

The Prairie Astronomer

April 2020 Volume 61, Issue #4

*Galaxias
Chaos,
Mars*



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

We are going to host our April 28th meeting at 7:30 PM via Zoom. Jim Kvasnicka will present his program on comets including background, sources, and some of his great sketches.

FUTURE PROGRAMS

The Observable Universe (will be rescheduled)
June - Solar Star Party
July - Review of the Nebraska Star Party
October - Club Viewing Night
November - How to Buy a Telescope
December - Holiday Gathering for club members

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Cover Photo:

Galaxias Chaos is located on the northern border of the Elysiun volcanic complex. Chaos terrain develops by erosion, often along faults, that create regions of mesas and valleys.

Orbit Number: 80119
Latitude: 33.6966
Longitude: 146.662
Instrument: VIS Captured:
2020-01-06 07:47

Credit: NASA/JPL-
Caltech/Arizona State
University



The Prairie Astronomy Club:
Fifty Years of Amateur Astronomy

Buy the book! The Prairie Astronomy Club: Fifty Years of Amateur Astronomy.
Order online from [Amazon](https://www.amazon.com) or [lulu.com](https://www.lulu.com).

COMPILED AND EDITED BY MARK DAHMKE

EVENTS



PAC Meeting

Tuesday April 28th, 7:30pm (virtual meeting via Zoom)
Comets

PAC Meeting

Tuesday May 26, 2020, 6:00pm

June 12-14 MSRAL, Oklahoma City

June 19-21 Sangre Star Festival, Westcliffe, Co

PAC Meeting

Tuesday June 30, 2020, 6pm

Solar Star Party

July 16-18 ALCON, Albuquerque, NM

July 19-24 Nebraska Star Party

July 25 Hillcrest Golf Star Party, Lincoln

2020 STAR PARTY DATES



Photo by Brian Sivill

Star Party Date Star Party Date

January	Jan 17	Jan 24
February	Feb 14	Feb 21
March	Mar 13	Mar 20
April	Apr 17	Apr 24
May	May-15	May 22
June	Jun 12	Jun 19
July	Jul 10	Jul 17
NSP	July 19 - 24	
August	Aug 14	Aug 21
September	Sep 11	Sep 18
October	Oct 9	Oct 16
November	Nov 6	Nov 13
December	Dec 11	Dec 27

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



PAC E-MAIL:

info@prairieastronomyclub.org

PAC-LIST:

Subscribe through [GoogleGroups](#).
To post messages to the list, send to the address:

pac-list@googlegroups.com

ADDRESS

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

WEBSITES

www.prairieastronomyclub.org
<https://nightsky.jpl.nasa.gov>
www.hydeobservatory.info
www.nebraskastarparty.org
www.OmahaAstro.com
Panhandleastronomyclub.com
www.universetoday.com/
www.planetary.org/home/
<http://www.darksky.org/>



Night Sky Network

The President's Message

Bob Kacvinsky

Welcome to spring, when flowers and galaxies show their fresh beauty while the sun continues its pure white disk. I hope a few of you have been able to get out and privately observe over the past month. I received a new mount for the Orion 80 mm Short Tube and got everything set up for my son's family. The solar filter works well and so far the moon has come in quite nicely. Have not tested it on deep sky objects yet but hope to soon.

April Meeting Update

We are going to host our April 28th meeting at 7:30 PM [via Zoom](#). Jim Kvasnicka will present his program on Comets including background, sources, and some of his great sketches. You will not want to miss participating in this meeting. I will be sending out about April 23rd to club members an invitation via the Night Sky Network. OAS recently did their April meeting via Zoom and it reportedly worked well.

The COVID-19 pandemic has been causing a lot of astronomy event cancellations over the last couple weeks. A few key cancellations to note were the June 9 MDA Camp Star Party in Fremont, the Mid States Astronomical League (MSRAL) meeting June 12-14th in Oklahoma, and the Sangre Star Festival June 19-21 in Colorado. We also had 3 local star parties that the dates are now floating that might still be scheduled further into the future. I suspect some may be pushed into the fall so please stay tuned. We will try and keep everyone informed as hopefully things start to free up.

The PAC Board will evaluate our May scheduled PAC Star parties as we get closer and will follow the guidelines from our governor. Hopefully we will have more information to share during the April Zoom PAC Meeting.

