IAAS Monthly Astronomy Newsletter December 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 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. The RMRL **146.94** repeater is also linked with the WBØWDF Cripple Creek **447.400 MHz** repeater and Allstar node **28368**. We are also linked via Echolink - **canoncty** - courtesy of KØJSC and KØGUR. More information on the WBØWDF repeater links, Allstar nodes and Echolinks can be found at k0jsc.com. We are also linked with Allstar nodes in Florida as well, courtesy of KA4EPS. The net meets on Tuesday nights at 7 P.M. Mountain Time (US).

Obtain your Amateur Radio (Ham) License or your General Radio Operator's License (GROL)! Visit the South Metro VE Team website for more information. The South Metro VE Team provides test sessions on the 1st Saturday of each month at our new Eagle Street Facility, The City of Centennial, 7272 South Eagle Street, Centennial, Colorado 80112-4244 at 9am.

The Colorado Astronomy Net and the IAAS are on Facebook page. Be sure to "Like" us.

Excerpts from JPL mission updates are provided as a public service as part of the JPL Solar System Ambassador / NASA Outreach program.

Donate to the IAAS!

Shop Smile.Amazon.com, sign up or sign in to smile.amazon.com and select the **International Association for Astronomical Studies**. 0.5% of every purchase will be donated to the group. Thank you!

In This Newsletter...

A Geminid fireball blazes through an [illegible]'s glowmbow above Alaska's Knik River Area in 2017. This year, the Geminid shower peaks under a moonlit sky. [illegible]

The Month At-A-Glance

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

The Moon

Phases:

- First Quarter Moon occurs on the 4th.
- Full Moon occurs on the 12th.
- Last Quarter Moon occurs on the 18th.
- New Moon occurs on the 26th.

- The Moon is at Apogee on the 4th, 251,311 miles from Earth.
- The Moon is at Perigee on the 18th, 230,072 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 4° south of Neptune on the 4th.
- The Moon passes 5° south of Uranus on the 8th.
- Venus passes 1.8° south of Saturn on the 10th.
- Mercury passes 5° north of Antares on the 15th.
- The Moon passes 4° north of Mars on the 22nd.
- The Moon passes 1.2° south of Saturn on the 27th.
- The Moon passes 0.6° south of Pluto on the 27th.
- The Moon passes 1.0° south of Venus on the 28th.
- The Moon passes 4° south of Neptune on the 31st.

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.)

Planetary Highlights for December

Venus, Jupiter and Saturn line up in the early evening during the first part of the month. Uranus and Neptune follow close behind, but are much dimmer than their closer neighbors and can be spotted well into the late evening. Mars and Mercury are visible before dawn. An annular eclipse will be visible for observers in southern Asia and Indonesia as well as Guam.The Geminids meteor show peaks midmonth but the full Moon will interfere with all but the brightest. Wait until the 22nd to watch the peak of the Ursids meteor shower when the Moon is barely a thin crescent.

Mercury

Rises at 5:19 a.m. on the 1st and about 7:06 a.m. by month's end. Look for Mercury low to the southwest about 30 minutes before sunrise early in the month when it will be highest in the sky. Mercury moves from the constellation of Libra into Sagittarius this month shining at magnitude -0.6 on the 1st.

Venus

Sets at 6:24 p.m. on the 1st and about 7:31 p.m. by month's end. Look for Venus soon after sunset to the southwest throughout the month. Venus continues to rise higher in the evening skies making it easier to spot. Venus moves from the constellation of Sagittarius into Capricornus shining at magnitude -3.9 on the 15th.

Earth

The Winter Solstice occurs at 11:19 p.m. EST on the 21st.

Mars

Rises at 4:26 a.m. on the 1st and about 4:08 a.m. by month's end. Mars continues to rise earlier making is easier to view in the morning sky before dawn. Look to the east about an hour before sunrise to spot Mars. Mars is in the constellation of Libra shining at magnitude 1.7.

