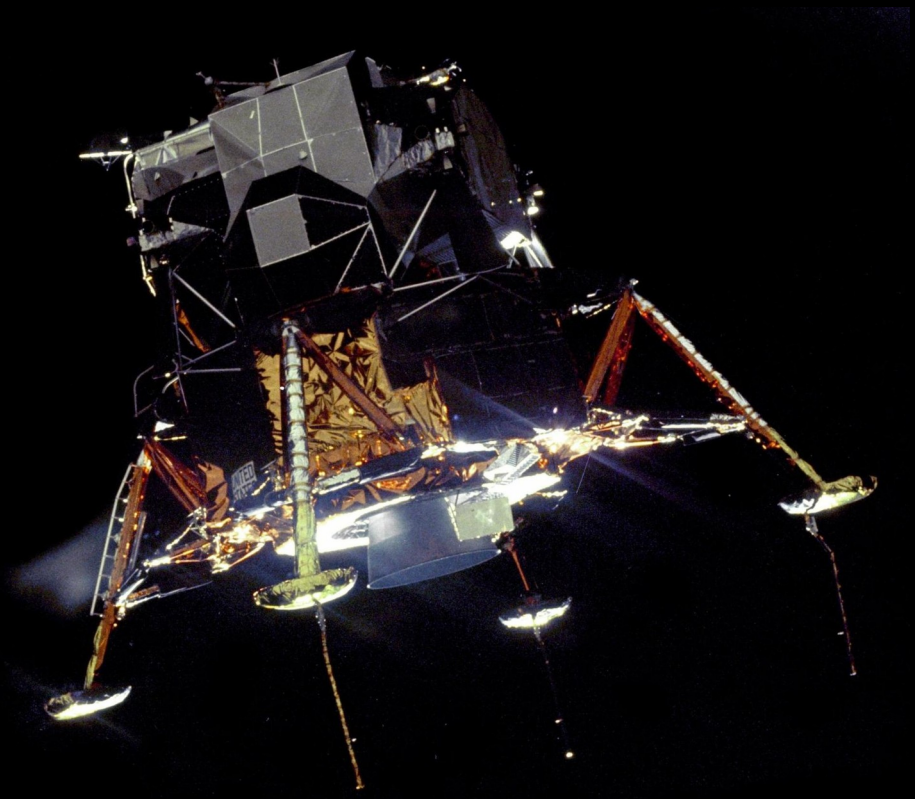
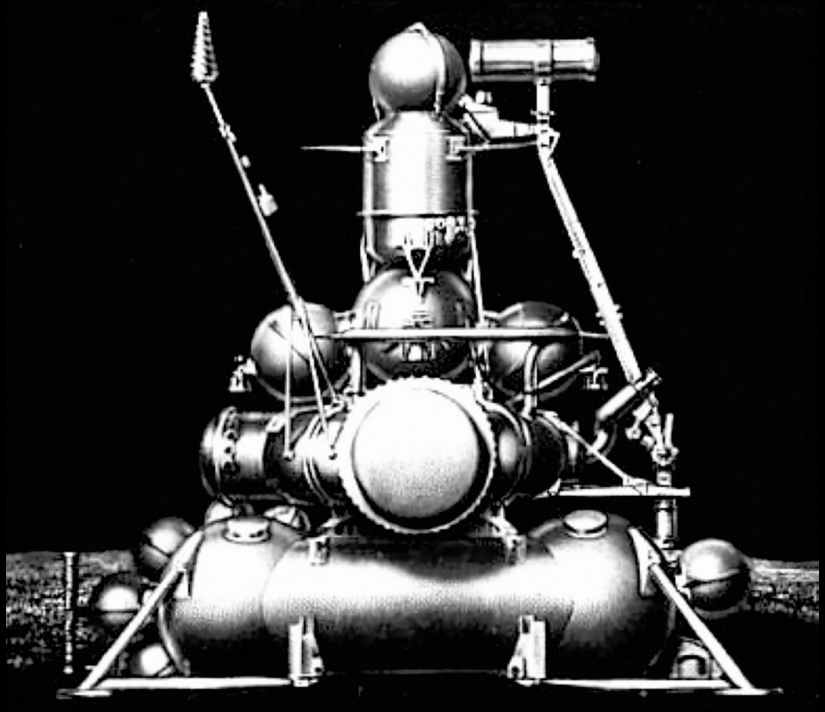
John J. McCarthy Observatory

