IAAS Monthly Astronomy Newsletter June 2014

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 and 29436. More information on the WB0WDF repeater links and Allstar nodes 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 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

In This Newsletter...

The Month At-A-Glance

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

The Moon

Phases:

- First Quarter Moon occurs on the 5th.
- Full Moon occurs on the 13th.
- Last Quarter Moon occurs on the 19th.
- New Moon occurs on the 27th.

- The Moon is at Apogee on the 3rd, 251,627 miles from Earth.
- The Moon is at Perigee on the 14th, 224,977 miles from Earth.
- The Moon is at Apogee on the 30th, 252,233 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 6° south of Jupiter on the 1st.
- The Moon passes 1.6° south of Mars on the 7th.
- The Moon passes 0.6° south of Saturn on the 10th.
- The Moon passes 5° north of Neptune on the 18th.
- The Moon passes 1.6° north of Uranus on the 20th.
- Jupiter passes 6° south of Pollux on the 21st.
- The Moon passes 1.3° south of Venus on the 24th.
- The Moon passes 5° south of Jupiter on the 28th.

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 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 June

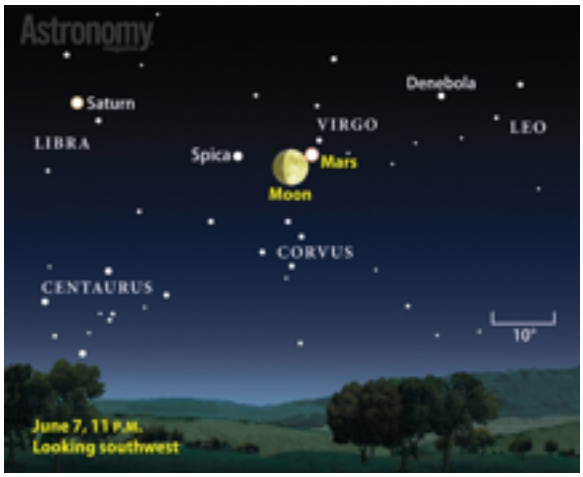
Begin your month by viewing Mercury, Jupiter and a 4 day old crescent Moon low on the western horizon after sunset on the evening of the 1st. Once Mercury and Jupiter have set, continue your observing of Mars in the constellation of Virgo along with Ceres and Vesta. Spot Saturn in Libra in the south. By the time Saturn sets, Pluto will be high enough for dark sky observers. Late night/early morning observers will want to catch Neptune and Uranus with binoculars or smaller telescopes. Look for Venus in the early morning hours before sunrise. While out enjoying the warm June evenings, try and view some meteors. There are a bunch of smaller meteor showers this month which should give observers a chance to see a few on any

given night. There are also a couple of daylight showers which may interest amateur radio operators with meteor scatter communications.

Mercury
Is visible, low on the western horizon about 90 minutes after sunset during the first half of June. Mercury is stationary on the 7th. Mercury is in inferior conjunction with the Sun on the 19th. Mercury sets about 9:57 p.m. on the 1st. After the 19th, Mercury will return to the morning sky several days later, lost in the morning twilight glow. Mercury rises about 4:50 a.m. by month's end. Mercury moves from the constellation of Gemini into Taurus shining at magnitude 1.2 on the 1st.

Venus
Rises at 3:50 a.m. on the 1st and about 3:39 a.m. by month's end. Early risers will not want to miss Venus and a waning crescent Moon on the morning of the 24th. Venus will be easy to spot moving from the constellation Aries into Taurus shining at magnitude -3.9 on the 15th.

Earth
The Summer Solstice occurs at 6:51 a.m. EDT on the 21st.



Mars
Sets at 02:49 a.m. on the 1st and about 1:08 a.m. by month's end. Observe Mars with binoculars or a small telescope in the mid to late evening skies. On June 7th, Mars is in conjunction with the waxing crescent Moon, separated by just 2°. Mars is in the constellation of Virgo this month shining at magnitude -0.2.

Jupiter
Sets at 11:09 a.m. on the 1st and about 9:33 p.m. by month's end. Look for Jupiter in the early evening skies this month within a half hour of sunset. Jupiter is in the constellation of Gemini shining at magnitude -1.8.

