NORTHERN LIGHTS

NORTH CENTRAL REGION OF THE ASTRONOMICAL LEAGUE

Autumn 2019 – Series II, Volume 4, Number 2

INSIDE THIS ISSUE OF *Northern Lights*

NCRAL CHAIR'S MESSAGE

Summer 2019 has come and gone, and so has ALCon 2019. Unfortunately, I was not able to attend ALCon this year but Bill Davidson – our Vice Chair and interim Regional Representative to the National Council – did so on the Region's behalf. I was told by one of the AL's past presidents afterward, "He did a very able job of representing your Region." I'm delighted to have received that comment.

I was further delighted to hear from Bill that NCRAL is considered by the AL executive leadership to be among the two most active Regions in the League. Of that there can be no doubt! We hold regular Regional conventions, have an exemplary newsletter, provide lots of valuable resources, have Regional awards and grants programs, a Facebook page, an email list, and much more.

During my current two-year term (2019-2021) I hope to accomplish the following goals mentioned in the Summer 2019 issue of ***Northern Lights***:

- establish guidelines for Seasonal Messier Marathons for exclusive use within our Region,
- complete the proposal for the Astronomical Bucket List observing program and re-submit it (noting Regional membership support) to the Astronomical League for formal approval at ALCon 2020, and
- seek 501(c)(3) non-profit status for NCRAL so that we can provide tax write offs for those willing to contribute to the Region's educational and service activities.

Achieving each of these goals will require considerable time and effort, and I hope to work on one of these goals each quarter. For now, I'm happy to announce that I earlier shared draft guidelines for the NCRAL Seasonal Messier Marathons with the Regional Council for review. Having hear nothing but praise for the new program, I am publishing the guidelines for program in this issue of ***Northern Lights***. The first of the three goals for my 2019-2020 term has been accomplished.

I'm happy to announce that our host for NCRAL 2019, Popular Astronomy Club, turned a profit hosting the spring meeting at Moline, Illinois. It so turns out that the club is making a generous donation to NCRAL in support of our educational and service programs for which I am very grateful. Read more about their contribution following this Chair's message.

As a member of the Twin City Amateur Astronomers (TCAA, Bloomington-Normal, Illinois) who received NCRAL's first membership recruitment mini grant of $250, I'm happy to report that we are making considerable headway in gaining new members. As of now (with course registration continuing through early October), the TCAA appears ready to experience a growth spirt! Enrollment in our *Introduction to Amateur Astronomy* course is a dozen and growing. Not only has the general public responded to our offer (see the Summer 2019 issue of this newsletter), but many of our inactive members are getting involved for the first time too!

The TCAA not long ago started a "school" for astrophotography and seven current members have gone on to learn how to use the 14" and 17" telescopes with QHY camera in the club's Prairie Sky Observatory. They have become capable astrophotographers, and our photographic observatory is being used more now than ever. One only need to look at the club's newsletter archive to see how much our members are achieving: http://tcaa.us/Observer.aspx

It seems that instructional courses are just what the doctor ordered for increasing involvement in the amateur astronomy – for both members and non-members. We plan

to share our findings with others in the Region soon. Details about both of these course offering will appear in the Winter 2020 issue of ***Northern Lights***.

With this issue of our newsletter, we are putting out the first information about NCRAL 2020 that will be hosted by the Northern Cross Science Foundation (NCSF) in Port Washington, Wisconsin, Friday/Saturday, May 1-2, 2020. Jeff Setzer will be taking the lead for this convention on behalf of the NCSF.

As your Regional Chair, I'm always looking ahead to the future. Right now – in addition to the work before me – I'm still prospecting for an affiliate to host the NCRAL 2022 convention. Please consider tossing your club's hat into the ring at the NCRAL 2020 business meeting if you are willing to do so. A research-based, up-to-date NCRAL convention planning guide (including a section on what to consider before hosting) can be found on the Region's website at the following URL: http://ncral.wordpress.com/conventions/. Please communicate to me your questions, concerns, and/or willingness to host NCRAL 2022 as soon as reasonably possible. Two years of planning time is more than adequate to prepare for the task.

With summer now gone and autumn upon us, the prevalence of clear, dark skies is most enticing. I hope that you will take this time to get out and observe the heavens. Jupiter and Saturn are easy early evening targets currently. Venus has move out from behind the Sun, but it will take some more time before it becomes easily visible in the western evening skies.

Mars is just past conjunction with the sun and will soon being an almost 2-year-long sojourn across our sky. It the next several weeks it should emerge from the glare of the sun and then be visible just before dawn in the east. Over the coming months, it will gradually move from the morning to the evening sky. Opposition will occur in mid-October 2020.

The transit of Mercury, the last in our lifetimes for many of us, will take place on Veterans Day, November 11, 2019. Get out to observe this event; you'll regret missing it. The next visible transit from our region will be 20 or more years away.

Thanks again to our many contributors to this issue of ***Northern Lights*** – Jan & Roy Gustafson, Bill Davidson, Jeff Setzer, and Jeff Hunt. Unless readers are either editors or contributors, NCRAL members in generally don't realize how much work goes into producing this quarterly publication. If you see any of the authors in the coming months, please do be certain to thank them for their efforts.

So you don't miss NCRAL 2020, be certain to set aside May 1-2 in your schedule now so you can avoid schedule conflicts to the greatest extent possible. Schedule conflicts are one of the main reasons why members don't attend our Regional conventions – events that should never be missed.

Carl J. Wenning
NCRAL Chair (2017-2021)
Twin City Amateur Astronomers
carlwenning@gmail.com

To: Carl Wenning, NCRAL Chair
From: Alan Sheidler, PAC President
Date: September 8, 2019
Re: NCRAL 2019

I wanted you to know that we were able to close the books on the NCRAL 2019 conference with a profit of $532. While the Popular Astronomy Club served as the host for the convention, the reason the convention was such a success is due to the high quality of the speakers, and the resounding support of the Region. We would like to thank everyone who attended the conference.

In recognition of the Region's support for this year's convention, the PAC board voted to donate 100% of the profit from this year's conference to NCRAL to promote the Region's programs.

Thanks again to everyone and hope to see you all in Port Washington, Wisconsin, for NCRAL 2020.

ALCon 2019 in Review

~ by Vice Chair Bill Davidson, Interim NCRAL Rep. to the AL, Rochester Astronomy Club ~

ALCon 2019 (July 25-29) was organized by the Astronomical League with Maynard Pittendreigh (member of the Melbourne Astronomical Society) as Chair. The convention was held at two venues – Titusville, Florida (to celebrate the 50th Anniversary of Apollo 11 moon landing) and on the Royal Caribbean Cruise Liner *Mariner of the Seas* traveling to Nassau, Bahamas.

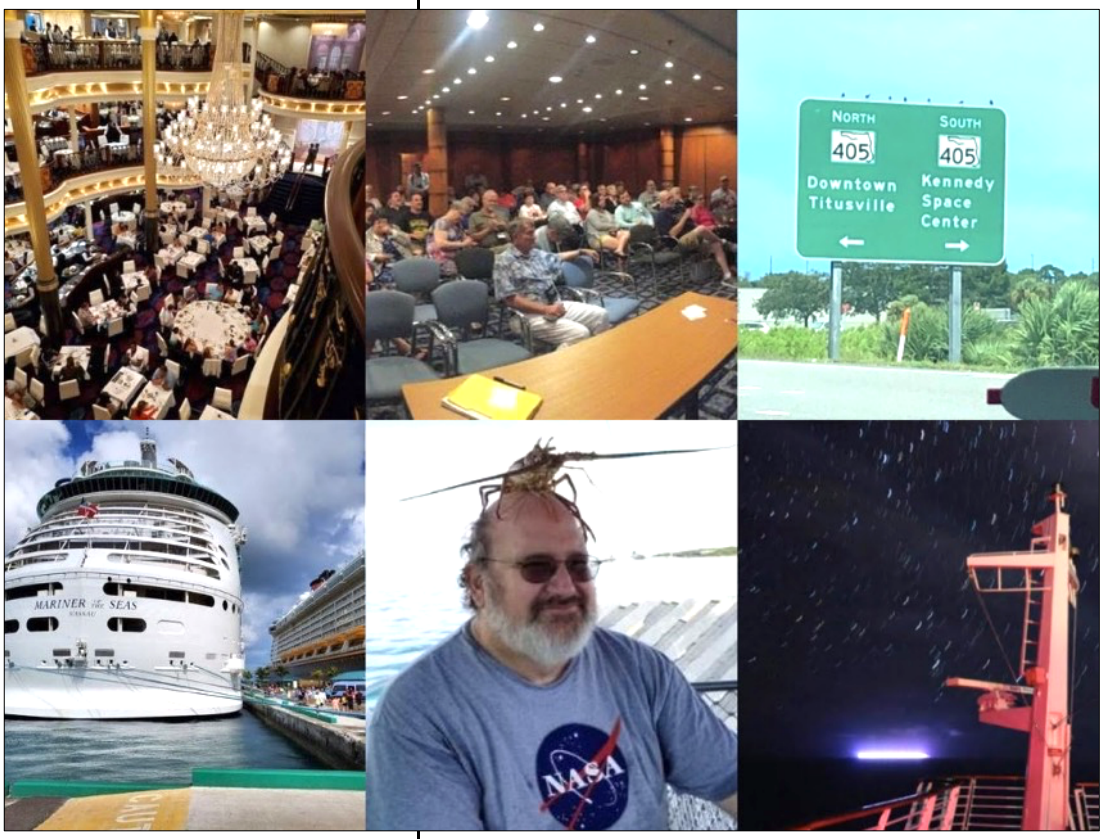
In Titusville, the group toured the Kennedy Space Center and later, from the hotel, viewed a launch of a Space X rocket. Convention speakers presented their talks on the cruise and night observations were held on the bow of the ship. Aaron Clevenson, the AL Observing Program Director, created an observation program for the southern night sky. Online certificates were presented for those who participated.

The National Council business meeting, held July 24th in Titusville, began with a moment of silence to honor the three presidents of the AL who passed this year: Bill Bogardus, Bob Gent and Jerry Sherlin. They had contributed greatly to the League and to the field of astronomy. Bill Bogardus was the President of the League when he passed in November of last

year. He was elected President at the ALCon 2018 gathering in Minneapolis. He initiated the idea of an ALCon cruise and Ron Kramer, Vice President at the time, and others continued the planning and final activation of the 2019 convention. With the loss of Bill, Ron became President, according to the Bylaws, and he appointed Carroll Iorg to serve as Vice President.

General Information for AL Members

The League announced that an IT Manager is needed. President Kramer asked if anyone knew of a person who would be a webmaster or handle part of the website. Such announcement was to be provided later to newsletter editors for publication. It was further noted that the League's magazine, the ***Reflector***, is approaching its 75th Anniversary.



There was discussion about getting more exposure for the League's Book Sales Program. This is a service the League offers its members. This program is run by Marilyn Unruh (a volunteer) who generally finds it hard to come up with astronomy books to sell at a discount to members. Sales this year were about $1,500.

Another benefit the League offers members (but not used as much) is the League's Discount Service. The vendors who participate are on the League's website under Celestial Savings.

There are three new observing programs:

Multiple Star Observing Program. It is an extension of the Double Star Program and is an advanced program. It requires a sketch or CCD image of 100 objects. The program adds more science regarding how stars behave, i.e. measure position angle and separation over time. A minimum of 4" aperture is required.

Spectroscopy Observing Program. This is, also, an advanced program and requires special equipment. It is designed to broaden observing programs and expose observers to new avenues. There are special eyepieces that can be purchased for this program for as little as $100.00. The science involved is to show the different spectra for different stars. Amateur astronomers must plot stars on a diagram and show the required calculations.

Mercury Transit Program for November 2019. This will be a special observing award with a pin and certificate. The pins will be ordered after the program is completed. Observations must be submitted within one month of the transit. Participants will calculate the AU and various features of the Sun and Mercury, i.e., diameter of Mercury and orbital parameters. Observers can use their own photographs or use someone else's photographs because of weather or lack of photography equipment.

During this past year, 671 certificates and pins were issued, with a total of 15,779 since the programs began. We added two programs last year. Also, certificates were added for two NASA observing challenges: Astronomy Before Telescopes, and Observing Program Mentor, which is normally one-on-one interactions. Also added was the Citizen Science Program which has a certificate only. These are not part of observing programs that count toward Master

Observer certification but will help keep people interested. Explorer Scientific has agreed to sponsor the Imaging Award, as the League lost the last sponsor.

