IAAS Monthly Astronomy Newsletter
March 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 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 W0WYX **146.94 MHz** and **449.825 MHz** repeaters. The RMRL **146.94** repeater is also linked with the WB0WDF Cripple Creek **447.400 MHz** repeater and Allstar nodes **28298**, **28299**, **29436**. We are also linked via Echolink, links are **k0jsc-r** and **canoncty** courtesy of K0JSC and K0GUR. More information on the WB0WDF 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).

Interested in obtaining 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 from 9am until 1pm.

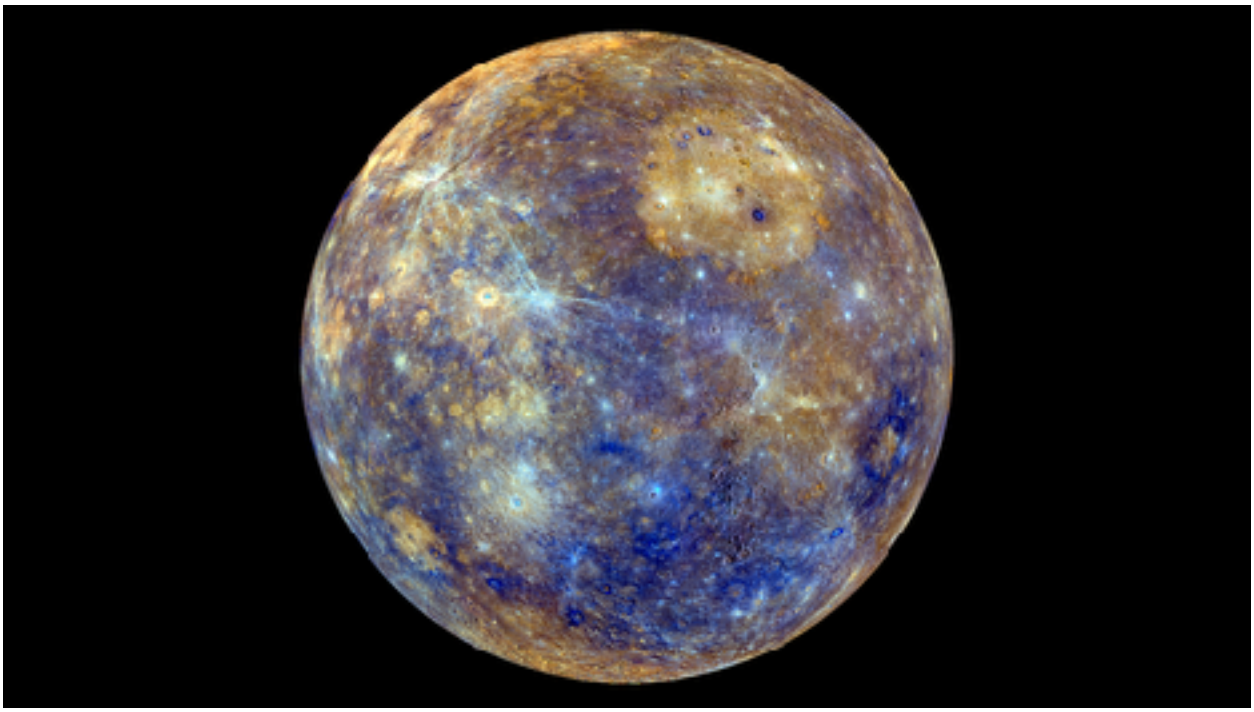
The Colorado Astronomy Net now has a Facebook page. Be sure to "Like" us.

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!

If you shop 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...



"The MESSENGER spacecraft revealed Mercury's stunning geology in this false-color image. Even under optimal viewing conditions in March, however, the planet appears bland through amateur scopes" Astronomy Magazine, March 2018, p.36.
NASA/JHUAPL/CIW

The Month At-A-Glance

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

The Moon

Phases:

- Full Moon occurs on the 1st.
- Last Quarter Moon occurs on the 9th.
- New Moon occurs on the 17th.
- First Quarter Moon occurs on the 24th.
- Full Moon occurs on the 31st.

