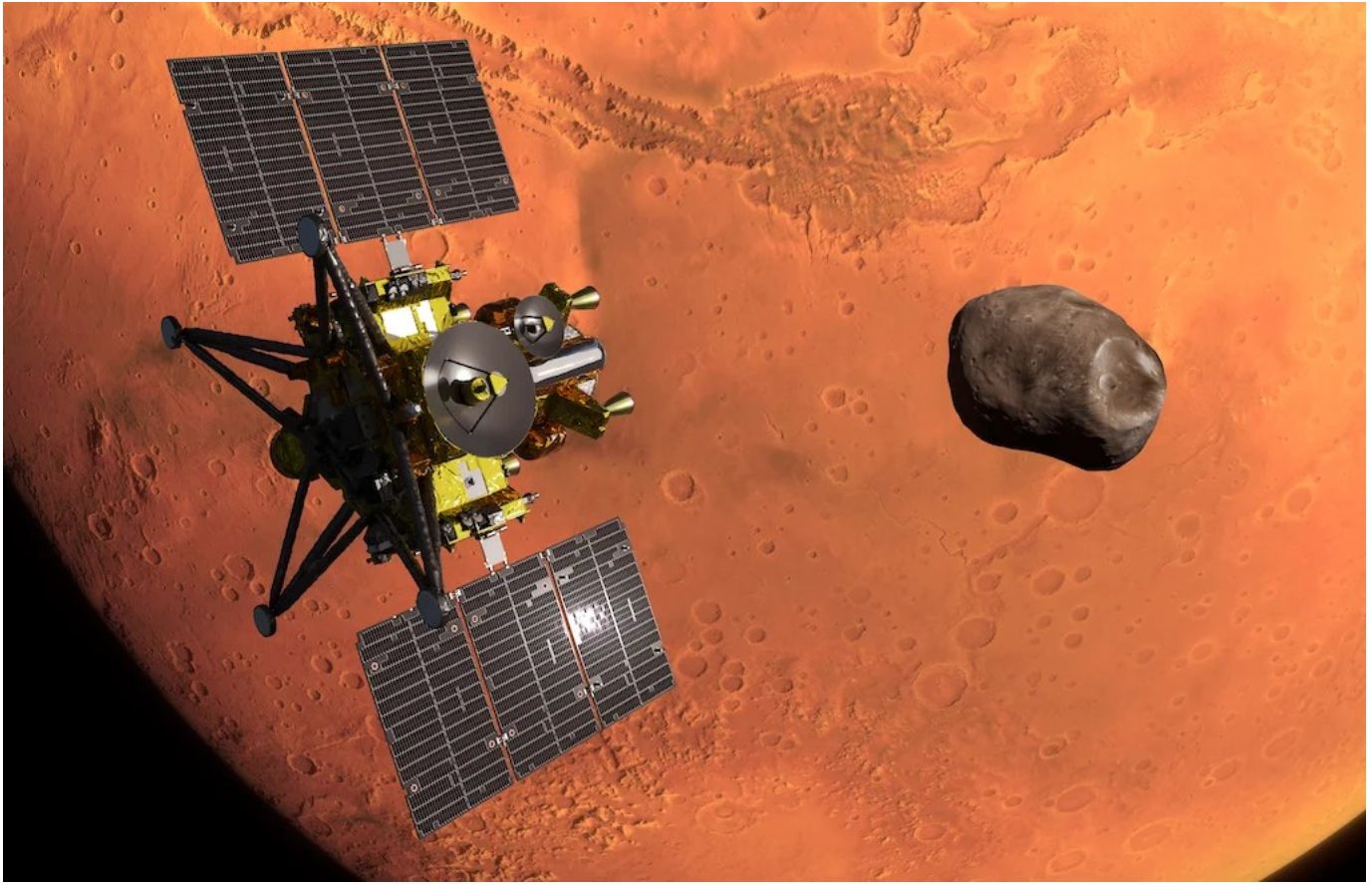
The primary science goals of the mission are to identify the chemical components and energy-producing chemical pathways that could drive prebiotic chemistry, sample the moon's organic sediments to determine the abundance and distribution of carbon, hydrogen, nitrogen, oxygen, and possibly phosphorous and sulfur, and determine the presence and abundance of key molecules for Earth-like life.