President Kramer is the Region Representative for the International League. He received a list of every astronomy group in Spain from their representative and is working to try to convince them to join the Astronomical League. He is also working with several countries to entice them to join the League. The League's goal is 20,000 members by 2020. There are over 18,000 people so far.

ALCon 2020 will be in Albuquerque, NM. Registration for the ALCon and reservations for the hotel will be available effective January 1, 2020. The Albuquerque club has a large membership and assures that they will have volunteers there. Peggy Walker is going to do the first ALCon Junior at the 2020 convention where the youth will be building a 6" reflector telescope. There is a cost to this. It is hoped that this first ALCon Junior will encourage more youths at the 2021 convention.

The Dallas/Fort Worth area has shown interest in hosting the 2024 ALCon. It would probably be held in April due to the Solar eclipse.

SECRETARY-TREASURER'S REPORT

~ by Roy E. Gustafson, Popular Astronomy Club ~

2018 - 2019

North Central Region of the Astronomical League Financial Statement

Date	Description	Check Amount	Deposit	Daily Balance	Monthly Balance	
20-Aug-18	Open new Acct. - S.E. National Bank, Moline, IL		$5,000.00	$5,000.00	$5,000.00	Aug
4-Sep-18	Carl Wenning - attend A.L. Council Mtg.	$250.00		$4,750.00		
4-Sep-18	William Davidson - attend A.L. Council Mtg.	$250.00		$4,500.00		
4-Sep-18	Deposit from rest of NCRAL Account (US Bank) by Don Klempt minus $5.00 fee for closing account		$5,012.08	$9,512.08		
30-Sep-18					$9,512.08	Sep
31-Oct-18					$9,512.08	Oct
30-Nov-18					$9,512.08	Nov
31-Dec-18					$9,512.08	Dec
31-Jan-19					$9,512.08	Jan
28-Feb-19					$9,512.08	Feb
31-Mar-19					$9,512.08	Mar
30-Apr-19					$9,512.08	Apr
1-May-19	Rochester Astronomy Cub (Newsletter Editor Award)	$50.00		$9,462.08		
1-May-19	Twin Cities Amateur Astronomers (mini grant)	$250.00		$9,212.08		
1-May-19	Carl Wenning (2 plaques, FedEx shipping (LOGO ballot)	$191.50		$9,020.58		
4-May-19	Charlotte DuPree (shipping 2017 award)	$9.90		$9,010.68		
4-May-19	Terry Dufek (LOGO 1st place winner)	$75.00		$8,935.68		
4-May-19	Dave Sheber (LOGO 2nd place winner)	$37.50		$8,898.18		
4-May-19	Jeff Setzer (Website)	$99.00		$8,799.18		
31-May-19					$8,799.18	May
30-Jun-19					$8,799.18	Jun
31-Jul-19					$8,799.18	Jul
31-Aug-19					$8,799.18	Aug
20-Sep-19	Popular Astronomy Club NCRAL 2019 donation		$532.00		$9,331.18	Sep

NCRAL 2020 Approaching

~ by Jeff Setzer, Northern Cross Science Foundation ~

Work is progressing steadily for the NCRAL 2020 Convention themed ***Vision 2020***. The convention will be held Friday/Saturday, May 1-2, 2020, at the Lakeview Conference Center attached to the Country Inn & Suites in Port Washington, WI. Activities and speakers are being planned for Friday afternoon and all day on Saturday. We are excited to work with a great catering company for the conference meals.

We have a block of rooms at the conference hotel reserved for NCRAL ***Vision 2020*** guests. Most are double queen, but some are single king. They are all offered at the same discounted rate of $109/night (plus tax) based on double occupancy. Additional occupants for these rooms are $10/night (plus tax). All registered guests will enjoy full use of the hotel facilities, including indoor pool, whirlpool, fitness room, game room, and full hot breakfast each morning. Our block of rooms will be open until April 1, 2020, and is limited in number, so don't delay! Call the Country Inn & Suites in Port Washington, WI at (262) 284-2100 and ask for the NCRAL Convention rate. You may also want to peruse the website, which is linked from our conference webpage.

In the coming months, we will be finalizing agenda, speaker and other details, so look for updates on our website: www.ncsf.info. For now, be sure to SAVE THE DATE, reserve your room, and plan on attending a valuable and highly enjoyable NCRAL convention.

Total Solar Eclipse from La Higuera, Chile: July 02, 2019

~ by Jan and Roy E. Gustafson, Popular Astronomy Club ~

Total Solar Eclipse, Wow! This is the reaction everyone experiences when they see a total solar eclipse for the first time. My wife, Jan, and I had this exhilarating experience the first time on August 21, 2017 in Grand Island Nebraska when we viewed our first total with friends of ours, Wayland and Anne Bauer.

Leading up to the eclipse we watched and studied everything that nature had to offer: the light of day started to grow dim, the animal sounds grew quiet, the leaves on the trees projected the partial eclipse phases on the ground acting like lenses due to the diffraction of the image, the birds settled down, and we saw a group of birds land in the trees behind us and roost for the night. We also noticed the temperature of the day cool and by our recording drop about 11° F. And totality, 2 minutes and 34 seconds – something that is hard to explain emotionally and spiritually, as most others experienced, but an event that one will never forget.

My wife and I have seen many astronomical events, but this was by far the most spectacular! We have seen both Transits of Venus, the Blood Red Moon Tetrad, the transit of Mercury, comets, meteor showers, various observatories around the world, galaxies, nebula, double stars, all the planets, and much, much more, but nothing could prepare us for the beauty and majesty of the eclipse. Wow! We were hooked, we had to see another one, and soon. We didn't want to wait until April 2024, and as they say in the commercial, we want it now!

So, we started to look for another place to observe an eclipse. We knew there were no total eclipses in 2018 but there was one in 2019 – in Chile. We had always wanted to see Chile and here was a way to get both, an eclipse and Chile. We found a tour leader in California, Mark Sood of *A Classic Tours Collection*, who has been operating eclipse tours since 1980. We made contact with Mark and proceeded to sign on to the tour of Chile and the total solar eclipse. As an add-on, we also got to spend four days on Easter Island! Now all we had to hope for was good weather at the eclipse sight!

We arrived in Santiago, Chile, on June 27, and settled into our hotel. Sightseeing of various places in Chile was arranged for our group and we spent the time before the eclipse soaking in the sights, sounds, food, and wonderful people of Chile. This was very pleasant, educational, and fun, but I was anxious for the eclipse.

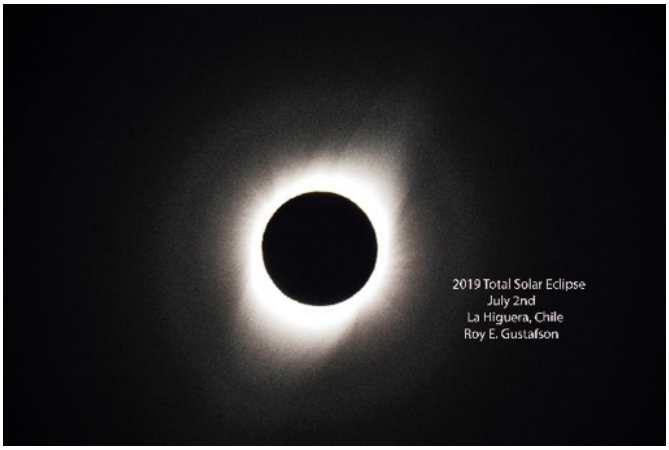
Mark had selected a spot on an old copper mine platform in La Higuera, a small-town north and west of Santiago, right along the eclipse line. Here is Jan on the platform with La Higuera in the background. We were staying in La Serena, about 42 miles from our viewing sight.

On the day of the eclipse we were up early and headed to our viewing sight. The town and surrounding area were filled with cars, but we were fortunate enough to have the platform all to ourselves, a group of about 100, that included some Chinese astronomers, and college students of Jay Pasachoff (our resident expert provided by Mark). We had visited this sight the day before, so we were familiar with it and knew where to place our telescopes, cameras, or chairs to view the eclipse. We were going to view and photograph the eclipse with my Stellarvue 70mm and a Canon 200D camera.

At last it was time. The Moon took the first bite out of the Sun and the eclipse was on! I had an intervalometer set at four-minute intervals and proceeded to enjoy the eclipse as the camera snapped away. The bite continued as we approached totality. The platform continued to darken as totality approached. We noticed the temperature change as the strength of the Sun's energy reaching Earth began to fade.

I shut off the intervalometer just before totality and took control of the photographing. We were fortunate to see and photograph Baily's Beads and the Diamond Ring on both sides of the eclipse, as shown in the composite below.

At last, totality! It was as spectacular as Grand Island! We could see Venus to the lower left, but my field of view was too narrow to photograph it. The eclipse lasted 2 minutes and 21 seconds. This seems like a long time, but if you are photographing a total solar eclipse and worrying about changing f-stops or second speed on your camera for your photos, time seems to fly by! But you must take time to see and experience the eclipse, and look at the covered Sun and the Corona, look at the now night sky and observe the planets or stars, look around at the eerie light on the landscape, listen to exclamations of the people around you, and process all of this in your own inner being.



Total solar eclipses are one of the most awesome events in astronomy, and remember, we are on the only planet in the Solar System that can experience a total solar eclipse. After totality the Moon moved along in its course and exposed more and more of the Sun until the eclipse was finally over. We were fortunate to see the eclipse from start to finish.

Even though the Sun was setting behind a mountain range, we saw the Moon leave the Sun just before the mountain started to take its bite. Now it was over, and we began our 5-hour journey of 42 miles back to our hotel. The long journey was worth it as we all sat in silence and processed what we had just seen. There will be more total eclipses before 2024 but they are all outside the U.S.A., so if you get excited to see another eclipse, start looking for tours to other parts of the world to view one.

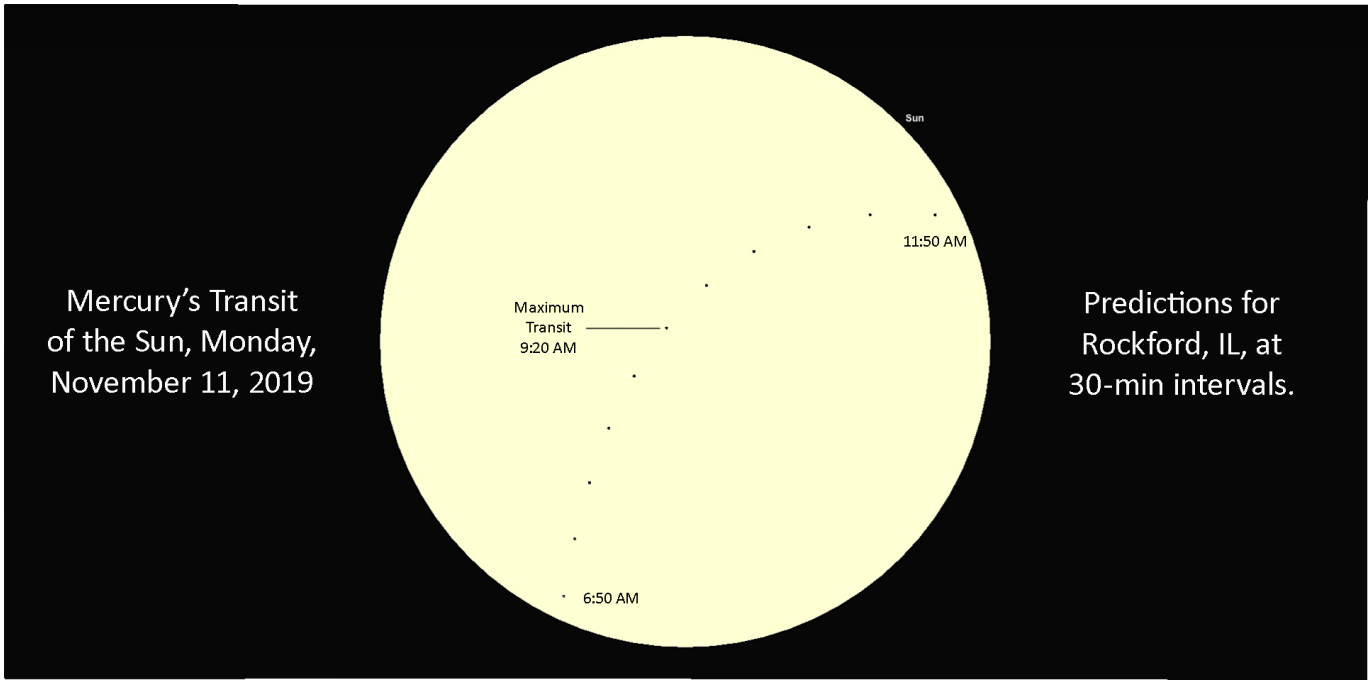
NOVEMBER 11, 2019 TRANSIT OF MERCURY

~ by Carl Wenning, Twin City Amateur Astronomers ~

This coming Veterans Day, Monday, November 11th, Mercury will move across the face of the sun as seen throughout the North Central Region. Transits of Mercury occur rarely but when they do occur, they take place in May or November due to the orbital mechanics of the Mercury and Earth. The last four transits occurred on November 15, 1999; May 7, 2003; November 8,

2006; and May 9, 2016. Like with the last two transits of Venus in 2004 and 2012 (much more rare events), this will be another great opportunity to share the excitement of amateur astronomy with the general public.

