The Prairie Astronomer

December 2024 Volume 65, Issue #12

IN THIS ISSUE:

The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

The next club meeting is FRIDAY January 24th at 7:00pm - AT BRANCHED OAK OBSERVATORY

NEXT MEETING AND PROGRAM

January: How to Use Your Telescope

The Prairie Astronomy Club will offer its annual free session: "How to Use Your Telescope" Friday evening January 24th at 7:00 p.m at Branched Oak Observatory. Do you own a telescope and need help getting started using it? The Prairie Astronomy Club would like to help. If you own a telescope and need some hands-on assistance, or are just interested and want to learn more, stop by for this free session.

IMPORTANT NOTE: Due to the temporary closure of Hyde Observatory for renovation, the January and February meetings will be held at another location - to be announced.

UPCOMING PROGRAMS

To be announced.

Cover: The Horsehead Nebula - by Russ Genzmer

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Background photo: Brett Boller

CALENDAR

January PAC Meeting
Friday, January 24th, 7pm
Branched Oak Observatory
How to Use Your Telescope

February PAC Meeting
Tuesday, February 25th, 7:30pm
Branched Oak Observatory

Most of our club meetings are held at Hyde Memorial Observatory in Holmes Park.

The Observatory is owned and maintained by the City of Lincoln Parks and Recreation Department, but is operated by volunteers, many of whom are also members of the Prairie Astronomy Club.

https://www.prairieastronomyclub.org/event-calendar/

Night Sky Network

www.prairieastronomyclub.org

2025 STAR PARTY DATES

	Date	Date
January	24	**31**
February	21	**28**
March	21	**28**
April	3/18	**25**
May	16	**23**
June	20	**27**
July	18	**25**
NSP	7/20	7/25
August	15	**22**
September	**19**	26
October	17	**24**
November	14	**21**
December	12	**19**

Dates in BOLD are closest to the New Moon.

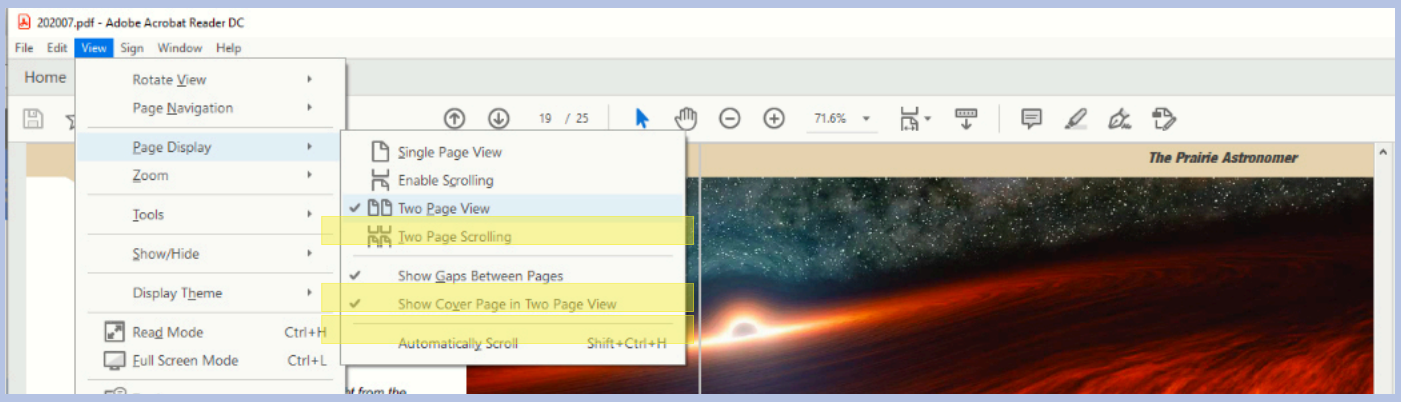
CLUB OFFICERS

President	Jason O'Flaherty jflaher@gmail.com
Vice President	Brett Boller proboller86@yahoo.com
2nd VP (Program Chair)	Lee Taylor otaylor88@gmail.com
Secretary	Jim White jrwhite2188@gmail.com
Treasurer	John Reinert jr6@aol.com
Club Observing Chair	Jim Kvasnicka jim.kvasnicka@yahoo.com
Outreach Coordinator	Don Hain dhain00@gmail.com
Website and Newsletter Editor	Mark Dahmke mark@dahmke.com

Notices

Newsletter Page View Format

How to Adjust Adobe Acrobat Settings for Two Page View



To view this newsletter in magazine spread format in Acrobat, select View ->Page Display->Two Page View. Acrobat will then show two pages side by side. Also make sure the checkboxes "Show Cover Page in Two Page View" and "Show Gaps Between Pages" are checked. If you have it setup correctly, the cover page will be displayed by itself and subsequent pages will be side by side with the odd numbered pages on the left.

PAC Newsletter Archive

Back issues of the Prairie Astronomer from 1962 to present are available online: https://newsletters.prairieastronomyclub.org/

Pay Dues Online

https://www.prairieastronomyclub.org/dues/

If you're already a member and are renewing within 30 days of your anniversary date, select the early renewal option for a discount.

PAC-LIST

Subscribe through GoogleGroups or contact Mark Dahmke to be added to the list. You'll need a Google/gmail account, but if you want to use a different email address, just associate that address with your google account to access Google Groups. Once subscribed, you can view message history through the GoogleGroups website.

To post messages to the list, send to this address: pac-list@googlegroups.com

The President's Message

Jason O'Flaherty

A Year in Review for the Prairie Astronomy Club

2024 has been an exciting and productive year for the Prairie Astronomy Club, marked by engaging events, inspiring presentations, and memorable moments of camaraderie.

We kicked off the year with the "How to Use Your Telescope" class in January, a hands-on event that welcomed telescope owners from the community to learn and connect. This spirit of outreach and education continued throughout the year, with club members volunteering at events like Camp Mourning Hope, the Branched Oak Observatory's Fall Star-B-Q, and Spring Creek Prairie's Hoot 'n' Howl. These efforts embody the club's mission to share the wonders of astronomy with others.

Our meetings featured an incredible lineup of speakers and topics. Highlights included Jack Dunn's talk on advancements in automated imaging telescopes in February, Michael Sibbernsen's solar eclipse preparation session at Branched Oak Observatory in March, Jim Kvasnicka's presentation on observing programs in May, Ilya Kravchenko's fascinating presentation on detecting ultra-high energy neutrinos at the South Pole in September, and Frank O'Brien's insights into the Apollo Guidance Computers that powered the Lunar Program in October. These programs inspired curiosity and deepened our understanding of the cosmos.

2024 also gave us unforgettable celestial events. The April total solar eclipse brought members and the public together at observatories and events across the state. The Aurora Borealis treated us to breathtaking displays in both May and October, with exceptionally vivid views across Nebraska. In October, Comet C/2023 A3 graced the night skies, offering stunning views for observers. Astrophotography continued to thrive within the club, with members sharing remarkable images in the newsletter. From capturing stunning details of celestial objects to documenting events like the eclipse and auroras, these contributions showcased the talent and dedication of our members.

In addition to outreach and observing, the club achieved several administrative milestones. The bylaws were updated after a year-long process, ensuring our structure aligns with the needs of our membership. Thanks to Mark Dahmke's efforts, our website also received a modern refresh. The year wrapped up with the "How to Buy a Telescope" class in

November, led by Dave Knisely, and our annual holiday party in December saw several dozen of us get together for good food and conversation. Both events provided opportunities to connect and celebrate as a community.

As we look ahead to 2025, details for the "How to Use Your Telescope" class in January are still being finalized. Due to anticipated construction at Hyde, we are exploring alternative locations. Please watch your email or check the PAC website and Facebook page for updates as they become available.

