

IAAS Monthly Astronomy Newsletter

October 2013



The International Association for Astronomical Studies provides this newsletter as a service for interested persons worldwide.



This newsletter is published on the World Wide Web at <http://www.ki0ar.com/astro.html> - The Home of KI0AR - and is received nationally and internationally. A PDF formatted downloadable version of the newsletter is at http://www.ki0ar.com/current_nl.pdf.

An Open Invitation - For amateur radio operators and scanner enthusiasts, when in the Denver metro area, please join the Colorado Astronomy Net on the Rocky Mountain Radio League's (<http://rmrl.hamradios.com/>) 146.94 MHz repeater on Tuesday nights at 7 P.M. local time.

Special Notice to Denver, CO residents and visitors to the area: The Plains Conservation Center in Aurora hosts Full Moon Walks every month, weather permitting, on or near the night of the full Moon. Visit <http://www.plainsconservationcenter.org> for more information and directions.

Also S&S Optika hosts [Backyard Star Parties](#) in Littleton several times a month, weather permitting. Come down and enjoy the fun and check out their fine selection of optical instruments.



Excerpts from JPL mission updates are provided as a public service as part of the JPL Solar System Ambassador / NASA Outreach program. <http://www2.jpl.nasa.gov/ambassador/index.html>

Solar System Ambassadors Program Application Deadline Extended

The NASA Jet Propulsion Laboratory Solar System Ambassadors Program (SSA), a nationwide network of space enthusiast volunteers, has **extended its application deadline to Tuesday, October 15.**

Highly motivated individuals will be given the opportunity to represent NASA's Jet Propulsion Laboratory as volunteer Solar System Ambassadors to the public for a one-year, renewable term beginning January 1, 2014.

While applications will be sought nationwide, interested parties from the following states are especially encouraged to apply: Alaska, Delaware, Mississippi, Montana, Nebraska, Oklahoma, South Dakota, West Virginia, Wyoming and the District of Columbia. SSA hopes to add 100 new volunteers to the program in 2014.

To learn more about the Solar System Ambassador Program, visit <http://www2.jpl.nasa.gov/ambassador/>. The Announcement of Opportunity and application form will be available on that website beginning September 1.

If you have questions about this opportunity, contact Kay Ferrari, SSA Coordinator, by email at ambassad@jpl.nasa.gov.

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The Month At-A-Glance

A calendar displaying the daily astronomical events.

The Moon

Phases:

- * New Moon occurs on the 4th.
 - * First Quarter Moon occurs on the 11th.
 - * Full Moon occurs on the 18th.
 - * Last Quarter Moon occurs on the 26th.
-
- * The Moon is at Perigee on the 10th, 229,792 miles from Earth.
 - * The Moon is at Apogee on the 25th, 251,380 miles from Earth.



Moon/Planet Pairs:

- * The Moon passes 7° south of Mars on the 1st.
- * The Moon passes 3° north of Mercury on the 6th.
- * The Moon passes 1.9° south of Saturn on the 6th.
- * The Moon passes 5° north of Venus on the 8th.
- * Mercury passes 5° south of Saturn on the 10th.
- * The Moon passes 0.9° south of asteroid Juno on the 12th.
- * Mars passes 1.0° north of Regulus on the 14th.
- * The Moon passes 6° north of Neptune on the 15th.
- * Venus passes 1.6° north of Antares on the 16th.
- * The Moon passes 3° north of Uranus on the 17th.
- * The Moon passes 5° south of Jupiter on the 25th.
- * The Moon passes 6° south of Mars on the 29th.

For reference: The Full Moon subtends an angle of 0.5°.

The Planets & Dwarf Planets

Planetary Reports are generated by "TheSky" software. (<http://www.ki0ar.com/planrpts.html>) These reports provide predicted data for the planets on the first of each month for the current year. The rise and set times for the Sun and the Moon for each day of the month are also included in the reports. These reports have been optimized for the Denver, Colorado location, however, the times will be approximate for other locations on Earth.

(All times are local unless otherwise noted.)

* Planetary Highlights for October

- Venus and Saturn can be spotted low in the west-southwest all month. Mercury joins Venus and Saturn during the first weeks of the month. However, due to the low angle of the ecliptic (the path the planets take through the sky), these three planets do not get very high above the horizon. Observe Venus, Saturn and Mercury in the early evening. Neptune and Uranus are prime for evening and late night viewing. Uranus is at its best viewing for the year. Mars and Jupiter rise early in the morning and are both prominent in the constellations of Leo and

Gemini and are visible before sunrise. Comet ISON is also visible in the morning sky this month, so get up early and see if you can spot it.

