

IAAS Monthly Astronomy Newsletter July 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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"Saturn looms large when it reaches opposition this month. With the rings tipped wide open, observers should look for the dark Cassini Division and other fine details."
Astronomy Magazine, July 2019, p.48.

NASA/ESA/A. Simon (GSFC) and the OPAL Team/ J. DePasquale (STScI)

The Month At-A-Glance

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

The Moon

Phases:

- New Moon occurs on the 2nd.
 - First Quarter Moon occurs on the 9th.
 - Full Moon occurs on the 16th.
 - Last Quarter Moon occurs on the 24th.
 - New Moon occurs on the 31st.
-
- The Moon is at Perigee on the 5th, 226,009 miles from Earth.
 - The Moon is at Apogee on the 20th, 251,954 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 0.09° north of Mars on the 4th.
- The Moon passes 3° north of Mercury on the 4th.
- Mercury passes 4° south of Mars on the 7th.
- The Moon passes 2° north of Jupiter on the 13th.
- The Moon passes 0.2° south of Saturn on the 16th.
- The Moon passes 0.04° north of Pluto on the 16th.
- The Moon passes 4° south of Neptune on the 21st.
- The Moon passes 5° south of Uranus on the 25th.

For reference: The Full Moon subtends an angle of $\sim 0.5^\circ$.

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 July

"These warm summer nights bring magnificent views of Saturn. The ringed planet remains visible all night, a feat nearly matched by its equally stunning sister world, Jupiter. Alas, the solar system's smaller planets don't fare as well. Mercury and Mars hang low in evening twilight, while Venus appears just before dawn." Astronomy Magazine, July 2019, p.48.

Mercury

Is stationary on the 6th. Mercury is in inferior conjunction on the 21st. Mercury sets at 9:38 p.m. on the 1st. After the 21st, Mercury returns to the morning sky. Mercury rises about 4:57 a.m. by month's end. Look for Mercury low to the west about 30 minutes after sunset during the first two weeks of July. On the evening of the 7th, Mercury and Mars are in conjunction. Mercury is stationary on the 31st. Mercury moves from the constellation of Cancer into Gemini this month shining at magnitude 1.0 on the 1st.

Venus

Rises at 4:44 a.m. on the 1st and about 5:40 a.m. by month's end. Look for Venus in the east about 30 minutes before sunrise during the first week of July. After the first week, Venus is lost in the Sun's glow. Venus moves from the constellation of Taurus into Cancer shining at magnitude -3.9 on the 1st.

Earth

Is at aphelion (94.5 million miles from the Sun) on the 4th.

Mars

Sets at 9:50 p.m. on the 1st and about 8:46 p.m. by month's end. Look to the west soon after sunset to spot Mars. Like Mercury, Mars is also rapidly approaching the western horizon and will be visible during the first two weeks of the month, then, it too disappears. Mars moves from the constellation of Cancer into Leo shining at magnitude 1.8 on the 1st.

Jupiter

Rises at 6:40 p.m. on the 1st and about 4:28 p.m. by month's end. Jupiter is visible almost all night long and is much easier to spot in the evening sky to the southeast. Jupiter is in the constellation of Ophiuchus shining at magnitude -2.5.

Saturn

Is at opposition on the 9th, rising as the Sun sets. Saturn rises at 8:52 p.m. on the 1st and about 6:42 p.m. by month's end. Saturn is visible nearly all night along this month. Look for Saturn to the east in the evening and



follow Saturn across the sky as the evening progresses. Saturn is in the constellation of Sagittarius shining at magnitude 0.1.

Uranus

Rises at 1:51 a.m. on the 1st and about 11:48 p.m. by month's end. Look for Uranus to the southeast very early in the morning before sunrise. Uranus is in the constellation of Aries shining at magnitude 5.8.

Neptune

Rises at 11:55 p.m. on the 1st and about 9:52 p.m. by month's end. Look for Neptune low to the east in late evening and to the south after midnight. Neptune is in the constellation of Aquarius shining at magnitude 7.8.

Dwarf Planets

Ceres

Rises at 5:22 p.m. on the 1st and about 4:24 p.m. by month's end. Ceres precedes Jupiter by about an hour or less all month. By month's end, Jupiter and Ceres are just a few minutes apart, which will aid in observing this dim object. Ceres is in the constellation of Libra shining at magnitude 8.1.



Pluto

Is at opposition on the 14th, rising as the Sun sets. Pluto rises at 9:11 p.m. on the 1st and about 7:06 p.m. by month's end. Pluto trails Saturn by about 20 minutes all month long, which may aid in spotting this elusive planet. Pluto is in the constellation of Sagittarius shining at magnitude 14.2.