Saturn
Rises at 6:13 p.m. on the 1st and about 4:14 p.m. by month's end. Saturn is still nearly as magnificent to view as it was at opposition. View Saturn through a telescope to truly appreciate the planet

and its ring system tilted at 21° to our viewing angle. Saturn is in the constellation of Libra shining at magnitude 0.3.

Uranus
Rises at 2:58 a.m. on the 1st and about 1:02 a.m. by month's end. Uranus is in the constellation of Pisces shining at magnitude 5.9.

Neptune
Rises at 1:28 a.m. on the 1st and about 11:25 p.m. by month's end. Neptune is in the constellation of Aquarius shining at magnitude 7.9.

Dwarf Planets
Ceres
Sets at 4:55 a.m. on the 1st and about 2:51 a.m. by month's end. Ceres and Vesta, the two brightest asteroids, travel within 2° of each other all month. Ceres has dimmed somewhat since last month but can still be seen under dark sky conditions. Ceres is in the constellation of Virgo shining at magnitude 8.1.

Pluto
Rises at 10:20 p.m. on the 1st and about 8:19 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 Arietids Meteor Shower - This is the strongest daylight meteor shower of the year. The duration extends from May 22 to July 2, with maximum activity occurring on June 8. The hourly rate is near 60 at maximum.

The June Lyrids - This shower is active during June 10 to 21, producing predominantly blue and white meteors at a maximum hourly rate of 8 per hour on June 15. The average magnitude of this shower is near 3, while 32% of the meteors leave trains.

The Zeta Perseids - This daylight shower occurs during May 20 to July 5. Maximum occurs on June 13. Radar surveys have revealed the activity of this shower to be near 40 per hour.

The June Boötids - This shower is currently active during June 27 to July 5 and possesses a maximum of activity that falls on the 28th... The shower is notable in that its meteors are primarily faint, with an average magnitude near 5; however, bright meteors do occur regularly.

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

Comets
Look for Comet PANSTARRS (C/2012 K1) passing through Ursa Major in early June, Leo Minor by mid-month and just over the head of Leo the Lion by month's end. Comet PANSTARRS C/2012 K1 glows around 10th magnitude so at least a 4 inch telescope and dark skies will be needed to view this fuzzball.

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 Mercury after sunset during the first week of the month.
- Jupiter trails Mercury and sets soon after sunset all month.
- Next, look for Mars to the southwest
- Saturn is visible in the evening in the southern sky.
- Pluto may be visible with large scopes later at night.
- Find Neptune and Uranus in the early morning sky.
- Observe Venus, in the early morning sky before sunrise.
- Try to spot some of the Arietids and June Lyrids streaking through the evening and morning skies.