*** Mercury**

- Is at greatest eastern elongation (25° above the western horizon) on the 9th. Mercury is stationary on the 21st. Mercury is visible, low on the western horizon about 30 minutes after sunset. Mercury sets about 7:31 p.m. on the 1st and about 5:53 p.m. by month's end. Mercury moves from the constellation of Virgo into Libra shining at magnitude 0.0 on the 15th.

*** Venus**

- Sets about 8:29 p.m. on the 1st and about 8:23 p.m. by month's end. Look for Venus in the early evening towards the west-southwest. Venus will be easy to spot as it moves from the constellation of Libra into Sagittarius shining at magnitude -4.4.

*** Earth**

- N/A.

*** Mars**

- Rises at 3:00 a.m. on the 1st and about 2:31 a.m. by month's end. Look for Mars in the east before sunrise. Mars is in the constellation of Leo this month shining at magnitude 1.6.

*** Jupiter**

- Rises at 12:18 a.m. on the 1st and about 10:21 p.m. by month's end. Look for Jupiter in the early morning skies after midnight. Jupiter is in the constellation of Gemini shining at magnitude -2.3.

*** Saturn**

- Sets at 8:10 p.m. on the 1st and about 6:18 p.m. by month's end. Look low in the west-southwest to spot Saturn in the early evening. Saturn is relatively easy to spot about 15° west of Venus in the early twilight while it is still fairly high above the horizon. Saturn is in the constellation of Libra shining at magnitude 0.6.

*** Uranus**

- Is at opposition on the 3rd, rising as the Sun sets. Uranus rises at 6:42 p.m. on the 1st and about 4:37 p.m. by month's end. Uranus is visible in the evening sky. Uranus is at its best viewing this month. Spot Uranus with binoculars or a small telescope. Uranus is in the constellation of Pisces shining at magnitude 5.7.

*** Neptune**

- Sets at 4:06 a.m. on the 1st and about 2:02 a.m. by month's end. Neptune is in the constellation of Aquarius shining at magnitude 7.8.

Dwarf Planets

* Ceres

- Sets at 7:22 p.m. on the 1st and about 5:55 p.m. by month's end. Ceres moves from the constellation of Leo into Virgo shining at magnitude 8.8.

* Pluto

- Sets at 11:46 p.m. on the 1st and about 9:45 p.m. by month's end. Pluto is in the constellation of Sagittarius shining at magnitude 14.1.

As always, good luck at spotting Neptune, Ceres and Pluto, a large telescope and dark skies will be needed.

Astronomical Events

Meteor Showers

* The Draconids - This meteor shower is associated with periodic comet Giacobini-Zinner. The duration may extend from October 6 to 10, though the point of maximum is very sharply defined within a 4-hour interval on October 9, but the annual maximum hourly rates are not consistent. The radiant rarely produces any recognizable shower except during years especially close to the parent comet's perihelion passage. The meteors are slow and tend to be relatively faint. They are generally yellow.

* The Orionids - The duration of this meteor shower extends from October 15 to 29, with maximum occurring on (the morning of) October 21. The maximum hourly rate is usually about 20 and the meteors are described as fast.

* The Southern Taurids - This meteor shower is active from September 10 to November 20. Maximum occurs on the morning of October 10. Maximum hourly rate is 5 meteors per hour. The meteors are described as bright and move more slowly than typical meteors, making them prime subjects for imaging and viewing.

* For more information about Meteor Showers, visit Gary Kronk's Meteor Showers Online web page at <http://meteorshowersonline.com/>.

Comets

* Comet ISON (C/2012 S1) may prove to be one of the best comets to appear in our lifetime. Look for Comet ISON and Mars tracking close together as the month progresses. Comet ISON and Mars are within 2° of each other on the 1st and close to within 1° by the 15th. Comet ISON is visible in 8 to 10 inch telescopes and possibly smaller aperture telescopes this month and may become visible with the naked eye by month's end under very dark skies. Comet ISON brightens in the morning sky before sunrise.

* Elements and Ephemeris for [C/2012 S1 \(ISON\)](#)

* For information, orbital elements and ephemerides on observable comets visit the Observable Comets page from the Harvard-Smithsonian Center for Astrophysics (<http://cfa-www.harvard.edu/iau/Ephemerides/Comets/index.html>).

* For more information about Comets, visit Gary Kronk's Cometography.com web page at <http://cometography.com/>.

Eclipses

* A penumbral lunar eclipse occurs on the 18th.

Observational Opportunities

* Observe Venus, Saturn and Mercury in the early evening sky in the west-southwest.

* Check out Neptune and Uranus in the late evening skies.

* Catch Jupiter, and Mars in the morning after midnight.

* Try getting a glimpse of Comet ISON in the early morning sky.

