Galactic Observer

John J. McCarthy Observatory

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June 5: The Transit of Venus

See page 6 for details

The John J. McCarthy Observatory

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It is through their efforts that the McCarthy Observatory has established itself as a significant educational and recreational resource within the western Connecticut community.

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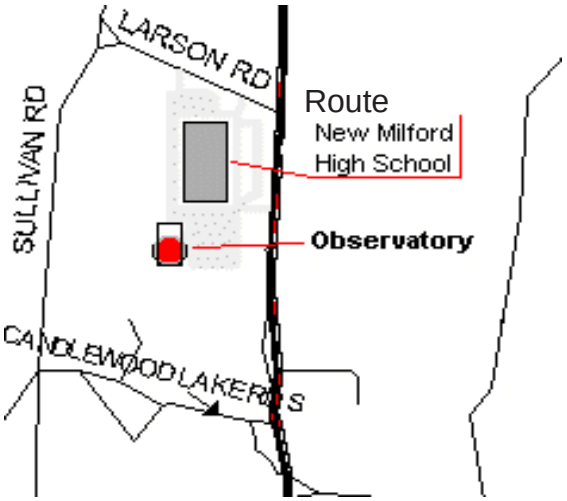

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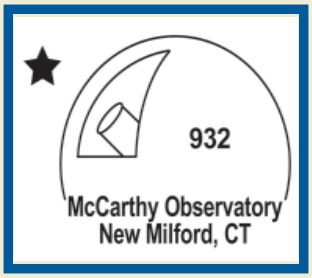


The Year of the Solar System

NASA announced on Oct. 7, 2010 that the upcoming year would be "The Year of the Solar System." The "Year," however, is a Martian year and, as such, 23 months in length. Some of the highlights of the "Year" of exploration are:

Date	Mission		Status
4 Nov 2010	Deep Impact encounters Comet Hartley 2		Successful rendezvous, see *http://www.nasa.gov/mission_pages/epoxi/index.html*
19 Nov 2010	Launch of O/OREOS, a shoebox-sized satellite designed to test the durability of life in space		Ground stations receiving data
19 Nov 2010	Launch of experimental solar sail (NanoSail-D)		Mission completed (successfully)
7 Dec 2010	Japan's Akatsuki (Venus Climate Orbiter) spacecraft		Spacecraft fails to enter orbit around Venus - now in orbit around the Sun
14 Feb 2011	Stardust NExT encounters Comet Tempel 1		Successful rendezvous; see http://stardustnext.jpl.nasa.gov/
17 Mar 2011	MESSENGER enters orbit around Mercury		First spacecraft to achieve orbit around Mercury; see *http://messenger.jhuapl.edu/*
18 Mar 2011	New Horizons spacecraft crosses the orbit of Uranus		see *http://pluto.jhuapl.edu/*
16 Jul 2011	Dawn spacecraft arrives at the asteroid Vesta		Orbit achieved; see *http://dawn.jpl.nasa.gov/*
5 Aug 2011	Launch of the Juno spacecraft to Jupiter		Successful launch/deployment; see *http://missionjuno.swri.edu/*
10 Sep 2011	Launch of twin GRAIL spacecraft to map Moon's gravitational field		Successful launch/deployment; see *http://solarsystem.nasa.gov/grail/*
8 Nov 2011	Launch of the Phobos-Grunt sample-return mission		Successful launch/failure to leave low-Earth orbit/re-entered Earth's atmosphere on January 15th
26 Nov 2011	Launch of Mars Science Laboratory (MSL)		Successful launch/deployment; see *http://marsprogram.jpl.nasa.gov/msl/*
05 Aug 2012	MSL lands on Mars		

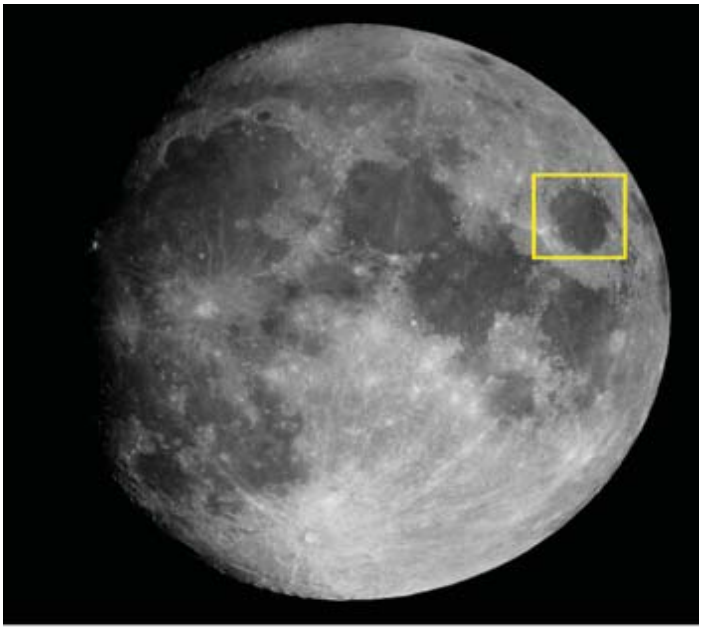
Other notable events:

- April 15, 2012 — Saturn at Opposition
- May 20, 2012 — Annular Solar Eclipse (visible in southwest U.S.)
- June 5, 2012 — Venus Transit (visible before sunset on the east coast)
- August 2012 — Dawn spacecraft leaves Vesta for Ceres

Out the Window on Your Left"

IT'S BEEN 40 YEARS since we left the last footprint on the dusty lunar surface. Sadly, as a nation founded on exploration and the conquest of new frontiers, we appear to have lost our will to lead as a space-faring nation. But, what if the average citizen had the means to visit our only natural satellite; what would they see out the window of their spacecraft as they entered orbit around the Moon? This column may provide some thoughts to ponder when planning your visit (if only in your imagination).

One of the more recognizable naked-eye features of the lunar landscape fills our viewport this month:



Mare Crisium or the Sea of Crises. The barren lava plain is bounded by the confines of an impact basin created during the pre-Imbrium period, 4.55 to 3.85 billion years ago.