Wishing everyone a warm and joyful holiday season and a happy start to the new year. I look forward to seeing you all in 2025 as we continue to explore and share the wonders of the night sky.

Jason O'Flaherty

Meeting Minutes

Jim White

11/26/2024

Tonight's meeting is going to be short to allow extra time for this month's program "How to Buy a Telescope." Jason O'Flaherty is out of town this week so tonight's meeting will be presented by Jim Kvasnicka, PAC's Observing Chairperson. Jim started the meeting at 7:32 PM with his monthly observing report. This month's star parties will be on Friday December 20th and 27th at the Clatonia Recreation Area, approximately 1 ½ miles north of Clatonia. The Geminid's Meteor shower will peak the nights of December 13th and 14th but there will be an almost full moon which could interfere with viewing. Jim's complete observing report can be found in this newsletter. Jim ended the club meeting at 7:36 PM and turned things over to Dave Knisely for tonight's program on "How to Buy a Telescope."

A large turnout of PAC members for our annual Holiday Gathering at Big Red Restaurant & Sports Bar, on December 17th

Hyde Observatory Needs You!

Volunteer at Hyde

Our crew of unpaid volunteers share an interest in Astronomy and they enjoy passing on that interest to the public.

- You don't need to be an expert in astronomy or telescopes. **We'll teach you what you need to know.**

- Volunteers start as telescope operators on the observing deck, which involves keeping one of the three telescopes focused on the sky objects we are showing and explaining them to our visitors. Experienced volunteers can become Deck Leaders who determine what objects to train the telescopes on, and answer the really difficult questions.

For more information, visit our website

ARP 74

The Mantrap Skies Image Catalog

Arp 74/UGC 01626 is a pair of galaxies not far from Gamma Andromeda. Arp put it in his class for spirals with high surface brightness companions on their arm. Red-shift puts it about 240 thousands of light-years away. There is no redshift data that I could find for its companion Arp 074B. A note at NED reads: "Companion 0.75, 169, 0.20 x 0.15, interaction. The arms appear to join close to the companion." This dates back to a 1973 paper. I don't see the interaction they mention. The fact the two arms happen to appear to meet near the position of the other galaxy seems immaterial as to decide if they are interacting or not. Arp 074B doesn't appear distorted. If interacting the smaller galaxy should show more distortion than the larger yet shows no sign of any distortion. There's no redshift data on the little galaxy to help me decide if they are related or not. For now, I'm saying they aren't related.

Arp 74 is classed by NED as SAB(rs)c. While the arms

Rick Johnson

Rick Johnson, a founding member of the Prairie Astronomy Club, passed away in January, 2019. His legacy lives on through his comprehensive catalog of over 1600 images at www.mantrapskies.com.

ARP74, continued

are obviously very different they don't earn it a peculiar designation. Unequal arms are rather common in fact. No interaction appears necessary either for the shape nor the high star formation rate these often have. Arp 074 is classed as IrS. Arp's comment on this one reads: "Broad, diffuse extension of arm leads to companion." Rather different from NED's note the arms appearing to join at the companion. Is Arp hinting that the arm leads to the other because they are related? I think he considered it a possibility that needed further investigation. That still hasn't happened it seems. Most likely Arp 74B is a distant background galaxy. The main galaxy appears to have little to no dust in its outer arms to dim a distant galaxy making it impossible to tell if it lies behind or not. There is little on the rest of the field. There is a spiral at the bottom of my frame that seems as distorted as Arp 74 but didn't make his list. It is UGC 1615. It is classed as SB(s)dm: at NED. There's no distance estimate for it or any other galaxy in the field.

Hyde Observatory Closed For Renovation in January/February

Hyde Observatory will be closed to the public in January and February for renovation work on the classroom. The volunteer schedule for Saturday nights is suspended for that period. We plan to offer training refreshers for volunteers during the down time; volunteers will receive emails early in January about these sessions.

The Major Lunistice of 2024-2025

Larry Stepp

Did you notice how far north the December full Moon was? It was almost 5 degrees further north than the Sun ever reaches, reaching more than 28 degrees north of the celestial equator. We are in the midst of a major lunistice, also called a major lunar standstill, which is when the Moon's declination reaches its largest northern and southern values. Major lunar standstills only occur at intervals of 18.6 years.

So, what is a "lunar standstill" and what causes it? As you know, the Earth's rotation axis is tilted relative to the plane of its orbital motion, which we call the ecliptic. The angle between the plane of the Earth's equator and the ecliptic plane is about 23.4 degrees. This is of course why we have seasons. As the Earth goes around the Sun, the Sun appears to move north and south relative to the celestial equator, as the north pole tilts toward the Sun in northern hemisphere summer, and on the other side of the orbit tilts away from the Sun in northern winter. The Sun reaches 23.4 degrees north declination in the summer, and 23.4 degrees south declination in the winter.

In the spring the Sun appears to be moving northward in the sky, until on or around the 21st of June the northward motion stops, and it subsequently begins to move back southward. We call this time, when the declination motion stops, the "solstice", a word that comes from the Latin words sol, meaning our Sun, and sistere, meaning "to stand still." Of course, we also have a winter solstice each year around December 21, when the Sun stops moving south and starts to move back north.

The analogous time when the Moon seems to reverse its north-south motion is a "lunistice," from the Latin luna, meaning our Moon, and sistere, again meaning "to stand still." There are two lunistices every lunar month, or every 27.3 days. If the Moon's orbital plane was the same as the ecliptic, the Moon would also reach 23.4 degrees north and south each lunar month. But the Moon's orbital plane is actually tilted about 5.1 degrees relative to the ecliptic.

As you know, the north pole of the Earth is near Polaris in the sky – Polaris is currently within 44 arc minutes of the pole. The north pole of the ecliptic is in Draco, at Right Ascension (RA) 18h 0m 0s, Declination 66° 33m 39s N. If you subtract the north ecliptic pole (NEP) declination from 90° you get 23° 26m, which is the relative tilt of the Earth's axis. Makes sense, right? (By the way, the Cat's Eye Nebula is within 7 arc minutes of the position of the NEP.)

The north pole of the Moon's orbital motion is about 5.1 degrees away from the NEP. But it isn't stationary in the sky. The gravitational pull of the Sun and Earth causes the Moon's orbital tilt to precess, so the lunar orbit north pole (LONP) traces a circle around the NEP, with an average

