

# **G***alactic Observer*

John J. McCarthy Observatory

Volume 6, No. 10

October 2013

## ***Looks can be Deceiving***



At 63 light years from Earth, exoplanet HD 189733b would appear ideal for a warp drive vacation, except for the weather - temperatures over 1000 degrees Celsius and raining glass driven by 7000 Kilometer winds. This artist's impression is based on successive observations of the planet's orbit of its host star, not from an AAA guidebook.

For more information, go to <http://sci.esa.int/hubble/52045-hubble-spots-azure-blue-planet-heic1312/>.

Source: NASA, ESA, M. Kornmesser

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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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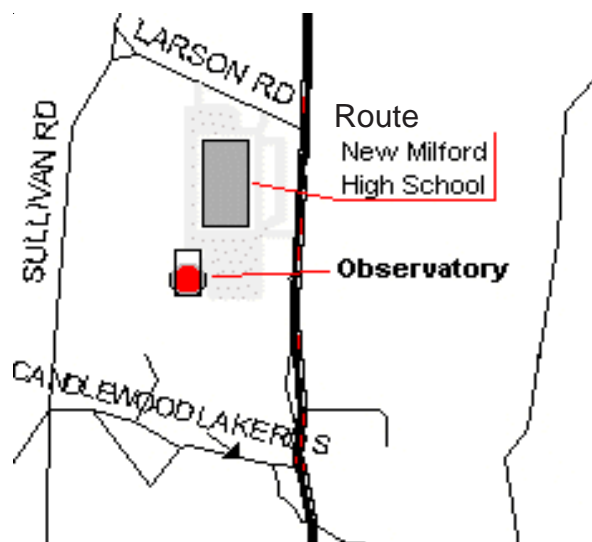
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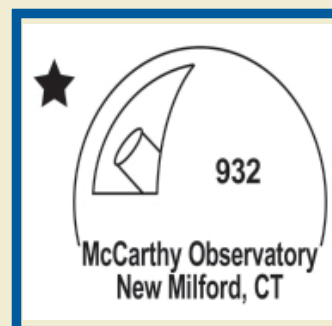
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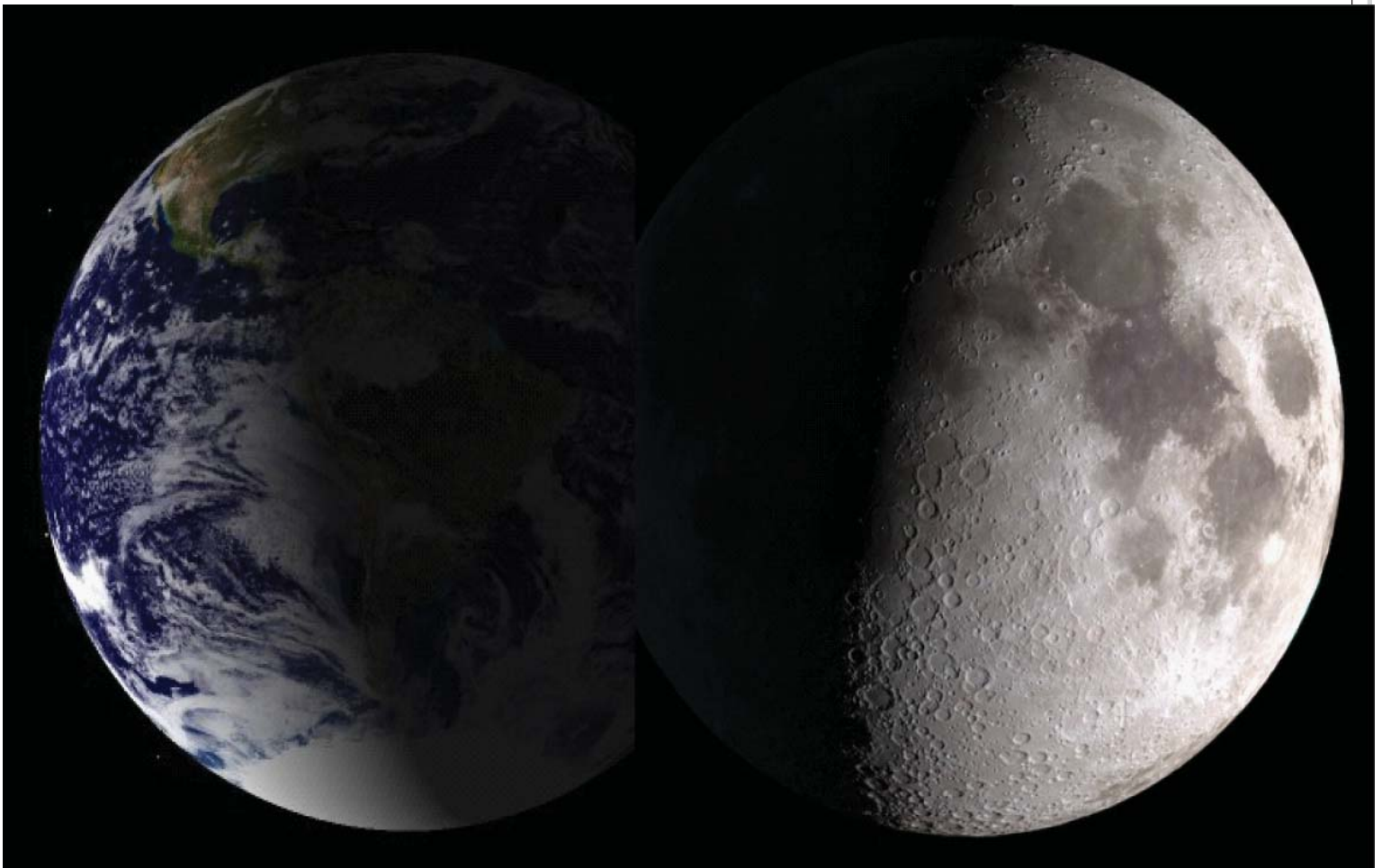


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# October Calendar and Space Exploration Almanac



## International Observe the Moon Night

Earth viewed from the Moon on the 12th, as generated by  
the JPL Solar System Simulator

*<http://space.jpl.nasa.gov/>*

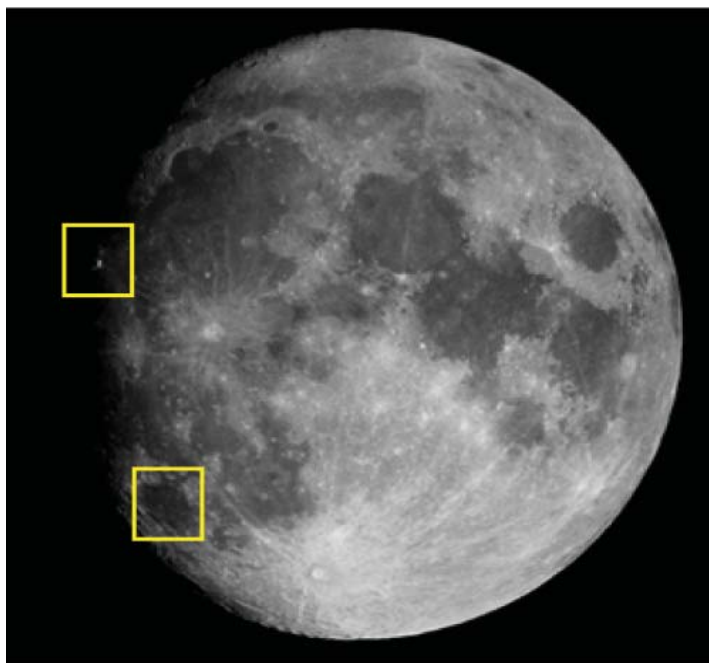
Moon viewed from the Earth on the 12th, as generated  
by the NASA/Goddard Space Flight Center Scientific  
Visualization Studio, Moon Phase and Libration 2013

*<http://svs.gsfc.nasa.gov/vis/a000000/a004000/a004000/>*



## "Out the Window on Your Left"

It's been over 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. Still, 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).

Sir Frederick William Herschel was a German-born British astronomer (1738–1822), best known for his discoveries of the planet Uranus, two of its moons (Titania and Oberon), and two of Saturn's moons (Enceladus and Mimas). He also discovered and catalogued thousands of double stars, star clusters and nebula through his home-



built telescopes, initially as an amateur, and later as the "King's Astronomer" to King George III.

