IAAS Monthly Astronomy Newsletter
April 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!

In This Newsletter...

"A waning gibbous Moon passes 2° from Jupiter on February 23, 2016. The two have an equally impressive encounter the morning of April 23." Astronomy Magazine, April 2019, p.36.
Alan Dyer

The Month At-A-Glance

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

The Moon

Phases:

- New Moon occurs on the 5th.
- First Quarter Moon occurs on the 12th.
- Full Moon occurs on the 19th.
- Last Quarter Moon occurs on the 26th.

- The Moon is at Apogee on the 1st, 252,013 miles from Earth.
- The Moon is at Perigee on the 16th, 226,306 miles from Earth.
- The Moon is at Apogee on the 28th, 251,396 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 3° south of Venus on the 1st.
- Mercury passes 0.4° north of Neptune on the 2nd.
- The Moon passes 3° south of Neptune on the 2nd.
- The Moon passes 4° south of Mercury on the 2nd.
- The Moon passes 5° south of Uranus on the 6th.
- The Moon passes 5° south of Mars on the 9th.
- Venus passes 0.3° south of Neptune on the 9th.
- Mars passes 7° north of Aldebaran on the 16th.
- The Moon passes 1.6° north of Jupiter on the 23rd.
- The Moon passes 0.4° south of Saturn on the 25th.
- The Moon passes 0.07° north of Pluto on the 25th.
- The Moon passes 3° south of Neptune 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 April

"The warmer nights of April entice skywatchers to spend more time under the stars. And this year, several bright planets add to the celestial splendor. Evening viewers can enjoy Mars in the company of Taurus' brightest star clusters. But the best action occurs before dawn. While Jupiter and Saturn show off in a dark sky, Venus and Mercury glow in morning twilight." Astronomy Magazine, April 2019, p.36.

Mercury

Is at greatest western elongation (28°) on the 11th. Mercury rises about 5:49 a.m. on the 1st and about 5:21 a.m. by month's end. Look for Mercury low to the east about 30 minutes before sunrise. Mercury moves from the constellation of Aquarius into Pisces this month shining at magnitude 0.8 on the 1st.

Venus

Rises at 5:27 a.m. on the 1st and about 4:59 a.m. by month's end. Look for Venus in the southeast about an hour before sunrise. Venus moves from the constellation of Aquarius into Pisces shining at magnitude -3.9 on the 15th.

Earth

N/A.

Mars

Sets at 11:33 p.m. on the 1st and about 11:12 p.m. by month's end. Look to the west soon after sunset to spot Mars. Mars is in the constellation of Taurus shining at magnitude 1.5.

Jupiter

Is stationary on the 10th. Jupiter rises at 1:15 a.m. on the 1st and about 11:11 p.m. by month's end. Jupiter is visible towards the south in the morning sky before sunrise. Jupiter is in the constellation of Ophiuchus shining at magnitude -2.3.

Saturn
Is stationary on the 29th. Saturn rises at 3:01 a.m. on the 1st and about 1:06 a.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 0.6.

Uranus
Is in conjunction with the Sun on the 22nd, Uranus sets at 9:52 p.m. on the 1st. Look for Uranus soon after sunset to the west during the first couple of days of the mont. After the first week, Uranus disappears into the evening twilight glow. After the 22nd, Uranus returns to the morning sky but is still lost in the morning twilight glow. Uranus will be visible in the morning sky in May. Uranus is in the constellation of Aries shining at magnitude 5.9.

Neptune
Has returned to the morning sky after that, rising at 5:53 a.m. on the 1st and about 3:57 a.m. by month's end. On the morning of the 10th, look for Neptune and Venus within 0.3 degrees of each other. These two planets will lie within the same field of view in a small telescope; however, observers will need very clear skies to observe Neptune in the pre-dawn twilight. Neptune is in the constellation of Aquarius shining at magnitude 8.0.

Dwarf Planets
Ceres
Is stationary on the 8th. Ceres rises at 12:07 a.m. on the 1st and about 12:07 a.m. by month's end. Ceres can be spotted low to the south in the early morning hours before sunrise. Ceres is in the constellation Ophiuchus shining at magnitude 8.1.

Pluto
Is stationary on the 25th. Pluto rises at 3:14 a.m. on the 1st and about 1:17 a.m. by month's end. Pluto trails 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 Lyrids [meteor shower] are typically visible between April 16 and 25. Maximum occurs during April 21-22. Although the maximum rate is about 10, there have been instances during the last 200 years when rates were near or over 100 per hour. The average magnitude of the meteors is near 2.4 and the speed is described as rapid. About 15% of the meteors leave persistent trains.

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) will glow around 13th magnitude. Observers will need a large telescope (10 inches or larger) to find Comet Atlas just south of Jupiter between the constellations of Sagittarius and Scorpius in the constellation of Ophiuchus.

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 Uranus in the early evening sky after sunset.
• Look for Venus, Jupiter, Saturn and Neptune in the morning sky.

Asteroids
(From west to east)
• **Juno** is in the constellation of Orion.
• **Herculina** is in the constellation of Lynx.
• **Iris** is at opposition on the 5th in the constellation of Corvus.
• **Pallas** is at opposition on the 9th is in the constellation of Boötes.
• **Parthenope** is in the constellation of Libra.

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.