Major Lunistice, continued

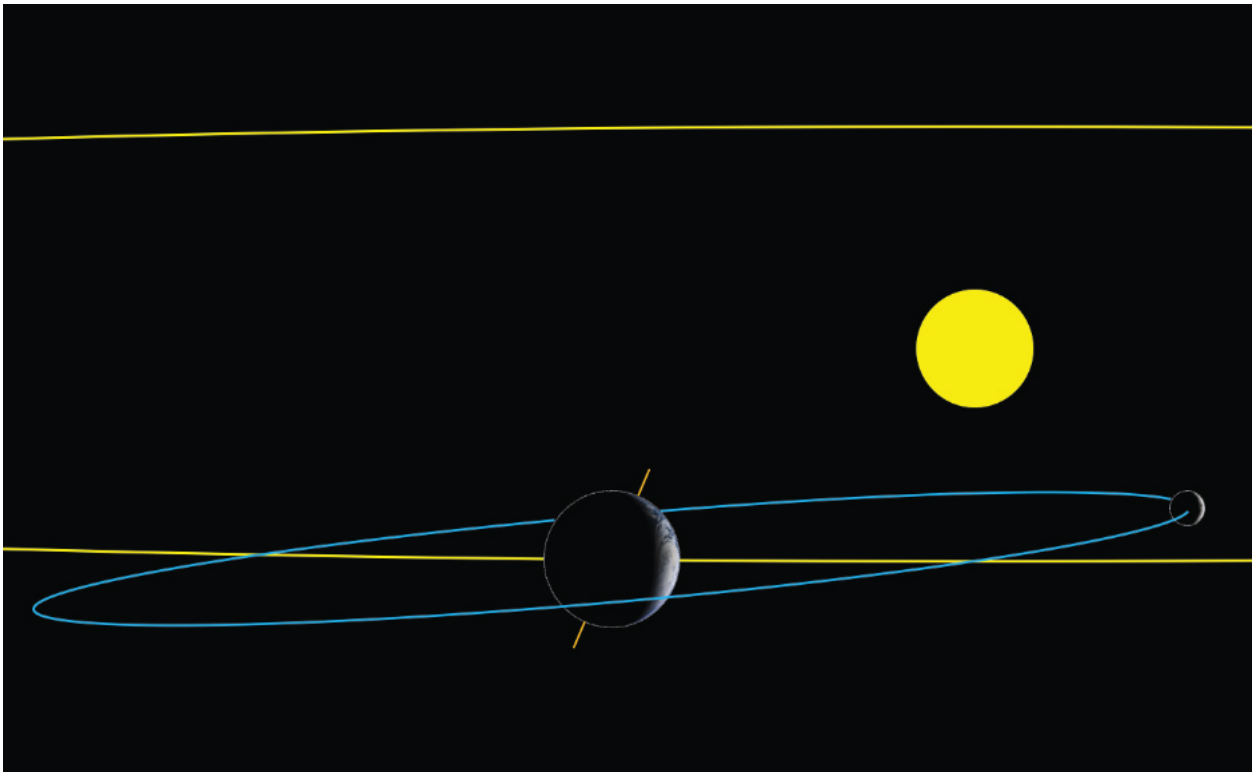
radius of 5.14 degrees. It takes 18.6 years for the wobble of the Moon's orbit to bring the LONP back to the same place in the sky.

When the LONP is at its furthest from our north pole (i.e., lowest declination) the Moon's apparent motion in declination is most extreme, with the Moon reaching about 28.7 degrees plus and minus declination in a month. This is called a major lunistice, as compared to an ordinary lunistice that happens every month. It happens when the position of the LONP is at a RA of 18h.

After 9.3 years, when the LONP moves around to the side closest to our north pole (highest declination) the Moon's apparent motion in declination is least extreme, only reaching 18.3 degrees north and south declination in a month. That is called a minor lunistice or a minor lunar standstill. This also happens when the LONP is at a RA of 18h.

The name lunar standstill was originated by author Alexander Thom in his 1971 book Megalithic Lunar Observatories, and now articles most often speak of a major or minor lunar standstill rather than lunistice.

The reason megalithic lunar observatories are



The Moon's orbit is tilted ~ 5.1 degrees from the plane of the ecliptic

Major Lunistice, continued

involved is because ancient peoples watched the sky to time the passing of the seasons, etc. Archeological sites in several locations appear to have alignments that mark the point on the horizon of the rising or setting of the Moon at major lunar standstill. Which means, of course, that those people carefully observed the Moon rising and setting over periods longer than 18.6 years. Sites where these alignments have been found include Stonehenge, Chaco Canyon in New Mexico and Chimney Rock in Colorado.

The time when the Moon is furthest north or south can be at different lunar phases, depending on the season. New Moon will always be close to the Sun, so will be north in summer and south in winter. Full Moon is the opposite, south of the celestial equator in summer, and north in winter. First quarter Moon will be in the north in the spring, and last quarter Moon will be in the north in the fall.

The full Moon this month, on December 15, was close to the winter solstice, therefore it was far north. And since we are at a major lunar standstill, the full Moon was very far north this month.

There is another twist to this lunar standstill business, though. The tilt of the Moon's orbit has a periodic component, increasing and decreasing slightly twice per year. The gravitational pull of the Sun causes the orbit to tilt about 0.135 degrees more when the Sun is aligned with the nodes of the lunar orbit, those points where the lunar orbital plane crosses the ecliptic plane. With respect to the LONP, the circle it follows around the NEP is not merely a circle, it's a wiggly circle.

At a lunar standstill, these node alignments happen near the vernal and autumnal equinoxes. Therefore, although the peak of this lunar standstill is in mid January 2025 (i.e., that is when the LONP will be at RA 18h) the most extreme lunar positions were/are last September and next March, when respectively the last quarter and first quarter Moons were/will be 28.7 degrees north and south. By the way, these declination angles are calculated relative to the Earth's center, and the angle you actually see in the sky depends somewhat on your latitude, varying up to +/- 0.95 degrees.

If you'd like to read more about lunar standstills, there are several websites with good articles, including the following:

https://en.wikipedia.org/wiki/Lunar_standstill

https://www.smithsonianmag.com/smart-news/a-major-lunar-standstill-is-happening-this-year-and-fridays-full-moon-offers-dramatic-view-180984568/

https://www.space.com/1st-lunar-standstill-in-18-years-about-to-occur-how-to-see-it

January Observing

Jim Kvasnicka

This is a partial list of objects visible for the upcoming month.

Planets

Venus: Evening planet at magnitude -4.6.

Mercury: Low in the dawn twilight, not visible after January 9th.

Mars: Reaches opposition on January 16th, occulted by the Moon on January 13th.

Jupiter: In Taurus at magnitude -2.7 with a disk 47" wide.

Saturn: Close to Venus on January 17th, magnitude +1.1 with a disk 16.6" wide.

Uranus and Neptune: Uranus in Aries, Neptune in Pisces.

Meteor Showers

Quadrantids: January 2-3, peaks on January 3rd at 9:00 am. The Moon will not interfere. This is a short duration shower known for bright fireballs.

Messier List

M33: The Pinwheel Galaxy in Triangulum.

M34: Open cluster in Perseus.

M52: Open cluster in Cassiopeia.

M74: Galaxy in Pisces.

M76: The Little Dumbbell in Perseus.

M77: Galaxy in Cetus.

M103: Open cluster in Cassiopeia.

Last Month: M2, M15, M29, M31, M32, M39, M110

Next Month: M1, M35, M36, M37, M38, M42, M43, M45, M78, M79

NGC and other Deep Sky Objects

NGC 1406: Galaxy in Fornax.

NGC 1425: Galaxy in Fornax.

NGC 1857: Open cluster in Auriga.

NGC 1907: Open cluster in Auriga.

NGC 1980: Emission nebula and open cluster in Orion just south of M42.

NGC 2169: The "37" Cluster in Orion.

Double Star Program List

Beta Orionis: Rigel, bright white and dim blue stars.

Delta Orionis: Mintaka, white and blue pair.

Struve 747: White pair of stars.

Lambda Orionis: White stars.

Theta 1 Orionis: The Trapezium.

Iota Orionis: White primary with a blue secondary.

Theta 2 Orionis: Three white stars.

Sigma Orionis: White primary with three pale blue stars.

Zeta Orionis: Bright white primary with two white secondary stars.

Challenge Object

B33: The Horsehead Nebula in Orion. Use a Hydrogen-Beta filter.

Focus on Observing Programs

Jim Kvasnicka

Arp Peculiar Galaxy (Northern) Observing Program

The Arp Peculiar Galaxy Observing Program is based on the 338 objects in the Arp Catalog of Peculiar Galaxies. This program was developed for advanced amateurs and it may not be suited for beginners. A majority of the 338 galaxies fall in the 12th to 18th magnitude range. However there are over 100 Arp objects below magnitude 13.5.

