NORTHERN LIGHTS

NORTH CENTRAL REGION OF THE ASTRONOMICAL LEAGUE

Summer 2023 - Volume 8, Number 1

INSIDE THIS ISSUE OF *Northern Lights*

NCRAL CHAIR'S MESSAGE

NCRAL 2023 convention has come and gone, and it was a good one. Our hosts, the *Twin City Amateur Astronomers,* did a bang-up job and are to be congratulated. I especially want to thank **Carl Wenning**, who served as this year's convention chair, TCAA President **Tom Willmitch**, Masters of Ceremonies **Dave Osenga** and **Dana Sawyer**, and all other TCAA members whose efforts resulted in a phenomenal meeting.

This year's theme was *Amateur Astronomy for Amateurs*. It included a mix of talks and panel discussions focusing on small-telescope astronomy, planning for the upcoming solar eclipses this fall and next April, recent developments, and many other topics of interest to amateurs. I particularly enjoyed the talk *Meteoroids, Meteors, and Meteorites* by Illinois Wesleyan students **Sydney Dunlap** and **Ethan Lowder** about the nature of these smallest solar system objects. This was a great primer on what meteors are, their origins, and their physical properties. I have always been interested to know a little about the physical makeup of the objects I observe.

I particularly enjoyed the after-dinner talk *JWST: The Just Wonderful Space Telescope* by **Dr. John Martin** from the University of Illinois – Springfield. This was a great introduction to what JWST is, how it works, and how it is used to reveal details of distant galaxies and stars that can only be observed using infrared wavelengths. Dr. Martin dazzled us with numerous images and described what has been learned and what is planned going forward with the largest space telescope ever launched.

This year's conference was held at the Grand Bear Resort, North Utica, Illinois, an excellent venue for the convention and centrally located for visitors from around the Region. Again, thanks and congratulations to the TCAA for doing a great job with this year's conference.

I also look forward to next year's NCRAL 2024 conference, hosted by the Neville Public Museum Astronomical Society, De Pere (Green Bay), Wisconsin. The date is May 17-18, 2024, and the theme is *Universe in Color*. I can't wait to see what is in store for us, so mark your calendars and stay tuned as information becomes available. You won't want to miss it!

I want to thank Carl Wenning for his help and encouragement particularly. You have all come to know Carl as the NCRAL Chair, a position he has held from 2017 until this year. Over the past six years, he has done yeoman's service in our Region. He is one of the most active and enthusiastic amateur astronomers I know. He has been an active member of the Twin City Amateur Astronomers since 1978, is an AL Master Observer, and continues to serve as the editor of the *Northern Lights* newsletter. I look up to Carl and am grateful he will still be there to coach and assist me as your regional chairperson. Carl has really big shoes to fill. I hope to carry on the excellent work he has promoted. Thank you so much, Carl!

As your new chairperson, I would like to get to know you all a little better. At this year's conference, I asked if any of you would invite me to visit your club meetings or observing sessions. In response, **Barry Beaman** from *Rockford Amateur Astronomers* invited me to their May 17th meeting at the Lockwood Park Observatory. I am happy to report that I attended their meeting, which I greatly enjoyed. I was welcomed by their president **Chuck Jansen** and ten other club members in attendance. **Keith Short** provided a fascinating talk about deep sky photography and showed video images of the Milky Way from the Big Bend National Park.

The Lockwood Park Observatory has a unique, customed-designed 10" Astro-Physics f/13 refractor. Unfortunately, we could not open the observatory due to clouds, but I would

love to observe with this one-of-a-kind scope. Maybe I will get another chance to do this at one of their public viewing nights planned for every 4th Saturday evening.

I want your help to further my efforts to get to know the astronomy clubs in the NCRAL region by inviting me to attend one of your club meetings or observing sessions. I will visit you. NCRAL has a long and successful astronomical tradition we can be very proud of. After my visit, and if space permits, I would like to feature your club in the *Northern Lights* newsletter. Rockford Amateur Astronomers was the first to invite me to come. Thank you very much, Rockford! Who will be next?

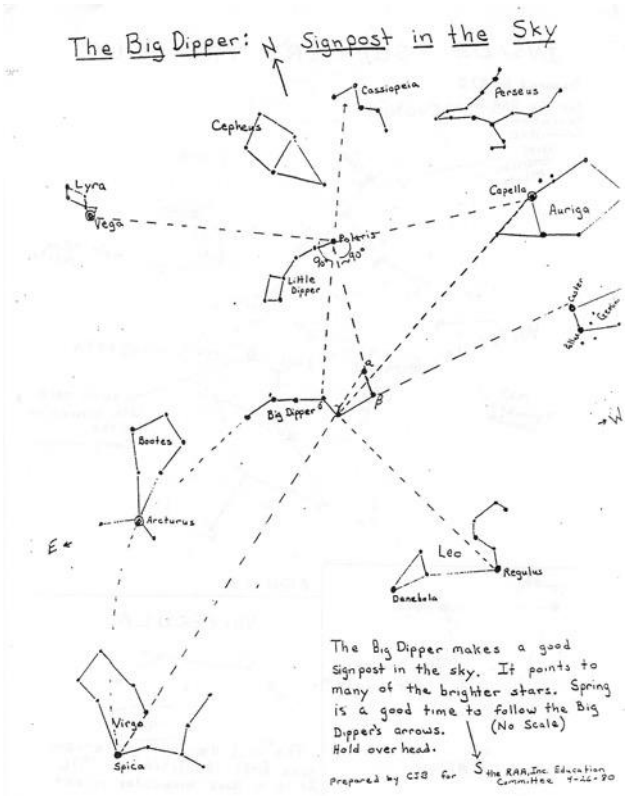
Keep looking up!

Alan Sheidler
Regional Chair (2023-2025)
Popular Astronomy Club
adsheidler@gmail.com

The Rockford Amateur Astronomers, Inc. was founded in 1958 to promote the fascinating hobby of astronomy. They operate the Lockwood Park Observatory at Lockwood Park in cooperation with the Rockford Park District.

Al Sheidler, Barry Beaman, Pete Minneci Jr., and Chuck Jansen under the 10" AP scope.

Eleven members of the Rockford Amateur Astronomers at their May 17, 2023, meeting at the Lockwood Park Observatory.



Barry Beaman showed me this sketch made by his wife, Carol. This is an excellent explanation of how to use the Big Dipper as a directional signpost to other constellations.

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NCRAL 2023 Convention Highlights

The *Twin City Amateur Astronomers* of Bloomington-Normal hosted the NCRAL 2023 Regional Convention May 5-6 at Grand Bear Resort near North Utica, Illinois. The theme was *Amateur Astronomy for Amateurs.* About 70 conferees were in attendance. Each was greeted upon check-in with a goody bag filled with space-related candy.

The event began with an informal Friday reception from 7-9 PM. About 50 attended this event. They enjoyed two complimentary bar drinks and hors d'oeuvres. There were eight "rounds" filled with people involved in discussions and seven 6-foot tables filled with items for sale and giveaway.

The convention began formally on Saturday at 8:30 AM and continued to 9:00 PM. The day featured eight sessions – four plenary sessions and four concurrent sessions. A dozen talks, panel discussions, and a solar funnel workshop were presented – at which some two dozen participants received a free solar funnel thanks to the *Illinois Section of the American Association of Physics Teachers.* Altogether, there were eighteen presenters, each receiving a complimentary 11 oz. coffee mug emblazoned with the TCAA logo on the front and back.

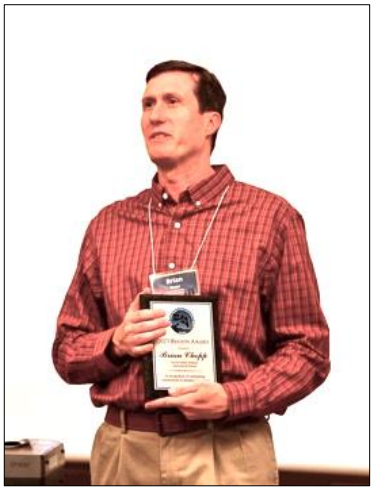
The morning and afternoon were punctuated with 30-minute breaks. Door prizes were a feature of the breaks, the council-business meeting, and the evening banquet. A total of 18 door prizes were awarded. The grand prize was won by **Barry Beaman**, a member of the *Rockford Astronomy Club* and past president of the *Astronomical League*.

