IAAS Monthly Astronomy Newsletter December 2022

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, please join the Colorado Astronomy Net on the Rocky Mountain Radio League's **K1DUN** repeater on **449.450 MHz** or other repeaters connected to the SKYHUBLINK system. The net meets on Tuesday nights at 7 P.M. Mountain Time (MST-US) (Wednesday at 0200 GMT). Connecting to the SkyHubLink system will expand our coverage in the U.S., Canada and internationally. All Amateur radio operators worldwide are welcome. If anyone wishes to "listen" to the net, the RMRL provides a "Live Audio Feed" using Broadcastify.

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 by appointment only. Check the website for current information. All others interested in Amateur Radio, check out your local area for information in becoming an Amateur Radio operator.

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

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 for your support!

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

In This Newsletter...

"These detailed images of Mars during its 2020 opposition were created by stacking frames from one-minute videos." Astronomy Magazine, December 2022, P. 28.
Steve Fung

The Month At-A-Glance

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

The Moon

Phases:

- Full Moon occurs on the 7th.
- Last Quarter Moon occurs on the 16th.
- New Moon occurs on the 23rd.
- First Quarter Moon occurs on the 29th.

- The Moon is at apogee (252,195 miles from Earth) on the 11th.
- The Moon is at perigee (222,619 miles from Earth) on the 24th.

Moon/Planet Pairs:

- The Moon passes 3° south of Neptune on the 1st.
- The Moon passes 3° south of Jupiter on the 1st.
- The Moon passes 0.7° north of Uranus on the 5th.
- The Moon passes 0.5° north of Mars on the 7th.
- Mars passes 8° north of Aldebaran on the 21st.
- The Moon passes 3° south of Venus on the 24th.
- The Moon passes 4° south of Mercury on the 24th.
- The Moon passes 4° south of Saturn on the 26th.
- The Moon passes 3° south of Neptune on the 28th.
- Mercury passes 1.4° north of Venus on the 29th.
- The Moon passes 2° south of Jupiter on the 29th.

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.

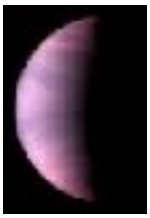
(All times are local unless otherwise noted.)

Planetary Highlights for December

"This month, all five naked-eye planets are visible in the evening sky soon after sunset. Mars grabs the most attention, reaching its most favorable Northern Hemisphere opposition in years. It's even occulted by a bright Full Moon for parts of the U.S. Mercury and Venus make a fine pair after sunset, low in the southwest. It's also your last chance to grab a good view of Saturn before it sets early in the evening. Jupiter dominates the southern sky after dark. And both Uranus and Neptune wander among fainter stars but are easy enough targets for binoculars or small scopes." Astronomy Magazine, December 2022, P. 28.

Mercury

Is at greatest eastern elongation (20°) on the 21st. Mercury is stationary on the 28th. Mercury sets at 5:15 p.m. on the 1st and about 5:45 p.m. by month's end. Look for Mercury low to the west about 30 minutes after sunset. Mercury moves from the constellation of Ophiuchus into Sagittarius shining at magnitude -0.6 on the 15th.



Venus

Sets at 5:11 p.m. on the 1st and about 6:05 p.m. by month's end. Look for Venus low to the west after sunset. Venus moves from the constellation of Ophiuchus into Sagittarius shining at magnitude -3.9 on the 15th.

Earth

Winter solstice occurs at 4:48 P.M. EST on the 21st.

Mars

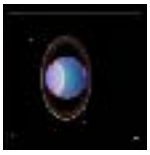
Is opposition on the 8th, rising as the Sun sets. Mars rises at 4:51 p.m. on the 1st and about 2:09 p.m. by month's end. Look for Mars in the evening soon after the Sun sets. Mars is at its best viewing this month and is closer to the Earth than it has been in years. Mars is in the

constellation of Taurus shining at magnitude -1.8 on the 15th.

Jupiter
Sets at 1:15 a.m. on the 1st and about 11:21 p.m. by month's end. Look for Jupiter in the south soon after sunset. Jupiter is still well positioned for early evening viewing. Jupiter is in the constellation of Pisces shining at magnitude -2.5.

Saturn

Sets at 9:55 p.m. on the 1st and about 8:06 p.m. by month's end. Look for Saturn to the southwest soon after sunset early in the evening. Saturn is in the constellation of Capricornus shining at magnitude 0.7.



Uranus

Sets at 5:13 a.m. on the 1st and about 3:06 a.m. by month's end. Uranus is still near its best viewing in December. Uranus is highest in the southern sky around local midnight. Uranus is in the constellation of Aries shining at magnitude 5.7.

