



LONGMONT ASTRONOMICAL SOCIETY

DECEMBER 2023

HB 3
BY M. J. POST

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No LAS Meeting in December!!

Longmont Astronomical Society

2024 Calendar

IC 5070 and 5067, "Pelican Nebula"
by Martin Butley

You may now purchase the Longmont Astronomical Society 2024 calendar at <https://members.longmontastro.org/store>. The calendar features some of the amazing astrophotography by members of the Longmont Astronomical Society. Price is only \$6.95 which includes a small donation to LAS.

The calendar is printed in full color on 100# glossy paper. It should ship about December 10. [Click here to preview the calendar in high resolution \(218 ppi\) PDF format.](#)

LAS Officers and Board Members in 2023

Vern Raben, President
Hunter Morrison, Vice President
Eileen Hall-McKim, Secretary
Bruce Lamoreaux, Treasurer

Board Members:
David Elmore, Gary Garzone,
Mike Hotka, Brian Kimball, and Tally O'Donnell

Appointed Positions 2023

Sarah Detty, Webmaster; Bruce Lamoreaux, Library Telescope Coordinator;
Bill Tschumy, Public Outreach Coordinator;
Eileen Hall-McKim and Vern Raben, Newsletter Editor;



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About LAS

The Longmont Astronomical Society Newsletter ISSN 2641-8886 (web) and ISSN 2641-8908 (print) is published monthly by the Longmont Astronomical Society, P. O. Box 806, Longmont, Colorado. Newsletter Editor is Vern Raben. Our website URL is <https://www.longmontastro.org> and the webmaster is Sarah Detty. The Longmont Astronomical Society is a 501 c(3), non-profit corporation which was established in 1987.



The Longmont Astronomical Society is affiliated with the Astronomical League (<https://www.astroleague.org>). The Astronomical League is an umbrella organization of amateur astronomy societies in the United States.



Planets in December

Mercury

Mercury may be seen low in the southwest around 5:30 pm from the 1st through the 12th this December. It decreases in brightness from -0.4 to +0.3 magnitude; the apparent size increases from 6.2 arc sec across to 8.0 arc sec. It may be seen again after the 29th in the ESE about 6:15 am.

Venus

Venus is prominent in the morning sky around 6:30 am in the southeast. It is magnitude -4.1 in brightness and the apparent size is 16 arc sec across.

Mars

Mars is not visible until about mid January 2024.

Jupiter

Jupiter is past opposition so is gradually decreasing in size and brightness. The apparent size decreases from 48 arc sec across to 44 arc sec; the brightness decreases from -2.8 to -2.6 magnitude.

The following are good times to view Jupiter's Great Red Spot transit at mid disk:

- Dec 1 at 12:18 am altitude (alt) 47°
- Dec 1 at 8:09 pm alt 58°
- Dec 3 at 1:56 am alt 28°
- Dec 3 9:47 pm alt 64°
- Dec 4 at 5:39 pm alt 35°
- Dec 5 at 11:26 pm alt 52°
- Dec 6 at 7:17 pm alt 53°
- Dec 8 at 1:04 am alt 34°
- Dec 8 at 8:55 pm alt 64°
- Dec 9 at 4:47 pm alt 29°
- Dec 11 at 5:25 pm alt 48°
- Dec 10 at 10:34 pm alt 57°
- Dec 11 at 6:25 pm alt 48°
- Dec 12 at 12:12 am alt 39°
- Dec 13 at 8:04 pm alt 62°
- Dec 15 at 9:42 pm alt 60°
- Dec 16 at 6:35 pm alt 43°
- Dec 17 at 11:21 pm alt 45°
- Dec 18 at 7:12 pm alt 59°
- Dec 20 at 1:00 am alt 25°
- Dec 20 at 8:51 pm alt 63°
- Dec 21 at 4:42 pm alt 37° * full rotation to 2:38 am
- Dec 22 at 10:30 pm alt 50°

- Dec 23 at 6:21 pm alt 55°
- Dec 25 at 12:00 am alt 31°
- Dec 25 at 8:00 pm alt 64°
- Dec 27 at 9:00 pm alt 55°
- Dec 28 at 5:30 pm alt 51°
- Dec 29 at 11:17 pm alt 37°
- Dec 30 at 7:09 pm alt 63°

Saturn

Saturn is visible in the southwestern sky after sunset. It is about magnitude +0.9 in brightness and apparent size of the disk is 16 arc sec across.

Uranus

Uranus is visible in the evening sky in constellation Aries. It is magnitude +5.6 in brightness and the disc is 3.7 arc sec across.

Neptune

Neptune is visible in the early evening sky in constellation Pisces until Dec 10 when it moves into Pisces. It is magnitude +7.9 in brightness and the disc is 2.2 arc sec across.

Vesta

Asteroid Vesta is at opposition on Dec 21st. It will be magnitude +6.4 in brightness.

