

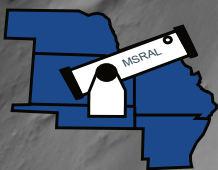
The Prairie Astronomer

September 2023 Volume 64, Issue #9

September Program
Ethan Van Winkle will present:
"A More Complete List of Young
Stellar Objects Candidates in
AFGL490"



IN THIS ISSUE: Webb Discovers Methane, Carbon Dioxide in Atmosphere of K2-18 b
Cracks in Ancient Martian Mud Surprise Rover Team
Exploring Jupiter's Moons



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer



The next meeting is September 26th at 7:30pm at Hyde Observatory

NEXT MEETING AND PROGRAM

Program: A More Complete List of Young Stellar Objects Candidates in AFGL490

A group of five high school teachers and seven high school students partnered up remotely with a caltech professor to do astronomy research for one year. Come learn about the NITARP program, the astronomy concepts needed for the research, and the results we presented at the American Astronomical Society Conference in Seattle, Washington. This will be presented by Ethan Van Winkle, a local high school physics teacher and board supervisor of Hyde.

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UPCOMING PROGRAMS

October: We will get a tour of the updated facilities at Branched Oak Observatory and a radio telescope demonstration by Doug Buhrman.

November: Bahrat Ratra (tentative)

December: How to Buy a Telescope

Cover: Coprates Chasma is visible at the top of this image of the equatorial canyon system of Valles Marineris. For more information see page 20. Credit: NASA/JPL-Caltech/University of Arizona.



CALENDAR

The PAC Calendar is now available as a [Google Calendar](#).

PAC Meeting
 Tuesday, September 26th, 7:30pm at Hyde Observatory
Program: A More Complete List of Young Stellar Objects Candidates in AFGL490

Hoot n'Howl
 October 7, 6:30pm at Spring Creek Prairie

Partial Solar Eclipse
 October 14th, 10:32am to 1:15pm.
 Hyde Observatory will be open.

PAC Meeting
 Tuesday, October 24th, 7:30pm at Branched Oak Observatory

PAC Meeting
 Tuesday, November 28th, 7:30pm at Hyde Observatory

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

2023 STAR PARTY DATES

	Date	Date
January	13	20
February	10	17
March	17	24
April	14	21
May	12	19
June	9	16
July	7	14
NSP	7/16	7/22
August	11	18
September	8	15
October	6	13
November	3	10
December	8	15

Dates in **BOLD** are closest to the New Moon.

CLUB OFFICERS

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Night Sky Network

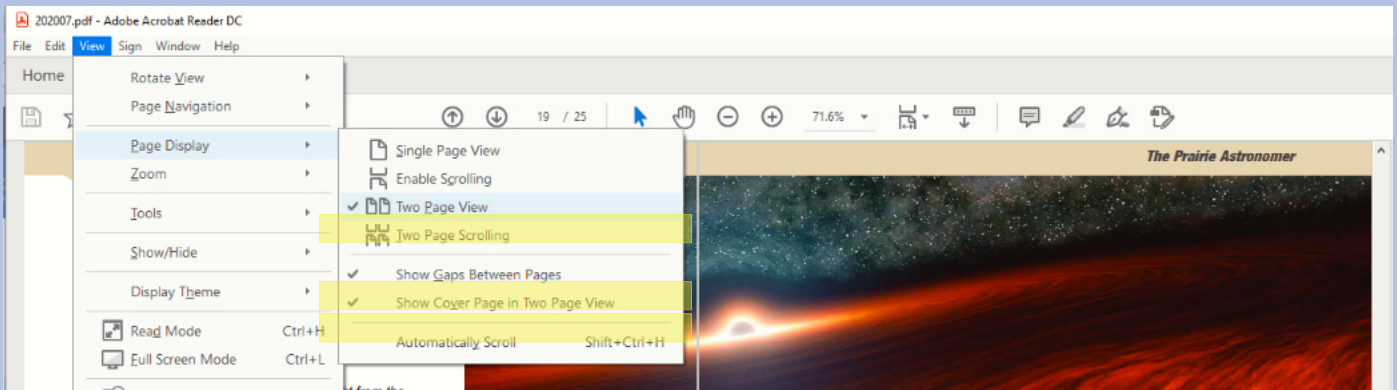


www.prairieastronomyclub.org

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/pay-dues-online/>

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

Dear Fellow Stargazers,
As the warm embrace of summer slowly yields to the crisp allure of autumn, I'm excited for the celestial marvels that lie ahead. The evenings have grown pleasantly mild, making it the perfect time to indulge in our shared passion for gazing at the cosmos. Fall is, without a doubt, my favorite season for stargazing.

Before we plunge into the upcoming events, I want to thank Bob Kacvinsky for leading our meeting last month. His presentation was a resounding success, drawing in an impressive 55 visitors.

Now, let's turn our gaze towards the future. Our September meeting marks the beginning of a crucial period for our club as we prepare to nominate new officers. I encourage you to consider taking on a leadership role in our astronomy community. If you're interested but don't want to nominate yourself, please reach out to me via email.

October promises to be an exhilarating month for us. There are several outreach events scheduled. We also have a tour of the Branched Oak Observatory lined up for the October meeting. We'll take a closer look at the radio telescopes, and with



luck, we might even attempt to bounce a signal off the moon! Please note that our October meeting will be a week earlier than usual, so mark your calendars accordingly.

And now, to leave you with a celestial chuckle: Why did the astronomer pack away his telescope? Because he needed space.

Clear skies and happy stargazing,

Jason O'Flaherty

Outreach Opportunities

Christine Parkyn

Outreach opportunities for this fall are listed below. If you can help with either event, please email cpparky@gmail.com.

09/22/23 9pm to 10pm: Camp Erin Lincoln @ Carol Joy Holling Center in Ashland, need 1 more telescope.

10/07/23 6:30pm to 8pm: Hoot n'Howl @ Spring Creek Prairie in Denton, need 2 telescopes.

ARP 59

The Mantrap Skies Image Catalog

Arp 59 falls under Arp's classification: Spiral Galaxies with Companions on Arms: Small high surface brightness companions. It is located just under 200 million light years away and is found in the constellation of Cetus. This appears to be a system similar to M51 but with more confused spiral arms. Arp had no comment about this pair. NED has no redshift for the companion to tell if it is a true companion.

The main galaxy is NGC 341, the companion MCG -02-03-064. The little galaxy at the 5 O'clock position is SDSS J010044.49-091151.8. I doubt it is related. I can't tell which arm, north or south, the companion is on. In Arp's photo (south up) the south arm seems to lead to the companion while the north one seems to end at a star to the lower left. In my image, things look just the reverse. The southern arm seems to just suddenly end at the north end of the galaxy or maybe continue and be the blue spike sticking out at the NE. While the north arm makes more than a 360 to end in at the companion. Usually, Arp's and my images look much alike



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.



ARP59, continued.

but not in this case. It appears it was a night of very poor seeing atop Palomar mountain when Arp took his image. That may explain the differences. The Sloan image doesn't help much that I see. Obviously, the encounter has messed up the arms of NGC 341. NED classes it as SAB(r)bc. It was discovered by Édouard Stephan on October 21, 1881.

As in my image of Arp 19, there appears to be a galaxy cluster just to the east of the galaxy. Though none is shown in NED at that location or any other location within this image. See the enlarged cropped image to see the really faint galaxies in this grouping. I see a few smaller groupings of faint galaxies throughout the image. While the SDSS has apparently cataloged them (I didn't begin to check them all) no redshift distances are provided.

As I've come to expect the SDSS omits blue, low surface brightness galaxies. Is there

something about their recognition algorithm that misses them? Or is it a NED selection effect? Maybe it's something else. In any case, the very blue smudge NW of Arp 59 isn't in the over 2000 SDSS galaxies in this image. But it did get picked up by the UK Automated Plate Survey as APMUKS(BJ) B005807.36-092427.4. Is it involved with Arp 59? Its blue color would indicate lots of newly formed massive stars often caused by such interaction. Yet no one seems to have paid it any attention.

This isn't the only somewhat blue galaxy missed by the SDSS and or NED. There's APMUKS(BJ) B005908.94-092242.1 near the left edge above center. It is just below a larger galaxy on the annotated image at 0.71 billion light years. There may be more, I didn't search very hard to find these two. NED picks up 24th magnitude galaxies from the SDSS and misses these 18th magnitude ones.