Jupiter
Is in conjunction with the Sun on the 27th. Jupiter sets at 5:56 p.m. on the 1st and sets with the Sun on the 27th. After conjunction, Jupiter returns to the morning sky, rising about 7:06 a.m. by month's end. Jupiter rapidly descends towards the western horizon this month, so try to spot Jupiter during the first two weeks of December. Jupiter is in the constellation of Sagittarius shining at magnitude -1.8.

Saturn
Sets at 7:20 p.m. on the 1st and about 5:34 p.m. by month's end. Look to the south-southwest about an hour after sunset to spot Saturn. Saturn is in the constellation of Sagittarius shining at magnitude 0.6.

Uranus
Sets at 4:08 a.m. on the 1st and about 2:03 a.m. by month's end. By the time the Sun sets and the skies darken, Uranus is high in the south around 9:30 p.m. local time. Uranus is in the constellation of Aries shining at magnitude 5.7.

Neptune
Sets at 12:11 a.m. on the 1st and about 10:07 p.m. by month's end. Look for Neptune to the southwest early in the evening. Neptune is in the constellation of Aquarius shining at magnitude 7.9.

Dwarf Planets
Ceres
Sets at 6:09 p.m. on the 1st and about 5:04 p.m. by month's end. Ceres still trails Jupiter by a few minutes but is much dimmer compared to Jupiter and will be lost in the evening twilight glow. Ceres is in the constellation of Sagittarius shining at magnitude 9.1.

Pluto
Sets at 7:32 p.m. on the 1st and about 5:35 p.m. by month's end. Pluto still trails Saturn by just a few minutes, but like Ceres, is too dim to see and is lost in the evening twilight glow of sunset. Pluto is in the constellation of Sagittarius shining at magnitude 14.4.

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.

  This year, the waning gibbous Moon will interfere with all but the brighter meteors from this shower.

- 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, except in 1945, when rates exceeded 100. Meteors belonging to this stream are typically faint.

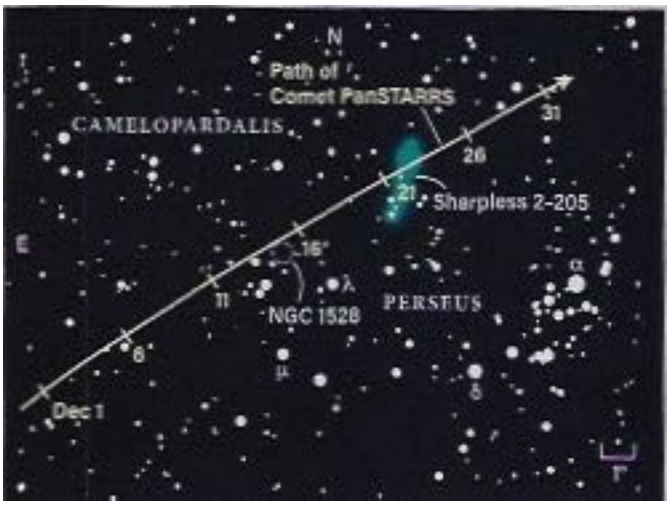
  This year, meteor experts are predicting a possible surge of up to 30 meteors per hour, so bundle up and brave the cold night to see this one.

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.

Comets



- Comet PANSTARRS (C/2017 T2) should glow around 9th or 10th magnitude this month. This comet spends most of this month passing through the constellation of Perseus, which passes nearly overhead during the evening hours this month. If you have a 4-inch telescope or larger, scan the skies on the evening of the 14th or 15th and look for the star cluster NGC 1548. Under low power, both the comet and the cluster should be in the same field of view.

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


An annular solar eclipse December 25 should deliver superb views for those in parts of southern Asia and Indonesia as well as all of Guam.

