IAAS Monthly Astronomy Newsletter October 2015



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 146.94 MHz and 449.825 MHz repeaters. The RMRL 146.94 repeater is also linked with the WB0WDF Cripple Creek 447.400 MHz repeater and Allstar nodes 28298, 28299, 29436 and 40764 (linked to the RMRL 449.875 Eldorado Mountain repeater). We are also linked via Echolink, links are k0jsc-r and canoncty. More information on the WB0WDF repeater links, Allstar nodes and Echolinks can be found at k0jsc.com. The net meets on Tuesday nights at 7 P.M. Mountain Time (US).

The Colorado Astronomy Net now has a Facebook page. Be sure to "Like" us.

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.



S&S Optika hosts <u>Backyard Star Parties</u> 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 <u>JPL Solar System Ambassador / NASA Outreach</u> program.

In This Newsletter...

The Month At-A-Glance	4
The Moon	4
Phases:	4
Moon/Planet Pairs:	
The Planets & Dwarf Planets	
Planetary Highlights for October	
Venus	
Earth	
Mars	
Jupiter	
Saturn	
Uranus Neptune	
Dwarf Planets	
Ceres	
Pluto	
Astronomical Events	
Meteor Showers	
Comets	
Eclipses	
Observational Opportunities (from evening to morning)	
Asteroids	
Occultations	
Subscriber Gallery	9
Planetary/Lunar Exploration Missions	
Cassini	
New Horizons	
Dawn	
MESSENGER	
Pack Your Backpack	15
Mars Missions	16
JMARS	16
Laboratory for Atmospheric and Space Physics	
MAVEN	
Mars Science Laboratory - Curiosity	18
Mars Exploration Rover Mission (Spirit and Opportunity)	
Mars Reconnaissance Orbiter Mission	
Mars Odyssey Orbiter	
Journey to Mars	
Mars Missions Status	
Astronomy Links and Other Space News	24
Colorado Astronomy Links	

Other Astronomy Links	25
Acknowledgments and References	29
Subscription Information	29
Keep looking UP!	29



On the evening of June 17, 1991, Venus gleamed above Jupiter while fainter Mars shone to their left. The same three planets converge in October's morning sky. (Astronomy Magazine, October 2015, p. 36)

Alan Dyer

The Month At-A-Glance

The current month's calendar displaying the daily astronomical events.

The Moon

Phases:

- Last Quarter Moon occurs on the 4th.
- New Moon occurs on the 12th.
- First Quarter Moon occurs on the 20th.
- Full Moon occurs on the 27th.
- The Moon is at Apogee on the 11th, 252,518 miles from Earth.
- The Moon is at Perigee on the 26th, 222,739 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 0.5° north of Aldebaran on the 2nd.
- The Moon passes 0.7° south of Venus on the 8th.
- The Moon passes 3° south of Mars on the 9th.
- Venus passes 3° south of Regulus on the 9th.
- The Moon passes 3° south of Jupiter on the 9th.
- The Moon passes 0.9° south of Mercury on the 11th.
- The Moon passes 3° north of Saturn on the 16th.
- Mars passes 0.4° north of Jupiter on the 17th.
- The Moon passes 3° north of Neptune on the 23rd.
- Venus passes 1.1° south of Jupiter on the 26th.
- The Moon passes 0.9° south of Uranus on the 26th.
- Mercury passes 4° north of Spica on the 28th.
- The Moon passes 0.6° north of Aldebaran on the 29th.

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

The Planets & Dwarf Planets

<u>Planetary Reports</u> are generated by "TheSky" software. 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 as well as meteor shower radiants 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

Again, begin your autumn viewing before dawn when Venus, Mars and Jupiter are visible. Venus climbs to its highest point above the eastern horizon by the end of the month still shining brightly. Evening viewers, start in the west and spot Saturn in the early evening soon after sunset. Neptune and Pluto can be spotted once the skies get dark to the south. Uranus is



at its best this month as it reaches opposition. The Orionids meteor shower peaks this month though predictions for this year are for weaker than normal rates.

Mercury

Is stationary on the 8th. Mercury is at greatest western elongation (18° above the eastern horizon) on the 15th. Mercury rises at 6:51 a.m. on the 1st and about 6:36 a.m. by month's end. Mercury is very low on the eastern horizon and will be difficult to spot without binoculars or a small telescope. Mercury lies about 8° above the western horizon for northern hemisphere observers just 45 minutes before sunrise. Mercury is in the constellation of Virgo shining at magnitude -0.5 on the 15th.