On the other hand, the very blue sliver of a galaxy in the southeast corner of my image is SDSS J010143.56-091900.7 with a redshift almost identical to that of Arp 59. Could it have tangled with Arp 59 in the past thus causing its new massive stars?

Also on the right edge above center is a very faint blue galaxy the SDSS did pick up at 250 million light years. This galaxy, like Arp 59 appears to have a galaxy cluster to its east that is obviously far beyond it. None have redshift data. Another, somewhat larger, blue galaxy at 250 million light years is found southeast of Arp 59. Are these two related?

The asteroid toward the northeast corner is (123186) 2000 UB9 at magnitude 17.9.

Meeting Minutes

Jim White

Tonight's meeting started at 7:32 pm. Bob Kacvinsky is running tonight's meeting for Jason who is out of town on business.

Bob started the meeting by asking Jim Kvasnicka for this month's observing report. Jim started off his report with dates for the September and October star parties.

September's star parties are scheduled for Friday the 8th and Friday the 15th. October's star parties are scheduled for Friday the 6th and Friday the 13th. The star parties at this time will be held at the Clatonia Recreation Area which is approximately 1 ½ miles north of Clatonia. Jim's full observing report can be found in this newsletter. Jim's observing report ended at 7:40 pm.

Bob turned the meeting over to John Reinert for the treasurer's report. John went over the costs for the different membership types, Individual is \$30.00/year, Family is \$35.00/year and Student is \$10.00/year with a volunteer requirement.

Current business that John is dealing with, club accounts are with Bank of the West which is being taken over by BMO (Bank of Montreal) and he is keeping an eye on the transition to make sure that things go smoothly with our online membership payment process. Looking ahead John is hoping that we can transition from a cycle where memberships are renewed in the month that a member originally joined to a yearly cycle where all memberships renewed in the same month, hopefully around the August/September/October time of the year. John is working on keeping club paperwork up to date for the government along with paying our clubs insurance and p.o. box fee. John's report concluded at 7:43 pm.

Bob stated that at our September meeting we will have nominations for club officers and we will have elections at our October meeting. If anyone is interested in running for an office get in touch with Jason, take a look at the

newsletter that will give descriptions of the duties of each office. Our October meeting will be at BOO (Branched Oak Observatory) and the meeting will be held a week early on October 24th because the last Tuesday in October falls on Halloween. A couple of outreach events coming up are October 7th at Spring Creek Prairie at 6:30, mainly a solar event, so those with solar scopes are being encouraged to volunteer. BOO Star-B-Q is September 9th from 5:00 pm to 11:00 pm. Tonight's meeting adjourned at 7:45 pm and tonight's program, being presented by Bob Kacvinsky, is "James Webb Space Telescope Discovering the Heavens Year One."

There were 44 people in attendance at tonight's meeting and I'm told another dozen or so attending via Zoom.

October Observing

Jim Kvasnicka

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

Planets

Jupiter: Shines at magnitude -2.9 with a disk 49.5" wide in Aries.

Saturn: Magnitude +0.6 with a disk 18.6" wide in Aquarius.

Uranus and Neptune: Look for Uranus in Aries and Neptune in Pisces.

Mercury and Mars: Not visible.

Venus: Morning planet at magnitude -4.7.

Annular Solar Eclipse

Saturday, October 14th. We will only see a partial eclipse from our location.

Meteor Showers

Orionids: October 21-22. Expect 10-20 meteors per hour.

Messier List

M11: The Wild Duck Cluster in Scutum.

M16: Open cluster in the Eagle Nebula.

M17: Omega or Swan Nebula in Sagittarius.

M18/M24: Open cluster and Small Sagittarius Star Cloud in Sagittarius.

M25/M26: Open clusters in Sagittarius.

M55/M75: Class XI and I globular clusters in Sagittarius.

Last Month: M13, M14, M22, M28, M54, M69, M70, M92



Next Month:

M27, M30,
M56, M57,
M71, M72, M73

NGC and other Deep Sky Objects

NGC 7009: The Saturn Nebula in Aquarius.

NGC 7293: The Helix Nebula in Aquarius.

NGC 7331: Galaxy in Pegasus.

NGC 7479: Galaxy in Pegasus.

NGC 7510: Bright open cluster in Cepheus.

NGC 7606: Galaxy in Aquarius.

Double Star Program List

8 Lacerta: Four white stars.

Beta Cephei: White and blue stars.

Struve 2816: White primary with 2 blue stars.

Xi Cephei: Pair of yellow stars.

Delta Cephei: Yellow primary with a pale blue secondary.

Eta Persei: Yellow and blue stars.

Struve 331: White primary with a light blue secondary.

Epsilon Pegasi: Yellow primary with a white secondary.

Challenge Object

NGC 7769 / 7770 / 7771: Galaxy
NGC 7769 is the brightest in this trio in Pegasus.

Focus on Observing Programs

Jim Kvasnicka

This month we focus on the Sunspotters Observing Program. The purpose of the Sunspotters Observing Program is to encourage solar observing. By doing this observing program the observer will learn the various features of solar activity and how these features change, and learn how to develop a regular solar observing program.

Before starting any solar observing program make certain you have safe solar filters to use.

In the Sunspotters Observing Program you will make two sets of drawings. The first set is 5 detailed sketches of sunspot groups. The second set is 20 or more sketches of the whole solar disk during two solar rotations (one rotation is about 30 days).

The 5 sunspot sketches must be done on five different days. These sketches must include time, observing conditions, equipment used, and sunspot class. Several features of the sunspot must be identified. These features are identified on the Astronomical League website.

For the second set of drawings you will need to sketch the whole disk of the Sun throughout the passage of large sunspot groups during two different solar rotations. Your sketches must identify the sunspot penumbrae and umbrae. You must also classify the sunspot groups on the disk and perform a sunspot count. You should have a minimum of 20 whole disk drawings for two rotations.

When you complete the Sunspotters Observing Program you will need to submit a copy of your observing logs to me for review. If your logs are accurate and complete I will submit your name to the Sunspotters Observing Program chair for approval. The chair will mail to me your certificate and pin which I will present to you at the next monthly PAC meeting.

If you have any questions regarding the Sunspotters Observing Program or any other observing program, or need help getting started please contact me and I will be glad to help.

Welcome New Members!

Matthew Deroche, Carol Wells, Michael High, Lester Hetrick and Amos Sobotka

Webb Discovers Methane, Carbon Dioxide in Atmosphere of K2-18 b

A new investigation with NASA's James Webb Space Telescope into K2-18 b, an exoplanet 8.6 times as massive as Earth, has revealed the presence of carbon-bearing molecules including methane and carbon dioxide. Webb's discovery adds to recent studies suggesting that K2-18 b could be a Hycean exoplanet, one which has the potential to possess a hydrogen-rich atmosphere and a water ocean-covered surface.

The first insight into the atmospheric properties of this habitable-zone exoplanet came from observations with NASA's Hubble Space Telescope, which prompted further studies that have since changed our understanding of the system.

K2-18 b orbits the cool dwarf star K2-18 in the habitable zone and lies 120 light-years from Earth in the constellation Leo. Exoplanets such as

K2-18 b, which have sizes between those of Earth and Neptune, are unlike anything in our solar system. This lack of equivalent nearby planets means that these 'sub-Neptunes' are poorly understood, and the nature of their atmospheres is a matter of active debate among astronomers.

The suggestion that the sub-Neptune K2-18 b could be a Hycean exoplanet is intriguing, as some astronomers believe that these worlds are promising environments to search for evidence for life on exoplanets.

"Our findings underscore the importance of considering diverse habitable environments in the search for life elsewhere," explained Nikku Madhusudhan, an astronomer at the University of Cambridge and lead author of the paper announcing these results. "Traditionally, the search for life on exoplanets has focused

primarily on smaller rocky planets, but the larger Hycean worlds are significantly more conducive to atmospheric observations."

The abundance of methane and carbon dioxide, and shortage of ammonia, support the hypothesis that there may be a water ocean underneath a hydrogen-rich atmosphere in K2-18 b. These initial Webb observations also provided a possible detection of a molecule called dimethyl sulfide (DMS). On Earth, this is only produced by life. The bulk of the DMS in Earth's atmosphere is emitted from phytoplankton in marine environments.