While an exceptionally devoted and keen observer, Herschel occasionally engaged in wild speculation, both privately in his journals and in open letters to colleagues. In April 1787, Herschel reported having seen three active volcanoes

on the Moon in a letter to the Royal Society of London. The volcanoes were observed by Herschel on the nights of April 19<sup>th</sup> and 20<sup>th</sup>, one and two days, respectively, past the New Moon. The brightest, described as "an eruption of fire, or luminous matter" was in the vicinity of Aristarchus crater. The French astronomer, Joseph Jérôme Lalande, a frequent correspondent with Herschel, dismissed the observations as reflections of Earthlight. Following Lalande's rebuff, Herschel made no further public assertions regarding lunar volcanism (quite possibly since Lalande had previously suggested that Uranus be named Herschel in honor of its discoverer.)

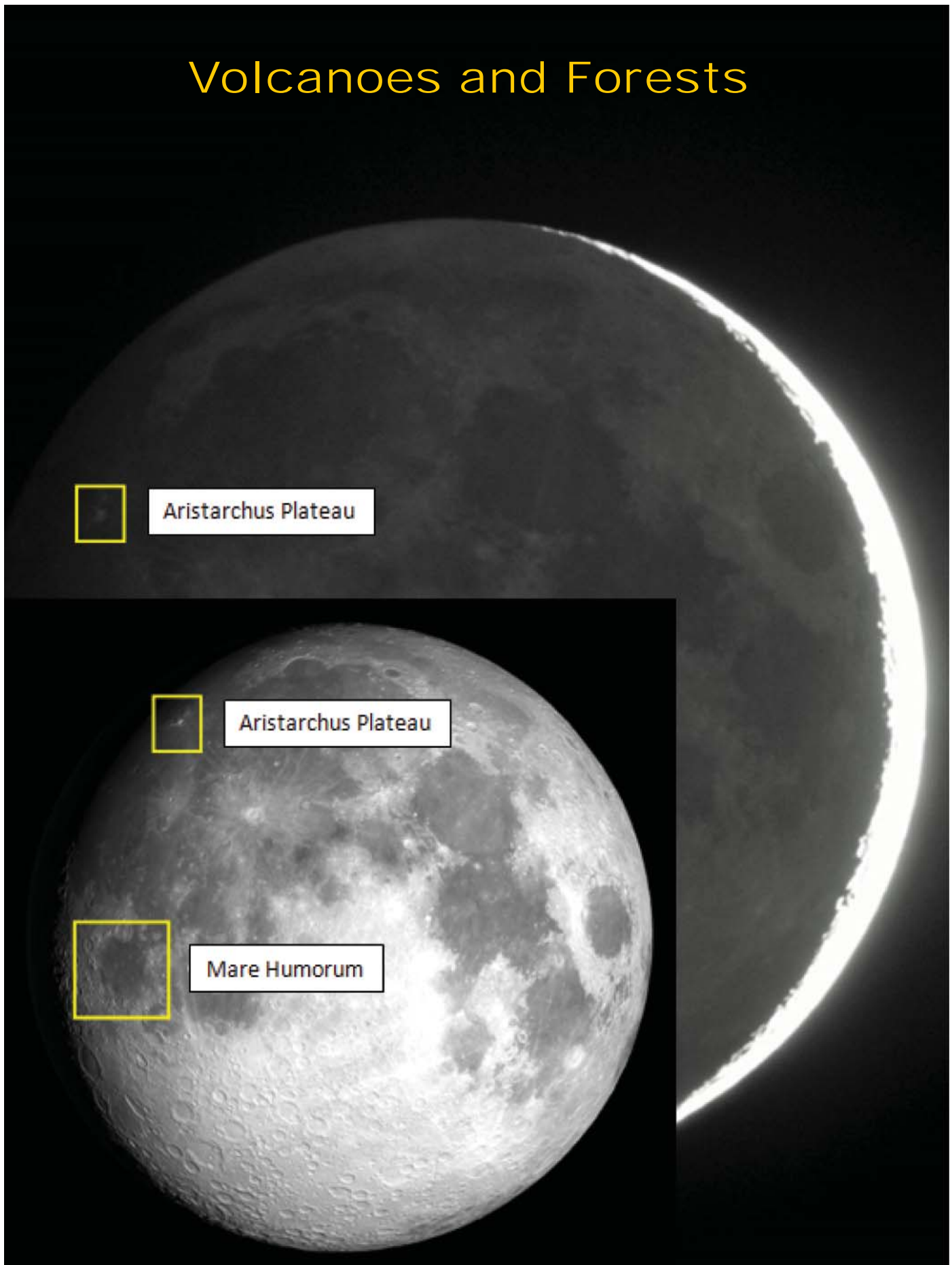
Today, while the Moon is not known to have active volcanoes, observers still report transient lunar phenomena (or TLPs), most notably in the vicinity of the Aristarchus plateau. These short-lived, bright features are thought to be caused by the outgassing of subsurface gas deposits, supported by the detection of radon gas by NASA's Lunar Prospector spacecraft in the vicinity of the Aristarchus crater (and Kepler crater). The gas clouds would be illuminated by sunlight (or Earthlight), making them visible to an observer.

Less credible were Herschel's private musings on lunar life, cities and forests (and even life on the Sun). Journal entries describe his observations of forests of vegetation in Mare Humorum (Sea of Moisture) and contemplation of how massive such vegetation would need to be to be visible from Earth. Herschel also surmised that the Moon's craters were actually towns and cities, built and occupied by Lunarians. Fortunately, he kept these sentiments to himself.



A series of sketches of imagined life on the Moon, published in the New York Sun in 1835, were falsely attributed to Herschel. A slightly more credible novel by Edgar Allen Poe described a hot air balloon trip to the Moon. Source: *Wikipedia*.