Venus

Rises at 3:25 a.m. on the 1st and about 3:36 a.m. by month's end. Venus reached greatest western elongation (46° above the eastern horizon) on the 26th. Look for Venus in the early morning skies before sunrise. Venus is still shining near its brightest. See if you can still see Venus after the Sun rises in the early morning. Venus is in the constellation of Leo shining at magnitude -4.6 on the 15th.



Earth

N/A.

Mars

Rises at 4:05 a.m. on the 1st and about 3:39 a.m. by month's end. Mars is visible to the east in the morning before dawn. Mars is in the constellation of Leo this month shining at magnitude 1.8.

Jupiter

Rises at 4:41 a.m. on the 1st and about 3:08 a.m. by month's end. Jupiter is visible in the early morning sky before sunrise. Look for Jupiter in the east before dawn. Jupiter is in the constellation of Leo shining at magnitude -1.8.

Saturn

Sets at 9:14 p.m. on the 1st and about 7:22 p.m. by month's end. Saturn is well placed for early evening viewing, appearing low to the west after the Sun sets. Saturn moves from the constellation of Libra into Scorpius shining at magnitude 0.6.

Uranus

Is at opposition on the 11th, rising as the Sun sets. Uranus rises at 7:03 p.m. on the 1st and about 4:59 p.m. by month's end. Uranus is at its best for the year. Uranus is visible almost all night long. Uranus



is in the constellation of Pisces shining at magnitude 5.7.

Neptune

Rises at 5:25 p.m. on the 1st and about 3:22 p.m. by month's end. Neptune is fairly well above the eastern horizon once the skies get dark enough to spot. Neptune is in the constellation of Aquarius shining at magnitude 7.8.

Dwarf Planets

Ceres

Rises at 5:14 p.m. on the 1st and about 2:24 p.m. by month's end. Ceres will be difficult to spot for those living in the more northerly latitudes. Ceres is in the lower part of the constellation of Sagittarius shining at magnitude 8.9.

Pluto

Sets at 12:05 a.m. on the 1st and about 10:01 p.m. by month's end. Look for Pluto to the southwest just above the handle of the teapot asterism in the late evening. Pluto is in the constellation of Sagittarius shining at magnitude 14.2.

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.



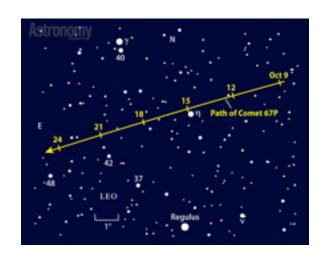
For more information about Meteor Showers, visit Gary Kronk's Meteor Showers Online web page at http://meteorshowersonline.com/.

Meteor Scatter (or Meteor burst communications) - http://en.wikipedia.org/wiki/ Meteor_burst_communications "is a radio propagation mode that exploits the ionized trails of meteors during atmospheric entry to establish brief communications paths between radio stations up to 2,250 kilometres (1,400 mi) apart." Tune your shortwave or your HF amateur radio to 55.25 MHz SSB and see if you can hear any pings.

Comets

Comet 67P/Churyumov-Gerasimenko passes through the constellation of Leo this month. Comet 67P may brighten to magnitude 10 if we're lucky and may be spotted under dark skies with a 4 inch telescope; however, it may not brighten much more than 12th magnitude and would require at least an 8 inch telescope to spot.

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

· No eclipse activity this month.

Observational Opportunities (from evening to morning)

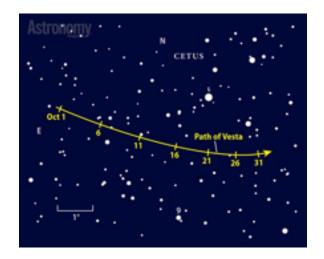
- Look for Venus, Mars, Jupiter and Mercury before sunrise.
- · Observe Saturn in the evening sky.
- Try to spot Neptune and Uranus later in the evening.
- Enjoy the Orionid meteors later in the month.

