IAAS Monthly Astronomy Newsletter August 2018

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 KIØAR - 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 WØWYX **146.94 MHz** and **449.825 MHz** repeaters. The RMRL **146.94** repeater is also linked with the WBØWDF Cripple Creek **447.400 MHz** repeater and Allstar nodes **28298**, **28299**, **29436**. We are also linked via Echolink, links are **k0jsc-r** and **canoncty** courtesy of KØJSC and KØGUR. More information on the WBØWDF repeater links, Allstar nodes and Echolinks can be found at k0jsc.com. We are also linked with Allstar nodes in Florida as well, courtesy of KA4EPS. The net meets on Tuesday nights at 7 P.M. Mountain Time (US).

Obtain your Amateur Radio (Ham) License or your General Radio Operator's License (GROL)! Visit the South Metro VE Team website for more information. The South Metro VE Team provides test sessions on the 1st Saturday of each month at our new Eagle Street Facility, The City of Centennial, 7272 South Eagle Street, Centennial, Colorado 80112-4244 at 9am.

The Colorado Astronomy Net and the IAAS are on Facebook page. Be sure to "Like" us.

Excerpts from JPL mission updates are provided as a public service as part of the JPL Solar System Ambassador / NASA Outreach program.

Donate to the IAAS!

Shop Smile.Amazon.com, sign up or sign in to smile.amazon.com and select the **International Association for Astronomical Studies**. 0.5% of every purchase will be donated to the group. Thank you!

In This Newsletter...

"A Perseid fireball blazes across a partly cloudy sky at the peak of the 2013 shower. Moon-free circumstances promise nearly perfect viewing conditions for this year's Perseids." Astronomy Magazine, July 2018, p.36.
Jamie Cooper

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 11th.
- First Quarter Moon occurs on the 18th.
- Full Moon occurs on the 26th.

- The Moon is at Perigee on the 10th, 222,500 miles from Earth.
- The Moon is at Apogee on the 23rd, 252,119 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 5° south of Uranus on the 3rd.
- The Moon passes 1.2° north of asteroid Juno on the 4th.
- The Moon passes 1.1° north of Aldebaran on the 6th.
- The Moon passes 6° north of Venus on the 14th.
- The Moon passes 5° north of Jupiter on the 17th.
- The Moon passes 2° north of Saturn on the 21st.
- The Moon passes 7° north of Mars on the 23rd.
- The Moon passes 2° south of Neptune on the 27th.
- The Moon passes 5° south of Uranus on the 30th.

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

The Planets & Dwarf Planets

Planetary Reports 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 August

The Perseids Meteor Shower peaks this month and is one of the best for the year. This year, the Perseids will not be obscured by moonlight as they were last year and should promise to be quite spectacular this year. If you're lucky, you may be able to spot every planet, minor planet and a comet this month, starting from the west, with Ceres, Venus, Jupiter, Saturn, Pluto, Mars, Neptune, Comet 21P/Giacobini-Zinner, Uranus and Mercury, although you will have to wait until the end of the month to spot Mercury.

Mercury

Is in inferior conjunction on the 8th. Mercury is stationary on the 18th. Mercury is at greatest western elongation (18°) on the 26th. Mercury will be visible low to the east about 30 minutes before sunrise during the last half of the month. Mercury rises at 7:14 a.m. on the 1st and about 5:04 a.m. by month's end. Mercury is in the constellation of Leo this month shining at magnitude -0.7 on the 31st.

Venus

Is at greatest eastern elongation (46°) on the 17th. Venus sets at 10:08 p.m. on the 1st and about 9:01 p.m. by month's end. Venus continues its motion towards the western horizon. Venus is easy to spot to the west soon after sunset. Venus is in the constellation of Virgo this month shining at magnitude -4.4.

