IAAS Monthly Astronomy Newsletter
June 2021

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...

Mars crosses the stunning Beehive Cluster (M44) this month, just as it did in this 2010 image. TUNÇ TEZEL

The Month At-A-Glance

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

The Moon

Phases:

- Last Quarter Moon occurs on the 2nd.
- New Moon occurs on the 10th.
- First Quarter Moon occurs on the 17th.
- Full Moon occurs on the 24th.

- The Moon is at Apogee on the 7th, 252,418 miles from Earth.
- The Moon is at Perigee on the 25th, 223,666 miles from Earth.

Moon/Planet Pairs:

- The Moon passes 5° south of Jupiter on the 1st.
- Mars passes 5° south of Pollux on the 2nd.
- The Moon passes 4° south of Neptune on the 2nd.
- The Moon passes 2° south of Uranus on the 7th.
- The Moon passes 1.5° north of Venus on the 12th.
- The Moon passes 3° north of Mars on the 13th.
- Venus passes 5° south of Pollux on the 22nd.
- The Moon passes 4° south of Saturn on the 27th.
- The Moon passes 4° south of Jupiter on the 28th.
- The Moon passes 4° 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 "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 June

"An annular solar eclipse crosses parts of northern Ontario this month. Easier targets for observers include the wonderful spectacle of Mars crossing the Beehive star cluster, while Venus dazzles in the early evening sky. The solar system's two giant planets, Jupiter and Saturn, perform well in the early morning hours. Uranus and Neptune are fine binocular objects, both moving close to similarly bright stars this month. Lastly, Mercury attempts to show itself in the last few days of June, but it's low and difficult in bright twilight." Astronomy Magazine, June 2021, P. 32.

Mercury

Is in inferior conjunction on the 10th. Mercury is stationary on the 22nd. Mercury sets at 9:16 p.m. After the 10th, Mercury returns to the morning sky. Mercury rises about 4:24 a.m. by month's end. Look for Mercury to the east about 30 minutes before sunrise during the last week of the month. Mercury is in the constellation of Taurus shining at magnitude 1.0 on the 30th.

Venus

Sets at 9:46 p.m. on the 1st and about 10:08 p.m. by month's end. Look for Venus in the west soon after sunset. Venus passes west of open star cluster M35 within a half degree on the 3rd. Venus moves from the constellation of Taurus into Cancer shining at magnitude -3.9 on the 15th.

Earth

Summer solstice occurs at 11:32 p.m. EDT on the 20th.

Mars

Sets at 11:26 p.m. on the 1st and about 10:27 p.m. by month's end. Look for Mars to the west soon after sunset. Mars moves from the constellation of Gemini into Cancer shining at magnitude 1.8.

Jupiter
Rises at 1:12 a.m. on the 1st and about 11:12 p.m. by month's end. Jupiter is stationary on the 21st. Look for Jupiter in the south before sunrise. Jupiter is in the constellation of Aquarius shining at magnitude -2.5.

Saturn
Rises at 12:21 a.m. on the 1st and about 10:16 p.m. by month's end. Look for Saturn in the south before sunrise. Saturn is in the constellation of Capricornus shining at magnitude 0.5.

Uranus
Rises at 4:05 a.m. on the 1st and around 2:11 a.m. by month's end. Look to the east before sunrise to spot Uranus. Uranus is in the constellation of Aries shining at magnitude 5.9.

Neptune
Rises at 2:06 a.m. on the 1st and about 12:04 a.m. by month's end. Neptune is stationary on the 26th. Look to the southeast to spot Neptune in the constellation of Aquarius shining at magnitude 7.8.

Dwarf Planets
Ceres
Rises at 4:25 a.m. on the 1st and about 2:58 a.m. by month's end. Look to the east to spot Ceres before sunrise. Ceres moves from the constellation of Cetus into Aries shining at magnitude 9.2.

Pluto
Rises at 11:26 p.m. on the 1st and about 9:27 p.m. by month's end. Pluto is visible in the early morning and late evening. Pluto is in the constellation of Sagittarius shining at magnitude 15.0.

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

Astronomical Events

Meteor Showers

- The Arietids Meteor Shower - This is the strongest daylight meteor shower of the year. The duration extends from May 22 to July 2, with maximum activity occurring on June 8. The hourly rate is near 60 at maximum.

- The June Lyrids - This shower is active during June 10 to 21, producing predominantly blue and white meteors at a maximum hourly rate of 8 per hour on June 15. The average magnitude of this shower is near 3, while 32% of the meteors leave trains.

- The Zeta Perseids - This daylight shower occurs during May 20 to July 5. Maximum occurs on June 13. Radar surveys have revealed the activity of this shower to be near 40 per hour.

- The June Boötids - This shower is currently active during June 27 to July 5 and possesses a maximum of activity that falls on the 28th... The shower is notable in that its meteors are primarily faint, with an average magnitude near 5; however, bright meteors do occur regularly.

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 7P/Pons-Winnecke makes it's closest approach to Earth on the 12th. Comet Pons-Winnecke is passing between Jupiter and Saturn during the first week of June. Look for the comet in the constellation of Capricornus, through Aquarius into Piscis Austrinus shining at magnitude 11.5.