Note that the path of Mercury across the solar disk in the drawing below shown for Rockford, IL, (roughly the geographic center of the affiliates in our Region) does not appear to be a straight line. This is due to the fact that the sun's disk rotates clockwise as it moves across the sky from east to west.



The position of Mercury seen against the face of the sun. Mercury's position is shown at 30-minute intervals centered on the time of maximum transit – 9:20 AM CST approximately. The transit is already in progress at the time of sunrise throughout the Region. While the predictions are for Rockford, IL, they will not differ substantially across the Region. Diagram by Carl J. Wenning

As astronomer Fred Espenak notes, "The principal events occurring during a transit are conveniently characterized by contacts, analogous to the contacts of an annular solar eclipse. The transit begins with Contact I, which is the instant when the planet's disk is externally tangent to the Sun. Shortly after Contact I, the planet can be seen as a small notch along the solar limb. The entire disk of the planet is first seen at Contact II when the planet is internally tangent to the Sun. During the next several hours, the silhouetted planet slowly traverses the brilliant solar disk. At Contact III, the planet reaches the opposite limb and once again is internally tangent to the Sun. Finally, the transit ends at Contact IV when the planet's limb is externally tangent to the Sun. Contacts I and II define the phase called *ingress* while Contacts III and IV are known as *egress*. Position angles for Mercury at each contact are measured counterclockwise from the north point on the Sun's disk." The table below gives the times of major geocentric events during the 2019 transit in Central Standard Time (CST) – Daylight Saving Time having come to an end on November 3.

Geocentric Event	Tim (CST)
Contact I	6:35:27
Contact II	6:37:08
Greatest Transit	9:19:48
Contact III	12:02:33
Contact IV	12:04:14

Fortunately, the event this year falls on Veterans Day, Monday, November 11th. As this is a national holiday, federal and some state workplaces will be closed providing additional opportunities for some to view it. Schools will likely be in session

unfortunately, so most school children will miss this event. The next transit of Mercury won't occur until November 13, 2032 – more than 13 years from now. Even more unfortunate is the fact that that transit will not be visible locally, having come to a conclusion just before sunrise.

Based on calculations for Rockford, IL (the rough geographic center of the Region's affiliates), the transit this year will start just before sunrise which occurs at 6:37 AM. Mercury will cross the local horizon (assumed flat and free from obstructions about 7 minutes before sunrise. Mercury will cross over the horizon at about 6:44 AM. Rise times within the region will vary slightly from these, being earlier for those farther to the east and later for those farther to the west.

Greatest transit is the instant when Mercury passes closest to the Sun's center (i.e., minimum separation) when observed from Earth's center. At this time, approximately 9:20 AM, the geocentric angular distance between the centers of Mercury and the Sun will be 75.9 arc-seconds or just over one minute of arc. The duration of the event will be just under 5 hours and 29 minutes.

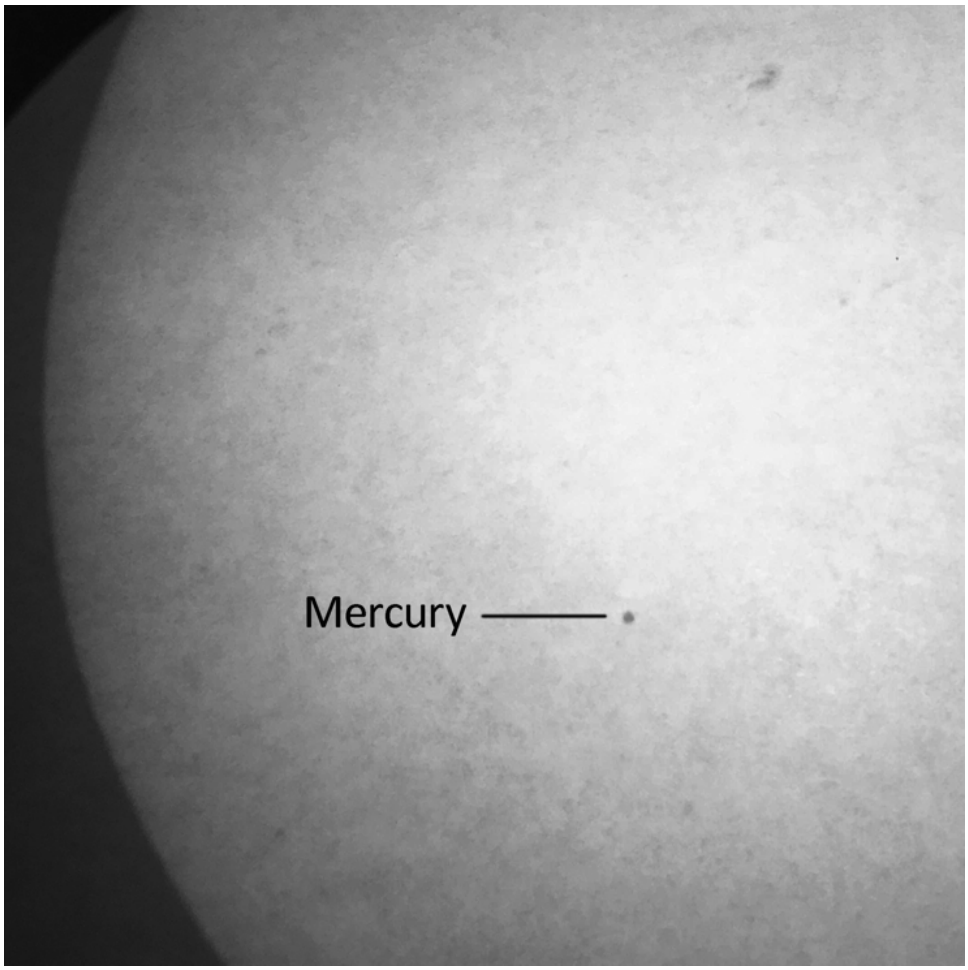


Image of Mercury visible against the face of the sun during the transit of May 9, 2016.
Image courtesy of Tim Stone, Twin City Amateur Astronomers, Sugar Grove Observatory.

Because Mercury appears so small in comparison in comparison with the sun's visible surface, successful observations will require the use of magnification in addition to suitable solar filters. I tried to observe the transit of Mercury back on November 10, 1973, with the use of a solar filter alone and no magnification. Despite prolonged efforts, I was unable to view Mercury with the unaided eye, so tiny was it in comparison to the face of the sun.

During the 2019 transit of Mercury, it will have an angular diameter of only 10.0 *arc seconds*. Compare this with the sun whose angular diameter will be 32.3 *arc minutes*! At the time of transit, the sun will appear 1,938 times larger than Mercury! No wonder that Mercury looks like a point of light even under high magnification when viewed with a telescope during the morning or evening twilight. It will look like a tiny speck even under magnification.

Prepare now to view Mercury's transit with a suitably filtered telescope or possibly a set of suitably filtered high-power binoculars. Personally, I plan on using my telescope to view this event so I can really "push" the magnification as needed. I advise you to do the same. Make plans now to share this interesting event with the general public.

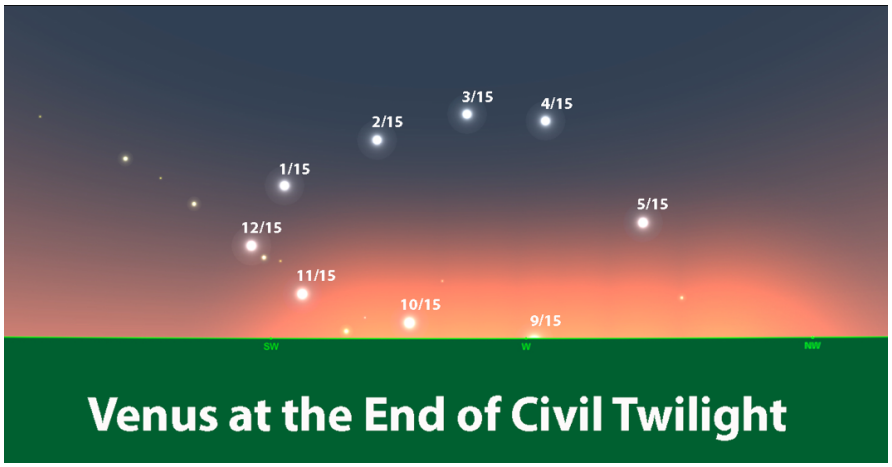
VENUS ARTICLE CORRECTION

A few edits were necessary in the Venus article that was published in the Summer 2019 issue of ***Northern Lights***. A corrected version is posted online at http://tinyurl.com/venus-eve-19-20 . Thank you for reading my writing – jlh

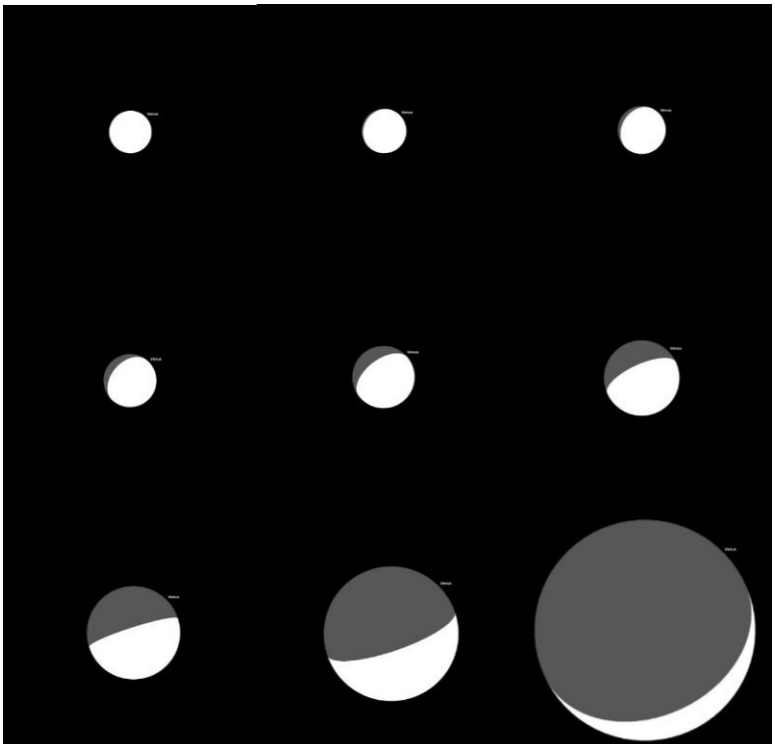
VENUS ENTERING EVENING SKY

~ by Carl Wenning, Twin City Amateur Astronomers ~

Venus will soon enter the evening sky. It was at superior conjunction on the far side of the sun on August 14th. Soon it will start appearing very low in the western evening sky at the end of civil twilight – approximately 30 minutes after sunset. It will be hard to see at first and will continue to hug the crepuscular western horizon until November when it starts to rise more rapidly higher up in the twilight glow. Jupiter and Saturn will also grace the western sky during the autumn but will slowly disappear into the glare of the sun as the sun's faster eastward motion along the ecliptic overtakes them. Mercury will make cameo appearances during this time as well. The first diagram shows the western evening sky about 30 minutes after sunset with the locations of Venus shown at midmonth from September 2019 through May 2020. The second diagram shows the phases at the corresponding mid-month dates.