Asteroids

(From west to east)

* **Juno** is in the constellation of Capricornus.

* **Iris** is in the constellation of Aquarius.

* **Bamberga** is in the constellation of Pegasus.

* **Julia** is in the constellation of Pegasus.

* **Massalia** is at opposition on the 31st in the constellation of Aries.

* **Kleopatra** is in the constellation of Taurus.

* **Pallus** is in the constellation of Hydra.

* **Vesta** is in the constellation of Leo.

* Information about the Minor Planets can be found at <http://www.minorplanetobserver.com> the Minor Planet Observer web site.

Occultations

* Information on various occultations can be found at <http://lunar-occultations.com/iota/iotaindx.htm> , the International Occultation Timing Association's (IOTA) web site.

Subscriber Gallery

I have created a web page containing images taken and submitted by subscribers to the email newsletter, check-ins to the Colorado Astronomy Net and readers of the online newsletter and some of my own images. Any one wishing to submit their images to the gallery, please let me know. The images must be taken by the submitter and be astronomy related. Please include a description and your information so that I can give proper credit to your work.

Planetary/Lunar Exploration Missions

(Excerpts from recent mission updates)

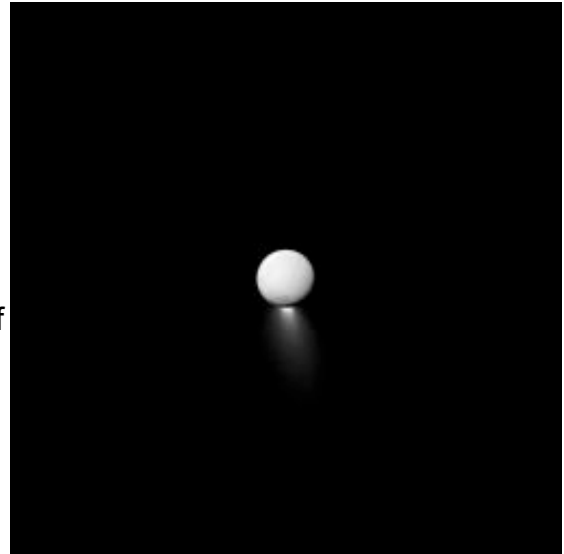


*** Cassini - September 23, 2013**
By the Pale Saturn-light
([Full-Res: PIA17129](#))

"Enceladus's unusual plume is only easily visible when the Cassini spacecraft and the Sun are on opposite sides of Enceladus. So what's lighting up the moon then? It's light reflected off Saturn. This lighting trick allows the Cassini spacecraft to capture both the back-lit plume and the surface of Enceladus in one shot.

This view looks toward the Saturn-facing hemisphere of Enceladus. North on Enceladus is up. The image was taken in blue light with the Cassini spacecraft narrow-angle camera on April 2, 2013.

The view was acquired at a distance of approximately 517,000 miles (832,000 kilometers) from Enceladus and at a Sun-Enceladus-spacecraft, or phase, angle of 175 degrees. Image scale is 3 miles (5 kilometers) per pixel.

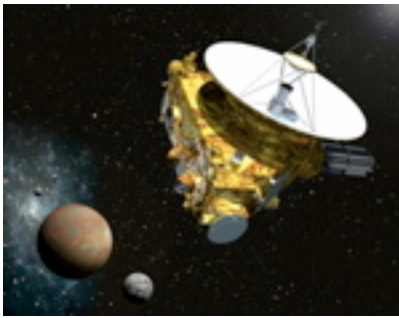


The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the mission for NASA's Science Mission Directorate in Washington. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. The imaging team is based at the Space Science Institute, Boulder, Colo."

Raw images are available at <http://saturn.jpl.nasa.gov/photos/raw/index.cfm>.

Cassini Imaging Team's website - <http://ciclops.org>.

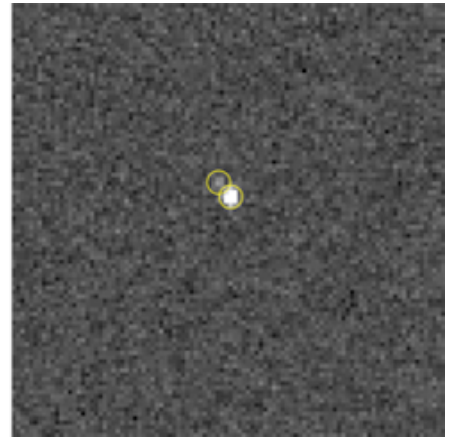
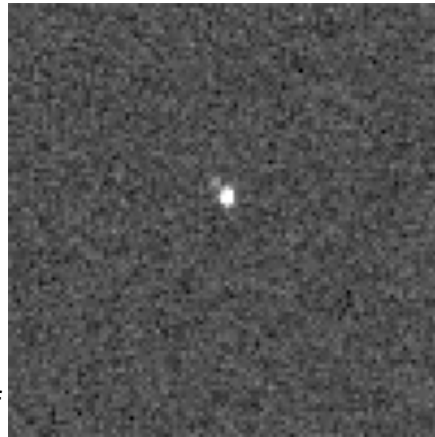
For the latest mission status reports, visit <http://saturn.jpl.nasa.gov/home/index.cfm>. The speed and location of the spacecraft can be viewed on the "[Present Position](#)" web page.