Asteroids

(From west to east)

- Metis is in the constellation of Aquarius.
- **Eunomia** is at opposition on the 3rd in the constellation of Pegasus.
- Vesta is in the constellation of Cetus.
- **Papagena** is at opposition on the 12th in the constellation of Cetus.
- Amphitrite is at opposition on the 25th in the constellation of Perseus.
- Laetitia is in the constellation of Taurus.
- Nausikaa is in the constellation of Perseus.

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

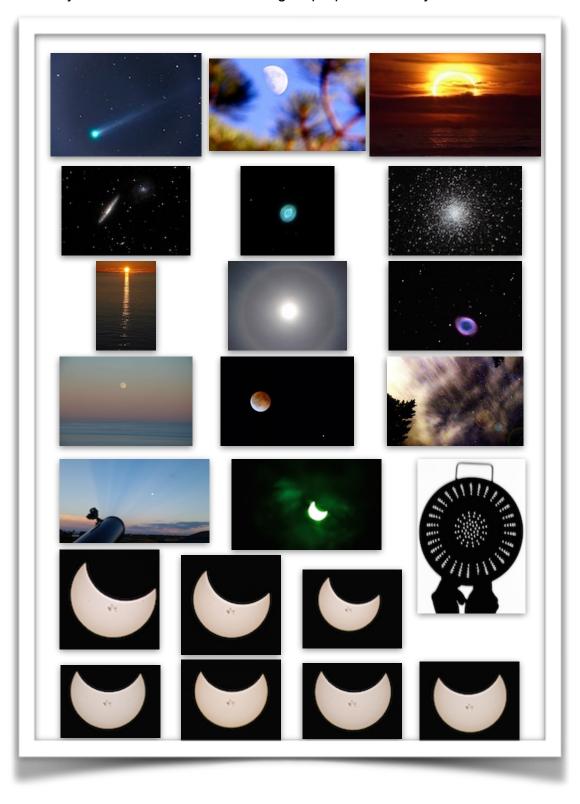


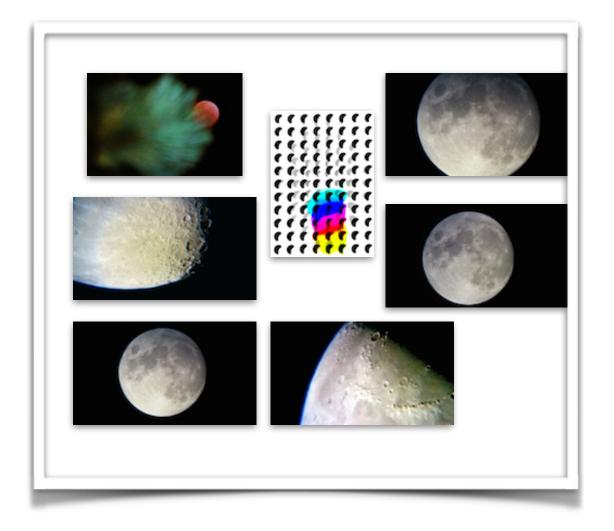
Occultations

Information on various occultations can be found at http://lunar-occultations.com/iota/iotandx.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

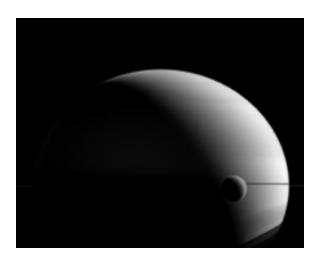
(Excerpts from recent mission updates)



Cassini September 28, 2015 Veiled Worlds Full-Res: PIA18335

"Titan and Saturn have few things in common, but a hazy, clouded appearance is one feature they share. Although their faces seem similar in images like this, appearances can be misleading.

Both Saturn and Titan have thick atmospheres, in a relative sense. But Saturn is a gas giant, covered in clouds, with no solid surface to speak of. Titan's atmosphere is a blanket of dense haze -- a photochemical smog -- surrounding an icy, solid body. Even their atmospheric compositions are different; Saturn is mostly hydrogen and helium with clouds of water, ammonia and ammonium



hydrosulfide. Titan's atmosphere is primarily nitrogen and methane, with occasional methane clouds.

This view looks toward Saturn from the unilluminated side of the rings, 0.3 degrees below the ring plane. The image was taken in visible green light with the Cassini spacecraft wide-angle camera on May 22, 2015.

The view was obtained at a distance of approximately 1.4 million miles (2.2 million kilometers) from Saturn. Image scale is 81 miles (130 kilometers) per pixel."