This might be a real good time to consider completing one of the Urban AL Observing Programs such as the Lunar Program. It

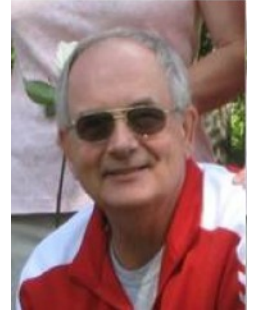
can easily be finished in a month of observing from your backyard using telescope, binoculars, and visual observations. This would be a nice tune-up for the summer observing activities.

I suspect many of you are like me and anxious to get out and do some observing with other members and friends. If you have any questions, suggestions, or other ideas in how PAC can better serve its members please drop me a note. We all look forward to when we can begin to resume our hobby safely and socially. Stay safe and healthy.

Bob Kacvinsky
PAC President

kacvinskyb@yahoo.com

402-499-1816



Citizen scientist Kevin M. Gill processed this JunoCam image, which was taken on April 10, 2020 as the Juno spacecraft performed its 26th close flyby of the planet. For more information see: <https://www.jpl.nasa.gov/spaceimages/details.php?id=PIA23803>

Image credit: Image data: NASA/JPL-Caltech/SwRI/MSSS Image processing by Kevin M. Gill, © CC BY

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.



Arp 18/NGC 4088 is in Arp's category for detached segments. I take it to be the piece on the northeastern end. It has a redshift that's 595 km/s while the galaxy has a redshift of 757 km/s. So could it be an entirely separate galaxy? Or is the difference due to that part of the galaxy rotating toward us? NED considers it part of the galaxy. A southwestern clump has a similar difference but is receding. For this reason, I am going with NED that it is a part of the galaxy. Since NGC 4088 doesn't appear to be interacting with NGC 4085 at the bottom of my image the question remains as to what caused this odd detached piece?

NED classifies NGC 4088 as SAB(rs)bc III, the NGC Project

agrees as does Seligman. A very rare agreement for all three! The galaxy was discovered by William Herschel on March 9, 1788. NGC 4085 is classified by NED as SAB(s)c:?? HII as does the NGC Project. Seligman is silent as to its classification. NGC 4085 was also discovered by William Herschel but on April 12, 1789, over a year later. Both are in the original Herschel 400 list. My comments about Arp 18 (I didn't know it was an Arp galaxy at the time) from May 4, 1984 on an excellent night with my 10" f/5 at powers up to 150x reads: "Bright easy oval, somewhat brighter to the northeast (detached segment?) Nucleus ill-defined." My entry for NGC 4085 the same night with the same scope reads "Small faint oval with

bright center. Fits in the same 150x field with NGC 4088. Nice pair." The last two words were penciled in at a later date and are not part of the computer file, only the printout. It was discovered by William Herschel on March 9, 1788 and is in the original Herschel 400 program. My notes from May 4, 1984 using a 12.5" f/6 scope at up to 150x on an excellent night reads "bright, easy oval, some brighter to the NE. Nucleus ill-defined."

Arp's image:

http://ned.ipac.caltech.edu/level5/Arp/Figures/big_arp18.jpeg



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

Planets

Venus: Starts the month at its peak brightness of -4.7.

Mercury: becomes visible around May 11th well below Venus.

Jupiter and Saturn: The two are within 5° of each other all month.

Mars: Rises just before 3:00 am to start May.

Uranus and Neptune: Both are not visible.

Meteor Showers

Eta Aquariids: Peaks the night of May 4-5 with 10-30 meteors per hour.

Messier List

M49/M61: Galaxies in Virgo.

M51: The Whirlpool Galaxy in Canes Venatici.

M63: The Sunflower Galaxy in Canes Venatici.

M64: The Black Eye Galaxy in Coma Berenices.

M85/M94: Galaxies in Coma Berenices and Canes Venatici.

M101: The Pinwheel Galaxy in Ursa Major.

M102: Galaxy in Draco.

M104: The Sombrero Galaxy in Virgo.

Last Month: M40, M65, M66, M95, M96, M105, M106, M108, M109

Next Month: M58, M59, M60, M84, M86, M87, M88, M89, M90, M91, M98, M99, M100

NGC and other Deep Sky Objects

NGC 4244: The Silver Needle Galaxy in Canes Venatici.