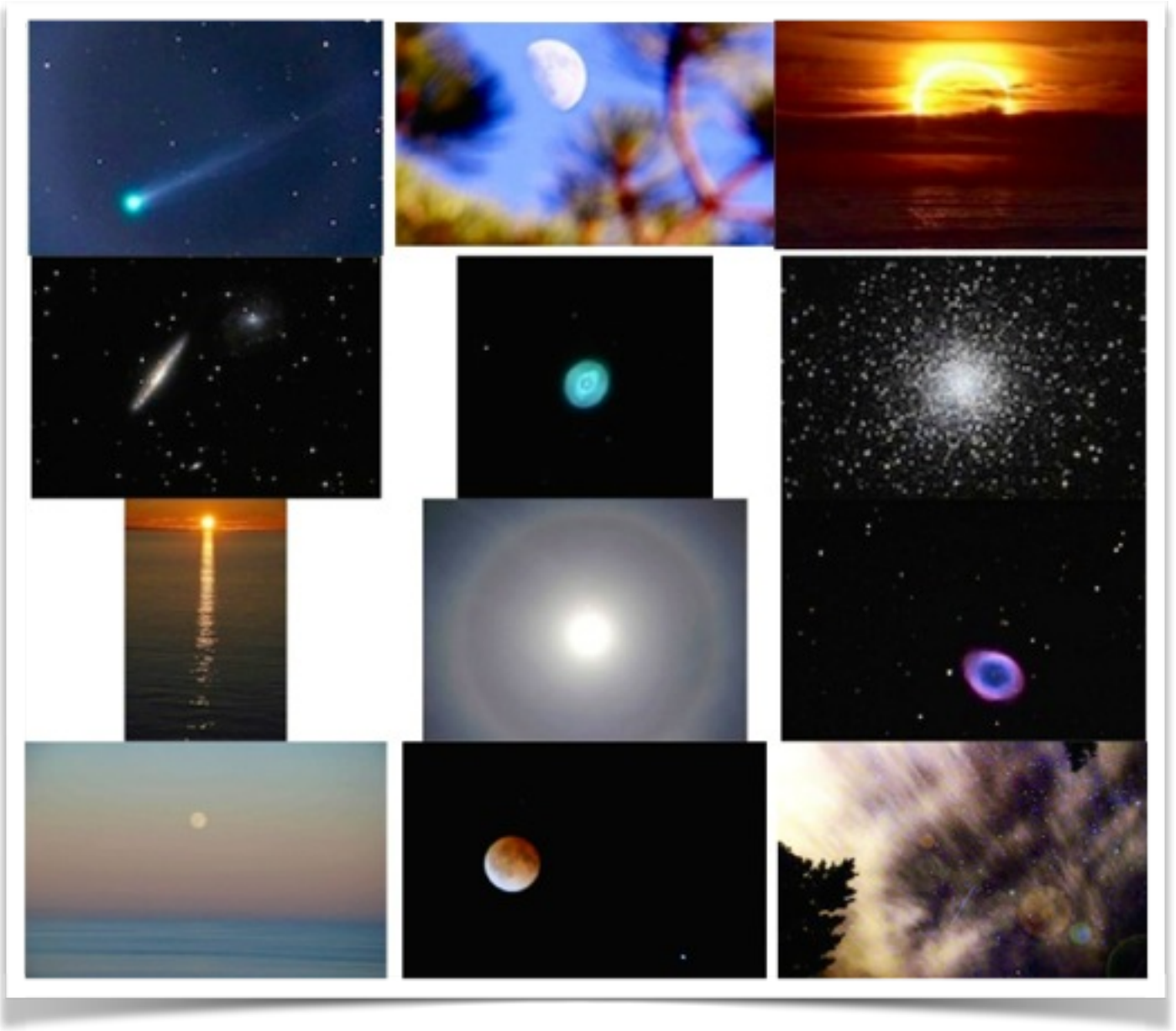
Asteroids
(From west to east)
- **Pallus** is in the constellation of Leo.
- **Vesta** is in the constellation of Virgo.
- **Eunomia** is in the constellation of Scorpio.
- **Amphitrite** is at opposition on the 24th in the constellation of Sagittarius.

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

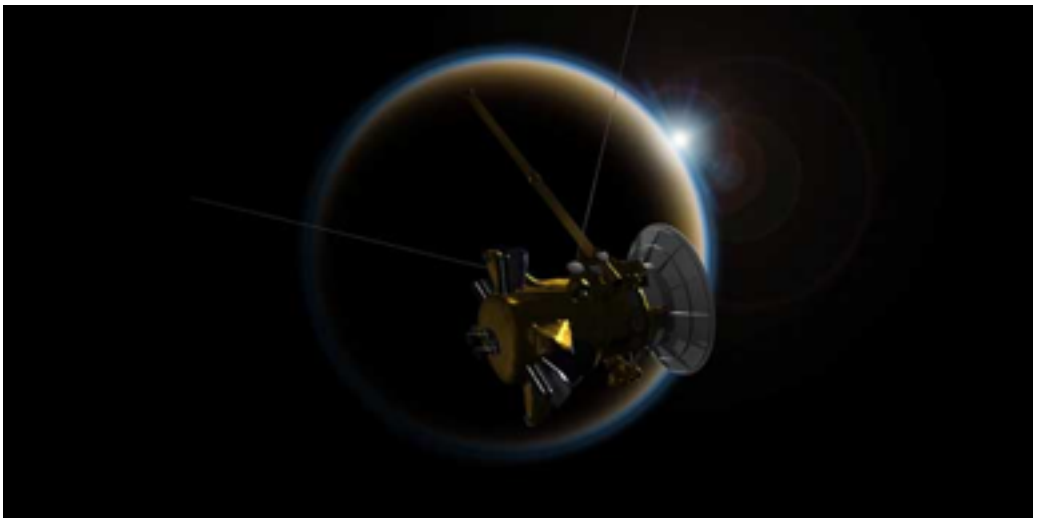
I have created a web page containing images taken and submitted by subscribers to the email newsletter, check-ins to the Colorado Astronomy Net and readers of the online newsletter and some of my own images. Any one wishing to submit their images to the gallery, please let me know. The images must be 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
May 27, 2014
Sunsets on Titan Reveal the Complexity of Hazy Exoplanets



"Scientists working with data from NASA's Cassini mission have developed a new way to understand the atmospheres of exoplanets by using Saturn's smog-enshrouded moon Titan as a stand-in. The new technique shows the dramatic influence that hazy skies could have on our ability to learn about these alien worlds orbiting distant stars.