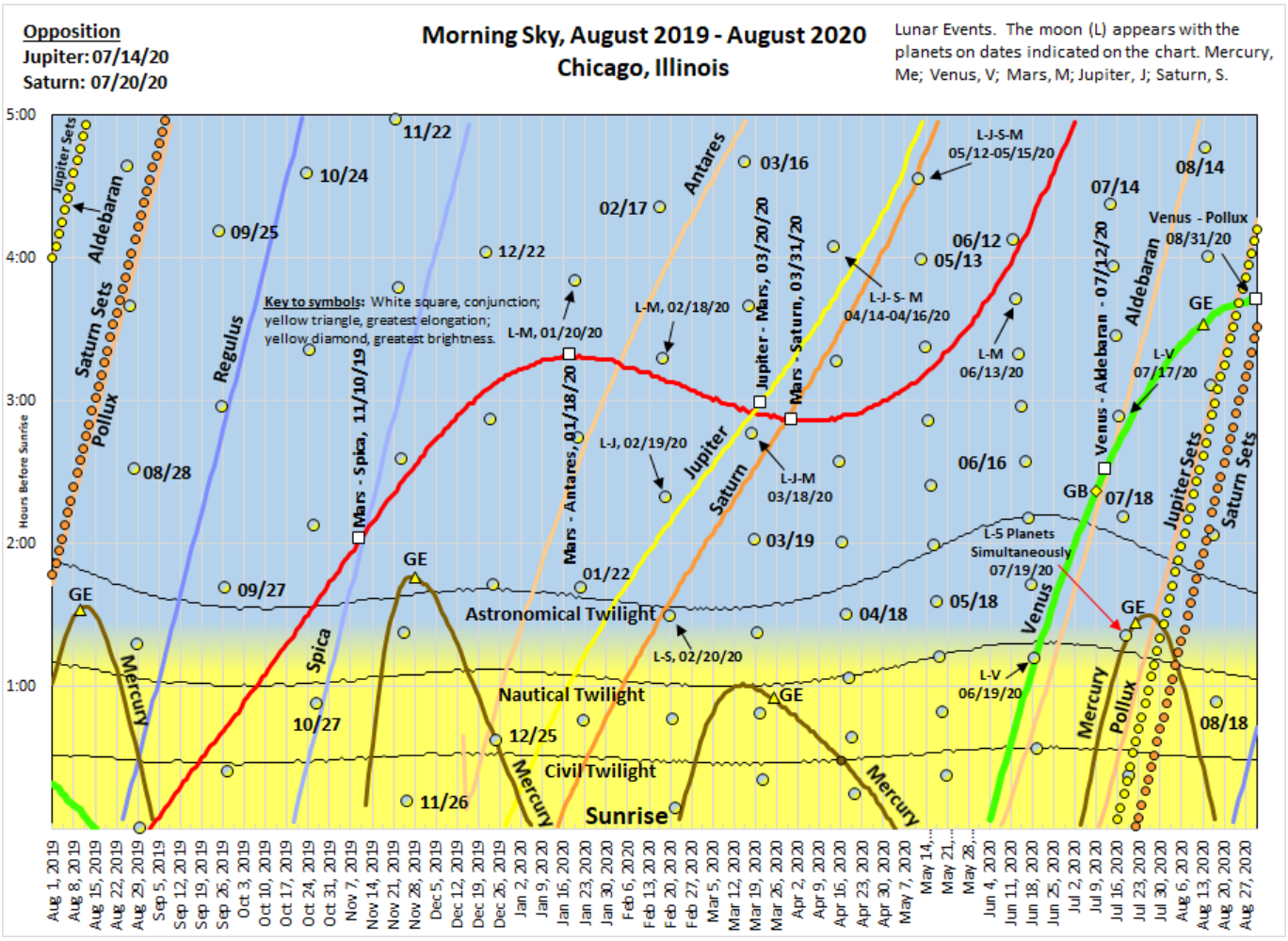
Location of Venus at monthly intervals from September through May. End of civil twilight will occur about 30 minutes past sunset.



Phases of Venus and relative angular size shown mid-month from September 2019 (upper left) through May 2020 (lower right).

MARS UNTIL RETROGRADE 2020

~ by Jeffrey L. Hunt ~



Mars Rising Chart – This chart shows the rising time differences for the rising times of the bright planets and stars near the ecliptic and sunrise for up to five hours before sunrise. The moon's time differences are displayed in circles. The setting times of Jupiter and Saturn are graphed compared to sunrise. (Data from the U.S. Naval Observatory)

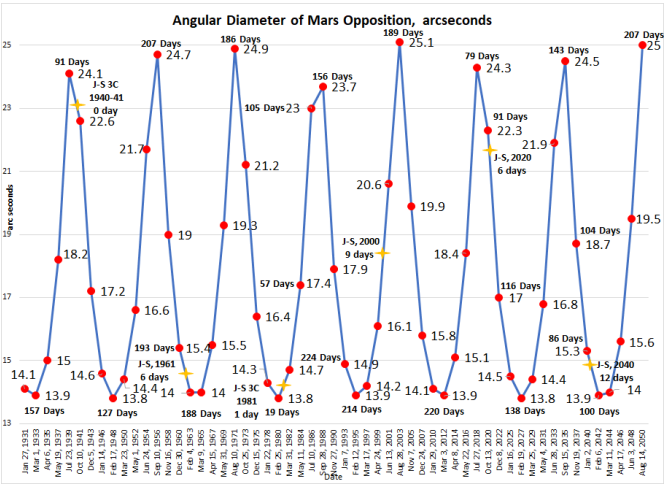
Mars begins an apparition that takes it to an opposition on October 12, 2020, 808 days following its 2018 perihelic opposition. The opposition, that will be highlighted in a future issue, brings Mars to its closest approach about a week before opposition. On October 6, the closest approach is 35.8 million miles, about 8% farther away than the preceding close passing. This corresponds to a smaller disk presented through a telescope.

The chart above, compiled with data from the U.S. Naval Observatory, shows the morning sky for 13 months beginning August 1, 2019, from Chicago, Illinois. Time intervals are noted on the chart and in the daily notes. Specific times are for Chicago, Illinois. To observe locally, refer to local sources for the times of sunrise and sunset; apply the time differentials in the notes.

The chart displays the time differences between the time of sunrise and the rising times for other planets, moon, and bright stars near the ecliptic, for up to five hours before sunrise. The moon's rising time difference is displayed with circles. The setting time differences for Jupiter and Saturn, compared to sunrise, are displayed as well. The three phases of twilight are graphed compared to sunrise, and conjunctions are identified. The chart also notes several dates when the moon is near the bright planets.

Mars, Jupiter, and Saturn have oppositions that occur within 91 days in 2020. The interest in the Mars opposition adds a highlight to the Great Conjunction of Jupiter and

Saturn that occurs late in the year. Such Jupiter – Saturn conjunctions occur about every 20 years.



Apparent Size of Mars at Opposition: The apparent sizes of Mars (in arcseconds) at its oppositions are graphed from 1930 to 2050. The larger apparent sizes occur when Mars is near perihelion and smallest when it is near aphelion. The time between oppositions for Mars, Jupiter, and Saturn are displayed for some oppositions (in days). The Great Conjunctions of Jupiter and Saturn that occur about every 20 years are displayed with yellow stars, including the time (in days) between oppositions of the two planets.

Mars' apparent size at opposition (24.3") is 8% smaller than the 2018 perihelic opposition and 11% smaller than the 2003 close opposition. This was described above with the close approach that is farther away in 2020 than the most recent perihelic opposition. The chart above displays the apparent size of Mars at its oppositions from 1930 through 2050. The twenty-year intervals of the Jupiter – Saturn Great Conjunction are displayed with yellow stars along with the time interval between their oppositions. For several Mars' oppositions, the time intervals are noted for the Bright Outer Planets – Mars, Jupiter, and Saturn.

In this summary the events before opposition include monthly passages of the moon that highlight the beginning of a lunar occultation that is easier to view in the Western US, conjunctions with Jupiter, Pluto, Saturn, Ceres, and Neptune.

The apparition began with Mars' conjunction with the sun on September 2, 2019. While dim, it began a slow crawl into the morning sky. By mid-month Mars was rising at Civil Twilight when the sun was 6° below the horizon.

At the beginning of October, the Red Planet (m = 1.8) is just above the eastern horizon, 45 minutes before sunrise, although it is a binocular object. The planet continues to rise earlier, Nautical Twilight (sun's altitude = −12°) on October 6. Throughout October it rises earlier, rising at Astronomical Twilight on October 25. In the summary, each entry includes the planet's magnitude, apparent size, distance from Earth in Astronomical Units, and difference between the planet's rising time and sunrise, stated in minutes. This time changes in the summary on July 1, 2020, when the difference noted is between sunset and the rising of Mars. Here's what to look for:

- **October 26**: (1.8, 3.7", 2.56 AU, 94m) Forty-five minutes before sunrise, the waning crescent moon (27.6 days old, 4% illuminated) is 5.6° to the upper left of Mars, about 8° up in the east-southeast. At this time, Mars is 4.5° below Gamma Virginis (γ Vir, m 3.4). Use a binocular.
- **November 10**: (1.8, 3.8", 2.50 AU, 122m) One hour before sunrise, Mars, about 9° up in the east-southeast, passes 2.8° to the upper left of Spica (α Vir, m = 1.0).
- **November 24**: (1.7, 3.9", 2.42 AU, 146m) One hour before sunrise, the waning crescent moon (27.3d, 6%) is 3.7° to the left of Mars, 15° up in the east-southeast. At the same time Mars is 9.5° to the upper right of Mercury (m = −0.4). Tomorrow morning, at the closest approach, the planets have about the same separation, although the gap is neither a conjunction nor a quasi-conjunction.
- **November 25**: (1.7, 3.9", 2.42 AU, 148m) One hour before sunrise, Mars is 14° up in the southeast, 9.5° to the upper right of bright Mercury (m = −0.3), 7° in altitude. The thin crescent moon (28.3d, 2%) is 5.5° to the lower left of Mercury. You'll need a clear horizon to see the moon. It's only 3° in altitude.
- **November 30**: (1.7, 3.9", 2.39 AU, 156m) One hour before sunrise, Mars, 15° in altitude in the southeast, is 0.2° to the lower left of Lambda Virginis (λ Vir, m = 2.8).

December 2019

As the year closes, Mars continues its eastward march. Early in the month, bright Mercury is to the lower left of Mars. Still over 2 Astronomical Units from Earth, Mars moves through Libra and between the pincers of the Scorpion. The planet rises about 3 hours before sunrise, but it's low altitude and southerly location may send you on a chase to find a clear horizon.

- **December 1**: (1.7, 3.9", 2.38 AU, 157m) Mars moves into Libra, 7.3° to the upper right of Zubenelgenubi (α Lib, m = 2.8). Sixty minutes before sunrise, Mars is about 15° up in the southeast.
- **December 12**: (1.7, 4.0", 2.32 AU, 174m) One hour before sunrise, Mars, over 17° up in the southeast, passes 0.2° to the upper left of Zubenelgenubi.

- **December 18**: (1.6, 4.1", 2.28 AU, 181m) One hour before sunrise, Mars, nearly 18° up in the southeast, is 0.7° to the lower right of Nu Librae (ν Lib, m =5.2). Use a binocular to see the pair.
- **December 21**: (1.6, 4.2", 2.25 AU, 184m) One hour before sunrise, Mars, 18° up in the southeast, is 2.3° to the upper left of Iota Librae (ι Lib, m = 4.5).
- **December 22**: (1.6, 4.2", 2.25 AU, 185m) One hour before sunrise, Mars, 18° in altitude in the southeast, is over 8° to the lower left of the waning crescent moon (25.7d, 15%). The moon is above a line that connects Zubenelgenubi and Zubeneschamali (β Lib, m = 2.6). The lunar crescent is 3.5° to the upper left of Zubenelgenubi.
- **December 23**: (1.6, 4.2", 2.24 AU, 191m) One hour before sunrise, Mars, 18° up in the southeast, is 6° to the upper right of the crescent moon (26.8d, 8%).

January 2020

As the New Year breaks, Mars is an unimpressive "star" low in the southeast as sunrise approaches, rising about 4 a.m. CST. It continues to move through Libra and Scorpius and into southern Ophiuchus. At mid-month it passes north of its Rival, Antares.

Notice on the rising chart above that the time differential between the rising of Mars and sunrise decreases from late January through early-April. The declination of the sun is greater than Mars' position. The sun is moving toward the vernal equinox while Mars is approaching the ecliptic's lowest point. The basic principle is that the farther north an object the earlier it rises. During January and February, the time interval between sunrise and Mars rising decreases nearly 20 minutes. This is reflected in the dip the Mars rising line takes on the chart. The differential increases after Mars moves farther north in declination.