NGC 4651/4656: The Whale Galaxy and Hockey Stick galaxies in Canes Venatici.

NGC 4666: Elongated galaxy in Virgo.

NGC 4754/4762: Galaxy pair in Virgo.

NGC 4866: Elongated galaxy in Virgo.



Double Star Program List

Kappa Bootis: Yellow and blue stars.

Iota Bootis: Yellow and dim blue pair.

Pi Bootis: Pair of white stars.

Epsilon Bootis: Yellow and greenish yellow stars.

Xi Bootis: Yellow pair.

Delta Bootis: Yellow primary with a blue-white secondary.

Mu Bootis: Two yellow stars.

Zeta Corona Borealis: Light blue and greenish yellow stars.

Challenge Object

Markarian's Chain: Galaxy group along the Virgo and Coma Berenices border. How many can you fit in your FOV?

Historically astronomers utilized sketches to record their observations and discoveries. With the advent of astrophotography you may wonder why anyone would want to sketch their observations. There is no reason to compare the two since they are different forms of recording information. Astrophotography requires a sizable investment while sketching requires only paper, a pencil, and a few other inexpensive items.

There are many advantages to sketching astronomical objects:

- Sketching requires the observer to slow down to record what is being viewed.
- Sketching provides a permanent record of observations.
- Photographs are beautiful and detailed but they do not record what is actually observed at the eyepiece.
- Sketching brings out a feeling of accomplishment at having created a lasting impression of the object observed.

The Sketching Observing Program was not created for artist. It is for everyone regardless of their artistic ability. There are many tutorial links and resources you can access to help you improve your sketching skills.

The main focus of the Sketching Observing Program is not to make artist out of amateur astronomers, but to help them slow down the observing process and improve their observing skills.

The object list was created by members of the Haleakala Amateur Astronomers of Maui, Hawaii. The list includes lunar, planetary, double stars, nebula, open and globular clusters, and more. The list includes the relative sketching difficulty of the object. Level 1 is simple, Level 2 and 3 are more complex objects to sketch.

There are 114 objects on the list and to qualify for the Sketching Observing Program award you must sketch 75 of the 114 objects on the list. All sketches must be made from the eyepiece and not from photographs of the object. It is acceptable to clean

up the sketches later but not add enhancements not seen at the eyepiece. Previous sketches are allowed at a maximum of 10. The usual information is required for your observations and can be found on the Astronomical League website under Observe. The list of all observing programs will be displayed and you can select the program you are working on.

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

If you have any questions regarding the Sketching Observing Program or need help getting started in any of the observing programs please ask me and I will be glad to help.

Habitable Zone Planet Hiding in Plain Sight

A team of transatlantic scientists, using reanalyzed data from NASA's Kepler space telescope, has discovered an Earth-size exoplanet orbiting in its star's habitable zone, the area around a star where a rocky planet could support liquid water.

Scientists discovered this planet, called Kepler-1649c, when looking through old observations from Kepler, which the agency retired in 2018. While previous searches with a computer algorithm misidentified it, researchers reviewing Kepler data took a second look at the signature and recognized it as a planet. Out of all the exoplanets found by Kepler, this distant world – located 300 light-years from Earth – is most similar to Earth in size and estimated temperature.

This newly revealed world is only 1.06 times larger than our own planet. Also, the amount of starlight it receives from its host star is 75% of the amount of light Earth receives from our Sun – meaning the exoplanet's temperature may be similar to our planet's, as well. But unlike Earth, it orbits a red dwarf. Though none have been observed in this system, this type of star is known for stellar flare-ups that may make a planet's environment challenging for any potential life.

"This intriguing, distant world gives us even greater hope that a second Earth lies among the

stars, waiting to be found," said Thomas Zurbuchen, associate administrator of NASA's Science Mission Directorate in Washington. "The data gathered by missions like Kepler and our Transiting Exoplanet Survey Satellite (TESS) will continue to yield amazing discoveries as the science community refines its abilities to look for promising planets year after year."

There is still much that is unknown about Kepler-1649c, including its atmosphere, which could affect the planet's temperature. Current calculations of the planet's size have significant margins of error, as do all values in astronomy when studying objects so far away. Rocky planets orbiting red dwarfs are of particular astrobiological interest. However, astrobiologists will need much more information about this planet in order to gauge whether it is promising for life as we know it. But based on what is known, Kepler-1649c is especially intriguing for scientists looking for worlds with potentially habitable conditions.