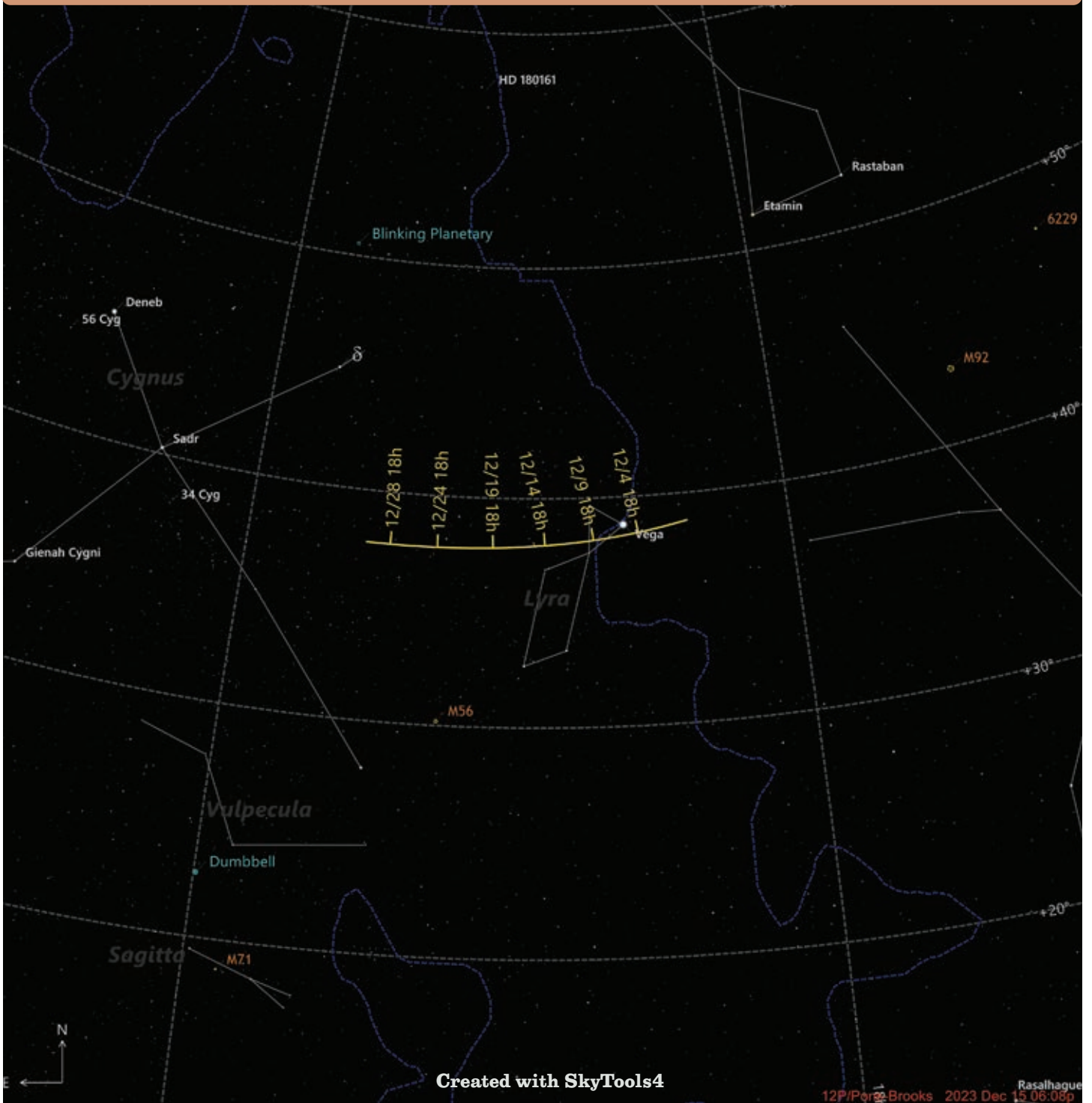
Lunar Phases in December

- Third quarter: December 4 at 10:50 pm
- New moon: December 12 at 4:33 pm
- First quarter: December 19 at 11:40 am
- Full moon: December 26 at 5:34 pm

Meteor Showers in December

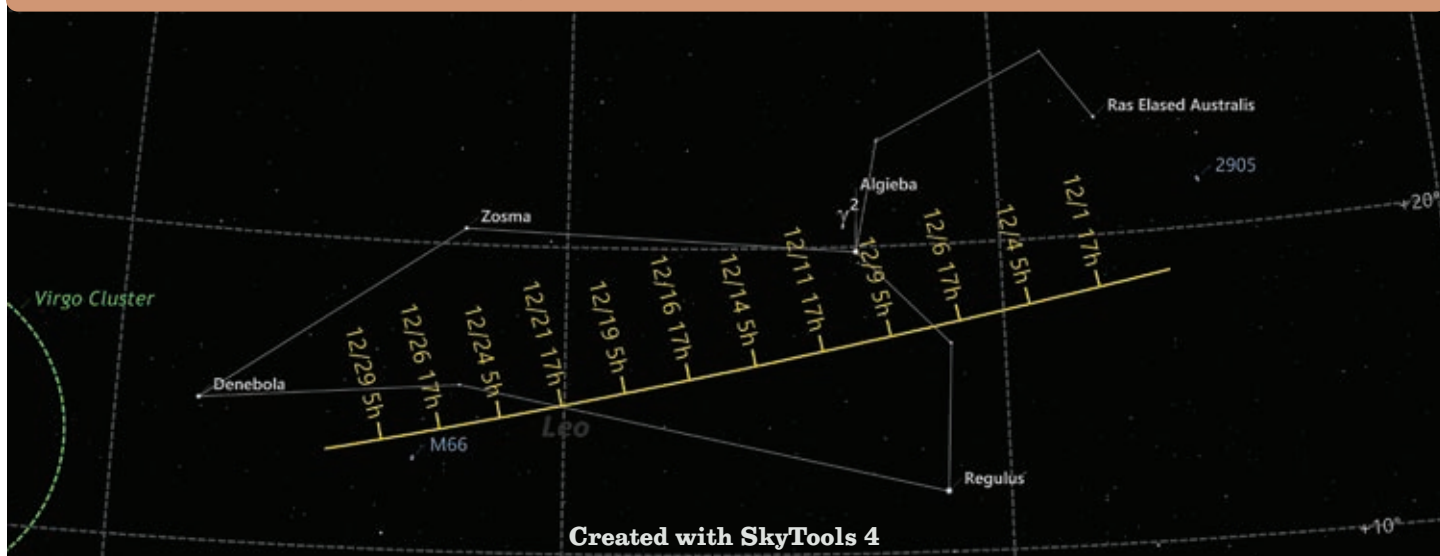
Geminids meteor shower peaks on of night of December 13-14. That night the moon is only a couple days past new so it won't interfere. The Geminids meteor shower is the strongest meteor shower of the year. You may see up to 120 per hour from a dark location. Geminids are debris from asteroid 3200 Phaethon. Best time to view them is between 10 pm at 2 am.