- **January 7, 2020**: (1.5, 4.4", 2.14 AU, 196m) One hour before sunrise, Mars, 19° up in the southeast, is 1° to the right of Graffias (β Sco, m = 2.5). Mars enters Scorpius today and moves through in only 8 days.
- **January 8**: (1.5, 4.4", 2.13 AU, 197m) One hour before sunrise, Mars, over 18° up in the southeast, passes 0.7° below Graffias.
- **January 9**: (1.5, 4.4", 2.12 AU, 197m) One hour before sunrise, Mars, over 18° up in the southeast, is still near Graffias, passing 0.1° from Omega1 Scorpii (ω1 Sco, m = 3.9). Use a binocular to see the planet with the dimmer starfield.
- **January 15**: (1.5, 4.5", 2.08 AU, 198m) Mars moves into Ophiuchus. It crosses the constellation in 27 days. One hour before sunrise, Mars is over 18° in altitude in the southeast, 1.8° to the upper right of Omega Ophiuchi (ω Oph, m = 4.4).
- **January 18**: (1.5, 4.6", 2.05 AU, 199m) One hour before sunrise, Mars, over 18° up in the southeast, is 4.7° to the upper left of Antares (α Sco, m = 1.0). At the same time, Mars is 0.4° below Omega Ophiuchi. View the star and Mars in the growing twilight with a binocular.
- **January 20**: (1.4, 4.6", 2.04 AU, 198m) One hour before sunrise, Mars is 18° up in the southeast, 3.9° to the lower left of the crescent moon (25.2d, 19%).
- **January 21**: (1.4, 4.6", 2.03 AU, 199m) One hour before sunrise, Mars, 18° up in the southeast, is over 9° to the upper right of the moon (26.2d, 11%).
- **January 24**: (1.4, 4.7", 2.00 AU, 198m) Mars is 2.0 Astronomical Units from Earth. One hour before sunrise, the Red Planet is 18° up in the southeast, 6.3° to the upper left of Antares.

February 2020

During February, Mars moves from Ophiuchus into Sagittarius, through the rich galactic background of our galaxy's nucleus region. Use a binocular to track the planet's motion. After mid-month, the moon occults Mars in a bright sky as sunrise approaches. Mars heads toward conjunctions with Jupiter, Pluto, and Saturn next month. Watch the gaps close during February as the Bright Outer Planets appear above the southeast horizon before sunrise.

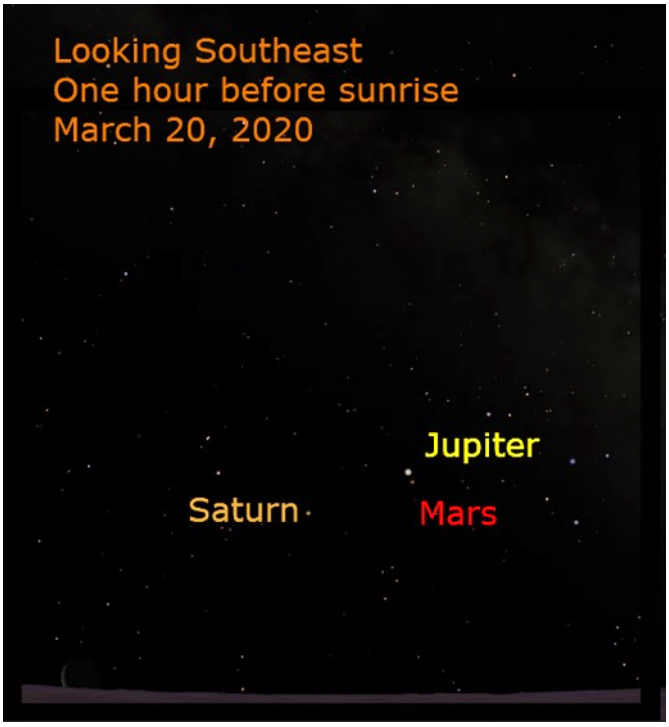
- **February 1**: (1.4, 4.8", 1.94 AU, 197m) Mars moves south of the ecliptic. One hour before sunrise, find it about 18° up in the southeast.
- **February 2**: (1.3, 4.8", 1.93 AU, 196m) One hour before sunrise, Mars, about 18° up in the southeast, is 1° above Omicron Ophiuchi (o Oph, m = 5.1).
- **February 4**: (1.3, 4.9", 1.92 AU, 195m) One hour before sunrise, Mars is over 17° in altitude in the southeast. It is 1.8° to the upper left of Theta Ophiuchi (θ Oph, m = 3.2).
- **February 5**: (1.3, 4.9", 1.91 AU, 194m) One hour before sunrise, Mars, over 17° up in the southeast, is 0.9° to the upper left of 44 Ophiuchi (44 Oph, m = 4.2).
- **February 6**: (1.3, 4.9", 1.90 AU, 194m) Mars rises at its most southerly rising azimuth, 122°, until March 5, 2020.
- **February 7**: (1.3, 5.0", 1.90 AU, 194m) One hour before sunrise, Mars, about 17° in altitude in the southeast, is 0.6° to the upper left of 51 Ophiuchi (51 Oph, m = 4.8).

- **February 9**: (1.3, 5.0”, 1.88 AU, 193m) Mars is about 20° to the upper left of Jupiter (m = −1.9), 7° up in the southeast, one hour before sunrise.
- **February 11**: (1.3, 5.0”, 1.86 AU, 192m) Mars moves into Sagittarius. It begins to approach the bright nebulae and rich star field above the Teapot of Sagittarius. Use low powers to view the planet and the starry background. As the moon approaches the region during the next week, watch Mars move between the Lagoon Nebula (M8, NGC 6523) and the Trifid Nebula (M20, NGC 6514). Mars crosses the constellation in 50 days.
- **February 17**: (1.2, 5.2”, 1.81 AU, 189m) One hour before sunrise, Mars, nearly 17° up in the southeast, is about 13° to the lower left of the moon (23.6d, 33%).
- **February 18**: (1.2, 5.2”, 1.81 AU, 189m) One hour before sunrise, the crescent moon (24.6d, 24%), about 17° up in the southeast, is 0.4° to the right of Mars. As sunrise approaches, the moon inches toward the planet. If you can track Mars into a brighter sky, the moon occults it a few minutes after 6 a.m. CST, about 35 minutes before sunrise in Chicago. Observers in the Western U.S. see the moon occult Mars in a darker sky.
- **February 26**: (1.1, 5.4”,1.74 AU, 185m) One hour before sunrise, Mars, 16° up in the southeast, passes 1.8° to the upper left of Kaus Borealis (λ Sgr, m =2.8), the star at the top of the lid of the Teapot of Sagittarius.

March 2020

Mars marches eastward in Sagittarius, above the Teapot’s handle, and continues to rise earlier. By month’s end, the planet rises before 4 a.m. CDT, as the clock advances one hour on March 8. The gaps to Jupiter, Pluto, and Saturn close as Mars passes the planetary trio this month.

- **March 1**: (1.1, 5.5”, 1.70 AU, 183m) One hour before sunrise, Mars, 16° up in the southeast, is 10° to the upper right of Jupiter (m = −2.0).
- **March 5**: (1.1, 5.6”, 1.67 AU, 180m) One hour before sunrise, Mars, 16° up in the southeast, passes 2.9° to the upper left of Nunki (σ Sgr, m = 2.0) and appears nearly 8° to the upper right of Jupiter.
- **March 11**: (1.0, 5.8”, 1.62 AU, 178m) One hour before sunrise, Mars, 16° up in the southeast, is 4.9° to the upper right of Jupiter. Gaps until the Jupiter – Mars conjunction: **Mar 12**, 4.3°; **Mar 13**, 3.7°; **Mar 14**, 3.3°; **Mar 15**, 2.7°; **Mar 16**, 2.2°; **Mar 17**, 1.7°, Mars to the right of Jupiter; **Mar 18**, 1.2°; **Mar 19**, 0.9°.
- **March 15**: (1.0, 5.9”, 1.59 AU, 177m) One hour before sunrise, Mars, 16° up in the southeast, is 10° to the upper right of Saturn (m = 0.7).
- **March 18**: (0.9, 6.0”, 1.56 AU, 174m) The crescent moon (24.1d, 29%) joins the scene with Jupiter and Mars. The trio makes a small triangle, the moon is 2.4° to the lower right of Jupiter and 2.2° to the lower left of Mars.

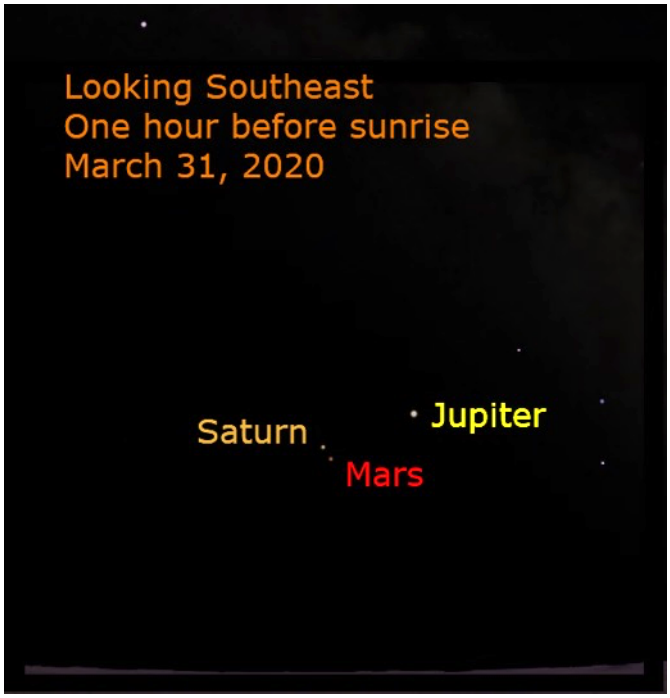


Jupiter-Mars Conjunction, March 20: Mars passes 0.6° to the lower right of Jupiter. Locate the planets in the southeast about an hour before sunrise.

- **March 20**: (0.9, 6.0”, 1.55 AU, 174m) Jupiter – Mars conjunction! Mars is 0.6° to the lower right of Jupiter. The gaps after the conjunction as Mars moves away from Jupiter: **Mar 21**, 0.9°; **Mar 22**, 1.3°; **Mar 23**, 1.7°; **Mar 24**, 2.3°; **Mar 25**, 2.7°; **Mar 26**, 3.4°; **Mar 27**, 3.9°; **Mar 28**, 4.5°; **Mar 29**, 5.0°. The next Jupiter – Mars conjunction is May 29, 2022 in the morning sky. At that conjunction the sky has 4 bright planets – Venus, Jupiter, Mars, and Saturn – in the southeastern sky. The moon is nearby, a few days before the closest Jupiter – Mars passage. This morning the Mars – Saturn gap is 7.1°.
- **March 23**: (0.9, 6.1”, 1.52 AU, 174m) Mars passes 0.1° to the lower left of Pluto (m = 14.3). At the beginning of morning twilight, Mars is about 12° up in the southeast. This is clearly a stretch to see this conjunction. A big scope

and ideal sky conditions are needed to locate the distant world near Mars.

- **March 26**: (0.8, 6.2", 1.50 AU, 173m) Mars is nearly equidistant from the two bright giant planets, although Mars is below a line that connects Jupiter and Saturn. One hour before sunrise, Mars, 15° up in the southeast, is 3.3° to the lower left of Jupiter and 3.2° to the upper right of Saturn. The Jupiter – Saturn gap is 6.4°.



Saturn-Mars Conjunction, March 31: Mars passes 0.9° to the lower right of Saturn. The planets are in the southeast about an hour before sunrise.

- **March 31**: (0.8, 6.4", 1.46 AU, 172m) Mars – Saturn conjunction! One hour before sunrise, Mars, 16° up in the southeast is 0.9° to the lower right of Saturn. The Mars – Saturn gap grows after the conjunction: **Apr 1**, 1°; **Apr 2**, 1.4°; **Apr 3**, 1.9°; **Apr 4**, 2.5°; **Apr 5**, 3.1°; **Apr 6**, 3.7°; **Apr 7**, 4.3°; **Apr 8**, 5.0°. This morning gap to Jupiter is 6.1°. Mars moves into Capricornus.