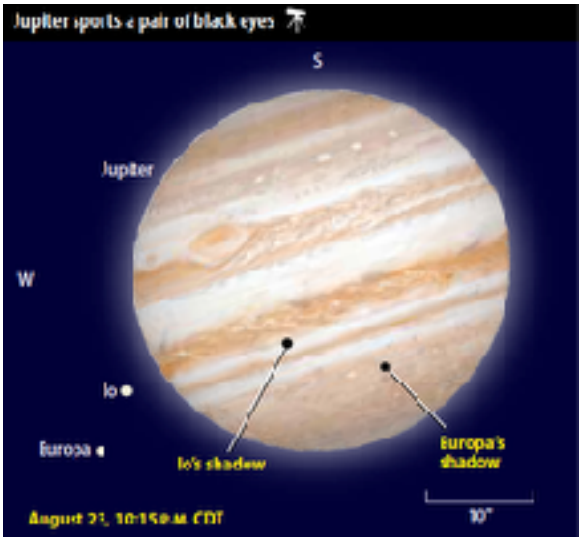
Earth

N/A.

Mars

Is stationary on the 28th. Mars remains near its best viewing for the year having just passed opposition late last month. Mars is still well placed for early evening viewing; however, the global dust storm continues to obscure fine detail when observed through a telescope. Mars rises at 8:15 p.m. on the 1st and about 5:55 p.m. by month's end. Mars is in the constellation of Capricornus shining at magnitude -2.5 on the 15th.

Jupiter



Sets at 12:20 a.m. on the 1st and about 10:23 p.m. by month's end. Jupiter can be easily spotted to the south-west soon after sunset. Jupiter is in the constellation of Libra shining at magnitude -2.0.

Saturn

Sets at 3:18 a.m. on the 1st and about 1:12 a.m. by month's end. Saturn is still near its peak visibility this month and looks quite spectacular through a telescope. In the vicinity of Saturn this month are the deep sky objects, the Trifid Nebula (M20), the Lagoon Nebula (M8) and open cluster M21. Saturn is in the constellation of Sagittarius shining at magnitude 0.3.

Uranus

Is stationary on the 7th. Uranus rises at 11:36 p.m. on the 1st and about 9:34 p.m. by month's end. Uranus is now rising early enough to be observed in the late evening sky. Uranus is in the constellation of Aries shining at magnitude 5.8.

Neptune

Rises 9:46 p.m. on the 1st and about 7:42 p.m. by month's end. Neptune is now well placed for evening viewing as well. Neptune is in the constellation of Aquarius shining at magnitude 7.8.

Dwarf Planets

Ceres

Sets at 10:21 p.m. on the 1st and about 8:48 p.m. by month's end. Ceres may be a bit more difficult to spot as it disappears into the evening twilight glow later in the month. Try to spot Ceres once the skies darken after sunset. Ceres is in the constellation of Leo shining at magnitude 8.8.

Pluto

Rises at 6:55 p.m. on the 1st and about 4:41 p.m. by months end. Look for Pluto to the south around 10:00 p.m. or later when Pluto is highest in the sky. 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 Northern Delta Aquarids extends from July 16 to September 10. Maximum occurs on August 13. The hourly rates reach a high of 10.

- The Perseids meteor shower is generally visible between July 23 and August 22. Maximum occurs during August 12/13. The hourly rate typically reaches 80, although some years have been as low as 4 and as high as 200. The meteors tend to be very fast, possess an average magnitude of 2.3 and leave persistent trains.

  Viewing the Perseids this year will hopefully be spectacular as they will not be hindered by moonlight during most of the duration of the showers. The period of August 6 through the 19th will provide ample opportunities to see many of these meteors streaking through the evening and night skies.

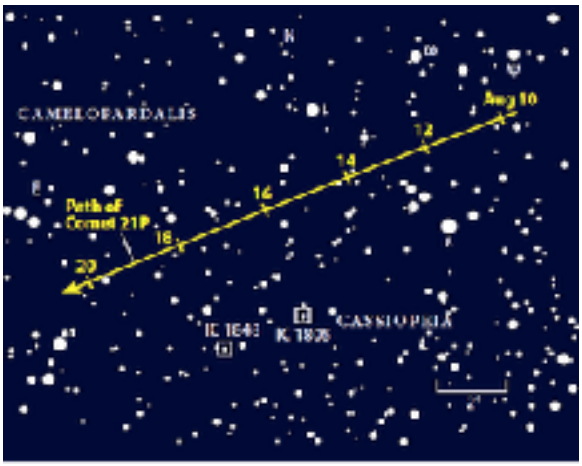
For more information about Meteor Showers, visit Gary Kronk's Meteor Showers Online web page at http://meteorshowersonline.com/.