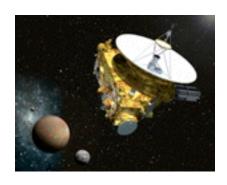
The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. JPL, a division of the California Institute of Technology, Pasadena, manages the mission for NASA's Science Mission Directorate in Washington.

More information about Cassini is available at the following sites: http://www.nasa.gov/cassini
http://saturn.jpl.nasa.gov

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 October 1, 2015 Pluto's Big Moon Charon Reveals a Colorful and Violent History

"NASA's New Horizons spacecraft has returned the best color and the highest resolution images yet

of Pluto's largest moon, Charon - and these pictures show a surprisingly complex and violent history.

At half the diameter of Pluto, Charon is the largest satellite relative to its planet in the solar system. Many New Horizons scientists expected Charon to be a monotonous, crater-battered world; instead, they're finding a landscape covered with mountains, canyons, landslides, surface-color variations and more.



"We thought the probability of seeing such interesting features on this satellite of a world at the far edge of our solar system was low," said Ross Beyer, an affiliate of the New Horizons Geology, Geophysics and Imaging (GGI) team from the SETI Institute and NASA Ames Research Center in Mountain View, California, "but I couldn't be more delighted with what we see!"

High-resolution images of the Pluto-facing hemisphere of Charon, taken by New Horizons as the spacecraft sped through the Pluto system on July 14, and transmitted to Earth on Sept. 21, reveal details of a belt of fractures and canyons just north of the moon's equator. This great canyon system stretches across the entire face of Charon, more than a thousand miles, and probably around onto Charon's far side. Four times as long as the Grand Canyon, and twice as deep in places, these faults and canyons indicate a titanic geological upheaval in Charon's past."



It's always Pluto Time somewhere, and NASA wants to see your view.

What is Pluto? -Video

Follow New Horizons on its journey to Pluto and beyond.

"How Do We Get to Pluto? Practice, Practice"

Part I: The Encounter Begins - Small mp4 (38 MB, 640x360)

- <u>Large mp4</u> (116 MB, 1280x720)

Part II: Passing Pluto - Small mp4 (34 MB, 640x360)

- Large mp4 (102 MB, 1280x720)

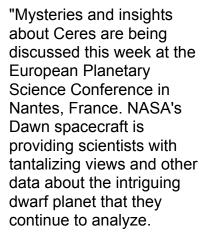
Find New Horizons in the iTunes App Store here. (http://itunes.com/apps/newhorizonsanasavoyagetopluto)

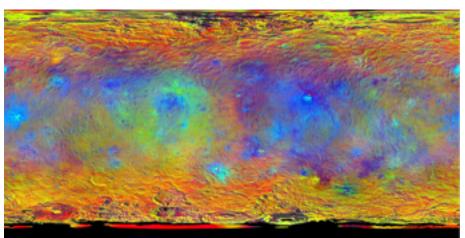
New Horizons gallery

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 30, 2015
Dawn Team Shares New Maps and Insights about Ceres
Full image and caption





"Ceres continues to amaze, yet puzzle us, as we examine our multitude of images, spectra and now energetic particle bursts," said Chris Russell, Dawn principal investigator at the University of California, Los Angeles.

A new color-coded topographic map shows more than a dozen recently approved names for features on Ceres, all eponymous for agricultural spirits, deities and festivals from cultures around the world. These include Jaja, after the Abkhazian harvest goddess, and Ernutet, after the cobra-headed Egyptian harvest goddess. A 12-mile (20-kilometer) diameter mountain near

Ceres' north pole is now called Ysolo Mons, for an Albanian festival that marks the first day of the eggplant harvest.

Another new Ceres map, in false color, enhances compositional differences present on the surface. The variations are more subtle than on Vesta, Dawn's previous port of call. Color-coded topographic images of Occator (oh-KAH-tor) crater, home of Ceres' brightest spots, and a puzzling, cone-shaped 4-mile-high (6-kilometer-high) mountain, are also available. Scientists are still trying to identify processes that could produce these and other unique Cerean phenomena.

Ceres Topographic Globe Animation

Ion Propulsion Dawn Video

Ion propulsion isn't something found only in science fiction. Ion engines are a real deal and drive NASA's Dawn spacecraft, en route to dwarf planet Ceres. Big things do come in small packages.