Comet 12P/Pons-Brooks in December



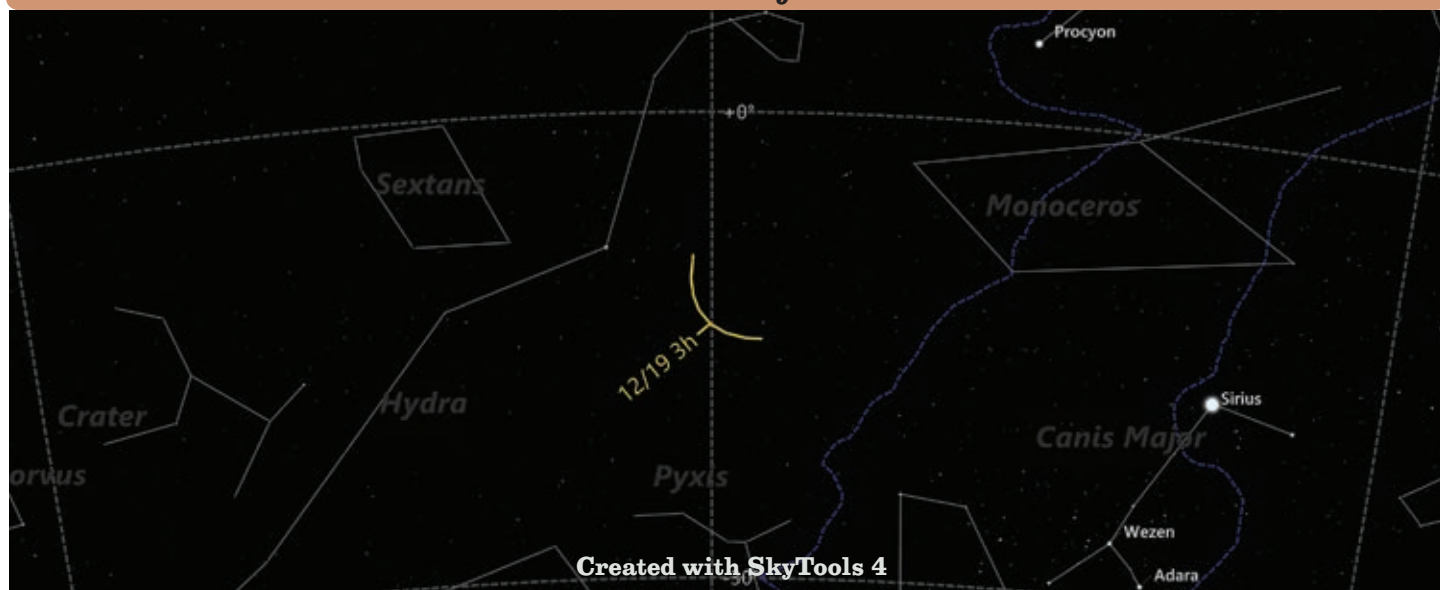
Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc min)
Dec 1	6:08 pm	18h28m45.7s	+38°36'38"	Lyra	10.2	2.6
Dec 7	6:07 pm	18h40m25.3s	+38°16'00"	Lyra	9.9	2.6
Dec 13	6:07 pm	18h53m04.8s	+38°01'01"	Lyra	9.7	2.7
Dec 19	6:09 pm	19h06m47.5s	+37°51'36"	Lyra	9.5	2.8
Dec 24	6:09 pm	19h19m04.0s	+37°47'48"	Lyra	9.3	2.8
Dec 31	6:14 pm	19h37m39.9s	+37°47'59"	Cygnus	9.1	2.9

Comet 62P/Tsuchinshan in December



Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc min)
Dec 1	5:17 am	09h50m00.6s	+18°06'59"	Leo	10.1	2.7
Dec 7	5:04 am	10h13m02.2s	+17°06'19"	Leo	9.9	2.8
Dec 13	5:04 am	10h35m19.8s	+16°02'32"	Leo	9.8	2.9
Dec 19	5:01 am	10h56m31.8s	+14°58'07"	Leo	9.6	2.9
Dec 24	5:51 am	11h13m17.0s	+14°05'12"	Leo	9.6	3.0
Dec 31	5:20 am	11h34m39.0s	+12°56'16"	Leo	9.6	3.1

