



Celebrating Sixty Years of the Warren Astronomical Society



The W.A.S.P.

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The Warren Astronomical Society Paper



The WASP



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Warren Astronomical Society, Inc.
P.O. Box 1505
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Dale Thieme, Editor

2021 Officers

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1st VP	Dale Partin	firstvp@warrenastro.org
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Secretary	Mark Kedzior	secretary@warrenastro.org
Treasurer	Adrian Bradley	treasurer@warrenastro.org
Outreach	Bob Trembley	outreach@warrenastro.org
Publications	Dale Thieme	publications@warrenastro.org
	Entire Board	board@warrenastro.org

The Warren Astronomical Society, Inc., is a local, non-profit organization of amateur astronomers. The Society holds meetings on the first Monday and third Thursday of each month, starting at 7:30 p.m.

First Monday meeting:	Third Thursday meeting:
Cranbrook: Institute of Science	Macomb Community College
1221 North Woodward Ave	South campus, Bldg. J, Room J221
Bloomfield Hills, Michigan	14600 Twelve Mile Rd.
	Warren, Michigan

Membership and Annual Dues

Student	Individual	Senior Citizen	for families
\$17.00	\$30.00	\$22.00	add \$7.00

Astronomical League (optional)\$7.50

Send membership applications and dues to the treasurer:
c/o Warren Astronomical Society, Inc.
P.O. Box 1505
Warren, Michigan 48090-1505

Pay at the meetings

Also via PayPal (send funds to treasurer@warrenastro.org)

Among the many benefits of membership are

- Loaner telescopes (with deposit). See 2nd VP.
- Free copy of each WASP newsletter.
- Free use of Stargate Observatory.
- Special interest subgroups. See chairpersons.

The Warren Astronomical Society Paper (WASP) is the official monthly publication of the Society.

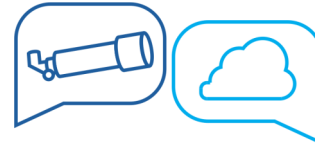
Articles for inclusion in the WASP are strongly encouraged and should be submitted to the editor on or before the end of each month. Any format of submission is accepted. Materials can either be transmitted in person, via US Mail, or by email (publications@warrenastro.org)

Disclaimer: The articles presented herein represent the opinion of their authors and are not necessarily the opinion of the Warren Astronomical Society or this editor. The WASP reserves the right to edit or deny publication of any submission.

Stargate Observatory is owned and operated by the Society. Located on the grounds of Camp Rotary on 29 Mile Road, 1.8 miles east of Romeo Plank Road, Stargate features an 8-inch refractor telescope under a steel dome. The observatory is open according to the open house schedule published by the 2nd VP.

Snack Volunteer Schedule

The Snack Volunteer program is suspended for the duration. When it resumes, volunteers already on the list will be notified by email.



Discussion Group Meeting

Come news, astronomy, space



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Virtual Group Hug

The changing of the guard...sort of



2020 Board

President	Diane Hall
1st VP	Dale Partin
2nd VP	Riyad Matti
Treasurer	Mark Jakubisin
Secretary	Glenn Wilkins
Outreach	Bob Trembley
Publications	Jonathan Kade



2021 Board

President	Diane Hall
1st VP	Dale Partin
2nd VP	Riyad Matti
Treasurer	Adrian Bradley
Secretary	Mark Kedzior
Outreach	Bob Trembley
Publications	Dale Thieme

2020 presented the Warren Astronomical Society some unique challenges, not the least of which was the handling of the election of officers. There was no provision in the by-laws for pandemic situations, but the Board came up with a workable solution.

We were aided by the fact that none of the positions were contested. In fact, the treasurer position was still up in the air as of meeting time.

Ken Bertin, as always, consented to preside over the January 2021

election process. As he went through the board nominees for each position, the applicant won by acclaim (no dissenting votes). When he got to the treasurer, Adrian Bradley spoke up and said he'd run for the position. Mark Jakubisin allowed that he was fine with that arrangement and so Adrian became the new treasurer-elect.

We look forward to the new year with a slightly different board.



President's Field of View

2021 marks the 60th anniversary of the Warren Astronomical Society; it's been six decades since, as the story goes, "the kids" who didn't quite fit into the older, staid Detroit Astronomical Society broke away and founded their own club. 1961 was the rising arc of the Space Race; Yuri Gagarin and Alan Shepard would both break free of earth's gravity that year, and President Kennedy wouldn't make his famous "We choose to go to the moon" speech until the following year.

The Warren Astronomical Society has seen human footsteps upon the moon, the birth and death of the Space Shuttle program, and the advent of the era of space telescopes. Voyager 1 and 2 have launched and gone interstellar in the lifetime of the club and concepts from black holes to exoplanets to gravitational waves have passed from theoretical to the realm of observed fact. Members have gathered for launches, eclipses, and meteor showers... and distanced under the threat of a global pandemic. From a classroom in Weber Elementary School to a globally accessible digital meeting room, the Warren Astronomical Society has evolved with the ages; amateur telescope making has passed from a key club activity to a dying art and today's astro-imagers have tools at their fingertips only imagined by yesteryear's photographers. Even the idea of a carload of high school kids tooling around town to meet with hobbyist group belongs to another era.

But our mission remains as it ever was: bringing our own passion for astronomy and space science education to the public of Metro Detroit because we love it that much and can't help ourselves. And we manage to have a pretty good time in doing it, too.

As the person with the honor of leading this august society in the year of its Diamond Anniversary, I hope that 2021 will be a year of renewal and reconnection, just as 2020 proved to be a year of often bitter endurance. Maintaining a proud and fond connection to the past while keeping our eyes on the future is part of what makes the Warren Astronomical Society such a special entity. If those kids from '61 could see us, I'd hope they'd understand us just enough.

-Diane Hall
President

Virtual Astronomy

The frustration of a Middle School Science Teacher

It has been an extremely difficult year for everyone around the Earth with Covid sweeping the planet. Stress has been at an all-time high with families losing jobs, income and in some cases loved ones. Life here is similar to the plights of everyone except I was thrown into trying to teach some of my classes virtually. Luckily I work for a small school district that only has 2 elementary schools, 1 middle school, and 1 high school, which allowed us to open in September for face to face teaching for those families that wanted it. For those that still wanted to keep their children home we offered virtual classes.

How do you teach astronomy virtually? Well, it's like being thrown into the deep end of the pool without knowing how to swim. It has been said that teachers are building the plane as we are flying it and I can't think of a better analogy. I have always thought of science, and especially astronomy as dynamic classes. It is about giving students the WOW factor not only to gain their interest but to maintain in. This is easily done in a classroom where I can do demonstrations and labs to help my students understand concepts and gain their interests. Over a computer screen it gets a little more complicated.

I have developed web search games using astronomy programs easily available to everyone. Turning it into a game like a scavenger hunt helps present the information in fun ways. I find short videos online for my students to watch which supplements the lessons I present. These help my students to visually see what I am teaching. Living in Michigan presents an added challenge as we are usually under cloud cover this time of year so events like the conjunction of Saturn and Jupiter was a missed opportunity to experience it in person. Back to a video to explain what is happening as well as giving links to observatories that are doing live video streams. Using resources like the Warren Astronomical Society is going to be an important part of my class. On line presentations on topics by members will give my students an experience by others who are excited about the topics presented, and this is critical in fostering interest in the students.

It is taking a LOT of creativity, but I believe it can still be a WOW factor class.

-Connie Martin-Trembley

McMath-Hulbert Report

We're prepping the McMath-Hulbert Observatory for winter now with some furnace work and we will be covering the dome of Tower 1 with some donated pool tarps. The wood dome has started leaking again and it can't be permanently re-roofed until this spring. Work on the spectroheliograph in the second tower has been suspended for the winter too, as the sun is not visible because of trees blocking our view of the sun.

We have a star party planned for January at the Hawk Woods Nature Center in Auburn Hills, pending of course the state of the Covid-19 situation. We're looking for ways to display video images from the eyepiece of our telescope using a cell phone camera or a video camera of some type.

Unfortunately, with the latest Covid-19 lockdown rules, we're forced to limit access to MHO to the small group of active volunteers who have been caring for the observatory in recent months. Will 2021 be a better year for astronomy??

After some flare activity the sun has been quiet for the past month or so, but if the past history of the solar cycle holds true, we should be in for a most interesting 2021 regarding sunspots and flares.

-Tom Hagen



1959 MHO Staff Photo



Letters

I believe Dale Thieme should receive the Pulitzer Prize for his outstanding work every month publishing the WASP!

-Bill Beers

Now you're making me blush!

-Ed.

Jupiter-Saturn Conjunction

OBSERVING REPORT

Jupiter - Saturn conjunction, 20-21 December, instant

Success against odds! From N. W. of Lowell, cloudless sky. 5-cm. refractor @ 30X (Bobwatt Eyepiece).

Stunning low mag. field. Saturn dark yellow, nearly orange. Titan not visible. Jupiter, bright white w/o cloud belts. To W.: Europa and Io. To E.:

Callisto ~ elongation, dim in residual twilight, and Ganymede. FIFTH object, "false" moon in same line, proximate to Ganymede opposite planet. Given the good transparency, viewing possible nearing the horizon.

OBSERVING REPORT, addendum.

Jupiter - Saturn, 20-21 Dec.

The "false" moon: J. McBride identifies an F2 @ 7.2 mag. By inspection of the magnitudes of satellites no. I, II, III, my estimate would have been 6.25, hence caution one must use with visual photometry and not enough range in comparison objects. Again, the alignment with the plane of the Jovian satellites was remarkable.

Correction to Observing Report, 20-21 Dec.

The satellites used for the mag. estim. of the interloper star in plane of the moons were: I, II, IV. Respectively: 5.0, 5.3, 5.7. The error in my stellar mag. = serious OVER-estim. possibly from residual twilight or proximity to Jupiter. Spectral class all so possible.