- The Moon is at Apogee on the 11th, 251,455 miles from Earth.
- The Moon is at Perigee on the 26th, 229,352 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 0.9° north of Regulus on the 1st.
- Mercury passes 1.4° north of Venus on the 5th.
- The Moon passes 4° north of Jupiter on the 7th.
- The Moon passes 4° north of Mars on the 9th.
- The Moon passes 2° north of Saturn on the 10th.
- Mercury passes 4° north of Venus on the 17th.
- The Moon passes 8° south of Mercury on the 18th.
- The Moon passes 4° south of Venus on the 18th.
- The Moon passes 5° south of Uranus on the 19th.
- The Moon passes 0.9° north of Aldebaran on the 22nd.
- The Moon passes 1.0° north of Regulus on the 28th.
- Venus passes 0.07° north of Uranus 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 March

"Mercury and Venus rule the early evening sky, a pair of bright worlds seemingly tethered to each other for much of March. Uranus joins the party late in the month as it wraps up a fine evening appearance, though you'll need binoculars to see its fainter glow. Not to be outdone, the morning sky features three bright planets -- Mars, Jupiter, and Saturn -- that grow more prominent by the week." Astronomy Magazine, April 2018, p. 36.

Mercury

Is at greatest eastern elongation (18°) on the 15th. Mercury is stationary on the 22nd. Mercury sets at 6:44 p.m. on the 1st and about 7:24 p.m. by month's end. Mercury is visible in the evening sky this month low in the west. Mercury moves from the constellation of Aquarius into Pisces this month shining at magnitude -0.4 on the 15th.

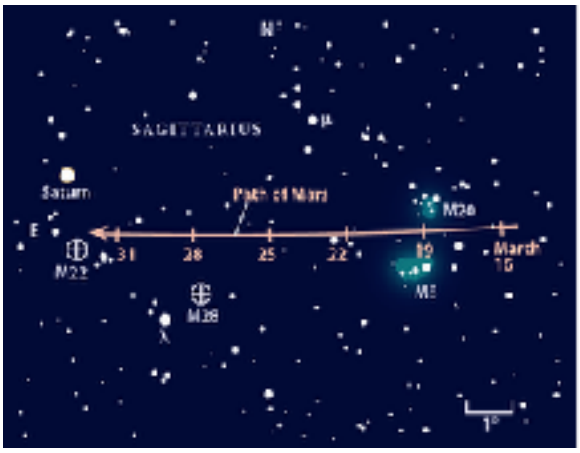
Venus

Venus sets at 6:51 p.m. on the 1st and about 9:03 p.m. by month's end. Venus sets later and later as the month progresses and is easily spotted low to the west as evening descends. Of note: On the evening of the 28th, Uranus and Venus are within 0.07° of each other, but observers will need binoculars to spot Uranus next to brightly shining Venus. Both planetary object should be in the same field of view. Venus moves from the constellation of Aquarius into Aries this month shining at magnitude -3.9.

Earth

Daylight Saving Time begins for much of the U.S. and other parts of the world at 2:00 a.m. local time on the 11th. The Vernal Equinox occurs at 12:15 p.m. EDT on the 20th.

Mars



Rises at 2:00 a.m. on the 1st and about 2:18 a.m. by month's end. Mars continues to brighten as the month progresses. This is the start of what will be its best appearance in 15 years, though that won't occur until July. Keep an eye on Mars later in the month as it is in conjunction with some of the Milky Way's brightest deep-sky objects. Look to the southeast well before sunrise to spot Mars as it moves from the constellation of Ophiuchus into Sagittarius shining at magnitude 0.6.