*** New Horizons - August 23, 2013**
The PI's Perspective
Late in Cruise, and a Binary Ahoy

"New Horizons has just completed a summer of intensive activities and entered hibernation on Aug. 20. The routine parts of the activities included thorough checkouts of all our backup systems (result:

they work fine!) and of all our scientific instruments (they work fine too!). We also updated our onboard fault protection (a.k.a. "autonomy") software, collected interplanetary cruise science data, and tracked the spacecraft for hundreds of hours to improve our trajectory knowledge. Added to this mix of routine summer wake-up activities for New Horizons were two major activities that had never been performed before.

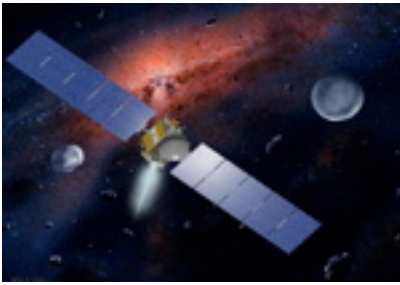


The first of these, conducted in early July, was planned imaging of Pluto and its largest satellite, Charon. As you can see from the image and caption above, we accomplished this using our LORRI long-focal length camera. Seeing these images, revealing our target as a true planetary binary, viscerally signaled to me that we're nearing our destination and the end of the long, 3-billion-plus mile cruise we set out on back in January 2006."

Find New Horizons in the iTunes App Store here. (<http://itunes.com/apps/newhorizonsanasavoyagetopluto>)

New Horizons gallery <http://pluto.jhuapl.edu/gallery/sciencePhotos/>.

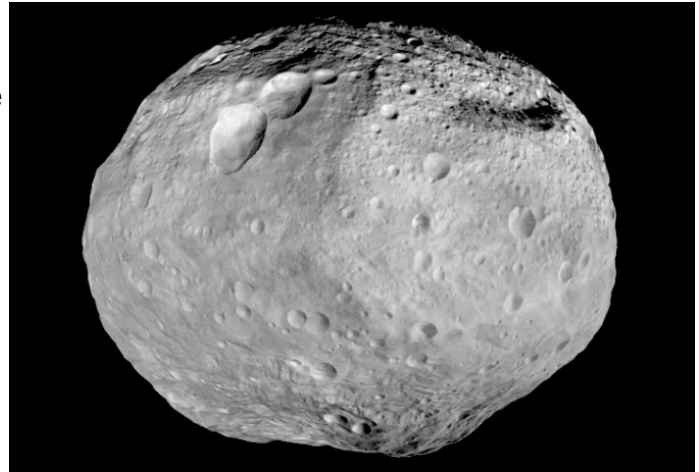
For more information on the New Horizons mission - the first mission to the ninth planet - visit the New Horizons home page: <http://pluto.jhuapl.edu/>.



*** Dawn - September 27, 2013**
Dawn Reality-Checks Telescope Studies of Asteroids
([Full image and caption](#))

"Tantalized by images from NASA's Hubble Space

Telescope and ground-based data, scientists thought the giant asteroid Vesta deserved a closer look. They got a chance to do that in 2011 and 2012, when NASA's Dawn spacecraft orbited the giant asteroid, and they were able to check earlier conclusions. A new study involving Dawn's observations during that time period demonstrates how this relationship works with Hubble and ground-based telescopes to clarify our understanding of a solar system object.

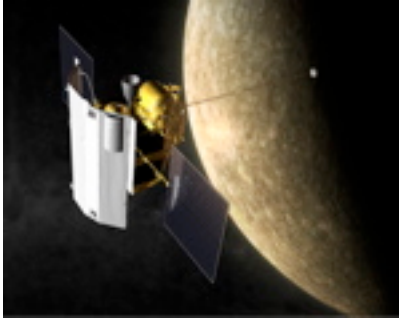


"Since the vast majority of asteroids can only be studied remotely by ground-based and space-based facilities, confirming the accuracy of such observations using in-situ measurements is important to our exploration of the solar system," said Vishnu Reddy, the lead author of a paper published recently in the journal *Icarus*. Reddy is based at the Planetary Science Institute in Tucson, Ariz., and the Max Planck Institute for Solar System Research in Katlenburg-Lindau, Germany."