Meteor Shower Radiant Report

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 54.310 MHz USB CW and see if you can hear any pings. Try other frequencies as well... 6m FT8 digital - 50.313 Mhz & 50.276 Mhz, JP-65 digital mode and the carrier frequencies of the lower vhf bands for TV channels 2, 3 & 4.

Comets

Comet 21P/Giacobini-Zinner passes through the constellation of Cassiopeia and Camelopardalis this month hopefully brightening to around 9th magnitude. Look for this comet during the 2nd and 3rd weeks of the month around midnight when the Moon will not interfere with viewing.

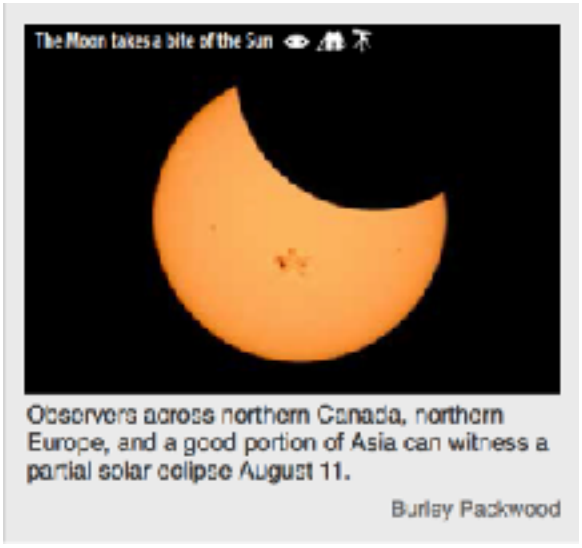


For information, orbital elements and ephemerides on observable comets visit the Observable Comets page from the Harvard-Smithsonian Center for Astrophysics. (http://cfa-www.harvard.edu/iau/Ephemerides/Comets/index.html)

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

Eclipses

- A partial Solar Eclipse occurs on the 11th for observers in northern Canada, northern Europe and a large area of Asia.



Observational Opportunities

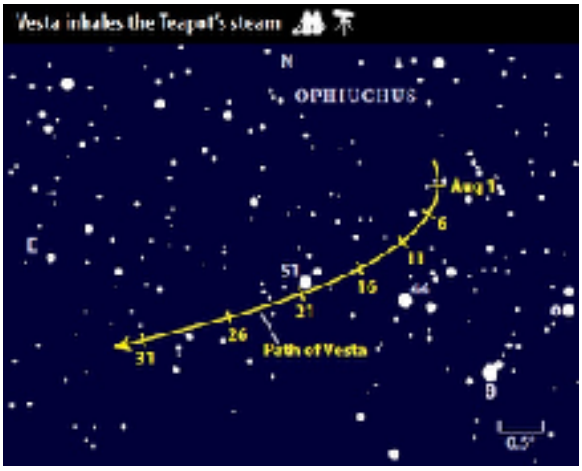
(from evening to morning)

- Enjoy most all of the planets during the evening skies after sunset.
- Watch the Perseids meteor shower before, during and after its peak in mid-August.
- Try to spot Comet 21P/Giacobini-Zinner passing through Cassiopeia.

Asteroids

(From west to east)

- **Vesta** is stationary on the 1st in the constellation of Ophiuchus.
- **Juno** is in the constellation of Cetus.
- **Hebe** is at opposition on the 20th in the constellation of Orion.
- **Pallas** is in conjunction with the Sun on the 7th.



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.