Jupiter

Rises at 11:41 p.m. on the 1st and about 10:35 p.m. by month's end. Jupiter is stationary on the 9th. The best time to observe Jupiter will be an hour or two before dawn when Jupiter lies almost due south and is highest in the sky. Much less of the Earth's atmosphere will interfere with seeing the finer details of Jupiter's cloud structures. Jupiter is in the constellation of Libra shining at magnitude -2.3.

Saturn

Rises at 3:11 a.m. on the 1st and about 2:16 a.m. by month's end. As you follow Mars through the night sky, you'll notice it approaching Saturn by the end of the month, then these two planets lie within 1.7° of each other. Look for Saturn to the southeast in the early morning sky, just above the "teapot" asterism of Sagittarius, shining at magnitude 0.5.

Uranus

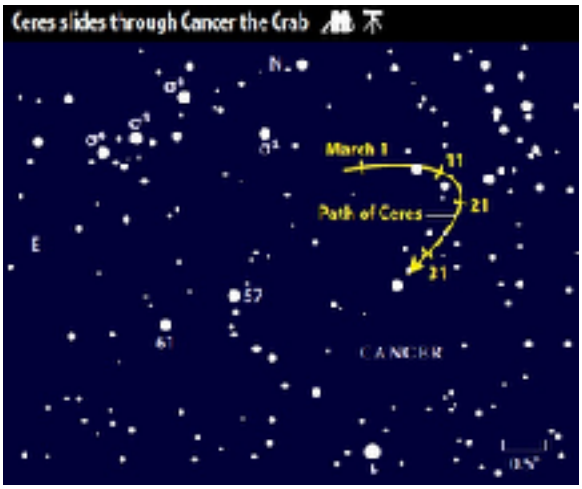
Sets at 9:32 p.m. on the 1st and about 8:38 p.m. by month's end. By the time the Sun sets, Uranus will be visible towards the west through a good pair of binoculars or a small telescope. On the evening of the 28th, look for Uranus and Venus in conjunction. Uranus is in the constellation of Pisces shining at magnitude 5.9.

Neptune

Is in conjunction with the Sun on the 4th and is not visible this month. Neptune will return to the morning sky next month. Neptune is in the constellation of Aquarius.

Dwarf Planets

Ceres



Sets at 6:20 a.m. on the 1st and about 5:09 a.m. by month's end. Once the skies darken, Ceres may be spotted to the south maybe an hour or two after sunset. Ceres can be spotted just above the apex of the constellation Cancer shining at magnitude 7.6.

Pluto

Rises at 4:04 a.m. on the 1st and about 3:04 a.m. by months end. Pluto is still fairly low to the eastern horizon and will be very difficult to spot this month, though visibility has improved some since last 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

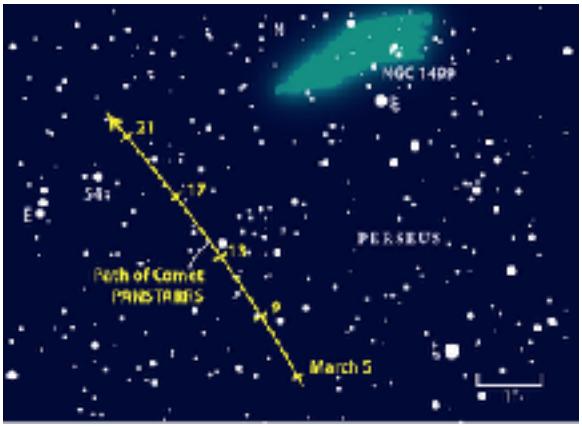
There are a few minor meteor showers but none that produce rates much higher than 2-5 per hour, except the Gamma Normids that extend over the period of March 11 to 21, with the maximum occurring on March 16. The maximum rate reaches about 5-9 meteors per hour.

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.

Comets



Comet PANSTARRS (C/2016 R2) is passing through the constellation of Perseus and into Auriga this month. Comet PANSTARRS continues to shine between 10th and 11th magnitude. Look high in the west during the early evening to spot Comet PANSTARRS. A 5-6 inch telescope (or larger) and dark skies will be required.

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 solar eclipse activity this month.