[Dawn's Virtual Flight over Vesta](#)

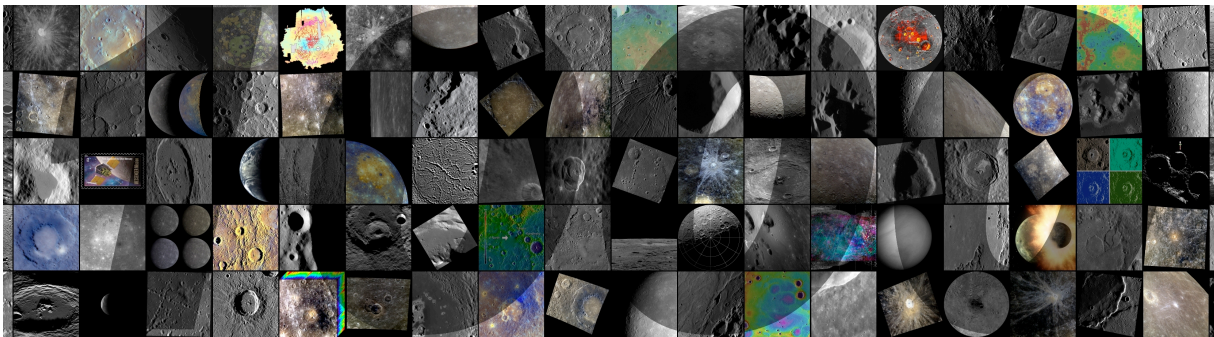
A gallery of images can be found online at: http://www.nasa.gov/mission_pages/dawn/multimedia/gallery-index.html.

For more information on the Dawn mission, visit the Dawn home page: http://www.nasa.gov/mission_pages/dawn/main/index.html.



*** MESSENGER - September 10, 2013**
1,000th Featured Image from MESSENGER Posted on the Project's Web Gallery

"The MESSENGER project is celebrating the posting today of the [1,000th featured image](#) from Mercury. The Mercury Dual Imaging System (MDIS) team has posted a new image to the MESSENGER website approximately once per business day since March 29, 2011, when the first image obtained from orbit about the innermost planet was made public.



Today's image is a collage comprised entirely of earlier featured images. "I thought it sensible to produce a collage for the 1,000th web image because of the sheer volume of images the team has already posted, as no single picture could encompass the enormous breadth of Mercury science covered in these postings," explained MESSENGER Fellow Paul Byrne, of the Carnegie Institution of Washington. "Some of the images represent aspects of Mercury's geological characteristics, and others are fun extras, such as the U.S. Postal Service's [Mercury stamp](#). The '1,000' superimposed on the collage is a reminder of the major milestone the team has reached in posting 1,000 featured images -- and even a motivation to post 1,000 more."

"During this two-year period, MESSENGER's daily web image has been a successful mechanism for sharing results from the mission with the public at large," said Nancy Chabot, MDIS Instrument Scientist at the Johns Hopkins University Applied Physics Laboratory (APL). Chabot has been leading the release of web images since MESSENGER's first flyby of Mercury, in January 2008."

The [MESSENGER app](#) is available for download on iTunes.

For more information on the MESSENGER mission, visit the MESSENGER home page: <http://messenger.jhuapl.edu/>.

*** Pack Your Backpack**

Calling all explorers! Tour JPL with our new Virtual Field Trip site. Stops include Mission Control and the Rover Lab. Your guided tour starts when you select a "face" that will be yours throughout the visit. Cool space images and souvenirs are all included in your visit.

+ <http://virtualfieldtrip.jpl.nasa.gov/>

* Past, Present, Future and Proposed JPL Missions - <http://www.jpl.nasa.gov/missions>.

* For special JPL programs and presentations in your area visit the JPL Solar System Ambassador web site at <http://www2.jpl.nasa.gov/ambassador/index.html>.

Mars Missions

[Be A Martian](#)

Mars website mobile version is here!

Simply type

<http://mars.jpl.nasa.gov>

into your mobile browser.



Mars on the Go! NASA Be A Martian Mobile App

If you want the latest news as it happens, try our Be A Martian app.

Download on Mobile Devices

[Android](#) | [iPhone](#) | [Windows Phone](#)



* JMARS - <https://jmars.mars.asu.edu/>

JMARS is an acronym that stands for Java Mission-planning and Analysis for Remote Sensing. It is a geospatial information system (GIS) developed by ASU's Mars Space Flight Facility to provide mission planning and data-analysis tools to NASA's orbiters, instrument team members, students of all ages, and the general public.