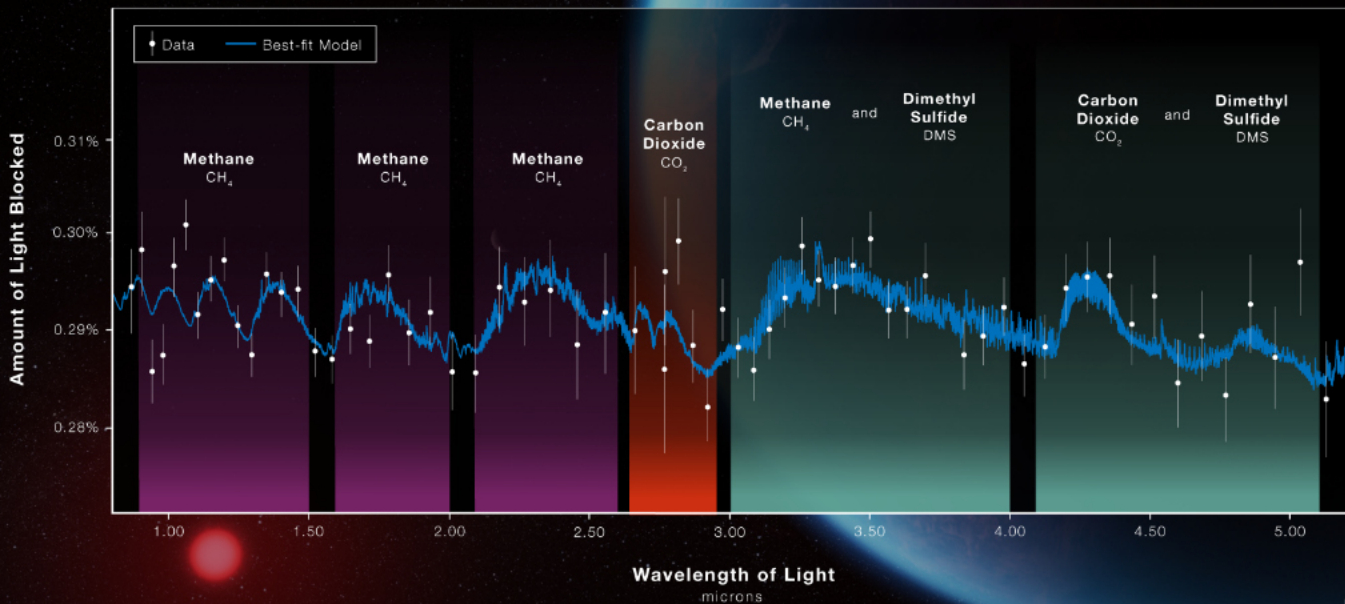
The inference of DMS is less robust and requires further validation. "Upcoming Webb observations should be able to confirm if DMS is indeed present in the atmosphere of K2-18 b at significant levels," explained

Webb, continued.

EXOPLANET K2-18 b

ATMOSPHERE COMPOSITION

NIRISS and NIRSpec (G395H)


WEBB
 SPACE TELESCOPE

Spectra of K2-18 b, obtained with Webb's NIRISS (Near-Infrared Imager and Slitless Spectrograph) and NIRSpec (Near-Infrared Spectrograph), display an abundance of methane and carbon dioxide in the exoplanet's atmosphere, as well as a possible detection of a molecule called dimethyl sulfide (DMS). The detection of methane and carbon dioxide, and shortage of ammonia, support the hypothesis that there may be a water ocean underneath a hydrogen-rich atmosphere in K2-18 b. K2-18 b, 8.6 times as massive as Earth, orbits the cool dwarf star K2-18 in the habitable zone and lies 120 light-years from Earth.

Credits: Illustration: NASA, CSA, ESA, R. Crawford (STScI), J. Olmsted (STScI), Science: N. Madhusudhan (Cambridge University)

Webb, continued.

Madhusudhan.

While K2-18 b lies in the habitable zone, and is now known to harbor carbon-bearing molecules, this does not necessarily mean that the planet can support life. The planet's large size – with a radius 2.6 times the radius of Earth – means that the planet's interior likely contains a large mantle of high-pressure ice, like Neptune, but with a thinner hydrogen-rich atmosphere and an ocean surface. Hycean worlds are predicted to have oceans of water. However, it is also possible that the ocean is too hot to be habitable or be liquid.

"Although this kind of planet does not exist in our solar system, sub-Neptunes are the most common type of planet known so far in the galaxy," explained team member Subhjit Sarkar of Cardiff University. "We have obtained the most detailed spectrum of a habitable-zone sub-Neptune to date, and this allowed us to work out the molecules

that exist in its atmosphere."

Characterizing the atmospheres of exoplanets like K2-18 b – meaning identifying their gases and physical conditions – is a very active area in astronomy. However, these planets are outshone – literally – by the glare of their much larger parent stars, which makes exploring exoplanet atmospheres particularly challenging.

The team sidestepped this challenge by analyzing light from K2-18 b's parent star as it passed through the exoplanet's atmosphere. K2-18 b is a transiting exoplanet, meaning that we can detect a drop in brightness as it passes across the face of its host star. This is how the exoplanet was first discovered in 2015 with NASA's K2 mission. This means that during transits a tiny fraction of starlight will pass through the exoplanet's atmosphere before reaching telescopes like Webb. The starlight's passage through the

exoplanet atmosphere leaves traces that astronomers can piece together to determine the gases of the exoplanet's atmosphere.

"This result was only possible because of the extended wavelength range and unprecedented sensitivity of Webb, which enabled robust detection of spectral features with just two transits," said Madhusudhan. "For comparison, one transit observation with Webb provided comparable precision to eight observations with Hubble conducted over a few years and in a relatively narrow wavelength range."

"These results are the product of just two observations of K2-18 b, with many more on the way," explained team member Savvas Constantinou of the University of Cambridge. "This means our work here is but an early demonstration of what Webb can observe in habitable-zone exoplanets."

Webb, continued.

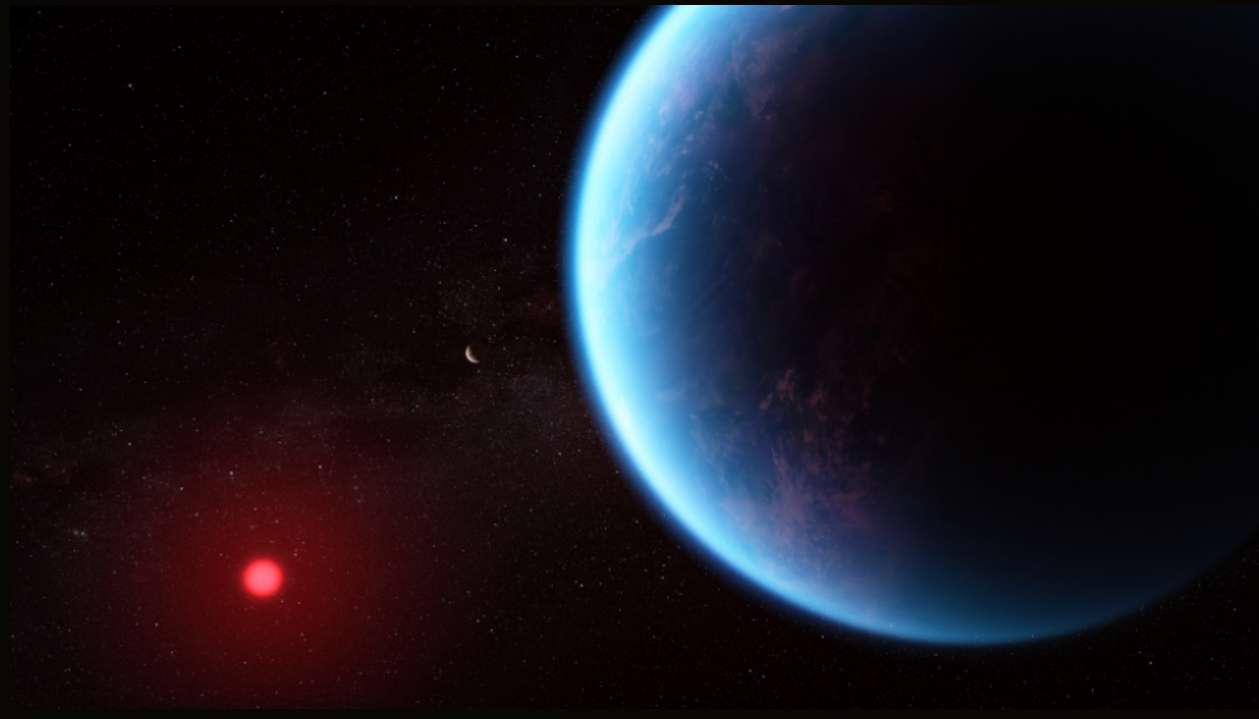
The team's results were accepted for publication in *The Astrophysical Journal Letters*.