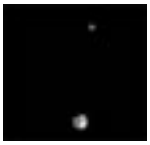
Neptune

Is stationary on the 4th. Neptune sets at 12:44 a.m. on the 1st and about 10:39 p.m. by month's end. Look to the southwest once the skies darken to spot Neptune. Neptune is in the constellation of Aquarius shining at magnitude 7.8.

Dwarf Planets

Ceres

Rises at 12:36 a.m. on the 1st and about 11:09 p.m. by month's end. Look for Ceres to the southeast in the early morning before sunrise. Ceres moves from the constellation of Leo into Virgo shining at magnitude 8.5.



Pluto

Sets at 7:53 p.m. on the 1st and about 5:55 p.m. by month's end. Look for Pluto to the west-southwest once the skies are very dark. Pluto is in the constellation of Sagittarius shining at magnitude 15.2.

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

Astronomical Events

Meteor Showers

- The 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 C/2022 E3 (ZTF) is passing through the northern sky, just below Polaris, the North Star, this month. This comet has brightened to 8th or 9th magnitude. Comet C/2022 E3 starts this

month in the constellation of Draco, passing through Camelopardalis into Cepheus by month's end. The best time to view the comet is before dawn when it is highest in the northern sky.

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

- No solar eclipse activity this month.

- No lunar eclipse activity this month.

Observational Opportunities

(from evening to morning)

- Look for Mars, Uranus, Jupiter, Neptune, Saturn, Venus and Mercury in the evening.
- Watch the Geminid meteor shower which peaks on the 13/14th.

Asteroids

(From west to east)

- **Vesta** is in the constellation of Aquarius.
- **Juno** is in the constellation of Aquarius.
- **Euterpe** is in the constellation of Aries.
- **Bamberga** is in the constellation of Perseus.
- **Pallas** is in the constellation of Canis Major.
- **Hebe** is in the constellation of Hydra (near the head).

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.

The Full Moon occults Mars on the 8th over Europe, Greenland and most of North America.

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
3871-2015	2015-11-13 01:55 MST	CO	Charles N	3871a
3587-2015	2015-11-22 17:38 MST	CO	Kevin S	3587aw
3829-2015	2015-12-05 18:06 MST	CO	Burness A	3829a
986-2020	2020-02-21 22:20 MST	CO	Lukas S	986
3716-2020	2020-07-24 23:22 MDT	CO	Lukas S	3716
4774-2021	2021-08-13 21:57 MDT	UT	Lukas S	4774
7044-2021	2021-10-28 20:37 MDT	CO	Burness A	249058
6763-2022	2022-10-06 05:56 CDT	OK	Mike C	6763

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.

StarLink Train (G4-3)
STARLINK-3200 and others

December 03, 2021

Courtesy of Burness Ansell

Taken with iPhone X @ 6:43 P.M. MST

Traveling from WSW to E passing close to the bright star Altair in Aquila.

Planetary/Lunar Exploration Missions

(Excerpts from recent mission updates)

JPL Latest News

The Latest from Space

The Origin of JPL (a Youtube video-1 Hour 29 minutes).

JPL Latest News

November 23, 2022
NASA's Europa Clipper Gets Its Wheels for Traveling in Deep Space

Full Article & Images

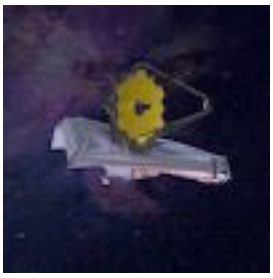
"The enormous spacecraft that will head to Jupiter's moon Europa uses four large reaction wheels to help keep it oriented.

Just as NASA's Mars rovers rely on robust wheels to roam the Red Planet and conduct science, some orbiters rely on wheels, too – in this case, reaction wheels – to stay pointed in the right direction. Engineers and technicians at NASA's Jet Propulsion Laboratory in Southern California recently installed four reaction wheels on Europa Clipper, which will rely on them during its journey at Jupiter's icy moon Europa."

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.



James Webb Space Telescope

November 22, 2022
NASA's Webb Reveals an Exoplanet Atmosphere as Never Seen Before

Full Article & Images

"NASA's James Webb Space Telescope just scored another first: a molecular and chemical profile of a distant world's skies.

While Webb and other space telescopes, including NASA's Hubble and Spitzer, previously have revealed isolated ingredients of this broiling planet's atmosphere, the

new readings from Webb provide a full menu of atoms, molecules, and even signs of active chemistry and clouds.

The latest data also gives a hint of how these clouds might look up close: broken up rather than a single, uniform blanket over the planet.

The telescope's array of highly sensitive instruments was trained on the atmosphere of WASP-39 b, a "hot Saturn" (a planet about as massive as Saturn but in an orbit tighter than Mercury) orbiting a star some 700 light-years away.

