IAAS Monthly Astronomy Newsletter
May 2019

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!

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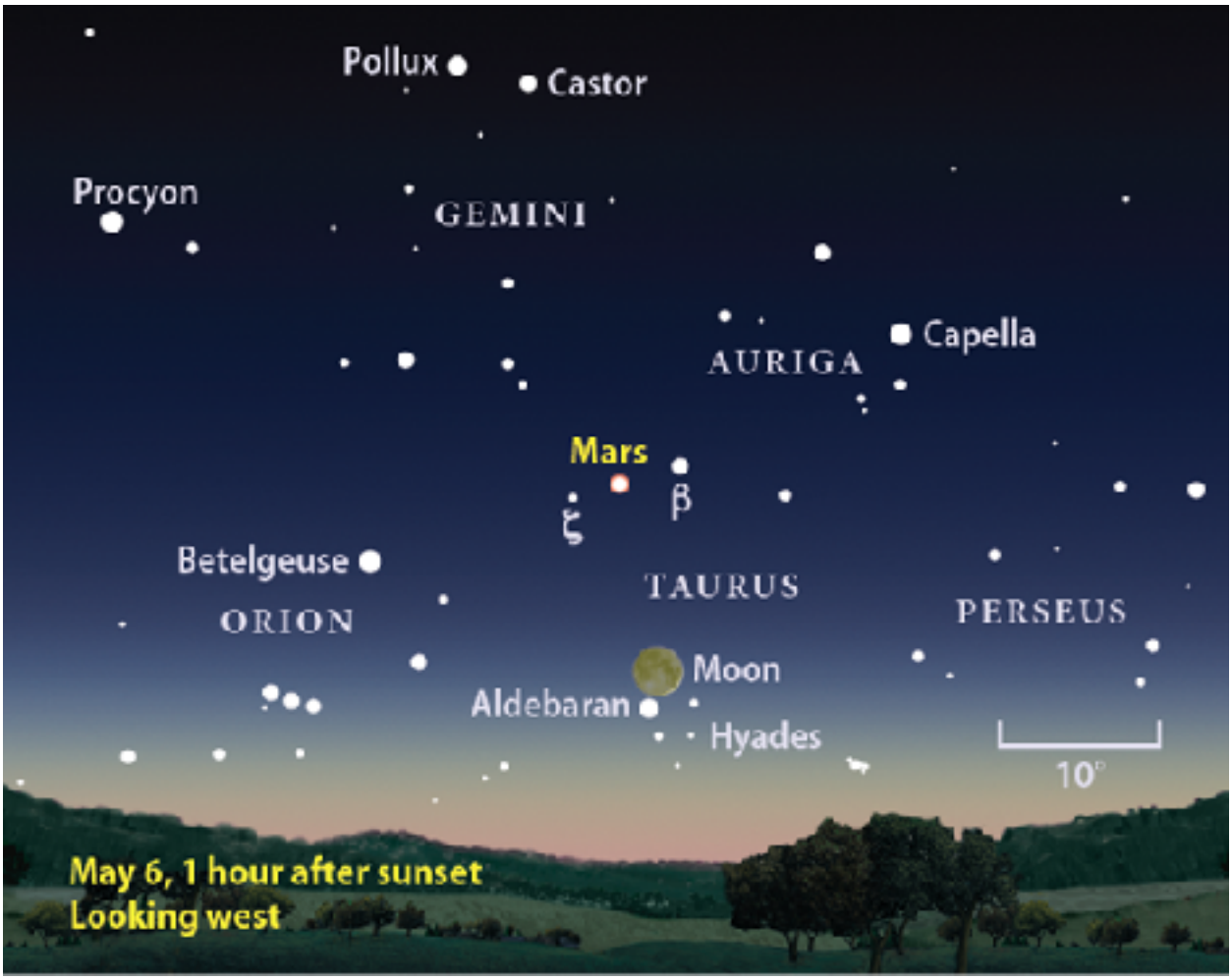


"Mars appears as Taurus the Bull's third horn May 6, when it lies midway between the traditional horns represented by Beta (β) and Zeta (ζ) Tauri. Meanwhile, the waxing crescent Moon stands just above the Hyades star cluster, which forms the Bull's face." Astronomy Magazine, May 2019, p.36.
All illustrations: Astronomy: Roen Kelly

The Month At-A-Glance

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

The Moon

Phases:

- New Moon occurs on the 4th.
- First Quarter Moon occurs on the 11th.
- Full Moon occurs on the 18th.
- Last Quarter Moon occurs on the 26th.