Artist's impression of Dragonfly rotorcraft in flight on Titan

Image: NASA/Johns Hopkins APL/Steve Gribben

Martian Moon Explorer



Artist conception of the Martian Moon eXploration spacecraft and Phobos

Credit: Japan Aerospace Exploration Agency (JAXA) and Japan Broadcasting Corporation (NHK)

Japan's Martian Moons eXploration (MMX) mission is scheduled to launch on October 20th. The spacecraft will study Mars' two moons over its three year stay before attempting to gather a sample of Phobos, Mars largest and innermost moon, for a return to Earth.

Phobos is a particularly challenging world to visit, being so small and orbiting deep within Mars' gravitational field. The force of gravity on Phobos is about 1,700 time weaker than on Earth, although this number can vary by a factor of two depending upon location with its irregular shape.

MMX's eleven instruments will map the moon, measuring surface roughness, temperature and composition, as well as search for indications of minerals altered by water, while its camera will capture ultra high definition images of the surface. Survey data will be used by the JAXA team to select a site for landing and sample retrieval.

Prior to an attempted landing by the spacecraft, MMX will release a small four-wheeled rover called IDEFIX, developed by the French space agency CNES and the German Aerospace Center, DLR. The rover will be dropped to the surface where, in the moon's almost non-existent gravity, it will slowly and cautiously explore its surroundings while attempting to maintain contact and traction with the surface.

The climax of the mission will be the sampling attempt. MMX is equipped with two different collection systems, the effectiveness of either will depend upon the nature of Phobos' regolith. The first system consists of a coring tube on the end of a robotic arm. It will attempt to gather material from an inch or so (2 centimeters) below the surface, while the second system will use a short blast of pressurized gas to free and push loose grains of rock and dust into a collection container. The mission target is to collect more than 10 grams in total.

Analysis of the samples may provide an answer as to Phobos' origin and age. Theories range from the moon being a captured asteroid to a collection of debris that was blasted into orbit from an impact on the planet.

Vera Rubin Commences 10-Year Survey



Above: A small portion of the Rubin Observatory's "Ocean of Stars"
Credit: NSF–DOE Rubin Observatory/NOIRLab/SLAC/AURA

Right: The 3,200-megapixel Rubin Observatory camera
Credit: SLAC National Accelerator Laboratory



The Vera C. Rubin Observatory, a joint initiative of the U.S. National Science Foundation and the U.S. Department of Energy's Office of Science, has officially begun its ten-year Legacy Survey of Space and Time. Over the next decade, the Observatory will create a dynamic record of the cosmos in extraordinary detail.