Dawn's Virtual Flight over Vesta

Ceres Fly By

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 August 3, 2015 MESSENGER Team Celebrates 11th Anniversary of Launch

"Eleven years ago today -- at 2:15:56 am EDT -- NASA's MESSENGER spacecraft was launched aboard a Boeing Delta II rocket

from Cape Canaveral Air Force Station in Florida, and after more than 6 1/2 years in transit it became the first spacecraft to orbit the innermost planet in our solar system.

The spacecraft is no more; on April 30 it impacted the surface of Mercury, as expected. But the team of scientists and engineers who built and operated the probe continues to analyze the many terabytes



of data acquired.

"MESSENGER the spacecraft may be no more, but the information it provided about Mercury continues to expand what we know about the planet and the origin of our solar system," said James Green, Director of NASA's Planetary Science Division. "The spacecraft already far exceeded our expectations, and we look forward to more fabulous results that will come from the analysis of the archived data."

In a video released today, "Making Mercury Whole," MESSENGER team members recount some highlights of the mission, originally planned to orbit Mercury for only one year, but ultimately orbiting the planet for more than four years."

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



the general public.

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



Laboratory for Atmospheric and Space Physics

"The Laboratory for Atmospheric and Space Physics (LASP) at the University of Colorado Boulder (CU) began in 1948, a decade before NASA. We are the world's only research institute to have sent instruments to all eight planets and Pluto.

LASP combines all aspects of space exploration through our expertise in science, engineering, mission operations, and scientific data analysis. As part of CU, LASP also works to educate and train the next generation of space scientists, engineers and mission operators by integrating undergraduate and graduate students into working teams. Our students take their unique experiences with them into government or industry, or remain in academia to continue the cycle of exploration.

LASP is an affiliate of CU-Boulder AeroSpace Ventures, a collaboration among aerospace-related departments, institutes, centers, government labs, and industry partners."



MAVEN September 22, 2015 MAVEN Celebrates One Year at Mars

"NASA's MAVEN spacecraft has been in orbit around Mars for one Earth year. MAVEN was launched to Mars on Nov. 18, 2013 from Cape Canaveral Air Force Station in Florida and successfully entered Mars' orbit on Sept. 21, 2014.

"The success of the mission so far is a direct result of the incredibly hard work of everybody who is working and has worked on MAVEN. This one year at Mars reflects the

tremendous efforts over the preceding dozen years," said Bruce Jakosky, MAVEN's principal investigator from the University of Colorado's Laboratory for Atmospheric and Space Physics in Boulder.

Some of the highlights of the first action-packed year include:

- * Performing the orbit insertion maneuver
- * Surviving the encounter with Comet Siding Spring
- * Commissioning the spacecraft
- * Carrying out ten months of observations during MAVEN's primary mission
- * Carrying out four deep-dip campaigns

"The team has done a fantastic job of adapting to spacecraft operations in the Martian environment," said Richard Burns, MAVEN project manager at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "All systems on MAVEN remain in excellent working condition."

MAVEN began its primary science mission on Nov. 16, 2014, and is the first spacecraft dedicated to understanding Mars' upper atmosphere. The goal of the mission is to determine the role that loss of atmospheric gas to space played in changing the Martian climate through time. MAVEN is studying the entire region from the top of the upper atmosphere all the way down to the lower atmosphere so that the connections between these regions can be understood."

Visit LASP and MAVEN for more information.



Mars Science Laboratory - Curiosity September 11, 2015 Mars Panorama from Curiosity Shows Petrified Sand Dunes

<u>Vista from Curiosity Shows Crossbedded Martian Sandstone</u>

"The next rock target to be drilled by NASA's Curiosity Mars rover may be sandstone that was deposited by wind, unlike previous rock targets deposited by water.

Some of the dark sandstone in an area being explored by NASA's Curiosity Mars rover shows texture and inclined bedding structures characteristic of deposits that formed as sand dunes, then were cemented into rock.

A panorama from Curiosity's Mast Camera (Mastcam) that includes a ridge made of this sandstone is online at:

http://mars.nasa.gov/msl/multimedia/images/?ImageID=7468

This sandstone outcrop -- part of a geological layer that Curiosity's science team calls the Stimson unit -- has a structure called crossbedding on a large scale that the team has interpreted as deposits of sand dunes formed by wind. Similar-looking petrified sand dunes are common in the U.S. Southwest. Geometry and orientation of the crossbedding give information about the directions of the winds that produced the dunes.