- No lunar eclipse activity this month.

Observational Opportunities

(from evening to morning)

- Enjoy Venus, Mercury and Uranus in the evening skies after sunset.
- Look for Mars, Jupiter and Saturn in the morning skies before sunrise.
- Try to spot Comet PANSTARRS in Taurus headed to Perseus.

Asteroids

(From west to east)

- **Pallas** is in the constellation of Eridanus.
- **Iris** is in the constellation of Taurus.
- **Vesta** is in the constellation of Ophiuchus.

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

February 23, 2018
CloudSat Exits the 'A-Train'

Full Article & Images

"MISSION STATUS REPORT

Mission managers at NASA's Jet Propulsion Laboratory in Pasadena, California, this week lowered the orbit of the nearly 12-year-old CloudSat satellite following the loss of one of its reaction wheels, which control its orientation in orbit. While CloudSat's science mission will continue, it will no longer fly as part of the Afternoon Constellation, or A-Train -- six Earth-monitoring satellites that fly in a coordinated orbit to advance our understanding of how Earth functions as a system. "

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

February 23, 2018
Time-lapse Sequence of Jupiter's South Pole

Full Article & Images

"This series of images captures cloud patterns near Jupiter's south pole, looking up towards the planet's equator.

NASA's Juno spacecraft took the color-enhanced time-lapse sequence of images during its eleventh close flyby of the gas giant planet on Feb. 7 between 7:21 a.m. and 8:01 a.m. PST (10:21 a.m. and 11:01 a.m. EST). At the time, the spacecraft was between

85,292 to 124,856 miles (137,264 to 200,937 kilometers) from the tops of the clouds of the planet with the images centered on latitudes from 84.1 to 75.5 degrees south."

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

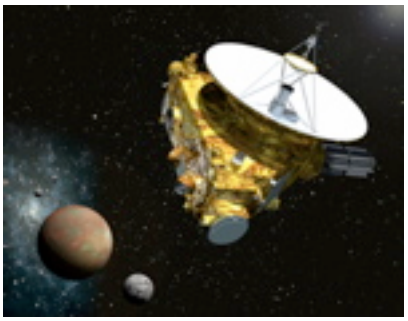
January 30, 2018
Cassini Significant Events 1/3/18 - 1/30/18

Full Article & Images

"Scientists continue to process data from the Cassini Mission for publication in the peer-reviewed scientific literature, and for presentation at technical and non-technical meetings. Meanwhile, work proceeds on Project Closeout, which includes ensuring proper archiving of the data, creating a Final Mission Report, and dismantling and recycling the Mission's ground system components."

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

February 08, 2018
New Horizons Captures Record-Breaking Images in the Kuiper Belt

Full Article & Images

"NASA's New Horizons spacecraft recently turned its telescopic camera toward a field of stars, snapped an image ñ and made history.

The routine calibration frame of the "Wishing Well" galactic open star cluster, made by the Long Range Reconnaissance Imager (LORRI) on Dec. 5, was taken when New

Horizons was 3.79 billion miles (6.12 billion kilometers, or 40.9 astronomical units) from Earth ñ making it, for a time, the farthest image ever made from Earth."

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

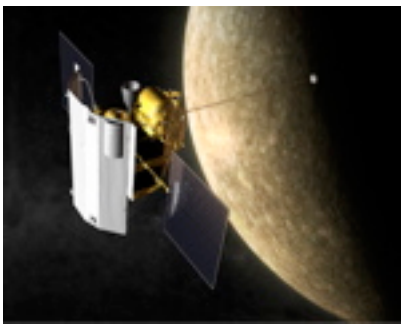
December 12, 2017
Bright Areas on Ceres Suggest Geologic Activity

Full Article & Images

"If you could fly aboard NASA's Dawn spacecraft, the surface of dwarf planet Ceres would generally look quite dark, but with notable exceptions. These exceptions are the hundreds of bright areas that stand out in images Dawn has returned. Now, scientists have a better sense of how these reflective areas formed and changed over time -- processes indicative of an active, evolving world.