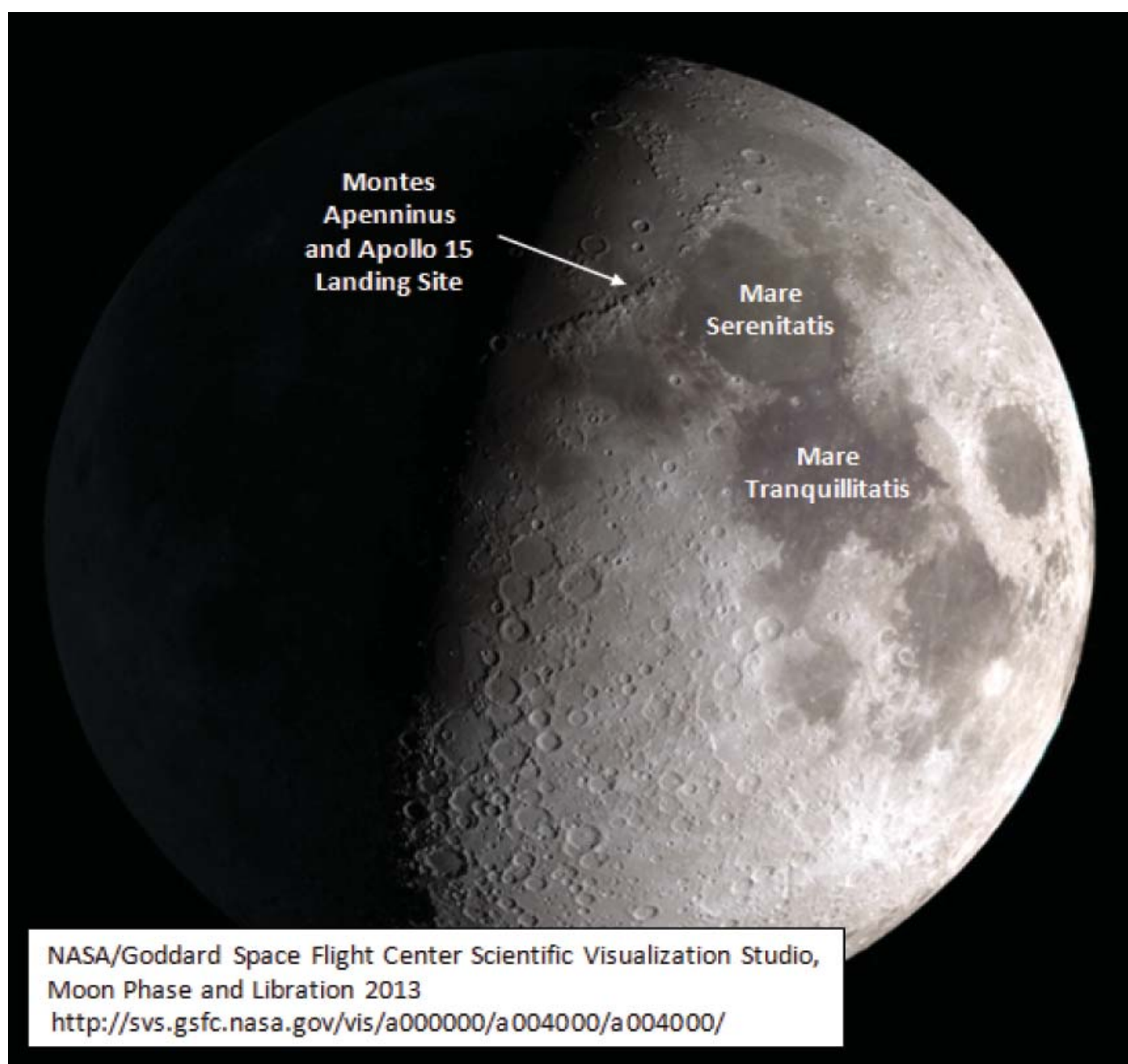
# Volcanoes and Forests



## International Observe the Moon Night

October 12<sup>th</sup> is the fourth annual International Observe the Moon Night (InOMN). The event was first inspired by public outreach events held in August 2009 by the Lunar Reconnaissance Orbiter (LRO) and Lunar CRater Observation and Sensing Satellite (LCROSS) educational teams at the Goddard Space Flight Center in Greenbelt, Maryland and at the Ames Research Center in Moffett Field, California, respectively. In 2010, the Lunar and Planetary Institute and Marshall Space Flight Center joined Goddard and Ames in a world-wide event to raise public awareness of lunar science and exploration. Additional information on scheduled events can be found on <http://observethemoonnight.org/>.

This year, observers will be treated to an 8-day old Moon, with sunrise (the terminator) crossing Mare Imbrium (Sea of Showers), just west of the Apennine Mountains and the landing site of Apollo 15.





## Uranus at Opposition

Uranus reaches Opposition on the 3<sup>rd</sup>, rising with the setting Sun and visible all night. It was the first planet to be discovered in the age of the telescope, although it can be seen with the naked eye under ideal conditions. The seventh planet from the Sun had been observed on several occasions in 1690 by English astronomer John Flamsteed (and mistaken for a star) and between 1750 and 1769 by French astronomer

Pierre Lemonnier before it was “discovered” by William Herschel in 1781, although he reported his discovery as a new comet. It wasn't until other observers had established a nearly circular orbit for the new object, and the absence of any cometary features, that Herschel conceded that he had discovered a planet.

### Uranus from Voyager 2; Image Credit: NASA/JPL

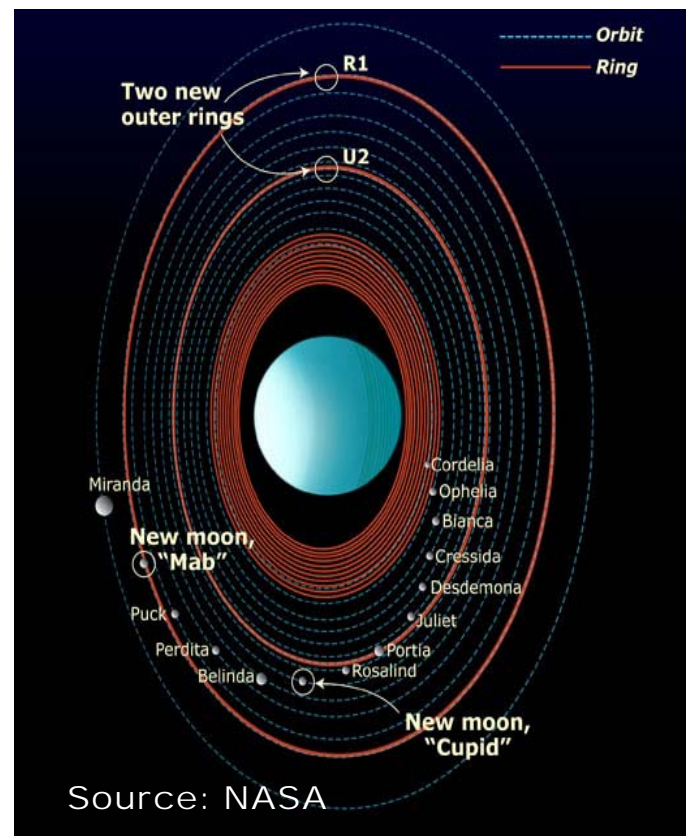
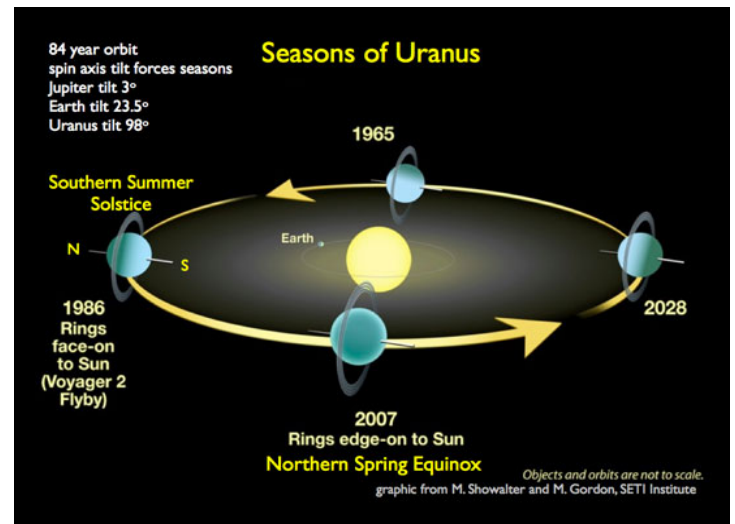
Herschel attempted to honor his patron, King George III, by naming the new planet Georgium Sidus or George's Star; however, the name was not well received outside of England. A name from mythology was eventually agreed upon, although Uranus (also known as Ouranos), is the only planet named after a Greek rather than Roman deity. Uranus was known as the god of the sky and son of Gaia. He was also the father of Cronus (Saturn), and grandfather of Zeus (Jupiter).

Uranus has several unique characteristics. Its axis is tilted more than 90°, quite possibly the result of an ancient impact, so at times during its orbit around the Sun, one pole or the other is pointed towards the Sun. Its magnetic field is also tilted from its rotational axis and is offset from the planet's center.

While its year is long, its day is short, spinning rapidly every 17 hours and 14 minutes. Seasons during the 84 year long orbit are 21 years in length, with significant portions of the planet in perpetual light or darkness. Closer to the Sun than Neptune, Uranus is the coldest planet in the solar system (Neptune generates more internal heat). While primarily composed of hydrogen and helium, it has more methane in its atmosphere than the gas giants Jupiter and Saturn, as revealed in its bluish tint. Uranus and Neptune both have icy mantles and are sometimes referred to as ice giants.

Uranus has a low density; only Saturn is less dense. Like Saturn, Uranus has a ring system - although they

are much darker, as compared to Saturn's bright ice rings. Twenty-seven moons have been discovered in orbit around Uranus, only five of significant size. Its largest moon, Titania, is less than 1,000 miles in diameter, less than half that of Earth's moon. Unlike most moons in the solar system which are named after mythological characters, the moons of Uranus are named after characters from the works of William Shakespeare and Alexander Pope.



In 2006, the Hubble Space Telescope photographed a new pair of rings and two new, small moons orbiting the planet. The rings and one of the moons are so far from the planet that they are considered a "second ring system."

## Nova in Delphinus

A classical nova (Latin for “new”) occurs when a white dwarf star in a binary system accumulates enough material (hydrogen) from its companion star to produce a thermonuclear explosion on its surface. The explosion causes a brief, but dramatic, increase in the star’s brightness. The process can be repeated again and again as the white dwarf accumulates additional hydrogen. Novae that brighten to be visible to the naked eye occur every 10 years on average.