- The Moon is at Perigee on the 13th, 229,291 miles from Earth.
- The Moon is at Apogee on the 26th, 251,119 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 4° south of Venus on the 2nd.
- The Moon passes 0.2° north of asteroid Vesta on the 2nd.
- The Moon passes 3° south of Mercury on the 3rd.
- The Moon passes 3° south of Mars on the 7th.
- Venus passes 1.2° south of Uranus on the 18th.
- The Moon passes 1.2° south of dwarf planet Ceres on the 19th.
- The Moon passes 1.7° north of Jupiter on the 20th.
- The Moon passes 0.5° south of Saturn on the 22nd.
- The Moon passes 0.07° north of Pluto on the 22nd.
- The Moon passes 4° south of Neptune on the 27th.
- The Moon passes 0.6° north of asteroid Vesta on the 30th.
- The Moon passes 5° south of Uranus on the 31st.

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 May

"Bright planets adorn May's sky from dusk till dawn. Mars appears conspicuous in the west after sundown, an orange-colored interloper making its way from Taurus into Gemini. Before the Red Planet sets, Jupiter rises in the southeast. The giant world remains a beacon until morning twilight brightens the sky. By then, Saturn has climbed highest in the south and Venus gleams low in the east. Not to be outdone, Mercury appears in morning twilight in early May and returns in evening twilight by month's end." Astronomy Magazine, May 2019, p.36.

Mercury

Is in superior conjunction on the 21st. Mercury rises about 5:21 a.m. on the 1st. After the 21st, Mercury returns to the evening sky, setting about 9:32 p.m. by month's end. Look for Mercury low to the east about 30 minutes before sunrise during the first week of May and about 30 minutes after sunset by the last week of May. Mercury moves from the constellation of Pisces into Taurus this month shining at magnitude -1.2 on the 31st.

Venus

Rises at 4:59 a.m. on the 1st and about 4:35 a.m. by month's end. Look for Venus in the southeast about an hour before sunrise. Venus moves from the constellation of Pisces into Aries shining at magnitude -3.8.

Earth

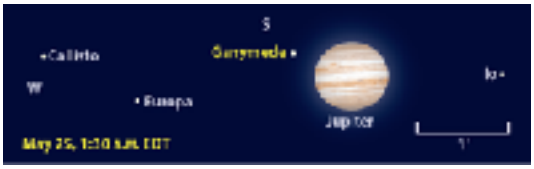
N/A.

Mars

Sets at 11:12 p.m. on the 1st and about 10:38 p.m. by month's end. Look to the west soon after sunset to spot Mars. Mars moves from the constellation of Taurus into Gemini shining at magnitude 1.7.

Jupiter

Rises at 11:11 p.m. on the 1st and about 8:55 p.m. by month's end. Jupiter is now visible in the late evening and early morning skies before sunrise. Jupiter is in the constellation of Ophiuchus shining at magnitude -2.5.



Saturn
Rises at 1:06 a.m. on the 1st and about 10:57 p.m. by month's end. Look for Saturn to the south about an hour before sunrise. Saturn is in the constellation of Sagittarius shining at magnitude 0.4.

Uranus
Has returned to the morning sky this month, rising at 5:43 a.m. on the 1st and about 3:46 a.m. by month's end. Look for Uranus to the east about 30 minutes to an hour before sunrise. Wait until after midmonth to spot Uranus though, as it will still be lost in the early morning twilight. Uranus is in the constellation of Aries shining at magnitude 5.9.