"The mysterious bright spots on Ceres, which have captivated both the Dawn science team and the public, reveal evidence of Ceres' past subsurface ocean, and indicate that, far from being a dead world, Ceres is surprisingly active. Geological processes created these bright areas and may still be changing the face of Ceres today," said Carol Raymond, deputy principal investigator of the Dawn mission, based at NASA's Jet Propulsion Laboratory in Pasadena, California. Raymond and colleagues presented the latest results about the bright areas at the American Geophysical Union meeting in New Orleans on Tuesday, Dec. 12."

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



MESSENGER

The MESSENGER mission is officially ended but there is a lot to learn about the planet closest to our Sun. Visit the new, updated MESSENGER website:

UNLOCKING THE MYSTERIES OF PLANET MERCURY
for resources, to learn, and to explore.

(Click Link above for Full Article & Images)

TOP 10 SCIENCE RESULTS AND TECHNOLOGY INNOVATIONS

"After more than 10 years in operation, the MErcury Surface, Space ENvironment, GEochemistry, and Ranging (MESSENGER) spacecraft impacted the surface of Mercury on April 30, 2015, at a speed of more than 3.91 kilometers per second (8,750 miles per hour), marking the end of operations for the hugely successful Mercury orbiter. At the MESSENGER Nears End of Operations media and public event, scientists and engineers discussed the mission's accomplishments, providing the top 10 scientific discoveries, as well as the technological innovations that grew out of the mission."

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/.

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

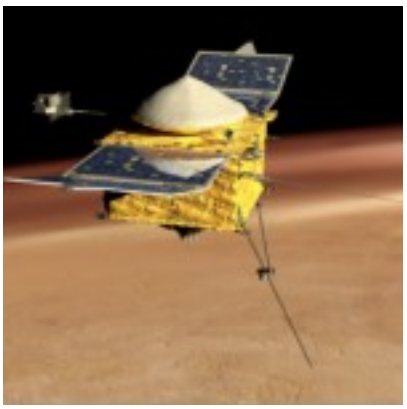
JMARS is an acronym that stands for Java Mission-planning and Analysis for Remote Sensing. It is a geospatial information system (GIS) developed by ASU's Mars Space Flight Facility to provide mission planning and data-analysis tools to NASA's orbiters, instrument team members, students of all ages, and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

December 13, 2017
MAVEN Sheds Light on Habitability of Distant Planets

Full Article & Images

"How long might a rocky, Mars-like planet be habitable if it were orbiting a red dwarf star? It's a complex question but one that MAVEN can help answer.

"The MAVEN mission tells us that Mars lost substantial amounts of its atmosphere over time, changing the planet's habitability," said David Brain, a MAVEN co-investigator and a professor at the Laboratory for Atmospheric and Space Physics, or LASP, at the University of Colorado Boulder. "We can use Mars, a planet that we know a lot about, as a laboratory for studying rocky planets outside our solar system, which we don't know much about yet.""

Visit LASP and MAVEN for more information.

Mars Science Laboratory - Curiosity

February 28, 2018
Sol 1979: Mars Strikes Back

Full Article & Images

"It is an exciting time for the Curiosity team. Although the drill was able to create a hole, Mars stubbornly refused to let the drill reach a depth where a rock sample could be collected and has driven Curiosity away from "Lake_Orcadie".

Attempting to evade the dreaded impenetrably hard bedrock, a group of dedicated scientists and engineers established a new drill target "Lake_Orcadie2" roughly 7 inches to the right of the first target.

Obsessed with finding a suitable new drill location, Curiosity will thoroughly characterize this new location with APXS and MAHLI after brushing it with the dirt removal tool while also studying the wall and tailings from first drill hole with a ChemCam LIBS raster and Mastcam imaging."

