IAAS Monthly Astronomy Newsletter December 2020

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 The Home of KIØAR - and is received nationally and internationally. Download the PDF formatted version of the newsletter.

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. Due to hardware issues, links with the Allstar node, Echolink and the Cripple Creek repeater are down until further notice. 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.

** Check the website for current info during these COVID-19 times. **

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...

"Jupiter (left) and Saturn are this month's highlight. While you enjoy their great conjunction, take some time to also admire detail within their turbulent atmospheres." Astronomy Magazine, p. 32, December 2020.

NASA, ESA, A. Simon (Goddard Space Flight Center) and M. H. Wong (University of California, Berkeley); NASA, ESA, A. Simon (Goddard Space Flight Center) and M.H. Wong (University of California, Berkeley), and the Opal Team.

The Month At-A-Glance

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

The Moon

Phases:

- Last Quarter Moon occurs on the 7th.
- New Moon occurs on the 14th.
- First Quarter Moon occurs on the 21st.
- Full Moon occurs on the 29th.

- The Moon is at Perigee on the 12th, 224,795 miles from Earth.
- The Moon is at Apogee on the 24th, 251,663 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 0.5° north of asteroid Vesta on the 7th.
- The Moon passes 0.8° north of Venus on the 12th.
- The Moon passes 3° south of Jupiter on the 16th.
- The Moon passes 3° south of Saturn on the 16th.
- The Moon passes 5° south of Neptune on the 20th.
- Jupiter passes 0.1° south of Saturn on the 21st.
- Venus passes 6° north of Antares on the 22nd.
- The Moon passes 6° south of Mars on the 23rd.
- The Moon passes 3° south of Uranus on the 24th.

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

The Planets & Dwarf Planets

Planetary Reports are generated by "TheSkyX" 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.)a

Planetary Highlights for December

Jupiter and Saturn are in conjunction and can be seen in the same field of view through a telescope. Don't miss this event on the Winter Solstice. Mars continues to dim as it moves away from Earth. Uranus is visible through binoculars in the constellation of Aries. Neptune is near 4th magnitude star HIP 114724 in the constellation of Aquarius and hopefully will be relatively easy to find with binoculars or a small telescope. Before sunrise, look for Venus in the east; however, Mercury is lost in the Sun's glare all month.

Mercury

Is in superior conjunction on the 19th. Mercury rises at 6:11 a.m. on the 1st and about 8:00 a.m. by month's end. Mercury is lost in the morning twilight glow all month. Mercury will return to the evening sky next month. Mercury moves from the constellation of Libra into Sagittarius shining at magnitude -0.8 on the 1st.

Venus

Rises at 4:42 a.m. on the 1st and about 5:52 a.m. by month's end. Look for Venus in the east before sunrise. On the morning of the 12th, look for the crescent Moon suspended over the planet Venus. Venus moves from the constellation of Libra into Ophiuchus shining at magnitude -3.9 on the 15th.

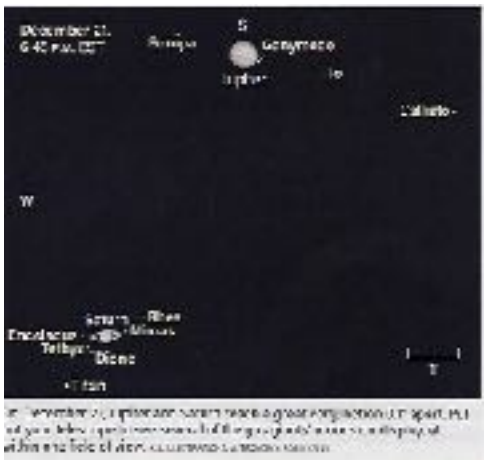
Earth

The Winter Solstice occurs at 5:02 a.m. EST on the 21st.

Mars

Sets at 2:45 a.m. on the 1st and about 1:37 a.m. by month's end. Mars can be viewed all evening. The best time to observe Mars will be around 9-10 p.m. in the evenings when Mars is highest in the south. Mars is in the constellation of Pisces shining at magnitude -0.7 on the 15th.

Jupiter



Sets at 9:28 p.m. on the 1st and about 6:26 p.m. by month's end. Look for Jupiter soon after sunset to the southwest. Jupiter and Saturn will be in conjunction on the 21st, passing within 0.1° south of Saturn. With a small telescope, Jupiter and Saturn will appear in the same field of view. Jupiter moves from the constellation of Sagittarius into Capricornus shining at magnitude -2.0.