* Mars Science Laboratory - Curiosity - September 26, 2013

Science Gains From Diverse Landing Area of Curiosity

"PASADENA, Calif. -- NASA's Curiosity rover is revealing a great deal about Mars, from long-ago processes in its interior to the current interaction between the Martian surface and atmosphere.

Examination of loose rocks, sand and dust has provided new understanding of the local and global processes on Mars.

Analysis of observations and measurements by the rover's

science instruments during the first four months after the August 2012 landing are detailed in five reports in the Sept. 27 edition of the journal Science.

A key finding is that water molecules are bound to fine-grained soil particles, accounting for about 2 percent of the particles' weight at Gale Crater where Curiosity landed. This result has global implications, because these materials are likely distributed around the Red Planet.

Curiosity also has completed the first comprehensive mineralogical analysis on another planet using a standard laboratory method for identifying minerals on Earth. The findings about both crystalline and non-crystalline components in soil provide clues to the planet's volcanic history.

Information about the evolution of the Martian crust and deeper regions within the planet comes from Curiosity's mineralogical analysis of a football-size igneous rock called "Jake M." Igneous rocks form by cooling molten material that originated well beneath the crust. The chemical compositions of the rocks can be used to infer the thermal, pressure and chemical conditions under which they crystallized.

"No other Martian rock is so similar to terrestrial igneous rocks," said Edward Stolper of the California Institute of Technology, lead author of a report about this analysis. "This is surprising because previously studied igneous rocks from Mars differ substantially from terrestrial rocks and from Jake M."

The other four reports include analysis of the composition and formation process of a windblown drift of sand and dust, by David Blake of NASA's Ames Research Center at Moffett Field, Calif., and co-authors."



To follow the Mars Curiosity rover and NASA on Foursquare, visit: <http://www.foursquare.com/MarsCuriosity> and <http://www.foursquare.com/NASA>

For information about NASA's partnership with Foursquare, visit: <http://www.nasa.gov/connect/foursquare.html>."



[Mars Rover Landing](#) - Free for the Xbox (requires Kinect)

Visit the Mars Science Laboratory page at <http://mars.jpl.nasa.gov/msl>.

*** Mars Exploration Rover Mission (Spirit and Opportunity) - September 17, 2013**



SPIRIT UPDATE: Spirit Remains Silent at Troy - sols 2621-2627, May 18-24, 2011:

"No communication has been received from Spirit since Sol 2210 (March 22, 2010).

More than 1,300 commands were radiated to Spirit as part of the recovery effort in an attempt to elicit a response from the rover. No communication has been received from Spirit since Sol 2210 (March 22, 2010). The project concluded the Spirit recovery efforts on May 25, 2011. The remaining, pre-sequenced ultra-high frequency (UHF) relay passes scheduled for Spirit on board the Odyssey orbiter will complete on June 8, 2011.

Total odometry is unchanged at 7,730.50 meters (4.80 miles)."

OPPORTUNITY UPDATE: Robotic Arm Goes to Work on Rock Target - sols 3426-3431, Sept. 12, 2013-Sept. 17, 2013:

"Opportunity is at the northern edge of 'Solander Point' on the rim of Endeavour Crater. The rover is investigating the geologic contact at the base of Solander Point.

On Sol 3426 (Sept. 12, 2013), Opportunity drove 28 feet (8.62 meters) to reach a surface target. On the next sol, the rover deployed the robotic arm to investigate the surface target named, 'Poverty Bush.' First, the rover imaged the Rock Abrasion Tool (RAT) bit to assess the remaining grind life. Then, the rover collected some calibration sky flat images with the Microscopic Imager (MI). After that, a Microscopic Imager mosaic was collected of Poverty Bush, followed by the placement of the Alpha Particle X-ray Spectrometer (APXS) for a multi-sol integration.

On Sol 3430 (Sept. 16, 2013), Opportunity drove away heading about 39 feet (12 meters) to the west/northwest. On the next sol, the rover continued driving another 74 feet (22.5 meters) to reach another candidate outcrop for in-situ (contact) science investigation.

As of Sol 3431 (Sept. 17, 2013), the solar array energy production was 346 watt-hours with an atmospheric opacity (Tau) of 0.619 and a solar array dust factor of 0.520.

Total odometry is 23.82 miles (38.34 kilometers)."

Landing sites link - <http://marsoweb.nas.nasa.gov/landingsites/>

Visit the Mars Exploration Rover page at <http://marsrovers.jpl.nasa.gov/home/index.html>.



*** Mars Reconnaissance Orbiter Mission - August 14, 2013 Swapping Motion-Sensing Units**

"The Mars Reconnaissance Orbiter is now using its Inertial Measurement Unit 2 and has resumed normal relay operations and science observations.