Comet 103P/Hartley in December

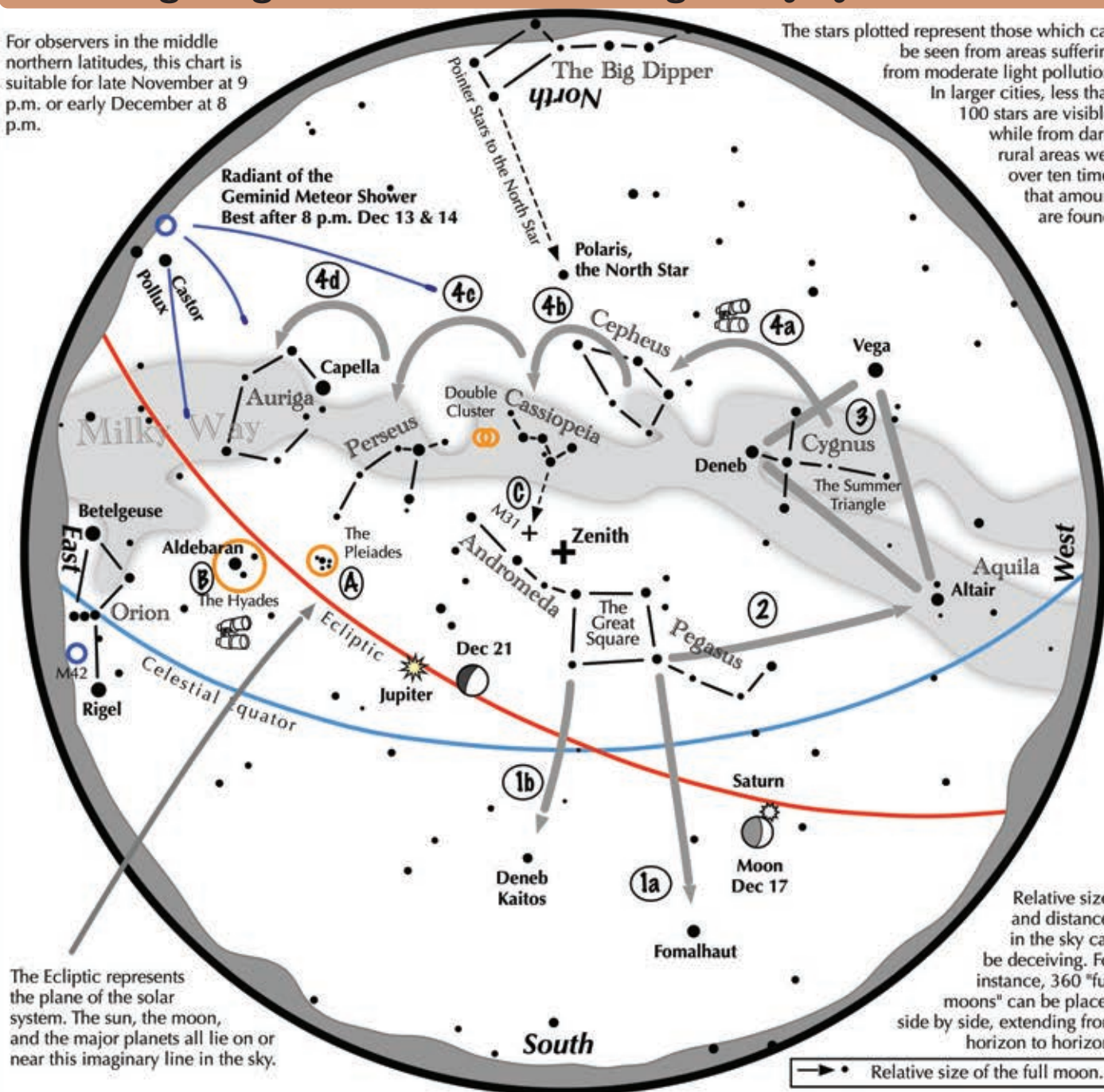


Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc min)
Dec 1	4:26 am	09h06m18.5s	-09°37'37"	Hydra	11.4	2.4
Dec 7	3:56 am	09h06m26.6s	-11°25'12"	Hydra	11.8	2.3
Dec 13	3:32 am	09h04m34.2s	-12°50'21"	Hydra	12.2	2.3
Dec 19	3:04 am	09h00m50.7s	-13°51'46"	Hydra	12.5	2.2
Dec 24	3:17 am	08h56m29.5s	-14°24'25"	Hydra	12.8	2.2

Navigating the mid December Night Sky by John Goss

For observers in the middle northern latitudes, this chart is suitable for late November at 9 p.m. or early December at 8 p.m.

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



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

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

→ • Relative size of the full moon.