After the afternoon paper sessions ended, the group assembled in the resort's lobby for a group photograph. The official image taken by the TCAA's **Sandullah Epsicokhan** is shown on the next page.

The Council & Business meeting was held late on Saturday afternoon. **Alan Sheidler** of *Popular Astronomy Club* was elected Regional Chair (2023-2025), and **Bill Davidson** of *Rochester Astronomy Club* was re-elected Vice Chair. The membership also approved a 103-object Regional Messier Marathon, extending the seasonal mini-Marathons to a single annual event. **Gerry Kocken** spoke on behalf of the *Neville Public Museum Astronomical Society* and gave a PowerPoint presentation about NCRAL 2024, inviting everyone to attend.

Carl Wenning, Regional Chair from 2017-2023, officially stepped down at the end of the meeting as required by the Region's bylaws. He announced that he would continue to serve as editor of the ***Northern Lights*** newsletter at the pleasure of the new chair.

That evening, **Brian Chopp** of the *Neville Public Museum Astronomical Society* (NPMAS) received the **Region Award** during the awards ceremony. (Brian is the seventh member of NPMAS to be recognized with a Region Award.) Also, **Paul Levesque** of *Popular Astronomy Club* received the Region's **Newsletter Editor Award.** Detailed descriptions of both winners' work can be found on the NCRAL Awards page.



Brian Chopp, NPMAS, recipient of NCRAL's Region Award for 2023.

Winners of the NCRAL 2023 astrophotography contest were announced. Alexandre Polozoff of the TCAA won the deep sky competition with an image of M31. Alan Sheidler of PAC won the solar system competition with a picture of a lunar occultation of Mars. Both won binoculars as their prize.

The convention's keynote speaker was **Dr. John Martin** of the University of Illinois – Springfield. He spoke on the *JWST: Just Wonderful Space Telescope.* Dr. Martin spoke about the scientific work of the infrared telescope and wowed the audience with the latest pictures and findings.

Many positive comments were received at the convention, complimenting the mix of amateur and professional topics, the relaxed agenda, the registration process, the meals, and much more. A post-convention survey showed that participants were pleased with the event. Data from this survey were compiled and entered into the revised *NCRAL Convention Planning Guidelines,* which may be found online at https://ncral.files.wordpress.com/2023/06/ncral-convention-planning-guidelines.pdf

Note: Convention coordinator Carl Wenning wishes to express thanks and his appreciation to the many TCAA members who assisted with the planning and presentation of this convention. He also thanks his wife Carolyn for working diligently to gather door prizes for this event.

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Official NCRAL 2023 Photo - Grand Bear Resort, North Utica, IL, May 6, 2023. Twin City Amateur Astronomers hosted the convention.

NCRAL 2023 Council & General Membership Meetings Minutes

Grand Bear Lodge, Utica, IL
June 5, 2023

COUNCIL MEETING: Chairman Carl Wenning called the annual Council meeting to order at 4:30 PM. Treasurer Roy Gustafson conducted a roll call and reported that 17 out of 37 affiliates had members in attendance, so a quorum was present.

Carl gave his Chair's report, during which he noted that the COVID-19 pandemic had caused the '20 and '21 conventions to be canceled and that Port Washington rescheduled NCRAL Vision 2020 to '22 and hosted last year's convention, for which he was thankful. The 2024 convention will be held in the Green Bay area, with details to follow. He said the Region is looking for hosts for '25, '26, and '27.

Carl reported that he had to step down from the Chair position because he had been chairman for three terms, the maximum number in succession allowed by the Region's bylaws. He said we also need to elect a vice-chair. He said he would continue to do the quarterly newsletters at the pleasure of the incoming chair.

Carl reported that many members received awards, including the Master Observer and seasonal Messier marathon awards. Some members had articles published in the Astronomical League magazine – ***Reflector***. Carl then presented the newsletter award for last year (2022) to David Brown.

Roy reported a balance of $8,112.83 at the end of last year (June 30, 2022). The proceeds from last year's NCRAL Convention were $470.51, as reported by Jeff Setzer. There being no old or new business, the meeting was adjourned.

Roy Gustafson
Secretary-Treasurer

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GENERAL MEMBERSHIP MEETING: Chairman Carl Wenning called the NCRAL Regional business meeting to order following the Council meeting. Members of 17 out of 37 affiliates were represented, so a quorum was present. There was no old business.

Under new business, an election was held for the offices of chairman and vice-chairman. Following a final call for nominations, Alan Sheidler was elected Chairman, and Bill Davidson was re-elected vice-chairman. Both officers will serve for two years (2023-2025).

A discussion was then held regarding the newly proposed NCRAL "annual" Messier Marathon. It was decided to have three levels with corresponding pins and certificates:

Gold – observe 103 objects - unassisted
Silver – observe 103 objects – may use GOTO or any means
Bronze – observe 70 objects – any method

These awards can be retroactive to Jan.1, 2023. The vote was unanimous to accept these guidelines. Roy Gustafson will be the administrator, and Carl will help generate new certificates. Details will be provided in the newsletter and on the NCRAL website.

The assembly agreed to hold the 2024 NCRAL Convention at De Pere, WI. Gerry Kochen gave a PowerPoint presentation saying the convention will be held at St. Norbert College, May 17-18, 2024. The Neville Public Museum Astronomical Society will host the convention. The theme will be "Universe in Color."

John Attewell, the representative to the Astronomical League, spoke briefly about the recent revisions in the Astronomical League bylaws. He noted that Alcon will be held July 26-29, 2023, in Baton Rouge, LA.

There being no further business, the meeting was adjourned.

Roy Gustafson
Secretary-Treasurer

NORTH CENTRAL REGION FINANCIAL STATEMENT FISCAL 2022
BY ROY E. GUSTAFSON, SECRETARY-TREASURER

Ck. No.	Date		Ck. Amt	Deposit	Daily	Monthly
	1-Jul-22					$8,112.83
	31-Jul-22					$8,112.83
1026	1-Aug-22	Roy E. Gustafson - U.S.P.S. (mail certificate and pin)	$6.39		$8,106.44	
	31-Aug-22					$8,106.44
	1-Sep-22					$8,106.44
	30-Sep-22					$8,106.44
	1-Oct-22					$8,106.44
	31-Oct-22					$8,106.44
	1-Nov-22					$8,106.44
	21-Nov-22	Proceeds from NCRAL 2022 - NCSF		$470.51		$8,576.95
	30-Nov-22					$8,576.95
	1-Dec-22					$8,576.95
1027	5-Dec-22	Roy E. Gustafson - U.S.P.S. (mail certificate and pin)	$9.90			$8,567.05
	31-Dec-22					$8,567.05
	1-Jan-23					$8,567.05
	31-Jan-23					$8,567.05

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	1-Feb-23					$8,567.05
	28-Feb-23					$8,567.05
	1-Mar-23					$8,567.05
	31-Mar-23					$8,567.05
	1-Apr-23					$8,567.05
1028	11-Apr-23	Jeff Setzer (Website)	$96.00			$8,471.05
	30-Apr-23					$8,471.05
	1-May-23					$8,471.05
1029	11-May-23	Popular Astronomy Club (Newsletter Award)	$50.00			$8,421.05
1030	11-May-23	Carl Wenning (Region Award Plaque)	$67.57			$8,353.48
	31-May-23					$8,353.48
	1-Jun-23					$8,353.48
	5-Jun-23	Proceeds from NCRAL 2023 - TCAA			$524.00	$8,877.48
	30-Jun-23					$8,877.48
					Net Change	**$764.65**

ABRIDGED NOTES FROM LEADERSHIP ZOOM MEETING

On June 14, the leadership of NCRAL gathered online for a meeting to discuss the future of NCRAL. They gathered at the request of newly-elected Chair Alan Sheidler (Popular Astronomy Club). Also in attendance were Vice Chair Bill Davis (Rochester Astronomy Club), Secretary-Treasurer Roy Gustafson (Popular Astronomy Club), Regional Representative to the AL John Attewell (Rochester Astronomy Club), and Newsletter Editor Carl Wenning (Twin City Amateur Astronomers, Bloomington-Normal). Webmaster Jeff Setzer (Northern Cross Science Foundation) was invited but could not attend.