This is an advanced observing program for large telescopes, it is recommended that you use a telescope with an aperture of 12.5 inches or larger, and observe from dark sky sites. This observing program will challenge even the most serious amateur astronomer.

To qualify for the Arp Peculiar Galaxy (Northern) Observing Program certificate and pin you must observe or image 100 of the 338 Arp galaxies. You may select any 100 objects from the list.

Some of the Arp objects are multiple galaxies and only the brightest member of the group needs to be observed or imaged. For locating the Arp galaxies a good star atlas is recommended such as the "Uranometria 2000."

You can use your own observing logs to record your observations. Your observations should include: object name, date and time, power, seeing, telescope used, latitude and longitude, and your observing notes.

Once you complete the Arp Peculiar Galaxy (Northern) Observing Program you will need to submit your observing logs to me for review. I will contact the Arp Peculiar Galaxy (Northern) Observing Program chair for approval. Once I receive your certificate and pin I will present them to you at the next PAC meeting.

Sombrero Galaxy (M104) Dazzles in New JWST Infrared Image (MIRI)
Credit: NASA, ESA, CSA, STScI

Outreach Calendar

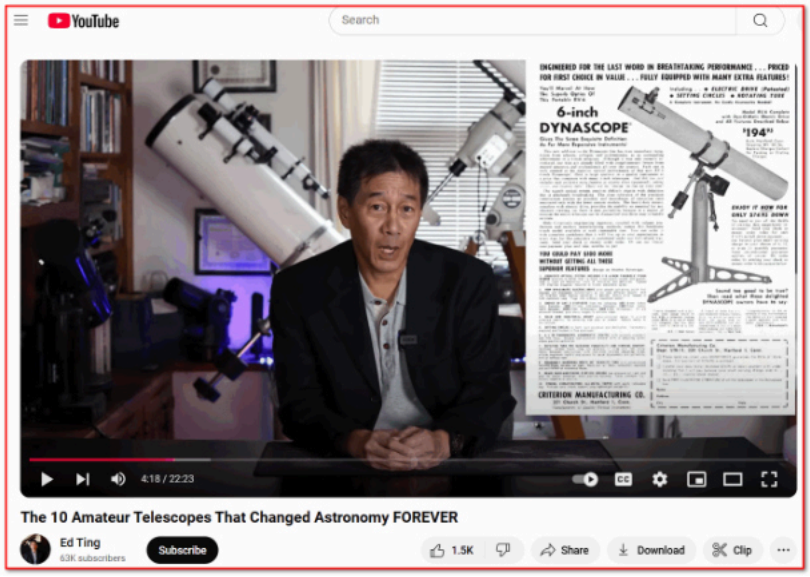
Don Hain
dhain00@gmail.com, 402 440 5318

With "How to Buy a Telescope" behind us, and the "How to Use Your Telescope" happening in January I found a recent YouTube video I stumbled across to be of interest. It is entitled "The 10 Amateur Telescopes That Changed Astronomy FOREVER". Depending on when you got a bit serious about the hobby you may have owned / still own one of the scopes mentioned. I have a friend who I know has a scope that is very similar to, if not one of the exact models discussed by Ed Ting in the video.

If you don't know of Ed Ting, you might take this opportunity to check this out as a sample of his talks too. I find his perspective on telescopes to provide valuable insights into our hobby and the equipment we use. The video I mention above can be found at the following link: [The 10 Amateur Telescopes That Changed Astronomy FOREVER.]

Do note that I have seen some emails circulating that indicate Hyde Observatory may be having some renovation work that could affect both our PAC meetings (even the one above for January outreach at Hyde), as well as the schedule for the Saturday night Hyde open houses. As I find out more, I will pass information along in this column. You may quite likely hear something in this newsletter or via receipt of an email from the PAC email distributions out of our Night Sky Network contact list from members of the PAC board in the future too.

As noted on the PAC Website: The Prairie Astronomy Club will offer its annual free session: "How to Use Your Telescope" at Hyde Observatory, Tuesday evening January 28th at 7:30 p.m. Do you own a telescope and need help getting started using it? The Prairie Astronomy Club would like to help. Every year at our January meeting, we offer a session to give hands-on assistance. There is no charge for this session. It is open to the public and if you have a telescope you want to use you are encouraged to bring it. Meetings are at Hyde Observatory and are open to the public.



Outreach Calendar

Scheduled events to be aware of:

PAC Annual "How to Use Your Telescope":

When: Tuesday January 28th, 7:30PM

Where: Hyde Memorial Observatory

Sponsored by: Prairie Astronomy Club

Needs: let the club know via the Contact Us page at https://www.prairieastronomyclub.org/contact-us/

(or contact me directly at dhain00@gmail.com if you've not already made a board member aware you are coming)

Visit: https://www.prairieastronomyclub.org/ for more info

Hyde Observatory: every Saturday night throughout the year (except for weekends of major holidays)

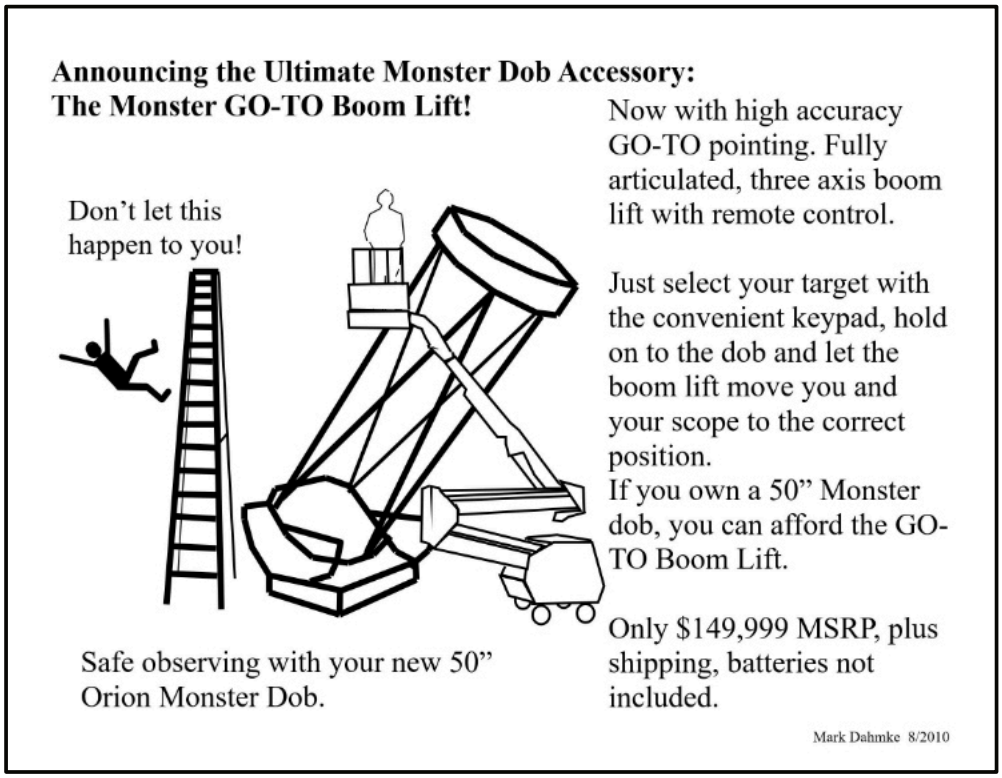
(as mentioned in this column, be watchful for possible changes as Hyde enters a timeframe of possible renovation work)

7:00pm to 10:00pm (October thru March)

Where: Hyde Memorial Observatory

Sponsored by: City of Lincoln (Parks and Recreation) and Hyde Observatory volunteers