Member Meteor Sightings

This is a new section where I will post meteor, fireball, etc sightings that have been published on the American Meteor Society's web site. I want to make this an active section of the web pages and newsletter and would like to publish the links to member sightings. If you have any published sightings, please provide me with the links and I will post them here for all to enjoy.

Event ID	Date/Time	Location	Observer	Link
3587-2015	2015-11-22 17:38 MST	CO	Kevin S	3587aw
3829-2015	2015-12-05 18:06 MST	CO	Burness A	3829a
3871-2015	2015-11-13 01:55 MST	CO	Charles N	3871a

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. I will post the most recent submissions here.

August 21, 2017 - Total Solar Eclipse - "Bailey's Beads" and the "Diamond Ring"
Taken by: Burness Ansell, Location: Guernsey, WY - More to come. I will be creating a special Solar Eclipse page to showcase subscriber contributions.

Planetary/Lunar Exploration Missions

(Excerpts from recent mission updates)

JPL Latest News

The Latest from Space

JPL Latest News

July 06, 2018
ECOSTRESS Launches to Space Station on SpaceX Mission

Full Article & Images

"Updated at 11 a.m. PDT on July 6, 2018.

NASA's ECOSTRESS was removed from the Dragon spacecraft and robotically installed on the exterior of the space station's Japanese Experiment Module -Exposed Facility (JEM-EF) late Thursday, July 5. Functional testing is expected to begin next week.

Updated on July 2, 2018, at 2:15 p.m.

Three days after its launch from Cape Canaveral Air Force Station in Florida, the SpaceX Dragon cargo spacecraft -- with NASA's ECOSTRESS in tow -- was installed on the Earth-facing side of the International Space Station's Harmony module at 6:52 a.m. PDT (9:52 a.m. EDT) on Monday, July 2.

ECOSTRESS will be taken off the Dragon spacecraft and robotically installed on the exterior of the station's Japanese Experiment Module Exposed Facility Unit on Thursday night/Friday morning.

Original feature - June 29, 2018"

"An Earth science instrument built by NASA's Jet Propulsion Laboratory in Pasadena, California, and experiments investigating cellular biology and artificial intelligence, are among the research heading to the International Space Station following Friday's launch of a NASA-contracted SpaceX Dragon spacecraft at 5:42 a.m. EDT.
...
JPL's ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) will provide a new space-based measurement of how plants respond to changes in water availability. This data can help society better manage agricultural water use."

Read the latest news and discoveries from JPL's dozens of active space missions exploring Earth, the solar system and worlds beyond.

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.

Juno
July 13, 2018
NASA Juno Data Indicate Another Possible Volcano on Jupiter Moon Io

Full Article & Images

"Data collected by NASA's Juno spacecraft using its Jovian InfraRed Auroral Mapper (JIRAM) instrument point to a new heat source close to the south pole of Io that could indicate a previously undiscovered volcano on the small moon of Jupiter. The infrared data were collected on Dec. 16, 2017, when Juno was about 290,000 miles (470,000 kilometers) away from the moon."

NASA's JunoCam website can be visited at: https://www.missionjuno.swri.edu/junocam

More information on the Juno mission is available at: http://www.nasa.gov/juno

The public can follow the mission on Facebook and Twitter at:
http://www.facebook.com/NASAJuno
http://www.twitter.com/NASAJuno

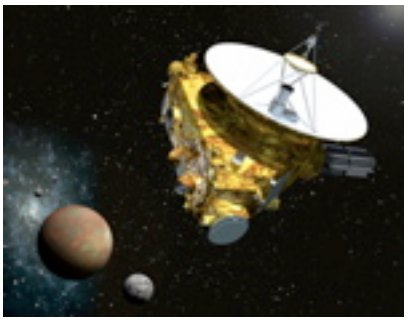
Cassini Legacy
July 30, 2018
Group Portrait

Full Article & Images

"On July 29, 2011, Cassini captured five of Saturn's moons in a single frame with its narrow-angle camera. This is a full-color look at a view that was originally published in September 2011 (see PIA14573)."