The meeting ran from 7:00 to 8:30 PM. Following a brief round of introductions, the following agenda items were addressed, and decisions made:

- Alan is now collecting affiliate histories, and Carl is building a repository of these records. We currently have about a dozen such stories. We hope to have all affiliates join this effort by submitting club histories – some already ranging from a few pages to others over 150 pages. Alan will continue working with affiliates' leaders to obtain more records. We hope to link these histories to the affiliates page on the NCRAL website.
- Alan mentioned his desire to visit as many NCRAL affiliates as possible in the coming year or two. He has already visited the Rockford Astronomy Club, the Peoria Astronomical Society, and the Twin City Amateur Astronomers in Bloomington-Normal, IL. He is familiar with members in quite a few more.
- With the recent amendment to Astronomical League bylaws, we will now review NCRAL bylaws. Alan has obtained a set of MSRAL bylaws that might serve as an example. We need to consult our bylaws for procedures relating to the amendment process. There are several unanswered questions, and Bill and John will investigate these and make recommendations for changes, perhaps as early as August when Alan and Carl are expected to visit the Rochester Astronomy Club.
- We discussed the need for convention hosts for 2025 and beyond. Several affiliates were named as viable candidates. Alan will contact two clubs, and Carl will contact one club. Carl suggested that outlying affiliates are in good locations to co-host conventions with other Regions.
- We spoke briefly about recruiting new affiliates. There are new clubs in the Region that are not affiliated and some older previously-affiliated clubs that are no longer affiliated with the Astronomical League and, hence, our Region. We will contact these groups in an effort to bring them back into the fold.
- Carl brought up his desire to increase the readership of the *Northern Lights* newsletter. Currently, only about 425 of 1,900 Regional members are receiving it. The leaders agreed that Carl should contact Mitch Glaze at the national office following the current round of renewals to obtain names and contact information for presidents and ALCors of all NCRAL affiliates. He will then work with these individuals and possibly Webmaster Jeff Setzer to

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develop a listserv through WordPress that might be populated with email lists provided by affiliates. Roy suggested that Carl create an index of feature stories appearing in the last seven years of our Region's newsletter. This listing should appear in the newsletter and the Region's newsletter archive web page.

- During the discussion, the need for long-term planning became evident. The topic of a 5-year plan for NCRAL was then addressed. Numerous reasons for development were presented. Everyone is invited to send ideas for NCRAL's 5-year plan to Carl, who will compile them for future consideration.
- Carl noted that keeping the NCRAL website accurate and up-to-date is important. He regularly scans it for needed updates and provides this information to Jeff Setzer. Carl urged Alan to "make the website your own" by personalizing various messages posted during the six years of the previous leadership. Everyone was encouraged to send notices for needed or desirable updates and inclusions to Carl, who will work with Jeff to keep the NCRAL website up to speed.
- The final topic for the evening was how to get affiliates more involved in the Region and, specifically, what that means. The primary point that came out of the discussion is, "We have to be valuable to the members of the affiliates." While efforts have been made along these lines, more work must be done. Because no significant answers were forthcoming, we will reflect on this concern and address it again at our next meeting.
- During his closing comments, Carl commended Alan for bringing the leaders together to improve the Region.

NCRAL AstroBits

As has been his habit with the Twin City Amateur Astronomers newsletter, ***The OBSERVER***, your editor is initiating a column titled **AstroBits** with this issue of ***Northern Lights***. These are news notes that readers might find of interest or helpful. Items appear here as bullet points because they are too short to merit a full-blown article. If readers have something to share and want it to appear here, contact carlwenning@gmail.com.

- **Sara Sheidler** of the *Popular Astronomy Club* (Quad Cities) has been named co-manager of the Region's Facebook page. She joins **Carl Wenning,** who first set up the page in 2017 and continues as newsletter editor of this publication. Readers can find, like, and follow our Facebook page at https://www.facebook.com/northcentralregionastronomicalleague.
- If you want to acquire a programable red LED name tag such as those sported by several in attendance at NCRAL 2023, you can find them *on Amazon.com* for about $19 each. Follow this link if interested: https://tinyurl.com/3apmtsuk
- If you own one of those *gnarly* LED name badges noted above, you know they are a bit bright. TCAA member Alexandre Polozoff recommended the following coverings that can be readily and cheaply acquired from Amazon. Check out his recommendation at https://amzn.to/45uweta
- Impressed by the quality of a recently acquired astronomical flashlight, TCAA observers recommend the purchase of a supply of 3-way red-filtered astronomical flashlights available for just over $5 each. https://tinyurl.com/redastrolight.
- If you or your neighboring clubs are organizing eclipse-viewing events, they can be added to the *Great American Eclipse* (GAE) mobile app here: https://www.greatamericaneclipse.com/addyourevent. GAE also has a program for a reciprocal listing of eclipse-related websites on state pages. Check it out, including many great resources, at https://GreatAmericanEclipse.com.
- The *NCRAL Convention Guide* has been updated using the NCRAL 2023 post-convention survey results. It contains many lessons learned from recent NCRAL conventions and will serve as a valuable guide to future convention hosts. Look for it on the NCRAL website. https://ncral.wordpress.com/conventions/.
- NCRAL Chair Alan Sheidler recently wrote on Facebook, "Spotlight on the Peoria Astronomical Society. What a pleasant evening with an enthusiastic group of club members observing through their historic telescope. Did you know that:
  - The lens for the 9-inch refractor at Northmoor was ground by Petididier, who also ground the lens used by scientist A. A. Michelson in his experiments to determine the speed of light.
  - The telescope was built in Chicago (1913) for the Illinois Watch Company and is considered an antique by astronomers at Yerkes Observatory, home of the world's largest refractor.

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- Clyde Tombaugh, the discoverer of the planet Pluto, visited Northmoor Observatory in 1982 and observed through the famous refractor."

★ Here's an interesting tidbit. When viewing through the smoke and haze from Waynesville Observatory on the evening of June 14th, Alan Sheidler and Carl Wenning were amazed to discover that the TCAA's NVT image intensifier produced images imperceptibly different from those on a clear night. The image intensifier, in combination with a ZWO 7nm Hα filter, made all the difference.

NCRAL Chair Alan Sheidler would like to hear from other clubs in the region and visit with them too. Please send him a PM.

NCRAL Chair Alan Sheidler and his wife Sara (front row, left) under the 9" Northmoor Observatory telescope in Peoria, guests of the PAS.

NCRAL Adopts 103-object Messier Marathon Observing Program

During its annual business meeting at NCRAL 2023, the membership established the NCRAL Messier Marathon Observing Program and rules for affiliates and at-large members with the following awards and certificates. The rules and regulations are as follows:

★ **Gold Star Award:** Use a telescope to observe at least 103 Messier objects in one dusk-to-dawn interval using only *unassisted* means (Telrad, optical finder, star hopping, sweeping, drift, etc., are acceptable).

★ **Silver Star Award:** Use a telescope to observe at least 103 Messier objects in one dusk-to-dawn interval using any combination of *assisted or unassisted* means (e.g., goto, setting circles, star hopping, etc.)

★ **Bronze Star Award:** Using a telescope, observe at least 70 Messier objects in one dusk-to-dawn interval using any combination of assisted or unassisted means.

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Those who earn the Gold Star also will receive the Silver and Bronze Stars. Those who earn the Silver Star also will receive the Bronze Star. At most, one star of each type will be awarded to a single observer.