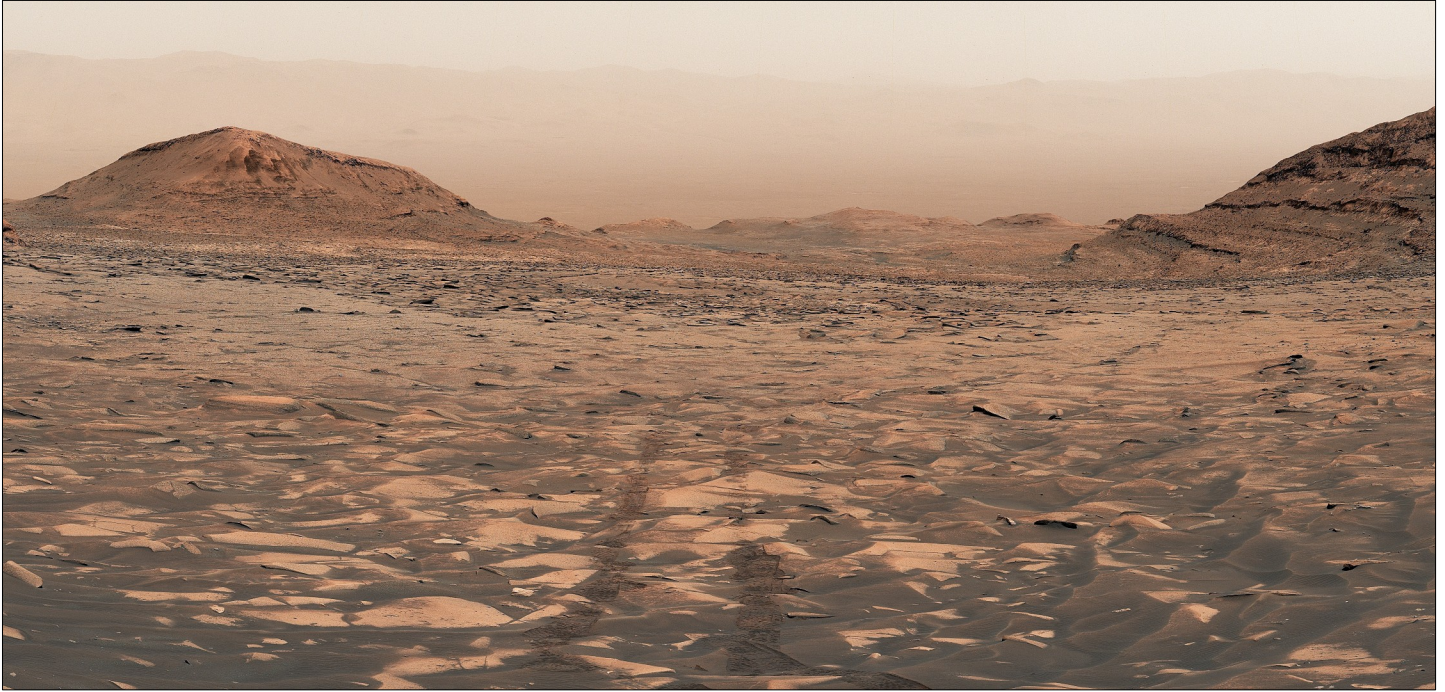
The Rubin Observatory is located on Cerro Pachón in Chile, about 8,850 feet (2,700 meters) above sea level. Groundbreaking began in April 2015 with a traditional Chilean stone-laying ceremony to celebrate the start of construction.

Casting of the telescope's mirrors began much earlier with workers at the University of Arizona's Steward Observatory Mirror Lab loading 51,900 pounds (23,540 kg) of E6 borosilicate glass into a giant rotating furnace in March of 2008. A three mirror system is used to collect and direct the light to a 3.2 billion-pixel camera. The Mirror Lab cast the outer 27-foot-diameter (8.4 meter) primary mirror and an inner 16.5-foot-diameter (5-meter) tertiary mirror in one mold. The optical path will yield a wide field view of the universe, roughly 40 times the size of the full moon.

The primary mirror went through more than 25 polishing and testing cycles over a period of seven years. The final polish was completed in February 2015. The uncoated blank was shipped to Cerro Pachón in May 2019 and placed in storage while construction of the observatory continued. The mirror was coated with a reflective layer in April 2024 and installed six months later in October.

A time-lapse view of the night sky is also expected to revolutionize our view of our solar system revealing millions of previously undiscovered objects – comets, asteroids and trans-Neptunian objects that move among the stars.

5,000 Sols and 1 Kilometer



View looking down the side of Mount Sharp, across the floor, and to the wall of the 96-mile (154 km) wide Gale Crater that was estimated to have formed by a large meteorite impact sometime between 3.5 to 3.8 billion years ago

Credit: NASA/JPL-Caltech/MSSS

NASA's Curiosity rover was set down inside Gale Crater by a rocket-powered descent vehicle on August 12, 2012 for a nominal two Earth-year mission (approximately 668 Mars days or sols). Fourteen Earth-years later, Curiosity is still going strong.