Summer 2026 Newsburst



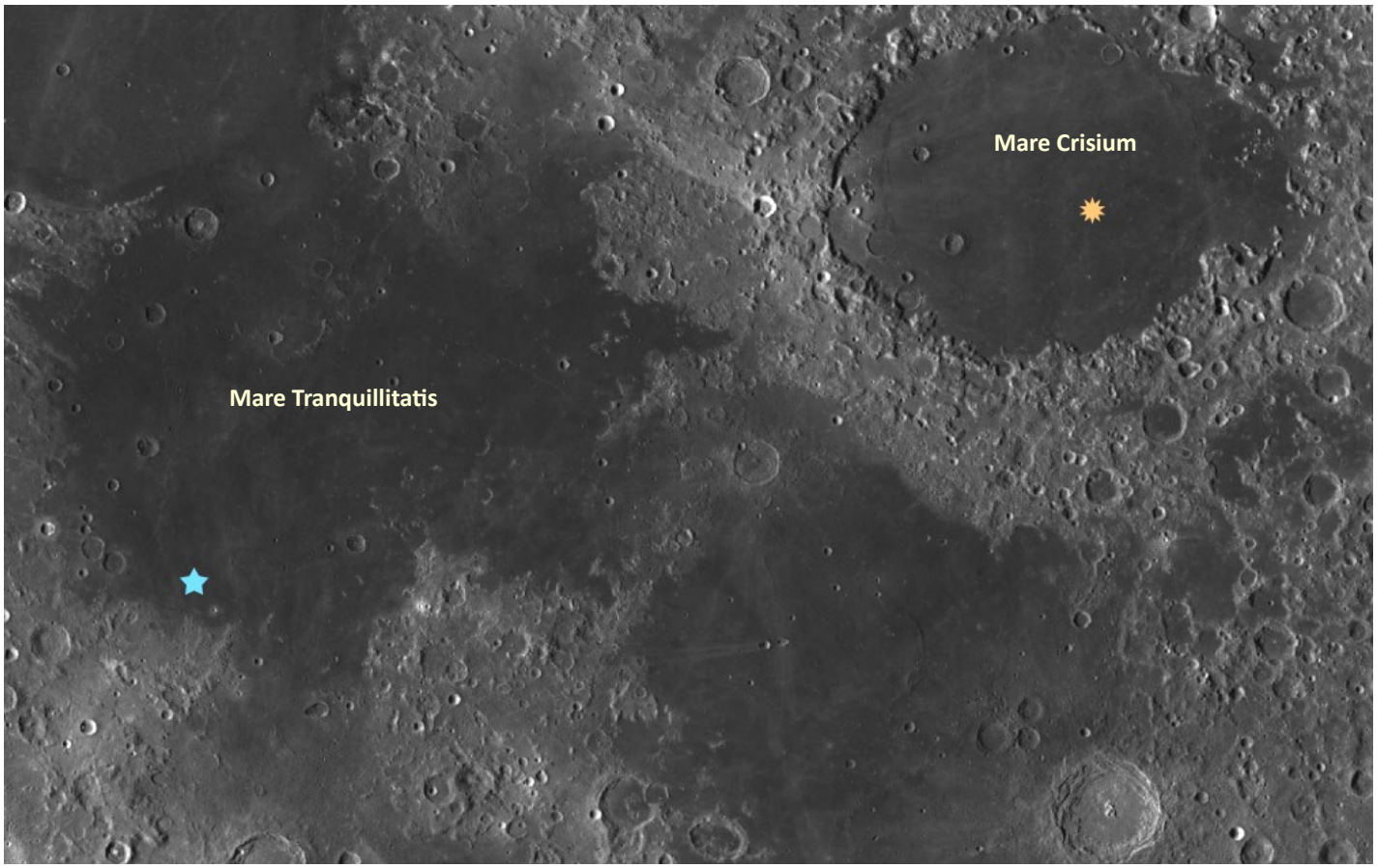
July 1969



Apollo 11 was not alone in lunar orbit in July 1969 - the Soviet robotic probe Luna 15 had arrived on the 17th, two days prior to the Americans, in a desperate, last-ditch effort to upstage the United States (see stories on pp 2 and 3).