The work was performed by a team of researchers led by Tyler Robinson, a NASA Postdoctoral Research Fellow at NASA's Ames Research Center in Moffett Field, California. The findings were published May 26 in the Proceedings of the National Academy of Sciences.

"It turns out there's a lot you can learn from looking at a sunset," Robinson said.

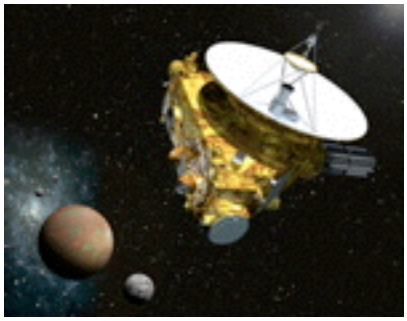
Light from sunsets, stars and planets can be separated into its component colors to create spectra, as prisms do with sunlight, in order to obtain hidden information. Despite the staggering distances to other planetary systems, in recent years researchers have begun to develop techniques for collecting spectra of exoplanets. When one of these worlds transits, or passes in front of its host star as seen from Earth, some of the star's light travels through the exoplanet's atmosphere, where it is changed in subtle, but measurable, ways. This process imprints information about the planet that can be collected by telescopes. The resulting spectra are a record of that imprint.

Spectra enable scientists to tease out details about what exoplanets are like, such as aspects of the temperature, composition and structure of their atmospheres."

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
February 27, 2014

What is Pluto? -Video

New Horizons Reaches the Final 4 (AU)

"New Horizons sailed past another milepost today when the NASA spacecraft moved to within four astronomical units (AU) of Pluto - which is less than four times the distance between the Earth and the sun, or about 371 million miles (598 million kilometers).

Did you know? An astronomical unit (AU) is the average distance between the Earth and sun, about 93 million miles or 149 million kilometers. New Horizons' journey from Earth to Pluto will cover more than 32 AU.

"We're as close to the Pluto system now as Earth ever gets to Jupiter, a first for any spacecraft," says New Horizons Principal Investigator Alan Stern, of the Southwest Research Institute, Boulder, Colo. “And hold on to your hat, it just gets more and more exciting from here."

Since launch on January 19, 2006, New Horizons has covered nearly 2.89 billion miles (4.62 billion kilometers). It makes a temporal connection with one NASA's legendary deep-space explorers this summer when it crosses the orbit of Neptune on Aug. 25 -- exactly 25 years after Voyager 2 made its historic flight past that giant planet. When New Horizons arrives at Pluto on July 14, 2015, it will have traveled farther than any spacecraft ever has to reconnoiter its prime target."

Follow New Horizons on its journey to Pluto and beyond.

“How Do We Get to Pluto? Practice, Practice, Practice”

Part I: The Encounter Begins	- Small mp4 (38 MB, 640x360) - Large mp4 (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
March 28, 2014
Dawn Wins National Air and Space Museum Trophy

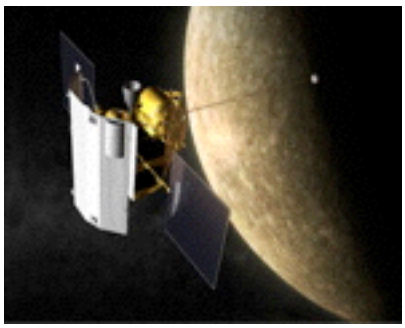
"The team in charge of NASA's Dawn mission, history's first detailed exploration of a celestial body inside the main asteroid belt, received the Smithsonian National Air and Space Museum's highest group honor at a dinner in Washington on March 26. Dawn, managed by NASA's Jet Propulsion Laboratory, Pasadena, Calif., received the 2014 Trophy for Current Achievement, which honors outstanding achievements in the fields of aerospace science and technology.