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

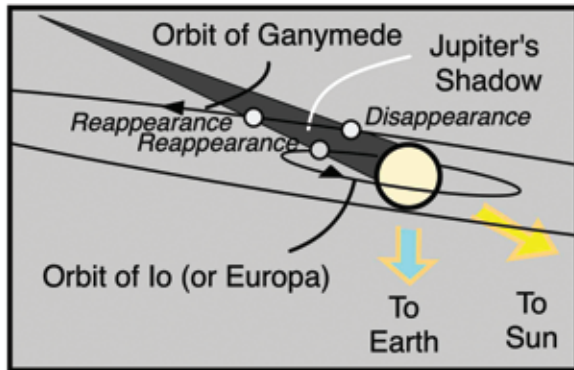
- 1 Face south. Almost overhead is the "Great Square" with four stars about the same brightness as those of the Big Dipper. Extend an imaginary line southward following the Square's two westernmost stars. The line strikes Fomalhaut, the brightest star in the southwest. A line extending southward from the two easternmost stars, passes Deneb Kaitos, the second bright star in the south.
- 2 Draw another line, this time westward following the southern edge of the Square. It strikes Altair, part of the "Summer Triangle."
- 3 Locate Vega and Deneb, the other two stars of the "Summer Triangle." Vega is its brightest member while Deneb sits in the middle of the Milky Way.
- 4 Jump along the Milky Way from Deneb to Cepheus, which resembles the outline of a house. Continue jumping to the "W" of Cassiopeia, to Perseus, and finally to Auriga with its bright star Capella.

Binocular Highlights

- A and B:** Examine the stars of the Pleiades and Hyades, two naked eye star clusters.
C: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval.
D: Sweep along the Milky Way from Altair, past Deneb, through Cepheus, Cassiopeia and Perseus, then to Auriga for many intriguing star clusters and nebulous areas.



Astronomical League www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.



Galilean moon emergence

(Elapsed time varies with moon)

Elapsed
time: 30 sec.

Elapsed
time: 2 min.

Elapsed
time: 4 min.



An "Oh! Wow!" moment through your telescope

Imagine seeing a world emerge in the darkness, taking several minutes to fully appear. Such a body is Io, Europa, or Ganymede on multiple occasions this December.

Aim a telescope at Jupiter shining in the south a few minutes before the event is predicted to take place. Look away from the planet's bright disk, about one planet diameter from its eastern edge. At the designated time, a faint speck can be discerned. As the seconds pass, that speck grows brighter and brighter.

This is one of the large Galilean moons, slowly leaving Jupiter's shadow while orbiting the giant planet. December is a good month this year to witness an event like this in the evening sky, because Jupiter's shadow angles to the east of the planet, putting the emerging moon relatively far from the planet's glare. Each moon takes a different time to fully emerge, because of its diameter and of its orbital velocity around the planet.

Note: December 12 and 19 have Ganymede disappearing into the shadow and reappearing. December 21 and 28 have Io and Europa both disappearing near the same time.

Make sure that Jupiter is sufficiently above the horizon at your location and that the evening twilight has sufficiently darkened. Begin viewing a few minutes before the listed times.

Event commencement: (all times CST)

Io	Dec 5, 11:34 pm
Io	Dec 7, 6:04 pm
Ganymede	Dec 12, disappearance 5:41 pm, reappearance 7:48 pm
Io	Dec 13, 1:30 am
Europa	Dec 14, 6:24 pm
Io	Dec 14, 7:58 pm
Ganymede	Dec 19, disappearance 9:45 pm, reappearance 11:49 pm
{ Europa	Dec 21, 9:03 pm
{ Io	Dec 21, 9:53 pm
{ Europa	Dec 28, 11:42 pm
{ Io	Dec 28, 11:48 pm
Io	Dec 30, 6:18 pm

**Use a "high"
magnification!**

Newsletter Archive by Eileen Hall-McKim

30 years ago December 1993

From the President, Bob Spohn

"Happy holidays to you all! This month marks the end of our seventh year: with the quality membership, meetings and events, this has certainly been our best year yet! Since the L.A.S. is basically a hobby society, there are times when little things like family, work and life in general tend to make the L.A.S. a low priority! To keep the club going, let alone improve it, requires involvement on the part of everyone, not just the officers. To all of you who attended meetings, star parties, gave presentations to the club or other organizations, participated in FRASC or other activities, or made any kind of contribution or effort, you have my deepest thanks. In an effort to keep anarchy and chaos from running amok throughout the club, once a year we perform the bone-chilling ritual of electing officers to chart our course for the next twelve months: in lieu of putting them out of their misery, I'd like to give them the credit they truly deserve"

December event: 18th, 1st Quarter Star Party at Lagerman Reservoir

20 years ago December 2003

Thoughts on Star Party by Michael Hotka:

I just returned from the Okie-Tex Star Party, held September 21-28, 2003 this year. My thoughts about the star party on the way down to the panhandle of Oklahoma were different than my thoughts returning home. On the way there I thought about dark skies and objects that I wanted to see, would it rain, be windy? Who would be there I knew? On the way back I thought about all the old friends I got to see and the new friends I made. Why does one attend star parties? If you own a telescope, the answer might be different than if you do not. If you ask 10 people who own a telescope and 10 people who do not, I would guess that you might find an answer that both groups have in common. Star parties are more than setting up a telescope and observing. It is being with fellow astronomy nuts, all gathered in one spot, sharing stories and ideas. The common answer that both groups of 10 people might say is "I attend star parties because of the people that will be there." Making new friendships and renewing old friendships are what star parties are all about.