The team now intends to conduct follow-up research with the telescope's MIRI (Mid-Infrared Instrument)

spectrograph that they hope will further validate their findings and provide new insights into the environmental conditions on K2-18 b.

"Our ultimate goal is the identification of life on a habitable exoplanet,

which would transform our understanding of our place in the universe," concluded Madhusudhan. "Our findings are a promising step towards a deeper understanding of Hycean worlds in this quest."



This artist's concept shows what exoplanet K2-18 b could look like based on science data. K2-18 b, an exoplanet 8.6 times as massive as Earth, orbits the cool dwarf star K2-18 in the habitable zone and lies 120 light-years from Earth. A new investigation with NASA's James Webb Space Telescope into K2-18 b has revealed the presence of carbon-bearing molecules including methane and carbon dioxide. The abundance of methane and carbon dioxide, and shortage of ammonia, support the hypothesis that there may be a water ocean underneath a hydrogen-rich atmosphere in K2-18 b.

Credits: Illustration: NASA, CSA, ESA, J. Olmsted (STScI), Science: N. Madhusudhan (Cambridge University)

Cracks in Ancient Martian Mud Surprise NASA's Curiosity Rover Team

Scientists aren't entirely sure how life began on Earth, but one prevailing theory posits that persistent cycles of wet and dry conditions on land helped assemble the complex chemical building blocks necessary for microbial life. This is why a patchwork of well-preserved ancient mud cracks found by NASA's Curiosity Mars rover is so exciting to the mission's team.

A new paper in *Nature* details how the distinctive hexagonal pattern of these mud cracks offers the first evidence of wet-dry cycles occurring on early Mars.

"These particular mud cracks form when wet-dry conditions occur repeatedly – perhaps seasonally," said the paper's lead author, William Rapin of France's Institut de Recherche en Astrophysique et Planétologie.

Curiosity is gradually ascending the sedimentary layers of

Mount Sharp, which stands 3 miles (5 kilometers) high in Gale Crater. The rover spotted the mud cracks in 2021 after drilling a sample from a rock target nicknamed "Pontours," found within a transitional zone between a clay-rich layer and one higher up that is enriched with salty minerals called sulfates. While clay minerals usually form in water, sulfates tend to form as water dries up.

The minerals prevalent in each area reflect different eras in Gale Crater's history. The transitional zone between them offers a record of a period when long dry spells became prevalent and the lakes and rivers that once filled the crater began to recede.

As mud dries out, it shrinks and fractures into T-shaped junctions – which are what Curiosity discovered previously at "Old Soaker," a collection of mud cracks lower down

on Mount Sharp. Those junctions are evidence that Old Soaker's mud formed and dried out once, while the recurring exposures to water that created the Pontours mud caused the T-shaped junctions to soften and become Y-shaped, eventually forming a hexagonal pattern.

The hexagonal cracks in the transitional zone kept forming even as new sediment was deposited, indicating that the wet-dry conditions continued over long periods of time. ChemCam, Curiosity's precision laser instrument, confirmed a hardy crust of sulfates along the cracks' edges, which isn't too surprising given the proximity of the sulfate region. The salty crust is what made the mud cracks resistant to erosion, preserving them for billions of years.

The Right Conditions

"This is the first tangible evidence we've seen that the ancient

climate of Mars had such regular, Earth-like wet-dry cycles,” Rapin said. “But even more important is that wet-dry cycles are helpful – maybe even required – for the molecular evolution that could lead to life.”

Although water is essential to life, a careful balance is needed – not too much water, not too little. The kinds of conditions that sustain microbial life – those that allow a long-lasting lake, for example – aren’t the same as the conditions scientists think are required to promote chemical reactions that might lead to life. A key product of those chemical reactions are long chains of carbon-based molecules called polymers – including nucleic acids, molecules considered to

be chemical buildings blocks of life as we know it.

Wet-dry cycles control the concentration of chemicals that feed the fundamental reactions leading to the formation of polymers.

“This paper expands the kind of discoveries Curiosity has made,” said the mission’s project scientist, Ashwin Vasavada of NASA’s Jet Propulsion Laboratory in Southern California. “Over 11 years, we’ve found ample evidence that ancient Mars could have supported microbial life. Now, the mission has found evidence of conditions that may have promoted the origin of life, too.”

The discovery of the Pontours mud cracks

may in fact have provided scientists their first opportunity to study the remains of life’s cauldron. Earth’s tectonic plates constantly recycle its surface, burying examples of its prebiotic history. Mars doesn’t have tectonic plates, so much older periods of the planet’s history have been preserved.

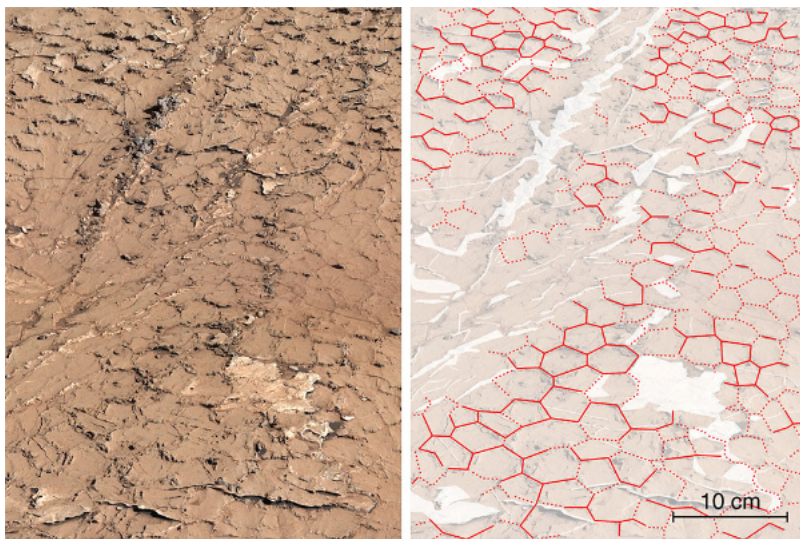
“It’s pretty lucky of us to have a planet like Mars nearby that still holds a memory of the natural processes which may have led to life,” Rapin said.

More About the Mission

Curiosity was built by NASA’s Jet Propulsion Laboratory, which is managed by Caltech in Pasadena, California. JPL leads the mission

A close-up of the panorama taken by Curiosity’s Mastcam at “Pontours” reveals hexagonal patterns – outlined in red in the same image, right – that suggest these mud cracks formed after many wet-dry cycles occurring over years.

Credit: NASA/JPL-Caltech/MSSS/IRAP



Club Offices and Duties

Nominations for next year's officers will begin at the September meeting, and remain open until election at the October meeting.

Club officer nominations are made in September and elections are held in October. The following is a list of responsibilities of each of the officers and what is required to maintain a functioning club.

As stated in the bylaws, the club has five officers: President, Vice President, Secretary, Treasurer and Second Vice President. The business of the club is managed by a Board of Directors. The Board consists of the five elected officers. Each decision of the Board requires an affirmative vote by at least three Board members. The Board can also create additional non-elected offices as required and can initiate impeachment proceedings against officers who have been negligent in performing their duties.

The Prairie Astronomy Club has a fifty year history of service to club members and the community. Potential club officers should

have a good understanding of the history of the club, its formation and mission, its relationship with Hyde Observatory and the types of events, activities and outreach that is part of the tradition of the club. The most complete resource is the book *The Prairie Astronomy Club: Fifty Years of Amateur Astronomy*, which is in the club library or available as a PDF document.

President

The President organizes and directs the regular monthly meetings and all other club activities. The President also prepares the meeting agenda and PowerPoint for the meeting.

The President also officially represents the club at meetings at the regional and national level where he/she is in attendance or delegates this authority. The President has the authority to call meetings of the Board and to appoint non-elected officers.

The President should have good communication skills and be comfortable interacting with the media and public, be a good public speaker, be available to do radio and TV interviews and to deliver prepared introductions and remarks at club-sponsored events.

Another duty of the President is the annual club audit. Within 10 days of assuming office, the President must appoint a committee of three club members to perform the audit. The audit must be completed within 45 days of the close of the fiscal year which is October 31.

When assuming office, the President should hold a meeting of the Board to present his/her direction and ideas for the coming year, and appoint any unfilled non-elected positions.

Vice President

The Vice President is responsible for running

Club Offices and Duties, continued.

club meetings and other events in the absence of the President. The VP is also to be the mediator in cases of procedural dispute and must be available to assume the duties of any officer at the direction of the President. The VP also maintains control of the current inventory of all club property.