Images: NASA

A Desperate Gambit



Crash site of Luna 15 (yellow) 344 miles (554 km) north-northeast of the Apollo landing site (blue)
Image: LROC Quickmap/NASA/GSFC/Arizona State University

The Soviet Union's lunar ambitions suffered a major setback on July 3, 1969, just weeks before Apollo 11 was scheduled to launch, when the second flight of their Moon rocket (designated "N1") exploded just seconds after liftoff. The incident, attributed to one of the 30 first stage engines self destructing and the severed fuel lines feeding an uncontrolled fire in the engine compartment, caused widespread destruction of the launch facility that would ultimately set the program back two years. If it had succeeded, the N1 was to place an unmanned Lunar Orbital Craft and mock-up Lunar Lander into orbit around the Moon.

With their human spaceflight program in ruins, in a last ditch effort to upstage the Americans, the Soviet Union launched a robotic probe to the Moon - three days before Apollo 11's launch. Luna 15 was a sample-return mission, designed to collect lunar regolith and deliver it to Earth before the American astronauts returned. It entered orbit around the Moon on the 17th.

With two spacecraft in lunar orbit, American engineers became concerned that Soviet radio frequencies might disrupt communications between the Apollo vehicles and with mission control. In a first exchange between rival superpowers, the situation was defused by diplomacy and Apollo 8 commander, astronaut Frank Borman. Borman had been invited to tour Russia after his historic flight. His meetings with cosmonauts, officials and academicians included Mstislav Keldysh, the President of the Soviet Academy of Sciences. During the Apollo 11 mission, Borman reached out to Keldysh for flight trajectory details on Luna 15 and received assurance that the Soviet frequencies would not interfere with Apollo 11 communications.

Luna 15 was originally scheduled to land on Mare Crisium on July 20th (the same day Apollo 11 set down on Mare Tranquillitatis). However, concerns with the ruggedness of the landing site kept the spacecraft in orbit for another day. By the time Luna 15 began its descent, Armstrong and Aldrin were ready to leave the surface. Unfortunately, the spacecraft never completed its engine burn and data transmission abruptly ceased. While the cause of failure was never confirmed, it is likely that Luna 15 crashed into the side of a mountain due to an angled descent. Two hours later, the Apollo 11 lunar lander Eagle took flight for an orbital rendezvous with the Columbia command module to begin the trip home.

Witness to History

The 75 meter (250 foot) diameter Lovell Telescope at the Jodrell Bank Observatory in the UK was witness to the historic events that unfolded in July 1969

Credit: Jodrell Bank/The University of Manchester

Astronomers at the Jodrell Bank Observatory (UK) had a ringside seat for the historic events that unfolded in July 1969 as the Soviet Union and United States raced to plant their flag upon the Moon. With the Lovell radio telescope (the world's largest, fully steerable radio telescope at the time), they were able to first track the Soviet Luna 15 spacecraft as it left the Baikonur Cosmodrome in Soviet Kazakhstan and travel to the Moon. Although its mission was shrouded in secrecy, its velocity and trajectory were transparent as the large Lowell antennae eavesdropped on the spacecraft's telemetry and data transmissions. They followed the probe as it attempted to land on the 52nd orbit (noting that it was traveling much too fast) until transmissions abruptly ceased.

Likewise, the Jodrell Bank astronomers listened in to the transmissions to and from the Apollo 11 spacecraft. They followed the descent of the Eagle lunar lander with their data showing the moment Neil Armstrong took manual control of the lander to avoid a boulder field. They also recorded audio of the Armstrong and Aldrin on the surface.

ISS Astronauts Take Shelter

The docking post of the Zvezda module which connects to the leaky transfer tunnel

Source: NASA

The International Space Station (ISS) leaks air from normal operations (around 0.6 pounds-mass of air per day). However, since 2019, this leak rate has increased from micro cracks in the aging station. The loss has been manageable and, when it has increased to an unacceptable level, corrective action by the onboard crew has brought the rate back under control. The primary source of air loss is the Russian Zvezda Service Module Transfer Tunnel. This structure is located between the docking port and the Zvezda module. The Russian Space Agency Roscosmos suspects that the leakage is being exacerbated by the mechanical stresses of spacecraft docking and thruster burns.