Having explored the giant asteroid Vesta and on its way to the dwarf planet Ceres, the Dawn spacecraft is designed to conduct an in-depth and up-close study of these two celestial bodies formed early in the history of the solar system. In 50 years of space exploration, no other spacecraft has orbited a distant solar system body, then left to travel to—and eventually orbit—another extraterrestrial body."

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
April 21, 2014
MESSENGER Completes Its 3,000th Orbit of Mercury, Sets Mark for Closest Approach

"On April 20, MESSENGER completed its 3,000th orbit of Mercury and moved closer to the planet than any spacecraft has been before, dropping to an altitude of 199 kilometers (123.7 miles) above the planet's surface.

"We are cutting through Mercury's magnetic field in a different geometry, and that has shed new light on the energetic electron population," said MESSENGER Project Scientist Ralph McNutt, of the Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, Md. "In addition, we are now spending more time closer to the planet in general -- and that has, in turn, increased the opportunities for all of the remote sensing instruments to make higher-resolution observations of the planet."

MESSENGER has been completing three orbits of Mercury every day since April 2012, when two orbit-correction maneuvers reduced its orbital period about Mercury from 12 hours to 8

hours. The shorter orbit has allowed the science team to explore new questions about Mercury's composition, geological evolution, and environment that were raised by discoveries made during the first year of orbital operations.

APL's Carolyn Ernst, the deputy instrument scientist for the Mercury Laser Altimeter (MLA), said the change from a 12- to an 8-hour orbit provided her team with 50% more altimetry tracks. "MLA coverage takes a long time to build up, and because of the small footprint of the laser, a lot of coverage is needed to obtain good spatial resolution. The more data we acquire, the better we resolve the topography of the planet," she said. "The 8-hour orbit has also allowed us to make more MLA reflectivity measurements, which have provided critical clues for characterizing Mercury's radar-bright deposits at high northern latitudes."

The probe has been edging closer and closer to Mercury since March 2013, at about the time that the spacecraft orbit's minimum altitude passed closest to Mercury's north pole.

APL's David Lawrence, a MESSENGER Participating Scientist, said he is excited about what the low-altitude orbits will reveal about Mercury's surface composition. "To date our compositional measurements with neutron, X-ray, and gamma-ray data have resolved only very large regions on Mercury's surface. Altitudes of less than 100 kilometers will enable us to pinpoint the compositional signatures of specific geologic features, which in turn will help us to understand how the surface formed and has changed over time."

MESSENGER's periapsis altitude will continue to decrease until the first orbit-correction maneuver of the low-altitude campaign, scheduled for June 17."

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
May 15, 2014
NASA Mars Rover Curiosity Wrapping Up Waypoint Work
(**Full image and caption**)

"Portions of powdered rock collected by drilling into a sandstone target last week have been delivered to laboratory instruments inside NASA's Curiosity Mars rover, and the rover will soon drive on toward its long-term destination on a mountain slope.

Other instruments on the rover have inspected the rock's interior exposed in the hole and in drill cuttings heaped around the hole. The target rock, "Windjana," is a sandstone slab within a science waypoint area called "The Kimberley."

The camera and spectrometer at the end of Curiosity's robotic arm examined the texture and composition of the cuttings. The instrument that fires a laser from atop the rover's mast zapped a series of points inside the hole with sharpshooter accuracy.

The rover team has decided not to drill any other rock target at this waypoint. In coming days, Curiosity will resume driving toward Mount Sharp, the layered mountain at the middle of Mars' Gale Crater. The rover is carrying with it some of the powdered sample material from Windjana that can be delivered for additional internal laboratory analysis during pauses in the drive."

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)
May 13, 2014

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: Opportunity Explores Region of Aluminum Clay Minerals - *sols 3657-3662, May 08, 2014-May 13, 2014*:

"Opportunity is exploring south of 'Solander Point' on the west rim of Endeavour Crater. The rover is exploring the region of aluminum-hydroxyl clay minerals seen from orbit.

On Sol 3657 (May 8, 2014), Opportunity collected a Microscopic Imager (MI) mosaic of the surface outcrop, called 'Ash Meadows,' then placed the Alpha Particle X-ray Spectrometer (APXS) for a multi-sol integration. On Sol 3659 (May 10, 2014), the rover drove just under 85 feet (26 meters) to the east, approaching a region of extended outcrop as a possible site for clay minerals. Also, Opportunity tested the new two-second spacecraft clock correction sequence. Over the next two sols, the rover collected an atmospheric argon measurement with the APXS and performed two more one-second-clock corrections.