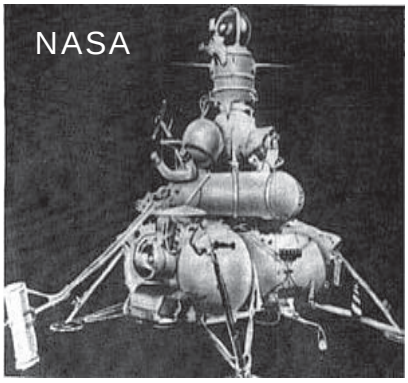
The circular mare is approximately 376 miles (605 km) in diameter and is located on the Moon's eastern limb, northeast of Mare Tranquillitatis (Sea of Tranquility). There are relatively few large craters on the surface of the mare, with the largest (Yerkes and Lick) flooded by ancient lava flows so that only an outline remains. The mare ridges, or dorsa, that ring the inner perimeter define a boundary between a shallow "coastal" shelf and the deeper central portion (up to 1.8 miles or 2.9 km in depth).

Mountains encircling Mare Crisium are interrupted by several outcroppings and projections onto the mare's surface, including Promontorium (Cape) Agarum along the southeast rim that rises 3.4 miles (5.5 km) above lava plain. Beyond the mountainous enclosure, there is evidence of additional basin rings from the original impact, although most are only ghostly arcs or concentric fault lines.

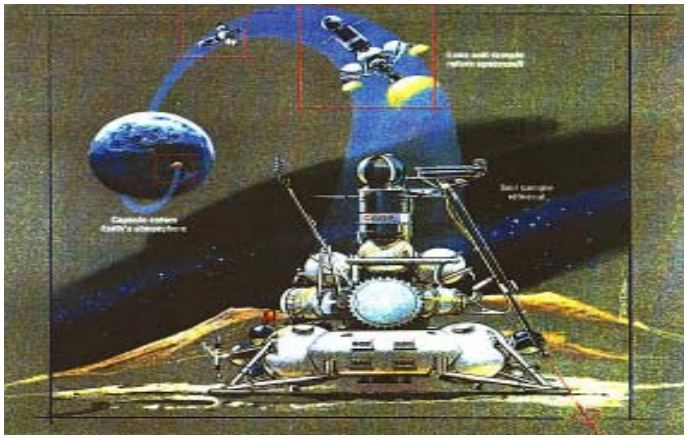
Apollo 11 Connection

There are notations for two landing sites targeted by the Soviet Union identified on the Mare Crisium image. On July 20, 1969, while Apollo 11 astronauts Armstrong and Aldrin were preparing to set their lunar lander down on Mare Tranquillitatis, the Soviets attempted to land, what was believed to be, a sample return mission (Luna 15) on Mare Crisium. With a crash landing, the Soviets lost their opportunity to upstage the Americans.

Seven years later, in August of 1976, Luna 24 successfully landed on the lunar surface just east of the Luna 15 crash site and succeeded in drilling into the regolith. The samples returned to Earth were the last collected from the Moon.

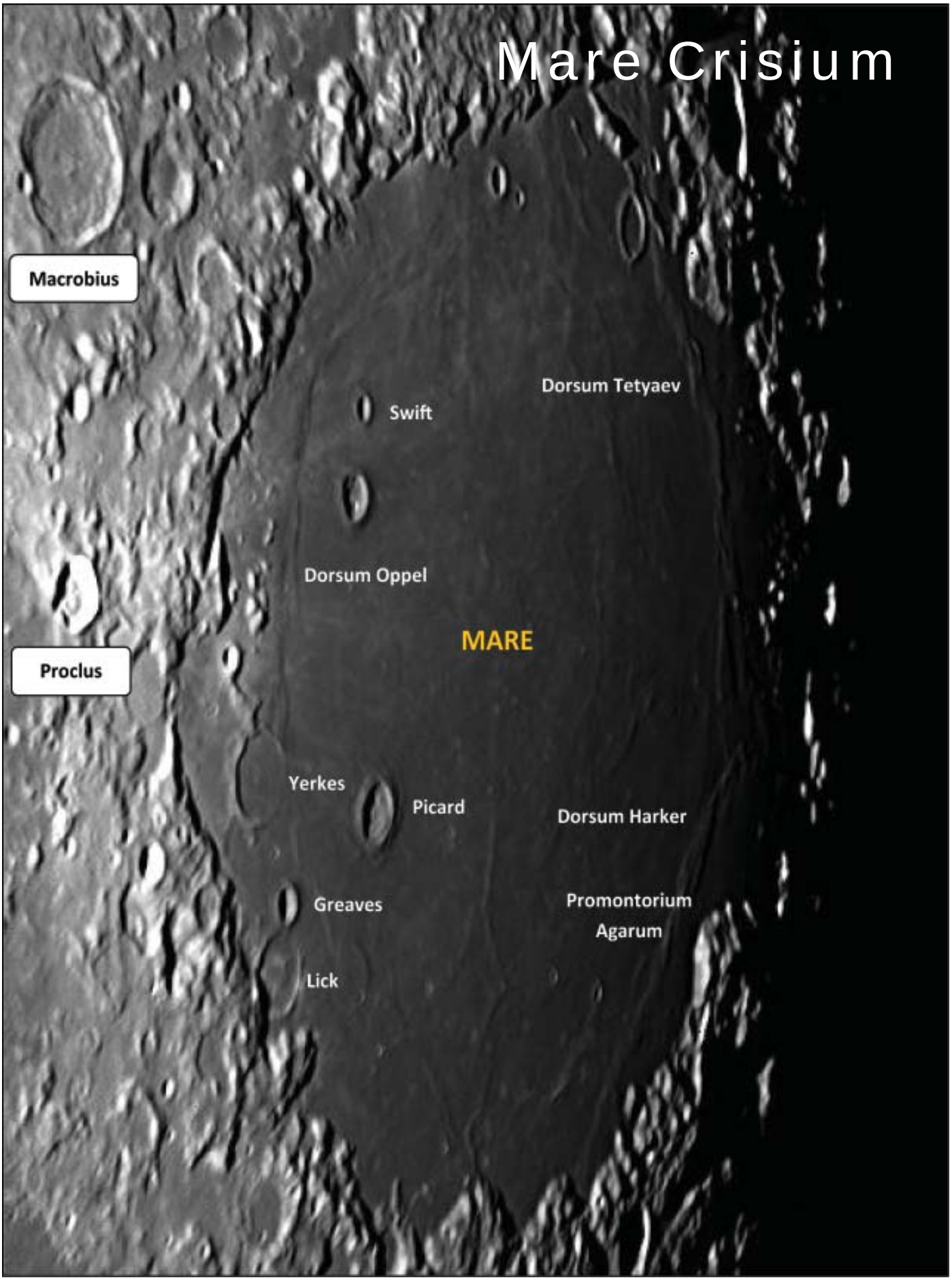


Luna 16



Luna 24 mission artist's impression (Source: NASA)

Sample return capsules from Luna 16, 20, and 24 on display at the NPO Lavochkin Museum (Courtesy of Alexander Chernov and the Virtual Space Museum).