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

- **2021's first solar eclipse**
  "The new moon will sweep in front of the sun to create this year's first solar eclipse on Thursday, June 10. On that day, the moon in its elliptical orbit of Earth will lie too far from us to cover over the sun completely. So a bright annulus -- or ring -- will surround the new moon silhouette at mid-eclipse. It's the outer rim of the sun, not quite hidden from view. People have taken to calling these "ring of fire" eclipses. Essentially, they are partial eclipses, albeit very dramatic ones. As with any partial eclipse, you need eye protection to watch an annular eclipse. Watching with the unaided eye will cause eye damage." More info, timings and maps can be found at **Earthsky.org.**

- No lunar eclipse activity this month.

Observational Opportunities

(from evening to morning)

- Look for Venus and Mars in the evening.
- Look for Pluto, Saturn, Jupiter, Neptune and Uranus in the late evening and morning before sunrise.
- Look for the Eta Aquarids meteors during the first week of the month.
- Watch the annular solar eclipse on the 10th over parts of Ontario Canada, Greenland and Siberia.

Asteroids

(From west to east)

- **Vesta** is in the constellation of Leo.
- **Hebe** is in the constellation of Aquila.
- **Victoria** is in Aquarius.

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.

Jupiter/Saturn Conjunction December 21, 2020

Several images from the recent conjunction.
Courtesy of Milton Omoto and Ed Hubbs

Planetary/Lunar Exploration Missions

(Excerpts from recent mission updates)

JPL Latest News

The Latest from Space

JPL Latest News

May 25, 2021
Europa's Interior May Be Hot Enough to Fuel Seafloor Volcanoes

Full Article & Images

"New research and computer modeling show that volcanic activity may have occurred on the seafloor of Jupiter's moon Europa in the recent past -- and may still be happening. NASA's upcoming Europa Clipper mission, targeting a 2024 launch, will swoop close to the icy moon and collect measurements that may shed light on the recent findings.

Scientists have strong evidence that Europa harbors an enormous ocean between its icy crust and rocky interior. The new work shows how the moon may have enough internal heat to partially melt this rocky layer, a process that could feed volcanoes on the ocean floor. The recent 3D modeling of how this internal heat is produced and transferred is the most detailed and thorough examination yet of the effect this interior heating has on the moon."

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

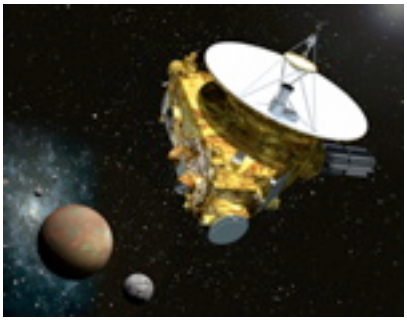
May 18, 2021
Juno Returns to "Clyde's Spot" on Jupiter

Full Article & Images

"During its 33rd low pass over the cloud tops of Jupiter on April 15, 2021, NASA's Juno spacecraft captured the intriguing evolution of a feature in the giant planet's atmosphere known as "Clyde's Spot."

The feature is informally named for amateur astronomer Clyde Foster of Centurion, South Africa, who discovered it in 2020 using his own 14-inch telescope. On June 2, 2020, just two days after Foster's initial discovery, Juno provided detailed observations of Clyde's Spot (upper image), which scientists determined was a plume of cloud material erupting above the top layers of the Jovian atmosphere just southeast of Jupiter's Great Red Spot, which is currently about 1.3 times as wide as Earth. These powerful convective outbreaks occasionally occur in this latitude band, known as the South Temperate Belt. The initial plume subsided quickly, and within a few weeks it was seen as a dark spot."

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

April 17, 2021
New Horizons at 50 (AU)

Full Article & Images

"On April 17, 2021, NASA's New Horizons reached a rare deep-space milepost -- 50 astronomical units from the Sun, or 50 times farther from the Sun than Earth is. New Horizons is just the fifth spacecraft to reach this great distance, following the legendary Voyagers 1 and 2 and Pioneers 10 and 11. It's almost 5 billion miles (7.5 billion kilometers) away; a remote region where a signal radioed from NASA's largest antennas on Earth, even traveling at the speed of light, needs seven hours to reach the far-flung spacecraft.

To celebrate reaching 50 AU, the New Horizons team compiled a list of 50 facts about this historic mission."

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

April 23, 2021
Neighboring Star's Bad Behavior: Large and Frequent Flares

Full Article & Images

"The star known as Proxima Centauri, the Sun's nearest interstellar neighbor, turns out to have a hair-trigger temper -- frequently erupting with potentially damaging stellar flares, including its largest ever recorded.

And these sizzling outbursts might be bad news for any potential lifeforms on the surface of a closely orbiting, probably rocky planet called Proxima b."