While the source of several of the leaks has been found and addressed (including the application of temporary and permanent sealants), there are areas that are just not accessible to inspection. When the tunnel is not in use for transferring cargo, this segment has been depressurized and isolated from the rest of the station.

In early June the station leak rate increased to 2 pounds during cargo transfer operations, prompting a detailed inspection of the tunnel by the Russian crew. When Roscosmos directed the cosmonauts to cut a metal structural bracket to access an out-of-the-way area, NASA directed the three Americans, one French astronaut, and one Russian cosmonaut, as a safety precaution, to take shelter in a docked SpaceX Crew Dragon spacecraft. In the end, Roscosmos and NASA agreed that the risk to the structural integrity of the tunnel was too high and the repair activity was paused for further evaluation. The sheltered crew was then allowed to return to their normal stations and duties.

The station is scheduled to be decommissioned in 2030. Zvezda was launched in 2000 and was the third module of the station. It is an integral part of the ISS and replacing the module would involve enormous complexity. With the end in sight, Roscosmos will likely continue to patch and isolate the unit to the extent possible barring a catastrophic failure.

Ready for Launch

NASA's Nancy Grace Roman Space Telescope

NASA/Jolearra Tshiteya

NASA's Nancy Grace Roman Space Telescope is scheduled to launch on August 30th from the Kennedy Space Center, eight months earlier than originally planned. The telescope will be carried into space aboard a SpaceX Falcon Heavy booster and make its way out to the Lagrange Point 2 (L2), a gravitational stable location about 1 million miles or 1.5 million kilometers away from the Earth in the opposite direction of the Sun (joining the James Webb, Euclid and Gaia telescopes).

Named for NASA's first chief astronomer, the Roman telescope has the same size primary mirror as the Hubble but its design provides a field of view 100 times larger. Over its five year prime mission, the telescope's 7.9-foot (2.4 meter) mirror will allow astronomers to survey the universe in near-infrared wavelengths with targets including stars, galaxies, black holes and exoplanets. Its observations are expected to contribute to and increase our understanding of both dark matter and dark energy.