The Stimson unit overlies a layer of mudstone that was deposited in a lake environment. Curiosity has been examining successively higher and younger layers of Mount Sharp, starting with the mudstone at the mountain's base, for evidence about changes in the area's ancient environment.

The dozens of individual Mastcam images combined into this panorama were taken on Aug. 27, 2015. Curiosity has driven about 103 yards (94 meters) in the subsequent two weeks, generally southward. Outcrops of the Stimson unit sandstone are still accessible to the rover,

and researchers plan to use the rover to collect and analyze a drilled sample of Stimson unit sandstone this month."

To follow the Mars Curiosity rover and NASA on Foursquare, visit: http://www.foursquare.com/NASA 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 22, 2015



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

"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: Rover's Current Location Makes Communications a Challenge - sols 4140-4146, September 16, 2015-September 22, 2015:

"Opportunity is within 'Marathon Valley' on the west rim of Endeavour Crater conducting a walk-about survey for clay minerals.

The rover's current location within Marathon Valley with its high walls to the north and west presents a challenge for low-elevation Ultra-High-Frequency (UHF) relay passes to the west. On Sol 4141 (Sept. 17, 2015), no data were received as the orbiter's flight path was below the elevation on the valley ridgeline. On that sol, the rover did successfully perform an in-situ science campaign on the surface target, 'Pvt. George Gibson' that included a Microscopic Imager (MI) mosaic and the placement of the Alpha Particle X-ray Spectrometer (APXS). Some of those data were received on subsequent sols. On Sol 4144 (Sept. 20, 2015), another MI mosaic was taken and the robotic armed stowed for a future drive. Once again, the high

ridgeline of the valley obscured the low-elevation pass on Sol 4145 (Sept. 21, 2015), and little data were received.

On Sol 4146 (Sept. 22, 2015), Opportunity was configured from RAM-only operation to Flash as a planned test of the non-volatile storage system. The drive on that sol completed successfully, but an amnesia event with Flash prevented a return of drive-related data on that sol. Those data are expected to be received on subsequent sols. The plan forward is to continue to operate in Flash for one week in order to gain information and statistics on the state of the Flash storage system.

As of Sol 4146 (Sept. 22, 2015), the solar array energy production was 335 watt-hours with an atmospheric opacity (Tau) of 0.539 and a solar array dust factor of 0.569.

Total odometry is (26.43 miles) 42.53 kilometers, more than a marathon."

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

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

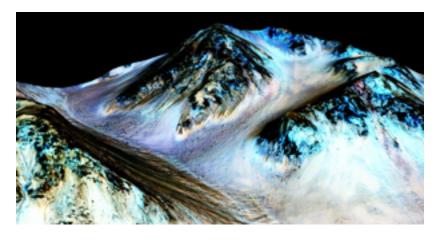


Mars Reconnaissance Orbiter Mission
September 28, 2015
NASA Confirms Evidence That Liquid Water Flows on Today's Mars
Full image and caption

"New findings from NASA's

Mars Reconnaissance Orbiter (MRO) provide the strongest evidence yet that liquid water flows intermittently on present-day Mars.

Using an imaging spectrometer on MRO, researchers detected signatures of hydrated minerals on slopes where mysterious streaks are seen on the Red Planet. These darkish streaks appear to ebb and



flow over time. They darken and appear to flow down steep slopes during warm seasons, and then fade in cooler seasons. They appear in several locations on Mars when temperatures are above minus 10 degrees Fahrenheit (minus 23 Celsius), and disappear at colder times.

"Our quest on Mars has been to 'follow the water,' in our search for life in the universe, and now we have convincing science that validates what we've long suspected," said John Grunsfeld, astronaut and associate administrator of NASA's Science Mission Directorate in Washington. "This is a significant development, as it appears to confirm that water -- albeit briny -- is flowing today on the surface of Mars."

These downhill flows, known as recurring slope lineae (RSL), often have been described as possibly related to liquid water. The new findings of hydrated salts on the slopes point to what that relationship may be to these dark features. The hydrated salts would lower the freezing point of a liquid brine, just as salt on roads here on Earth causes ice and snow to melt more rapidly. Scientists say it's likely a shallow subsurface flow, with enough water wicking to the surface to explain the darkening."