Observations must be approved and sent by an affiliate's ALCor to the NCRAL Secretary-Treasurer, who will serve as program administrator. The observing record must be affirmed by an affiliate's ALCor or confirmed by another observer if a member-at-large. Observing records (objects and time stamps) in an electronic file should be sent to Roy Gustafson at astroroy46@gmail.com for final approval and recognition. NCRAL will provide suitable certificates, pins, and postage associated with this program. Recipients will be recognized in the *Noteworthy!* section of NCRAL's ***Northern Lights*** newsletter. Due to the more prestigious nature of this program, it is NOT permissible for two or more individuals to work together to earn this recognition. Binoculars may not be used in the telescopic program.

This observing program was approved retroactively to January 1, 2023, so that anyone completing the observing program following these guidelines during the winter and spring of 2023 may receive appropriate recognition from NCRAL.

Notes: This observing program, including all 110 Messier objects, is possible only under limited conditions. The usual time to conduct the Marathon is from mid-March to early April when no Messier objects are hidden in the sun's glare. With the requirement of only 103 objects, there are considerably more days throughout the year when the Marathon might be completed. The program may now be completed at nearly any time of the year, so long as only a few M-objects are lost in the sun's glare (e.g., the Virgo cluster of galaxies from September through November.) Northerly observers need not observe items lost in the sun's glare due to their proximity to the southern horizon. Regardless, observations should be well planned and begin as soon as it gets dark and continue through morning twilight. Observations start low in the western sky and progress eastward throughout the night. Consult any of the several Messier Marathon observing guides found online for details. A checklist documenting observations is adequate because the goal is merely to "view" and not necessarily "observe" each M object. The checklist must include the date and time. Please send electronic observing records to Roy at astroroy46@gmail.com

NCRAL Seasonal Mini Messier Marathon Observing Program

The NCRAL Seasonal Mini Messier Marathon program is intended to serve as motivation to get NCRAL-affiliated members out under the stars to observe. The program permits the use of goto telescopes to find objects, and, as such, the program must not be considered proof of observing prowess. The Astronomical League's Messier observing program serves that purpose. Still, NCRAL observing certificates include "assisted" or "unassisted." Certificates and pins are now being distributed on the equinoxes and solstices along with ***Northern Lights*** by the program administrator. NCRAL Secretary-Treasurer Roy Gustafson is the program administrator. Please send observing records to Roy at astroroy46@gmail.com. Up-to-date details about the Region's four observing programs and helpful observing record sheets can be found on the NCRAL website: https://ncral.wordpress.com/awards/.

Autumn: M55, M69, M70, M75, M11, M26, M56, M57, M71, M27, M29, M39, M2, M72, M73, M15, M30, M52, M103, M31, M32, M110, M33, M74, M77, M34, and M76. (27 objects)

Winter: M1, M45, M36, M37, M38, M42, M43, M78, M79, M35, M41, M50, M46, M47, M93, M48, M44, M67, M40, M81, M82, M97, M101, M108, M109, M65, M66. (27 objects)

Spring: M95, M96, M105, M53, M64, M85, M88, M91, M98, M99, M100, M49, M58, M59, M60, M61, M84, M86, M87, M89, M90, M104, M3, M51, M63, M94, M106, and M68 (28 objects)

Summer: M83, M102, M5, M13, M92, M9, M10, M12, M14, M19, M62, M107, M4, M6, M7, M80, M16, M8, M17, M18, M20, M21, M22, M23, M24, M25, M28, and M54. (28 objects)

OBSERVING NOTES:

- ***Autumn:*** This season's objects span a wide range of right ascension and declination. With several objects located in Sagittarius and disappearing into the sun's glare by mid-autumn (M55, M69, and M70), it is best to complete the autumn observing program before the end of October. After that, they will be too near the sun to observe during late autumn

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evenings. Also, note that a late September start will require observations after 10 PM due to the late rising of two of these objects.

- ***Winter:*** It is best to begin the winter Marathon around late February or later. Any earlier in the year, observers will have to wait until later into the night for all winter objects to have risen high enough in the sky to observe. With winter weather moderating in March, it wouldn't be too late to start then so long as observations are completed by the March equinox.
- ***Spring:*** This season's objects span a relatively narrow region of right ascension, with most objects being associated with or near the Virgo-Coma cluster of galaxies. At the start of spring, an observing run beginning near the end of astronomical twilight should allow observers to view all objects by around 10:30 PM. By mid-April, all objects should be well enough placed at the end of astronomical twilight, allowing for their fastest possible observation.
- ***Summer:*** All summer Marathon objects are above the horizon at the end of astronomical twilight on the first day of summer through the last day of summer. They are nearly all tightly clustered around the galactic center, and most are globular clusters with a few notable exceptions.

UPDATE (June 4, 2021): *By fiat of the Regional Chair, it is permissible for a group of two or more individuals to work together using a single telescope on the same night to earn a seasonal Mini Messier Marathon certificate and pin, so long as the group shares a single certificate and pin. All members of a group must observe each Messier object.*

NOTEWORTHY!

The following NCRAL members have completed the following Astronomical League observing and award programs in recent months. Congratulations to all!

Beyond Polaris Observing Program:
Joseph D. Kubal, Naperville Astronomical Association

Carbon Star Observing Program:
Alan Sheidler, Popular Astronomy Club
Lisa Wentzel, Twin City Amateur Astronomers

Globular Cluster Challenge:
David Ernst, Minnesota Astronomical Society

Library Telescope Program:
Randy Harrison, Silver, River Bend Astronomy Club

Outreach Program:
Trena Johnson, Stellar, Minnesota Astronomical Society
Terry Menz, Stellar, Master, River Bend Astronomy Club
Jeff Menz, Stellar, Master, River Bend Astronomy Club
Dan Brandon, Outreach, Stellar, River Bend Astro. Club
Kerry Brethauer, Outreach, River Bend Astronomy Club
Cheryl Brinkman, Outreach, River Bend Astronomy Club
Spencer Chapman, Outreach, River Bend Astronomy Club
Richard Dietz, Outreach, River Bend Astronomy Club
Karen Fajardo, Outreach, River Bend Astronomy Club
Randy Harrison, Outreach, Stellar, River Bend Astro. Club
David Kirsch, Outreach, Stellar, River Bend Astro. Club
Lance Taylor, Outreach, River Bend Astronomy Club
Jim Reagan, Outreach, Stellar, River Bend Astronomy Club
Brandon Runyon, Outreach, River Bend Astro Club
Chris Weis, Outreach, River Bend Astronomy Club
Rolando Gamino, Outreach, Popular Astronomy Club
Eva Davison, Outreach, Popular Astronomy Club

Sketching Program:
Jeffrey S. Moorhouse, La Crosse Area Astronomical Society

Solar Neighborhood Observing Program:
Lisa Wentzel, Binocular, Twin City Amateur Astronomers

Southern Sky Binocular Observing Program:
Lisa Wentzel, Twin City Amateur Astronomers

Sunspotter Observing Program:
Jeffrey S. Moorhouse, La Crosse Area Astronomical Society

Two in the View Observing Program:
Carl J. Wenning, Twin City Amateur Astronomers

Master Observer Award:
Jeffrey S. Moorhouse, La Crosse Area Astronomical Society

Binocular Master Observer Award:
Lisa Wentzel, Twin City Amateur Astronomers

NCRAL Members with articles appearing in June 2023 issue of ***Reflector***

- **Mark Brown** (River Bend Astronomy Club) captured an image of the aurora on March 24 from Independence, Iowa. His image graced the front cover of the magazine.