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

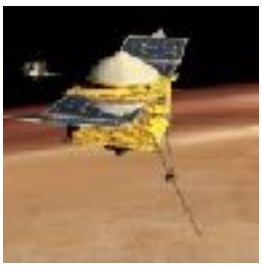
JMARS

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

March 9, 2021
Hope Probe captures new images of Mars with the Emirates Ultraviolet Spectrometer

Full Article & Images

"Key takeaways:

- March 9th marks one month since the Hope Probe successfully entered into orbit around Mars.
- The Emirates Ultraviolet Spectrometer (EMUS) took its first science images on February 20th, 2021, providing information on the composition of Mars' upper atmosphere.
- The orbiter, named 'Hope' (Al Amal in Arabic), and two of the three science instruments on board, Emirates eXploration Imager (EXI) and Emirates Mars Ultraviolet Spectrometer (EMUS) were developed at LASP in partnership with MBRSC engineers.
- The mission, the first interplanetary exploration undertaken by an Arab nation, will spend one Martian Year (about two Earth years) orbiting around the red planet gathering crucial scientific data on its atmosphere."

Visit LASP and MAVEN for more information.

Mars 2020 - Perseverance

May 25, 2021

Life Goals: NASA Software Unlocks Martian Rover Productivity

Full Article & Images

"Productivity pundits know lots of tricks to make the most of your day, so you can schedule enough time for important tasks while guarding against overload. Planning a day of work for a Martian rover puts a lot of the same strategies into practice.

When the Mars 2020 Perseverance's driving and science activities begin, dozens of mission personnel will start each planning session with a massive trove of new and exciting data and images from Mars. They have limited time to make sense of the data and create a plan for what the rover will do during the next Martian day. The pressure is on, because in order for the rover to download the plans, they need to send them before the next satellite passes above Perseverance."

Learn more about the Mars 2020 (Perseverance) mission.

Mars Science Laboratory - Curiosity

May 28, 2021

NASA's Curiosity Rover Captures Shining Clouds on Mars

Full Article & Images

"Cloudy days are rare in the thin, dry atmosphere of Mars. Clouds are typically found at the planet's equator in the coldest time of year, when Mars is the farthest from the Sun in its oval-shaped orbit. But one full Martian year ago -- two Earth years -- scientists noticed clouds forming over NASA's Curiosity rover earlier than expected.

This year, they were ready to start documenting these "early" clouds from the moment they first appeared in late January. What resulted are images of wispy puffs filled with ice crystals that scattered light from the setting Sun, some of them shimmering with color. More than just spectacular displays, such images help scientists understand how clouds form on Mars and why these recent ones are different."

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

February 8, 2021
Where Should Future Astronauts Land on Mars? Follow the Water

Full Article & Images

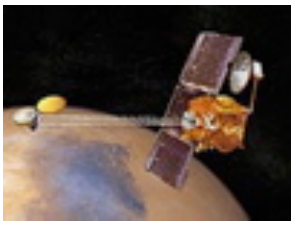
"*A new NASA paper provides the most detailed map to date of near-surface water ice on the Red Planet.*

So you want to build a Mars base. Where to start? Like any human settlement, it would be best located near accessible water. Not only will water be crucial for life-support supplies, it will be used for everything from agriculture to producing the rocket propellant astronauts will need to return to Earth.

Schlepping all that water to Mars would be costly and risky. That's why NASA has engaged scientists and engineers since 2015 to identify deposits of Martian water ice that could be within reach of astronauts on the planet's surface. But, of course, water has huge scientific value, too: If present-day microbial life can be found on Mars, it would likely be nearby these water sources as well."

MARS RECONNAISSANCE ORBITER HIRISE IMAGES

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



Mars Odyssey Orbiter

April 7, 2021
NASA's Odyssey Orbiter Marks 20 Historic Years of Mapping Mars

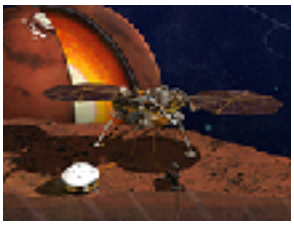
Full Article & Images

"NASA's 2001 Mars Odyssey spacecraft launched 20 years ago on April 7, making it the oldest spacecraft still working at the Red Planet. The orbiter, which takes its name from Arthur C. Clarke's classic sci-fi novel "2001: A Space Odyssey" (Clarke blessed its use before launch), was sent to map the composition of the Martian surface, providing a window to the past so scientists could piece together how the planet evolved."

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
April 1, 2021
NASA's InSight Detects Two Sizable Quakes on Mars

Full Article & Images

"NASA's InSight lander has detected two strong, clear quakes originating in a location of Mars called Cerberus Fossae -- the same place where two strong quakes were seen earlier in the mission. The new quakes have magnitudes of 3.3 and 3.1; the previous quakes were magnitude 3.6 and 3.5. InSight has recorded over 500 quakes to date, but because of their clear signals, these are four of the best quake records for probing the interior of the planet."

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!

73 from KI0AR
Created by Burness F. Ansell, III
ki0ar@ki0ar.com

COO, Director of Aerospace Technologies, IAAS
JPL Solar System Ambassador, Colorado
Last modified: June 01, 2021