Video

This animation simulates a flyover of a portion of a Martian canyon detailed in a geological map produced by the U.S. Geological Survey and based on observations by the HiRISE camera on NASA's Mars Reconnaissance Orbiter. The landforms include a series of hills called Candor Colles.

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 September 2, 2015 What Happened to Early Mars' Atmosphere? New Study Eliminates One Theory

Rocks Here Sequester Some of Mars' Early Atmosphere

This view combines information from two instruments on NASA's Mars Reconnaissance Orbiter to map color-coded composition over the shape of the ground in a small portion of the Nili Fossae plains region of Mars' northern hemisphere.

Credit: NASA/JPL-Caltech/JHUAPL/Univ. of Arizona

"Scientists may be closer to solving the mystery of how Mars changed from a world with surface water billions of years ago to the arid Red Planet of today.

A new analysis of the largest known deposit of carbonate minerals on Mars suggests that the original Martian atmosphere may have already lost most of its carbon dioxide by the era of valley network formation.

"The biggest carbonate deposit on Mars has, at most, twice as much carbon in it as the current Mars atmosphere," said Bethany Ehlmann of the California Institute of Technology and NASA Jet Propulsion Laboratory, both in Pasadena. "Even if you combined



all known carbon reservoirs together, it is still nowhere near enough to sequester the thick atmosphere that has been proposed for the time when there were rivers flowing on the Martian surface."

Carbon dioxide makes up most of the Martian atmosphere. That gas can be pulled out of the air and sequestered or pulled into the ground by chemical reactions with rocks to form carbonate minerals. Years before the series of successful Mars missions, many scientists expected to find large Martian deposits of carbonates holding much of the carbon from the planet's original atmosphere. Instead, these missions have found low concentrations of carbonate distributed widely, and only a few concentrated deposits. By far the largest known carbonate-rich deposit on Mars covers an area at least the size of Delaware, and maybe as large as Arizona, in a region called Nili Fossae."

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.



Journey to Mars
InSight - Revealing the Heart of Mars
August 18, 2015
Send Your Name to Mars on NASA's Next Red Planet Mission

Mars enthusiasts around the world can participate in NASA's journey to Mars by adding their names to a silicon microchip headed to the Red

Planet aboard NASA's InSight Mars lander, scheduled to launch next year.



"Our next step in the journey to Mars is another fantastic mission to the surface," said Jim Green, director of planetary science at NASA Headquarters in Washington. "By participating in this opportunity to send your name aboard InSight to the Red Planet, you're showing that you're part of that journey and the future of space exploration."

Submissions will be accepted until Sept. 8. To send your name to Mars aboard InSight, go to:

http://go.usa.gov/3Aj3G

The fly-your-name opportunity comes with "frequent-flier" points to reflect an individual's personal participation in NASA's journey to Mars, which will span multiple missions and multiple decades. The InSight mission offers the second such opportunity for space exploration fans to collect points by flying their names aboard a NASA mission, with more opportunities to follow.

Learn more about the InSight mission at: http://insight.jpl.nasa.gov/home.cfm

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/.



Astronomy Links and Other Space News

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

Colorado Astronomy Links

Brighton Astronomy Group, Brighton, Colorado - http://www.brightonastronomy.com - Astronomy in Brighton, Colorado (under construction).

Cloudbait Observatory, Guffey Colorado - http://www.cloudbait.com - Submit your fireball reports here. Interesting, knowledgeable site.

Colorado Springs Astronomical Society - http://csastro.org - The Colorado Springs Astronomical Society (CSAS) is a nonprofit organization dedicated to the enjoyment of the nighttime sky.

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.

Gateway2Space - http://www.gateway2space.com - More information about the Star Light -- Star Bright Observatory.

Little Thompson Observatory - http://www.starkids.org/ - The Little Thompson Observatory (LTO) offers no-charge public access to the wonders of the night sky, either on one of our regularly scheduled public nights, or as a private group affair. When the weather co-operates, each session includes a guided tour of the sky using our large (18") telescope.

Mike Coletta's SatWatch - http://www.kg0ufo.com - Orbiting object and satellite watching. ORBITING OBJECT TRACKING ... It's the thrill of the chase. Promoting and supporting the hobby of amateur radio, Mike - KG0UFO, along with many other radio hobbyists around the globe use the reflected signals of the AF Space Fence to detect orbiting objects as they make their way over the US. - The AF Space Fence was shut down in Sept. 2013. These are recordings of Mike's many observations.