- An annular solar eclipse will occur on the 26th for observers in southern Asia, Indonesia and Guam. The eclipse begins over the eastern part of Saudi Arabia, crosses the southern tip of India, passing over Indonesia and then heads out over the Pacific. The eclipse begins at 02:29:53 UTC and ends at 08:05:40 UTC. Maps and timings at the link below.

  December 26 Annular Eclipse

- No lunar eclipse activity this month.

Observational Opportunities

(from evening to morning)

- Look for Jupiter, Venus and Saturn in the early evening sky soon after sunset.
- Follow Neptune and Uranus in the late evening and early morning.
- Look for Mars and Mercury in the early morning before sunrise.
- Watch the Geminid and Ursid meteor showers.

Asteroids

(From west to east)

- **Eunomia** is in the constellation of Aquarius.
- **Amphitrite** is in the constellation of Pisces.
- **Metis** is in the constellation of Pisces.
- **Vesta** is in the constellation of Cetus (in the tail).
- **Astraea** is in the constellation of Cancer.

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

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

November 27, 2019
NASA's Briefcase-Size MarCO Satellite Picks Up Honors

Full Article & Images

"Aviation Week & Space Technology is bestowing a prestigious Laureate award on NASA's pair of briefcase-size Mars Cube One spacecraft. Known as MarCO, they're the first CubeSats - compact spacecraft made up of cube-shaped units - to travel into deep space.

Designed and built at NASA's Jet Propulsion Laboratory in Pasadena, California, as a technology demonstration, MarCO launched to the Red Planet last year with NASA's InSight lander. Using experimental radios and antennas, the pair relayed signals back to Earth that enabled InSight's team to observe the spacecraft's Nov. 26, 2018, entry, descent and landing on Mars in near real-time."

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

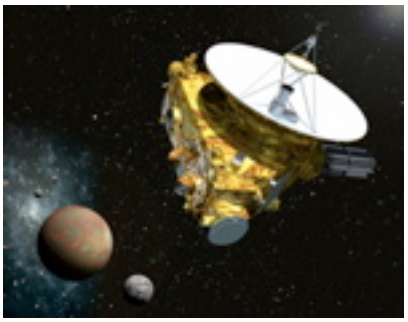
November 7, 2019
Jovian Vortex View

Full Article & Images

"Juno captured this stunningly detailed look at a cyclonic storm in Jupiter's atmosphere during its 23rd close flyby of the planet (also referred to as "perijove 23").

Juno observed this vortex in a region of Jupiter called the "north north north north temperate belt," or NNNNTB, one of the gas giant planet's many persistent cloud bands. These bands are formed by the prevailing winds at different latitudes. The vortex seen here is roughly 1,200 miles (2,000 kilometers) wide."

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 26, 2019
New Horizons Team Earns Sir Arthur Clarke Space Achievement Award

Full Article & Images

"The team that captivated the world with its exploration of Pluto and the Kuiper Belt received the Sir Arthur Clarke Award for International Space Achievement at the recent British Interplanetary Society Reinventing Space Conference 2019 Gala Dinner in Belfast, Northern Ireland. The New Horizons mission team and its Principal Investigator Alan Stern were jointly selected for outstanding achievements in space over the past many years."

New Horizons gallery

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

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.

TESS

November 5, 2019
NASA's TESS Presents Panorama of Southern Sky

Full Article & Images

"The glow of the Milky Way -- our galaxy seen edgewise -- arcs across a sea of stars in a new mosaic of the southern sky produced from a year of observations by NASA's Transiting Exoplanet Survey Satellite (TESS). Constructed from 208 TESS images taken during the mission's first year of science operations, completed on July 18, the southern panorama reveals both the beauty of the cosmic landscape and the reach of TESS's cameras."

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

October 2, 2019

An India-Pakistan nuclear war could kill millions, threaten global starvation

Full Article & Images

"A nuclear war between India and Pakistan could, over the span of less than a week, kill 50-125 million people--more than the death toll during all six years of World War II, according to new research.