PASADENA, Calif. -- NASA's Mars Reconnaissance Orbiter is switching from one motion-sensing device to a duplicate unit onboard.

The veteran orbiter relies on this inertial measurement unit (IMU) for information about changes in orientation. This information is important for maintaining spacecraft attitude and for pointing the orbiter's large antenna and science-observation instruments.

The spacecraft has two identical copies of this motion-sensing device, called IMU-1 and IMU-2. Either of them can be used with either of the spacecraft's redundant main computers. Each contains three gyroscopes and three accelerometers.

"The reason we're doing this is that one of the gyroscopes on IMU-1 is approaching its end of life, so we want to swap to our redundant unit early enough that we still have some useful life preserved in the first unit," said Mars Reconnaissance Orbiter Mission Manager Reid Thomas of NASA's Jet Propulsion Laboratory, Pasadena, Calif."

MARS RECONNAISSANCE ORBITER HIRISE IMAGES

All of the HiRISE images are archived here: <http://hirise.lpl.arizona.edu/>.

More information about the MRO mission is available online at <http://www.nasa.gov/mro>.



*** Mars Odyssey Orbiter - May 08, 2013 Mars As Art Lands At Dulles Airport**

"The majestic beauty of the Red Planet is featured in a vivid collection of images taken by Mars spacecraft, now on exhibit at Dulles airport in Washington, DC through November 30."

[See the Mars As Art Gallery](#)

[Dulles Airport Full News Release](#)

[Global Martian Map](#)

"A simulated fly-through using the newly assembled imagery is available online at http://www.nasa.gov/mission_pages/mars/missions/odyssey/20060313.html.

The fly-through plus tools for wandering across and zooming into the large image are at <http://themis.asu.edu/>."

DAILY MARS ODYSSEY THEMIS IMAGES

Thermal Emission Imaging System (THEMIS) web site: (<http://themis.asu.edu/gallery>)

The Odyssey data are available through a new online access system established by the Planetary Data System at: <http://starbrite.jpl.nasa.gov/pds/>

Visit the Mars Odyssey Mission page at <http://mars.jpl.nasa.gov/odyssey/index.html>.

* **Mars Missions Status** - New Mars missions are being planned to include several new rover and sample collection missions. Check out the Mars Missions web page: <http://mars.jpl.nasa.gov/missions/> and the Mars Exploration page: <http://marsprogram.jpl.nasa.gov/>.



Links and Other Space News

(If you have a link you would like to recommend to our readers, please feel free to submit it.)

- * **A Guide to the Galaxy Right from our Bedroom Window** - <http://www.bedroomfurniturespot.com/guide-to-galaxies> - An interesting site suggested by the students from Lexington Middle School Science Club in Nebraska. Lots of good basic astronomy information.
- * **A Kid's Guide to Astronomy** - <http://www.jmacsupply.com/astronomy-guide-for-kids-a/316.htm> - A great site with other links to learn about stars and astronomy for kids of all ages.
- * **"TheSky" Software** - <http://www.bisque.com> - Astronomy software by Software Bisque.
- * **A Short Guide to Celestial Navigation** - <http://www.celnav.de/> - Celestial navigation is the art and science of finding one's geographic position by means of astronomical observations, particularly by measuring altitudes of celestial objects – sun, moon, planets, or stars.
- * **Astrogirl Homepage** - <http://www.astrogirl.org> - Family friendly educational astronomy website.
- * **Astronomical Lexicon** - <http://www.ki0ar.com/astrolex.html> - Many of the astronomical terms used in this newsletter are defined here.
- * **Astronomy Picture of the Day** - <http://antwrp.gsfc.nasa.gov/apod/astropix.html> - A different picture of the cosmos every day.
- * **Astronomy 2009** - <http://www.surveillance-video.com/astronomy-sept-2009.html> - This site has some good links a young, interested student wishes to share.
- * **Black Hole Encyclopedia** - <http://blackholes.stardate.org/> - Excellent site from StarDate - University of Texas McDonald Observatory (<http://mcdonaldobservatory.org/>)
- * **Celestron Telescopes** - <http://www.celestron.com/> - Celestron telescopes.
- * **Clear Skies Observing Guides** - <http://www.clearskies.eu> - CSOG, short for Clear Skies Observing Guides is a new concept in visual amateur astronomy. It is a digital publication that will enable observers to target all deepsky objects and carbon stars within reach of their equipment.
- * **Cloudbait Observatory**, Guffey Colorado - <http://www.cloudbait.com> - Submit your fireball reports here. Interesting, knowledgeable site.