Mare Crisium
Macrobius
Dorsum Tetyaev
Swift
Dorsum Oppel
MARE
Proclus
Yerkes
Picard
Dorsum Harker
Greaves
Promontorium
Agarum
Lick

Kathleen Fischer Sundial

Daytime visitors to the John J. McCarthy Observatory this summer will discover a wonderful addition to the adjacent gardens and grounds. Resting on a one-ton granite disk in the center of the "outdoor classroom" in Galileo's Garden will be a magnificent, stainless steel sundial. The equatorial sundial will stand nine feet tall, with a bronze replica of Galileo's first telescope integrated into the gnomon pointing to the celestial pole. The shadow arms span five feet and the engraved time scale is adjustable so that both "clock time" and "sun time" can be read. The time scale contains both standard time and daylight saving time engravings.

The sundial will be dedicated to Kathy Fischer, an inspirational science teacher, advocate for science literacy and long-time supporter of the Observatory's mission, before passing away in 2010. She and her husband Larry loved the teaching possibilities of a sundial. Along with family members and friends, Kathy and Larry are the primary benefactors that allowed the concept (pictured below) to become a reality.

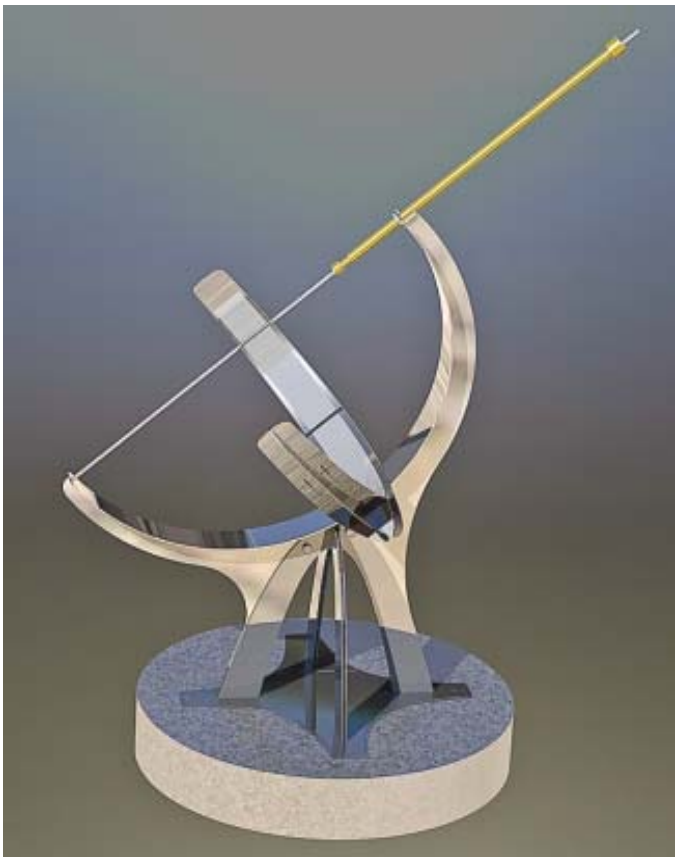
Dedication of the sundial will be during the daylight hours on June 9th. Additional details will be provided on the Observatory's website (*www.mccarthyobservatory.org*). Later that day, the Observatory will hold its monthly open house (Second Saturday Stars) with a "Kids Night" program. Weather permitting; the public will be able to observe the night sky through the Observatory's main telescope, as well as through portable telescopes set up by the Observatory's all-volunteer staff.