A new study conducted by researchers from CU Boulder and Rutgers University examines how such a hypothetical future conflict would have consequences that could ripple across the globe. Today, India and Pakistan each have about 150 nuclear warheads at their disposal, and that number is expected to climb to more than 200 by 2025.

The picture is grim. That level of warfare wouldn’t just kill millions of people locally, said LASP atmospheric scientist Brian Toon, who led the research published today in the journal Science Advances. It might also plunge the entire planet into a severe cold spell, possibly with temperatures not seen since the last Ice Age."

Visit LASP and MAVEN for more information.

Mars Science Laboratory - Curiosity

November 12, 2019

With Mars Methane Mystery Unsolved, Curiosity Serves Scientists a New One: Oxygen

Full Article & Images

"For the first time in the history of space exploration, scientists have measured the seasonal changes in the gases that fill the air directly above the surface of Gale Crater on Mars. As a result, they noticed something baffling: oxygen, the gas many Earth creatures use to breathe, behaves in a way that so far scientists cannot explain through any known chemical processes."

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

November 26, 2019

Global Storms on Mars Launch Dust Towers Into the Sky

Full Article & Images

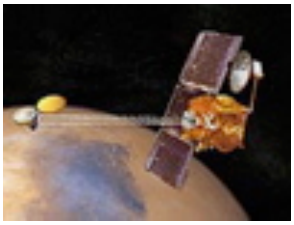
"Dust storms are common on Mars. But every decade or so, something unpredictable happens: A series of runaway storms breaks out, covering the entire planet in a dusty haze.

Last year, a fleet of NASA spacecraft got a detailed look at the life cycle of the 2018 global dust storm that ended the Opportunity rover's mission. And while scientists are still puzzling over the data, two papers recently shed new light on a phenomenon observed within the storm: dust towers, or concentrated clouds of dust that warm in

sunlight and rise high into the air. Scientists think that dust-trapped water vapor may be riding them like an elevator to space, where solar radiation breaks apart their molecules. This might help explain how Mars' water disappeared over billions of years."

MARS RECONNAISSANCE ORBITER HIRISE IMAGES

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



Mars Odyssey Orbiter

August 23, 2019
What's Mars Solar Conjunction, and Why Does It Matter?

Full Article & Images

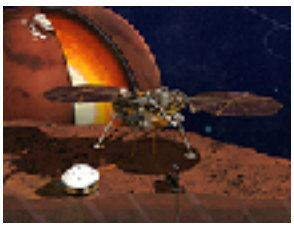
"The daily chatter between antennas here on Earth and those on NASA spacecraft at Mars is about to get much quieter for a few weeks.

That's because Mars and Earth will be on opposite sides of the Sun, a period known as Mars solar conjunction. The Sun expels hot, ionized gas from its corona, which extends far into space. During solar conjunction, this gas can interfere with radio signals when engineers try to communicate with spacecraft at Mars, corrupting commands and resulting in unexpected behavior from our deep space explorers."

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.



InSight - Journey to Mars

InSight - Revealing the Heart of Mars
November 6, 2019
Common Questions about InSight's 'Mole'

Full Article & Images

"Q: Why can't you pick up the 'mole' and move it to another spot?

A: The mole is part of the instrument called the Heat Flow and Physical Properties Package, or HP3, and was designed to be housed within HP3's support structure. The support structure of HP3 was outfitted with a knob, or "grapple point," that the robotic arm can grasp in order to move it from the lander's deck onto the Martian surface. Designed to be housed within the support structure, the mole itself has no grapple point and was not intended to be grasped or moved.

Even if the mole could be moved, relocating it would be an unlikely solution. The team is confident that the probe has been unable to dig because the soil doesn't provide enough friction. Anywhere you move the mole near the lander would likely pose the same problem. The strategy of "pinning" -- pressing the robotic arm's scoop against the side of the mole -- compensates for that lack of friction and helped the mole progress downward in early October."

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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