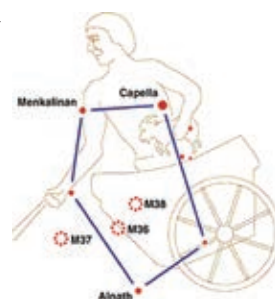
Final reminder about the banquet: Saturday, January 3rd at the Wayside Inn in Berthoud. As I'm sure you've heard by now, we are extremely pleased to announce famed

astronomer and comet discoverer David Levy as our guest speaker! Please be sure to have your reservations and payment in by Dec. 20th. This is something you certainly don't want to miss!

Two Mars Explorations Rovers (MER) launched this past summer will soon land on Mars and perform some of the most ambitious off-world explorations ever attempted by robotic spacecraft. The twin rovers, named Spirit and Opportunity, will land on the Red Planet on January 3rd and 24th respectively. Each will drive around on Mars for three months, taking thousands of pictures, drilling into and analyzing the composition of rocks and looking for signs of ancient water. Spirit and Opportunity will act as "robot field geologists," allowing scientist back on Earth to rove vicariously across landscapes more than 100 million miles from home.

Constellation of the month- Auriga

This lovely multi-sided figure is easy to find in the sky, largely because of the bright Capella, the she-goat star, and her retinue of three little kids. Capella has been seen as the she-goat star since Roman times. Almost 50 light-years away, Capella is similar to our Sun, only larger.



10 years ago December 2013

There is no newsletter for December 2013

Your Next Observing Outing

by Mike Hotka

You are ready to drive to your chosen observing location. At this point, you have prepared the list of objects you will observe. You have been watching the weather of your observing location and picked a night that will be clear and transparent. You have your laptop/phone loaded with your observing list(s), additional resources gathered to support your planned observing, and your car loaded. You are as prepared for this upcoming outing as you can be.

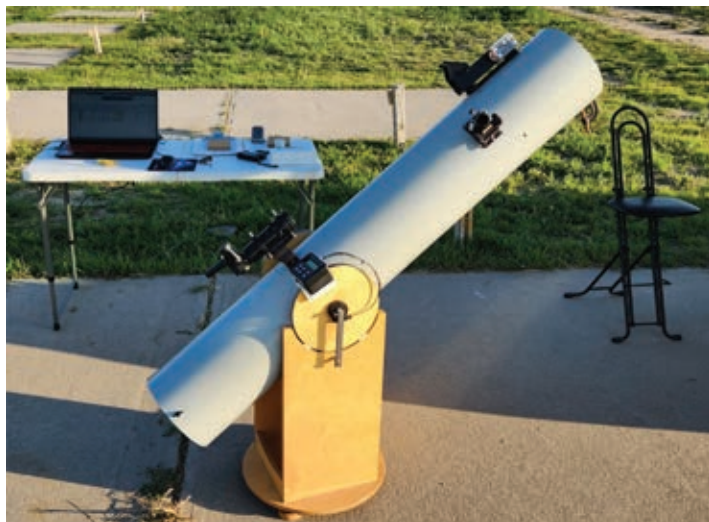
I like to arrive at my chosen observing location in the afternoon. This gives me plenty of time to setup my equipment while it is still light enough to see. I also enjoy being immersed in nature, relaxing in my chair and scanning the prairie with my binoculars. I enjoy finding wild animals to watch or watching a local farmer harvesting his crops in a field adjacent to one of my observing locations. This is a time for me to escape the hustle and bustle of the city and just relax.

I bought a 2 x 4 foot collapsible table to aid me in recording my observations. I like this table because I can extend the legs about 40 inches, which puts the table at a comfortable height. I don't have to bend my lower back to write my observations in my logbook, as I would have too if I had a lower table.



I have all the items on this table that I will need to support my night of observing. The table is located near my telescope so that I can clearly see the screen of the laptop

that is running my Standard Edition of SkyTools 4 (ST4) ([SkyTools 4 Standard Edition \(skyhound.com\)](http://skyhound.com)). I have the observing list, I prepared at home, open in ST4 and with hotkeys, I can display the next object to observe in its associated star field, thus helping me identify that I am viewing the exact object that is on the observing list.



I use a spiral bound notebook, I call my field logbook, to capture all my thoughts about the observing site, the details of the objects I view, the sky conditions throughout the night and any other thoughts about the observing session that occur to me. I like this hard copy of my field notes because it is easy to reference it when I am home, completing my post observing activities. I've also developed a short hand notation that allows me to write a very descriptive narrative of the object I am observing, with very few words and characters. This speed of recording my observations allows me to spend time viewing more objects during the night because I am not spending excessive time electronically recording my observations.

Early on in the recording of my observations, I thought a tape recorder would be an efficient way to record my observations. This worked out well until one night. Instead of recording my observations, I recorded all the conversations between observations and not one word was recorded about the objects I was viewing. I had the record/pause cycle reversed. That was the last night I used a recorder to record my observations at the eyepiece. I have used my field logbook since that night.

My rule of thumb of what to record about my observations is to put enough information in my logbook so that if I re-

read my entries from a certain night, in my mind's eye, I can recreate the observing outing and see the objects I observed that night. I record: where I went; what time I got there; anything about the location that caught my eye throughout the outing; who was there observing with me that night; detailed descriptions of all the objects I observed; any last thoughts of the night before I pack everything back in the car at the end of the night.