Needs: visit https://www.hydeobservatory.info/volunteer/ to become a volunteer



January's Night Sky Notes: The Red Planet

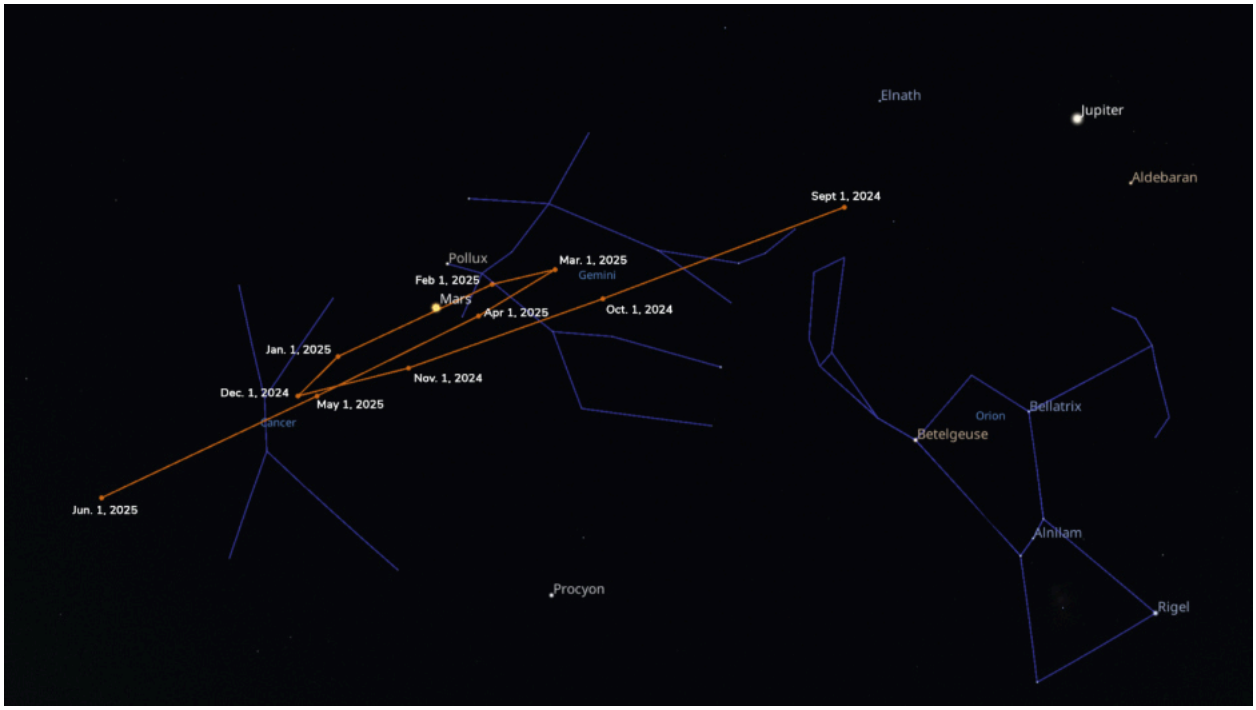
This article is distributed by NASA's Night Sky Network (NSN). The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!v

Kat Troche

Have you looked up at the night sky this season and noticed a bright object sporting a reddish hue to the left of Orion? This is none other than the planet Mars! January will be an excellent opportunity to spot this planet and some of its details with a medium-sized telescope. Be sure to catch these three events this month.

Martian Retrograde

Mars entered retrograde (or backward movement relative to its usual direction) on December 7, 2024, and will continue throughout January into February 23, 2025. You can track the planet's progress by sketching or photographing Mars' position relative to nearby stars. Be consistent with your observations, taking them every few nights or so as the weather permits. You can use free software like Stellarium or Stellarium Web (the browser version) to help you navigate the night as Mars treks around the sky. You can find Mars above the eastern horizon after 8:00 PM



This mid-January chart shows the path of Mars from September 2024 to June 2025 as it enters and then exits in retrograde motion. Mars appears to change its direction of motion in the sky because Earth is passing the slower-moving Mars in its orbit. Credit: Stellarium

The Red Planet, continued

A simulated view of the Moon as Mars begins its occultation on January 13, 2025. Credit: Stellarium

local time.

Hide and Seek

On the night of January 13th, you can watch Mars 'disappear' behind the Moon during an occultation. An occultation is when one celestial object passes directly in front of another, hiding the background object from view. This can happen with planets and stars in our night sky, depending on the orbit of an object and where you are on Earth, similar to eclipses.

Depending on where you are within the contiguous United States, you can watch this event with the naked eye, binoculars, or a small telescope. The occultation will happen for over an hour in some parts of the US. You can use websites like Stellarium Web or the Astronomical League's 'Moon Occults Mars' chart to calculate the best time to see this event.

Closer and Closer

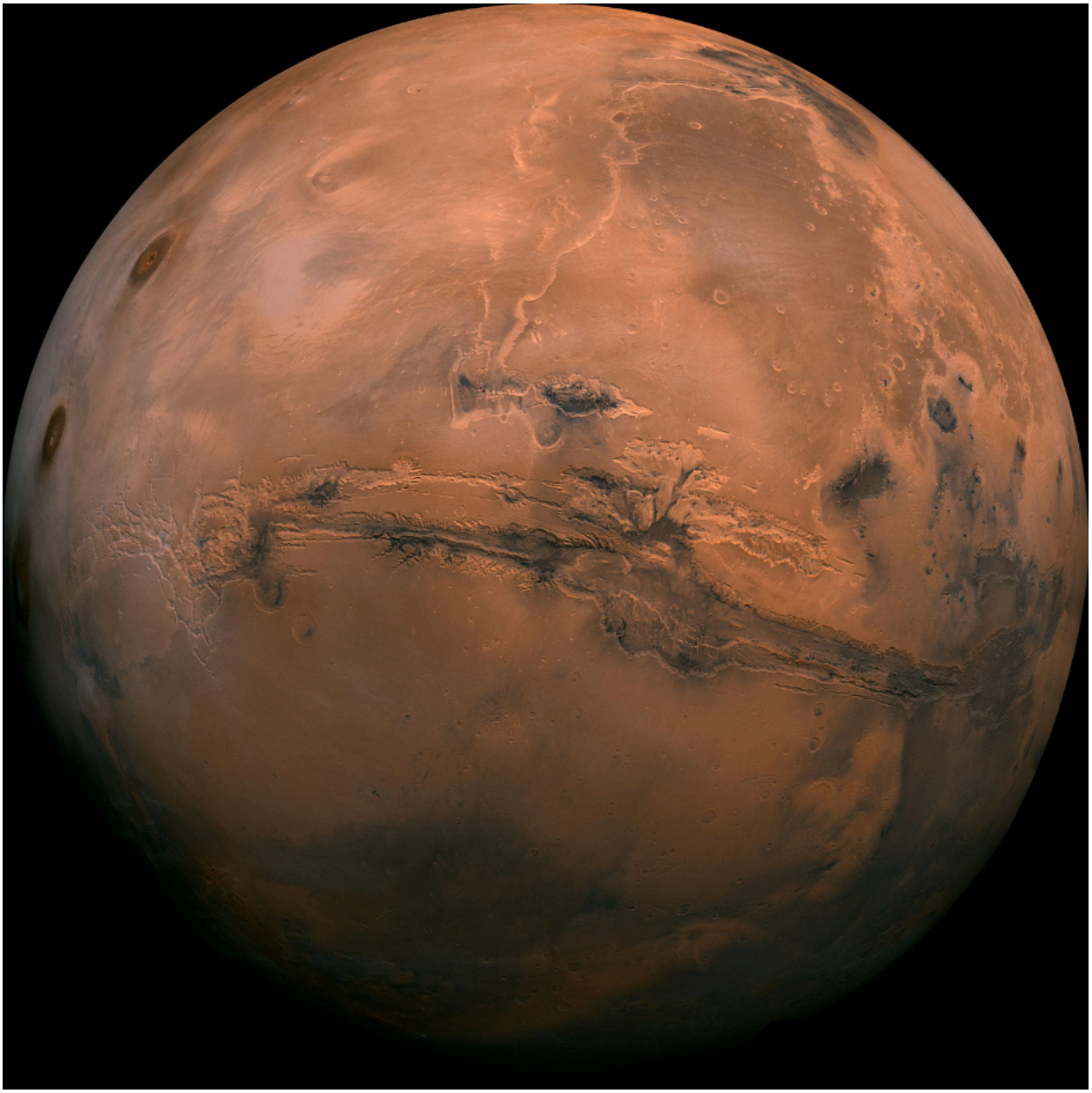
As you observe Mars this month to track its retrograde movement, you will notice that it will increase in brightness. This is because Mars will reach opposition by the evening of January 18th. Opposition happens when a planet is directly opposite the Sun, as seen from Earth. You don't need to be in any specific city to observe this event; you only need clear skies to observe that it gets brighter. It's also when Mars is closest to Earth, so you'll see more details in a telescope.