In 2014, after exploring the floor of the crater, the rover started working its way up the slope of Mount Sharp, a 3-mile-tall (5-kilometer-tall) mountain filling the center of the crater. Curiosity has now surpassed 5,000 sols, driven over 23.6 miles (38 km) and climbed over 3,280 feet (1 km) of elevation, setting an off-planet record.

Along the way, Curiosity has found chemical and mineral evidence of past habitable environments on Mars. On the crater floor, the rover found fine layers of mudstone and clay minerals that formed in ancient lakes and riverbeds.

Mount Sharp displays hundreds of geological layers as new deposits covered old, presenting a visual history of climatic changes in the Red Planet over billions of years (from a planet that was once wet and warm to the dry and cold world that we see today).

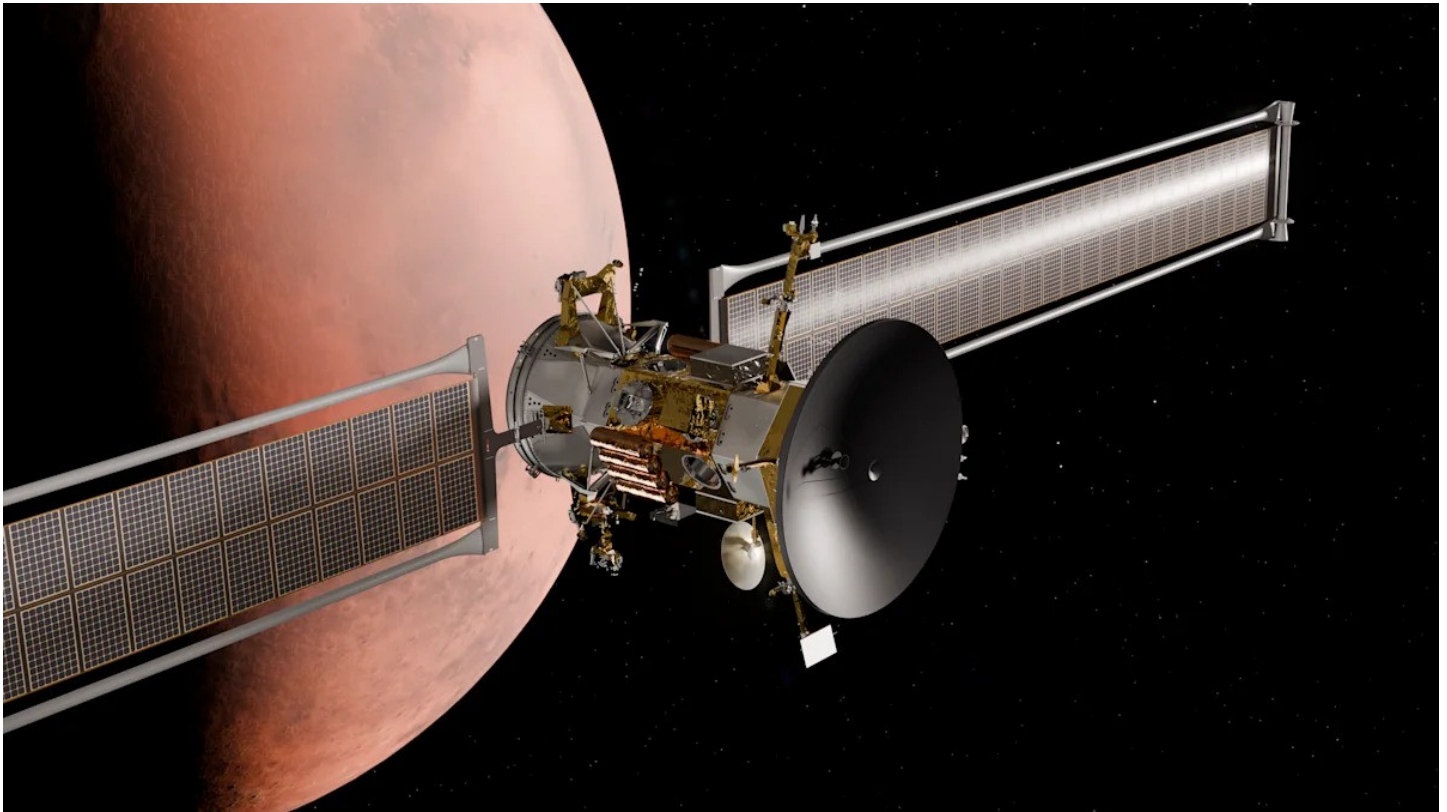
The environment transformation is evident as the rover climbs the mountain. At lower elevations on the mountain, the rover found sulfate minerals, indicative of a drying environment where evaporation produces a more acidic water chemistry. At its current elevation the ground still shows signs of ground water movement despite the disappearance of surface water.