Here is an example from my field logbook of how I record my night of observing:

Star party on CDT f4.5

Oliver Tex 9/25/19
 arrived ~ 7pm. Sun setting
 Clear light breeze from SE. Will use Mike's scope & look at what he looks at.

- Saturn was awesome. Cassini division clear.
- Jupiter good

7:15 Saw supply craft ahead of SStation. on same orbit but supply ship disappeared almost over head. SS followed ~ 2 min later & it was bright all across the sky

9:18 IC 1276 13 A small gb. see 3-4 brighter stars surrounded by a dim halo of glow. Above = 2d of a brighter FS = near.

9:08 IC 1257 9mm A very small round of glow w/ 2-3 hb stars on glow
 ST very good
 MW very nice well defined across the sky

9:35 N6749 13 A small round glow w/ hb 'star' in center. VF
 seen w/AV only.

9:40 M13 9mm nice. Very good view.

9:54 N6482 13 A small round dim glow w/ brighter FS 2d of center of glow.

9:52 N6487 13 A small oval. dim. hard to see. Has 2 brighter FS on glow which hides the glow.

9:55 N6501 13 A nice tilted oval dim. has brighter stellar core. then below & near is 6500. A bit smaller better oval w/ hb stellar core.
 6500 Then above & 2d = in same fov 6495 a small VF oval glow. 2d is 6490 a tiny sliver of gl glow.

11:30 N6903 13 A small round ul^{dim} glow. Just above & near a dim FS = near
 Comet line in Breda Scope. In Papp A nice round brighter coma w/ bright stellar core in center.

11:34 N6958 13, in an arc of 3 stars 2d is a small VF ul glow

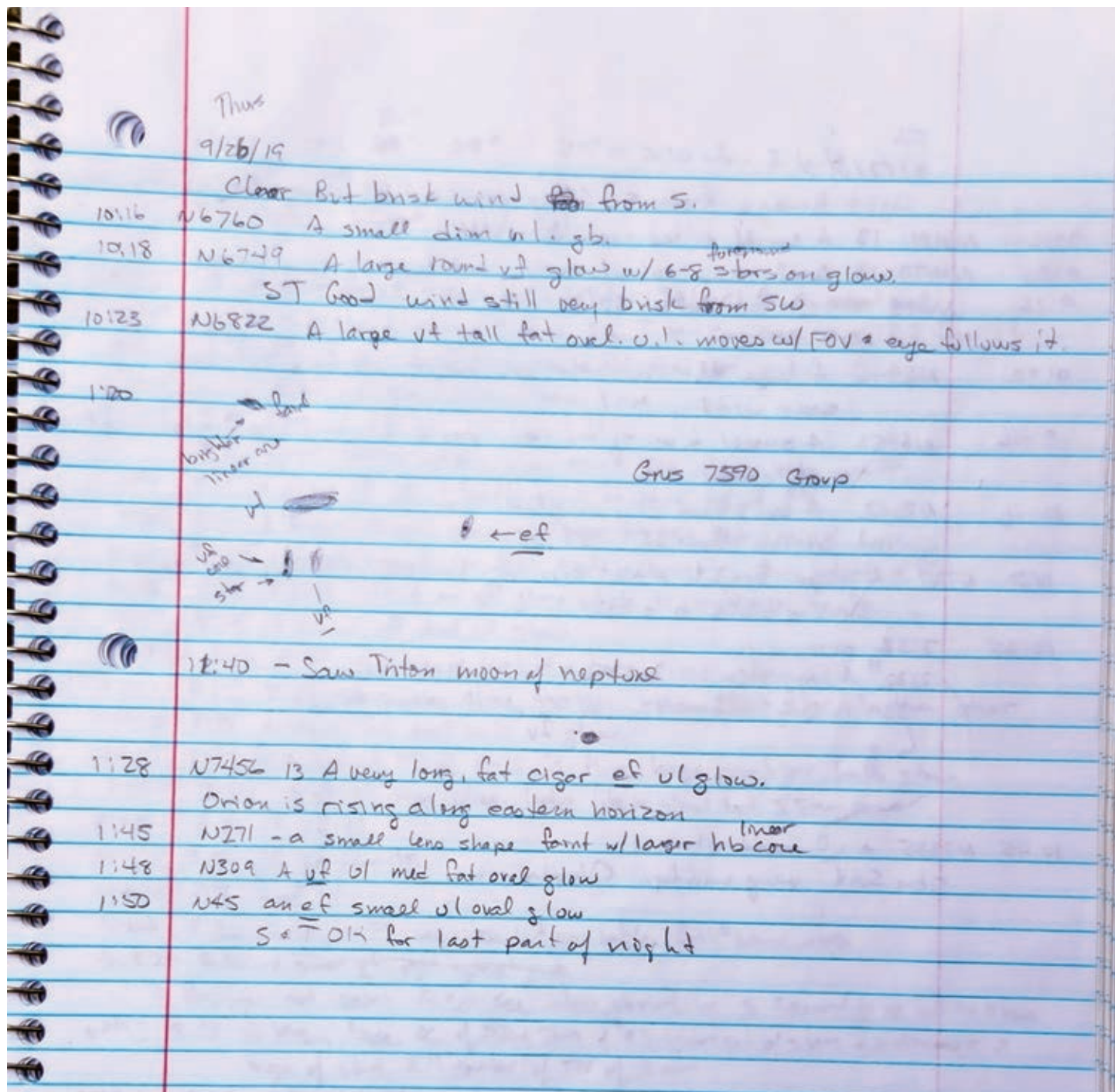
11:36 N7135 13 A small roundish ul dim glow

11:41 IC 5105 13 A VF small round of hb w/ tiny brighter stellar core

11:48 N7097 13 A small of ul sol. Saw it as I panned scope around. Just above horizon. In South

In the above logbook page, you can see that if something catches my eye in the field of view of the object I am looking at, I quickly sketch it in my logbook. In the above example, there was a second galaxy next to NGC 6501. I sketched this to show the closeness of the pair.