A is for Aeronautics

NASA's Experimental X-59 Aircraft in Flight
NASA / Lori Losey

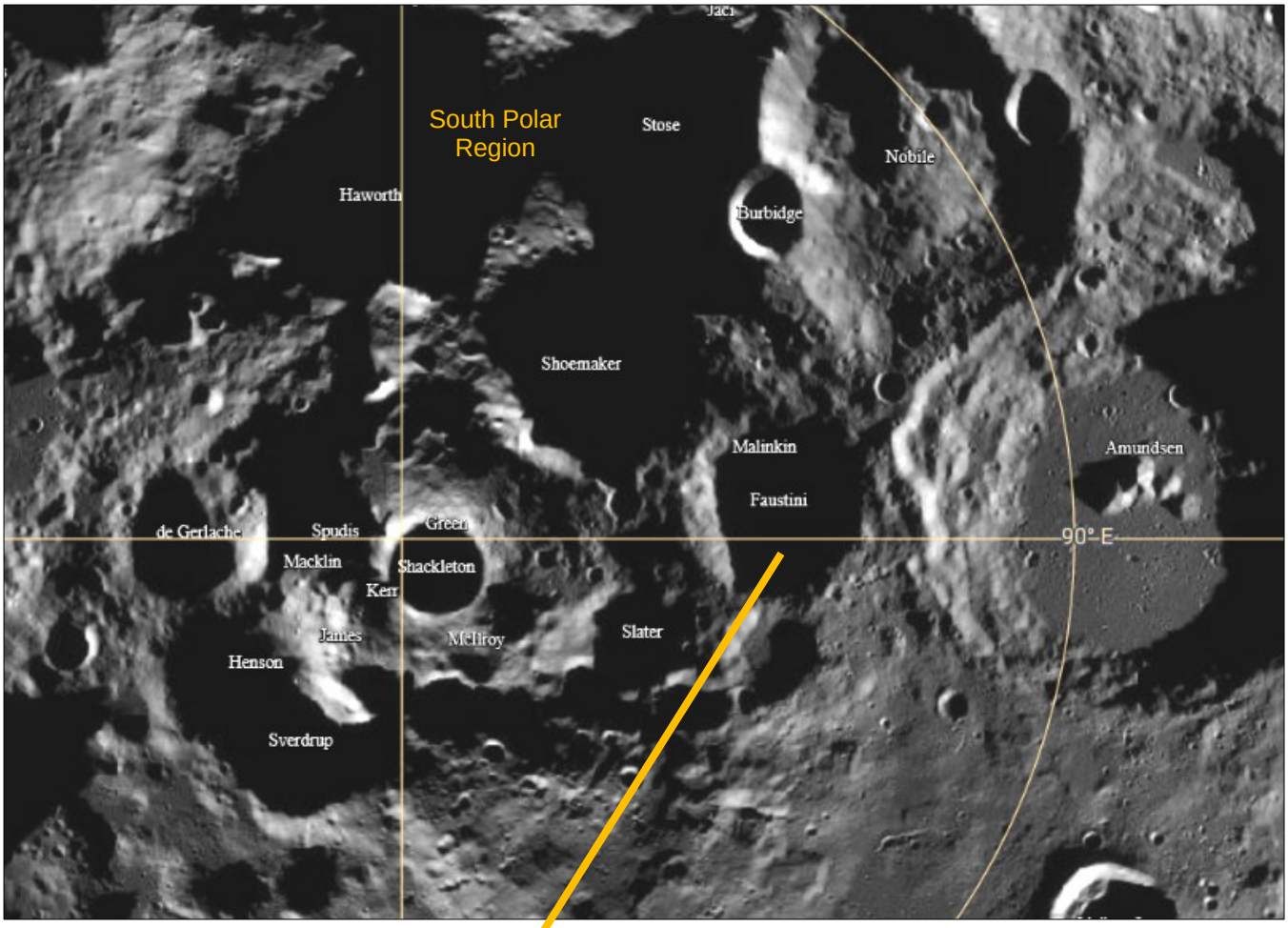
NASA is synonymous with the exploration of space. However NASA's activities are governed by the core objectives and guiding principles described in the National Aeronautics and Space Act of 1958, signed into law by President Dwight Eisenhower on July 29, 1958. They include "expanding human knowledge of phenomena in the atmosphere and space, and developing, testing, and operating aeronautical and space vehicles."

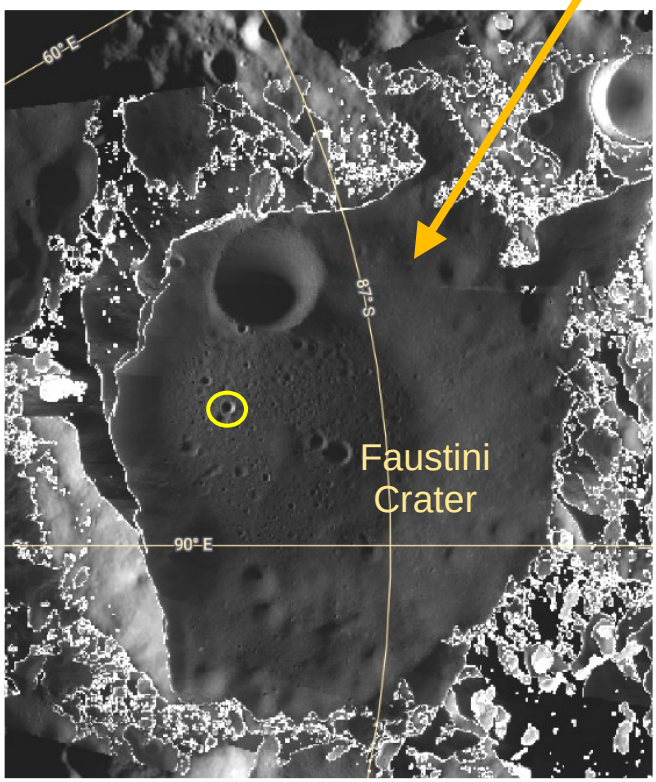
While not front page news, NASA has been tackling an issue that has hampered supersonic travel and led to overland flight restrictions – sonic booms.