Secretary

The Secretary handles all Club correspondence, is responsible for the distribution of information received through official club correspondence and is in charge of Club publicity (often the job of Publicity or Outreach Coordinator is delegated to a non-elected member). The Secretary also sends out membership renewal notices and delivers meeting minutes to the newsletter editor. The Secretary is responsible for maintaining an accurate club membership roster. The master copy of the roster is currently maintained on the Night Sky Network website. The bylaws also require publication of the complete roster in the

newsletter on an annual basis.

Treasurer

The Treasurer is responsible for all Club funds and for keeping accurate records of all monetary transactions. The Treasurer must submit a written report of the club's monetary status at the request of the President or give a verbal report at the request of any member during regular meetings. He/she also prepares an annual financial report in November for publication in the newsletter and presentation at the November meeting. The Treasurer is also responsible for all tax filings and reporting requirements, to maintain the club's 501c3 status.

Second Vice President (and Program Chair)

The Second Vice President is responsible for the formation and presentation of the monthly club programs. Ideally the 2nd VP should try to plan ahead six months to one year to build a list of potential presenters or programs. The 2nd VP

also sends out email announcements of upcoming programs to the membership, and sends a program description to the newsletter/website editors.

The club usually has several appointed positions:

The Publications Chairperson (or Newsletter Editor) is responsible for editing and publishing the *Prairie Astronomer*. The newsletter editor may also be the website manager/editor. The newsletter editor should have a good working knowledge of desktop publishing software (and computers in general), graphics, photo editing, some design and layout experience and some experience with social networking and Internet marketing. The Website editor needs to be familiar with WordPress (or similar CMS software) and graphics and word processing applications. Ideally the newsletter and website editor(s) should have prior experience with the publication of a newsletter or website, or demonstrated skills. The

Club Offices and Duties, continued.

publications chairperson is also responsible for social networking for the club - posting Facebook and Twitter announcements for club meetings and events (or this responsibility might be delegated to another officer or someone appointed by the President).

If the club has an appointed Outreach Coordinator, the coordinator takes on some of the roles performed by other officers - organizes outreach events, shares in media communications tasks, puts together flyers, etc.

The Club Librarian (often the Vice President) manages the club library. He/she

keeps a current bibliographic listing of all Club library material including the archive of all back issues of The Prairie Astronomer. The Club Librarian and Secretary work together to maintain a record of club activities and regularly update the official club history.

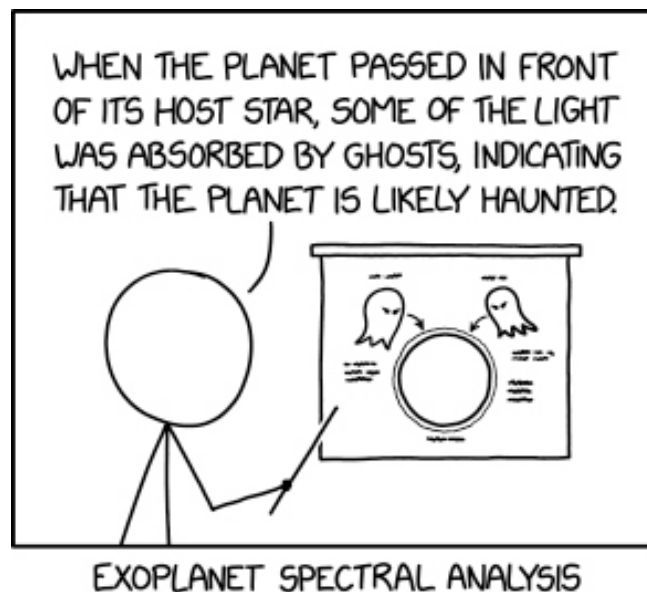
The Observing Chairperson presents a monthly report at Club meetings and/or in the Prairie Astronomer. He/she keeps members informed of upcoming celestial events, sky objects of special interest and star parties.

The Recording Secretary (often the Club's elected Secretary) is responsible for keeping the minutes of the club meetings and

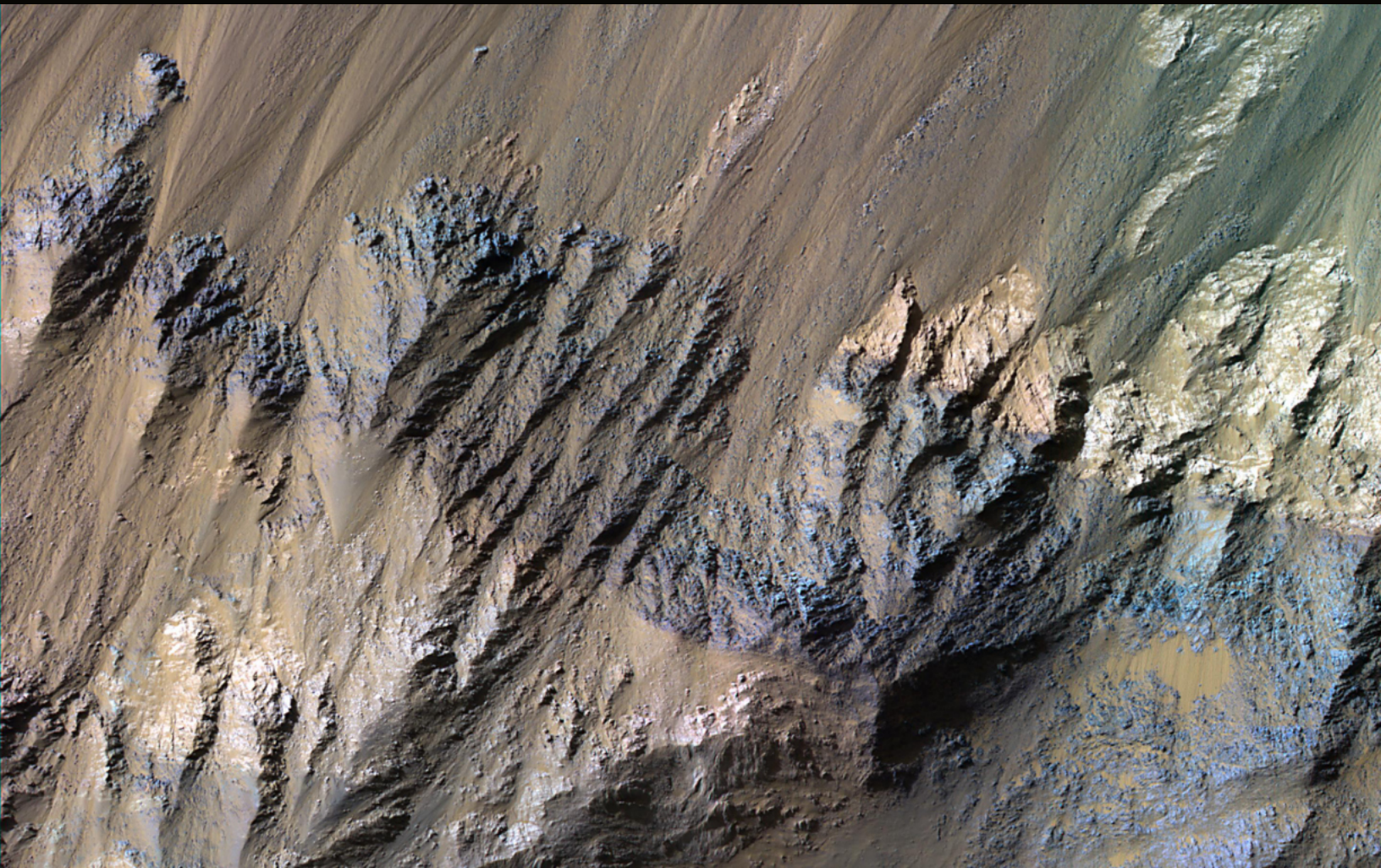
filing a copy with the Club Secretary. Minutes need to be kept in a systematic fashion as they record the history and life of the club and need to be published in the Prairie Astronomer on a monthly basis.

The Site Chairperson (if one is appointed) is responsible for establishing a site committee to oversee the maintenance and security of the club observing site.