-G.M. Ross

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2020 W.A.S. Awards

Larry F. Kalinowski Doug Bock



"Open Skies" Doug Bock, like Larry, has been a mainstay of the club for decades. He has a string of awards to his credit, from long-gone award categories like the Ken Wilson Award and Comet Halley Award to the Bob Watt Award for his DIY Northern Cross Observatory. It's hard to summarize all he's done with and for the WAS in his time with us and I won't attempt to. I can't do it justice. But this year, Doug graciously provided the WAS with the platform we needed to make our transition to virtual meetings as we went from Cranbrook and Macomb to WebEx and Discord. His NCO now hosts our virtual Open Houses and he's been essential in making sure our meetings are broadcast and archived on YouTube. We could not have managed the transition smoothly without Doug's coolheaded competence supporting us. Congratulations, Doug, and thank you.

Blaine McCullough Adrian Bradley



"Spheres of Influence" This year the board presents the Blaine McCullough Award to Adrian Bradley. Adrian isn't new to astronomy, as he's been a member of the University Lowbrows and took over as GLAAC president this year. But he worked tightly with the WAS to make Astronomy at the Beach 2020 happen as a virtual event, joined the club, signed up repeatedly to present the news, and graced us with his astro-images & digital art. And then, after the board decided to present this award to him, he outdid himself and up and ran for Treasurer. Congratulations, Adrian!

Bob Watt

Dale Hollenbaugh



"Interstellar Ambition" : In keeping with the digital nature of this year, the board presents the 2020 Bob Watt Award to Dale Hollenbaugh, whose relentless pursuit of better astro-imaging has stood out this year as something completely in keeping with the hands-on spirit, with software tweaks in place of a toolbox. Dale never stops asking questions, pooling resources, and striving for better images and the WAS has reaped visual rewards from his quest. Congratulations, Dale.

WAS ANNUAL (and VIRTUAL) AWARDS BANQUET

VIA WebEx/YouTube
December 10, 2020

The year 2020 – COVID 19 Pandemic – social distancing – wearing a face mask – need I say more? Fortunately, the Warren Astronomical Society has diverse talent within its membership to incorporate the technology of meeting via Zoom, WebEx and YouTube and enable us to conduct business, inform and entertain with our monthly membership meetings (the screen shot of the WebEx with all the membership and guests in attendance looked like a larger version of the acclaimed TV game show “Hollywood Squares”)

The WAS Annual Banquet Celebration began at 7PM with WebEx and YouTube logins – sound checks – registering for raffle prize drawing – and socializing until start of event.

At 7:30PM the WAS Annual/Virtual Banquet began with a welcome from our President Diane Hall, with commentary and thoughts on how the WAS kept its mission alive by going from physical to virtual meetings. She then reviewed the rules and etiquette of this virtual banquet so as to be enjoyed by all.

Diane then proceeded with “WAS: Year 2020 in Review : The Year That Was” – a perspective of this year briefly describing observing highlights – Comet Neowise, the Mars Opposition and the Jupiter-Saturn Conjunction, and an overview of all the presenters at the 2020 WAS meetings. She also made observations on how not having public outreach affected our club’s mission during this pandemic. Diane also took the time for a memorial to Pat Brown, a fixture at WAS outreach events, whose contributions will be missed. She then shared words of appreciation to outgoing 2020 WAS Board members Glenn Wilkens, Secretary, Mark Jakubisin, Treasurer, and Jonathan Kade, Publications, and welcoming new 2021 WAS Board members Mark Kedzior, Secretary, and Adrian Bradley, Treasurer, and Dale Thieme, Publications.

Diane then announced the 2020 recipients of the WAS Service Awards:

Bob Watt Award – Dale Hollenbaugh
Blaine McCullough Award – Adrian Bradley
Larry Kalinowski Award – Doug Bock

The virtual break took place from 7:50PM until 8:10PM, with Adrian Bradley discussing and sharing his latest astrophotography efforts in Port Austin/Pointe Aux Barques in the Michigan Thumb with his camera and iPhone.

At 8:15PM, WAS Outreach Director Bob Trembley introduced and provided a bio on our guest speaker, Brother Guy Consolmagno SJ, Director of the Vatican Observatory, presenting “The Great Conjunction and the Star of Bethlehem” or “What the Star of Bethlehem Wasn’t”.

The evening’s festivities ended with the raffle prize drawings and winners:

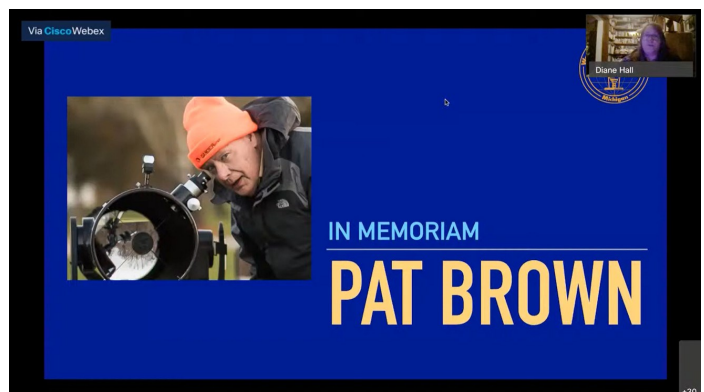
- Wall Art of Sun & Solar System (donated by Dale Partin) - Dale Hollenbaugh
- Royal Astronomical Society of Canada 2021 Handbook (donated by Dale Thieme)- Victor Manske
- Sky and Telescope Pocket Sky Atlas – Tab Ahmed
- Sky and Telescope Caldwell Objects Poster – Ken Bertin
- Mystery Prize (at the Warren PO) – Sue Ciaravino **

Let’s hope that 2021 provides us with an opportunity to once again meet in person and be able to gather, share and observe the night skies with fellow members and the public at outreach events.

Kudos to the 2020 WAS Board and members on their contributions in making this virtual awards banquet a reality.

Mark Kedzior
Secretary-Elect
WAS

** The Mystery Prize was later revealed to be a 1.25” University Optics 25MM Orthoscopic eyepiece.



Remembering Pat Brown at the Virtual banquet

Lunar Observing Report

9-10 DECEMBER 2020 --- 5-cm. refractor @ 60X.
Light fog but seeing good.

2 d. past Last Q. Although favourable libration for that expanse of the sunlit limb, could not see the Doerfel Mountains. Doerfels are delineated on *Mapa Selenographica* (1926), but not mentioned by Kopal (1971) nor Rukl (1990).

Mistakenly confused a ruined depression at very high S. latitude for walled plane Bailly. Very close to the limb. Reference works dispelled the error.

Given position of waning terminator, Schiller was a black dagger pointing at S. polar area. A deep feature.

Re: Mare Humor: Interior of the most interest. Very low angle of illumination allowed variations in floor shading, but most arresting was a small, subtle feature at centre, at first blush a "ray dome". However, examination of Alter (1964), plus the atlases of Rukl and Kopal revealed unseen characteristics beyond the small telescope.

Alter Plate 21 (Lick refractor) shows the Moon at very nearly the same waning phase as A. M. of the 10th. Photograph reveals the central feature, all be it indistinctly. Alter Plate 64 reveals three closely clustered features using vastly greater mag. Alter Plate 144 w/ 100" Hooker yields a ray craterlet + two very small craterlets on opposite sides thereof, equidistant.

Kopal Plate 4, using Manchester Reflector. Very good photograph @ high mag..
Ray crater & two smaller companions at slight diagonal from N-S.



Photo by: John French
Abrams Planetarium
Michigan State University

Rukl Plate 52 finally enters nomenclature: Gassendi J, K, L from south to north. The long low ridge ending at J, beyond capability of the instant telescope.

One of the Shining Mountains, cf. "In Search of . . . the Shining Mountain" (W.A.S., Jan. 2020) was visible on limb above southern extremity of Mare Orientale, which was barely visible.

END NOTES: Lunar observation performed with home-assembled refractor w/o multi-coated lenses, no "go to", no "push to", no solid state, no computer, no (useless) "red dot" finder. Eye-piece modified from God-knows-what ocular by Martin N. Mill in garage machine shop, unknown optical formula. Focusing mount, 2nd cheapest sold by A. Jagers ca. 1970, hence no auto-focus.

Telescope mounted on seriously damaged Star-D camera tripod. Observer not seated on ergonomic adjustable heated chair, but heavy oak office unit salvaged from American Standard Industrial Division in 1960's. NO references derived "on line".

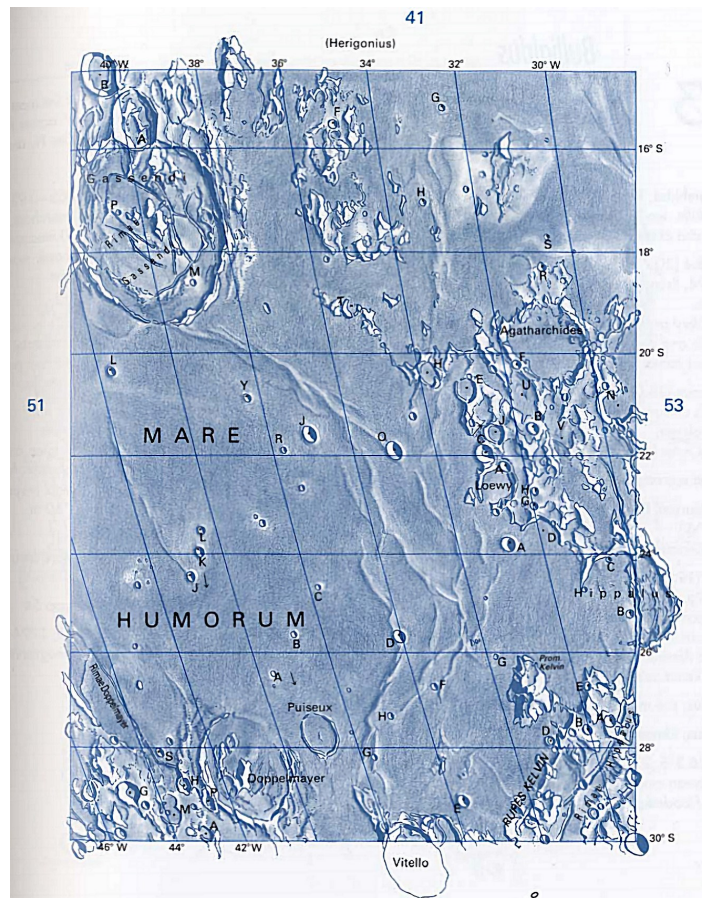


Plate 52 from Rukl's *Atlas of the Moon*



Above: Adrian Bradley put up a nice conjunction tree topper in this photo.