There are other exoplanets estimated to be closer to Earth in size, such as TRAPPIST-1f and, by some calculations, Teegarden c. Others may be closer to Earth in temperature, such as TRAPPIST-1d and TOI 700d. But there is no other exoplanet that is considered to be closer to Earth in both of these values that also lies in the habitable zone of its system.

"Out of all the mislabeled planets we've recovered, this one's particularly exciting – not just because it's in the habitable zone and Earth-size, but because of how it might interact with this neighboring planet," said Andrew Vanderburg, a researcher at the University of Texas at Austin and first author on the paper released today in *The Astrophysical Journal Letters*. "If we hadn't looked over the algorithm's work by hand, we would have missed it."

Kepler-1649c orbits its small red dwarf star so closely that a year on Kepler-1649c is equivalent to only 19.5 Earth days. The system has another rocky planet of about the same size, but it orbits the star at about half the distance of Kepler-1649c, similar to how Venus orbits our Sun at about half the distance that Earth does. Red dwarf stars are among the most common in the galaxy, meaning planets like this one could be more common than we previously thought.

Looking for False Positives

Previously, scientists on the Kepler mission developed an algorithm called Robovetter to help sort through the massive amounts of data produced by the Kepler spacecraft, managed by NASA's Ames Research Center in California's Silicon Valley.

Kepler searched for planets using the transit method, staring at stars, looking for dips in brightness as planets passed in front of their host stars.

Most of the time, those dips come from phenomena other than planets – ranging from natural changes in a star's brightness to other cosmic objects passing by – making it look like a planet is there when it's not. Robovetter's job was to distinguish the 12% of dips that were real planets. Those signatures Robovetter determined to be from other sources were labeled "false positives," the term for a test result mistakenly classified as positive.

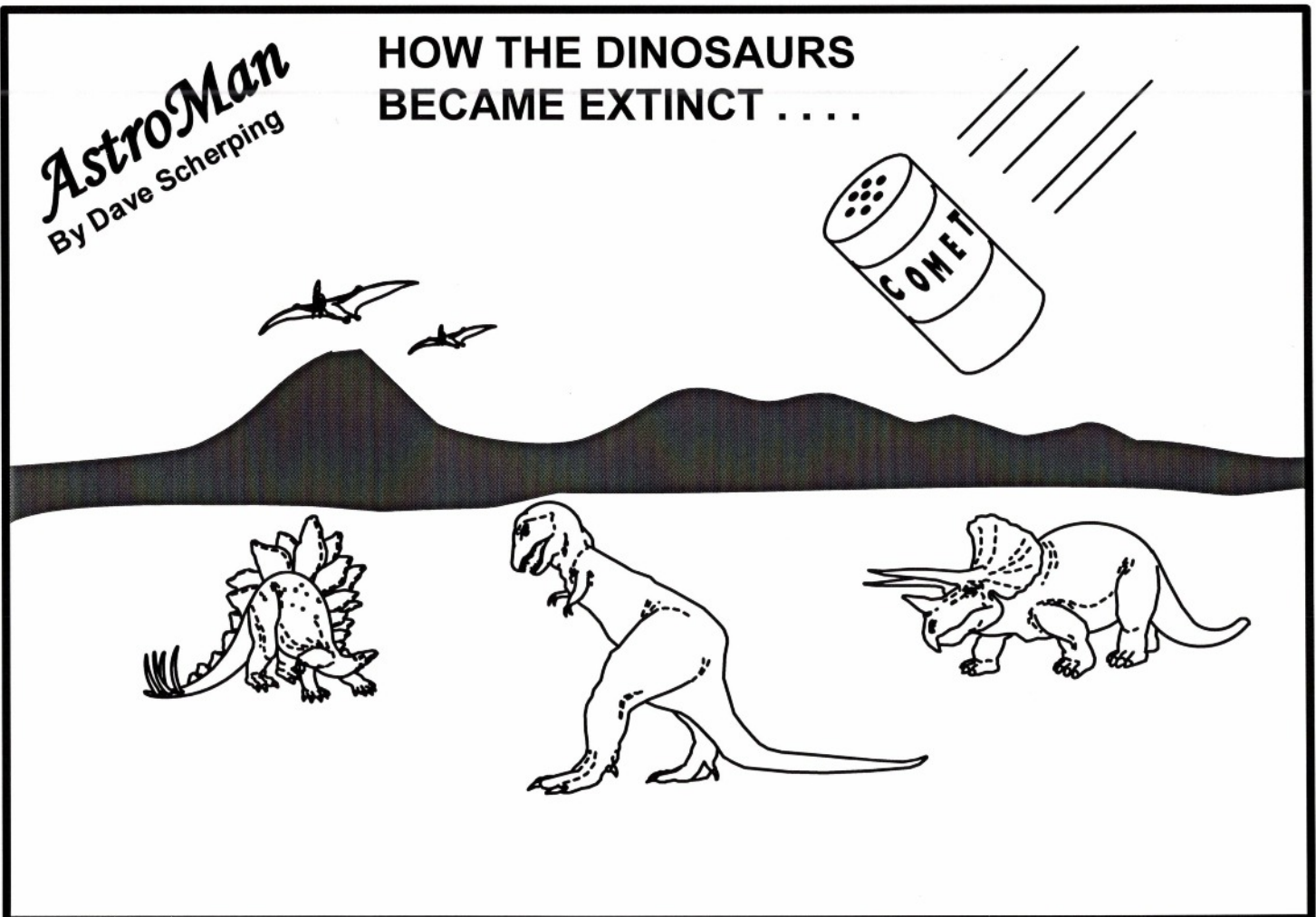
With an enormous number of tricky signals, astronomers knew the algorithm would make mistakes and would need to be double-checked – a perfect job for the Kepler False Positive Working Group. That team reviews Robovetter's work, going through all false positives to ensure they are truly errors and not exoplanets, ensuring fewer potential discoveries are overlooked. As it turns out, Robovetter had mislabeled Kepler-1649c.