The findings bode well for the capability of Webb's instruments to conduct the broad range of investigations of all types of exoplanets – planets around other stars – hoped for by the science community. That includes probing the atmospheres of smaller, rocky planets like those in the TRAPPIST-1 system."

More information on the James Webb Space Telescope mission is available at The James Webb Space Telescope website.
The public can follow the mission on Facebook, Twitter and YouTube.

Juno

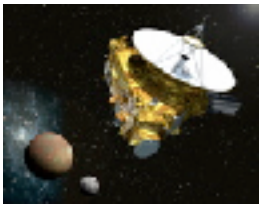
October 6, 2022
Citizen Scientists Enhance New Europa Images From NASA's Juno

Full Article & Images

"*Science enthusiasts have processed the new JunoCam images of Jupiter's icy moon, with results that are out of this world.*

Citizen scientists have provided unique perspectives of the recent close flyby of Jupiter's icy moon Europa by NASA's Juno spacecraft. By processing raw images from JunoCam, the spacecraft's public-engagement camera, members of the general public have created deep-space portraits of the Jovian moon that are not only awe-inspiring, but also worthy of further scientific scrutiny."

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 14, 2022
New Horizons 'MOM' Lauded for STEM Leadership

Full Article & Images

"Alice Bowman recalls seeking out a campus television to watch the

first space shuttle launch in 1981 and, a few years later, making the few-hour trek from her Pasadena apartment to Edwards Air Force Base to see a shuttle landing. She also remembers the "horrible and unfathomable" experience of watching Challenger break apart minutes after launch in 1986.

That fascination with space inspired an impressive career in space science, and recently, Bowman, from the Johns Hopkins Applied Physics Laboratory (APL), was honored by the Society of Women Engineers (SWE) with the 2022 Resnik Challenger Medal. Founded in memory of Judith Resnik, who died in the Challenger disaster, the medal is one of SWE's most prestigious honors, awarded only as merited for visionary contributions to space programs."

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 20, 2022
'Marshmallow' World Orbiting a Cool Red Dwarf Star

Full Article & Images

"Kitt Peak National Observatory telescope helps determines that Jupiter-like Planet is lowest-density gas giant ever detected around a red dwarf.

Astronomers using the WIYN 3.5-meter Telescope at Kitt Peak National Observatory in Arizona, a Program of NSF's NOIRLab, have observed an unusual Jupiter-like planet in orbit around a cool red dwarf star. Located approximately 580 light-years from Earth in the constellation of Auriga the Charioteer, this planet, identified as TOI-3757 b, is the lowest-density planet ever detected around a red dwarf star and is estimated to have an average density akin to that of a marshmallow."

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 out the "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.

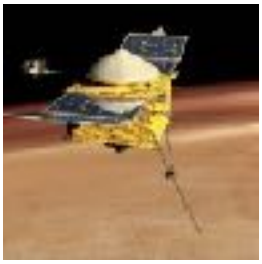
LASP is an affiliate of CU-Boulder AeroSpace Ventures, a collaboration among aerospace-related departments, institutes, centers, government labs, and industry partners."

LASP
November 9, 2022

LASP's Peter Pilewskie named to prominent National Academies committee for space-based research

Full Article & Images

"Peter Pilewskie, a senior researcher at the Laboratory for Atmospheric and Space Physics (LASP) at the University of Colorado Boulder, has been named to the National Academies of Sciences, Engineering, and Medicine's Committee on Earth Sciences and Applications from Space (CESAS). This prominent committee supports scientific progress in Earth system science and applications, with an emphasis on research requiring global data that are best acquired from space."



MAVEN
November 10, 2022
NASA's MAVEN observes Martian light show caused by major solar storm

Full Article & Images

"For the first time in its eight years orbiting Mars, NASA's MAVEN mission witnessed two different types of ultraviolet aurorae simultaneously, the result of solar storms that began on Aug. 27.

MAVEN – the Mars Atmosphere and Volatile Evolution mission – is the only asset at Mars able to observe the Sun's activity and the response of the thin Martian atmosphere at the same time. Real-time analysis and simulations of the solar eruptions from NASA's Moon to Mars Space Weather Analysis Office also allowed the MAVEN team to correctly predict when the developing solar storm would reach the Red Planet.

Accurate space weather forecasting is critical to help protect current missions and future human explorers at the Red Planet because unlike Earth, Mars lacks a global magnetic field to shield against the damaging radiation solar storms can bring."

Visit LASP and MAVEN for more information.

Mars 2020 - Perseverance

November 17, 2022
NASA's Perseverance Rover Investigates Intriguing Martian Bedrock

Full Article & Images

"*Exploring a sediment-rich location in this Mars delta offers tantalizing opportunities for the six-wheeler's science team.*

NASA's Perseverance Mars rover has begun exploring an area the science team calls "Yori Pass" near the base of Jezero Crater's ancient river delta. They've been eager to explore the region for several months after spotting a rock similar to one Perseverance collected samples from in July.