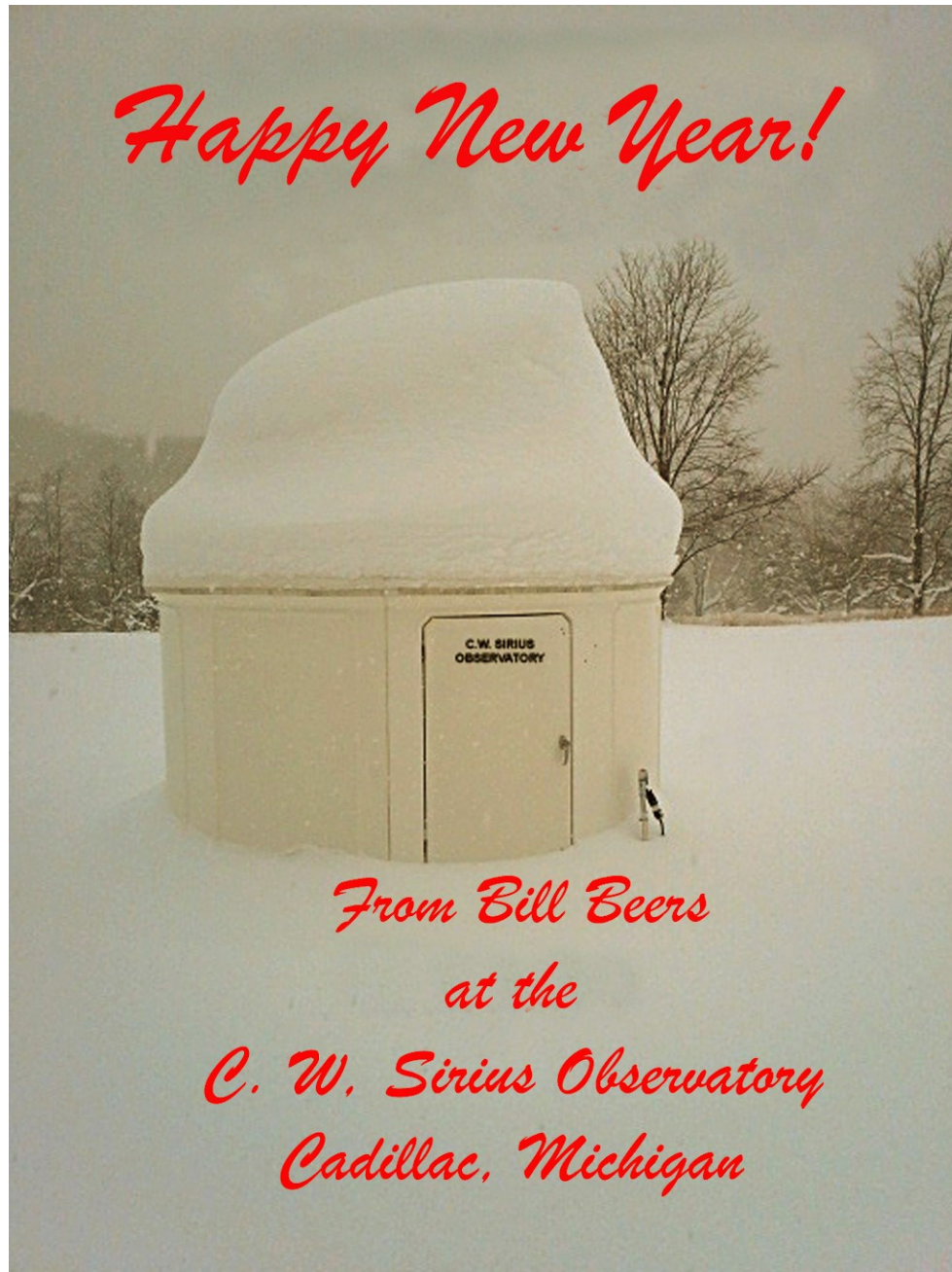
The Great Conjunction

Below: Rik Hill assembled a collage of the Jupiter/Saturn placements over four days.



Another view of the conjunction by Adrian Bradley

The View From C.W. Sirius Observatory



About CW Sirius Observatory:

C.W. (Cadillac West) Sirius Observatory is located 15 west of Cadillac Michigan. Owned and operated by WAS member Bill Beers. The dome is an 8' Clear Skies Inc dome which houses an 11" f/10 SCT telescope, a 102mm f/7 refractor telescope, Celestron CGEM DX mount, and uses an ASI ZWO 071 color CMOS camera, as well as a QHY8L color CCD camera. The telescope can be remotely operated from inside Bills house.

Anyone interested in learning about astrophotography, or any questions regarding equipment, or how to take astrophotos using your iPhones, or any related questions, can contact Bill at: BEZOLL@AOL.COM



From the Desk of the Northern Cross Observatory



Comet C/2020 M3 ATLAS Traveled through Orion, Taurus and into Auriga during November and December. Here are images from the 4 nights I had a chance to capture it, as it faded in magnitude.

Current information located at [Comet C/2020 M3 \(ATLAS\) Information | TheSkyLive.com](https://www.theskylive.com/comet-c-2020-m3-atlas)

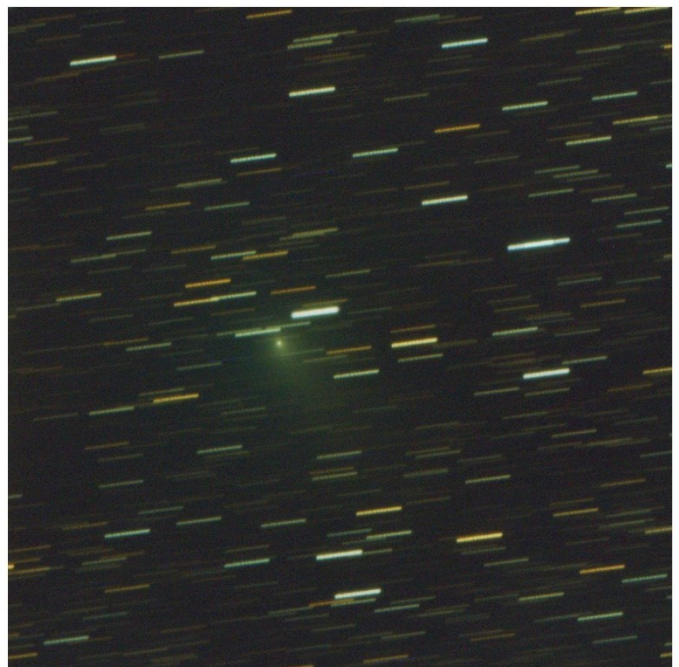
Data: November 8, 28, December 9 and 20th, 2020