The agency contracted with Lockheed Martin's "Skunk Works" to build an experimental aircraft design-optimized to reduce the sound of the sonic boom reaching the ground. The aircraft, designated as the X-59, as been conducting subsonic flights to evaluate its unique shape and flight performance while gathering data on its suppression characteristics as part of NASA's Quesst mission.

On June 5th, the X-59 flew faster than the speed of sound for the first time, a major milestone. The aircraft took off and landed at Edwards Air Force Base in California, reaching a top speed of approximately Mach 1.1 (713 mph) and an altitude of 43,400 feet on a flight that lasted 81 minutes. No attempt was made to measure the X-59's sonic boom on this flight, which was masked by the noise from a NASA F15 chase plane. However, the flight sets up a series of overland evaluations later this year.

Double Shadowed Iceboxes





ShadowCam image of the floor of Faustini crater and the double shadowed crater (circled)

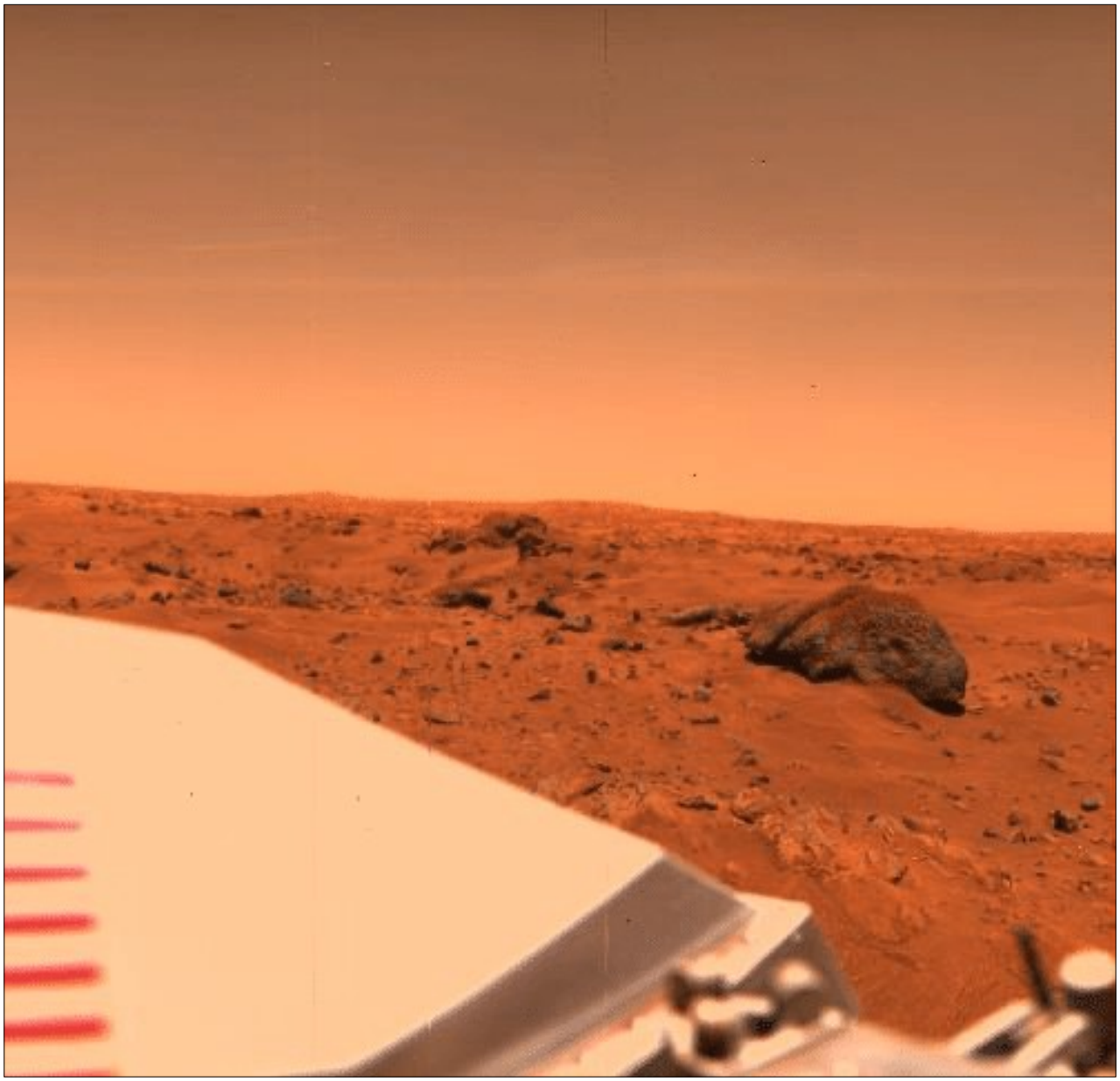
Images: LROC Quickmap/NASA/GSFC/Arizona State University