While not a requirement of the bylaws, all club officers and appointees should have good computer and social media skills, should be accessible and responsive via email and phone. §



Diverse Minerals in Coprates Chasma



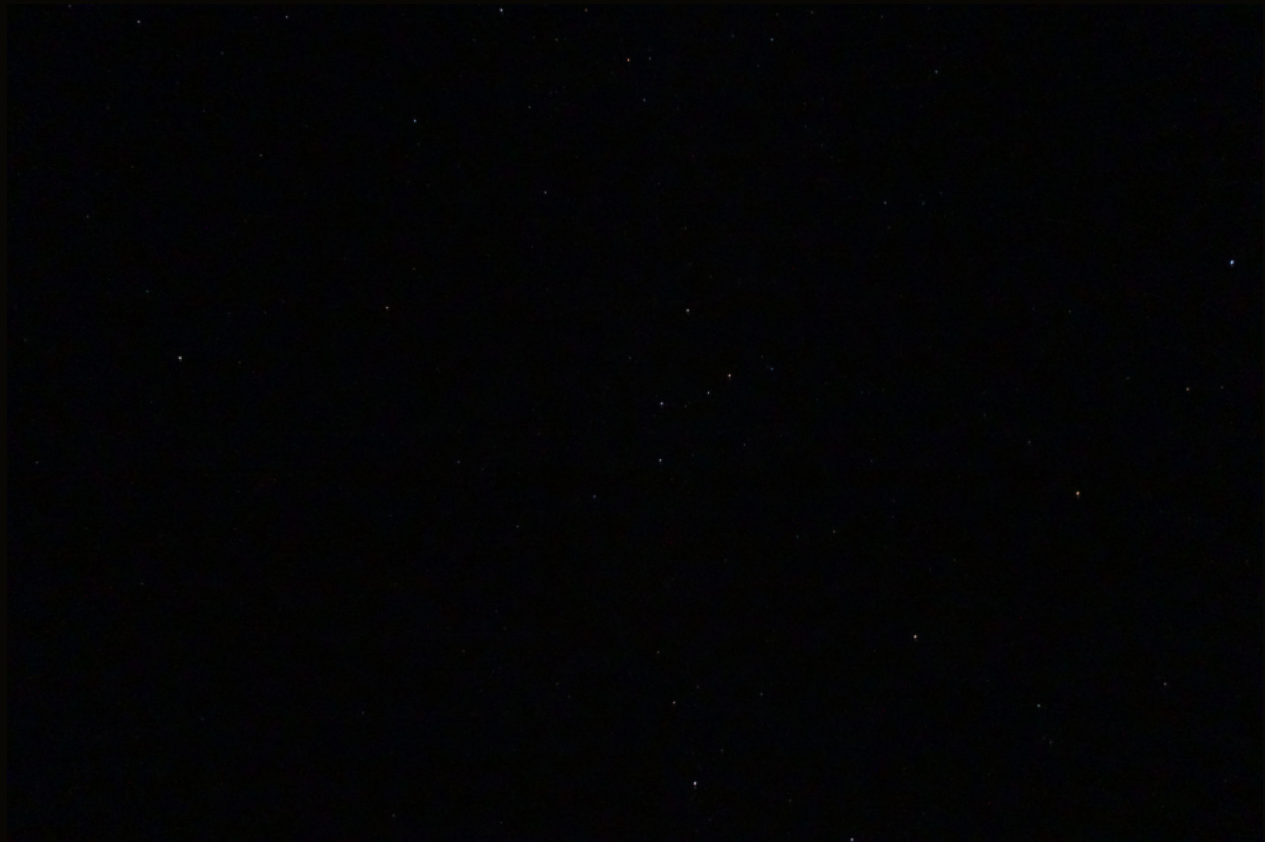
This image shows the southern wall of Coprates Chasma, in the equatorial canyon system of Valles Marineris. While much of the lower slopes are covered by sand, exposed bedrock is clearly visible in the upper canyon walls.

In an enhanced color image, the varying colors – shades of white, cyan, and purple – are suggestive of multiple minerals being present within the bedrock, indicating a complicated geologic history, possibly involving alteration by water. (In this cutout, north is down.)

The University of Arizona, in Tucson, operates HiRISE, which was built by Ball Aerospace & Technologies Corp., in Boulder, Colorado. NASA's Jet Propulsion Laboratory, a division of Caltech in Pasadena, California, manages the Mars Reconnaissance Orbiter Project for NASA's Science Mission Directorate, Washington.

Credit: NASA/JPL-Caltech/University of Arizona

Astrophotography



Cassiopeia by Amos Sobotka.

*f/8, 30 sec single exposure, ISO1600, +3
exposure bias, 4mm focal length, Sony
DSC-WX500, 9:57pm CT, PAC Hill Snake
River Rd, Merritt Reservoir, September 15,
2023.*



Astrophotography



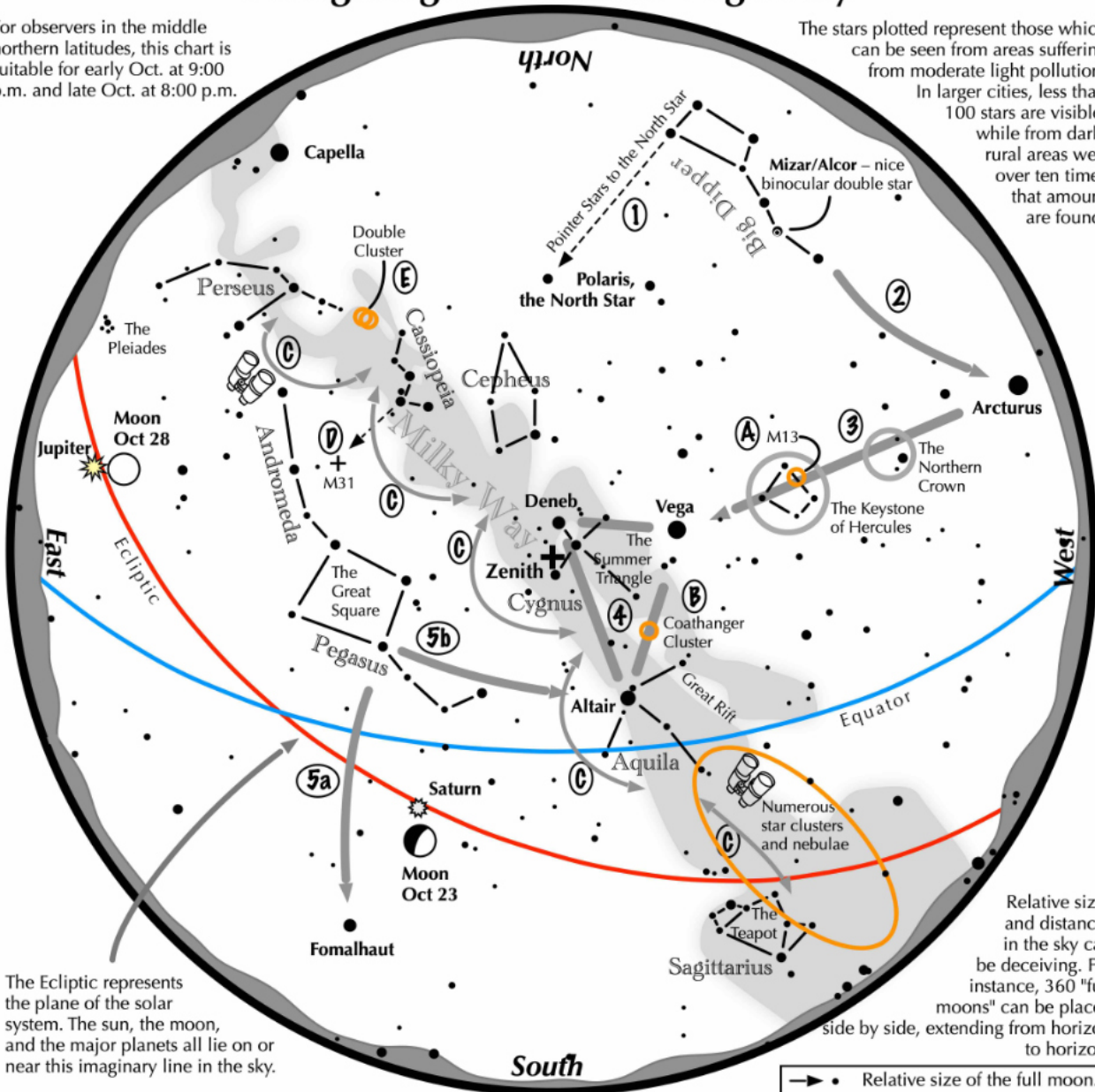
The Milky Way by Amos Sobotka.

f/3.5, 30sec single exposure, ISO1600,+3 exposure bias, 4mm focal length, Sony DSC-WX500, 9:50pm CT, PAC Hill Snake River Rd. Merritt Reservoir, September 15, 2023. Looking south, extent approx. ascent 16-24, +20-70 declination.