SGPro, PHD2, FocusLock

10" f/8 RC Telescope, Losmandy G11 mount

ZWO asi071mc PRO camera @ 0C, gain 400,

Stacked on the core and processed in PixInsight

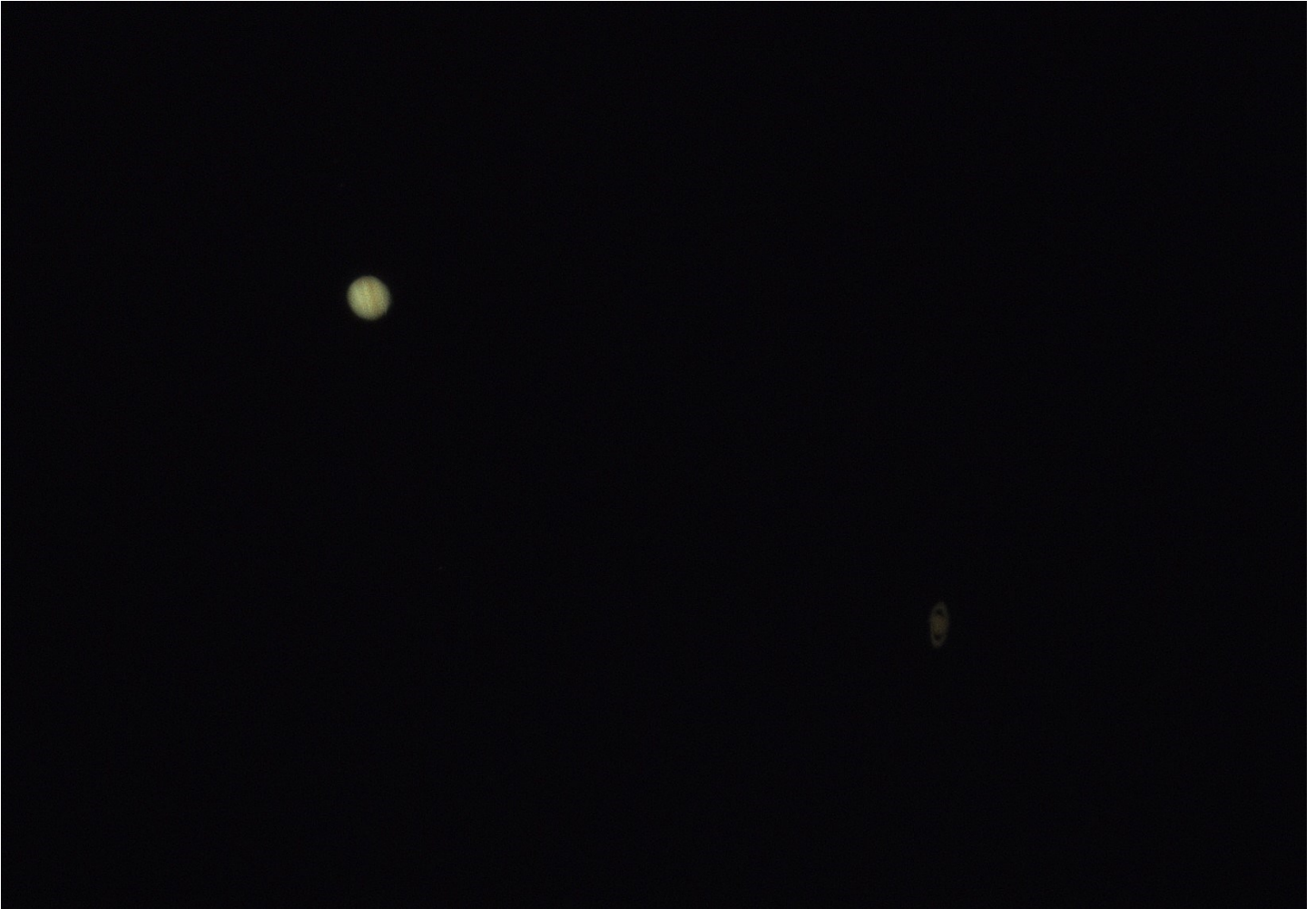


(Continued on page 12)

(Continued from page 11)

We also had the close conjunction of Jupiter and Saturn in December.

Here is a single shot of them through the 10" f/8 RC telescope on the evening of December 20, 2020



-Doug Bock

Join the Astronomical League!



The mission of the Astronomical League is to promote the science of Astronomy. The major benefit of belonging to this organization is receiving the quarterly newsletter, The Reflector, which keeps you in touch with amateur activities all over the country.

Also:

- Participate in the Observing Program
- Avail yourself of the League Store
- Astronomy Books at a discount
- Attend Astronomical League Conventions

Only \$7.50 annually,
(Membership starts July 1)

alcor@warrenastro.org

Presentations

Monday, January 4, 2021

Virtual Presentations

Main Talk:

Giovanni Cassini His Life and Times



By Ken Bertin

Ken will present the life of 17th Century Astronomer Giovanni Cassini, and his family. Born in Italy in 1625, He became a leader in solar observing and eventually was appointed chair of astronomy and mathematics at the University of Bologna. In 1668, Cassini emigrated to France where he was appointed the director of the new Paris Observatory. His discoveries include Jupiter's Red Spot and divisions in Saturn's rings along with the discovery of several moons in the solar system.

Short Talk:

2020 Astro-News in Review Including Highlights from the Space Program

By Ken Bertin

The stories will include, Comet Neowise, the conjunction of Jupiter and Saturn, close approach of Mars, Solar and Lunar eclipses, the dimming of Betelgeuse. Also it will cover the Space X return of American Astronauts to the ISS, the Chinese landing on the moon, NASA Osiris-Rex successful retrieval of a sample from asteroid Bennu, Perseverance Rover and several other missions.

Ken Bertin is a hobbyist astronomer for over 65 years, Past President and VEEP of WAS, Solar System Ambassador, 10 Total Solar Eclipses, 4 Annular eclipses, 6 Transits of Mercury, 2 transits of Venus. 15 Lunar eclipses. He does our presentations of historical figures in astronomy and currently presenting online to schools and other organizations.



Thursday, January 21, 2021

Virtual Presentation

Exploring Mars

With NASA's Curiosity
and Perseverance Rovers



By Dr. Roger Wiens

This talk will reveal discoveries from the Curiosity rover's journey and the next steps for exploring this intriguing planet. The 1-ton [Curiosity rover](http://mars.jpl.nasa.gov/msl/) has been trekking toward the 3-mile-high Mt. Sharp for nearly three years. Its [ChemCam laser instrument](http://www.msl-chemcam.com), operated from downtown Los Alamos, has acquired more than 10,000 chemical observations and several thousand images along the way. Now, Perseverance is on its way to the Red Planet and new discoveries await.

Dr. Wiens is the leader of the ChemCam laser instrument on the Curiosity rover (<http://mars.jpl.nasa.gov/msl/>; <http://www.msl-chemcam.com>) which landed in 2012. He has directed the US and French team operating ChemCam and interpreting the data returned from Mars. Wiens has been involved in other NASA robotic missions as well, including Stardust, Mars Odyssey, Lunar Prospector, and Deep Space-One, which include missions to the Moon, Mars, and comets. Since 2014 he has led the SuperCam laser instrument developed for the Perseverance rover, which is set to land on Mars in February 2021. Wiens has been recognized by NASA and Los Alamos National Laboratory for his contributions to science. In 2016 he was knighted by the government of France for his work in "forging strong ties between the French and American scientific communities" and for "inspiring many young, ambitious earthlings." He has received other awards, including the naming of Asteroid 41795 WIENS.



WAS PRESENTATIONS

If you would like to present either a short talk (10-15 minutes) or a full-length talk (45-60 minutes) at a future meeting, please email Dale Partin at:

firstvp@warrenastro.org



A Great Conjunction, and the Christmas Star

Said the night wind to the little lamb:

"Do you see what I see?

Way up in the sky, little lamb

Do you see what I see?

*A star, a star, dancing in the
night*

With a tail as big as a kite

With a tail as big as a kite"

Noel Regney and Gloria Shayne, 1962

In the words of this beautiful Christmas carol, written during the Cuban missile crisis of 1962, we are reminded of Christmas, the biblical Book of Matthew, and the Star of Bethlehem. Famous as it is, this story appears but once in the Gospel according to Matthew:

Now when Jesus was born in Bethlehem of Judea in the days of Herod the king, behold, wise men from the East came to Jerusalem, saying,

"Where is he who has been born king of the Jews? For we have seen his star in the East, and have come to worship him."

When they had heard the king they went their way; and lo, the star which they had seen in the East went before them, till it came to rest over the place where the child was.

When they saw the star, they rejoiced exceedingly

with great joy; and going into the house they saw the child with Mary his mother, and they fell down and worshiped him. Then, opening their treasures, they offered him gifts, gold and frankincense and myrrh.

For more than two thousand years, people have tried to attach some astronomical meaning to the star. From books and planetarium shows, I have gathered several possible interpretations:

- 1) The star was Halley's comet. Unlikely, because Halley's comet returned in October of the year 11 BCE.
- 2) An exploding star; a nova or a supernova. Although we have no evidence of such an event in those years, there could have been one.
- 3) A planetary conjunction. The Moon did pass close to Venus in the eastern sky (the location in the east appears twice in the biblical account). My personal favorite is a conjunction between Jupiter and Venus, on June 17, 2 BCE. However, this conjunction happened after the death of King Herod in 4 BCE, and it would have led the Magi in the wrong direction.

However, there was a Great Conjunction in 6 BCE. (Great conjunctions involve only Jupiter and Saturn and take place roughly every twenty years.) A subset of this series involved the



This image of the conjunction was taken by Dr Tim. Hunter on December 21, 2020

Moon passing close to Jupiter on April 17, 6 BCE. True to the biblical account, Jupiter was in the east over Israel at this time, and King Herod was still living.

One thing I like about the planetary conjunction theory is that astrologers in those ancient days⁴, more than the general population, paid attention to these events. One possible translation of “wise men” is “astrologers”, people versed in how the stars and planets influence humanity. They would have paid attention to planetary conjunctions more than the general population.

- 4) It could have been a miracle. In my own life, I consider every night out under the stars as a miracle, so why not?

Whatever the Christmas star was, we got to see it again as a “Great Conjunction” on Monday, December 21st. It is the closest that Jupiter and Saturn have been close to each other since 1623, that long-ago year that also saw the first publication of the First Folio of Shakespeare’s plays. On that day in 1623, the conjunction took place in daylight, so no one would have paid attention to it. But the one in 2020 was visible in the early evening! Therefore, millions of people were definitely paying attention to it, and it reminds us of the Star of Bethlehem. Whatever it was, we shall never know. But for those of us who were able to gaze in wonder at this fabulous event, it acted to increase the nightly miracle of the magnificent sky.

Even in our postmodern age, the chance close alignment of the solar system’s two biggest planets is not a big scientific event. However, it is a big astrological happening. While no true scientist follows astrology these days, two thousand years ago the night sky was all about astrology. And were it not for ancient astrology, we would not enjoy today’s comprehension of

the night sky. Even in 1623, the last time Jupiter and Saturn were this close, most people were more interested in astrology. I quote from Shakespeare, who did not follow judicial astrology. The two opening lines of Sonnet 14 state clearly that

Not from the stars do I my judgment pluck,
And yet methinks I have astronomy...

I believe that Shakespeare used astrology a lot in his plays because he knew his audience followed it. And now at the close of 2020, we have that rare opportunity to reflect on an astrological event, the joining together of two planets, a simple event that helps us to go outside, look towards the southwest, and revel in the beauty of the night sky.

-David Levy



Space Pirate Radio

Tune in to Captains Marty Kunz and Diane Hall for live radio

Wednesday nights at 9:00 pm ET
on Astronomy.fm

W.A.S.P. Photo and Article Submissions

We’d like to see your photos and articles in the W.A.S.P. Your contribution is ESSENTIAL! —

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Astronaut Wives Club

<https://abc.com/shows/the-astronaut-wives-club>

Episode Five: Flashpoint

So after the misogynist fluff of *Liftoff*, we now have a Very Serious Episode about feminism, the glass ceiling, unreliable white male allies, and such.