April 2020

Mars is now moving away from Jupiter and Saturn and through the starfield of Capricornus. Continue to track it with low powers as it passes dimmer stars. It has a close appearance with the moon at mid-month. By month's end the planet rises before 3 a.m. CDT.

- **April 5**: (0.7, 6.6", 1.42 AU, 172m) One hour before sunrise, Mars, nearly 16° up in the southeast, is 5.1° to the lower right of Beta Capricorni (m = 3.0). Look for Saturn and Jupiter nearby.
- **April 7**: (0.7, 6.7", 1.41 AU, 172m). One hour before sunrise, Mars is 10° to the lower left of Jupiter and over 4° to the lower left of Saturn.
- **April 15**: (0.6, 7.0", 1.34 AU, 173m) One hour before sunrise, Mars, 16° up in the southeast, is nearly 10° to the left of the thick crescent moon (22.0d, 45%). At the same time, the moon is 3.3° below Saturn. This morning Jupiter is 5.5° to the upper right of Saturn and nearly 15° to the upper right of Mars.
- **April 16**: (0.6, 7.0", 1.34 AU, 173m) One hour before sunrise, Mars, over 16° up in the southeast, is 3.8° to the upper right of the crescent moon (23.0d, 36%). Mars is 10° to the lower left of Saturn.
- **April 20**: (0.5, 7.2", 1.30 AU, 174m) One hour before sunrise, Mars, nearly 17° up in the southeast, is 0.8° below Theta Capricorni (θ Cap, m = 4.0). In the brightening sky, use a binocular to see the star with Mars.
- **April 23**: (0.5, 7.3", 1.28 AU, 175m) One hour before sunrise, Mars, about 17° up in the southeast, is nearly 15° to the lower left of Saturn. Meanwhile, the Jupiter – Saturn gap is 5.1°.
- **April 25**: (0.5, 7.4", 1.27 AU, 177m) One hour before sunrise, Mars, over 17° up in the southeast, is 0.2° to the lower right of Iota Cap (ι Cap, m = 4.2). Optical assistance helps see Mars' close proximity to the star.

May 2020

Mars moves from Capricornus into the dim star field of Aquarius early in the month, brightening about 45% as it nears 1.0 Astronomical Unit away. The planet is about 40 times brighter than the stars it passes during the month. Continue to use low power to track the planet on its eastward march. The moon passes at mid-month, although about a degree farther away than in April. The planet passes Ceres late in the month. As April closes, Mars rises before 2 a.m.

- **May 1**: (0.4, 7.7", 1.22 AU, 180m) Ninety minutes before sunrise, Mars, 14° up in the southeast, 0.9° above Gamma Capricorni (γ Cap, m = 3.6).
- **May 4**: (0.4, 7.8", 1.20 AU, 183m) Mars is 1.0° to the upper left of Delta Capricorni (δ Cap, m = 2.8), 90 minutes before sunrise. The planet is over 14° up in the southeast.
- **May 9**: (0.3, 8.0", 1.16 AU, 187m) Mars moves into Aquarius. Ninety minutes before sunrise, locate it nearly

16° in altitude in the southeast. Mars crosses the constellation in 47 days.

- **May 11**: (0.3, 8.1", 1.14 AU, 188m) About 90 minutes before sunrise, Mars, about 16° up in the southeast, passes 0.3° to the upper right of Iota Aquarii. (ι Aqr, m = 4.2).
- **May 14**: (0.2, 8.3", 1.13 AU, 192m) About 90 minutes before sunrise, Mars, nearly 17° up in the southeast, is over 9° to the upper left of the slightly gibbous moon (21.3d, 52%).
- **May 15**: (0.2, 8.3", 1.12 AU, 193m) Mars is nearly 17° up in the southeast, ninety minutes before sunrise, 4.5° to the upper right of the moon (22.3d, 42%).
- **May 18**: (0.2, 8.5", 1.11 AU, 196m) One hour before sunrise, Jupiter is 27° up in the south. Saturn is 4.7° to the left of Jupiter. This is a quasi-conjunction. Saturn began retrograding May 11 and Jupiter May 18. This occurs over 7 months before the two planets' Great Conjunction. At this time, Mars, 36° to the left of Jupiter, is 21° up in the southeast.
- **May 19**: (0.2, 8.6", 1.11 AU, 198m) Mars passes nearly 20° north of Fomalhaut (α PsA, m = 1.2). While not near the ecliptic, Fomalhaut is a bright beacon among the dimmer stars of this region. And its place helps note the passage of bright solar system objects. One hour before sunrise, Mars is 22° up in the southeast while the star is about 4° in altitude in the southeast.
- **May 21**: (0.1, 8.7", 1.08 AU, 201m) About 90 minutes before sunrise, Mars, over 18° up in the southeast, passes 0.8° to the lower right of Sigma Aquarii (σ Aqr, m =4.8).
- **May 24**: (0.1, 8.8", 1.06 AU, 205m) Ninety minutes before sunrise, Mars, over 19° up in the southeast, is 7° to the upper left of Ceres (1Ceres, m = 8.0), 1.2° to the lower right of Delta Aquarii (δ Aqr, m = 3.2).
- **May 25**: (0.1, 8.9", 1.05 AU, 207m) About 90 minutes before sunrise, Mars, over 19° up in the southeast, passes 3.5° above Tau Aquarii (τ Aqr, m = 4.0).
- **May 30**: (0.0, 9.2", 1.02 AU, 215m) Mars passes 1.9° to the lower right of Lambda Aquarii (λ Aqr, m = 3.7). Mars is over 20° up in the southeast, ninety minutes before sunrise.

June 2020

During the month, Earth moves within 1 Astronomical Unit of Mars, while the Red Planet's brightness grows nearly 0.5 magnitude. The planet passes Neptune late in the month. As the month closes, Mars rises at about 12:30 p.m. CDT.

- **June 1**: (0.0, 9.3", 1.00 AU, 218m) Mars is 1 Astronomical Unit from Earth. Ninety minutes before sunrise the planet is 21° up in the southeast.
- **June 5**: (−0.1, 9.6", 0.98 AU, 225m) Mars is 90° west of the sun. Ninety minutes before sunrise, it is nearly 21° up in the southeast.
- **June 8**: (−0.1, 9.8", 0.96 AU, 232m) Ninety minutes before sunrise Mars is nearly 24° up in the southeast. With a binocular observe that it is 1.5° to the lower right of Phi Aquarii (ϕ Aqr, m = 4.2) and 0.3° to the upper left of Chi Aquarii (χ Aqr, m = 4.9).
- **June 13**: (−0.2, 10.1", 0.92 AU, 243m) Ninety minutes before sunrise, Mars, 26° up in the southeast, is 1.6° to the lower right of Neptune (m = 7.9) and 4.7° to the upper right of the moon (21.6d, 49%). Use higher powers to see Neptune's 2.3"-diameter disk.
- **June 25**: (−0.4, 11.0", 0.85 AU, 276m) Mars moves into Pisces, below the six, fourth magnitude stars that make the western fish. Mars makes a partial passage through Pisces in 13 days, then it moves into Cetus. It is 0.2° to the upper right of 27 Piscium (27 Psc, m = 4.8). Ninety minutes before sunrise, Mars is 31° up in the southeast.

July 2020

The time differential in the notes changes to rising time after sunset. (On July 8, Mars rises in the east 221 minutes after sunset.) Earth begins to close in on Mars. Now brighter than all the stars, except Sirius from the Northern Hemisphere, Mars gleams from the southeast before morning twilight begins. It moves into Cetus for a short duration, still among dimmer stars. Continue to track it with a binocular, although larger scopes should start to bring in details visually. The morning sky has a planet parade of all the planets in the solar system. In addition to ruddy Mars, brilliant Venus joins, Jupiter and Saturn, although brilliant Venus shines from the eastern sky. Jupiter and Saturn pass opposition six days apart, then Mercury pops into the sky. This results in 5 naked eye planets in the sky at once. Additionally, the telescopic planets are there as well: Uranus, Neptune, and Pluto. (Historically, Pluto is a planet. Without too much description, we have many things in astronomy that are misnamed – like planetary nebula.)

- **July 8**: (−0.6, 12.2", 0.77 AU, 221m) Mars moves into Cetus. Mars moves across this corner of Cetus in 19 days, then back into Pisces. The constellations are not uniform in shape and size. The ecliptic is less than 1° from a corner of Cetus near coordinates Right Ascension, 0 hours, 26 minutes; Declination, 2°. Cetus also bounds Aries on the

south, but Mars moves north of the ecliptic after opposition and it does not return to this constellation this apparition. Ninety minutes before sunrise (about 4 a.m. CDT in Chicago), it is 37° up in the southeast.

- **July 11**: (−0.7, 12.4", 0.75 AU, 215m) Two hours before sunrise, Mars, nearly 36° up in the southeast, is over 6° to the upper left of the moon (20.1d, 65%).
- **July 12**: (−0.7, 12.5", 0.74 AU, 212m) Mars rises before midnight CDT. Two hours before sunrise, Mars, 36° up in the southeast, is nearly 6° to the upper right of the moon (21.1d, 56%). At this time, brilliant Venus is nearly 6° up in the east-northeast, 0.9° to the upper left of Aldebaran (m = 0.8).
- **July 14**: (−0.8, 12.7", 0.74 AU, 209m) Jupiter (m = −2.8) is at opposition. One hour after sunset, Jupiter is 10° up in the southeast, nearly 7° to the upper right of Saturn. Later this night, at 1 a.m. CDT, July 15, Mars is 11° up in the east, 77° to the east of Jupiter, now 26° up in the south.
- **July 18**: (−0.8, 13.1", 0.71 AU, 200m) Mars is 105° west of the sun. Ninety minutes before sunrise, it is 42° up in the southeast.
- **July 19**: (−0.8, 13.2", 0.71 AU, 199m) Two hours before sunrise, Mars, nearly 40° up in the southeast, passes 2.2° to the upper left of 20 Ceti (20 Cet, m = 4.8). **This morning and for the next week, look for the five naked eye planets simultaneously.** Mercury rises higher in the eastern sky and brightens as Jupiter appears lower in the southwestern sky. This morning the thin crescent moon is part of the scene. Look for them 45 minutes before sunrise. The moon (28.1d, 2%) is about 5° up in the east-northeast. Dim Mercury (m = 0.8) is about 5° to the right of the moon at about the same altitude, only slightly higher in the sky. It's a binocular object. Brilliant Venus (m = −4.4) is over 20° up in the east, 4.5° to the lower left of Aldebaran. By this time, Mars is over 45° up in the south-southeast. Saturn (m = 0.1) is 9° up in the southwest, 7° to the upper left of Jupiter that is just above the southwestern horizon. The five naked eye planets are in the sky simultaneously with the bonus of a thin crescent moon!
- **July 20**: (−0.9, 13.4", 0.70 AU, 197m) Saturn is at opposition. One hour after sunset, Saturn is 10° up in the southeast, about 7° to the lower left of Jupiter. As midnight approaches, Mars is about 3° up in the east, about 74° east of Saturn, now 26° up in the south-southeast.
- **July 24**: (−0.9, 13.8", 0.68 AU, 189m) Two hours before sunrise, Mars, nearly 42° up in the southeast, is 5.6° to the lower right of Delta Piscium (δ Psc, m = 4.4).
- **July 27**: (−1.0, 14.1", 0.66 AU, 184m) Mars moves back into Pisces. Two hours before sunrise, the planet is over 43° up in the southeast. Brilliant Venus is over 60° to the lower left of Mars.
- **July 31**: (−1.1, 14.6", 0.64 AU, 178m) Two hours before sunrise, Mars, 45° up in the southeast is 4.9° below Epsilon Piscium (ε Psc, m = 4.2).

August 2020

Mars, now back in the constellation Pisces, continues its eastward march, as its brightness grows. While Mars brightens, Venus dominates the morning sky. Mars passes perihelion on August 2.

- **August 2**: (−1.1, 14.8", 0.63 AU, 175m) Mars is at perihelion, 1.38 Astronomical Units from the sun. It is 45° from its position when it is at opposition, measured along its orbit. Mars rises before 10 p.m. CDT. As midnight approaches the plant is about 10° in altitude in the east.
- **August 9**: (−1.3, 15.7", 0.60 AU, 164m) Two hours before sunrise, Mars, nearly 50° up in the southeast, is 0.9° to the upper right of the moon (19.6d, 72%).
- **August 14**: (−1.4, 16.4", 0.58 AU, 155m) Two hours before sunrise, Mars, 52° up in the south-southeast, is 1.0° below Mu Piscium (μ Psc, m = 4.8).
- **August 23**: (−1.6, 17.7", 0.53 AU, 139m) Two hours before sunrise, Mars, over 50° up in the south, is 0.5° to the upper left of Nu Piscium (ν Psc, m = 4.4).