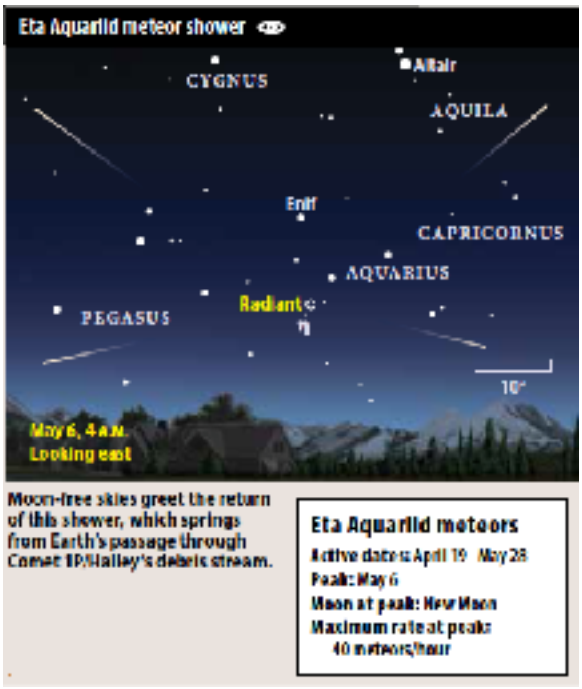
Neptune
Rises at 3:57 a.m. on the 1st and about 1:57 a.m. by month's end. Look for Neptune about an hour before sunrise to the east. Neptune is in the constellation of Aquarius shining at magnitude 7.9.

Dwarf Planets
Ceres
Is at opposition on the 28th, rising as the Sun sets. Ceres rises at 10:04 p.m. on the 1st and about 7:39 p.m. by month's end. Ceres can be spotted low to the east in late evening and to the south in the early morning hours before sunrise. Ceres moves from the constellation Ophiuchus into Scorpius shining at magnitude 7.3.

Pluto
Rises at 1:17 a.m. on the 1st and about 11:11 p.m. by month's end. Pluto continues to trail Saturn by about 15 to 20 minutes all month, which may aid in spotting this elusive planet. 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 Eta Aquarids Meteor Shower - This shower is visible during the period of April 21 to May 12. It reaches maximum on May 5. During the period of greatest activity hourly rates usually reach 20 for observers in the northern hemisphere and 50 for observers in the southern hemisphere.

This year, the Eta Aquarids peak before dawn on the 6th, under a moonless sky.

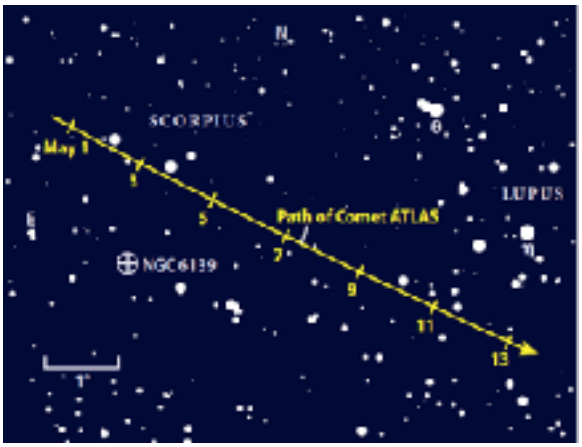
For more information about Meteor Showers, visit Gary Kronk's Meteor Showers Online web page at http://meteorshowersonline.com/.

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 C/2017 M4 (ATLAS) may glow around 13th magnitude as it passes through the constellations of Scorpius and Lupus this month. Observers will need a large telescope (10 inches or larger) to find Comet Atlas highest in the south between 2 and 3 a.m. during the first two weeks of May.



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)
- View Mars and Mercury in the early evening sky after sunset.
- Look for Jupiter and Ceres in the late evening sky.
- Look for Saturn, Pluto, Neptune, Uranus and Venus in the morning sky.

Asteroids
(From west to east)
- **Iris** is in the constellation of Corvus.
- **Pallas** is in the constellation of Coma Berenices.
- **Flora** is at opposition on the 9th in the constellation of Libra.
- **Parthenope** is at opposition on the 14th in the constellation of Libra.
- **Massalia** is at opposition on the 20th in the constellation of Libra.
- **Eunomia** is in the constellation of Capricornus.

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.

The Moon occults the Beehive Cluster (M44) on the evening of the 10th.

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.

Lunar Eclipse January 20/21, 2019

A short video clip of images taken by some of our subscribers on the evening of January 20, 2019, during the Super Blood Moon Lunar Eclipse. (Click on the image above to start the video.)