As always, good luck at spotting Neptune, Ceres and Pluto, a large telescope and dark skies will be needed.

Astronomical Events

Meteor Showers

- The Southern Delta Aquarids - This meteor shower has a duration of July 14 - August 18. Maximum hourly rates of 15-20 occur on July 28/29.
- The Northern Delta Aquarids extends from July 16 to September 10. Maximum occurs on August 13. The hourly rates reach a high of 10.



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 168P/Hergenrother, glowing around 12th to 10th magnitude, is passing between Pisces and Cetus and into Aries during the first two weeks of July, when the Moon will not interfere with viewing in the early morning skies before dawn.



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

- A total solar eclipse occurs on the 2nd along a narrow path that crosses the South Pacific, Chile and Argentina.

[How to watch the July 2 solar eclipse from anywhere in the world](#)

- A partial lunar eclipse occurs on the 16/17th across most of Europe, Africa and Asia.



Observational Opportunities

(from evening to morning)

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

Asteroids

(From west to east)

- **Pallas** is in the constellation of Boötes.
- **Melpomene** is at opposition on the 1st in the constellation of Scutum.
- **Psyche** is in the constellation of Capricornus.
- **Eunomia** is in the constellation of Aquarius.
- **Laetitia** is in the constellation of Aquarius.
- **Vesta** is in the constellation of Cetus.

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.

<u>Event ID</u>	<u>Date/Time</u>	<u>Location</u>	<u>Observer</u>	<u>Link</u>
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](#)

June 28, 2019

Mars 2020 Rover's 7-Foot-Long Robotic Arm Installed

[Full Article & Images](#)

"In this image, taken on June 21, 2019, engineers at NASA's Jet Propulsion Laboratory in Pasadena, California, install the main robotic arm on the Mars 2020 rover. (A smaller arm to handle Mars samples will be installed inside the rover as well.) The main arm includes five electrical motors and five joints (known as the shoulder azimuth joint, shoulder elevation joint, elbow joint, wrist joint and turret joint). Measuring 7 feet (2.1 meters) long, the arm will allow the rover to work as a human geologist would: by holding and using science tools with its turret, which is essentially its "hand." "

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

May 20, 2019

NASA's Juno Finds Changes in Jupiter's Magnetic Field

[Full Article & Images](#)

"NASA's Juno mission to Jupiter made the first definitive detection beyond our world of an internal magnetic field that changes over time, a phenomenon called secular variation. Juno determined the gas giant's secular variation is most likely driven by the planet's deep atmospheric winds.

The discovery will help scientists further understand Jupiter's interior structure -- including atmospheric dynamics -- as well as changes in Earth's magnetic field. A paper on the discovery was published today in the journal Nature Astronomy."

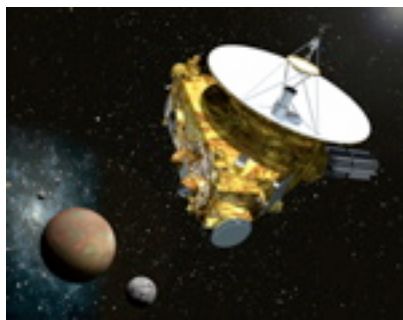
NASA's JunoCam website can be visited at: <https://www.missionjuno.swri.edu/junocam>

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

June 26, 2019

The Journey Continued

Exactly Five Years Ago, the New Horizons Team Discovered 2014 MU69 -- and Prepared to Make the Distant Kuiper Belt Object Part of Space Exploration History

[Full Article & Images](#)

"It was during a survey of the skies in June 2014 that the New Horizons team, using the powerful Hubble Space Telescope, located several small, ancient Kuiper Belt objects that New Horizons spacecraft could reach with the expected fuel remaining onboard after its planned, first exploration of Pluto the following summer.

One of those objects, spotted in Hubble images on June 26, 2014, by science team member Marc Buie, was given the designation "PT1" -- the first of three "potentially targetable" candidate flyby targets. It was the faintest and smallest of the lot, but it was most reachable within the mission's fuel budget and in the ideal timeline. So in August 2015 -- now with the official designation 2014 MU69 -- it was selected by NASA and the New Horizons mission team to be the farthest object ever explored by spacecraft. Later that year, New Horizons fired its engines to target the intercept of MU69."