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✯ **Dick Jacobson** (Minnesota Astronomical Society) wrote a letter to the editor. ✯ **Jamey Jenkins** (Twin City Amateur Astronomers) wrote *Further Adventures of Starlight Detective.* ✯ **Dave Tosteson** (Minnesota Astronomical Society) wrote *Museum of the Sky.*	Note: NCRAL members are reminded that details about all of these observing programs and awards can be found on the Astronomical League website at the following URL: https://www.astroleague.org/observing.html

AL Globular Cluster Observing Program
~ by Alan Sheidler ~

On the evening of May 20th, the Popular Astronomy Club conducted a public observing session in the parking lot of Niabi Zoo, Coal Valley, Illinois. In addition to the PACMO (mobile observatory), eight other telescopes were set up, providing visual and video images to visitors.

During this observing session, globular clusters M3, M13, and M92 provided spectacular views for guests as images were displayed on the PACMO flat-screen TV. The images of these three globulars can be found below. Looking at them, one can quickly discern differences in the appearance of these objects. There is, in fact, a wide variety of sizes, shapes, and compactness of globular clusters.

Messier 3

Messier 13

Messier 92

The Astronomical League has an observing program that I would like to recommend to anyone interested in learning more about globular clusters. The nearby link will take you to the requirements for earning an award for the globular program. It can be done either visually or by imaging. I used imaging to complete the globular observing program in 2021. I found that having images of these objects enabled me to discern the concentration class of each object more easily. In my case, I used a DSLR camera attached to a Schmidt-Cassegrain telescope to take pictures of each globular. Each of my images is simply a time exposure (snapshot) of the object. Whether you do it with a camera or visually, the AL's program is a wonderful way to learn about globulars and appreciate their beauty and diversity.

Summer is a wonderful time to observe globular clusters as they are "in season" this time of year. Why not take a look at trying this fun and educational observing program? The AL has many other programs as well. Why not take a look and see if any of them piques your interest?

NCRAL Seasonal Mini Messier Marathon Awards

- *Alan Novick,* Twin City Amateur Astronomers, Spring, Assisted
- *Allan Griffith,* Twin City Amateur Astronomers, Spring, Assisted
- *Patrick Connelly,* Twin City Amateur Astronomers, Spring, Assisted

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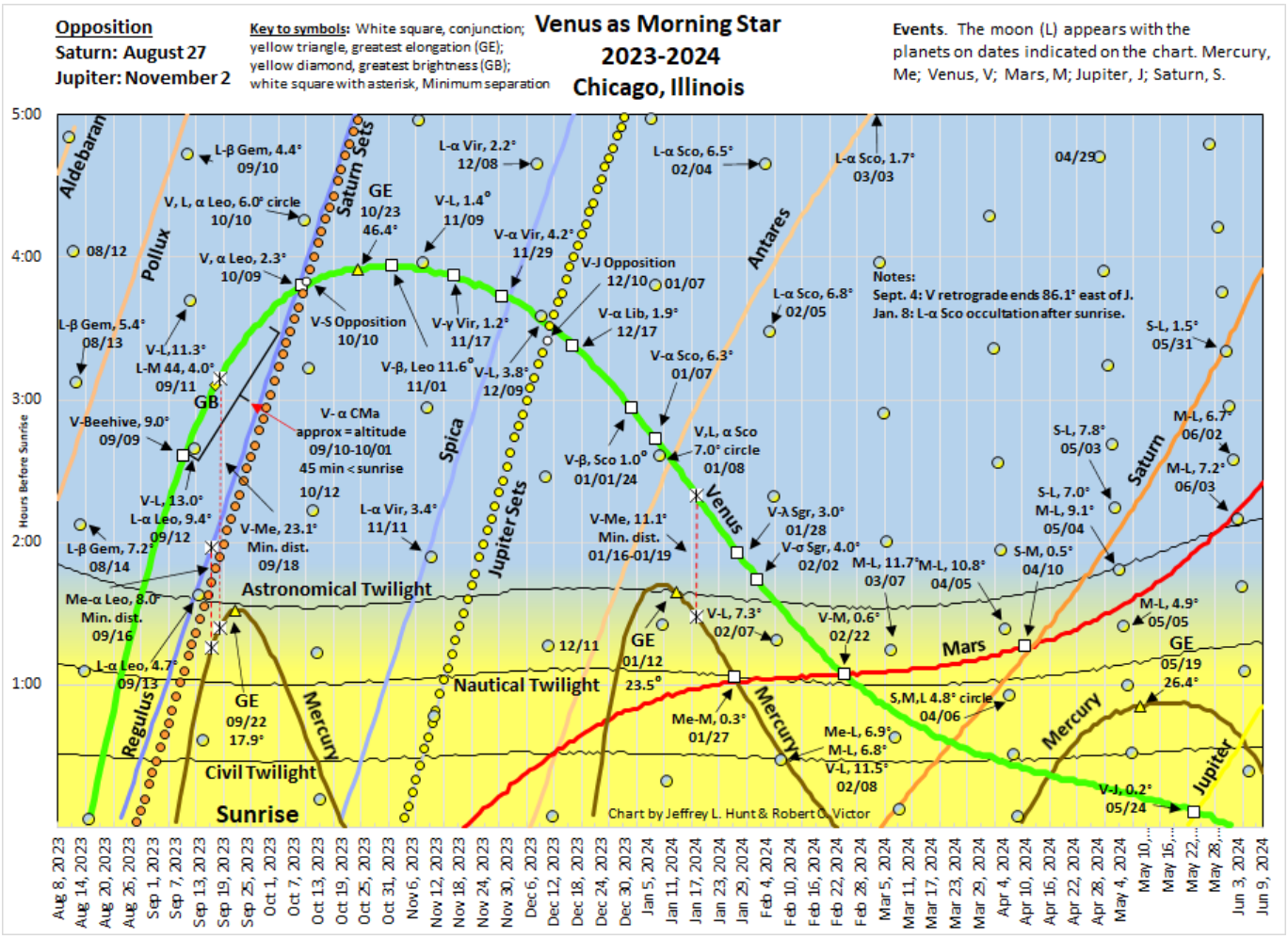
THE SUMMER SEASON

~ by Jeffrey L. Hunt ~



This chart shows the rising time of Venus compared to sunrise during 2023 and 2024. The rising time intervals of the moon, naked-eye planets, and bright stars near the ecliptic are also shown. Conjunctions and other interesting events are indicated as well.

Astronomical summer 2023 begins when the **sun** reaches its most-northerly declination on June 21st at 9:58 am CDT. The season lasts 93 days, 15 hours, and 52 minutes until the autumnal equinox on September 23rd, at 1:50 a.m. CDT. From the solstice through the equinox, daylight loses 3 hours, 6 minutes.

Summer's mid-point occurs August 9th, 4:52 pm CDT. From European traditions, August 1, known as Lammas (Loaf Mass) Day, traditionally marked the middle of summer. It was the beginning of harvest season. In North America, sweet corn begins to ripen at about this time, depending on the growing season. The Native American Green Corn Ceremony celebrates the corn harvest near the beginning of August.

Earth is at aphelion on July 6th at 3:07 p.m. CDT. The distance is 1.016680468 A.U.

Month	New	First	Full	Last
July	17	25	3	9
Aug	16	24	1 / 30	8
Sep	14	22	29	6

The phases of the moon for summer 2023.

Usually, an astronomical season (solstice to equinox or equinox to solstice) has three Full moons. During some seasonal sequences, four Full moons occur. Following the traditions of naming a Full moon after nature's events in a season (July, Buck; August, Sturgeon; September, Harvest), there was no name for the extra full moon. It was named

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"Blue." This year, September's bright moon occurs after the equinox.

A *Sky & Telescope* magazine article traced the term's origins to the *Maine Farmer's Almanac* in the 1930s.

The Blue Moon name has been expanded over time to indicate the second full moon in a calendar month, a mistake by *Sky & Telescope*. The error has caught on in popular culture. This year the second Full moon occurs during August, but the season has only three Full moons.