Planetary/Lunar Exploration Missions

(Excerpts from recent mission updates)

JPL Latest News

The Latest from Space

JPL Latest News

April 29, 2019
Scientists Planning Now for Asteroid Flyby a Decade Away

Full Article & Images

"On April 13, 2029, a speck of light will streak across the sky, getting brighter and faster. At one point it will travel more than the width of the full Moon within a minute and it will get as bright as the stars in the Little Dipper. But it won't be a satellite or an airplane - it will be a 1,100-foot-wide (340-meter-wide) near-Earth asteroid called 99942 Apophis that will cruise harmlessly by Earth, about 19,000 miles (31,000 kilometers) above the surface. That's within the distance that some of our spacecraft that orbit Earth."

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
March 21, 2019
JUPITER MARBLE

Full Article & Images

"This striking view of Jupiter's Great Red Spot and turbulent southern hemisphere was captured by Juno as it performed a close pass of the gas giant planet.

Juno took the three images used to produce this color-enhanced view on Feb. 12, 2019, between 9:59 a.m. PST (12:59 p.m. EST) and 10:39 p.m. PST (1:39 p.m. EST), as the spacecraft performed its 17th science pass of Jupiter. At the time the images were taken, the spacecraft was between 16,700 miles (26,900 kilometers) and 59,300 miles

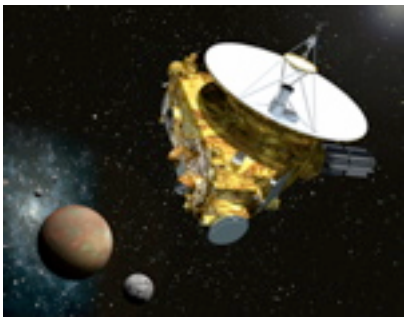
(95,400 kilometers) above Jupiter's cloud tops, above a southern latitude spanning from about 40 to 74 degrees.

Citizen scientist Kevin M. Gill created this image using data from the spacecraft's JunoCam imager."

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
March 18, 2019
A Prehistoric Puzzle in the Kuiper Belt
NASA's New Horizons Team Unravels the Many Mysteries of Ultima Thule

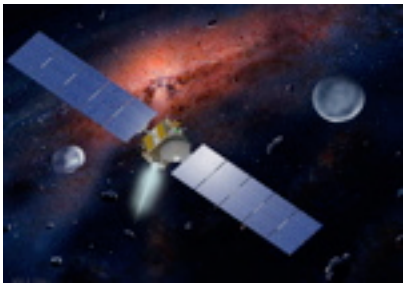
Full Article & Images

"The farthest object ever explored is slowly revealing its secrets, as scientists piece together the puzzles of Ultima Thule – the Kuiper Belt object NASA's New Horizons spacecraft flew past on New Year's Day, four billion miles from Earth.

Analyzing the data New Horizons has been sending home since the flyby of Ultima Thule (officially named 2014 MU69), mission scientists are learning more about the development, geology and composition of this ancient relic of solar system formation. The team discussed those findings today at the 50th Lunar and Planetary Science Conference in The Woodlands, Texas."

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
April 10, 2019
NASA's Dawn Mission Honored by Space Foundation

Full Article & Images

"The Space Foundation presented NASA's Dawn mission with the 2019 John L. "Jack" Swigert, Jr., Award for Space Exploration at the opening ceremony of the foundation's 35th Space Symposium on April 8, 2019.

Dawn is managed by NASA's Jet Propulsion Laboratory in Pasadena, California. Project Manager Marc Rayman of JPL and Dave Gallagher, associate director for strategic integration at JPL, accepted the award in front of about a thousand symposium attendees in Colorado Springs, Colorado."

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

TESS
April 15, 2019
NASA's TESS Discovers its First Earth-size Planet

Full Article & Images

"NASA's Transiting Exoplanet Survey Satellite (TESS) has discovered its first Earth-size world. The planet, HD 21749c, is about 89% Earth's diameter. It orbits HD 21749, a K-type star with about 70% of the Sun's mass located 53 light-years away in the southern constellation Reticulum, and is the second planet TESS has identified in the system. The new world is likely rocky and circles very close to its star, completing one orbit in just under eight days. The planet is likely very hot, with surface temperatures perhaps as high as 800 degrees F (427 degrees C)."