Want a quick and easy way to illustrate what opposition is for Jupiter, Saturn, Mars, or other outer worlds? Follow the instructions on our Toolkit Hack: Illustrating Opposition with Exploring the Solar System page using our Exploring Our Solar System activity!

Mars has fascinated humanity for centuries, with its earliest recorded observations dating back to the Bronze Age. By the 17th century, astronomers were able to identify features of the Martian surface, such as its ice caps and darker regions. Since the 1960s, exploration of the Red

The Red Planet, continued

Planet has intensified with robotic missions from various space organizations. Currently, NASA has five active missions, including rovers and orbiters, with the future focused on human exploration and habitation. Mars will always fill us with a sense of wonder and adventure as we reach for its soil through initiatives such as the Moon to Mars Architecture and the Mars Sample Return campaign.



A mosaic of the Valles Marineris hemisphere of Mars projected into point perspective, a view similar to that which one would see from a spacecraft. The mosaic is composed of 102 Viking Orbiter images of Mars. Credit: NASA/JPL-Caltech

NASA's Perseverance Rover Reaches Top of Jezero Crater Rim

The road ahead will be even more scientifically intriguing, and probably somewhat easier-going, now that the six-wheeler has completed its long climb to the top.

NASA's Perseverance Mars rover has crested the top of Jezero Crater's rim at a location the science team calls "Lookout Hill" and rolling toward its first science stop after the monthslong climb. The rover made the ascent in order to explore a region of Mars unlike anywhere it has investigated before.

Taking about 3½ months and ascending 1,640 vertical feet (500 vertical meters), the rover climbed 20% grades, making stops along the way for science observations. Perseverance's science team shared some of their work and future plans at a media briefing held Thursday, Dec. 12, in Washington at the American Geophysical Union's annual meeting, the country's largest gathering of Earth and space scientists.

"During the Jezero Crater rim climb, our rover drivers have done an amazing job negotiating some of the toughest terrain we've encountered since landing," said Steven Lee, deputy project manager for Perseverance at NASA's Jet Propulsion Laboratory in Southern California. "They developed innovative approaches to overcome these challenges — even tried driving backward to see if it would help — and the rover has come through it all like a champ. Perseverance is 'go' for everything the science team wants to throw at it during this next science campaign."

Since landing at Jezero in February 2021, Perseverance has completed four science campaigns: the "Crater Floor," "Fan Front," "Upper Fan," and "Margin Unit." The science team is calling Perseverance's fifth campaign the "Northern Rim" because its route covers the northern part of the southwestern section of Jezero's rim. Over the first year of the Northern Rim campaign, the rover is expected to visit as many as four sites of geologic interest, take several samples, and drive about 4 miles (6.4 kilometers).

"The Northern Rim campaign brings us completely new scientific riches as Perseverance roves into fundamentally new geology," said Ken Farley, project scientist for Perseverance at Caltech in Pasadena. "It marks our transition from rocks that partially filled Jezero Crater when it was formed by a massive impact about 3.9 billion years ago to rocks from deep down inside Mars that were thrown upward to form the crater rim after impact."

"These rocks represent pieces of early Martian crust and are among the oldest rocks found anywhere in the solar system. Investigating

Perseverance Rover, continued

them could help us understand what Mars — and our own planet — may have looked like in the beginning," Farley added.

First Stop: 'Witch Hazel Hill'

With Lookout Hill in its rearview mirror, Perseverance is headed to a scientifically significant rocky outcrop about 1,500 feet (450 meters) down the other side of the rim that the science team calls "Witch Hazel Hill."

"The campaign starts off with a bang because Witch Hazel Hill represents over 330 feet of layered outcrop, where each layer is like a page in the book of Martian history. As we drive down the hill, we will be going back in time, investigating the ancient environments of Mars recorded in the crater rim," said Candice Bedford, a Perseverance scientist from Purdue University in West Layfette, Indiana. "Then, after a steep descent, we take our first turns of the

NASA's Perseverance Mars rover used its right-front navigation camera to capture this first view over the rim of Jezero Crater on Dec. 10, 2024, the 1,354th Martian day, or sol, of the mission. The camera is facing west from a location nicknamed "Look... Credit: NASA/JPL-Caltech

Perseverance Rover, continued

wheel away from the crater rim toward 'Lac de Charmes,' about 2 miles south."

Lac de Charmes intrigues the science team because, being located on the plains beyond the rim, it is less likely to have been significantly affected by the formation of Jezero Crater.

After leaving Lac de Charmes, the rover will traverse about a mile (1.6 kilometers) back to the rim to investigate a stunning outcrop of large blocks known as megabreccia. These blocks may represent ancient bedrock broken up during the Isidis impact, a planet-altering event that likely excavated deep into the Martian crust as it created an impact basin some 745 miles (1,200 kilometers) wide, 3.9 billion years in the past.

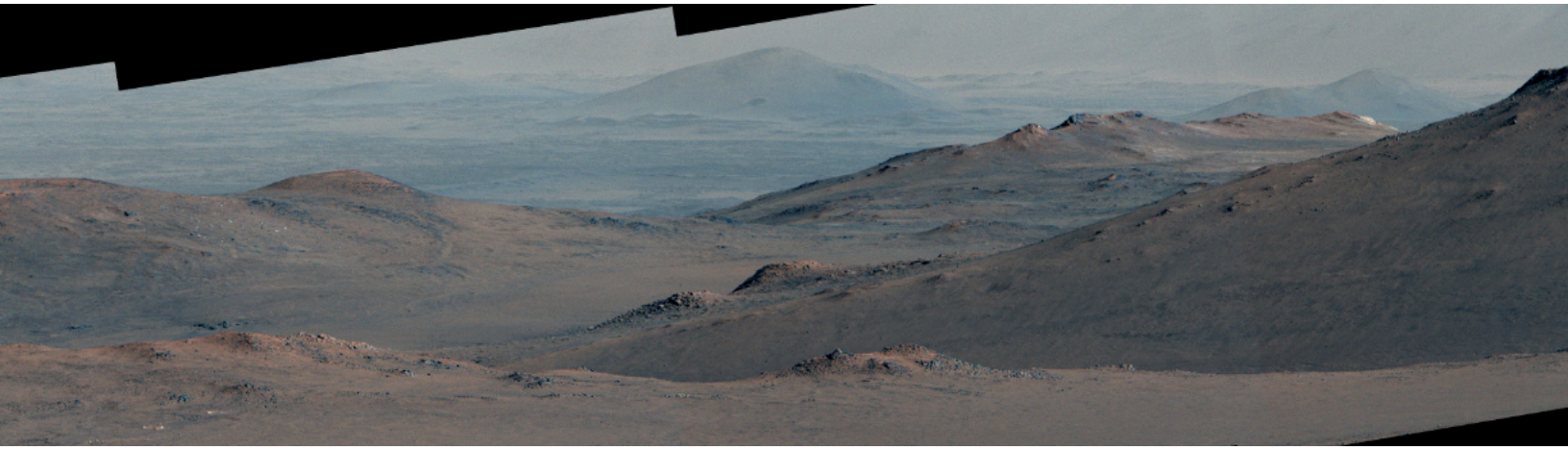
More About Perseverance

A key objective of Perseverance's mission on Mars is astrobiology, including caching samples that may contain signs of ancient microbial life. The rover will characterize the planet's geology and past climate, to help pave the way for human exploration of the Red Planet and as the first mission to collect and cache Martian rock and regolith.