Koichi Itagaki of Yamagata, Japan, discovered this type of nova in an image he had taken on August 14<sup>th</sup> (the star not being visible in a similar image taken the previous night). The 17<sup>th</sup> magnitude star brightened by a factor of 100,000, reaching 4.5 magnitude before slowly fading.

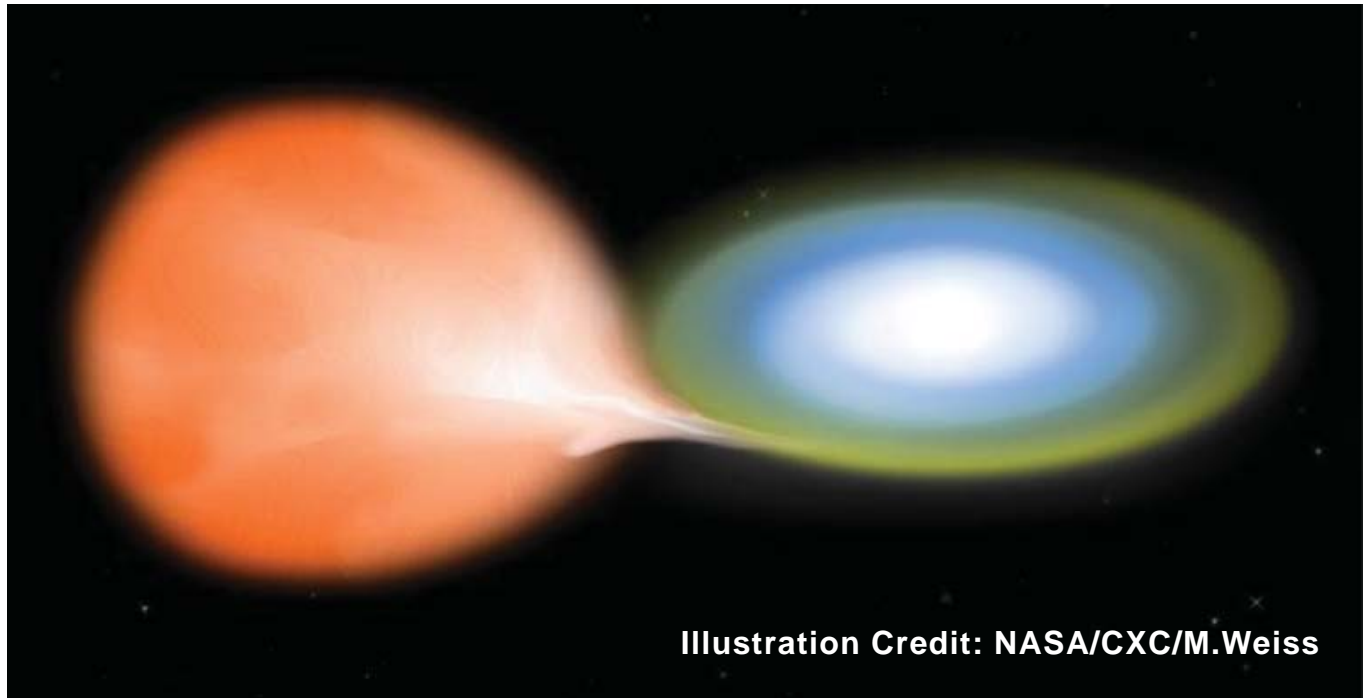
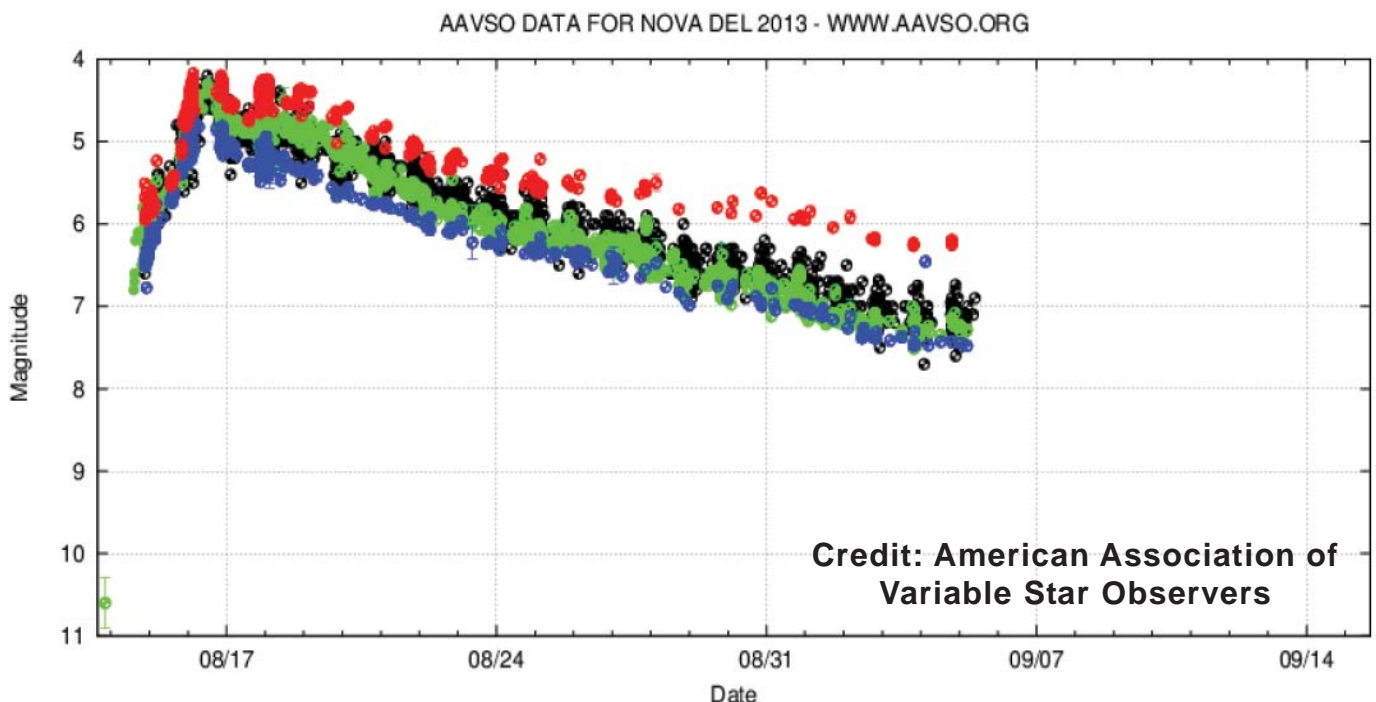


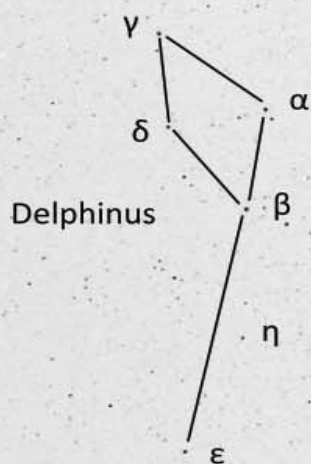
Illustration Credit: NASA/CXC/M.Weiss





## Nova Delphini 2013 Imaged on August 23, 2013

Nova Delphini 2013



• Altair

30 sec guided exposure,  
Nikon D-80, 50 mm

## Quest for a Reusable Single Stage to Orbit Rocket

Twenty years ago, a prototype of a reusable, single-stage-to-orbit space vehicle took to the skies



**Photo Credit: NASA**  
First flight of the DC-X at  
the White Sands Missile  
Range, New Mexico

of New Mexico. The DC-X (Delta Clipper Experimental) was a proof-of-concept vehicle constructed by McDonnell Douglas in conjunction with the Department of Defense's Strategic Defense Initiative Organization. The first flight lasted only 59 seconds, but conceptually demonstrated the spacecraft's ability to take off and return in a vertical configuration.

The vehicle and technology were transferred to NASA in 1996. Its successor, the DC-XA, was an upgraded version, with an improved control system. On June 8, 1996, the vehicle set an altitude and duration record, flying to a height of more than 10,000 feet during 142 seconds of flight. Unfortunately, the vehicle was

severely damaged on its next (and last) flight when a fire, fed by a cracked liquid oxygen tank, engulfed a toppled vehicle after a landing strut failed. Political wrangling within NASA, pressure from competitors, and budget cuts ultimately led to the program's cancellation.