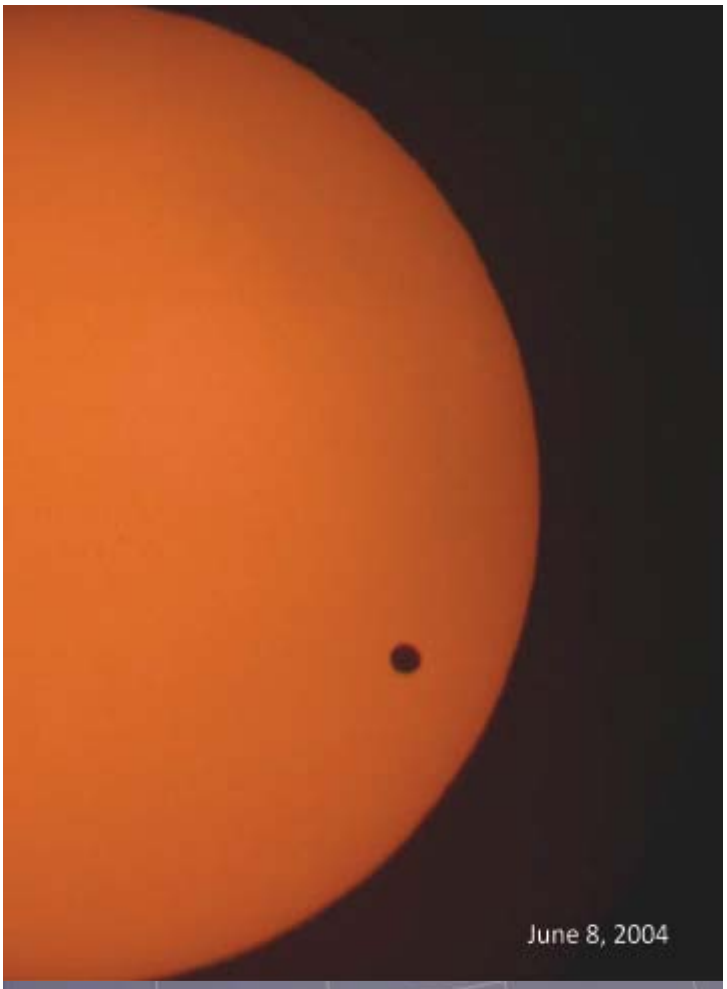
Venus Transit

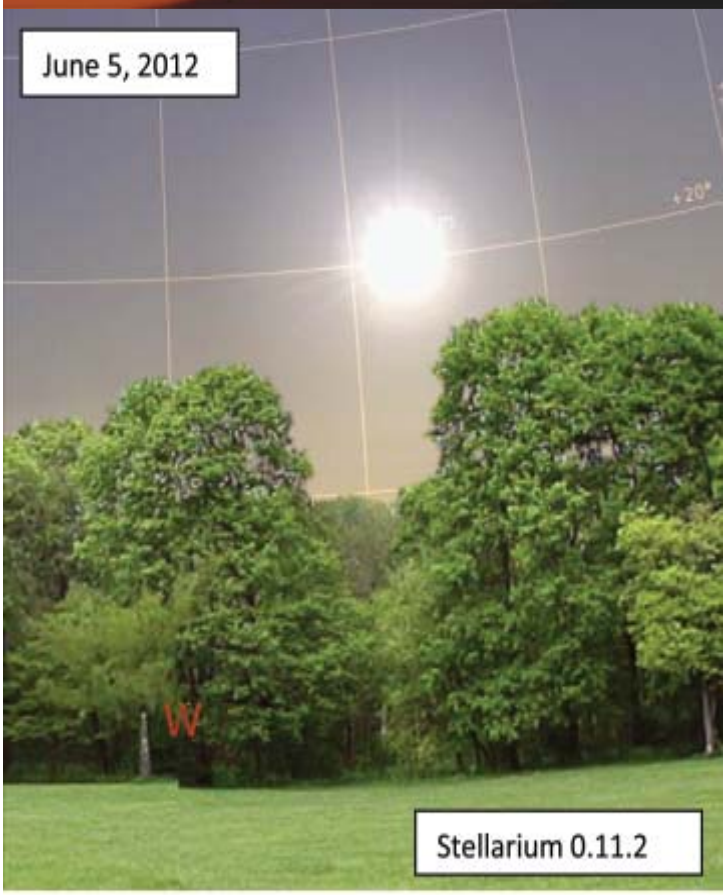
On June 5th, one of the rarest planetary alignments can be observed in the hours prior to sunset on the east coast of North America. On that evening, the planet Venus can be seen crossing in front of, or transiting, the disk of the Sun.

Transits of Venus occur when the planet is closest to the Earth and directly in line with the Sun, as viewed from Earth. This celestial arrangement is known as an Inferior Conjunction. Because the orbit of Venus is inclined 3.4° with respect to the ecliptic (the apparent path of the Sun across the sky), Venus will almost always appear to pass either above or below the Sun, as viewed from Earth at an Inferior Conjunction.

However, it is possible that during the months of December or June, Venus can be observed crossing the disk of the Sun. This event is so infrequent (but predictable), that it has only happened seven times since the invention of the telescope: first in 1631 and most recently in 2004.







Transits of Venus occur in pairs approximately 8 years apart, separated by an interval of either 105.5 years or 121.5 years. Prior to the June 2004 transit, the previous transit occurred on December 6, 1882. Following the June 2012 transit, the next transit will occur on December 11, 2117, more than a hundred years in the future.

The entire transit will be visible from northwestern North America and Hawaii; however, the Sun will set on the east coast while the transit is in progress. From western Connecticut the silhouette of Venus will be inside the limb of the Sun's disk at 6:21 pm on June 5th at an elevation of approximately 20°. In the next two hours (Sunset is at 8:25 pm), observers will notice the slow progression of the planet across the Sun's disk before it disappears below the horizon. As with any solar viewing, proper eye protection (and binocular and telescope filtration) is required for a safe viewing experience.

The McCarthy Observatory will be hosting a live event on the evening of June 5th. With hills to the west of the Observatory limiting the view, the event will be held at a remote location (to be determined). Details of the final plan will be posted on the Observatory's website as the event nears and a reliable forecast is available (*www.mccarthyobservatory. org*).

Hubble Space Telescope to View Venus Transit

The sensitive instruments aboard the Hubble Space Telescope (HST) are not able to view bright objects like the Sun without damage, so a proposal by researchers at the University of Grenoble and the Paris Astrophysics Institute to view the Venus transit offered an unconventional approach. The proposal, which was selected by the Space Telescope Science Institute, uses the Moon as a large mirror to indirectly view the transit (the Moon has the reflective properties of worn asphalt or coal, reflecting, on average, only 12% of the sunlight received). On June 5th/6th, scientists will attempt to isolate and analyze the composition of that infinitesimal portion of sunlight passing through the Venusian atmosphere, and reflected off the Moon, with the Space Telescope Imaging Spectrograph (STIS) during the transit. The spectrograph will be observing the area around the lunar crater Hipparchus (near the lunar equator) for 40 minutes out of each 96 minute orbit (when the Earth doesn't interfere with HST's view of the Moon) over a total duration of seven hours. From the information collected, they hope to detect the atmospheric signature of the planet Venus within the solar spectrum.

The technique was successfully tested on January 11, 2012, when the HST imaged several lunar craters in a practice run for the transit. The demonstration allowed the imaging team to fine-tune their procedures and calibrate the suite of instrumentation. In addition to the STIS, astronomers will also use Hubble's Advanced Camera for Surveys and the Wide Field Camera 3 to view other areas of the Moon in multiple wavelengths, as well as measure the slight decrease in sunlight falling on the Moon due to the occulting planet.

If successful, the technique could be used to analyze the composition of atmospheres of planets around other stars and, in particular, to distinguish the signatures of those compounds within the atmosphere that could indicate life. The experience gained from using Venus as a proxy for a transiting alien world will enhance our diagnostic capabilities as more Earth-sized worlds are discovered.

Countdown to Pluto

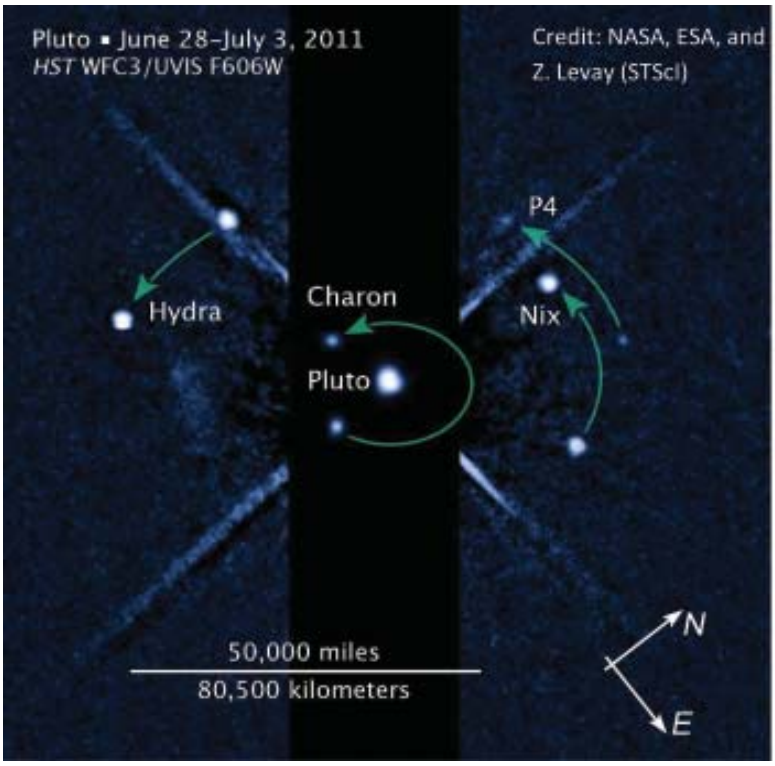
On a January afternoon, six and a half years ago, New Horizons began its journey to Pluto on top of an Atlas V rocket from the Cape Canaveral Air Force Station in Florida. In another three years, (July 2015), the spacecraft will make its closest approach to Pluto and its natural satellites.