National Space Science & Technology Institute - http://www.nssti.org - NSSTI runs the Star Light--Star Bright Observatory in Colorado Springs, Colorado.

Northern Colorado Astronomical Society - http://ncastro.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 Party 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).

Southern Colorado Astronomical Society - http://www.scaspueblo.com - The Southern Colorado Astronomical Society, CSU-P and the Pueblo Nature and Raptor Center welcomes everyone to participate in the discovery of our night sky.

Star Cruiser Bill's Astrophotography - <u>http://www.kd0npt-astro.net</u> - Great astrophotography from Aurora Colorado.

Radio Astronomy Links

HighQ Software Group - http://home.earthlink.net/~boydralp/highqsoftwaregroup/ - Blog of Ralph Boyd, Software engineer, amateur radio operator, radio astronomer.

Radio Astronomy News - http://www.radioastronomynews.com/ - Radio Astronomy news and information.

Radio Astronomy Research Posts - http://www.radioastronomyresearch.com/ - Radio Astronomy Research news posts and observations.

Radio Astronomy Supplies - http://www.radioastronomysupplies.com/ - Radio Astronomy Supplies, the International leader in research radio telescopes for universities, observatories and individual.

Radio JOVE Project - http://radiojove.gsfc.nasa.gov - Radio JOVE students and amateur scientists observe and analyze natural radio emissions of Jupiter, the Sun, and our galaxy.

Society of Amateur Radio Astronomers - http://www.radio-astronomy.org/ - The Society of Amateur Radio Astronomers (SARA) is an international society of dedicated enthusiasts who teach, learn, trade technical information, and do their own observations of the radio sky.

Other Astronomy Links

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 Sea of Stars - Voyages of a Merchant Mariner & Amateur Astronomer - http://gloriousseas.blogspot.com/ - I'm a retired Navy veteran, currently sailing with the US Navy's Military Sealift Command as an Operations Chief. My dominant interests are science (esp. astronomy), history and photography, and I enjoy naval and military wargaming WHEN I can find the time.

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.

Amateur Radio Relay League - http://www.arrl.org - Information about amateur radio and how to become an amateur radio operator.

Astrogirl Homepage - http://home.pcisys.net/~astrogirl/ - 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.

Be an Astronomer right from your Window - http://www.blindschalet.com/kba-be-an-astronomer-right-from-your-window-240.html - At-home astronomy techniques.

Black Hole Encyclopedia - http://blackholes.stardate.org/ - Excellent site from StarDate - University of Texas McDonald Observatory (http://mcdonaldobservatory.org/)

Caelum Observatory - http://www.caelumobservatory.com/index.html - The LARGEST dedicated public telescope in the Southwest at the Mount Lemmon SkyCenter!

Celestial Bodies and Astronomy - http://ellejet.com/celestial-bodies.php.

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.

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.

CosmoQuest - http://cosmoquest.org/ - The place where you map other worlds, explore out universe and contribute to science.

Distant Suns - http://www.distantsuns.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.

informED: 10 Teaching Tools for Educators - http://www.opencolleges.edu.au/informed/teacher-resources/ - informED - Teacher Resources.

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 - http://www.jpl.nasa.gov/ambassador/front.html - 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.

Mars Exploration, Mars Rovers Information, Facts, News, Photos - http://science.nationalgeographic.com/science/space/space-exploration/mars-exploration-article/ - National Geographic - Mars Exploration - Investigating the Red Planet.

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 - Lunar and Planetary Science - http://nssdc.gsfc.nasa.gov/planetary/planets/cometpage.html - General information, Missions to Comets, Data, Press Releases, Meteors and Meteorites, Other topics of Interest.

NASA Science News - http://science.nasa.gov/ - NASA missions, updates, astronomy news, excellent resource.

National Archives info on space exploration - http://www.archives.gov/research/alic/reference/space-exploration.html - Archives Library Information Center (ALIC) - Space Exploration - Information about the United States' space flight programs, including NASA missions and the astronauts who participate in the efforts to explore space.

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.

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

Much of the information in this newsletter is from "Astronomy Magazine" (Kalmbach Publishing), JPL mission status reports, "Meteor Showers - A Descriptive Catalog" by Gary W. Kronk and other astronomical sources that I have stashed on my book shelves.

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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