Since that time, there have been attempts to resurrect the reusable single-stage-to-orbit space vehicle, with mixed success. Several of the engineers who worked on the DC-X went on to work for Blue Origin.

Blue Origin, owned by Amazon.com founder and businessman Jeff Bezos, is developing reusable, suborbital and orbital launch vehicles that can take off and land vertically. The first in a planned series of "New Shepard" launch vehicles, designated "Goddard," has been tested at a remote facility in western Texas. A sub-scale version of the vehicle made its first flight in 2006.

In 2012, the company demonstrated a pad escape by ejecting a full-scale crew capsule from the launch vehicle. The capsule reached an altitude of 2,300 feet before safely returning to Earth by parachute.

Blue Origin is currently working on a new vehicle capable of carrying crew and cargo into space. Once in space, the crew module will separate from the propulsion module and return to the launch site (a powered landing). The crew capsule will return by parachute. Both components are designed for reuse.



**Photo Credits: Blue Origin, LLC**  
Launch of the Propulsion Module



Masten Space Systems, Inc. (Masten) is another company working on a reusable vertical takeoff and vertical landing vehicle. Their current vehicle (Xaero) is capable of carrying

small payloads to an altitude of approximately 18 miles. The next generation vehicle, Xogdor, will be capable of attaining an altitude of 60 miles.



**Photo Credit: Masten Space Systems Xaero-B Spacecraft**



A newcomer to the competition, but no less qualified, is Space X. Known for its Falcon rocket boosters and ISS servicing missions, Space X is also tinkering with a vertical launch vehicle, code name “Grasshopper.” On August 13, 2013, Grasshopper flew to an altitude of approximately 800 feet before moving laterally 300 feet and returning back to the launch pad.

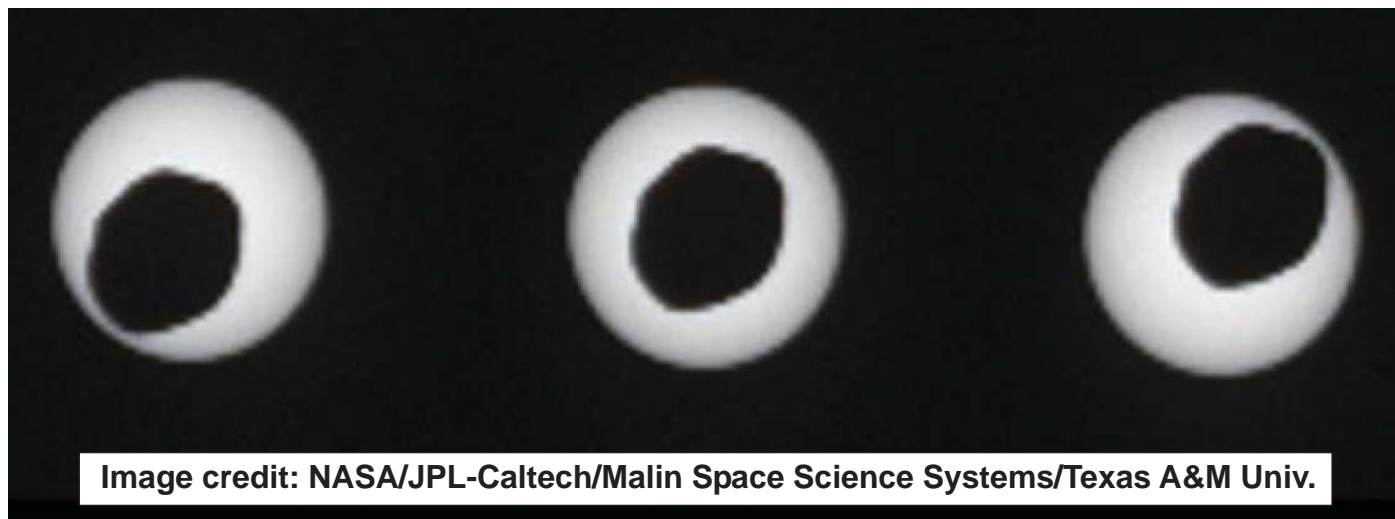
Standing 106 feet high and powered by a single Merlin 1D engine, the rocket uses many of the Falcon’s components. Space X plans to move to the White Sands Missile Range in New Mexico for high altitude, high speed testing. Ultimately, the lessons learned from Grasshopper will be used to develop reusable versions of the Falcon 9 and Falcon Heavy boosters.

**Photo Credit: Space X  
Grasshopper Spacecraft**



### Eclipse Watching on Mars

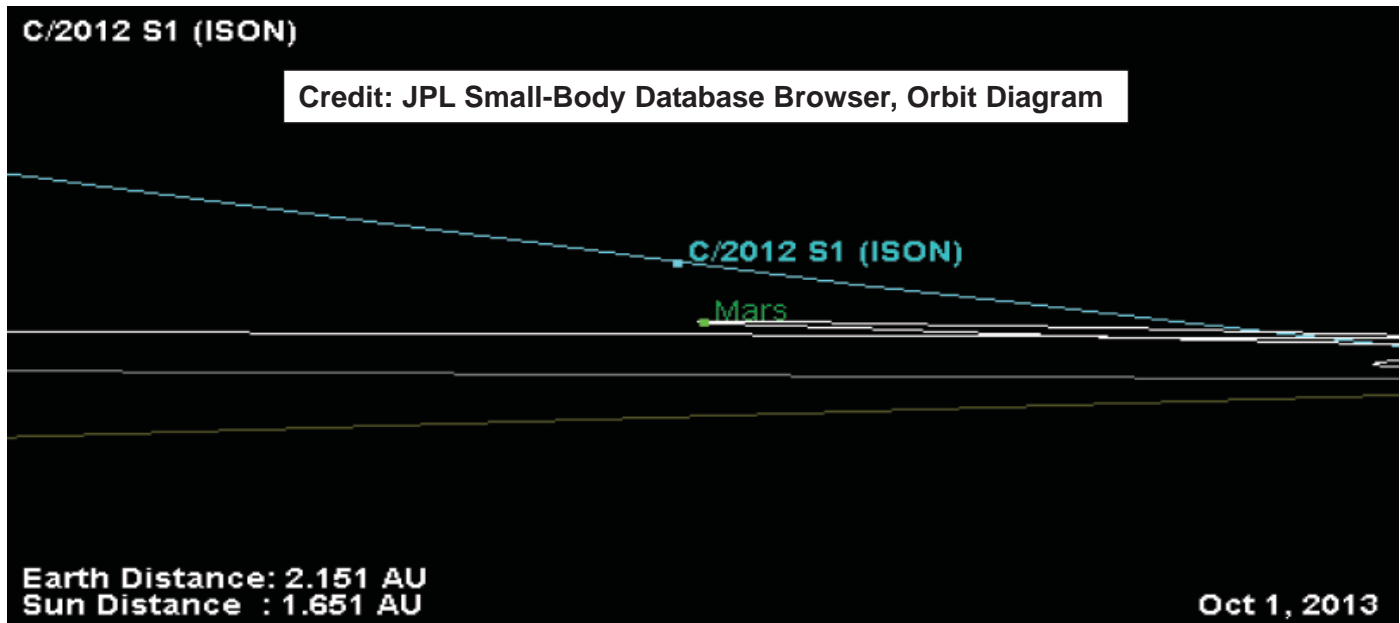
The Mars rover Curiosity took a break from its exploration of Gale crater on August 17<sup>th</sup> to record Phobos (the larger of the two Martian moons), passing in front of the Sun. The three images (below) were taken three seconds apart and show the irregular shaped moon traversing the solar disk. The observations will be used to refine Phobos’ orbit.



**Image credit: NASA/JPL-Caltech/Malin Space Science Systems/Texas A&M Univ.**

## Comet Watching on Mars

Earth-bound viewers will have to wait until late November or early December for optimal views of comet ISON, as it heads for a close encounter with the Sun. Martian observers, however, will have a front row seat as ISON passes within 6.5 million miles (10.4 million km) of the Red Planet on October 1<sup>st</sup>, six times closer than its closest approach to Earth (assuming it survives).