September 2020

Earth closes to within 0.5 Astronomical unit of Mars. The planet is now appearing above the eastern horizon before midnight. Mars slows and stops its eastward motion against the starry background.

- **September 2**: (−1.8, 19.2", 0.49 AU, 120m) Two hours before sunrise, Mars, 55° up in the south, is 3.6° to the upper right of Xi Piscium (ξ Psc, m = 4.6). In the evening, three hours after sunset (about 10:30 p.m. CDT in Chicago), Mars is 10° up in the east.
- **September 4**: (−1.9, 19.5", 0.48 AU, 117m) Mars is 135° west of the sun. Three hours after sunset, Mars is nearly 11° up in the east. The gibbous moon (17.0d, 92%) is over 12° to the upper right of the planet.
- **September 5**: (−1.9, 19.6", 0.48 AU, 115m) Two hours before sunrise, Mars, 54° up in the south-southwest, is 10°

to the upper left of the moon (17.3d, 91%). In the evening, 3 hours after sunset, Mars – 11° up in the east – is 0.8° to the upper left of the moon (18.0d, 86%).

- **September 6**: (−1.9, 19.8", 0.47 AU, 112m) Two hours before sunrise, Mars, nearly 55° up in the south-southwest, is 2° to the lower right of the moon (18.3d, 85%). In the evening, three hours after sunset, Mars - 11° up in the east is nearly 12° to the upper right of the moon (19.0d, 79%).
- **September 8**: (−2.0, 20.1", 0.47 AU, 108m) Two hours before sunrise, Mars is 53° up in the south-southwest. This evening the planet rises before 9 p.m. CDT. Three hours after sunset, Mars is over 12° up in the east.
- **September 11**: (−2.1, 20.4", 0.46 AU, 101m) Mars eastward motion ends and it begins to retrograde. It is 141° west of the sun. Two hours before sunrise, the planet is 52° up in the south-southwest. In the evening, three hours after sunset, Mars is nearly 14° up in the east.

Until retrograde began, Mars passed four planets and a minor planet, and had an occultation with the moon. Earth is now closing in toward its closest approach and Mars' opposition, about a month away. While not as close as the last perihelic opposition, the next opposition occurs farther north and promises great views. In a later issue, we pick up the story of Mars at opposition.

Dr. Jeffrey L. Hunt

About the Author: *Jeffrey Hunt has had a life-long interest in astronomy and astronomy education. He has taught astronomy at all levels from preschool students to university courses. Jeff is a former director of the Waubonsie Valley High School Planetarium in Aurora, Illinois. Dr. Hunt holds several degrees including a master's degree in planetarium education from Michigan State University. He writes an astronomy blog (http://jeffreylhunt.wordpress.com) showing easily-seen sky events. Currently he is retired with his wife and cat in Northern Illinois.*

NCRAL Observing Program Approved – It's Official!

~ by Carl Wenning, NCRAL Chair (2017-2021) ~

On August 26, 2019, NCRAL Chair Carl Wenning submitted a draft NCRAL Seasonal Messier Observing Program proposal to the Regional Council for review, recommendations, and final approval. It was further noted that if there were no significant changes to the program, the observing program would stand approved. With no concerns being raised (and many accolades being received), the program stands approved as follows:

NCRAL Seasonal Messier Marathon Observing Program

In the early 1990s, the Twin City Amateur Astronomers (TCAA, Bloomington-Normal, IL) developed a seasonal Mini Messier Marathon. This was not the first club to do so and certainly not the last. The traditional Messier Marathon – observing all 110 Messier objects on a given night (usually in March) – is difficult, presenting a serious physical challenge for many observers. The time necessary behind the eyepiece to complete the requisite observations prevents many from undertaking the rather daunting task. So, in the spirit of the original Messier Marathon and in an effort to get members out under the stars, the annual Marathon was split up into four easier seasonal tasks.

During NCRAL 2018 in Sturgeon Bay, WI, there was a brief discussion about the TCAA's Mini Messier Marathon. It was noted that the club issues certificates to members who complete each of the four seasonal marathons. The listener encouraged involvement by the Region in a similar observing program (the Astronomical League has no such program). At NCRAL 2019 in Moline, IL, the idea was brought up formally in the annual business meeting. The membership approved the creation of a Seasonal Messier Marathon observing program – contingent upon the approval of the Regional Council – to be operated by NCRAL, that would include both pins and certificates. The program would be administered much like the Astronomical League's Messier Observing Award program, but unrelated to it.

NCRAL's Seasonal Messier Marathon observations do NOT qualify observers for the Astronomical League's Messier Observing program; the two programs are unrelated and have different observing requirements. The main requirement of the NCRAL program is to quickly observe and check off items from a seasonal list of Messier objects, completing all observations during a single night. There are many other differences as well.

NCRAL recognition will be a ¾-inch colored enameled star pin and a printed certificate. There is no direct cost to the membership for either; the cost of the program (pins, certificates, mailers, postage) will be borne by the Region as a benefit of affiliation. An award recipient therefore must be either a member of an NCRAL affiliated club or an AL member-at-large living with the boundaries of NCRAL.

TELESCOPIC OBSERVING PROGRAM:

Naturally dispersed, the highest concentration of Messier objects is located in the spring sky due to the abundance of galaxies in the Virgo-Coma region. The lowest concentration just happens to be in the autumn sky. As a result, a certain amount of liberty has been taken to roughly equalize the number of celestial objects to observe each season into four groups of 27 or 28 objects.

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 (NGC 5907?), 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)

Please note that there is no observing guide for this program.

RULES:

1. All required observations for a given season must be completed *during a single dusk-to-dawn night*; no object substitutions or time extensions are permitted. The only acceptable observations are those made on or after September 23, 2019 – the official start date of this NCRAL observing program.
2. Observations for a particular season must be completed during that season – from equinox to solstice or vice versa.
3. Observers must find each object themselves and observe it using a telescope (not binoculars); merely viewing an object through your or someone else's telescope after they find the object does not qualify as an observation.
4. Assistive devices are permitted (e.g., setting circles, goto telescopes, etc.) to find objects. No distinction will be made on the observing program certificate.
5. Observer name, NCRAL affiliation (give club name or indicate AL membership-at-large), date(s) of observations, location, type and size of telescope(s) used, eyepiece(s) used, magnification(s) used, field(s) of view of eyepiece(s) used, seeing, transparency, limiting magnitude, and moon phase must be recorded. A summary statement is sufficient for all observations unless there are significant changes during the course of the night's observing run.
6. For individual observations, provide a record consisting of sequence number (1, 2, 3, etc.), Messier number, common name of object (if applicable), type of object (OCl – open cluster, GCl – globular cluster, PlN – planetary nebula, SnR – supernova remnant, BrN – bright nebula, Gal – galaxy, Dbl – double star, etc.), constellation, and time of observation. See the sample observing record below.
7. Observational records of affiliate members must be confirmed by and submitted through the affiliated club's ALCor. In the event that the ALCor has made the observations, then any affiliate officer may confirm and forward the observations. Members-at-large may send in their observations without confirmation.

8. Records must include the name, email, and mailing address of observer and/or ALCor for sending the certificate and pin.

NCRAL Chair Carl Wenning (2017-2021) will serve temporarily as the program manager. Electronic submissions (e.g., Excel file with cover letter in the body of an email) are preferred and may be sent to carlwenning@gmail.com. Be certain to include "Seasonal Messier Marathon" in the subject line. Alternatively, send a physical copy of observing record to Carl Wenning, NCRAL Chair; Seasonal Messier Marathon; 21 Grandview Drive; Normal, IL 61761-4071. Mailed physical copies will NOT be returned.

SAMPLE OBSERVING RECORD:

The following sample observing record was created using Excel.

AUTUMN 2019 SEASONAL MESSIER MARATHON

Observer: Dalilah Grover
NCRAL Affiliation: Twin Bay Astronomy Club
Date(s) of Observations: September 23-24, 2019
Location: Olive Grove Nature Center, Oil City, IL

Telescope(s) used: Celestron CPC 11" goto
Eyepiece(s) used: 28mm Plössl
Magnification(s) used: 100X
Field(s) of view: 0.65 degrees
Moon phase: waning crescent (~27.5 days)
Seeing: 3/5
Transparency: 4/5

Sequence	Messier No.	Object Type	Common Name	Constellation	Time Observed
1	55	GCl	none	Sagittarius	8:22 PM
2	69	GCl	none	Sagittarius	8:30 PM
3	70	GCL	none	Sagittarius	8:37 PM
4	57	PlN	Ring Nebula	Lyra	8:43 PM
5	11	OCl	Wild Duck	Scutum	8:50 PM
6	31	Gal	Andromeda Galaxy	Andromeda	9:02 PM
7	27	PlN	Dumbbell Nebula		
8	26				

For details about the objects to be observed, see Messier Object list in the *RASC Observer's Handbook* and available online at the following URL: http://www.messier.seds.org/xtra/similar/dataRASC.html Please note that the RASC seasonal list does NOT correspond exactly with the objects found in the NCRAL Seasonal Mini Marathon observing program.

The author acknowledges the assistance of Gretchen Patti in editing of the final document.

First NCRAL Member Recruitment Mini Grant Moving Along

~ Carl Wenning, Twin City Amateur Astronomers ~

As mentioned in the last issue of ***Northern Lights***, the Twin City Amateur Astronomers received a $250 Membership Recruitment Mini Grant at NCRAL 2019. In that last issue, the TCAA explained for the sake of the Region's membership what it was planning to do with the mini grant. As this issue of ***Northern Lights*** goes to press, the TCAA has enrolled over a dozen members of the general public in its October/November *Introduction to Amateur Astronomy* course to be taught at the Illinois State University Planetarium in Normal, IL on three Saturday afternoons. The course will be taught by two AL-certified Master observers – NCRAL Chair Carl Wenning and TCAA member Lisa Wentzel. Assisting will be astrophotographer and planetarium director Thomas Willmitch. A recently revised TCAA Guide #1 – *Introduction to Amateur Astronomy* (for an earlier version see http://tcaa.us/TCAAGuides.aspx), the planetarium projector, and several PowerPoint presentations will be used as the basis of instruction.

Following each class session, class members will break for dinner at which time they will be encouraged to dine together so that they might get to know one another. This will help to build camaraderie and help to ensure their transition to becoming amateur astronomers. The class then will be invited to Sugar Grove Nature Center near McLean, IL, where they will view celestial objects in the evening sky through the club's Celestron CPC 11" telescope housed in the TCAA's Sugar

Grove Observatory (SGO). Other telescopes will be brought into play if the group becomes too large for one telescope – which it almost certainly will. Class members will be given a one-year free membership in the TCAA and access to training in the use of the SGO's CPC 11" goto telescope.

From all indicators, it appears that there will be a substantial boost in the membership of the TCAA as a result of the NCRAL mini grant. The $250 mini grant is being used to print copies of the newly revised TCAA Guide #1 which will become available online after the course is completed.

This approach to recruiting new members is something other groups can easily emulate. More information about the TCAA's recruiting efforts – successes and failures – will be provided in the Winter 2020 issue of ***Northern Lights***.

It's never too early to apply for one of the 2020 mini grants. The next round of awards will occur during NCRAL 2020 hosted by the Northern Cross Science Foundation May 1-2 in Port Washington, WI. See the appropriate article further on in this issue of the Region's newsletter.

Add Your Email Address to the NCRAL Member Database

Did you know that only about 400 of some 1,850 NCRAL members are receiving this newsletter via email? That's only 22% of the members. Still, this represents a small but important increase since that last report on the summer solstice when only 375 were on the list! 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.

When one adds his or her email address to the NCRAL member database, they get direct mailings of ***Northern Lights*** and important and timely announcements about Regional conventions, star parties, and so forth. Only blind addressing (Bcc:) will be used with this email list so that others will not see your email address. 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. You'll need to provide your name, email address, astronomy club affiliation (or indicate AL 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://goo.gl/gsS8SF today so you won't miss important future communications.