Saturn

Sets at 8:06 p.m. on the 1st and about 6:20 p.m. by month's end. Observe Saturn as is nears Jupiter for its conjunction on the 21st. Saturn moves from the constellation of Sagittarius into Capricornus shining at magnitude 0.6.

Uranus

Sets at 4:26 a.m. on the 1st and around 2:21 a.m. by month's end. Uranus is visible in the evening almost night long. Look to the south-southeast soon after sunset to spot Uranus. Uranus is in the constellation of Aries shining at magnitude 5.7.

Neptune

Sets at 12:19 a.m. on the 1st and about 10:15 p.m. by month's end. Neptune can be spotted to the south once the skies darken. Neptune is in the constellation of Aquarius shining at magnitude 7.9.

Dwarf Planets

Ceres

Sets at 10:46 p.m. on the 1st and around 9:30 p.m. by month's end. Ceres can be spotted to the southwest soon after sunset. Ceres is in the constellation of Aquarius shining at magnitude 9.1.

Pluto

Sets at 7:36 p.m. on the 1st and around 5:39 p.m. by month's end. Pluto now precedes Jupiter and Saturn by a few minutes. Pluto is in the constellation of Sagittarius shining at magnitude 14.7.

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.

- The Ursids - Occurring primarily between December 17 and 24, this meteor shower reaches maximum on December 22... The maximum hourly rate is usually between 10 and 15... Meteors belonging to this stream are typically faint.

For more information about Meteor Showers, visit Gary Kronk's Meteor Showers Online web page.

Meteor Shower Radiant Report

Meteor Scatter (or 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.

Meteor Rx How-To by Terry Bullett (WØASP).

Comets

- Comet 88P/Howell is now passing through the constellation of Capricornus in the early evening. Comet Howell is shining about 9th or 10th magnitude about 15° above the southwest horizon, so look for the comet soon after local twilight as it will set fairly soon in the early evening.

For information, orbital elements and ephemerides on observable comets visit the Observable Comets page from the Harvard-Smithsonian Center for Astrophysics.

For more information about Comets, check out Gary Kronk's 6-volume series of books on Cometography.

Eclipses

- A total solar eclipse occurs on the 14th for locations in southern Chile and Argentina. Totality occurs near midday and lasts for about 2 minutes 9 seconds while over land. December 14, 2020 Total Solar Eclipse Path

- No lunar eclipse activity this month.

Observational Opportunities

(from evening to morning)

- Look for Jupiter, Saturn, Neptune, Mars and Uranus in the evening.
- Look for Comet Howell in the early evening.
- Look for Venus in the morning before sunrise.

Asteroids

(From west to east)

- **Papagena** is in the constellation of Cetus.
- **Flora** is in constellation of Cetus.
- **Psyche** is at opposition on the 7th in the constellation of Taurus.
- **Eunomia** is in the constellation of Cancer.
- **Irene** is in the constellation of Cancer.
- **Vesta** is in the constellation of Leo.

Information about the Minor Planets can be found at the Minor Planet Observer web site.

Occultations

Information on various occultations can be found at the International Occultation Timing Association's (IOTA) web site.

Member Meteor Sightings

In this section 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
986-2020	2020-02-21 22:20 MST	CO	Lukas S	986
3716-2020	2020-07-24 23:22 MDT	CO	Lukas S	3716

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.

Comet C/2020 F3 NEOWISE July 19, 2020

This image taken by Ed Hubbs (W6RDZ).

"**C/2020 F3 (NEOWISE)** or **Comet NEOWISE** is a long period comet with a near-parabolic orbit discovered on March 27, 2020, by astronomers during the *NEOWISE* mission of the Wide-field Infrared Survey Explorer (WISE) space telescope." (Wikipedia)

Planetary/Lunar Exploration Missions

(Excerpts from recent mission updates)

JPL Latest News

The Latest from Space

JPL Latest News

November 25, 2020
Follow Sentinel-6 Michael Freilich in Real Time As It Orbits Earth

Full Article & Images

"When Sentinel-6 Michael Freilich was encapsulated in the payload fairing of a SpaceX Falcon 9 rocket, it was the last time human eyes would have a close-up look at the satellite. But now that the spacecraft is in orbit after launching from Vandenberg Air Force Base in central California on Nov. 21, NASA's Eyes on the Earth is keeping track."