## Martian Invasion

In the late 1930s, a critically acclaimed New York drama company was founded by Orson Welles and John Houseman (with total monetary assets of \$100). Together, they produced “The Mercury Theatre on the Air.” The first show was broadcast on CBS radio in July 1938. Originally without a sponsor, the program was picked up by Campbell’s Soup after the October 30<sup>th</sup> broadcast of H.G. Wells’ “War of the Worlds.” Orson Welles’ adaptation incorpo-

rated simulated news bulletins of a Martian invasion during a seemingly ordinary broadcast of a local orchestra. Many listeners panicked, fearing a real Martian invasion and the reported destruction of Grovers Mill, New Jersey. While the production was strongly denounced for its deceptive tactics, it did propel the 23 year old Welles on his way to fame and fortune.

You can download the complete radio broadcast at <http://www.mercurytheatre.info/>.



## Autumnal Conjunctions

A setting crescent moon and the planet Venus (captured on September 8<sup>th</sup>) will once again be near the western horizon on the nights of October 7<sup>th</sup> and 8<sup>th</sup>, although the separation between the two celestial bodies will be greater.



10 sec exposure,  
Nikon D-80, 220 mm



## On Its Way

It came out of the trees along the southwest horizon, glowing like a hot ember, and then disappeared. It materialized again several seconds later, continuing along an eastern trajectory, arcing through a star-studded sky, leaving a lingering, ghostly trail.

The clear night sky along the east coast on September 6<sup>th</sup> provided spectators the opportunity to witness the launch of NASA's Lunar Atmosphere and Dust Environment Explorer (LADEE) spacecraft aboard a Minotaur 5 rocket from Wallops Island, Vir-

ginia. Bound for the Moon, the five stage rocket was clearly visible from Connecticut around 11:30 p.m. The launch was picture perfect with all five stages performing as expected. The 844 pound spacecraft successfully separated from the rocket and started its month long journey and rendezvous with the Moon.

The image (below) was a 10 second exposure showing the firing of the third stage as the rocket streaked across the southern sky (as seen from New Milford, Connecticut).



## The Solar Cycle

The Sun's activity waxes and wanes on an eleven year cycle. One measure of activity is the number of sunspots on the side of Sun facing Earth. The abundance correlates with the total solar irradiance (brightness summed across all wavelengths), solar wind pressure and solar radio emissions. As with weather on Earth, solar weather can be unpredictable.

The current Solar Cycle 24 was originally expected to begin in 2008. Instead of the activity increasing, the Sun defied expectations and headed into a deeper minimum. There were no sunspots observed on 266 of that year's 366 days (73%) (the least active period since 1913). A comparable spotless period (71%) followed in 2009. Solar activity returned in 2010 with only 14% of the days without a visible sunspot, followed by a near continuous parade of sunspots across the solar disk in 2011 and 2012. As we await solar maximum, solar activity is now at an unanticipated low level. Clearly, our understanding of our nearest star is incomplete.

### Imagination and Vision

One hundred and fourteen years ago (1899), on a quiet October afternoon in Worcester, Massachusetts, a 17 year old Robert Goddard climbed a tall cherry tree in the backyard to trim some dead limbs. From high in the tree, he looked out upon the horizon and imagined how wonderful it would be to create a means of traveling to the planet Mars. Twenty-seven years later, in 1926, Goddard would launch the world's first liquid fuel rocket from a field in nearby Auburn. Today he is considered one of the founding fathers of modern rocketry.

### October Nights

As the nights grow longer and cooler our view of the night sky begins to change. Summer evenings showcase our own galaxy, the Milky Way. The center of our spiral galaxy is in the direction of the constellation Sagittarius, which appears in the southern sky throughout the summer. In the autumn, as Sagittarius disappears into the west, the stars forming the Great Square of Pegasus rise in the east. Following Pegasus is the Andromeda Galaxy, one of the most distant objects that can be seen with the unaided eye at approximately 2.5 million light years (14.7 million trillion miles). With the rising of Andromeda, we begin to look outward to the outer arms of our own galaxy and to other galaxies far, far away.

### Sunrise and Sunset

<u>Sun</u>	<u>Sunrise</u>	<u>Sunset</u>
October 1 <sup>st</sup> (EDT)	06:51	18:35
October 15 <sup>th</sup>	07:06	18:12
October 31 <sup>st</sup>	07:25	17:49

## Astronomical and Historical Events

- 1<sup>st</sup> History: NASA created by the National Aeronautics and Space Act (1958)
- 2<sup>nd</sup> History: opening of the Hayden Planetarium (1935)
- 3<sup>rd</sup> Uranus at Opposition; rising with the setting Sun and visible all night
- 3<sup>rd</sup> History: launch of the fifth Mercury flight, piloted by astronaut Walter Schirra (1962)
- 3<sup>rd</sup> History: fall of the Zagami Martian meteorite in Katsina Province, Nigeria; the meteorite is classified as a Shergottite and is the largest single individual Mars meteorite ever found at 40 pounds (1962)
- 3<sup>rd</sup> History: fall of the Chassigny Martian meteorite in Haute-Marne province, France; the meteorite is distinctly different from other Martian meteorites (shergottites and nakhlites) and is classified as its own subgroup – “chassignites” (1815)
- 4<sup>th</sup> New Moon
- 4<sup>th</sup> History: Japanese lunar probe “Selenological and Engineering Explorer” (SELENE) enters lunar orbit; also known as Kaguya, the spacecraft was designed to study the geologic evolution of the Moon (2007)
- 4<sup>th</sup> History: SpaceShipOne rockets to an altitude of almost 70 miles to win the \$10 million Ansari X Prize (2004)
- 4<sup>th</sup> History: launch of Luna 3; Soviet spacecraft was first to photograph the far side of the Moon (1959)
- 4<sup>th</sup> History: launch of Sputnik 1, world's first artificial satellite (1957)
- 5<sup>th</sup> History: Robert Goddard born, founding father of modern rocketry (1882)
- 6<sup>th</sup> History: Asteroid 2008 TC3 discovered by astronomers on Mt. Lemmon less than 24 hours before exploding over the Sudan. The McCarthy Observatory submitted the last accepted observation. Fragments of the asteroid were eventually recovered. (2008)
- 6<sup>th</sup> History: launch of the space shuttle Discovery and the solar polar orbiter spacecraft Ulysses (1990)
- 7<sup>th</sup> Kuiper Belt Object 303775 (2005 QU182) at Opposition (49.284 AU)
- 8<sup>th</sup> Kuiper Belt Object 19308 (1996 TO66) at Opposition (46.104 AU)
- 8<sup>th</sup> History: discovery of Supernova 1604 (Kepler's Nova) (1604)