Curiosity rover self portrait combining images from the MAHLI camera on the rover's robotic arm along with images from the Mastcam

Credit: NASA/JPL-Caltech/MSSS

Next Generation Telecommunications Spacecraft Awarded to Blue Origin



Artist conception of Blue Origin's Mars Telecommunications Orbiter, the first dedicated, high-speed communications relay network at the Red Planet.

Credit: Blue Origin

While NASA's rovers Curiosity and Perseverance can send data directly to Earth with their high gain antenna, speed is slow (kilobits per second) and takes considerable rover power. Good for small data exchanges and the transmission of daily instructions, NASA will use one of its orbiters to relay large data packages, scientific information and image files. The Mars Reconnaissance Orbiter (MRO) and Mars Odyssey share the work load, with the European Space Agency's Mars Express acting as a backup communication relay in time of heavy traffic.

Considering that the space agency and private companies are talking about landing astronauts on the Red Planet in the 2030s, and that the Mars Odyssey and MRO spacecrafts are now 25 and 21 years old, respectively, NASA is looking to upgrade and modernize their communication link.

To that end, NASA has awarded Blue Origin a \$700 million contract for a Martian communication satellite. Under the terms of the contract, the "Mars Telecommunications Orbiter" is expected to be delivered in 2028, with operations around the Red Planet as early as 2030.

Blue Origin is planning on incorporating its Blue Ring spacecraft platform in the satellite design. The platform has the potential of adding other services in addition to telecommunications, being designed to refuel, transport and host smaller satellites for missions in planetary orbit, or as a way station for surface exploration.

The award was not without controversy with Rocket Lab filing a formal bid protest with the U.S. Government Accountability Office (GAO), citing deviations from eligibility and funding rules mandated by Congress and errors in the technical evaluation. Work during the GAO review period (expected to be about 100 days) is likely to be frozen until the final ruling is issued.



FREE EVENT

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

October 10th

7:00 - 9:00 pm

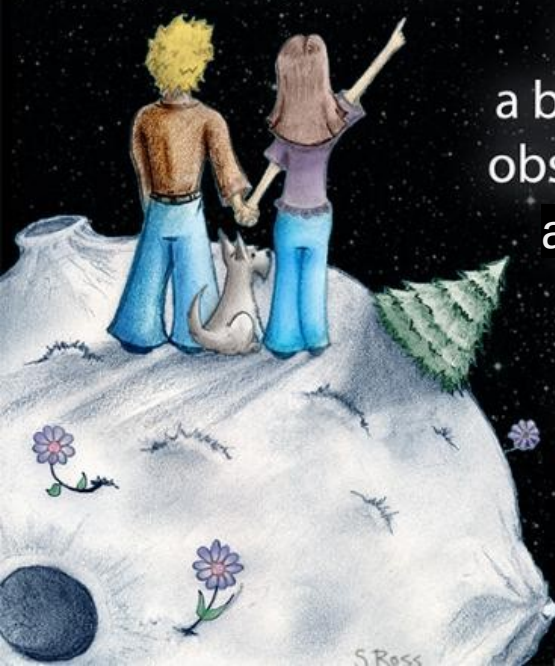
Free Star Party

Featuring:

**Roz's Wild Night:
A Safari from Earth to Space**

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

*Observing if weather permits



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