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 WEATHER
Mars Daily Weather Report

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

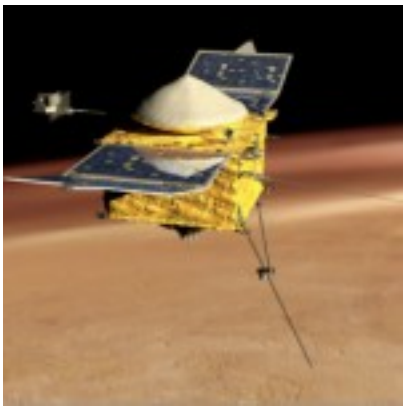
JMARS
JMARS is an acronym that stands for Java Mission-planning and Analysis for Remote Sensing. It is a geospatial information system (GIS) developed by ASU's Mars Space Flight Facility to provide mission planning and data-analysis tools to NASA's orbiters, instrument team members, students of all ages, 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
April 29, 2019
MAVEN sets its sights beyond Mars

Full Article & Images

"For more than four years, NASA's Mars Atmosphere and Volatile Evolution (MAVEN) mission has explored the mysteries of the Red Planet's upper atmosphere. More recently, the spacecraft has gotten up close and personal with that same expanse of gas."

Visit LASP and MAVEN for more information.

Mars Science Laboratory - Curiosity
April 29, 2019
NASA Mars Rover Curiosity: Mission Updates
Sol 2393-2394: Putting the L in MSL

Full Article & Images

"Today's main activities use the "laboratory" instruments SAM and CheMin inside of Curiosity to analyze some of the powder from the Kilmarie drill hole. SAM will do an Evolved Gas Analysis, which involves heating the sample and measuring the gases that are generated, and CheMin will do its usual analysis, shining x-rays through the sample to determine what minerals are present. Power was on the low side today, and initially we thought there wouldn't be much of a chance to do other science, but our resourceful team was able to fit two small science blocks into the plan."

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.

Mars Exploration Rover Mission (Spirit and Opportunity)
March 12, 2019
Opportunity's Parting Shot Was a Beautiful Panorama

Full Article & Images

"Over 29 days last spring, NASA's Mars Exploration Rover Opportunity documented this 360-degree panorama from multiple images taken at what would become its final resting spot in Perseverance Valley. Located on the inner slope of the western rim of Endeavour Crater, Perseverance Valley is a system of shallow troughs descending eastward about the length of two football fields from the crest of Endeavour's rim to its floor."

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

Visit the Mars Exploration Rover page at

https://mars.nasa.gov/mer/home/.

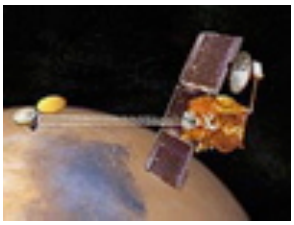
Mars Reconnaissance Orbiter Mission
February 11, 2019
InSight Seismometer's Wind and Thermal Shield Seen from Space

Full Article & Images

"NASA's InSight spacecraft and its recently deployed Wind and Thermal Shield were imaged on Mars on Feb. 4 by the HiRISE camera aboard NASA's Mars Reconnaissance Orbiter."

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.



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

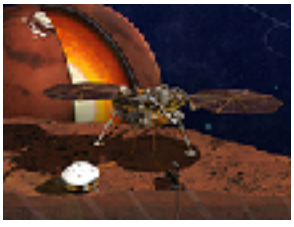
Full Article & Images

"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.

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.



InSight - Journey to Mars
InSight - Revealing the Heart of Mars

April 23, 2019
NASA's InSight Detects First Likely 'Quake' on Mars

Full Article & Images

"NASA's Mars InSight lander has measured and recorded for the first time ever a likely "marsquake."

The faint seismic signal, detected by the lander's Seismic Experiment for Interior Structure (SEIS) instrument, was recorded on April 6, the lander's 128th Martian day, or sol. This is the first recorded trembling that appears to have come from inside the planet, as opposed to being caused by forces above the surface, such as wind. Scientists still are examining the data to determine the exact cause of the signal."

Play the YouTube video.

Interactive selection of raw images taken by the cameras aboard InSight.

Learn more about the InSight mission.

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 and the Mars Exploration page.

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.

- Full documentation of the online administration system.

- The latest version of the newsletter.

Keep looking UP!

73 from KI0AR

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JPL Solar System Ambassador, Colorado
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