## Astronomical and Historical Events for July (continued)

- 9<sup>th</sup> Mercury at its Greatest Eastern Elongation; apparent separation from the Sun in the evening sky (25°)
- 9<sup>th</sup> Draconids Meteor Shower peak (produced by debris from Comet Giacobini-Zinner)
- 9<sup>th</sup> History: LCROSS impacts crater Cabeus near the Moon's south pole in search of water (2009)
- 9<sup>th</sup> History: Peekskill meteorite fall; 27 pound meteorite hits a 1980 Chevy Malibu sitting in its driveway in Peekskill, NY (1992)
- 10<sup>th</sup> Moon at perigee (closest distance to Earth)
- 10<sup>th</sup> History: inauguration of the Very Large Array, one of the world's premier astronomical radio observatories; located west of Socorro, New Mexico (1980)
- 10<sup>th</sup> History: enactment of the Outer Space Treaty: 1) prohibited placement of nuclear and other weapons of mass destruction in orbit, on the Moon or other celestial body and 2) limited the use of the Moon and other celestial bodies to peaceful purposes (1967)
- 10<sup>th</sup> History: discovery of Neptune's moon Triton by William Lassell (1846)
- 11<sup>th</sup> First Quarter Moon
- 11<sup>th</sup> History: NASA's historic 100<sup>th</sup> space shuttle flight as Discovery carries the Z1 Truss (first piece of the ISS structural backbone) into space (2000)
- 11<sup>th</sup> History: Magellan spacecraft burns up in the Venusian atmosphere after completing its mission to map the planet with its imaging radar (1994)
- 11<sup>th</sup> History: launch of first manned Apollo mission (Apollo 7) with astronauts Schirra, Eisele and Cunningham (1968)
- 11<sup>th</sup> History: launch of WAC Corporal, first man-made object (16 foot rocket) to escape Earth's atmosphere (1945)
- 12<sup>th</sup> **Second Saturday Stars** and the **International Observe the Moon Night** at the McCarthy Observatory (7:00 p.m.)
- 12<sup>th</sup> Kuiper Belt Object 202421 (2005 UQ513) at Opposition (47.544 AU)
- 12<sup>th</sup> History: launch of Voskhod 1; Soviet spacecraft was first to carry multiple (3) cosmonauts (a pilot, scientist and physician) into space. Due to the cramped conditions the crew flew without spacesuits, ejection seats, or an escape tower (1964)
- 12<sup>th</sup> History: first Symposium on Space Flight held at the Hayden Planetarium in New York City; participants included Wernher von Braun, Willy Ley, and Fred L. Whipple; topics included an orbiting astronomical observatory, survival in space, circumlunar flight, a manned orbiting space station, and the question of sovereignty in outer space (1951)
- 13<sup>th</sup> History: launch of Shenzhou 6, China's second manned spacecraft (2005)
- 13<sup>th</sup> History: launch of Explorer 7; spacecraft measured solar X-rays, energetic particles, and cosmic rays (1959)
- 13<sup>th</sup> History: formation of the British Interplanetary Society by Phillip Cleator in Liverpool (1933)
- 14<sup>th</sup> Scheduled flyby of Saturn's largest moon *Titan* by the Cassini spacecraft
- 14<sup>th</sup> History: three main belt asteroids discovered by the McCarthy Observatory while searching for NEOs. 2003 TG10 (its provisional name) was subsequently named after Monty Robson (115449 Robson), the founder and director of the observatory (2003)
- 14<sup>th</sup> History: launch of Shenzhou 5, first Chinese manned spacecraft (2003)
- 14<sup>th</sup> History: Air Force Captain Chuck Yeager breaks the sound barrier in the Bell X-1 rocket plane (called "Glamorous Glennis" as a tribute to his wife). The plane reached a speed of 700 miles per hour after being launched from the bomb bay of a Boeing B-29 (1947)
- 15<sup>th</sup> Dwarf Planet Eris (formally 2003 UB313 and/or Xena) at Opposition; first Kuiper Belt object discovered to be larger than Pluto (95.476 AU)
- 15<sup>th</sup> History: launch of the Cassini spacecraft to the planet Saturn (1997)
- 16<sup>th</sup> History: launch of GOES 1, first weather satellite placed in geosynchronous orbit (1975)
- 17<sup>th</sup> Comet 2P/Encke closest approach to Earth (0.478 AU)
- 18<sup>th</sup> Full Moon (Full Hunter's Moon)



## Astronomical and Historical Events for July (continued)

- 18<sup>th</sup> History: launch of the space shuttle Atlantis (STS-34) and Galileo spacecraft to Jupiter (1989)
- 18<sup>th</sup> History: discovery of Chiron by Charles Kowal; Chiron has the characteristics of both a comet and an asteroid. These types of objects are called Centaurs after a mythological being that are half human/half horse (1977)
- 18<sup>th</sup> History: Soviet spacecraft Venera 4 enters the atmosphere of Venus; first probe to analyze the environment (in-situ) of another planet (1967)
- 18<sup>th</sup> History: discovery of Asteroid 8 Flora by John Hind (1847)
- 19<sup>th</sup> Kuiper Belt Object 55636 (2002 TX300), discovered by the Palomar Mountain Near-Earth Asteroid Tracking (NEAT) program in 2002, at Opposition (41.087 AU)
- 19<sup>th</sup> History: launch of IBEX (Interstellar Boundary Explorer) to explore the interactions between the solar wind and the interstellar medium at the edge of our solar system (2008)
- 19<sup>th</sup> History: flyby of the planet Venus by the Mariner 5 spacecraft (1967)
- 19<sup>th</sup> History: Subrahmanyan Chandrasekhar born; awarded Nobel Prize in Physics (1983) for studies of the structure and evolution of stars; NASA named its premier X-ray observatory the Chandra X-ray telescope in his honor (1910)
- 20<sup>th</sup> History: launch of the Soviet spacecraft Zond 8; moon flyby mission (1970)
- 20<sup>th</sup> History: discovery of asteroid 577 Rhea by Max Wolf (1905)
- 21<sup>st</sup> Orionids meteor shower peak (produced by debris from Comet Halley)
- 21<sup>st</sup> Scheduled launch of India's Mars Orbiter "Mangalyaan" from the Satish Dhawan Space Center, Sriharikota, India
- 21<sup>st</sup> History: opening of the Yerkes Observatory in Williams Bay, Wisconsin; home of the world's largest refractor with its 40-inch objective lens manufactured by Alvan Clark and Sons (1897)
- 22<sup>nd</sup> History launch of Chandrayaan-1, India's first mission to the Moon (2008)
- 22<sup>nd</sup> History: Soviet spacecraft Venera 9 touches down on Venus and transmits first pictures (black and white) of its surface (1975)
- 22<sup>nd</sup> History: launch of the Soviet Moon orbiter Luna 12 to take high-resolution photos of the Moon's surface from lunar orbit (1966)
- 23<sup>rd</sup> Kuiper Belt Object 15760 (1992 QB1); first resident of the Kuiper Belt found beyond Pluto at Opposition (40.188 AU)
- 23<sup>rd</sup> History: first time female commanders led orbital missions at the same time: Pamela Melroy commanded space shuttle Discovery (STS-120) to the ISS while Peggy Whitson led the Expedition 16 team aboard the ISS in the installation of a new orbital node (2007)
- 24<sup>th</sup> History: launch of Chang'e-1, Chinese lunar orbiter, from the Xichang Satellite Launch Center in the southwestern province of Sichuan (2007)
- 24<sup>th</sup> History: launch of Deep Space 1; first of a series of technology demonstration probes developed by NASA's New Millennium Program; propulsion was provided by a xenon ion engine that operated for a total of 16,265 hours (1998)
- 24<sup>th</sup> History: discovery of Uranus' moons Umbriel and Ariel by William Lassell (1851)
- 25<sup>th</sup> Moon at apogee (furthest distance from Earth in its orbit)
- 25<sup>th</sup> History: launch of the twin Solar Terrestrial Relations Observatories (STEREO A and B); 3-D studies of the Sun and coronal mass ejections (2006)
- 25<sup>th</sup> History: Soviet spacecraft Venera 10 touches down on Venus 2,200 km from its twin Venera 9; lands on a flat boulder that was determined to be similar in composition to basalt on Earth (1975)
- 25<sup>th</sup> History: discovery of Saturn's moon Iapetus by Giovanni Cassini (1671)
- 26<sup>th</sup> Last Quarter Moon
- 27<sup>th</sup> History: first test flight of the Saturn I rocket (1961)
- 27<sup>th</sup> History: Canon City meteorite fall; hit garage (1973)
- 28<sup>th</sup> History: first test flight of the Ares I-X rocket; a two minute powered suborbital flight (2009)
- 28<sup>th</sup> History: launch of Prospero spacecraft, Great Britain's first space launch (1971)

### Astronomical and Historical Events for July (continued)

- 29<sup>th</sup> History: launch of the space shuttle Discovery (STS-95) with astronaut and then U.S. Senator, John Glenn (1998)
- 29<sup>th</sup> History: flyby of asteroid Gaspra by the Galileo spacecraft on mission to Jupiter (1991)
- 30<sup>th</sup> History: discovery of the Los Angeles (Mars) Meteorite (1999)
- 30<sup>th</sup> History: launch of Venera 13, Soviet Venus lander; lander survived for 127 minutes on the surface where the temperature was recorded at 855 °F (1981)
- 30<sup>th</sup> History: Mercury Theatre broadcasts Orson Welles' adaptation of H.G. Wells "War of the Worlds" (1938)
- 31<sup>st</sup> Kuiper Belt Object 55637 (2002 UX25) at Opposition; trans-Neptunian object discovered by the Spacewatch program on October 30, 2002 (40.174 AU)
- 31<sup>st</sup> History: birthday of Apollo 11 Command Module pilot Michael Collins (1930)
- 31<sup>st</sup> History: first rocket engine tests by three young rocketeers that would be the beginning of what would become the Jet Propulsion Laboratory (1936)

### References on Distances

- The apparent width of the Moon (and Sun) is approximately one-half a degree ( $\frac{1}{2}^\circ$ ), less than the width of your little finger at arm's length which covers approximately one degree ( $1^\circ$ ); three fingers span approximately five degrees ( $5^\circ$ )
- 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](http://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](http://www.spaceweather.com).