[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

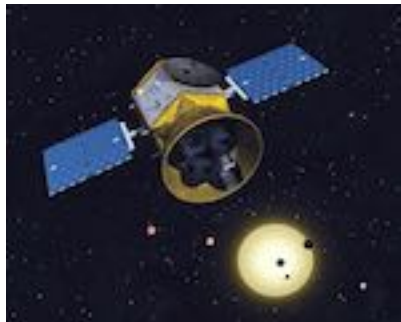
NASA's Dawn Mission Honored by Space Foundation

[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

June 27, 2019

NASA's TESS Mission Finds Its Smallest Planet Yet

[Full Article & Images](#)

"NASA's Transiting Exoplanet Survey Satellite (TESS) has discovered a world between the sizes of Mars and Earth orbiting a bright, cool, nearby star. The planet, called L 98-59b, marks the tiniest discovered by TESS to date.

Two other worlds orbit the same star. While all three planets' sizes are known, further study with other telescopes will be needed to determine if they have atmospheres and, if so, which gases are present. The L 98-59 worlds nearly double the number of small exoplanets -- that is, planets beyond our solar system -- that have the best potential for this kind of follow-up."

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

[Send your name to Mars](#)

onboard the Mars 2020 rover



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.

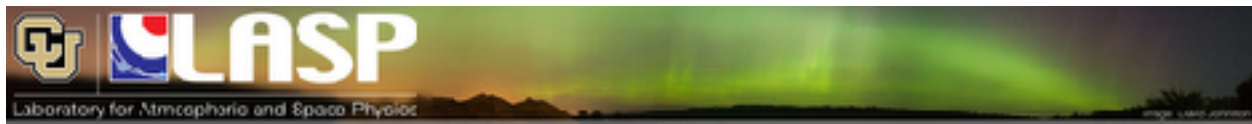
Download on Mobile Devices

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

June 28, 2019

Sols 2451-2453: Climbing Higher

[Full Article & Images](#)

"Curiosity has been a bit down lately-in elevation. After exploring the top of Vera Rubin Ridge (VRR) last year, the rover descended into a trough south of the ridge, dropping as much as 15 meters in elevation this spring to explore part of the clay-bearing unit. Curiosity is now back to the highest elevation that it achieved before it left the ridge, about -4140 meters relative to the reference level representing zero elevation on Mars. The image shows the rim of the crater once again visible above Vera Rubin Ridge. Curiosity will continue to climb higher as it explores the rest of the Glen Torridon and then moves on to the sulfate unit and Greenheugh Pediment."

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)

Opportunity's Mission Is Complete

[Full Article & Images](#)

"For mission highlights and resources, visit the mission [website](#). You can also send the Opportunity rover and team a [postcard](#)."



Mars Reconnaissance Orbiter Mission

May 15, 2019
NASA's MRO Completes 60,000 Trips Around Mars

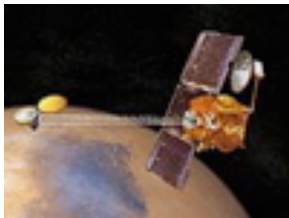
[Full Article & Images](#)

"NASA's Mars Reconnaissance Orbiter hit a dizzying milestone this morning: It completed 60,000 loops around the Red Planet at 10:39 a.m. PDT (1:39 p.m. EDT). On average, MRO takes 112 minutes to circle Mars, whipping around at about 2 miles per second (3.4 kilometers per second).

Since entering orbit on March 10, 2006, the spacecraft has been collecting daily science about the planet's surface and atmosphere, including detailed views with its High Resolution Imaging Science Experiment camera (HiRISE). HiRISE is powerful enough to see surface features the size of a dining room table from 186 miles (300 kilometers) above the surface."

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

May 9, 2019
Why This Martian Full Moon Looks Like Candy

[Full Article & Images](#)

"For the first time, NASA's Mars Odyssey orbiter has caught the Martian moon Phobos during a full moon phase. Each color in this new image represents a temperature range detected by Odyssey's infrared camera, which has been studying the Martian moon since September of 2017. Looking like a rainbow-colored jawbreaker, these latest observations could help scientists understand what materials make up Phobos, the larger of Mars' two moons."

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

June 5, 2019

InSight's Team Tries New Strategy to Help the 'Mole'

[Full Article & Images](#)

"Scientists and engineers have a new plan for getting NASA InSight's heat probe, also known as the "mole," digging again on Mars. Part of an instrument called the Heat Flow and Physical Properties Package (HP3), the mole is a self-hammering spike designed to dig as much as 16 feet (5 meters) below the surface and record temperature.

But the mole hasn't been able to dig deeper than about 12 inches (30 centimeters) below the Martian surface since Feb. 28, 2019. The device's support structure blocks the lander's cameras from viewing the mole, so the team plans to use InSight's robotic arm to lift the structure out of the way. Depending on what they see, the team might use InSight's robotic arm to help the mole further later this summer."

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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