Even as scientists work to further automate analysis processes to get the most science as possible out of any given dataset, this discovery shows the value of double-checking automated work. Even

six years after Kepler stopped collecting data from the original Kepler field – a patch of sky it stared at from 2009 to 2013, before going on to study many more regions – this rigorous analysis uncovered one of the most unique Earth-analogs discovered yet.

A Possible Third Planet

Kepler-1649c not only is one of the best matches to Earth in terms of size and energy received from its star, but it provides an entirely new look at its home system. For every nine times the outer planet in the system orbits the host star, the inner planet orbits almost exactly four times. The



fact that their orbits match up in such a stable ratio indicates the system itself is extremely stable, and likely to survive for a long time.

size planet in the habitable zone of a red dwarf star. These small and dim stars require planets to orbit extremely close to be within that zone – not too warm and not too cold – for life as we know

"The more data we get, the more signs we see pointing to the notion that potentially habitable and Earth-size exoplanets are common around these kinds of stars," said Vanderburg. "With red dwarfs almost everywhere around our galaxy, and these small, potentially habitable and rocky planets around them, the chance one of them isn't too different than our Earth looks a bit brighter."

Missions such as Kepler and TESS help contribute to the field of astrobiology, the interdisciplinary research into understanding how the variables and environmental conditions of distant worlds could harbor life as we know it, or whatever other form that life could take.



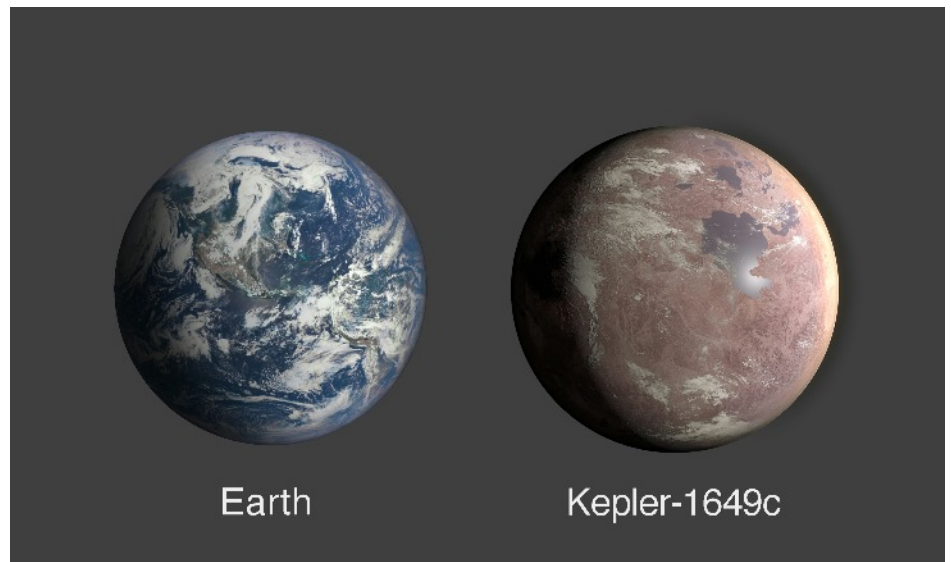
An illustration of what Kepler-1649c could look like from its surface. Credits: NASA/Ames Research Center/Daniel Rutter