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

March 28, 2019
NASA's Mars Helicopter Completes Flight Tests

Full Article & Images

"Since the Wright brothers first took to the skies of Kill Devil Hills, North Carolina, Dec. 17, 1903, first flights have been important milestones in the life of any vehicle designed for air travel. After all, it's one thing to design an aircraft and make it fly on paper - or computer. It is quite another to put all the pieces together and watch them get off the ground.

In late January 2019, all the pieces making up the flight model (actual vehicle going to the Red Planet) of NASA's Mars Helicopter were put to the test.

Weighing in at no more than 4 pounds (1.8 kilograms), the helicopter is a technology demonstration project currently going through the rigorous verification process certifying it for Mars."

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.

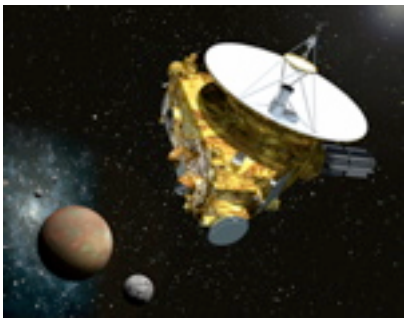
Juno took the three images used to produce this color-enhanced view on Feb. 12, 2019, between 9:59 a.m. PST (12:59 p.m. EST) and 10:39 p.m. PST (1:39 p.m. EST), as the spacecraft performed its 17th science pass of Jupiter. At the time the images were taken, the spacecraft was between 16,700 miles (26,900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

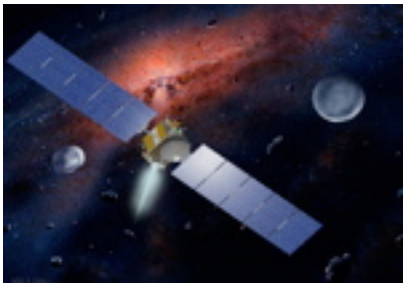
Full Article & Images

"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

February 27, 2019
Do-It-Yourself Dwarf Planet: Exploring Ceres in Labs

Full Article & Images

"Ceres, the dwarf planet between Mars and Jupiter, is a mysterious and exotic world, with its complicated history and recent geologic activity. Since scientists can't currently visit or bring back a sample, they are trying to make a little bit of Ceres 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

February 5, 2019
Tour Alien Worlds with New Multimedia Treats

Full Article & Images

"Explore the plethora of planets outside our solar system with new multimedia experiences from NASA's Exoplanet Exploration Program (ExEP). In addition to a new Exoplanet Travel Bureau poster celebrating a molten world called 55 Cancri e, space fans can enjoy a 360-degree visualization of the surface of the same planet, a multimedia journey into the life and death of planetary systems, and a major update to the popular Eyes on Exoplanets app."

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

February 11, 2019
MAVEN shrinking its orbit to prepare for Mars 2020 rover

Full Article & Images

"The 4-year-old atmosphere-sniffing MAVEN mission is embarking on a new campaign today to tighten its orbit around Mars. The operation will reduce the highest point of the MAVEN spacecraft's elliptical orbit from 3,850 to 2,800 miles (6,200 to 4,500 kilometers) above the surface and prepare it to take on additional responsibility as a data-relay satellite for NASA's Mars 2020 rover, which launches next year."

Visit LASP and MAVEN for more information.

Mars Science Laboratory - Curiosity

March 28, 2019
NASA Mars Rover Curiosity: Mission Updates
Sol 2361 - 2362: Lots to explore in Glen Torridon

Full Article & Images

"We are continuing to find interesting new things in Glen Torridon. One of my favorite new images was taken this weekend (Mars sol 2356) on target "Stonebriggs" (pictured). We've seen round and smooth clasts before, but this area really stands out in how densely the clasts are packed together. Were these pebbles rounded by water during transport over a long distance?

Or are they wind polished concretions similar to what we saw back on sol 1806? Or something completely different? There is a lot to talk about within the science team!"

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

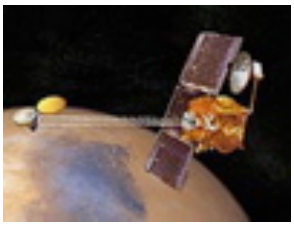
February 11, 2019
InSight Seismometer's Wind and Thermal Shield Seen from Space

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

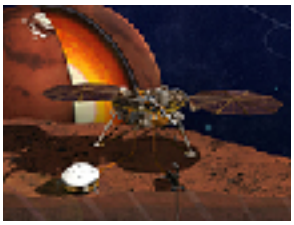
Full Article & Images

"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
March 5, 2019
Mars InSight Lander's 'Mole' Pauses Digging

Full Article & Images

"Updated at 8 a.m. PDT (11 a.m. EDT) on March 21: More imaging and testing are planned to further study InSight's heat probe, formally known as the Heat and Physical Properties Package (HP3). That testing includes a new round of hammering, which was last attempted March 2. Many ideas for freeing up the mole are being considered, all of which will require at least several more weeks of careful analysis.

There is still little clarity as to whether the "mole" -- the nickname for the self-hammering spike that is part of HP3 -- is being blocked by a single rock or a layer of gravel. There is also the possibility that the probe or its cable might be stuck on something inside the instrument's protective housing."

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!

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- 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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