NASA's Mars Sample Return Program, in cooperation with ESA (European Space Agency), is designed to send spacecraft to Mars to collect these sealed samples from the surface and return them to Earth for in-depth analysis.

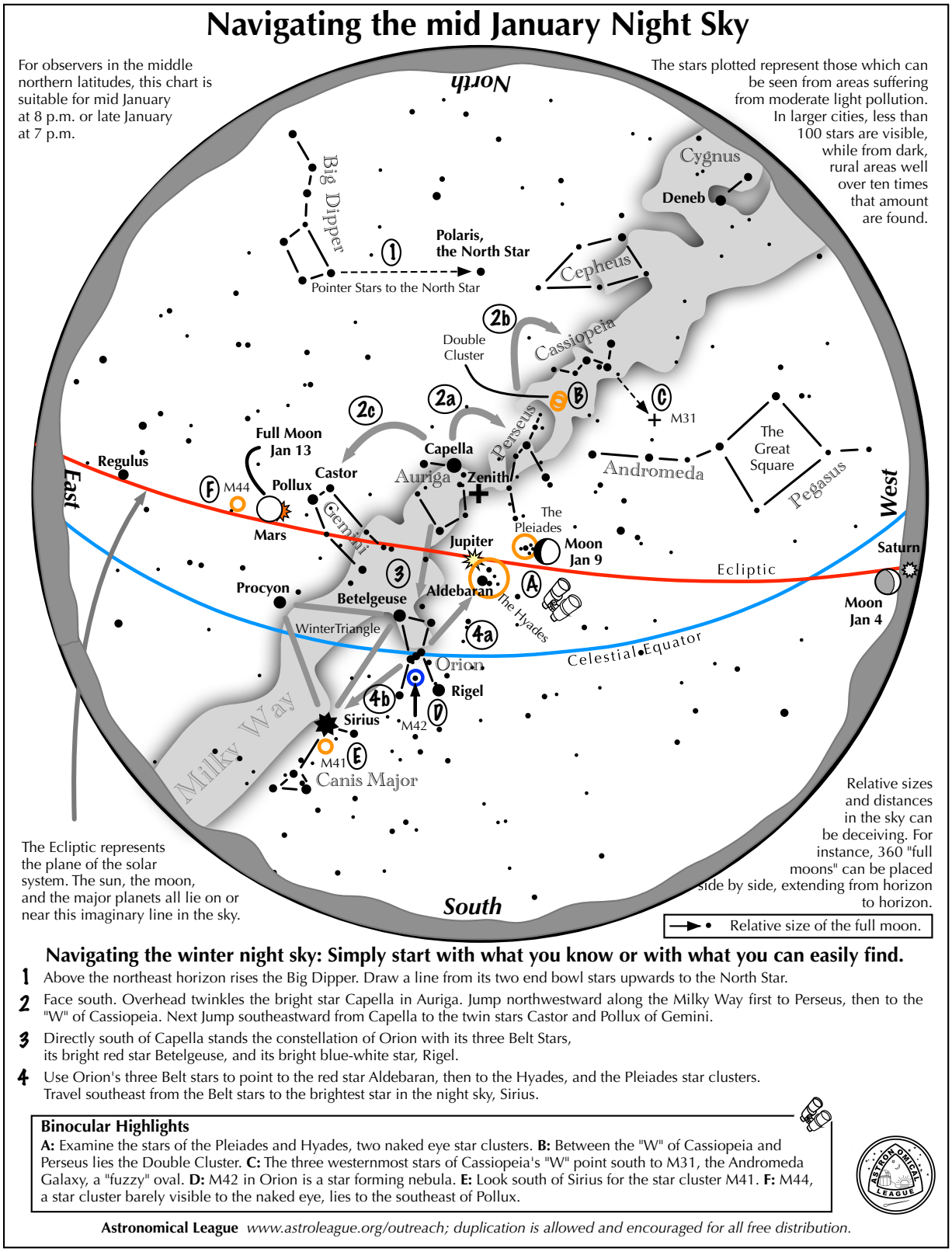
The Mars 2020 Perseverance mission is part of NASA's Moon to Mars exploration approach, which includes Artemis missions to the Moon that will help prepare for human exploration of the Red Planet.

NASA's Jet Propulsion Laboratory, which is managed for the agency by Caltech, built and manages operations of the Perseverance rover.



NASA's Perseverance Mars rover used its Mastcam-Z camera system to capture this view as it was ascending to the rim of Jezero Crater on Dec. 5, 2024 NASA/JPL-Caltech/ASU/MSSS This is a cropped version showing a small section of the original panorama.

Navigating the mid January Night Sky



Navigating the winter night sky: Simply start with what you know or with what you can easily find.

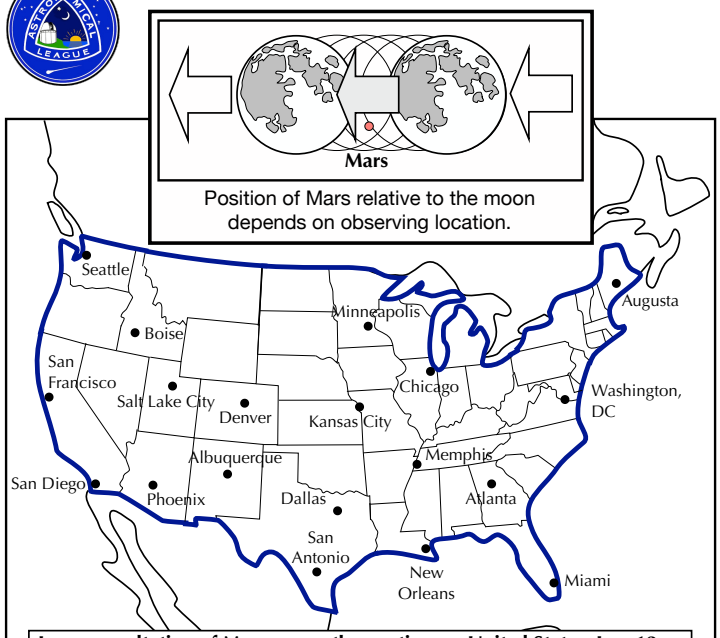
1. Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star.
2. Face south. Overhead twinkles the bright star Capella in Auriga. Jump northwestward along the Milky Way first to Perseus, then to the "W" of Cassiopeia. Next Jump southeastward from Capella to the twin stars Castor and Pollux of Gemini.
3. Directly south of Capella stands the constellation of Orion with its three Belt Stars, its bright red star Betelgeuse, and its bright blue-white star, Rigel.
4. Use Orion's three Belt stars to point to the red star Aldebaran, then to the Hyades, and the Pleiades star clusters. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius.