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

For special JPL programs and presentations in your area visit the JPL Solar System Ambassador web site.

Juno

October 27, 2020
Juno Data Indicates 'Sprites' or 'Elves' Frolic in Jupiter's Atmosphere

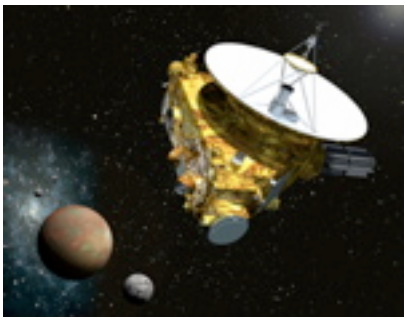
Full Article & Images

"*An instrument on the spacecraft may have detected transient luminous events – bright flashes of light in the gas giant's upper atmosphere.*

New results from NASA's Juno mission at Jupiter suggest that either "sprites" or "elves" could be dancing in the upper atmosphere of the solar system's largest planet. It is the first time these bright, unpredictable and extremely brief flashes of light – formally known as transient luminous events, or TLE's – have been observed on another world. The findings were published on Oct. 27, 2020, in the Journal of Geophysical Research: Planets.

Scientists predicted these bright, superfast flashes of light should also be present in Jupiter's immense roiling atmosphere, but their existence remained theoretical. Then, in the summer of 2019, researchers working with data from Juno's ultraviolet spectrograph instrument (UVS) discovered something unexpected: a bright, narrow streak of ultraviolet emission that disappeared in a flash."

Images from NASA's JunoCam.
More information on the Juno mission is available at Juno and Mission Juno.
The public can follow the mission on Facebook and Twitter.



New Horizons

November 4, 2020
The PI's Perspective: New Plans Afoot

Full Article & Images

"New Horizons is healthy and continuing to send data back from the flyby of the Kuiper Belt object (KBO) Arrokoth back in late 2018 and early 2019, even as it speeds deeper into the Kuiper Belt and farther from the Earth and the Sun.

By next spring, New Horizons will be 50 times as far from the Sun as the Earth is – only the fifth operating spacecraft to reach that distance. But as far as we've come, there's much more ahead! We plan to upgrade the spacecraft system and instrument software aboard New Horizons to enhance the mission's scientific capabilities and to search for new KBO targets to study or even fly by. I'll describe both of those plans just below."

New Horizons gallery

Find New Horizons in the iTunes App Store.

For more information on the New Horizons mission -- the first mission to the ninth planet -- visit the New Horizons home page.

TESS

October 26, 2020
New NASA Posters Feature Cosmic Frights for Halloween

Full Article & Images

"*The eye-catching posters depict some of the universe's most mysterious astronomical phenomena with artistic flair.*

With Halloween just around the corner, NASA has released its latest Galaxy of Horrors posters. Presented in the style of vintage horror movie advertisements, the new posters feature a dead galaxy, an explosive gamma ray burst caused by colliding stellar corpses, and ever-elusive dark matter."

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

Past, Present, Future and Proposed JPL Missions.

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

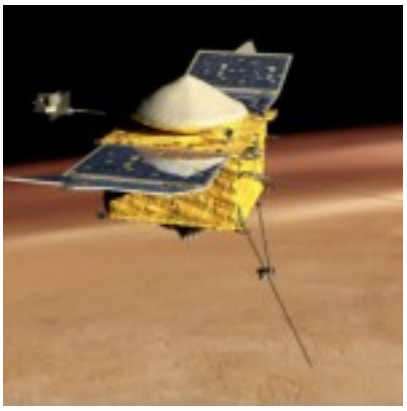
JMARS is an acronym that stands for Java Mission-planning and Analysis for Remote Sensing. It is a geospatial information system (GIS) developed by ASU's Mars Space Flight Facility to provide mission planning and data-analysis tools to NASA's orbiters, instrument team members, students of all ages, and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

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."



LASP/MAVEN

November 20, 2020

LASP scientists find hidden pockets of water ice on the moon

Full Article & Images

"Hidden pockets of water ice could be much more common on the surface of the moon than scientists once suspected, according to new research led by the Laboratory of Atmospheric and Space Physics at CU Boulder. In some cases, these tiny patches of ice might exist in permanent shadows no bigger than a penny."

Visit LASP and MAVEN for more information.