Scientists using India's Chandrayaan-2 lunar orbiter's dual frequency synthetic aperture radar have found strong water-ice signatures in several permanently shadowed craters at the Moon's south pole. Water-ice is considered a critical resource for future lunar settlements as it can provide drinking water for colonists and the molecule split to extract oxygen for breathing air, and hydrogen for rocket fuel.

Permanently shadowed craters within permanently shadowed craters (or doubly shadowed craters) are of particular interest since they are shielded from sunlight and thermal radiation. Temperatures within these cold traps hover only 45°F above absolute zero (or around ~25K), ideal for the preservation of ice over eons.

Images from a highly sensitive optical camera called ShadowCam, aboard South Korea's Danuri Lunar Orbiter, were used to correlate specific lunar features from Chandrayaan-2's radar surveys. NASA funded, ShadowCam is roughly 200 times more sensitive than the Lunar Reconnaissance Orbiter Camera (LROC). It can reveal details within shadows by utilizing faint "secondary illumination" from reflected light off of crater rims or even from the light scatter off the Earth.

Anniversary of the Viking Mars Project



Sunset on Mars from the Viking 1 Site

Credit: NASA

Fifty years ago NASA's first astrobiology mission touched down on Chryse Planitia (the Plains of Gold). The Viking 1 orbiter/lander had entered orbit around Mars on the 19th. A day later, the Viking 1 lander became the first spacecraft to successfully land on the Red Planet. It would be joined on the surface by Viking 2 in early September (landing on Utopia Planitia). The landers would transmit over 4,500 photographs from the surface over their operating lives while the orbiters mapped 97 percent of the surface, recorded in more than 52,000 photographs.

Both landers operated well beyond their 90-day prime mission, made possible by their radioisotope thermoelectric generators (RTGs). The Viking 1 lander transmitted data for 2,307 days (over 6.25 years) on seasonal changes in the Martian atmosphere and daily variations in atmospheric opacity and suspended aerosols with its weather station, as well as providing a detailed analyses of the surrounding soil with its onboard laboratory.

The Viking landers conducted three biology experiments in an attempt to detect microbial life in the Martian soil. The results were puzzling and generally inconclusive with no clear evidence for the presence of living microorganisms although the elements for life were detected (carbon, nitrogen, hydrogen, oxygen, and phosphorus).

Setback for Blue Origin and Artemis

The New Glenn Launch Complex 36 (LC-36) at the Cape Canaveral Space Force Station (prior to the accident)

Credit: Blue Origin

Blue Origin's Launch Complex 36 at the Cape Canaveral Space Force Station was reduced to ruins in late May when a New Glenn booster, undergoing a static fire test, exploded. The energy released by the blast was estimated at greater than 1 kiloton of TNT equivalent. The explosion destroyed the rocket as the liquid oxygen and methane fuel combined to create a fireball that lit up the night sky. The morning after revealed the extent of the devastation with incinerated ground equipment, a severely damaged launch tower, one of the lighting towers knocked over, and the strongback mechanism used to transport, lift, and place the rocket into a vertical position on the pad destroyed.

The explosion happened just two days after NASA announced that the company's Blue Moon Mark 1 lunar lander would serve as the lander for the agency's first Moon Base mission. More importantly, the ill-timed blast could affect the availability of Blue Origin's Mark 2 lunar lander, which is destined to carry astronauts to the lunar surface in the future and for Artemis III's near-Earth hardware evaluation mission (to be conducted along with SpaceX's Starship).