Morning Sky

Late-June/July

Jupiter (m = −2.2) and Saturn (m = 0.9) are easy to locate during morning twilight. Bright Jupiter begins the season nearly 20° up in the east one hour before sunrise. It is gently moving eastward in Aries, over 11° to the lower right of Hamal (α Ari, m = 2.0). At this time, the Pleiades (M 45) have returned to the morning sky, over 10° above the east-northeast horizon. Capella (α Aur, m = 0.1) is also nearly 15° up in the northeast. Jupiter's increasing altitude provides better views of the cloud features and the Great Red Spot (GSR). Check your favorite Jupiter resource for times to see the GSR. The crescent moon, 36% illuminated, is 5.5° to the upper right of the Jovian Giant on July 11th. Two mornings later, the crescent (17%) is 2.5° to the lower left of the Pleiades.

Rising a few minutes after midnight on solstice morning, **Saturn**, over 35° up in the south-southeast at mid-twilight, is retrograding in Aquarius, 6.9° to the upper right of Skat (δ Aqr, m = 3.2) and nearly 20° above Fomalhaut (α PsA, m = 1.2). Saturn appears to move westward until November 4th. The moon is in the vicinity on July 6th and 7th. Through a telescope, the planet's rings are inclined 7.4°. Look carefully for the rings' shadows on the cloud tops as a dark narrow line. Satellite Iapetus is immediately north of Saturn on July 24th. While at the eyepiece, look for the Helix Nebula (NGC 7293), over 9° to the southwest of Saturn.

August

As the month opens, bright Jupiter (m = −2.4), still rising after midnight, is over 50° above the southeast horizon. During morning twilight, the stars that dominate winter evenings are between the planet and the eastern horizon, except for Procyon and Sirius. Their heliacal risings are imminent. The moon is nearby on August 8th. Use the moon after sunrise to attempt a naked-eye observation of Jupiter.

Venus is at inferior conjunction (August 13th) and rapidly enters the morning sky. What is the first date that you can find it? By month's end, the planet (m = −4.4) is 10° above the east horizon 30 minutes before daybreak.

The **Perseid meteor shower** peaks before the beginning of twilight on the morning of August 13th. The moon is at waning crescent phase, 8% illuminated, and 6.0° to the upper right of Pollux, which rises about an hour before the beginning of twilight. The predicted zenith hourly rate is 90 meteors per hour, although this is affected by light pollution and the ability to see the entire sky. More meteors are visible toward the radiant but can be seen anywhere in the sky.

Saturn (m = 0.6), retrograding and nearing its opposition on the 28th, is over 30° up in the southwest and appearing lower each morning. On opposition morning, it sets in the west as the sun rises. The planet displays a disk 19 arc seconds across the equator. Titan shows a tiny disk 0.8 arc seconds across. The moon is 3.5° to the lower left of the Ringed Wonder on the 3rd.

The moon is near Neptune (4th, 5th), Uranus and Jupiter (8th), Pleiades (9th), β Tauri (11th), and Pollux (13th, 14th).

September

On the first, Venus (m = −4.4) rises nearly two hours before daybreak, gaining five to six minutes of rising time compared to sunrise. By month's end, the planet rises over three hours, thirty minutes before the sun. Watch the phase grow from a crescent, 11% illuminated to 36% illuminated, while its size shrinks from 50 arcseconds in diameter to 36 arcseconds across. On September 19th, the planet is at its greatest illuminated extent, meaning it's very bright in the sky.

Venus passes widely (9.0°) from the Beehive star cluster on the 9th. Watch the planet move through eastern Cancer and approach Regulus. On the morning of the 11th, the crescent moon is near the Beehive and farther from Venus.

Look for Venus and Sirius at about the same altitudes in the eastern sky beginning about September 10 and continuing through month's end. The brightest planet and the brightest star shine brightly from the eastern sky.

After Mercury passes inferior conjunction on the 6th, it moves into the morning sky for its best morning appearance of the year. It reaches its greatest elongation (17.9°) on the 22nd. On the 16th, Mercury closes to 8.0° on Regulus and 23.1° from Venus two mornings later, their closest for this Mercury apparition.

Jupiter begins the month high in the south during morning twilight, 13.6° to the lower left of Hamal and 7.5° to the lower right of Uranus (m = 5.7). The planets may fit tightly into your binoculars' field of view. The Jovian Giant begins to retrograde on the 4th.

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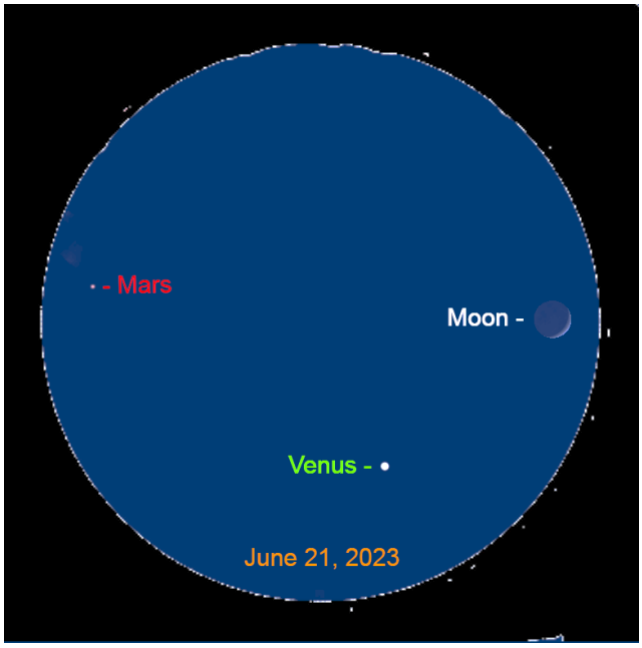
Look for the moon with Jupiter (4th), β Tauri (7th), Pollux (10th), and Regulus (12th, 13th).

Evening Sky

Late-June/July

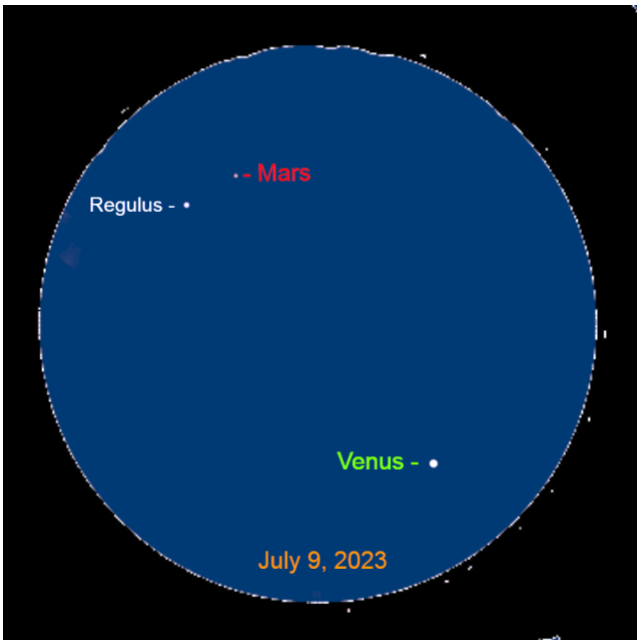
Venus' (m = −4.7) months-long pursuit of **Mars** (m = 1.7), now considerably dimmer than when closest during 2022, ends in the western evening sky early during summer. On solstice evening, the Venus-Mars gap is 4.5°. This evening, a rare close gathering occurs with Venus, Mars, and the crescent moon. The triplet fits into a circle 6.3° in diameter and is easily within most binoculars' fields of view. The three are not this close again until September 15, 2028. During the future gathering, the three fit into a 4.1° circle. It is less than halfway up in the sky an hour before daybreak. Four other gatherings occur in the interim ranging from a 7.1° circle in 2027 to an 11.2° circle in 2024. One gathering appears when the three are very close to the sun. This year's gathering is a do-not-miss event!



2023, June 21: Venus, the crescent moon, and Mars easily fit into the same binocular field of view. Venus is 2.9° to the moon's lower left, the closest gap during this apparition, and 4.4° to the lower right of Mars.