The A-plot surrounds the Coopers; Gordo (Bret Harrison) at last gets his turn to go up on what by Project Mercury standards is a long-duration mission, but Trudy (Odette Annable) finds an opportunity to make a case for women to join the astronaut corps and throws her energy into engineering a splash on Capitol Hill. In the B-plot, Rene Carpenter (Yvonne Strahovski) decides to seek employment as a journalist and isn't going to be satisfied with a mere second-string recipe column. In the C-plot, the not-romance between Louise (Dominique McElligott) and Max (Luke Kirby) reaches some kind of resolution.

Meanwhile in the S-plot (the S is for Stupid) Jo (Zoe Boyle) and Betty (JoAnna Garcia Swisher) become "friends" with Marilyn See, (Nora Zehetner) not because they actually give a damn about the See family vacation slides but because the See house has air conditioning. Catty Susan Borman (Antonia Bernath, worlds away from Rita Wilson's empathetic take on the same character) sees through them in five seconds flat. Sisterhood, yo.

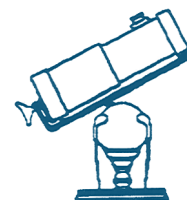


I'm not sure whether to cheer this episode on for introducing some moral fallibility to "good guy" astronauts John Glenn (Sam Reid) and Scotty Carpenter (Wilson Bethel) because I'm not entirely sure the scriptwriters fully grasped what they were doing with these flawed heroes: the closing scene in which the Glenns decide to embrace John's political destiny says the writers did not. Besides that, since I'm aware of the depressing reality of the women among

the cosmonaut corps, it's harder for me to embrace the "Soviets achieve girl power in space!" moment at face value the way Trudy and her fellow female pilots can. I know Valentina Tereshkova couldn't actually fly the Vostok because cosmonauts weren't supposed to fly and astronauts could and well, technically NASA had a point in requiring test pilot experience.

Anyway, Gordo gets Trudy back by using his moment in the spotlight to say "women's rights!" in front of the camera and Louise finally lets Al (Desmond Harrington) know how she feels about his infidelities being a national joke. It all feels very untethered; maybe the writers should've done a straight-up alternate history wherein Trudy and her pilot friend Dot (Mercedes Mason) go off jetting together like Captain Marvel and Maria Rambeau while Lady Louise ditches Al to become a San Franciscan alongside Max.

Four moons out of five because again, there are great character moments but overall this series is reaching for some kind of significance beyond the grasp of the writers.





Taurus-Littrow base

South and east of Posidonius is the crater Romer (41km dia.) seen here at the top of this image with starkly terraced walls and an off center peak on its floor. It's a young crater and its shape is strongly affected by the topography it was created in. Twin 12km craters below it are Brewster on the left and a little lower on the right is Franck.

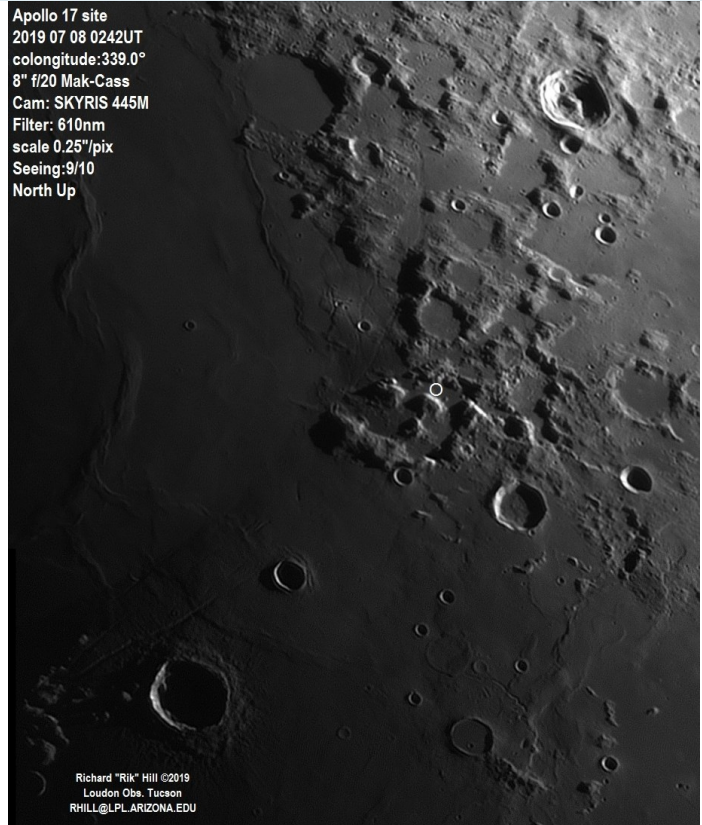
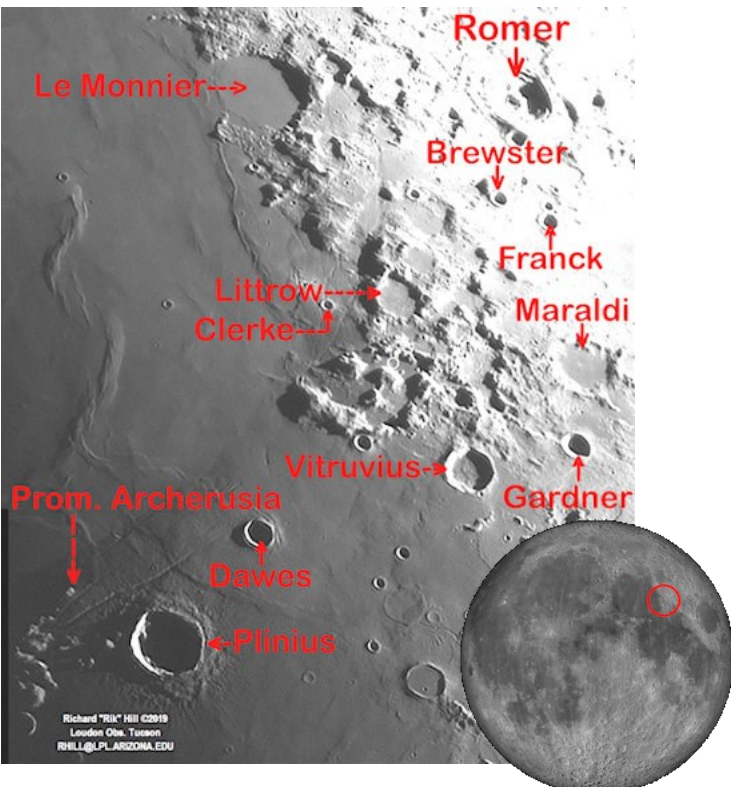


These both sit in the western reaches of Sinus Amoris with Mons Miraldi, a round mound on the southern shore of the Sinus just north of the low walled crater Miraldi (41km). Moving further south is the crater Gardner

(19km) and to its west (left) is the flat floored Vitruvius (31km) half in shadow. South and west of Vitruvius is a smaller crater, Dawes

(19km) with an interesting set of ridges on the east side of the crater, followed by Plinius (44km) with Rimae Plinius north and Promontorium Archerusiz next to it.

Notice north and west of Vitruvius there are four similar mountain peaks in a row all catching the early morning sunlight. They mark the location of the Apollo 17 landing site marked here with a "O". It is one of the easiest Apollo landing sites to find



and once you learn it, Taurus-Littrow will always stand out. The "O" sits in Taurus-Littrow Valley with South Massif being the sunlit mountain to the south and the dimmer light just north of the "O" is North Massif. The little dot to the lower right of the "O" is Bear Mountain named by Harrison Schmidt after a mountain near his hometown in Silver City, New Mexico. Details can be seen in images taken from overhead at the URL:

www.lpi.usra.edu/lunar/missions/apollo/apollo_17/landing_site/

All the EVAs and the 37km of driving around in the "Moon Buggy" was done inside that circle and included the most time of any crew on the lunar surface collecting 110.4 Kg of surface samples.

North of the landing site is the flat floored teardrop shaped crater Littrow (19km) and to the left is a field of rimae called Catena Littrow with the small crater Clerke (7km) between them. The rimae are graben-like and therefore fairly wide, about 2km on average. Going further north, following the wrinkle ridge or dorsa that leads out of the Catena we come nearly full circle with the embayment Le Monnier (63km), a very distinctive feature.

This image is a montage of two images each made from 1800 frame AVIs stacked with AVISack2 (IDL) and further processed with GIMP and IrfanView.

History S.I.G.

January has issues. But not in a WASP sense. The problem January has is that many of the WASP issues combined December and January. December already claimed these issues in my SIG reports. Rather than repeat the issue reports, I thought maybe this time we might dive into more recent examples. Here are the last two decade's examples of WASP evolution.



January 2001

This issue is an example of our foray into pure digital publication (the digitals started in June 1996). Pictured at right is just the top part of a long page of copy generated by HTML code (printed out, it would be a document nearly 28 inches long.) Each article starts there and, with a link, picks up again further on down the page. The issue contains one column and one article, "Astro Chatter" by Larry Kalinowski and a book review by Mike Simonsen: *Cosmic Catastrophes* - J. Craig Wheeler.

These online issues were apparently considered a work in progress, this appears at the bottom of the page:

This page was created by Jeff Bondono, and last changed on December 17, 2000. Modified by Doug Bock on February 18, 2001

January 2011

We see here that we are back to a "printed" version in the form of a PDF file. The practice of which started in August of 2003 (I may have to revise that if copies of May, June or July surface) and continues to this day.