Nearly perfect period ratios are often caused by a phenomenon called orbital resonance, but a nine-to-four ratio is relatively unique among planetary systems. Usually resonances take the form of ratios such as two-to-one or three-to-two. Though unconfirmed, the rarity of this ratio could hint to the presence of a middle planet with which both the inner and outer planets revolve in synchronicity, creating a pair of three-to-two resonances.

The team looked for evidence of such a mystery third planet, with no results. However, that could be because the planet is too small to see or at an orbital tilt that makes it impossible to find using Kepler's transit method.

Either way, this system provides yet another example of an Earth-

it to potentially exist. Though this single example is only one among many, there is increasing evidence that such planets are common around red dwarfs.



A comparison of Earth and Kepler-1649c, an exoplanet only 1.06 times Earth's radius. Credits: NASA/Ames Research

From the Archives: April, 1980

The Prairie Astronomy Club trotted out its wares for full public inspection all day Saturday, April 26, in celebration of Astronomy Day 1980.

From opening to closing time at Gateway Shopping Center, the club was set up on both the indoor and outdoor malls. On the Gallery Mall was a telescope display with scopes ranging from 6 to 12 inches in aperture contributed by Ron Veys, Steve Hyatt and Rick Johnson. Russ Genzmer's Apple Computer star map was displayed continuously

throughout the day and Rick Johnson had one of his microcomputers programmed to ask multiple choice questions of passersby in an astronomy quiz.

In a demonstration of telescope optics, customers were invited to view an unidentified picture over 300 feet away down the mall. There was an astrophotography display and a number of handouts about Hyde Observatory, and the the club.

On the garden mall, the solar telescope was set up to allow safe viewing of the sun.

During the evening, Hyde Observatory was open as usual, and club members brought out a variety of telescopes to supplement the instruments usually available at the community facility.

All of these activities will be described in a written presentation that is to be submitted for consideration in the Edmund Scientific Co Astronomy Day Awards contest.



Photos are from a 1980s Astronomy Day event at Gateway Mall.

27th Nebraska Star Party - July 19-24



Mark Dahmke

Photo Credit: Fred Hultstrand History in Pictures Collection, NDSU, Fargo, N.D.

Join us this summer as families from all over the US and around the world gather in the sparsely populated sand hills of North Central Nebraska to spend a good week under a galaxy of stars.

NSP Schedule of Events

Sunday: registration and check-in, optional dinner.

Monday: registration and check-in, field school, optional dinner.

Tuesday: registration and check-in, swap meet, field school, free “Cattle Country” hamburger dinner.

Wednesday: (All at Valentine High School) field school, registration, swap meet, speaker program, children’s program, dinner on your own.

Thursday: Brewer’s Niobrara Canoe or tube float, optional dinner.

Friday: public star party at 9pm.

For more information see the [NSP website](#).

Register online or at NSP!

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

CLUB APPAREL



Order club apparel from cafepress.com:



Shop through Amazon Smile to automatically donate to PAC:



CLUB OFFICERS

President	Bob Kacvinsky kacvinskyb@yahoo.com
Vice President	Rick Brown rickerbrown2000@gmail.com
2nd VP (Program Chair)	James Quach jamesq@utexas.edu
Secretary	Bill Lohrberg wmlohrberg89@gmail.com
Treasurer	John Reinert jr6@aol.com
Club Observing Chair	Jim Kvasnicka jim.kvasnicka@yahoo.com
Outreach Coordinator	Mike Kearns mkearns@neb.rr.com
Website and Newsletter Editor	Mark Dahmke mark@dahmke.com

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.