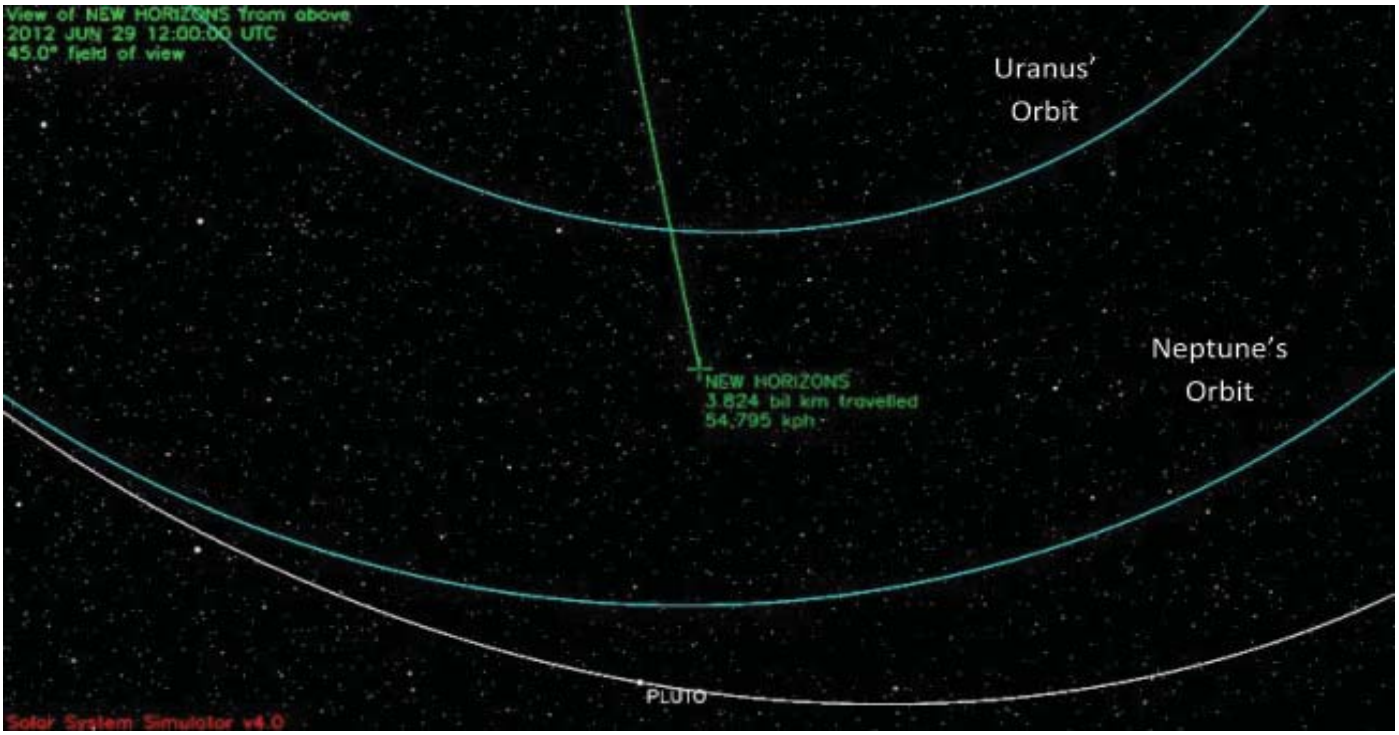
The number of known moons orbiting the dwarf planet increased by one since New Horizons began its journey. In 2011, a fourth moon (currently designated P4) was discovered by astronomers using the Hubble Space Telescope while searching for rings around Pluto.

The new moon orbits Pluto between the orbits of the moons Nix and Hydra (discovered in 2005). P4 is the smallest moon discovered so far around Pluto, with an estimated diameter of 8 to 21 miles (13 to 34 km). By comparison, Charon, Pluto's largest moon, has a diameter of 750 miles (1,206 km).

New Horizons is currently traveling at more than 34,000 miles per hour (55,000 kmph) as it closes in on its target. The spacecraft passed the orbit of Mars on April 7, 2006, had a close encounter with Jupiter on February 28, 2007, and crossed the orbits of Saturn and Uranus on June 8, 2008 and March 18, 2011, respectively. It will cross the orbit of Neptune in August 2014, less than a year before its closest approach to Pluto, and before racing off into the Kuiper Belt.

Pluto reaches opposition on June 29th, rising in the evening sky opposite a setting Sun. At almost 32 times further from the Sun than the Earth, you will need a moderate sized telescope to spot the 14th magnitude Pluto. You can find Pluto in the constellation Sagittarius, although against the background stars of the Milky Way, the hunt will be challenging.

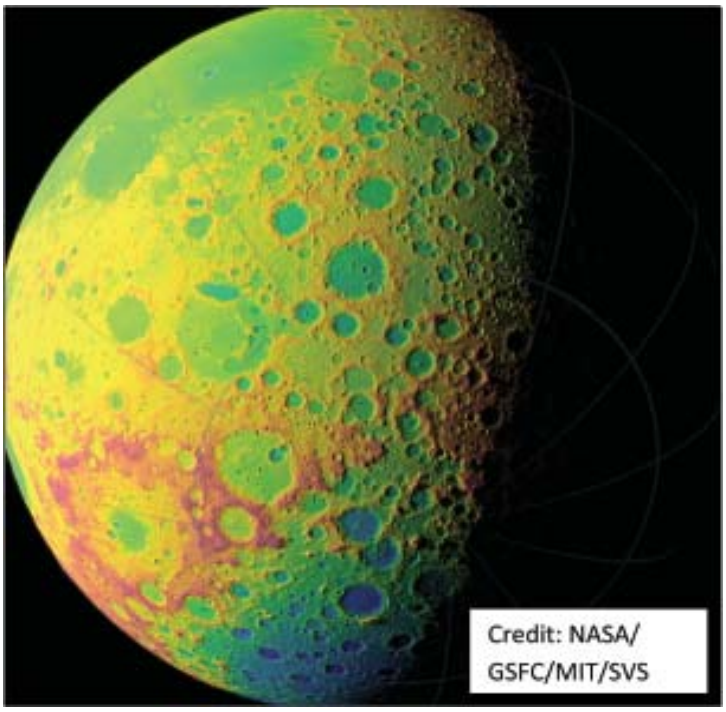




Lunar Reconnaissance Orbiter

On the evening of June 18, 2009, an Atlas V 401 rocket lifted off from Cape Canaveral carrying NASA's Lunar Reconnaissance Orbiter (LRO). In the three years since entering polar orbit, the spacecraft has been mapping the Moon from as close as 14 miles (22 km) above the lunar surface.