Navigating the October Night Sky

For observers in the middle northern latitudes, this chart is suitable for early Oct. at 9:00 p.m. and late Oct. at 8:00 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→ • Relative size of the full moon.

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

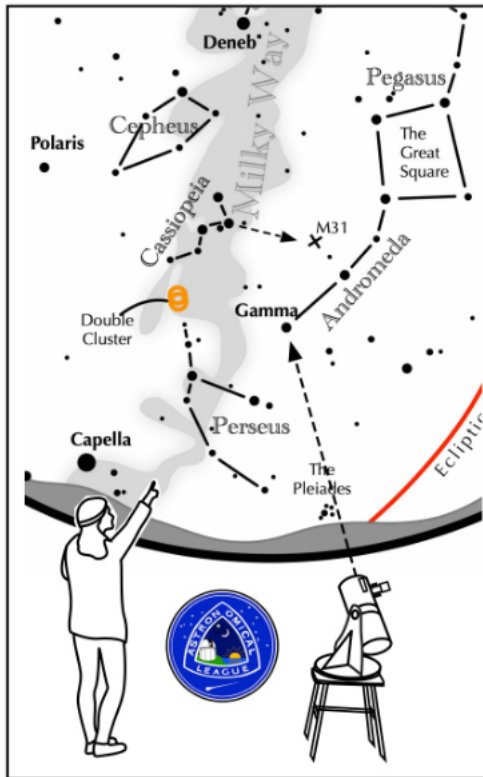
- 1 Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
- 2 Follow the arc of the Dipper's handle. It intersects Arcturus, the brightest star in the early October evening sky.
- 3 To the northeast of Arcturus shines another star of the same brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
- 4 Nearly overhead lie the summer triangle stars of Vega, Altair, and Deneb.
- 5 High in the east are the four moderately bright stars of the Great Square. Its two southern stars point west to Altair. Its two western stars point south to Fomalhaut.

Binocular Highlights

A: On the western side of the Keystone glows the Great Hercules Cluster, a ball of 500,000 stars. **B:** 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger. **C:** Sweep along the Milky Way for an astounding number of fuzzy star clusters and nebulae amid many faint glows and dark bays, including the Great Rift. **D:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **E:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster.



ASTRONOMICAL LEAGUE Double Star Activity



Other Suns: Gamma Andromedae

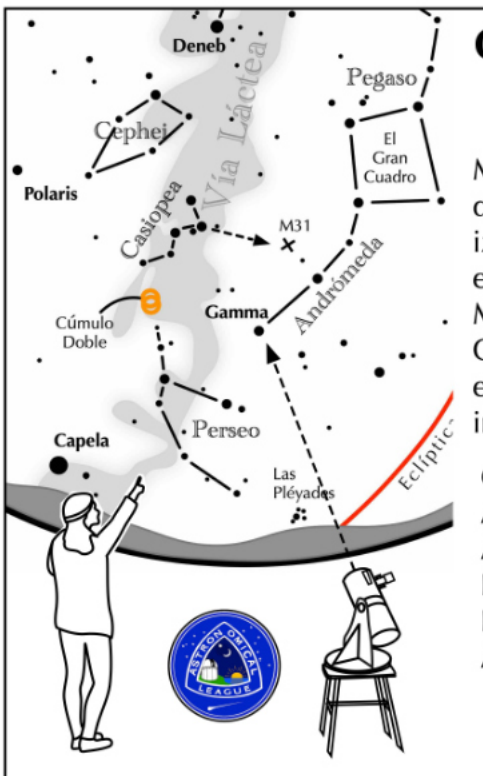
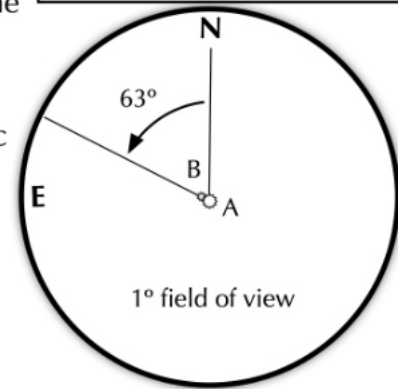
How to find Gamma Andromedae on an October evening

Face northeast. Find the Great Square and the curve of stars extending to the lower left. This is Andromeda. Gamma is the third star on the string and is as bright as the major stars of the Big Dipper. From the "W" of Cassiopeia, Gamma lies to the lower right.

Suggested magnification: 40x
Suggested aperture: >2 inches

Gamma Andromedae

A-B separation: 9.7 sec
A magnitude: 2.3
B magnitude: 5.0
Position Angle: 63°
A & B colors:
orange, blue



Otros Soles: Gamma Andromedae

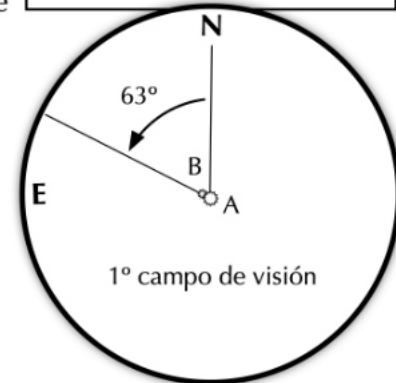
Cómo encontrar Gamma Andromedae en una tarde de Octubre

Mira al noreste. Encuentra el Gran Cuadrado y la curva de estrellas que se extiende hacia la parte inferior izquierda. Gamma es la tercera estrella de la cadena y es tan brillante como las estrellas principales de la Osa Mayor. Desde la "W" de Cassiopeia, Gamma se encuentra en la parte inferior derecha.

Ampliación sugerida: >40x,
Apertura sugerida: >50 mm

Gamma Andromedae

A-B separación: 9.7 sec
A magnitud: 2.3
B magnitud: 5.0
PA: 63°
A & B color:
naranja, azul



From the Archives

September, 1983

Newsworthy Notes

Those of you with scanners that cover the two meter (146Mhz) amateur band may want to try to hear the Space Shuttle Columbia on its next flight tentatively scheduled for October 28th. This mission will be Columbia's first flight carrying the European Space Agency's Spacelab and Dr. Owen Garriot, also known as W5LFL, will be carrying along a small handheld handheld transceiver to communicate with his

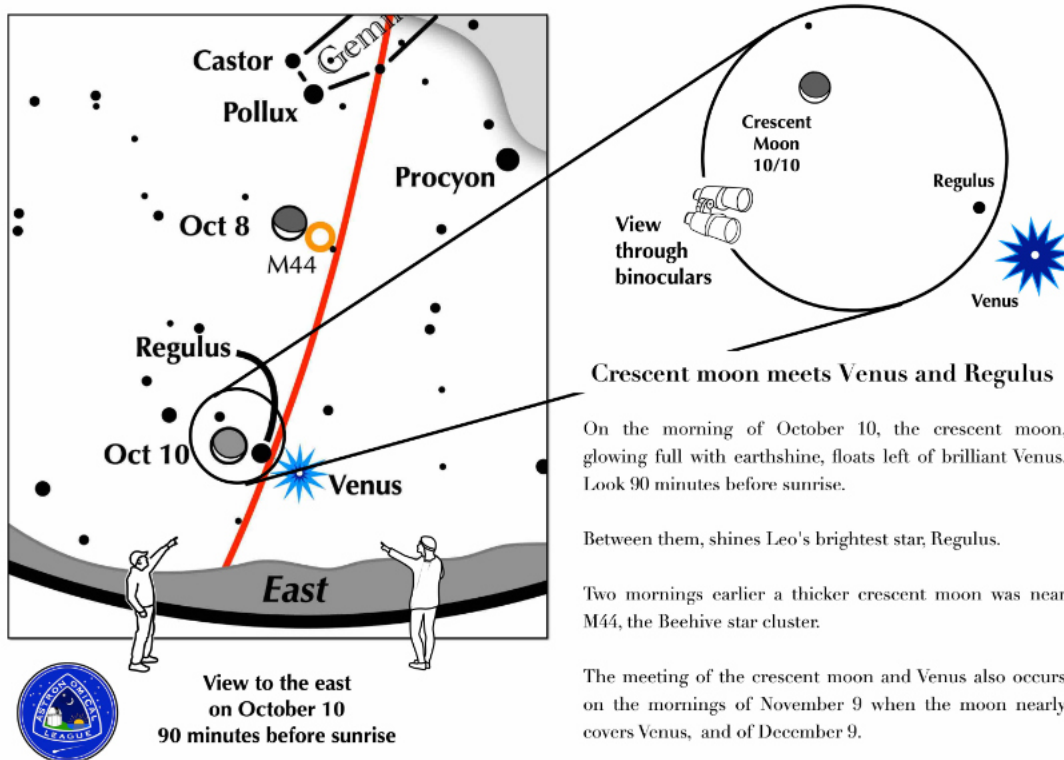
fellow amateur radio operators world-wide.