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)

February 20, 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 Celebrates 5,000 Days on Mars, Snaps First 'Selfie' - *sols 4998 to 5004, Feb. 14, 2018 - Feb. 20, 2018:*

"Opportunity is continuing the exploration of "Perseverance Valley" on the west rim of Endeavour Crater.

The rover is positioned about half way down the valley. This past week the rover exceeded 5,000 sols (or days) on the surface of Mars. To commemorate Sol 5000 (Feb. 16, 2018), Opportunity for the first time used the Microscopic Imager (MI) on the end of the robotic arm (also called the Instrument Deployment Device, or IDD) to take a self-portrait mosaic "selfie."

The rover continues to collect extensive stereo color Panoramic Camera (Pancam) panoramas and Navigational Camera (Navcam) panoramas from the current location. A beautiful sunrise color Pancam image was taken on the morning of Sol 4999 (Feb. 15, 2018). An atmospheric argon measurement using the Alpha Particle X-ray Spectrometer (APXS) was collected on the evening of Sol 5001 (Feb. 17, 2018).

As of Sol 5004 (Feb. 20, 2018), the solar array energy production was 653 watt-hours with an atmospheric opacity (Tau) of 0.407 and an improved solar array dust factor of 0.850.

Total odometry is 28.03 miles (45.12 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

February 20, 2018
Nearly a Decade After Mars Phoenix Landed, Another Look

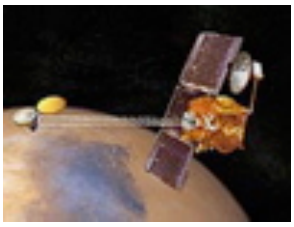
Full Article & Images

"A recent view from Mars orbit of the site where NASA's Phoenix Mars mission landed on far-northern Mars nearly a decade ago shows that dust has covered some marks of the landing.

The Phoenix lander itself, plus its back shell and parachute, are still visible in the image taken Dec. 21, 2017, by the High Resolution Imaging Science Experiment (HiRISE) camera on NASA's Mars Reconnaissance Orbiter. But an animated-blink comparison with an image from about two months after the May 25, 2008, landing shows that patches of ground that had been darkened by removal of dust during landing events have become coated with dust again."

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

October 4, 2017
Examining Mars' Moon Phobos in a Different Light

Full Article & Images

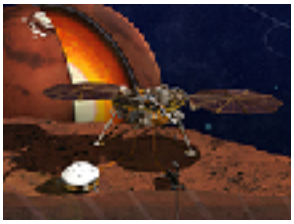
"NASA's longest-lived mission to Mars has gained its first look at the Martian moon Phobos, pursuing a deeper understanding by examining it in infrared wavelengths.

The Thermal Emission Imaging System (THEMIS) camera on NASA's Mars Odyssey orbiter observed Phobos on Sept. 29, 2017. Researchers have combined visible-wavelength and infrared data to produce an image color-coded for surface temperatures of this moon, which has been considered for a potential future human-mission outpost."

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
February 22, 2018
Seven Ways Mars InSight is Different

Full Article & Images

"NASA's Mars InSight lander team is preparing to ship the spacecraft from Lockheed Martin Space in Denver, where it was built and tested, to Vandenberg Air Force Base in California, where it will become the first interplanetary mission to launch from the West Coast. The project is led by NASA's Jet Propulsion Laboratory in Pasadena, California.

NASA has a long and successful track record at Mars. Since 1965, it has flown by, orbited, landed and roved across the surface of the Red Planet. What can InSight -- planned for launch in May -- do that hasn't been done before?

1. InSight is the first mission to study the deep interior of Mars.

2. InSight will teach us about planets like our own.

3. InSight will try to detect marsquakes for the first time.

4. First interplanetary launch from the West Coast

5. First interplanetary CubeSat

6. InSight could teach us how Martian volcanoes were formed.

7. Mars is a time machine"

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

Created by Burness F. Ansell, III
ki0ar@ki0ar.com

COO, Director of Aerospace Technologies, IAAS
JPL Solar System Ambassador, Colorado
Last modified: March 01, 2018