Mars 2020 - Perseverance

November 18, 2020

Hear Audio From NASA's Perseverance As It Travels Through Deep Space

Full Article & Images

"A microphone aboard NASA's Mars 2020 Perseverance rover has recorded the sounds of the spacecraft as it hurtles through interplanetary space. While another mic aboard the rover is intended specifically to listen for the laser zaps of the SuperCam instrument, this one is devoted to capturing some or all of the entry, descent, and landing (EDL) sequence – from the firing of the mortar that releases the parachute to the Mars landing engines kicking in to the rover wheels crunching down onto the surface." Listen to Perseverance

Learn more about the upcoming Mars 2020 (Perseverance) mission.

Mars Science Laboratory - Curiosity

November 12, 2020

NASA's Curiosity Takes Selfie With 'Mary Anning' on the Red Planet

Full Article & Images

"NASA's Curiosity Mars rover has a new selfie. This latest is from a location named "Mary Anning," after a 19th-century English paleontologist whose discovery of marine-reptile fossils were ignored for generations because of her gender and class. The rover has been at the site since this past July, taking and analyzing drill samples."

Follow the Mars Curiosity rover on Foursquare.

Check out information about NASA's partnership with Foursquare.

Mars Rover Landing - Free for the Xbox 360 (requires Kinect)

Visit the Mars Science Laboratory page.

Mars Reconnaissance Orbiter Mission

October 1, 2020

AI Is Helping Scientists Discover Fresh Craters on Mars

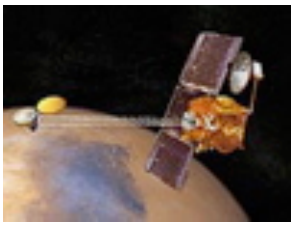
Full Article & Images

"It's the first time machine learning has been used to find previously unknown craters on the Red Planet.

Sometime between March 2010 and May 2012, a meteor streaked across the Martian sky and broke into pieces, slamming into the planet's surface. The resulting craters were relatively small -- just 13 feet (4 meters) in diameter. The smaller the features, the more difficult they are to spot using Mars orbiters. But in this case -- and for the first time -- scientists spotted them with a little extra help: artificial intelligence (AI)."

MARS RECONNAISSANCE ORBITER HIRISE IMAGES

View all of the archived HiRISE images.
More information about the MRO mission is available online.



Mars Odyssey Orbiter
June 8, 2020
Three New Views of Mars' Moon Phobos

Full Article & Images

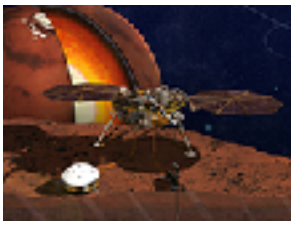
"Three new views of the Martian moon Phobos have been captured by NASA's Odyssey orbiter. Taken this past winter and this spring, they capture the moon as it drifts into and out of Mars' shadow.

The orbiter's infrared camera, the Thermal Emission Imaging System (THEMIS), has been used to measure temperature variations across the surface of Phobos that provide insight into the composition and physical properties of the moon. Further study could help settle a debate over whether Phobos, which is about 16 miles (25 kilometers) across, is a captured asteroid or an ancient chunk of Mars that was blasted off the surface by an impact."

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.

Visit the Mars Odyssey Mission page.



Mars InSight - Journey to Mars
InSight - Revealing the Heart of Mars
October 16, 2020
NASA InSight's 'Mole' Is Out of Sight

Full Article & Images

"NASA's InSight lander continues working to get its "mole" – a 16-inch-long (40-centimeter-long) pile driver and heat probe – deep below the surface of Mars. A camera on InSight's arm recently took images of the now partially filled-in "mole hole," showing only the device's science tether protruding from the ground.

Sensors embedded in the tether are designed to measure heat flowing from the planet once the mole has dug at least 10 feet (3 meters) deep. The mission team has been working to help the mole burrow to at least that depth so that it can take Mars' temperature.

The mole was designed so that loose soil would flow around it, providing friction against its outer hull so that it can dig deeper; without this friction, the mole just bounces in

place as it hammers into the ground. But the soil where InSight landed is different than what previous missions have encountered: During hammering, the soil sticks together, forming a small pit around the device instead of collapsing around it and providing the necessary friction."

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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Keep looking UP!

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JPL Solar System Ambassador, Colorado
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