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

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



New Horizons
July 20, 2018
The True Colors of Pluto and Charon

Full Article & Images

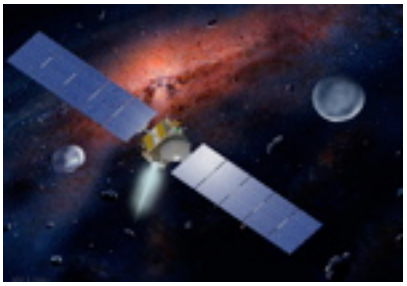
"Three years after NASA's New Horizons spacecraft gave humankind our first close-up views of Pluto and its largest moon, Charon, scientists are still revealing the wonders of these incredible worlds in the outer solar system.

Marking the anniversary of New Horizons' historic flight through the Pluto system on July 14, 2015, mission scientists have released the most accurate natural color images of Pluto and Charon.

These natural-color images result from refined calibrations of data gathered by New Horizons' Multispectral Visible Imaging Camera (MVIC). "That processing creates images that would approximate the colors that the human eye would perceive -- bringing them closer to 'true color' than the images released near the encounter," said Alex Parker, a New Horizons science team co-investigator from Southwest Research Institute, Boulder, Colorado."

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
July 24, 2018
What Looks Like Ceres on Earth?

Full Article & Images

"With its dark, heavily cratered surface interrupted by tantalizing bright spots, Ceres may not remind you of our home planet Earth at first glance. The dwarf planet, which orbits the Sun in the vast asteroid belt between Mars and Jupiter, is also far smaller than Earth (in both mass and diameter). With its frigid temperature and lack of atmosphere, we're pretty sure Ceres can't support life as we know it.

But these two bodies, Ceres and Earth, formed from similar materials in our solar system. And, after combing through thousands of images from NASA's Dawn spacecraft, which has been orbiting Ceres since 2015, scientists have spotted many features on Ceres that look like formations they've seen on Earth."

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

TESS

July 30, 2018
Symphony of Stars: The Science of Stellar Sound Waves

Full Article & Images

"We can't hear it with our ears, but the stars in the sky are performing a concert, one that never stops. The biggest stars make the lowest, deepest sounds, like tubas and double basses. Small stars have high-pitched voices, like celestial flutes. These virtuosos don't just play one "note" at a time, either -- our own Sun has thousands of different sound waves bouncing around inside it at any given moment.

Understanding these stellar harmonies represents a revolution in astronomy. By "listening" for stellar sound waves with telescopes, scientists can figure out what stars are made of, how old they are, how big they are and how they contribute to the evolution of our Milky Way galaxy as a whole. The technique is called asteroseismology. Just as earthquakes (or Earth's seismic waves) tell us about the inside of Earth, stellar waves -- resulting in vibrations or "star quakes" -- reveal the secret inner workings of stars.
"

For more news and information on the TESS mission, visit the Latest Tess Stories page.

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

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. https://jmars.mars.asu.edu/

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

July 23, 2018
MAVEN Finds That "Stolen" Electrons Enable Unusual Aurora on Mars

Full Article & Images

"Auroras appear on Earth as ghostly displays of colorful light in the night sky, usually near the poles. Our rocky neighbor Mars has auroras too, and NASA's MAVEN spacecraft just found a new type of Martian aurora that occurs over much of the day side of the Red Planet, where auroras are very hard to see"

Visit LASP and MAVEN for more information.

Mars Science Laboratory - Curiosity
July 27, 2018
Sols 2124-2126: It's a Hard Rock Life

Full Article & Images

"Our attempt at drilling the target "Ailsa Craig" was partly successful: the drill behaved exactly as it was supposed to, but unfortunately we weren't able to drill very deep. The rock here is just too hard! Since we didn't get a nice deep drill hole, the plan for the weekend is to do some final observations at this location and then move on another location to try again."

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 360 (requires Kinect)

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

Mars Exploration Rover Mission (Spirit and Opportunity)
July 18, 2018

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 Continues in a Deep Sleep Beneath Raging Dust Storm - *sols 5142 to 5148, July 11, 2018 - July 18, 2018:*

"The dust storm on Mars is continuing as a Planet-encircling Dust Event (PEDE).