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# Second Saturday

**FREE EVENT**

*Every Month at the*  
**John J. McCarthy Observatory**  
Behind the New Milford High School  
**860.946.0312**

[www.mccarthyobservatory.org](http://www.mccarthyobservatory.org)

**October 12th**

**7:00 - 9:00 pm**

## ENJOYING A LUNAR SUNRISE



**Refreshments**  
**Family Entertainment**  
**Activity Center**  
**Stars & Planets**  
**Rain or shine**

S. Ross



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# October 2013

## Celestial Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday																																										
<p>Sep 2013</p> <table> <tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr> <tr><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td></tr> <tr><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td></tr> <tr><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td></tr> <tr><td>29</td><td>30</td><td></td><td></td><td></td><td></td><td></td></tr> </table>		S	M	T	W	T	F	S	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30						<p>1</p> <p>NASA created by the National Aeronautics and Space Act (1958)</p>	<p>2</p> <p>Hayden Planetarium founded (1935)</p>	<p>3</p> <p>Launch of Mercury-Atlas 8 with Walter Schirra (1962)</p> <p>Chassigny meteorite, determined origin of Mars (1815)</p> <p>Zagami Martian meteorite in Katsina Province, Nigeria (1962)</p>	<p>4</p> <p>Luna 3; Soviet spacecraft, was first to photograph the far side of the Moon (1959)</p> <p>SpaceShipOne, 70 miles up, to win Ansari X Prize (2004)</p> <p>World Space Week, Oct. 4-10 "Exploring Mars, Discovering Earth"</p>	<p>5</p> <p>Robert Goddard born, founding father of modern rocketry (1882)</p>
S	M	T	W	T	F	S																																										
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<p>6</p> <p>Launch of space shuttle Discovery and solar polar orbiter spacecraft Ulysses (1990)</p> <p>Asteroid 2008 TC3, tracked by McCarthy Observatory, explodes over Sudan (2008)</p>	<p>7</p> <p>Launch of Explorer 6, with "paddlewheel satellite," a photocell scanner transmitting a crude picture of the earth's surface and cloud cover (1959)</p>	<p>8</p> <p>Discovery of Supernova 1604 - Kepler's Nova (1604)</p> <p>Pioneer Venus orbiter concludes mission and begins fiery plunge into Venusian atmosphere (1992)</p>	<p>9</p> <p>Draconids meteor shower peak</p> <p>LCROSS impacts Moon's south pole (2009)</p> <p>Peekskill meteorite hits Chevy Malibu (1992)</p>	<p>10</p> <p>Moon at Perigee (closest to Earth)</p> <p>Enactment of outerspace treaty (1967)</p> <p>Inauguration of the Very Large array in New Mexico (1980)</p> <p>Discovery of Uranus' moon Triton by William Lassell (1846)</p>	<p>11</p> <p>WAC Corporal, first rocket to escape Earth's atmosphere (1945)</p> <p>100th space shuttle flight carries Z1 Truss, backbone of the ISS (2000)</p> <p>Launch of first manned Apollo mission (1968)</p>	<p>12</p> <p>1st symposium on space travel, held at Hayden Planetarium (1951)</p> <p>Launch of Voskhod 1, Soviet spacecraft, first to carry multiple cosmonauts (1964)</p> <p>2nd Saturday Stars Open House McCarthy Observatory</p>																																										
<p>13</p> <p>Launch of Explorer 7 spacecraft (1959)</p> <p>Launch of Shenzhou 6, China's 2nd manned spacecraft (2005)</p> <p>British Interplanetary Society founded (1933)</p>	<p>14</p> <p>Launch of Shenzhou 5, China's 1st manned spacecraft (2003)</p> <p>Chuck Yeager breaks sound barrier (1947)</p> <p>Three main belt asteroids discovered by McCarthy Observatory (2003)</p>	<p>15</p> <p>Dwarf Planet Eris (formally 2003 UB313 and/or Xena) at Opposition (95.542 AU)</p> <p>Launch of Cassini spacecraft to planet Saturn (1997)</p>	<p>16</p> <p>Launch of GOES 1, first weather satellite in geosynchronous orbit (1975)</p>	<p>17</p> <p>Mae Carol Jemison born, American physician and NASA astronaut; became first black woman in space aboard the Shuttle Endeavour on September 12, 1992; has appeared on television several times, including an episode of <i>Star Trek: The Next Generation</i>. (1956)</p>	<p>18</p> <p>Soviet spacecraft Venera 4 probes atmosphere of Venus; (1967)</p> <p>Discovery of Asteroid 8 Flora by John Hind (1847)</p> <p>Discovery of asteroid/comet Chiron in Taurus by Charles Kowal (1977)</p> <p>Launch of space shuttle Atlantis and Galileo spacecraft to Jupiter (1989)</p>	<p>19</p> <p>launch of IBEX (Interstellar Boundary Explorer) to explore the edge of solar system (2008)</p> <p>Subrahmanyan Chandrasekar wins Nobel physics prize for study of star evolution (1983)</p>																																										
<p>20</p> <p>Discovery of asteroid 577 Rhea by Max Wolf (1905)</p> <p>Launch of Soviet spacecraft Zond 8, Moon flyby mission (1970)</p>	<p>21</p> <p>Opening of the Yerkes Observatory, Williams Bay, Wisconsin, with world's largest refractor lens (40") (1897)</p> <p>Orionids meteor shower peak</p>	<p>22</p> <p>Soviet spacecraft Venera 9 lands on Venus, takes first b/w pictures of Moon's surface (1975)</p> <p>Launch of the Soviet orbiter Luna 12 to take high-resolution photos of the Moon's surface from lunar orbit (1966)</p> <p>Launch of India's first Moon mission Chandrayaan-1 (2008)</p>	<p>23</p> <p>Launch of the Soviet orbiter Luna 12 to take high-resolution photos of the Moon's surface from lunar orbit (1966)</p> <p>Pamela Melroy and Peggy Whitson first women to lead two missions at same time (shuttle and space station) (2007)</p>	<p>24</p> <p>Launch of Deep Space 1 (1998)</p> <p>Launch of Chang'e-1, Chinese lunar orbiter (2007)</p> <p>Discovery of Uranus' moons Umbriel and Ariel by William Lassell (1851)</p>	<p>25</p> <p>Moon at apogee (farthest from Earth)</p> <p>Discovery of Saturn's moon Iapetus by Giovanni Cassini (1671)</p> <p>Launch of twin Solar Terrestrial Relations Observatories (STEREO A&amp;B) for 3-D studies of Sun (2006)</p> <p>Soviet spacecraft Venera 10 touches down on Venus (1975)</p>	<p>26</p> <p>Soviet Union releases first images of the far side of the Moon, taken by Luna III spacecraft, showing a more mountainous terrain than seen from Earth and only two dark, low-lying regions. (1959)</p>																																										
<p>27</p> <p>First test flight of the Saturn I rocket (1961)</p> <p>Cañon City, Colorado meteor hits garage - 1973</p>	<p>28</p> <p>First test flight of the Ares I-X rocket; a two minute powered suborbital flight (2009)</p> <p>Launch of Prospero, Britain's first space mission (1971)</p>	<p>29</p> <p>Launch of space shuttle Discovery (STS-95) with astronaut and former senator John Glenn (1998)</p> <p>Flyby of asteroid Gaspra by the Galileo spacecraft on mission to Jupiter (1991)</p>	<p>30</p> <p>Mercury Theatre War of Worlds broadcast with Orson Welles produces panic (1938)</p> <p>Discovery of the Los Angeles (Mars) Meteorite (1999)</p> <p>Launch of Venera 13, Soviet Venus lander; survived for 127 minutes on the surface where the temperature was recorded at 855 °F (1981)</p>	<p>31</p> <p>Apollo 11 Command module pilot Michael Collins born (1930)</p> <p>First rocket engine tests that spawned the Jet Propulsion Laboratory (1936)</p>	<h3>Phases of the Moon</h3> <p>New Moon Oct 4</p> <p>Waxing Crescent Oct 11</p> <p>First Quarter Oct 18</p> <p>Full Moon Oct 25</p> <p>Waning Gibbous Oct 31</p> <p>Last Quarter Nov 7</p>																																											