This issue leads off with the reporting of the Awards handed out in December, 2010. Bob Berta wrote an update on the DbarA observatory project. Cliff Jones covered events and programs at the Vollbrecht Planetarium. Meeting minutes round out the issue

From the Scanning Room

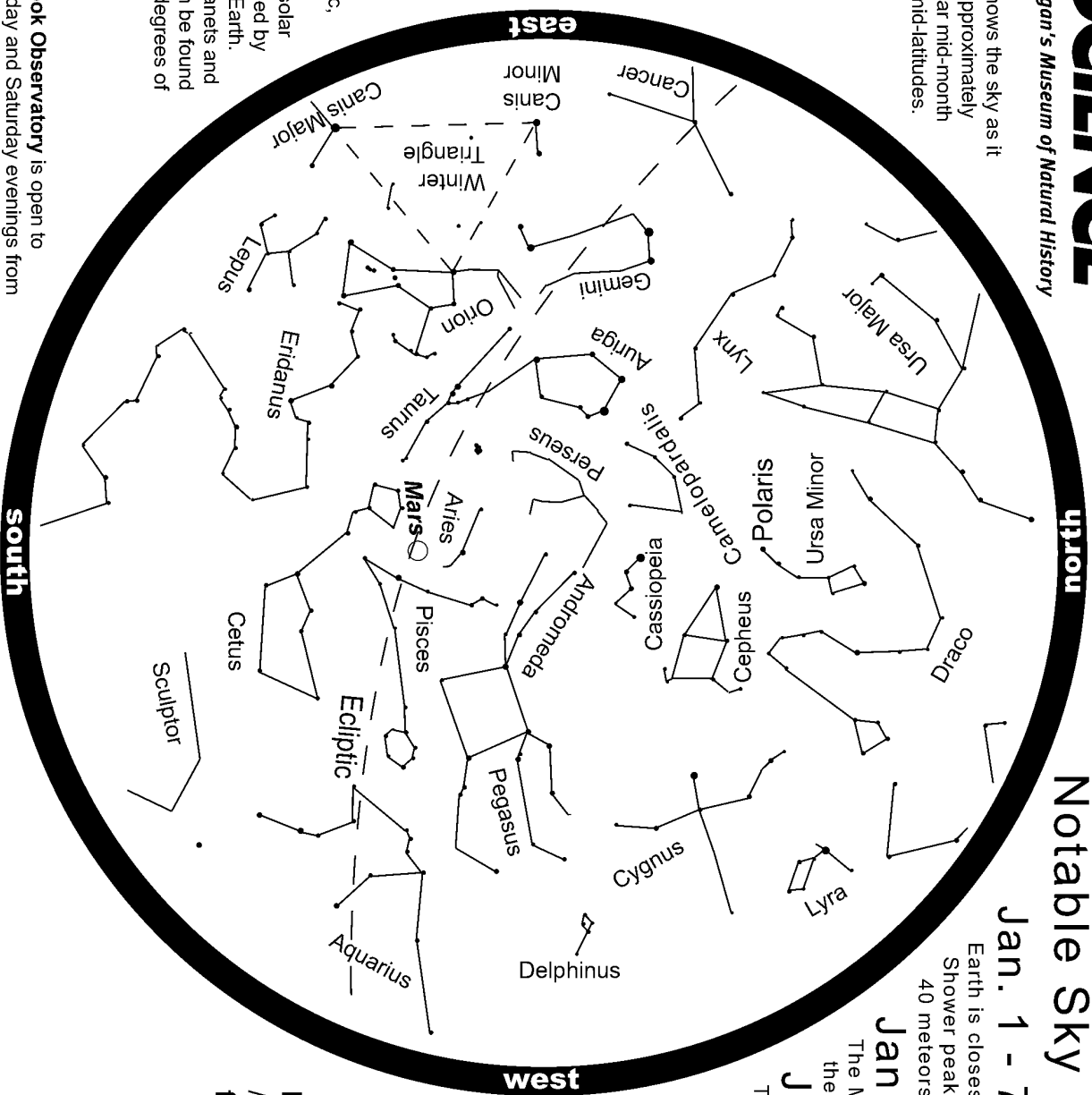
While considering my "issue" with January WASPs, I briefly considered going back to a Dec/Jan issue, picking one that said December 1990/January 1991. Looking over at the volume and issue numbers, I see that it says Vol. 23, issue 1. Interesting. This appears to be the issue when that issue's editor, Nancy Rowe, decided to break with the system that had issue #1 starting in March (Making the December issues #10). The very earliest WASPs did not display Vol./Issue but when it started appearing, that was the system they used. There have been a few other hiccups along the



way since then (copy and paste will trip you up every time), but we're on track now *cough, cough*.

Dale Thieme,
Chief scanner

This chart shows the sky as it appears at approximately 7pm EST near mid-month at northern mid-latitudes.



What is that dashed line? It's the ecliptic, the reference plane of the solar system, defined by the Sun and Earth. The major planets and the Moon can be found within a few degrees of this plane.

The Cranbrook Observatory is open to the public Friday and Saturday evenings from 7:30 - 10:00pm EST, and the first Sunday of the month from 1:00 - 4:00pm for solar viewing. Come have a look through our 6" telescope! For observatory information visit <http://science.cranbrook.edu/explore/observatory>

JANUARY 2021

Notable Sky Happenings

Jan. 1 - 7

Earth is closest to the Sun on the 2nd. The Quadrantid Meteor Shower peaks on the night of the 3rd-4th. It produces about 40 meteors per hour on average.

Jan. 8 - 14

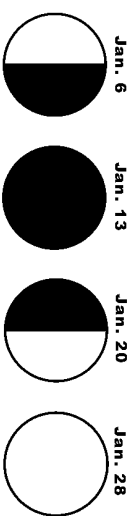
The Moon is above Antares in the SE predawn sky on the 9th and to the left on the 10th.

Jan. 15 - 21

The Moon is below Mars in the S evening sky on the 20th and to the left on the 21st.

Jan. 22 - 31

Mercury is at maximum elongation east (left) of the Sun on the evening of the 23rd. It's only six degrees (about half the width of a fist) above the WSW horizon at 6:30pm. An unobstructed horizon is a must. Binoculars help.



Now Showing

Please visit science.cranbrook.edu/explore/acheson-planetarium for program updates.



For astronomy information visit <http://science.cranbrook.edu>



Adrian Bradley - The Milky Way Over the Boat Launch

January 2021

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 New Years Day	2
3 Quadrantid Meteor Shower	4 Cranbrook Virtual Meeting	5	6	7	8	9
10	11	12	13 New Moon	14	15	16
17	18 Martin Luther King Day	19	20	21 Macomb Virtual Meeting	22	23 Mercury easy to see at dawn Virtual Stargate
24	25	26	27	28 Beehive 2.3'S of Moon Full Moon	29	30
31						



Stargate Observatory

Special Notice

Due to the measures taken during the Covid-19 pandemic On-site Star Parties and group events are cancelled.

During this time, you are encouraged, when the skies co-operate, to join the livestream with Northern Cross Observatory on the open house schedule (4th Saturday of the month)

Past livestream are available on the Warren Astronomical Society's YouTube channel:

<https://www.youtube.com/channel/UC12jUX4Gmweg6fTtUuqa8CQ>

Observatory Rules:

1. Closing time depends on weather, etc.
2. May be closed one hour after opening time if no members arrive within the first hour.
3. Contact the 2nd VP for other arrangements, such as late arrival time. Call 586-909-2052.
4. An alternate person may be appointed to open.
5. Members may arrive before or stay after the scheduled open house time.
6. Dates are subject to change or cancellation depending on weather or staff availability.
7. Postings to the Yahoo Group and/or email no later than 2 hours before starting time in case of date change or cancellation.
8. It is best to call or email the 2nd VP at least 2 hours before the posted opening with any questions. Later emails may not be receivable (secondvp@warrenastro.org).
9. Generally, only strong rain or snow will prevent the open house... the plan is to be there even if it is clouded over. Often, the weather is cloudy, but it clears up as the evening progresses.

Advisory: Concerns are circulating in the amateur astronomy community about COVID-19 being passed from one person to another via contact of different persons' eyes with a telescope eyepiece. While we are not medical experts, we thought we should pass on this concern. Sharing telescopes may be considered by some to be high-risk due to the possibility of eyes touching eyepieces.

Stargate Report

Observatory report for January 2021.

Stargate observatory and the Dob shed along with all equipment are in good condition as of December 7, 2020.

The observatory will remain closed until further notice due to the COVID-19 pandemic.

Riyad I. Matti
2020/2021 WAS 2nd VP,
Observatory Chairperson

Treasurer's Report

Treasurer's Report for 12/22/2020:

MEMBERSHIP:

We have 152 members (adjusted to reflect extended membership for dues paying members in 2019)

INCOME AND EXPENDITURES (SUMMARY):

We took in \$2869 and spent/transferred \$2276 We have \$21314 in the bank \$74 in checks and \$609 in cash, totaling \$21997 as of 12/22/2020

INCOME:

AL 2020 \$75
AL 2021 \$15
calendar 2020 \$150
calendar 2021 \$495
donation \$474.75
membership \$662
merch \$84
renewal \$913

EXPENSES:

2020 Insurance Premium \$1117
Calendar 2020 Shipping Cost \$30.35
calendar 2021 expense paid via paypal \$506.64
PO Box 2020 \$92
Reimbursement envelopes / stamps for beg letters \$19.32
Reimbursement for 6 mos Meetup Fees \$89.94
Reimbursement for batteries for AP Hand Control \$33.07
Snack Reimbursement \$70
Snack Supplies \$2.12
Speaker Expense, Dinner \$54.23
Speaker Expense, Driving \$261

Astronomical Events for January 2021

Add one hour for Daylight Savings Time

Source:

<http://www.astropixels.com/ephemeris/astrocal/astrocal2021est.html>

Day	EST (h:m)	Event
01	02:05	Beehive 2.3°S of Moon
02	09:00	Earth at Perihelion: 0.98325 AU
02	16:58	Regulus 4.7°S of Moon
03	10:00	Quadrantid Meteor Shower
06	04:37	LAST QUARTER MOON
09	10:39	Moon at Perigee: 367390 km
09	21:08	Antares 5.6°S of Moon
10	00:00	Mercury 1.6° of Saturn
10	15:14	Moon at Descending Node
11	13:00	Mercury 1.4° of Jupiter
11	15:12	Venus 1.5°N of Moon
13	00:00	NEW MOON
14	03:15	Mercury 2.3°N of Moon
20	16:02	FIRST QUARTER MOON
21	00:37	Mars 5.1°N of Moon
21	08:11	Moon at Apogee: 404361 km
23	21:00	Mercury at Greatest Elong: 18.6°E
23	21:00	Saturn in Conjunction with Sun
23	23:39	Aldebaran 4.7°S of Moon
24	16:47	Moon at Ascending Node
27	10:46	Pollux 3.8°N of Moon
28	09:50	Beehive 2.3°S of Moon
28	14:16	FULL MOON
28	20:00	Jupiter in Conjunction with Sun
28	21:00	Mercury at Perihelion
29	23:56	Regulus 4.6°S of Moon

GLAAC REPORT 12/22/2020

Beginning Balance: \$3,075

INCOME

No activity

EXPENSES

No activity

Ending Balance: \$3,075

Mark Jakubisin
Treasurer

Outreach Report

I cannot WAIT to be able to set up my telescope and coax passers-by to come have a look at the Moon or planets; since Connie and I have moved in with her parents, I've not set up my telescope (which is in need of repairs or replacement *anyway*), and not felt the thrill of someone exclaiming "Oh WOW!" - I miss it terribly!

In 2019 I was just getting started demonstrating Virtual Reality (VR) space apps - I had to put the kibosh on that activity too... I'm hoping that by Astronomy at the Beach time next fall, we'll be back to doing in-person outreach events.

For the next several months, it looks like online / virtual will be the format of choice. We have several people who do outreach events, I'd like to make a list of topics our outreachers can present available to teachers. I'd also like to include which [Michigan NCSS standards](#) these talks cover; teachers REALLY like having this info - I'll very likely need some help coming up with this info.

Member Spotlight

Ken Bertin reports that he taught nine 5th grade classes for Rochester Community School System

from Dec. 7-12. He gave his "Size and Distance in the Universe" presentation - he also talked about how stars work, star designations, supernovae, how red giants form, black holes (there was extreme interest here) and eclipses.

His presentation took 40 minutes, and he had a 20 minute Q/A session where the questions he got were "numerous and stunningly brilliant." Ken has also received about a dozen follow-up questions via email.

Ken says that the teachers were very enthusiastic and he got a lot of enjoyment out of doing these sessions. **Note to all:** Ken is available to give this presentation to any group anytime.

Connie Martin-Trembley is teaching an online astronomy class at Endeavour school with 26 students; I asked her for a couple sentences, and she wrote an *entire article!*

If you are giving presentations or doing other astronomy outreach, *please let me know!* [Use this link to send me a quick email report.](#)

Great Lakes Association of Astronomy Clubs Board Meeting

December 3, 2020 - ONLINE, 7pm - <https://umich.zoom.us/j/584733345>

Call to order: 7:08 pm

Online:

- Adrian Bradley - GLAAC President, Lowbrows
- John Wallbank - GLAAC Vice President, Lowbrows
- Jeff Kopmanis - GLAAC Secretary, Lowbrows
- Brian Ottum - GLAAC Communication, Lowbrows
- Mike Ryan - GLAAC Board, Ford

Discussion:

~~Status of Incorporation~~

Status of Bank Account

We have a fed tax id number

AB is treasurer of WAS, so it'll be easier to transfer funds

~\$2000

501c3 - JW is working on finishing touches now

Bortle article: <https://nightskypix.com/bortle-scale/> Include on GLAAC site?

Yes, Talk to Bob about location on web site

Date for AATB 2021

Covid-19 will dictate live event

First Quarter Moon is ideal

UM starts on Aug 30; EMU starts on ??;

September 10/11 - too close to Labor day?

September 17/18 - International Observe the Moon Night - Oct 16

September 24/25 - Moon rise is around 9:30 with more terminator

Tentative 2021 Date: Sept 24/25 - Covid permitting

Move to set Sept 24/25: AB, Seconded: OB,MR Vote: Unanimous

Send out Poll in groups.io for thumbs up/down

Yes:4, No:2

Brian will contact Bridget Hayward regarding Island Lake State Park arrangements.

Nominations for 2021 officers.

Can be made by Email to Pres & VP before **January 14, 2021**

Existing officers are OK with staying on, Shared Treasurer between P and VP

President: Adrian

VP and Treasurer: John Wallbank

Secretary: Jeff Kopmanis

Webmeister: Bob Trembley

Communications: Brian Ottum

AATB Large Telescope (11" or larger) Manager: Mike Ryan

Nominations will be taken and voted on on January 14, 2021

One more round of congratulations for the success of 2020's Virtual event.

Adjourn:

Motion to adjourn by JK, seconded by AB. Approved by unanimous vote.

Meeting Adjourned at 7:42 pm.

Next GLAAC Meeting: January 14, 2021



Grandpa Santa

Around October, Connie and I asked our friend Jennifer Skwarski if she would be willing to make a "Victorian Santa" outfit for me - we gave her very little guidance, except that I did not want to look like the "Coca-Cola Santa."

This was my granddaughter Alayanora's first Christmas, and she wouldn't be able to visit Santa - I haven't shaved since March, so I'm sporting a pretty good Santa beard!

Jennifer is a master seamstress, and has been making award-winning costumes for Science Fiction conventions for quite a few years - she actually got kicked out of the amateur ranks because she kept winning.

When we picked the costume up, we were *blown away* by its beauty and craftsmanship - everyone who has seen it has said that pictures simply do NOT do it justice!

I guess I know what I'll be wearing at future W.A.S. banquets!

Happy Holidays to all, and to all a Dark Night!

-Bob Trembley

Meeting Minutes

BOARD MEETING December 7, 2020

Board Members logged in: Diane Hall, Dr. Dale Partin, Riyadh Matti, Mark Jakubisin, Glenn Wilkins, Bob Trembley and Jonathan Kade. Dale Thieme and Mark Kedzior also joined us. Diane called the meeting to order at 6:36.

Old Business

2020 Year in Review + 2020 mailer - Diane reported that this is a work in progress and is expected to be completed by the end of the year.

Website updates and automated membership form - Jonathan expects to have these completed for the first 2021 Cranbrook meeting.

Banquet prizes & how they are distributed - Jon and Bob reported that responses have been disappointing. Bob offered to search his memorabilia items for possible additions. Numbers will be supplied to members and Adrian Bradley will pick winners through a random number generator. Distribution has not yet been determined but may have to be delayed until our first get-together next year due to the cost of mailing.

Annual service awards - These will be announced at the banquet and mailed directly to the honored members.

Calendar - Jonathan plans to have orders filled by mail as soon as they are published.

New Business

Banquet duties - Diane will be the MC and is currently finishing the program plan with event timing. The general outline was approved by the Board.

Officer transition plan - Departing officers answered questions and will make themselves readily available to the new team as needed. A problem was identified with regular mail pickups from our P.O. box due to travel distance. Mark Kedzior offered to make regular pickups and keep Adrian informed.

Calendar Committee - Bill Beers reported that the team received 64 photos from a wide variety of contributors for consideration. He was able to pick at least one photo from each contributor. A survey was made to determine calendar purchase interest. Since it proved popular, he was able to determine how many copies will be printed. Bill thanked everyone for their support.

CRANBROOK MEETING December 7, 2020

Diane called this meeting to order at 7:31. 30 members continued to participate on WebEx and an additional 15 joined on You Tube.

In the News/Sky presented by Adrian Bradley

The Japanese sample return mission, called Hayabusa 2, landed safely in Australia on December 5 with material from asteroid Ryugu

Sun spots - the quick return of significant sun spots is providing good observing opportunities and offers hope for better days for solar observers as we move into solar maximum.

The Arecibo observatory experienced the complete collapse of the last remains of the 900 ton receiver system which fell 400 feet to the dish on December 1. The dramatic ending was caught on video.

The Jupiter/Saturn conjunction, now often called the Christmas star, could be the highlight of the December sky for those able to see it above the horizon.

The Geminids are expected to peak December 13-14.

Officer reports

Diane reported that the Awards Banquet will go live at 7:00 P.M. on Thursday, December 10. Members will receive the agenda two days in advance.

Dr. Partin indicated that Brother Guy will make a presentation on the Star of Bethlehem this Thursday. We are currently good for speakers into April.

Riyad reported that he applied several tubes of caulk to the observatory and plans to finish in the Spring before insects become active.

Mark reported that we ended November with a total of \$21,889. Details in the WASP. He thanked the WAS for the experience and declared that the Treasurer's duties are not as difficult as some might fear!

Glenn reported that the November minutes are all in the current WASP. It was an honor to serve, and a special experience working with this exceptional team of officers and the many talented members who all made it possible to overcome major challenges and keep hope alive!

Bob indicated that Ken Bertin is conducting an ongoing outreach program with Rochester Schools.

Jonathan remarked that the WASP is up. He also updated us on Banquet activities & the status of special projects he expects to finish after the banquet.

Observing reports

David Levy watched the penumbral eclipse and noted the sun was very active.

Doug Bock held an outside observing session that was very "lively".

Adrian Bradley shared his recent photos including beautiful sun sets.

Special reports

Adrian reported elections were held last Thursday for GLAAC officers (all returning). The plan for the next Astronomy at the Beach event is expected to be determined next June.

Short talk – Dr. Partin introduced Mark O'Malley to finish his presentation on Werner Von Braun which started last June. Werner played a major role in the Saturn 5 rocket which carried our astronauts to the moon. We arrived there first due, in large part, to his leadership ability and engineering experience. The rocket, which was not as large as he wanted, still stood 363 ft. high over 3 stages including the module. The amazing power was generated using simple kerosine as the liquid fuel.