Venus's easterly rate slows considerably, resulting in a near or quasi-conjunction (3.6°) with Mars on June 30th. The planets generally move toward Regulus (α Leo, m = 1.3). They fit into the same binocular field of view on about July 4th. The smallest grouping (July 9) fits into a 4.7° circle. Mars passes the star on July 10th (0.7°). Venus rapidly moves southward, crossing the ecliptic on July 3rd, resulting in a quasi-conjunction with Regulus on July 16th. Venus' eastward rate does not end until July 22nd, when it begins to retrograde.

The July 9th trio (Venus, Mars, and Regulus) only occurs like this again on July 19, 2053. In the intervening years, six widely-spaced groupings occur, ranging from 10.6° (September 28, 2049) to 21.1° (July 9, 2042). One closely-bunched trio (August 19, 2051, 3.6°) occurs when Regulus is less than 4.0° from the sun and is not visible by conventional means.



2023, July 9: Venus, Mars, and Regulus fit into a circle 4.7° in diameter. An hour after sundown, Venus is less than 10° up in the west, 4.6° to the lower right of Mars, and 4.7° to the lower right of Regulus. The Mars – Regulus gap is 0.7°. Tomorrow evening is the Mars-Regulus conjunction.

Venus is a spectacular sight after sunset. After its greatest elongation (June 4), the planet's phase is an evening crescent. The greatest illuminated extent occurs on July 6th. Beginning July 1, Venus loses over three minutes of setting time compared to sunset each evening, resulting in a lower western altitude at 45 minutes after sunset.

Mercury begins an evening apparition after superior conjunction (July 1). The planet rapidly enters the sky, gaining four to five minutes of setting time compared to sunset. Its maximum setting time interval is sixty-eight minutes (July 25-28), about the time of Nautical Twilight (sun 12° below the horizon). Around mid-month, use a binocular to find Mercury over 15° to the lower right of Venus. During bright twilight on July 18th, the crescent

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moon (2% illuminated) joins the western traffic jam. The span is over 25° from the lunar orb to **Mars**. On the following evening, from the sunset point eastward, see Mercury (m = −0.4), Moon (5%), Venus, Regulus, and Mars (m = 1.8), spanning 19.5°. On July 20th, the moon (10%) is 3.5° to the right of Mars with a total span of 18.5°. The Venus-Mercury gap is 11.4°. While Regulus is a challenge to see in the bright twilight, Venus, Mercury, and the star fit into the same binocular field on the evenings of the 24th and 25th. Venus sets about 50 minutes after sunset, so find an observing site with a clear western horizon. Mercury passes 0.2° to the lower left of Regulus on the 28th during bright evening twilight.

The bright gibbous moon is near Antares on July 28th. Venus sets at Civil Twilight (sun 6° below the horizon) on the 29th.

August

As the month opens, the western evening sky is less congested with bright planets as Venus retreats into bright sunlight, leaving Mercury (m = 0.1) and Mars (m = 1.8) low in the sky at Civil Twilight, separated by 8.3°, outside the field of view for most binoculars. On the 8th, Mercury (m = 0.3) is 5.2° from Mars but not easily visible from the bright twilight and low western altitude. On the 27th, Mars sets at Nautical Twilight. How long can you follow it into brighter evening twilight until it fades into the glare of brighter evening light?

On August 1st, Saturn rises over an hour after sundown and crosses the southern meridian well after midnight. Saturn and the moon track westward together on the night of August 2/3. The moon and Neptune are in the same binocular field on the 4th. Look for Iapetus south of the planet at month's end.

Jupiter rises around midnight on the 1st and earlier each night. By month's end, it rises about three and one-half hours after sundown. The moon is 1.9° above the planet on the morning of the 8th.

The moon occults Antares on the 24th, beginning at approximately 9:30 p.m. in Chicago. Check the International Occultation Timing Association's (IOTA) website or your favorite source for the occultation's circumstances at your location.

The moon is near Spica on the 19th and 20th.

September

The western planet shuffle has dissolved as Mercury retreats into bright twilight, reaching inferior conjunction on the 6th. Fading Mars sets at Nautical Twilight on the 1st. Try to find the Red Planet and the crescent moon (3%) with a binocular during twilight on the 16th.

The giant planets generally follow the westward march of the seasonal constellations. Saturn, retrograding in Aquarius, is in the east-southeast during evening twilight. On the 1st, it crosses the south point after midnight, but at the month's end, this is after 10 p.m. The moon is nearby on the 26th. Through a telescope, the rings are inclined 9.0°.

Jupiter joins the evening sky at about 10 p.m. on the 1st and moves westward with the stars during the night, but it still appears in the morning sky before sunrise. It begins to retrograde on the 4th, 13.4° from Hamal, with a bright moon nearby.

The moon is near Pollux on the 10th and Antares on the 21st. Have a great summer observing!

NCRAL Seeking Future Convention Hosts

During NCRAL's annual business meeting, the Region receives offers for hosting future conventions. We are now looking for hosts for NCRAL 2025 and beyond. It's never too early to start planning to host an NCRAL convention.

Whether or not your club has ever hosted an NCRAL Regional convention, please consider doing so in 2025 or later. While hosting a Regional convention is a lot of work, it can be quite rewarding – even fun. It allows you to highlight your group's facilities and accomplishments, build club camaraderie, and personally get to know interesting guest speakers. You can also use such an event to grow your club's membership.

NCRAL now has its own convention planning guide. It was updated with lessons learned following NCRAL 2023. To download the planning guide, visit the following URL: https://ncral.wordpress.com/conventions/. Look for the link at the bottom of the page.

Please email NCRAL Regional Chair Alan Sheidler at adsheidler@gmail.com should you have any questions or wish to toss your affiliate's hat into the ring for hosting a future NCRAL convention.

Northern Lights Newsletter Index Coming

Because there are so many excellent feature articles in the back issues of our ***Northern Lights*** newsletter, Editor Carl Wenning is compiling an index that will appear on the newsletter archive webpage and in the future editions of this newsletter. Stay tuned for details.

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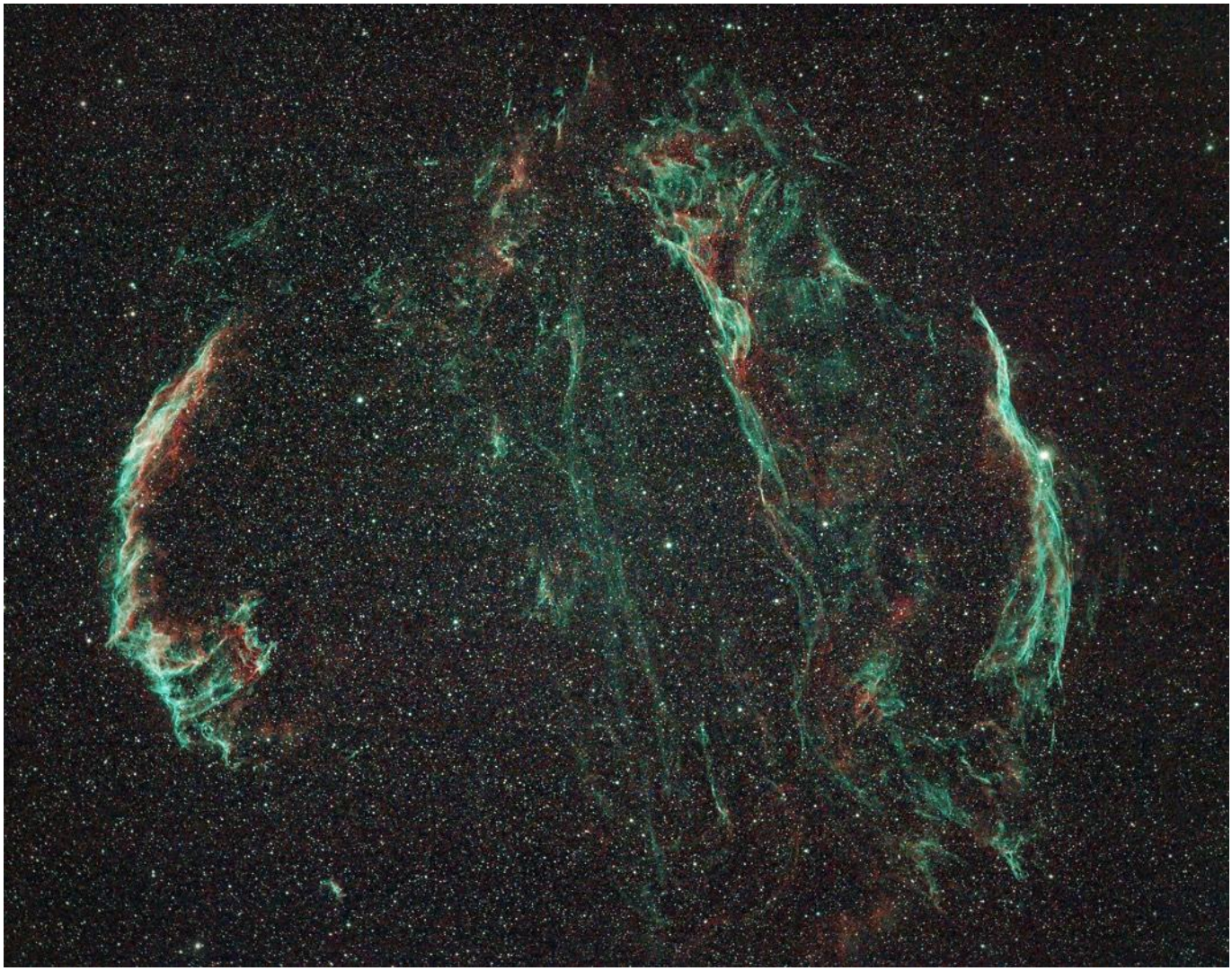
CYGNUS SUPERNOVA COMPLEX