Although the images from the spacecraft's wide and narrow field cameras provide dramatic vistas of the lunar landscape, a compact instrument package weighing just 21 pounds, and bouncing a laser pulse off the Moon's surface, is revolutionizing the way we see the Moon. The Lunar Orbiter Laser Altimeter (LOLA) is constructing topographical maps of the rugged visible surface as well as those areas hidden by perpetual shadow. The data gathered by the altimeter is providing an unprecedented depiction of the lunar landscape; information invaluable in assessing future landing sites, identifying means of access to resources (for example, polar ice), and for general lunar navigation and exploration.



The topographic map of the moon's southern hemisphere is presented in false colors to indicate elevation, with blue representing the lowest elevations and red the highest. This particular image shows one of the largest impact basins in the solar system, the South Pole-Aitken, at the lower left of the globe (in deep blue). The western limb shows features on the far side while the terminator (day/night dividing line) shows the southern highlands on the near side.

Summer Solstice

On the morning of June 21st the Sun will rise over a prehistoric structure on the Salisbury Plain in southern England as it has for the last 4,000 years. For those individuals standing within the 100 foot diameter circle of 30 sandstone or sarsen-stones (weighing up to 50 tons each), the Sun will appear over a large naturally shaped stone (Heel Stone) located outside and to the northeast of the circle. The

alignment signals the start of the longest day, midsummer, or the summer solstice.

The photo below shows the current state of the stone circle. Many of the original stones are missing or damaged. Over time, they were taken to build houses and roads, chipped away by visitors and taken as souvenirs. What remains represents the last in a progressive sequence of monuments erected at the site between 3000 and 1600 B.C. The Heel Stone (photo top right) is adjacent to the access road to the site. The ancient people who constructed

this monument left no written record of their accomplishments or the intended use of the stone circle. Its purpose has been widely debated and many groups have attempted to claim ownership. However, archeologists have clearly shown that the construction of Stonehenge predates the appearance of most modern cultures in Britain.

In the 1960s, Gerald Hawkins, an astronomer at the Smithsonian Astrophysical Observatory, found that each significant stone aligns with at least one other to point to an extreme position of the sun or moon ("Stonehenge Decoded," Doubleday & Company). That Stonehenge is an astronomical observatory or celestial calendar is intriguing, as the precision and architectural refinement by which it was constructed certainly suggests a significant purpose for this megalithic monument.

June History

Women in Space

On June 16, 1963, Valentina Tereshkova became the first woman in space. Shortly after Yuri Gagarin's flight, the Soviets began a search for suitable female candidates for spaceflight. With few female pilots, the majority of the candidates were women parachutists (Valentina had joined an amateur parachuting club at the age of 18). Control of the Vostok spacecraft was completely automatic, so piloting experience was not required. However, since the Vostok was not designed to return its occupant safely to Earth, the cosmonaut was required to eject from the spacecraft after re-entry and parachute to the landing site.

The selection of Valentina Tereshkova for the flight was made by Premier Khrushchev. In addition to experience and fitness, qualifications included being an ideal Soviet citizen and model Communist Party member. On June 16th, Valentina rode Vostok 6 into orbit with the call sign "Chaika" (Seagull). The mission was not without incident and included space-sickness, leg cramps and other discomforts from being strapped into the capsule for three days. More importantly, the capsule ended up in the wrong orientation and, had it not been corrected, would not have allowed her to return to Earth.

Valentina's three days in space was more flight time than all the American astronauts combined (at that time). After fulfilling her duties to her country, Tereshkova retired to a small house on the outskirts of Star City. The house was topped with a seagull weathervane, the call sign of her flight.

Twenty years later on June 18th, Sally Ride became the first American woman in space. Launched aboard the space shuttle Challenger, Sally served as the mission specialist on the five person crew.

An Extraordinary Feat

If you have ever seen a Gemini space capsule (there is one on display at the Air and Space Museum in Washington, D.C.) it is difficult to comprehend how two people could have spent any length of time inside its cramped interior (Frank Borman and Jim Lovell spent 14 days orbiting the Earth in Gemini 7). The

James A. McDivitt (foreground) and Edward H. White II inside their Gemini-4 spacecraft

reentry module, where the two astronauts sat, is approximately 11 feet long with a maximum diameter of 7½ feet and filled with instrumentation and controls.

On June 3, 1965, Gemini 4 lifted off on a four day mission. The highlight of the mission was to be a spacewalk by Ed White. NASA was very concerned with "putting guys in vacuums with nothing between them but that little old lady from Worcester, Massachusetts [the seamstress at the David Clark Company], and her glue pot and that suit." However, the Soviets had challenged the United States with a spacewalk by Cosmonaut Alexei Leonov in March during a Voskhod II mission, and the United States did not want to appear to be falling behind its adversary.

After struggling with a faulty hatch, Ed White finally exited the spacecraft as it passed over the Pacific Ocean. Using a gun powered by compressed oxygen, he was able to maneuver outside the capsule, just avoiding the flaming thrusters of the Gemini capsule. After a 23 minute spacewalk, Jim McDivitt struggled to get the six foot tall Ed White back inside the capsule and close the balky door.

Unfortunately, after making history as the first American to walk in space, Ed White died during a test of the Apollo 1 spacecraft when the pure oxygen atmosphere exploded, killing all three astronauts.

Galaxy Check

For those hockey enthusiasts, June signals the end of a long season, culminating in the award of Lord Stanley's Cup to the league's best team. As a fitting tribute, the CCD camera on the 16-inch telescope at the McCarthy Observatory was used to acquire an image of the "Hockey Stick" galaxy (NGC 4656). The galaxy is located 30 million light years away in the constellation Canes Venatici and is so named because of its peculiar shape. The distorted shape appears to have resulted from an unfortunate encounter with another nearby galaxy (NGC 4631).