He will operate during his free time (about one hour per day) and will be transmitting primarily on 145.550 Megahertz, although he could be found anywhere from 145.510 to 145.770 Mhz. He will be transmitting on the even minutes of the hour and listening for signals during the odd minutes. You will need a good outside antenna to

hear him. Your observing chairman David Knisely, KAOCZC, will be attempting to make contact with Dr. Garriot and may eventually provide tapes of his results. There will be a special 900 telephone number that will provide information on what times Dr. Garriot will be on the air. More on this next month.

Dave Knisely

In the early morning on October 10, try this challenge:



Hyde Volunteer Appreciation Dinner and Volunteer of the Year Award



Lee Taylor received the 2022 Hyde Volunteer of the Year award at the Volunteer Appreciation Dinner held at Morrill Hall on September 19th. The award was presented by Ron Veys.

Congratulations Lee!



Rachel Scheet, Coordinator at Mueller Planetarium, hosted our volunteer appreciation dinner at Morrill Hall, and also treated us to a special full dome planetarium program.

From Galileo to Clipper, Exploring Jupiter's Moons

Vivian White



This article is distributed by NASA's Night Sky Network (NSN).

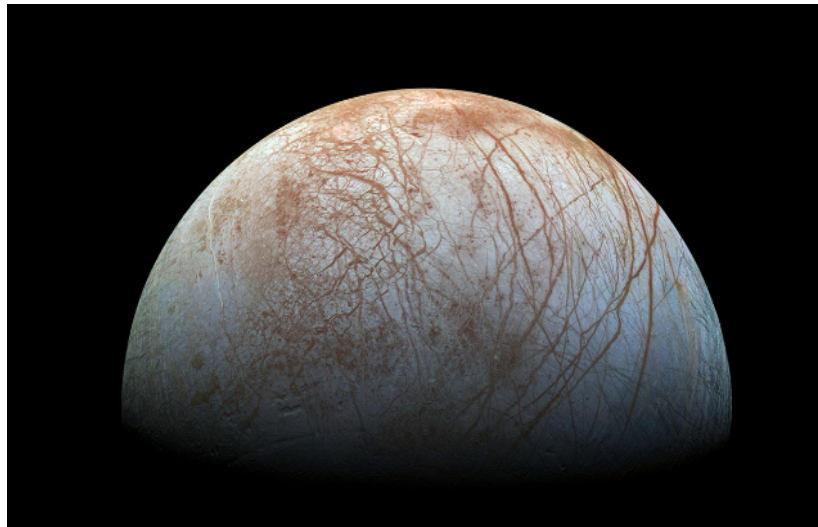
The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

"...We, too, are made of wonders, of great and ordinary loves, of small invisible worlds, of a need to call out through the dark."

From *In Praise of Mystery: A Poem for Europa* by Ada Limon

As autumn begins, if you're up late, you may notice a bright point of light rising in the east. Look a bit closer, with a pair of binoculars, and you'll notice it's not a star at all. While stars look point-like no matter how big your backyard telescope, this light appears as a circle under closer examination. Even more curious, you will likely see a line of smaller dots on one or both sides. Congratulations! You've rediscovered the king of the planets - majestic Jupiter - and its four largest moons.

Galileo famously chronicled the four moving dots near Jupiter and surmised that they were orbiting the distant world. While Jupiter has well over 80 discovered moons as of



Jupiter's Moon Europa

September 2023, these brightest four are called the "Galilean Moons" - Io, Europa, Ganymede, and Callisto. (Great mnemonics exist to remember these in order of distance from Jupiter, such as "I Eat Green Caterpillars") You can follow these like Galileo did, using stargazing apps or the handy image below. A favorite beginning

observing challenge is to track the movement of the Galilean Moons over the course of many nights. Even within a few hours, you will notice them moving in relation to Jupiter, just as Galileo did.

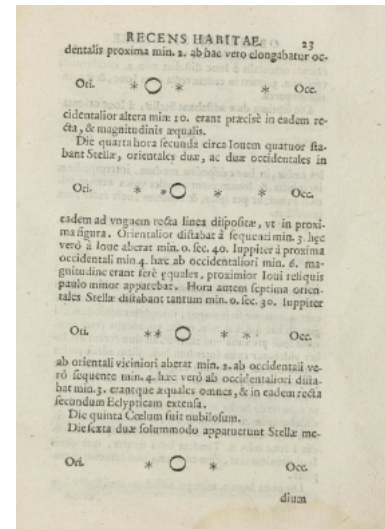
Fast forward 414 years, and NASA will be sending a robotic mission to investigate the surface of one of

Exploring Jupiter's Moons, continued.

these distant worlds. The Europa Clipper Mission is launching to the cold, icy moon in 2024, to begin orbiting in 2030. With its salty oceans covered by ice, Europa was chosen as an excellent location to continue the search for life outside of Earth. Clipper will be the largest spacecraft ever sent to another planet, designed to withstand Jupiter's punishing radiation. Once it arrives at Jupiter in 2030, NASA plans to do about 50 flybys of Europa, mapping almost the entire surface of this watery

world.

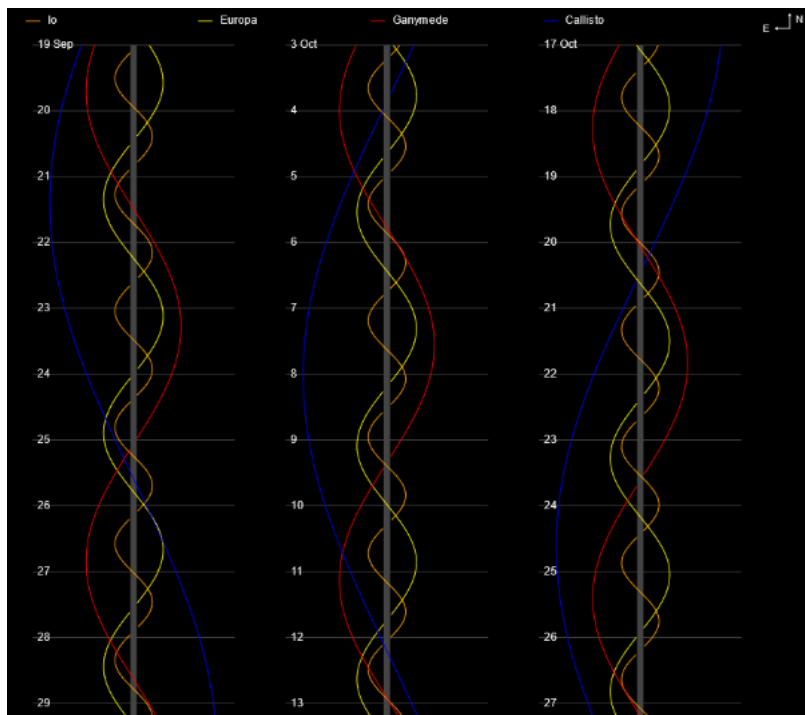
What was once only dreamed of in the small telescope of Galileo, or in great works of fiction, NASA is turning our wildest imagination into reality. One of the celebrated quotes from the classic 2010: *Odyssey Two* warns, "All these worlds are yours, except Europa. Attempt no landing there." Science fiction fans can feel relieved knowing that writer Arthur C. Clarke gave his blessing for the Europa Clipper mission.



Galileo's drawings of Jupiter and its Medicean Stars from *Sidereus Nuncius*. Image courtesy of the History of Science Collections, University of Oklahoma Libraries.

Join the Europa Message in a Bottle Campaign to send your name with the spacecraft, hear the rest of the poem by the US Poet Laureate, and learn more about the wonders of space travel with the Clipper Mission: <https://europa.nasa.gov/participate>

Watch a wonderful Clipper webinar with Dr. Cynthia Phillips, planetary geologist with the mission: <https://www.youtube.com/live/RnnLJBLRBCA?feature=shared&t=269>



The position of the Galilean Moons of Jupiter in October 2023: <https://in-the-sky.org/jupiter.php>

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

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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.