Although the company has stated that it intends to fly again before year's end, recovering from such devastation could take considerably longer, especially if the accident investigation requires extensive changes to the vehicle and/or engines for flight. The loss of Blue Origin's only launch pad also puts the company at a disadvantage to compete for upcoming missions like the Mars Telecommunications Orbiter.

Help is On its Way

Katalyst Space Technologies' LINK robotic servicing spacecraft loaded aboard a Northrop Grumman Pegasus XL rocket

Credit credit: NASA/Ron Beard

The mission to rescue the Neil Gehrels Swift Observatory is scheduled to be launched from the Kwajalein Atoll (Marshall Islands) as early as July 1st, weather permitting A Katalyst's robotic servicing spacecraft, called LINK, was placed aboard a Grumman's Pegasus XL rocket which will be carried aloft by a L1011 Stargazer aircraft. Released from an altitude of approximately 40,000 feet (12 km), the rocket will propel LINK into an orbit where it can rendezvous with Swift.

The Swift spacecraft is falling at a rate of about 5 miles (8 km) a month. This rate is expected to increase as the telescope descends and the density of air molecules increases along with the induced drag. Depending upon the intensity of solar activity, which heats up and expands the upper layers of Earth's atmosphere, the observatory's lifetime is measured in months without a reboost.

Katalyst's team expects a commissioning period of a few weeks, after which time, the robotic spacecraft will initiate a controlled approach to Swift. The observatory was not designed for capture so engineers will be assessing their options and condition of the observatory, which was launched in 2004, once LINK is in close proximity to the spacecraft. While attachment of all three of LINK's robotic arms would provide the most secure configuration, a reboost of the observatory is possibly will only one arm engaged.

If all goes well, LINK will slowly raise Swift's orbit to approximately to 360 miles (600 km), close to altitude where it initially operated. At that time, LINK will disengage and use its remaining fuel to drop down into a deorbiting altitude.

Swift is unique in its ability to respond quickly to energetic outbursts from cataclysmic events in our universe. Its Burst Alert wide-field telescope scans the sky for gamma-ray bursts. Within 20 to 70 seconds of a detection, the spacecraft will automatically swivel to point its narrow-field instruments (X-ray and Ultraviolet/Optical telescopes) at the burst to gather detailed data on the event and alert ground telescopes.

Second Saturday Stars

FREE EVENT

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

July 11th

8:00 - 10:00 pm

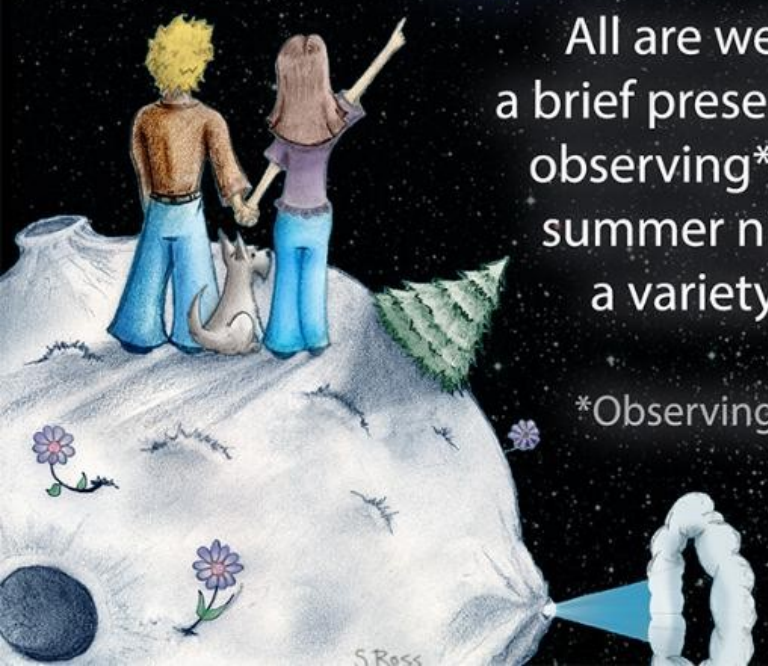
Free Star Party

Featuring:

"Mother of Hubble":
The Nancy Grace Roman Space Telescope

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

*Observing if weather permits



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