PAC member Byron Davies took this image of the Veil Nebular in Cygnus. Scope/camera data: Takahashi Baby Q, Canon 6D Mark II with the Optolong L- Extreme filter. This image consists of 25 sub-images at ISO 1600, 180 seconds each, and processed in Siril. Mount was a Celestron CGEM II with ZWO on camera guiding.

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Add Your Email Address to the NCRAL Member Database

Did you know that just over 400 of our Region's 1,900 members receive this newsletter? That's less than one-quarter of the membership! Please help NCRAL get its newsletter out to the membership by encouraging fellow club members to add their email addresses to the NCRAL member database. Editors, please include this information in your affiliate's newsletter. It's one of the many benefits of belonging to the Astronomical League.

When one adds his or her email address to the NCRAL member database, he or she will receive direct notifications about the availability of ***Northern Lights***. In addition, subscribers receive important and timely announcements about Regional conventions, elections, star parties, and so forth. Only blind addressing (Bcc:) will be used with this email list so that others will not see subscribers' email addresses. Email addresses will never be shared with or sold to outside entities.

No one will add your email address to this list for you, so you'll need to do it yourself. Sign-up takes only about a minute. Resubscribe if you recently changed your email address and are not receiving our notifications. You'll need to provide your name, email address, and astronomy club affiliation (or indicate A.L. membership-at-large) and let us know if you hold specific positions within your club. Go to the following case-sensitive URL to add your information to our database at https://tinyurl.com/NCRAL today, so you won't miss important future communications.

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REGIONAL OFFICER & LEADER CONTACT INFORMATION

Chair: Alan Sheidler

Bio: Alan has been an active member of the Popular Astronomy club in the Quad Cities for 30 years and has held the offices of vice president and president. He is currently serving as the director of observing. Alan has been very involved in public outreach activities and in 2022 received the Master Level Astronomical League Outreach Award. He has also completed a number of AL observing programs including those for Double Stars, Globular Clusters, Planetary Nebulae, Venus & Mercury transits, and all four of the NCRAL Seasonal Messier Observing Awards.

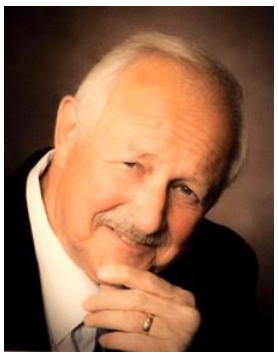
Contact: Adsheidler@gmail.com

Vice Chair: Bill Davidson

Bio: In the days of the Apollo missions, Bill first observed the moon (and sunspots!) with a 50x, 60mm JC Penny's refractor telescope. Not discouraged, 40 years later, he built and observes with a 6.25-inch achromatic doublet objective, f/10, 1600mm focal length refracting telescope. He recently retired as a college mathematics instructor, has been a member of the *Rochester Astronomy Club* (Minnesota) for more than 20 years, and serves as editor of the club's award-winning newsletter ***Rochester Skies***. (Two-year term as Vice Chair; currently in his third term, 2023-2025.) As Vice Chair, Bill manages the Region's membership awards and grants program.

Contact: rochesterskies@outlook.com

Secretary-Treasurer: Roy Gustafson



Bio: Roy, a member of *Popular Astronomy Club* (Quad Cities), got interested in astronomy when visiting the Adler Planetarium in Chicago when he was in 2nd Grade. The stars projected by the Zeiss Projector hooked him and started him on the path of astronomy. He has been active in outreach and has presented astronomy programs to over 20,000 people. He was awarded the ***Master Outreach Award*** from the Astronomical League. Roy travels with his telescopes and has observed both Transits of Venus and total solar eclipses in 2017 and 2019. Roy also taught astronomy at Black Hawk Junior College in Moline, IL. Roy retired from John Deere & Company after 32 years of service. As Secretary-Treasurer, Roy manages the Region's observing awards program. (Two-year term as Secretary-Treasurer; currently in his third term, 2018-2024.)

Contact: astroroy46@gmail.com

Regional Representative: John Attewell

Bio: John's interest in astronomy was kindled during two great comet events – comets Hyakutake (1996) and Hale–Bopp (1997). For the next ten years he used a 2½-inch refractor borrowed from his brother which he mounted on a rickety camera tripod. It wasn't until 2009 that he acquired a serious telescope as a gift from his family. He started attending meetings of the Rochester Astronomy Club in 2002, becoming a member in 2006, and Vice President in 2019. In 2017, he chaired the NCRAL annual conference held at Eagle Bluff Environmental Center in Lanesboro, Minnesota, and served as NCRAL Vice Chair from 2017-2019. John's particular interest is the history of astronomy. (Three-year term as Regional Representative; currently in first term, 2022-2025)

Contact: john_attewell@hotmail.com

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Webmaster: Jeff Setzer (appointed)

Bio: Jeff has been an amateur astronomer since 1984 and has been part of the *Northern Cross Science Foundation* (Wisconsin) since that time. He is a longtime member of their Board of Directors, has held several office positions, and is currently their President. He has completed several Astronomical League observing programs, made his own telescopes and optics, and is a self-described telescope nut. You will often find him at star parties with his 22" Starmaster and TeleVue 85 telescopes. Jeff is webmaster of the NCRAL website which can be found at https://ncral.wordpress.com/.

Contact: astrosetz@hotmail.com

Newsletter Editor: **Carl J. Wenning**

Bio: Carl has been an avid amateur astronomer since being introduced to the sky by his grandfather during July 1957. Today he is an ***A.L. Master Observer*** spending most of his time introducing nascent amateur astronomers to observing. He has been involved with the *Twin City Amateur Astronomers* (Illinois) since September 1978. Carl served as editor of his club's newsletter, ***The OBSERVER,*** from 2014-2021, during which time he received the Astronomical League's *Mabel Sterns Newsletter Editor Award* in 2017. He has served as the Region's ***Northern Lights*** newsletter editor from 2016 to present. (All prior issues are available at https://ncral.wordpress.com/newsletter-archive/.) Carl served three consecutive terms as Regional Chair from 2017 to 2023. He was recognized for his Regional education and outreach efforts in 2007 when he received the ***NCRAL Region Award***. Carl served as planetarium director and physics teacher educator at Illinois State University (1978-2008).

Contact: carlwenning@gmail.com

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