The storm has sustained high atmospheric opacity conditions over the Opportunity site for several weeks. The last contact with the rover was on Sol 5111 (June 10, 2018). Since then, it is likely that Opportunity has experienced a low-power fault, putting herself to sleep only to wake when the skies eventually clear. If the atmospheric opacity or the solar array dust factor has gotten even worse since the last contact, Opportunity could also experience a mission clock fault.

The science team is listening every day for the rover either during the expected fault communication windows or listening over a broader range of times using the Deep Space Network Radio Science Receiver on both left- and right-hand circular polarizations. For the near term, the science team will continue to send a command, three times a week, to elicit a beep if the rover happens to be awake.

The team does not expect to hear anything from Opportunity until there has been a significant reduction in the atmospheric opacity over the rover site.

Total odometry is 28.06 miles (45.16 kilometers)."

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

Visit the Mars Exploration Rover page at
https://mars.nasa.gov/mer/home/.

Mars Reconnaissance Orbiter Mission

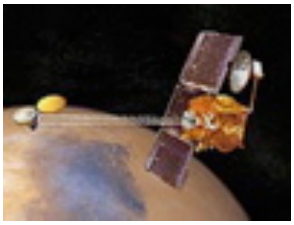
July 30, 2018
Mars Terraforming Not Possible Using Present-Day Technology

Full Article & Images

"Science fiction writers have long featured terraforming, the process of creating an Earth-like or habitable environment on another planet, in their stories. Scientists themselves have proposed terraforming to enable the long-term colonization of Mars. A solution common to both groups is to release carbon dioxide gas trapped in the Martian surface to thicken the atmosphere and act as a blanket to warm the planet."

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
July 27, 2018
Mars in our Night Sk

Full Article & Images

"Mars Close Approach to Earth

See Mars in the Night Sky!

Simply go outside and look up, contact your local planetarium, or look for a star party near you.

In 2018, Mars will appear brightest from July 27 to July 30

Mars Close Approach is July 31, 2018

That is the point in Mars' orbit when it comes closest to Earth. Mars will be at a distance of 35.8 million miles (57.6 million kilometers). Mars reaches its highest point around midnight -- about 35 degrees above the southern horizon, or one-third of the distance between the horizon and overhead. Mars will be visible for much of the night.

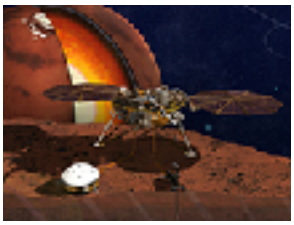
By mid-August, Mars will become fainter as Mars and Earth travel farther away from each other in their orbits around the Sun.

Miss seeing Mars Close Approach in 2018? The next Mars Close Approach is Oct. 6, 2020."

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
June 26, 2018
NASA Mars Mission Adds Southern California Dates

Full Article & Images

"Looking for summer fun? Southern California families have their choice of the beach, movies, museums -- and even NASA's next mission to Mars.

Starting this week, scientists and engineers working on NASA's InSight mission will begin visiting cities in the Southern California region. InSight launched on May 5 from Vandenberg Air Force Base -- the first interplanetary launch from the West Coast. Leading up to the landing on Mars on November 26, the Mars InSight Roadshow is stopping at cities throughout quake-prone California to explain how the robotic lander will study Mars' deep interior using seismology and other geophysical measurements."

Learn more about the InSight mission at: http://www.jpl.nasa.gov/missions/insight/

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

Radio Astronomy Links

Other Astronomy Links

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!

Subscription Information

- Email Newsletter archives -
http://ki0ar.com/pipermail/astronews_ki0ar.com/

- Full documentation of the online administration system is available at http://ki0ar.com/mailman/listinfo/astronews_ki0ar.com.

- 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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COO, Director of Aerospace Technologies, IAAS
JPL Solar System Ambassador, Colorado
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