IAAS Monthly Astronomy Newsletter December 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 Geminid meteor slices between Taurus (with brilliant Jupiter intruding) and Orion at the height of the 2012 shower. Observers should get another great show this year with the Moon out of the sky." Astronomy Magazine, December 2018, p. 36.
Amirreza Kamkar

The Month At-A-Glance

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

The Moon

Phases:

- New Moon occurs on the 7th.
- First Quarter Moon occurs on the 15th.
- Full Moon occurs on the 22nd.
- Last Quarter Moon occurs on the 29th.

- The Moon is at Apogee on the 12th, 251,765 miles from Earth.
- The Moon is at Perigee on the 26th, 224,353 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 4° north of Venus on the 3rd.
- The Moon passes 1.9° north of Mercury on the 5th.
- Mars passes 0.04° north of Neptune on the 7th.
- The Moon passes 1.1° north of Saturn on the 8th.
- The Moon passes 0.7° north of Pluto on the 9th.
- The Moon passes 3° south of Neptune on the 14th.
- The Moon passes 4° south of Mars on the 14th.
- The Moon passes 5° south of Uranus on the 17th.
- Jupiter passes 5° north of Antares on the 19th.
- Mercury passes 6° north of Antares on the 21st.
- Mercury passes 0.9° north of Jupiter on the 21st.
- Venus passes 3° south of Ceres 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. 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 December

Two planetary conjunctions occur this month. Mars and Neptune are in conjunction on the 7th in the evening. Mercury and Jupiter are in conjunction in the morning sky on the 21st. Saturn is low in the southwest and Mars continues to shine brightly in the southern sky. The showcase for December is the peak of the Geminid meteor shower on the morning of the 14th before dawn under a moonless sky.

Mercury

Is stationary on the 6th. Mercury is at greatest western elongation (21°) on the 15th. Mercury is visible in the morning sky all month. Mercury rises at 6:11 a.m. on the 1st and about 6:13 a.m. by month's end. Look for Mercury low to the east about 30 minutes before sunrise. Mercury moves from the constellation of Libra into Ophiuchus this month shining at magnitude -0.5 on the 15th.

Venus

Is at its greatest brilliancy on the 1st (magnitude -4.9). Venus rises at 3:40 a.m. on the 1st and about 3:36 a.m. by month's end. Venus moves from the constellation of Virgo into Libra shining at magnitude -4.8 on the 15th.

Earth

The Winter Solstice occurs on the 21st. at 5:23 p.m. EST.

Mars

Sets at 11:38 p.m. on the 1st and about 11:20 p.m. by month's end. Look to the south soon after sunset to spot Mars. Mars is in conjunction with Neptune on the 7th. Mars moves from the constellation of Aquarius into Pisces shining at magnitude 0.2.

Jupiter

Rises at 6:41 a.m. on the 1st and about 5:12 a.m. by month's end. Jupiter is visible in the morning sky before sunrise. Jupiter is in conjunction with Mercury on the morning of the 21st. Jupiter i moves from the constellation of Scorpius into Ophiuchus shining at magnitude -1.8.

Saturn

Sets at 6:33 p.m. on the 1st and about 4:48 p.m. by month's end. Look for Saturn towards the southwest during the first two weeks of December. Saturn is in the constellation of Sagittarius shining at magnitude 0.5.

Uranus

Uranus sets at 3:47 a.m. on the 1st and about 1:42 a.m. by month's end. Look for Uranus about an hour or so after sunset to the south. Uranus is in the constellation of Pisces shining at magnitude 5.7.

Neptune

Sets 11:56 p.m. on the 1st and about 9:56 p.m. by month's end. Neptune is in conjunction with Mars on the 7th. Neptune is in the constellation of Aquarius shining at magnitude 7.9.

Dwarf Planets

Ceres

Rises at 4:17 a.m. on the 1st and about 3:16 a.m. by month's end. Ceres can be spotted just north of Venus in the morning sky as long as you have nice dark skies. Ceres is in the constellation of Virgo shining at magnitude 8.9.

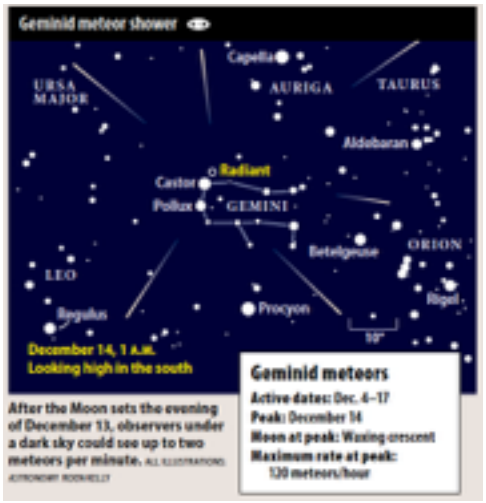
Pluto

Sets at 7:25 p.m. on the 1st and about 5:28 p.m. by months end. Pluto may be too low to the western horizon to spot this month. Pluto is in the constellation of Sagittarius shining at magnitude 14.3.