Updating the Regional Council Email Database

The national Astronomical League office only very rarely provides updates in relation to the names and email addresses of affiliates' presidents and Astronomical League correspondents to your Regional Chair – even after repeated requests as experience has sadly shown. It is therefore essential that Regional affiliates inform the Regional Chair of changes in the offices of President and ALCor following elections. Please have someone within your affiliate email carlwenning@gmail.com with the names and emails of any newly elected president and/or ALCor.

It is important for the NCRAL Chair to maintain the most compete and up-to-date email database of these individuals for the purpose of communicating with every member of the Regional Council. Even if you are uncertain about whether or not the NCRAL Chair has this critical information, please send it to him anyway. Don't let your affiliate fall outside the loop. Better safe than sorry.

CALL FOR 2020 NCRAL NOMINATIONS:

Regional Representative/Region Award/Newsletter Editor Award/Mini Grants

As was mentioned in the last Chair's message, the Region did not elect a Regional Representative to a new 3-year term at NCRAL 2019. Vice Chair Bill Davidson (former Regional Rep.) is now filling both positions on an interim basis. An election will be held at NCRAL 2020 to fill the remaining two-years of the unexpired Regional Rep. term. Please send your nomination for Regional Rep. to NCRAL Chair Carl Wenning at carlwenning@gmail.com

It's never too early to start thinking about nominations for the NCRAL Region Award. Do you know someone who has dedicated his or her time and energy to promoting astronomy? Wouldn't you like to let them know they are appreciated for their hard work? This is your chance! This award recognizes exceptional individual effort and meritorious service to amateur astronomy through the member's local astronomy club, public outreach, the NCRAL, or the Astronomical League.

The Regional is now calling for nominations for the 2020 Region Award. Using the guidelines and submission forms below, we have made it easier than ever to nominate someone you feel deserves this award. This award will be presented in a ceremony concluding the dinner banquet of the next Regional convention, NCRAL 2020, to be held at Port Washington, WI, the first weekend of May.

The Rules for nomination are set as follows:

1. The individual must be a member in good standing, either through an AL/NCRAL-affiliated club, association, or society or as a current member-at-large in the North Central Region.
2. The three current regional officers and the regional representative are NOT eligible for this award. Past winners are also ineligible for this award.
3. The regional officers are the voters and will base their decision on the information provided. Past winners of this award will be asked to assist in the case of a tie vote. Each member votes independently and will use his/her best judgment. All decisions are final.
4. The winner will be contacted not less than 21 days in advance of the NCRAL meeting at which the award will be presented. The winner will not be publicly revealed until the time of the presentation. Those nominated but not selected will not be revealed.
5. All non-winning nominations will be kept on file for two years after initial submission. After such time, a new nomination needs to be competed. Nominations for 2020 MUST BE RECEIVED by the date of the March 31st. Any nominations received after this date will be kept on file for 2021.

There are many deserving candidates within NCRAL. We look forward to receiving your nomination(s). If there are any questions, please contact Vice Chair Bill Davidson via phone or email using the contact information found on the Submission Form below.

Submission Form for the NCRAL Region Award

Nominee's name (as it will appear on plaque) _____

Nominee's email address _____

Street address _____

City _____ State _____ Zip _____

Club affiliation _____

Nominator's name _____

Club affiliation _____

Street _____

City _____ State _____ Zip _____

Phone _____

Email _____

Submission Guidelines

Prepare a *statement of the nominee's accomplishments* in one or more of the areas listed under the criteria described in first paragraph on page 1. This statement should:

- Not exceed 3 double-spaced pages (1,000 words). Length does not necessarily equal strength.
- Include the number of years in office or committee membership.
- Include the dates of said membership.
- Include the length of time participating in public education, number of presentations, etc.

Include *supporting data*

- Any relevant newspaper clippings, photos, and other articles that support the nomination.

- For service to groups such as schools, scouts, etc., it would help the committee if you could obtain a brief statement from the teacher, leader, chair etc. on the usefulness of the presentation.

All nominations must be sent via email to Bill Davidson, NCRAL Vice Chair, at rochesterskies@outlook.com

Let's not forget about the **NCRAL Newsletter Editor Award**. It is expected that the next award will be conferred at the NCRAL 2020 meeting. Submission Guidelines: The president of the affiliate should email a copy of the designated issue of the associated newsletter in Adobe Acrobat pdf file format to NCRAL Vice Chair Bill Davidson (rochesterskies@outlook.com), along with a cover letter of recommendation in the same file format. In addition, complete contact information of the editor must be included. A photo of the newsletter editor, preferably in an astronomical-type setting, must be received electronically in jpg format to the same email address by March 31st.

Lastly, don't about the two **NCRAL mini grants**. A mini-grant will be awarded following a successful written proposal originating with the president of an NCRAL affiliate. The focus of a mini-grant must be oriented to an increase in either: (1) an affiliate's membership whose mini-grant proposal must focus on both recruitment and retention (Member Recruitment & Retention Mini Grant), or (2) an increase in the number of A.L.-affiliated clubs, societies, or associations within the North Central Region (Non-affiliate Recruitment Mini Grant). A unified online mini-grant application must be completed by the deadline noted below. The application link may be found at the following URL: http://bit.ly/2W2pdeA Deadline: The application deadline for all mini-grants is March 31st. Mini grants, if approved, will be announced at NCRAL 2020.

Future NCRAL Regional Conventions

Each year at NCRAL's annual business meeting, the Region receives offers for hosting upcoming meetings. The following affiliates have agreed to hosting future conventions. We are still in need for additional hosts, but especially for 2022, 2024, and the years beyond. It's never too early to start planning to host.

- 2020 Port Washington, WI: Northern Cross Science Foundation (confirmed)
- 2021 Green Bay, WI: Neville Public Museum Astronomical Society (confirmed)
- 2022 OPEN
- 2023 Bloomington-Normal, IL: Twin City Amateur Astronomers (confirmed)
- 2024 OPEN

If your club has never hosted an NCRAL Regional convention, please consider doing so. While it is a considerable amount of work, it can be quite rewarding – even fun. It provides an opportunity to showcase your group's facilities and accomplishments, build club camaraderie, and to get to personally know interesting guest speakers. You can also use such an event to grow your club's membership.

Remember, NCRAL now has its own convention planning guidelines. The guide was developed by experienced hosts of NCRAL conventions in conjunction with one future host who asked lots of excellent questions. Significant contributions were made by Alan Sheidler (Popular Astronomy Club) and John Beck (Door Peninsula Astronomical Society). NCRAL Chair Carl Wenning, served as contributor and lead author.

Remember, NCRAL now has its own convention planning guidelines. The guide was developed by experienced hosts of NCRAL conventions in conjunction with one future host who asked lots of excellent questions. Significant contributions were made by Alan Sheidler (Popular Astronomy Club) and John Beck (Door Peninsula Astronomical Society). NCRAL Chair Carl Wenning, served as contributor and lead author.

The ***NCRAL Convention Planning Guide*** has three sections. Section 1 deals with the "preliminaries" of what it takes to host a Regional convention. Section 2 deals with programming information. Section 3 deals with budgeting information.

The guide is considered a "living document" that will be updated as new survey information becomes available. The recent NCRAL 2019 post-convention survey was included in the recently updated document. Results from the 2018 NCRAL Convention Preferences Survey are also included. The goal is to increase the benefits of convention attendance, thereby increasing attendance at our Region's conventions.

To download and review the planning guide, you may access it through the NCRAL website the following URL: https://ncral.wordpress.com/conventions/. Look for the link at the bottom of the page.

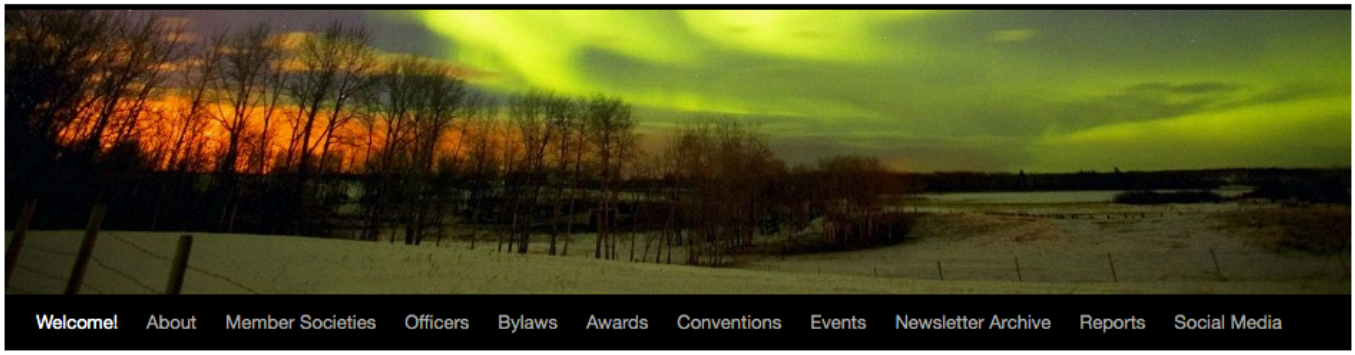
Please contact NCRAL Chair Carl Wenning at carlwenning@gmail.com should you have any questions or wish to toss your hat into the ring for hosting a future NCRAL convention.

NCRAL & AL ON FACEBOOK

Did you know that NCRAL now has a Facebook page for sharing information about your Region's AL-affiliated clubs? This is also a great way share observations, notes, images, and any other things you think the NCRAL membership or AL members-at-large living in our region would enjoy. Check us out at: https://www.facebook.com/northcentralregionastronomicalleague/ Also, did you know that the Astronomical League is on Facebook too? It's an active site with lots of good information. Check it out at: https://www.facebook.com/search/top/?q=astronomical%20league

NCRAL WEBSITE

~ by Jeff Setzer ~



Did you know that NCRAL has its own website? It's true! Point your browser to ncral.wordpress.com and you'll see a central repository for information about our Region and affiliates, the Region's Bylaws, back issues of ***Northern Lights***, and much, much more.

Will the website progress from an occasionally used reference to something more? That's entirely up to you, dear reader. If you have ideas or submissions, contact me at astrosetz@hotmail.com

REGIONAL OFFICER & LEADER CONTACT INFORMATION

Chair: Carl Wenning (2-year term expires Spring 2021, in second term)

Bio: Carl has been an amateur astronomer since being introduced to the sky by his grandfather during July 1957. Today he is an AL Master observer. He has been a member of the Twin City Astronomers of Bloomington-Normal (Illinois) since 1979. He serves as the club's secretary, historian, and editor of ***The OBSERVER*** newsletter for which he received the AL's 2017 Mabel Sterns Newsletter Editor Award. Carl is a former planetarium director and physics teacher educator who remains actively involved in both astronomy and physics education as well as public outreach event.

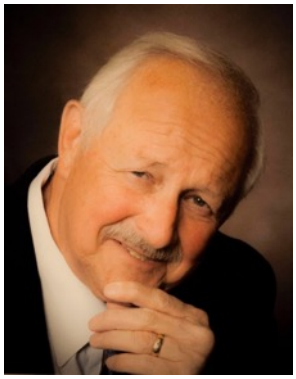
Contact: carlwenning@gmail.com

Vice Chair: Bill Davidson (2-year term expires Spring 2021, in first term)

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, 1600 mm focal length refracting telescope. He recently retired as a college mathematics instructor, has been a member of the Rochester Astronomy Club (Minnesota) for 20 years, and serves as editor of the club's newsletter *RochesterSkies.*

Contact: rochesterskies@outlook.com

Secretary-Treasurer: Roy Gustafson (2-year term expires Spring 2020, in first term)



Bio: Roy 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 last year the Total Solar Eclipse. Roy also taught astronomy at Black Hawk Junior College in Moline, IL. Roy retired from John Deere & Company after 32 years of service.

Contact: astroroy46@gmail.com

Regional Representative to the Astronomical League: Bill Davidson (Interim 2019-2020)

Contact: rochesterskies@outlook.com

NCRAL 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.

Contact: astrosetz@hotmail.com

***Northern Lights* Editor-in-Chief:** Jim Gibbs (appointed)

Bio: Jim has been observing the starry skies since he was 10 years old and on and off ever since. His primary affiliation is with the Twin City Amateur Astronomers (Illinois) where he has been a member for 5 years. He is also a member of the Fox Valley Astronomical Society where he has been a member for 5 years. He is also a member of the Fox Valley Astronomical Society where he has held several leadership positions. He is an avid amateur astronomer who enjoys observing and especially imaging around the TCAA dark sites and travelling around finding other dark sites. He is a software engineer and currently is concentrating in growing his small consulting business.

Contact: jrgibbs@msn.com