Sunrise and Sunset

Sun	Sunrise	Sunset
June 1st (EDT)	05:22	20:22
June 15th	05:19	20:30
June 30th	05:23	20:32

Summer Nights

For the more adventurous and sleep deprived individuals, the summer sky sparkles as twilight deepens and the summer Milky Way rises. The Milky Way is heralded by the three stars of the summer triangle Vega, Deneb and Altair. Appearing like a gossamer stream of stars, it flows across the night sky, emptying into the constellation Sagittarius. In our light-polluted skies, it may be easier to see on nights when the Moon is absent (between the Last Quarter Moon on the 11th and the New Moon on the 19th).

High in the June sky is the constellation Hercules. Shaped like a keystone or trapezoid, Hercules is home to one of the finest globular star clusters in the northern hemisphere. The Great Hercules Cluster (M13) is a collection of several hundred thousand suns located near the galactic core of the Milky Way Galaxy at a distance of approximately 25,000 light years. Hercules rises in the evening after the constellation Boötes with its bright star Arcturus and before the constellation Lyra with its bright star Vega. The cluster can be found on the side of the keystone asterism facing Boötes.

Astronomical and Historical Events

- 1st History: launch of the ROSAT (Röntgen) X-ray observatory; cooperative program between Germany, the United States, and United Kingdom; among its many discoveries was the detection of X-ray emissions from Comet Hyakutake (1990)
- 2nd History: launch of the Mars Express spacecraft and ill-fated Beagle 2 lander (2003)
- 2nd History: launch of the Space Shuttle Discovery (STS-91); ninth and final Mir docking (1998)
- 2nd History: launch of Soviet Venus orbiter Venera 15; side-looking radar provided high resolution mapping of surface in tandem with Venera 16 (1983)
- 3rd Moon at perigee (closest distance from Earth)
- 3rd History: launch of Gemini 4; Ed White becomes first American to walk in space (1965)
- 3rd History: launch of Gemini 9 with astronauts Thomas Stafford and Eugene Cernan (1966)
- 3rd History: dedication of the 200-inch Hale Telescope at Palomar Mountain (1948)
- 4th Full Moon (Strawberry Moon)
- 4th History: maiden flight of Space X's Falcon 9 rocket; launched from Cape Canaveral, Florida (2010)
- 5th Venus crosses (transits) the face of the Sun; only the start of the transit will be visible from the east coast just prior to sunset
- 5th Distant flyby of Saturn's moons *Pallene*, *Prometheus*, *Pandora*, *Mimas*, *Daphnis* and *Atlas* by the Cassini spacecraft
- 6th History: launch of Soviet Venus orbiter Venera 16; side-looking radar provided high resolution mapping of surface in tandem with Venera 15 (1983)
- 7th Flyby of Saturn's largest moon *Titan* by the Cassini spacecraft
- 8th History: New Horizons spacecraft, on its way to Pluto, crosses the orbit of Saturn (2008)
- 8th History: launch of Soviet Venus orbiter/lander Venera 9; transmitted the first black and white images of the surface of Venus (1975)
- 8th History: Giovanni Cassini born, observer of Mars, Jupiter and Saturn (1625)
- 9th **Second Saturday Stars/Open House at the McCarthy Observatory 8:00 to 10:00 pm**
- 9th Kuiper Belt Object 28978 *Ixion* at Opposition (39.884 AU)
- 10th History: launch of Mars Exploration Rover A (Spirit) in 2003
- 10th History: launch of Explorer 49, Moon orbiter and radio astronomy explorer (1973)
- 11th Last Quarter Moon
- 11th History: flyby of Venus by Soviet spacecraft Vega 1 on its way to Comet Halley; dropped off lander and a balloon to study middle cloud layers (1985)

Astronomical and Historical Events (continued)

12th History: launch of Venera 4, Soviet Venus lander; first to enter atmosphere of another planet (1967)
13th History: return of the sample capsule from the Hayabusa (MUSES-C) spacecraft (2010)
14th Kuiper Belt Object 50000 *Quaoar* at Opposition (42.082 AU)
14th History: launch of Mariner 5; Venus flyby mission (1967)
14th History: launch of Venera 10; Soviet Venus orbiter/lander (1975)
15th Moon at apogee (furthest distance from Earth)
15th History: flyby of Venus by Soviet spacecraft Vega 2 on its way to Comet Halley; dropped off lander and a balloon to study middle cloud layers (1985)
16th History: Valentina Tereshkova; first woman in space aboard Soviet Vostok 6 (1963)
17th History: discovery of the Dhofar 378 Mars Meteorite (2000)
18th History: launch of the Lunar Reconnaissance Orbiter (LRO) and Lunar CRater Observation and Sensing Satellite (LCROSS) to the Moon (2009)
18th History: Sally Ride becomes the first American woman in space aboard the Space Shuttle Challenger (1983)
19th New Moon
19th History: flyby of Earth by the ill-fated Nozomi spacecraft on it way to Mars (2003)
20th History: discovery of Nova 1670 in Vulpeculae (1670)
21st Summer Solstice at 11:11 UT (7:11 am EDT)
22nd History: launch of Soviet space station Salyut 5 (1976)
25th Kuiper Belt Object 2002 MS_4 at Opposition; a Trans-Neptunian object discovered in 2002 by Chad Trujillo and Michael E. Brown (46.080 AU)
25th History: Rupert Wildt born, German-American astronomer and first to hypothesize that the CO_2 in the Venusian atmosphere was responsible for the trapped heat (1905)
25th History: Hermann Oberth born, father of modern rocketry and space travel (1894)
26th First Quarter Moon
26th History: Charles Messier born, famed comet hunter (1730)
27th Distant flyby of Saturn's largest moon *Titan* by the Cassini spacecraft
27th History: discovery of the Mars meteorite SAU 060, a small 42.28 g partially crusted grey-greenish stone found near Sayh al Uhaymir in Oman (2001)
27th History: flyby of the asteroid *Mathilde* by the NEAR spacecraft (1997)
27th History: Alexis Bouvard born, French astronomer, director of Paris Observatory, postulated existence of eighth planet from discrepancies in his astronomical tables for Saturn and Uranus. Neptune was subsequently discovered by John Couch Adams and Urbain Le Verrier after his death where he had predicted (1767)
28th Distant flyby of Saturn's moon *Tethys* by the Cassini spacecraft
28th History: Nakhla meteorite fall in Egypt (Mars meteorite), a piece of which was claimed to have vaporized a dog; first direct evidence of aqueous processes on Mars; (1911)
28th History: launch of SEASAT 1, first Earth-orbiting satellite designed for remote sensing of Earth's oceans (1978)
29th Dwarf Planet 134340 Pluto at Opposition, rising opposite the setting Sun and visible all night (31.240 AU)
29th History: George Ellery Hale born, founding father of the Mt. Wilson Observatory (1868)
30th History: death of 3 cosmonauts in Soyuz 11 when capsule depressurizes on reentry – capsule was too cramped for cosmonauts to wear spacesuits (1971)
30th History: Tunguska Explosion Event (1908)

References on Distances

• The apparent width of the Moon (and Sun) is approximately one-half a degree (½°), less than the width of your little finger at arm's length which covers approximately one degree (1°); three fingers span approximately five degrees (5°)

• One astronomical unit (AU) is the distance from the Sun to the Earth or approximately 93 million miles

International Space Station/Space Shuttle/Iridium Satellites

Visit www.heavens-above.com for the times of visibility and detailed star charts for viewing the International Space Station, the Space Shuttle (when in orbit) and the bright flares from Iridium satellites.