- * **Colorado Springs Astronomical Society** - <http://csastro.org>
- * **The Constellations and Their Stars** - <http://www.astro.wisc.edu/~dolan/constellations/constellations.html> - Good site for finding out more about the 88 constellations and their associated stars.
- * **Denver Astronomical Society** - <http://www.denverastrosociety.org> - Promotes the enjoyment and understanding of astronomical phenomena, history and lore by providing educational and observing opportunities for our members, general public, and outreach activities at the University of Denver's historic Chamberlin Observatory, schools, and nature centers.
- * **Distant Suns** - <http://www.distantstars.com/> - Desktop Astronomy package for PCs.
- * **EarthSky** - <http://earthsky.org> - Astronomy news.
- * **Green Laser** - <http://www.greenlaser.com> - If you're looking for a reasonably priced laser pointer that is great for astronomy work, visit this site.
- * **Groovy Adventures** - <http://www.groovyadventures.com> - Unique adventures and vacations including astronomy related vacations.
- * **Heavens Above** - <http://www.heavens-above.com> - As the name implies - What's up in the heavens, particularly satellite passes.
- * **The International Dark-Sky Association** - <http://www.darksky.org> - To preserve and protect the nighttime environment and our heritage of dark skies.
- * **iTelescope.net** - <http://www.itelescope.net> - iTelescope.Net is the world's premier network of Internet connected telescopes, allowing members to take astronomical images of the night sky for the purposes of education, scientific research and astrophotography.
- * **JPL Solar System Ambassador Program** - <http://www.jpl.nasa.gov/ambassador/front.html> - "Volunteers Bringing the Solar System to the Public"
- * **JPL Solar System** - http://www.jpl.nasa.gov/solar_system/ - Jet Propulsion Laboratory information on our solar system.
- * **Kids Space Center - Telescopes and Astronomy** - <http://www.orlandofuntickets.com/kids-space-center-telescopes-and-astronomy/> - Another site suggested by a young student - Great info about telescopes.
- * **Meade Advanced Products Users Group** - <http://www.mapug-astronomy.net/> - Mapug-Astronomy Topical Archive & information resource, containing a massive 335 page archive of discussions about Meade equipment, and much more: observatories, observing lists, permanent piers, equatorial wedges, remote operations, software, eyepieces, etc.

- * **My Stars Live** - <http://www.mystarslive.com/> - Interactive Star Chart
- * **NASA Science News** - <http://science.nasa.gov/> - NASA missions, updates, astronomy news, excellent resource.
- * **Northern Colorado Astronomical Society** - <http://ncaastro.org/> - The purpose of our organization is to encourage the understanding & interest in the science & hobby of astronomy.
- * **Rocky Mountain Star Stare** - <http://www.rmss.org> - The Premier Star Part in The Rocky Mountains
- * **Sangre Stargazers** - <http://sangrestargazers.skymtn.com/> - New astronomy club in the Wet Mountain Valley of Custer County (about 45 miles due west of Pueblo, CO).
- * **Skymaps.com** - <http://www.skymaps.com> - Free sky maps each month.
- * **Skywatch Sightings from NASA** - <http://spaceflight.nasa.gov/realdata/sightings/> - This site gives you the best times to watch the ISS pass over or near your location.
- * **Southern Colorado Astronomical Society** - <http://www.scasastronomy.info/> - Site under construction.
- * **Space.com** - <http://space.com> - Interesting space and astronomy articles.
- * **Spaceflight Now** - <http://spaceflightnow.com/> - Launches and satellite news.
- * **SpaceLinks/Space Careers** - <http://www.spacelinks.com/SpaceCareers/> - SPACELINKS is a specialist staffing consultancy sourcing and supplying high caliber professionals for a wide range of world class organizations in the Space and Defense industry.
- * **"SpaceRef.com"** - <http://www.spaceref.com/> - SpaceRef's 21 news and reference web sites are designed to allow both the novice and specialist alike to explore outer space and Earth observation.
- * **Space Weather** - <http://www.spaceweather.com> - Check out what the Sun is doing as seen from space.
- * **Stellarium** - <http://www.stellarium.org> - Free, downloadable planetarium/astronomy software.
- * **Universe Today** - <http://www.universetoday.com> - Short, interesting articles about space and related topics.
- * **Wikisky** - <http://www.wikisky.org> - WIKISKY is a non-commercial project. The main purpose of WIKISKY is to consolidate astronomical, astrophysical and other information about different space objects and astrophysical facts.

Acknowledgments and References

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The author will accept any suggestions, constructive criticisms, and corrections. Please feel free to send me any new links or articles to share as well. I will try to accommodate any reasonable requests. Please feel free to send questions, comments, criticisms, or donations to the email address listed below. Enjoy!

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Keep looking UP!

73 from KI0AR

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