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

Astronomical Events

Meteor Showers



- The Geminids - This shower is active during the period December 6 to December 19. Upon reaching maximum activity during December 13 to 14, hourly rates are typically near 80. The meteors are described as rapid and yellowish, with about 4% displaying persistent trains. They possess an average magnitude of 2.4.

  Luckily, this year, this shower peaks well after moonset.

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 46P/Wirtanen is a relatively active comet that makes its closest approach to the Sun this month just outside Earth's orbit. And to top things off, we hit the timing almost perfectly: On December 16, Wirtanen swoops within 7.2 million miles of Earth, just 30 times the Moon's average distance.

The comet's peak brightness remains the key unknown. Conservatively, it will glow around 7th magnitude and be a decent binocular object. But some astronomers estimate it might reach 4th magnitude, which would make it visible to the naked eye under a dark sky. Either way, you should be able to follow changes to the dusty inner coma through a 4-inch telescope from the suburbs." Astronomy Magazine, December 2018, p.42.

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)

- Mars and Saturn in the early evening sky after sunset.
- Look for Mercury, Venus and Jupiter shining brightly in the morning sky.
- Watch for the Geminid meteors.
- Try to spot Comet 646P/Wirtanen passing through Taurus and Auriga.

Asteroids

(From west to east)

- **Vesta** is in the constellation of Capricornus.
- **Juno** is in the constellation of Eridanus.
- **Eros** is at opposition on the 7th in the constellation of Perseus.
- **Harmonia** is in the constellation of Taurus.
- **Hebe** is at opposition on the 27th in the constellation of Monoceros.
- **Herculina** is in the constellation of Leo.
- **Pallas** is in the constellation of Virgo.

December's brightest asteroid takes a sharp turn northward in December as it navigates the shoals of northern Eridanus the River.

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.