Solar Activity

For the latest on what's happening on the Sun and the current forecast for flares and aurora, check out www.spaceweather.com.

Cover Photo

With the transit well underway by the time the Sun rose on June 8, 2004 on the east coast of North America, the planet Venus approaches the western limb of the Sun. This year, observers on June 5th will see the planet starting its transit just before sunset on the east coast.

Image by Bill Cloutier from New Milford, Connecticut

All other non-credited photos were taken by the author: Bill Cloutier

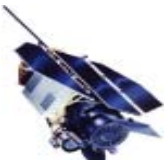

Second Saturday Stars
FREE EVENT
Every Month at the
John J. McCarthy Observatory
Behind the New Milford High School
860.946.0312
www.mccarthyobservatory.org
Place of the Orion Nebula
June 9th
8:00 - 10:00 pm
Kid's Night
• Astronomy Journal Series •
Sketching the Night Sky
Refreshments
Family Entertainment
Activity Center
Stars & Planets
Rain or shine
S.Ross
Map
LARSON RD.
RT. 7
SULLIVAN RD.
New Milford High School
Observatory
CANDLEWOOD LAKE RD. S
RT. 7
art & design · sean ross · rossdesign@charter.net

June 2012

Celestial Calendar

Phases of the Moon

June 4 June 11 June 19 June 26

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1  Launch of ROSAT (Röntgen) X-ray observatory (1990)	**2** Launch of Soviet Venus Orbiter, Venera 15 to map surface of Venus, in tandem Venera 16 (1983)   Launch of Mars Express spacecraft and ill-fated Beagle 2 lander. (2003)
3  Moon at perigee (closest to earth) 200-inch Hale Telescope dedication (1948)   Gemini 9 launch, Thomas Stafford, Eugene Cernan. (1966) Launch of Gemini 4; Ed White 1st American to walk in space (1965) 	**4**  Full Strawberry Moon  Maiden flight of Space X Falcon 9 rocket (2010)	**5**  Venus transits the Sun - last time until 2117 (check JJMO for viewing events).	**6**  Venera 16 - last of Soviet Venus orbiter/ lander missions to map Venusian landscape (1983)	**7**  Scheduled launch of a Russian Kanopus-V (Kanopus-Vulkan) and Belorussian Belka 2 remote sensing satellites to monitor natural and man-made environmental and weather phenomena.	**8**  Giovanni Cassini born, observer of Mars, Jupiter and Saturn (1625)  Launch of Venera 9, - 1st black/white images of surface of Venus (1975)	**9**  2nd Saturday Stars Open House McCarthy Observatory
10  Launch of Explorer 49 - moon orbiter and radio astronomy explorer (1973) Launch of Mars Exploration Rover A Spirit (2003) 	**11**  Flyby of Venus by Soviet spacecraft Vega 1 on its way to Comet Halley - dropped off lander and a balloon to study middle cloud layers (1985)	**12**  Launch of Venera 4, Soviet Venus lander, first to enter orbit of another planet (1967)	**13**  Return of sample capsule from the Hayabusa (MUSES-C) spacecraft, taken from near-Earth asteroid Itokawa (2010)	**14**  Launch of Mariner 5, Venus flyby mission (1967) Launch of Venera 10, Soviet Venus orbiter/lander (1975)	**15**  Moon at Apogee (farthest from earth)  flyby of Venus by Soviet spacecraft Vega 2 on its way to Comet Halley; dropped off lander and a balloon to study middle cloud layers (1985)	**16**  Valentina Tereshkova, 1st woman in space 1963
17  Discovery of the Dhofar 378 Mars meteorite (2000)	**18**  Sally Ride, 1st U.S. woman in space (1983) Launch of Lunar Reconnaissance Orbiter and LCROSS satellite to Moon (2009) 	**19**  Flyby of Earth by the ill-fated Nozomi spacecraft on its way to Mars (2003)	**20**  Discovery of Nova 1670 in Vulpeculae by Pere Dom Voiture Anthelme, a Carthusian monk in Dijon, France(1670)	**21**  Summer Solstice 11:11 UT (7:11 EDT)	**22**  Royal Greenwich Observatory founded (1675) Discovery of Pluto's largest moon Charon by Jim Christy (1978)   Launch of Soviet space station Salyut 5 (1976)	**23**  Martin John Rees born, British cosmologist and astrophysicist, has contributed to knowlege of the cosmic background radiation, galaxy clustering and formation, and on the final disproof of Steady State theory. (1942)
24 Fred Hoyle born, British astronomer and proponent of nucleosynthesis (1915)   Sir William Huggins makes 1st photographic spectrum of a comet (1881)	**25** Rupert Wildt born, German astronomer (1905)   Hermann Oberth born, father of modern rocketry and space travel (1894)	**26**  Charles Messier born, famed comet hunter (1730) German astronomer Walter Baade discovers near-earth asteroid 1566 Icarus inside orbit of Mercury, which became the subject of asteroid-busting "project Icarus." (1949) 	**27** Alexis Bouvard born, postulated existence of 8th planet, later identified as Neptune (1767) Flyby of the asteroid Mathilde by the NEAR spacecraft (1997)	**28** Nakhla meteor fall in Egypt - A piece of Mars object fabled to have hit dog (1911) launch of SEASAT 1, first Earth-orbiting satellite designed for remote sensing of Earth's oceans (1978)	**29** George Ellery Hale born, founding father of Mt. Wilson Observatory (1868) Shuttle Atlantis docks with Russian space station Mir to form the largest man-made satellite ever to orbit the Earth - the second time ships from two countries had linked up in space (1995). Dwarf Planet 134340 Pluto at Opposition, rising opposite the setting Sun and visible all night (31.038 AU) 	**30** Death of 3 cosmonauts in Soyuz 11 when capsule depressurizes in reentry (1971) Tunguska explosion event (1908)