On Sol 3662 (May 13, 2014), Opportunity bumped 7 feet (2 meters) forward to approach an exposed rock outcrop for further in-situ (contact) investigation.

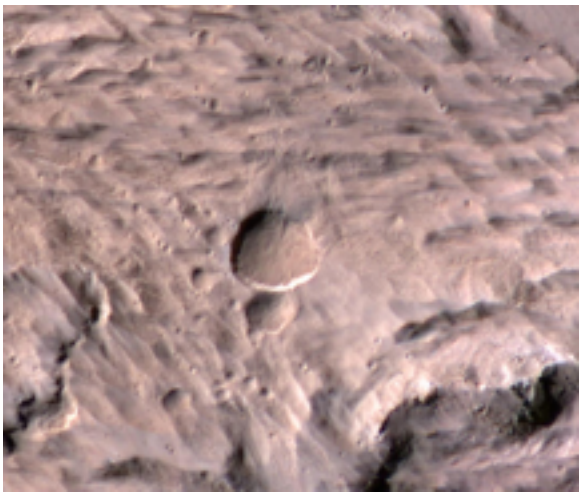
As of Sol 3662, the solar array energy production was 761 watt-hours with an atmospheric opacity (Tau) of 0.621, and an improved solar array dust factor of 0.964. Perfectly clean solar arrays would have a dust factor of 1.0, so the larger the dust factor, the cleaner the arrays.

Total odometry is 24.49 miles (39.41 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
May 22, 2014
NASA Mars Weather Camera Helps Find New Crater on Red Planet
(**Full image and caption**)

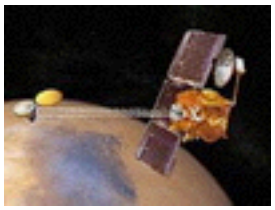


"Researchers have discovered on the Red Planet the largest fresh meteor-impact crater ever firmly documented with before-and-after images. The images were captured by NASA's Mars Reconnaissance Orbiter (MRO).

The crater spans half the length of a football field and first appeared in March 2012. The impact that created it likely was preceded by an explosion in the Martian sky caused by intense friction between an incoming asteroid and the planet's atmosphere. This series of events can be likened to the meteor blast that shattered windows in Chelyabinsk, Russia, last year. The air burst and ground impact darkened an area of the Martian surface about 5 miles (8 kilometers) across."

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 27, 2014
NASA, Khan Academy Collaborate to Bring STEM Opportunities to Online Learners

"NASA and Khan Academy, a non-profit educational website, today debuted a series of online tutorials designed to increase student interest in science, technology, engineering and mathematics, or STEM. The announcement of the new collaborative effort was made today at the 6th annual White House Science Fair.

The interactive education lessons invite users to become actively engaged in the scientific and mathematical protocols that NASA uses everyday to measure our universe, to explore the exciting engineering challenges involved in launching and landing spacecraft on Mars, and to learn about other space exploration endeavors and destinations.

Exciting and realistic simulations, challenges and games transport students deep into STEM subjects, blending NASA's space exploration expertise with Khan Academy's compelling approach to online self-paced learning. The innovative collaboration on this pilot program began last summer with NASA supplying technical content and subject matter experts to

ensure authenticity of the learning experiences and Khan providing proven expertise in delivering interactive online learning experiences for millions of learners worldwide.

These dynamic educational materials are free and available on Khan Academy at

https://www.khanacademy.org/partner-content/nasa

In just the past two years, Khan Academy's free online educational materials have reached over 100 million learners worldwide and delivered over 2 billion exercise problems.

NASA has been using its unique programs, assets, facilities and expertise to inspire students since the agency's inception in 1958. To learn more about NASA's education programs and opportunities, please visit http://www.nasa.gov/education."

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.

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

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/)

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.

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.

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

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.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 - "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.

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 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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http://ki0ar.com/pipermail/astronews_ki0ar.com/

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- The latest version of the newsletter is accessible from http://www.ki0ar.com/astro.html.

Keep looking UP!

73 from KI0AR

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