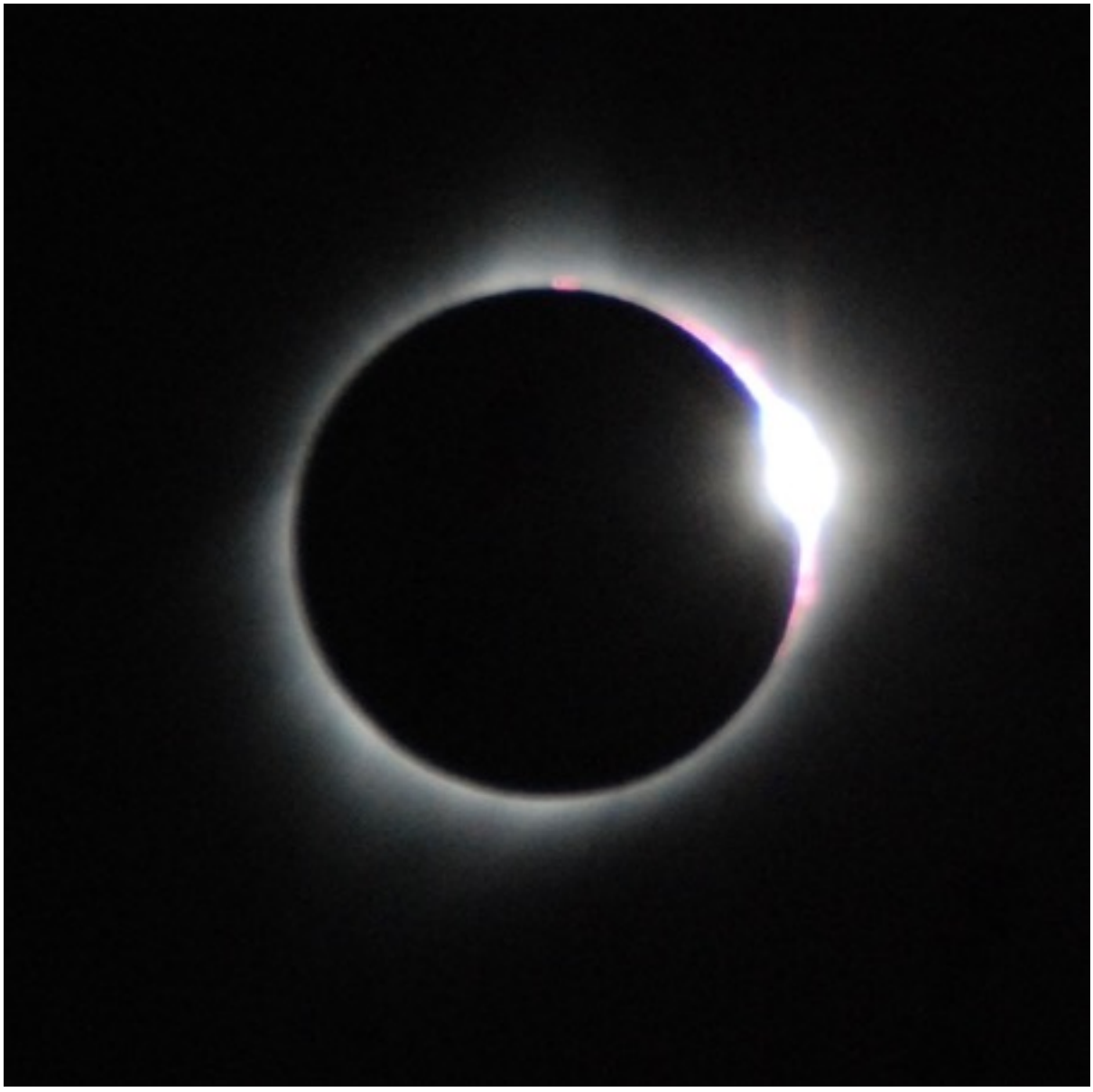
Member Meteor Sightings

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

November 30, 2018
Mars New Home 'a Large Sandbox'

Full Article & Images

"With InSight safely on the surface of Mars, the mission team at NASA's Jet Propulsion Laboratory in Pasadena, California, is busy learning more about the spacecraft's landing site. They knew when InSight landed on Nov. 26 that the spacecraft had touched down on target, a lava plain named Elysium Planitia. Now they've determined that the vehicle sits slightly tilted (about 4 degrees) in a shallow dust- and sand-filled impact crater known as a "hollow." InSight has been engineered to operate on a surface with an inclination up to 15 degrees."

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

October 24, 2018
NASA's Juno Mission Detects Jupiter Wave Trains

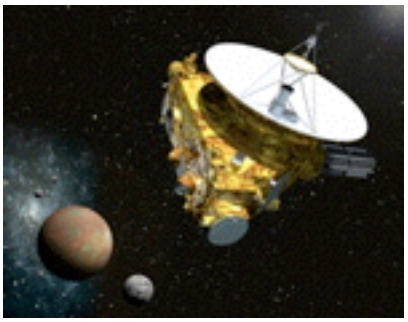
Full Article & Images

"Massive structures of moving air that appear like waves in Jupiter's atmosphere were first detected by NASA's Voyager missions during their flybys of the gas-giant world in 1979. The JunoCam camera aboard NASA's Juno mission to Jupiter has also imaged the atmosphere. JunoCam data has detected atmospheric wave trains, towering atmospheric structures that trail one after the other as they roam the planet, with most concentrated near Jupiter's equator."

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



New Horizons

November 27, 2018
The PI's Perspective: Share the News - The Farthest Exploration of Worlds in History is Beginning!

Full Article & Images

"The New Horizons spacecraft is healthy and is now beginning its final approach to explore Ultima Thule -- our first Kuiper Belt object (KBO) flyby target -- about a billion miles beyond Pluto. And on New Year's Eve and New Year's Day, New Horizons will swoop three times closer to "Ultima" than we flew past Pluto three years ago!"

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

November 07, 2018
Cosmic Detective Work: Why We Care About Space Rocks

Full Article & Images

"The entire history of human existence is a tiny blip in our solar system's 4.5-billion-year history. No one was around to see planets forming and undergoing dramatic changes before settling in their present configuration. In order to understand what came before us -- before life on Earth and before Earth itself -- scientists need to hunt for clues to that mysterious distant past.