Binocular Highlights

A: Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **B:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster. **C:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **D:** M42 in Orion is a star forming nebula. **E:** Look south of Sirius for the star cluster M41. **F:** M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux.

Astronomical League Observing Project

If you can see only one celestial event this January, see this one.



Lunar occultation of Mars across the contiguous United States: Jan. 13. Extreme southern US sees Mars move behind the southern portion of the moon, and the northern US sees the planet move behind the northern portion of the moon.

Be sure to use binoculars!

Occultations demonstrate the moon's eastward orbital motion as Earth's rotation causes it to move in a westward arc across the night night sky.

Full Moon occults Bright Mars

In the evening hours of **January 13**, the brilliant full moon passes in front of bright Mars, which is near opposition. It may not be easy to spot because of the moon's bright glare!, but give it a try!

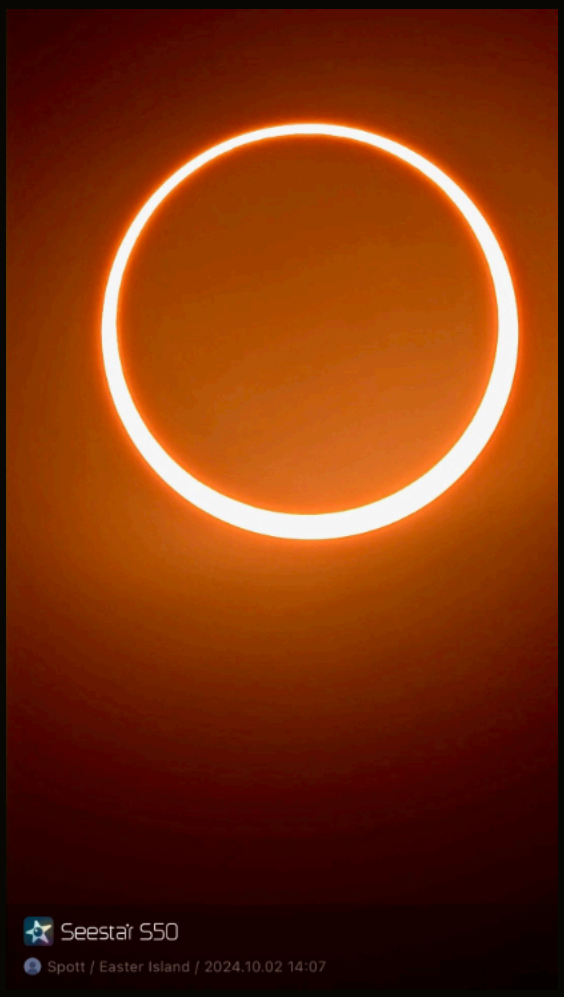
Approximate local times of disappearance and reappearance.
Begin viewing ten minutes before your estimated time. Mars' time and position of reappearance is difficult to judge since the planet lies concealed behind the moon beforehand.

City	Disappearance	Reappearance
Albuquerque	6:51 pm	7:52
Augusta	9:29	10:44
Atlanta	9:06	10:13
Boise	7:06	7:49
Boston	9:26	10:42
Chicago	8:08	9:16
Dallas	7:54	8:57
Denver	6:57	7:57
Kansas City	8:00	9:06
Memphis	8:00	9:07
Minneapolis	8:08	9:10
Los Angeles	5:51	6:45
Miami	9:30	9:53
New Orleans	8:00	8:59
New York	9:21	10:37
Phoenix	6:49	7:48
Salt Lake City	6:59	7:52
San Antonio	7:52	8:50
San Diego	5:49	6:45
San Francisco	5:58	6:45
Seattle	6:23	6:39
Washington DC	9:16	10:31

Astrophotography

The Horsehead Nebula - by Russ Genzmer
Equipment and conditions: Askar 103 mm triplet apochromatic refractor, Skywatcher EQ 6 R Pro mount, ZWO ASI 294 color cooled camera, ZWO ASI 120 mm guide camera, ZWO ASI AIR Plus control system, November 26-27, 2024, 7.5 hours imaging , 26% waning moon, Optilong L enhanced filter, Pre and Post Processing with Pixinsight software
(I am a beginner on Pixinsight so this is a first pass attempt)

Astrophotography



October's Annular Eclipse on Rapa Nui (Easter Island) Chile - Scott Spaulding
Images are processed by Seestar.

Astrophotography

Comet C/2023 A3, Tsuchinshan - ATLAS, Milky Way, and Moai on Rapa Nui - by Scott Spaulding

The comet tail is near vertical to the left of the moai statues. The clouds obstructed the comet tail a bit but we were lucky and in between the cloud layers you can see the comet's head and extended tail. Ahu Tongariki National Park is a popular spot to take sunrise photos with the moai statues any time of the year. Sony A7IIIR, 14mm, f/2, ISO 1600, 13 second exposure, Lightroom.

From the Archives

December, 1977

Editor's note: this report by PAC President Rick Johnson was written just one month after Hyde Observatory opened its doors to the public. As part of the effort to acquire funding for the observatory and a commitment by the City of Lincoln to build it in a city park and be a City Park facility, the Prairie Astronomy Club promised to find volunteers to staff and operate the observatory. In the early days, the details of this arrangement had not yet been worked out, but it was a community effort. In the months and years that followed, the Hyde Board of Supervisors formalized the procedures for onboarding, training and scheduling volunteers, including encouraging club members to support the observatory but also reaching out to the community to find volunteers.

The President's Report

Last month's meeting was so well attended that some were left without chairs. Looks like the observatory is too small already! I want to welcome the many new members who joined us last month and encourage any thinking of joining to do so before dues go up at the start of the year.

Club activities were again centered upon Hyde Memorial Observatory. The weatherman didn't cooperate very well with the public nights this month as two of the three were cloudy. The third was fairly clear but cold. Even so, crowds were surprisingly large. There is now a sign out front which shows the open nights, though it is unreadable at night. A "closed" sign is soon to be added by the door, which should help reduce the confusion. Now if the newspapers can just get the dates correct! We have four open house nights coming up in January and four in February, so dig out the long johns and come out and help.

Many public school groups wish to use the observatory, but they can only do so during the day. This means they will be limited to solar observing, which is highly dangerous with large groups and large telescopes. For this reason, we feel that the main scopes should not be used during the day in the presence of large groups, and in the absence of a supervisor. Funds have been made available to us for the development of safe solar projects that can be set up and demonstrated for the school groups by operators with only minimal training. We accepted this responsibility and now need both volunteers and ideas. While these funds are not from our treasury, they are limited so think cheap.

See you at the meeting! --Rick Johnson

CLUB MEMBERSHIP INFO

REGULAR MEMBER - $30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - $35.00 per year. Same as regular member except gets 2 votes at club meetings.

STUDENT MEMBER - $10.00 per year with volunteer requirement.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

CLUB TELESCOPES

To check out one of the club telescopes, please contact a club officer. Scopes can be checked out at a regular club meeting and kept for one month. Checkout can be extended for another month if there are no other requests for the telescope, but you must notify a club officer in advance.

100mm Orion refractor: Available
10 inch Meade Starfinder Dobsonian: Available.
13 inch Truss Dobsonian: Needs repair.
10 inch Zhumell: Needs mount.

Buy the book! The Prairie Astronomy Club: Fifty Years of Amateur Astronomy. Order online from Amazon or lulu.com.

ADDRESS

The Prairie Astronomer
c/o The Prairie Astronomy Club, Inc.
P.O. Box 5585
Lincoln, NE 68505-0585

info@prairieastronomyclub.org

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: Regular $30/yr, Family $35/yr. Address all new memberships and renewals to: The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585. For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: Mark Dahmke, P. O. Box 5585, Lincoln, NE 68505 or mark@dahmke.com, no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.