Break 8:23 – 8:38

Long talk – Dr. Partin introduced Jeff Mac Cloud, our previous President. His talk was entitled Planetarium Math and involved the many considerations in defining the location of celestial objects.

Jeff reviewed the basic systems used for locating points in 3 dimensions included cartesian, circular and others for special situations. All celestial approaches are only good for a particular terrestrial location and point in time. The problems of defining the location of a sky object to someone located somewhere else on the globe quickly become apparent. As an exercise, Jeff developed his own impressive software program somewhat similar to the widely used Stellarium Program. After a quick look at Jeff's software, it became obvious to most that training in trigonometry and programming would be required to follow it. However, he later demonstrated his program to show its usefulness for ordinary astronomers in determining celestial locations and planning future viewing sessions for anyone able to understand star charts and tables.

For those requiring even more accurate locations, there are additional considerations. These include corrections for precession, star movement, nutation, refraction and parallax! Jeff also noted the established time and location standards in place for mean time at Greenwich, as well as universal systems for latitude and longitude. A "meridian" scope can be seen in Detroit as representative of instruments used to develop star maps. Finally, we went on a historical tour showing the many attempts to refine regular adjustments to our calendars to the ever-changing hours in a year over the decades.

This last meeting of 2020 was closed at 9:38

Glenn Wilkins
Secretary



The Warren Astronomical Society is a Proud Member of the Great Lakes Association of Astronomy Clubs (GLAAC)

GLAAC is an association of amateur astronomy clubs in Southeastern Michigan who have banded together to provide enjoyable, family-oriented activities that focus on astronomy and space sciences.

GLAAC Club and Society Meeting Times

Club Name & Website	City	Meeting Times
Astronomy Club at Eastern Michigan University	Ypsilanti/EMU	Every Thursday at 7:30PM in 402 Sherzer
Capital Area Astronomy Club	MSU/Abrams Planetarium	First Wednesday of each month 7:30 PM
Farmington Community Stargazers	Farmington Hills	Members: Last Tuesday of the month Public observing: 2nd Tuesday of the month
Ford Amateur Astronomy Club	Dearborn	Fourth Thursday of every month (except November and December) at 7:00 PM
McMath-Hulbert Astronomy Society	Lake Angelus	Board and paid members-First Sunday of the month Public open house—first Saturday at 11 am
Oakland Astronomy Club	Rochester	Second Sunday of every month (except May)
Seven Ponds Astronomy Club	Dryden	Monthly: generally the Saturday closest to new Moon
Sunset Astronomical Society	Bay City/Delta College Planetarium	Second Friday of every month
University Lowbrow Astronomers	Ann Arbor	Third Friday of every month
Warren Astronomical Society	Bloomfield Hills/ Cranbrook & Warren/ MCC	First Monday & third Thursday of every month 7:30 PM

GLAAC Club and Society Newsletters

Warren Astronomical Society:	http://www.warrenastro.org/was/newsletter/
Oakland Astronomy Club:	http://oaklandastronomy.net/
McMath-Hulbert Astronomy Club	http://www.mcmathhulbert.org/solar/newsletter/
Ford Amateur Astronomy Club:	http://www.fordastronomyclub.com/starstuff/index.html
Sunset Astronomical Society:	http://www.sunsetastronomicalsociety.com/
University Lowbrow Astronomers:	http://www.umich.edu/~lowbrows/reflections/

WAS Member Websites

Jon Blum: [Astronomy at JonRosie](#)
 Bill Beers: [Sirius Astro Products](#)
 Jeff MacLeod: [A Life Of Entropy](#)

Bob Trembley: [Balrog's Lair](#)
 Bob Trembley: [Vatican Observatory Foundation Blog](#)

Doug Bock: <https://boonhill.org>
 Facebook: Northern Cross Observatory <https://www.facebook.com/NorthernCrossObservatory>
 Boon Hill and NCO Discussion <https://www.facebook.com/groups/369811479741758>
 YouTube channel: <https://www.youtube.com/channel/UC-gG8v41t39oc-bL0tGpS6w>



This article is distributed by NASA Night Sky Network

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

Check Your Sky's Quality with Orion!

David Prosper

Have you ever wondered how many stars you can see at night? From a perfect dark sky location, free from any light pollution, a person with excellent vision may observe a few thousand stars in the sky at one time! Sadly, most people don't enjoy pristine dark skies – and knowing your sky's brightness will help you navigate the night sky.

The brightness of planets and stars is measured in terms of **apparent magnitude**, or how bright they appear from Earth. Most visible stars range in brightness from 1st to 6th magnitude, with the lower number being brighter. A star at magnitude 1 appears 100 times brighter than a star at magnitude 6. A few stars and planets shine even brighter than first magnitude, like brilliant Sirius at -1.46 magnitude, or Venus, which can shine brighter than -4 magnitude! Very bright planets and stars can still be seen from bright cities with lots of light pollution. Given perfect skies, an observer may be able to see stars as dim as 6.5 magnitude, but such fantastic conditions are very rare; in much of the world, human-made light pollution drastically limits what people can see at night.

Your sky's **limiting magnitude** is, simply enough, the measure of the dimmest stars you can see when looking straight up. So, if the dimmest star you can see from your backyard is magnitude 5, then your limiting magnitude is 5. Easy, right? But why would you want to know your limiting magnitude? It can help you plan your observing! For example, if you

have a bright sky and your limiting magnitude is at 3, watching a meteor shower or looking for dimmer stars and objects may be a wasted effort. But if your sky is dark and the limit is 5, you should be able to see meteors and the Milky Way. Knowing this figure can help you measure light pollution in your area and determine if it's getting better or worse over time. And regardless of location, be it backyard, balcony, or dark sky park, light pollution is a concern to all stargazers!

How do you figure out the limiting magnitude in your area? While you can use smartphone apps or dedicated devices like a Sky Quality Meter, you can also use your own eyes and charts of bright constellations! The Night Sky Network offers a free printable Dark Sky Wheel, featuring the stars of Orion on one side and Scorpius on the other, here: bit.ly/darkskywheel. Each wheel contains six "wedges" showing the stars of the constellation, limited from 1-6 magnitude. Find the wedge containing the faintest stars you can see from your area; you now know your limiting magnitude! For maximum accuracy, use the wheel when the constellation is high in the sky well after sunset. Compare the difference when the Moon is at full phase, versus new. Before you start, let your eyes adjust for twenty minutes to ensure your night vision is at its best. A red light can help preserve your night vision while comparing stars in the printout.

Did you have fun? Contribute to science with monthly observing programs from Globe at Night's website (globeatnight.org), and check out the latest NASA's science on the stars you can - and can't - see, at nasa.gov.



The Dark Sky Wheel, showing the constellation Orion at six different limiting magnitudes (right), and a photo of Orion (left). What is the limiting magnitude of the photo? For most observing locations, the Orion side works best on evenings from January-March, and the Scorpius side from June-August.



Last Word

-Dale Thieme, Publisher

I am using the column Jonathan Kade started when he took on Publications to take stock and look back on 2020. With the election of the 2020 board, some reshuffling took place. Dale Partin left his position in publications and went back to First VP, Jonathan Kade then took over the publication spot. I didn't get fired. So far, so good. I looked forward to collaborating with Jonathan on the WASP and other publishing projects, but then 2020 got in the way.

Now, I am used to working at a distance (the club is 800+ miles away), but the rest of the club suddenly had to deal with going online to conduct meetings. Happily, Doug Bock was already streaming his imaging process on YouTube and was able to help us get our meetings online and streaming. But there is a silver lining even to that Covid cloud: with the virtual meetings, Dale Partin has been able to line up speakers we may never have gotten for an onsite talk. As a bonus, I have a new columnist for the WASP, David Levy. Speaking of columnists for the WASP, I want to take a moment and thank the contributors that lighten my load: the astrophotographers, Bill Beers and Doug Bock, who have gone to monthly contributions and I'm expecting an uptick in images as we have some more imagers in the club, such as Adrian Bradley and Dale Hollenbaugh. Rik Hill, of course with his prolific lunar imaging (and a tip of the hat to Ralph DeCew for labeling the features Rik mentions). Of course, Brian Thieme's artwork, as well. The officer reports continue apace, providing us with a continuing historical record of the society's operation (even if the outreach chair and 2nd VP are reduced to thumb-twiddling.)



But, alas and alack, the Armchair Astronomer has gone A.W.O.L. Turns out he couldn't resist the siren call of the Great Conjunction, got out of his armchair, and hauled his telescope out of mothballs for a look-see. But he is still busy reading, currently a fascinating tome from the Apollo era: *To a Rocky Moon: A Geologist's History of Lunar Exploration* by Don E. Wilhelms. So there's a chance of a return...

The 2021 Board has undergone some more reshuffling. Glen Wilkins declined to run a second year as secretary, but his spot will be covered by the very capable Mark Kedzior. Adrian Bradley is taking over as treasurer from Mark Jakubisin and his banking background should prove invaluable. Finally, Jonathan Kade, who left the publication post, expecting to take on the treasury, suddenly found himself on the outside, looking in. So, what happened to publi-



My capture of the Great Conjunction Monday, December 21. Telescope, Celestron 4SE (4" Maksutov), camera: iPhone 6s. Location: Front Door, looking across the street, moments before the sodium street lamp came on.

cations? That position wound up with Dale Thieme, now put in the curious position of directing himself. I look forward to talking to myself. It's not like I haven't had practice.

-Dale Thieme
The Editing Publisher

About the cover: The Warren Astronomical Society is celebrating 60 years of operation this year. Brian Thieme designed the banner for it on the front cover. His contributions to the graphic designs used in the WASP are invaluable.