Those clues come in the form of asteroids, comets and other small objects. Like detectives sifting through forensic evidence, scientists carefully examine these small bodies for insights about our origins. They tell of a time when countless meteors and asteroids rained down on the planets, burned up in the Sun, shot out beyond the orbit of Neptune or collided with one another and shattered into smaller bodies. From distant, icy comets to the asteroid that ended the reign of the dinosaurs, each space rock

contains clues to epic events that shaped the solar system as we know it today -- including life 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

September 25, 2018
NASA Is Taking a New Look at Searching for Life Beyond Earth

Full Article & Images

"Since the beginning of civilization, humanity has wondered whether we are alone in the universe. As NASA has explored our solar system and beyond, it has developed increasingly sophisticated tools to address this fundamental question. Within our solar system, NASA's missions have searched for signs of both ancient and current life, especially on Mars and soon, Jupiter's moon Europa. Beyond our solar system, missions, such as Kepler and TESS, are revealing thousands of planets orbiting other 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

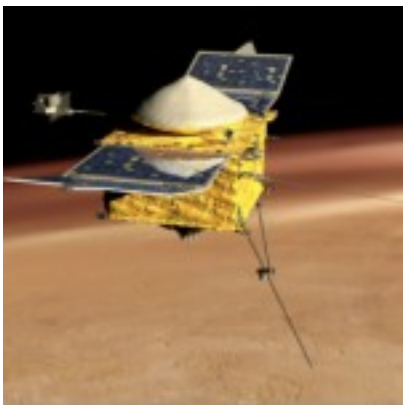
JMARS is an acronym that stands for Java Mission-planning and Analysis for Remote Sensing. It is a geospatial information system (GIS) developed by ASU's Mars Space Flight Facility to provide mission planning and data-analysis tools to NASA's orbiters, instrument team members, students of all ages, and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

September 20, 2018
MAVEN Selfie Marks Four Years in Orbit at Mars

Full Article & Images

"Today, NASA's MAVEN spacecraft celebrates four years in orbit studying the upper atmosphere of the Red Planet and how it interacts with the Sun and the solar wind. To mark the occasion, the team has released a selfie image of the spacecraft at Mars."

Visit LASP and MAVEN for more information.

Mars Science Laboratory - Curiosity

November 28, 2018
Sol 2245-2246: Hunting shiny things!

Full Article & Images

"Curiosity woke up to Mr Rogers "Please would you be my neighbour" this morning to welcome InSight, and then got very busy at the Highfield drill site. Every plan has its personality, and the upcoming one is that of a gymnast - at least as far as the arm is concerned: Curiosity will dump the Highfield sample, which requires several MAHLI looks and an APXS operation, but the plan also requires swinging the arm out of the way so other instruments can have their unobscured look at the dump pile."

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)

November 27, 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: Over Five Months Without Word From Opportunity - *sols 5265 to 5277, Nov. 15, 2018 - Nov. 27, 2018:*

"Mars atmospheric opacity (tau) over the rover site remains at a storm-free level of 0.8.

Since loss of signal on Sol 5111 (June 10, 2018), 359 recovery commands have been radiated including on both polarizations. No signal from Opportunity has been heard. Opportunity likely experienced a low-power fault, a mission clock fault and an up-loss timer fault. The project has been listening for the rover over a broad range of times, frequencies and polarizations using the Deep Space Network (DSN) Radio Science Receiver.

They have been commanding "sweep and beeps" throughout the daily DSN pass with both right-hand and left-hand circular polarization to address a possible complexity with certain conditions within mission clock fault.

Total odometry is unchanged at 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

September 25, 2018
Opportunity Emerges in a Dusty Picture

Full Article & Images

"NASA still hasn't heard from the Opportunity rover, but at least we can see it again.

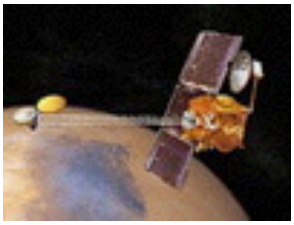
A new image produced by HiRISE, a high-resolution camera aboard NASA's Mars Reconnaissance Orbiter (MRO), shows a small object on the slopes of the Red Planet's Perseverance Valley. That object is Opportunity, which was descending into the Martian valley when a dust storm swept over the region a little more than 100 days ago.

The storm was one of several that stirred up enough dust to enshroud most of the Red Planet and block sunlight from reaching the surface. The lack of sunlight caused the solar-powered Opportunity to go into hibernation."

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

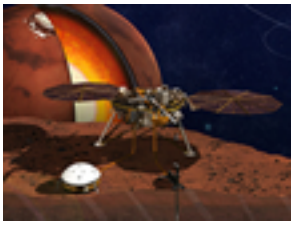
Full Article & Images

"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."

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
November 30, 2018
Surface Operations

Full Article & Images

"The InSight lander began surface operations the minute it landed at Elysium Planitia on Mars, but science data collection doesn’t start fully until about 10 weeks after landing. That's because InSight's science goals and instruments are very different from other Mars landers or rovers that have gone before. In some ways, InSight's science activities are more like a marathon than a sprint. The lander team must carefully select where to place the precious science instruments, which will be the first to study the interior of Mars."

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!

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Keep looking UP!

73 from KI0AR

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