The feature is so tantalizing to the scientists because it is sandstone, which is composed of fine grains that have been carried from elsewhere by water before settling and forming stone. Perseverance's samples are central to the first step in the NASA-ESA (European Space Agency) Mars Sample Return campaign, which began when the rover cached its first cored rock in September 2021."

Learn more about the Mars 2020 (Perseverance) mission.

Mars Science Laboratory - Curiosity

October 19, 2022
Curiosity Mars Rover Reaches Long-Awaited Salty Region

Full Article & Images

"*The rover has arrived at a special region believed to have formed as Mars' climate was drying.*

Ten years ago today, a jetpack lowered NASA's Curiosity rover onto the Red Planet, beginning the SUV-size explorer's pursuit of evidence that, billions of years ago, Mars had the conditions needed to support microscopic life.

After journeying this summer through a narrow, sand-lined pass, NASA's Curiosity Mars rover recently arrived in the "sulfate-bearing unit," a long-sought region of Mount Sharp enriched with salty minerals.

Scientists hypothesize that billions of years ago, streams, and ponds left behind the minerals as the water dried up. Assuming the hypothesis is correct, these minerals offer tantalizing clues as to how – and why – the Red Planet's climate changed from being more Earth-like to the frozen desert it is today."

Check out information about NASA's partnership with Foursquare.
Visit the Mars Science Laboratory page.

Mars Reconnaissance Orbiter Mission

June 28, 2022
Help NASA Scientists Find Clouds on Mars

Full Article & Images

"*By identifying clouds in data collected by NASA's Mars Reconnaissance Orbiter, the public can increase scientists' understanding of the Red Planet's atmosphere.*

NASA scientists hope to solve a fundamental mystery about Mars' atmosphere, and you can help. They've organized a project called Cloudspotting on Mars that invites the public to identify Martian clouds using the citizen science platform Zooniverse. The information may help researchers figure out why the planet's atmosphere is just 1% as dense as Earth's even though ample evidence suggests the planet used to have a much thicker atmosphere.

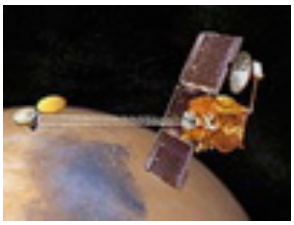
The air pressure is so low that liquid water simply vaporizes from the planet's surface into the atmosphere. But billions of years ago, lakes and rivers covered Mars, suggesting the atmosphere must have been thicker then.

How did Mars lose its atmosphere over time? One theory suggests different mechanisms could be lofting water high into the atmosphere, where solar radiation breaks those water molecules down into hydrogen and oxygen (water is made of two hydrogen atoms and one oxygen atom). Hydrogen is light enough that it could then drift off into space."

MARS RECONNAISSANCE ORBITER HIRISE IMAGES

View all of the archived HiRISE images.

More information about the MRO mission is available online.



Mars Odyssey Orbiter

May 5, 2022
Science at Sunrise: Solving the Mystery of Frost Hiding on Mars

Full Article & Images

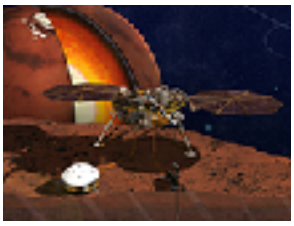
"*A new study using data from NASA's Mars Odyssey orbiter may explain why Martian frost can be invisible to the naked eye and why dust avalanches appear on some slopes.*

Scientists were baffled last year when studying images of the Martian surface taken at dawn by NASA's Mars Odyssey orbiter. When they looked at the surface using visible light – the kind that the human eye perceives – they could see ghostly, blue-white morning frost illuminated by the rising Sun. But using the orbiter's heat-sensitive camera, the frost appeared more widely, including in areas where none was visible."

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
November 1, 2022
NASA Prepares to Say 'Farewell' to InSight Spacecraft

Full Article & Images

"*A closer look at what goes into wrapping up the mission as the spacecraft's power supply continues to dwindle.*

The day is approaching when NASA's Mars InSight lander will fall silent, ending its history-making mission to reveal secrets of the Red Planet's interior. The spacecraft's power generation continues to decline as windblown dust on its solar panels thickens, so the team has taken steps to continue as long as possible with what power remains. The end is expected to come in the next few weeks."

November 30, 2022
NASA InSight's Power Level as of Nov. 27, 2022

As of Nov. 27, 2022, InSight is generating an average between 285 and 295 watt-hours of energy per Martian day, or sol. The tau, or level of dust cover in the atmosphere, was estimated at .95 (typical tau levels outside of dust season range from 0.6-0.7).

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!

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JPL Solar System Ambassador, Colorado
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