On a subsequent night, a page from my logbook shows the sketch and my shorthand notation for the Grus NGC 7590 galaxy group. I annotated the sketch so I could note the brightness of each member galaxy. The sketch showed their relative positions to each other and the cores of the galaxy if it was present:



At the end of the night, before I start to pack up my car and head home, I put any final thoughts about my night of observing in the logbook.

When I get home, there is more to do before I have completed this observing session. This will be the topic of next month's article.

Meeting Notes Thursday, November 16, 2023

by Eileen Hall-McKim

I. Introduction

The November LAS in-person/hybrid meeting was held on November 16th at the Longmont Lutheran Church. President, Vern Raben began the meeting with a self-introduction by members attending in person and those on zoom. Eighteen members attended in-person, 20 via zoom.

II. Meeting Presentations

This evening our guest speaker was Dr. Bob Grossman, President of the Western Slope Dark Sky Coalition, with his presentation “The Cloud Bases are Dark Out Here.” Bob is a retired University of Colorado Research Faculty Member. After serving time in the Air Force, he pursued graduate studies at Colorado State University, specializing in air-sea interaction and field science. Bob was a (NCAR) Advanced Study Program Post-Doctoral Fellow, and member of the scientific staff. He later joined the Co-operative Institute for Research in the Environmental Sciences (CIRES) as a Visiting Fellow then as scientific staff. He later joined the University of Colorado Astrogeophysics Department and was one of five atmospheric scientists who formed the Program in Atmospheric and Oceanic Science, which in turn became the Department of Atmospheric and Ocean Science, retiring in 2002. He has specified a Mars climate observing system and published articles on air-sea interaction, land/atmosphere interaction, basic atmospheric turbulence, atmospheric waves, instrument technology, parameterization testing, drainage winds, frontogenesis, stratospheric-tropospheric exchange, reservoir evaporation, monsoon dynamics, and monsoon forecasting. His current interest is light pollution monitoring from cloud reflection. He is an AMS Certified Consulting Meteorologist, and lives in Norwood, Colorado.

The Clouds Bases are Dark Out Here

Dr. Bob Grossman introduced us to the topic of Dark Sky History for San Miguel County in Southwest Colorado by first acknowledging the important role serendipity and the Longmont Astronomical Society played in it. Bob was living part-time in Boulder, and part-time in Norwood, Colorado, where he had purchased land and build a cabin. In 2016, the Boulder home had an electrical problem and the electrician hired to fix it, Gary Garzone, was a member of the Longmont Astronomical Society. Bob had started a

Dark Sky Community effort for Norwood in spring 2015, and mentioned it to Gary, who then invited Bob to give a talk about Dark Sky to the LAS group. He did and afterward invited all to visit Norwood. That Fall David Elmore did.

“Before I begin to talk about what is going on out here in Southwest Colorado and the area around San Miguel County, I will say it is encapsulated in an observation by David Elmore when he was out in this area in 2016. In September 2016 we had star party 3 miles SE of Norwood, with myself, Creighton Wood, Val Szwarc, and David Elmore. We were out one night, just before astronomical twilight, clouds were dissipating, going to be a clear night, that’s when David made the prescient comment, “You know, the clouds bases are dark out here” I didn’t realize the significance of that at the time, but soon did.” This intriguing comment eventually led to a scientific study and paper by a research group; Dr. Robert Grossman, Dr. Bryan Cashion, Mr. Braden Barkemeyer, Dr. Vayu Gokhale Monitoring Light Contamination From Cloud Reflection, Part 1; Proof of Concept. Will discuss this more later.

- During the star party, David took 93 images and produced the first deep space photo from Wright’s Mesa, the Andromeda Galaxy
- That photo was an important part of a subsequent Public Relations effort to obtain Norwood’s Dark Sky Community designation from what is now Dark Sky International
- David’s photo is part of the Norwood Dark Sky display in the Lone Cone Library Visitor Center and is being used to fund raise for the Dark Sky Reserve Effort



What does Dark Sky mean?

- Deb Stueber, my Dark Sky partner and a practical woman, observes, “it isn’t dark here, it’s full of starlight!”
- The reason it is full of starlight is because there is an absence of exterior artificial light, known as Artificial Light at Night (ALAN). That absence makes it a “dark sky” for ALAN
- Proponents of a Dark Sky try to reduce exterior light
- It is a global effort managed by Dark Sky International, formally the Dark Sky Association, and they are based in Tucson, AZ



Photo by David Muller Milky Way Over Lone Cone

This is why it a global effort, the green and yellow areas are areas of excessive exterior light

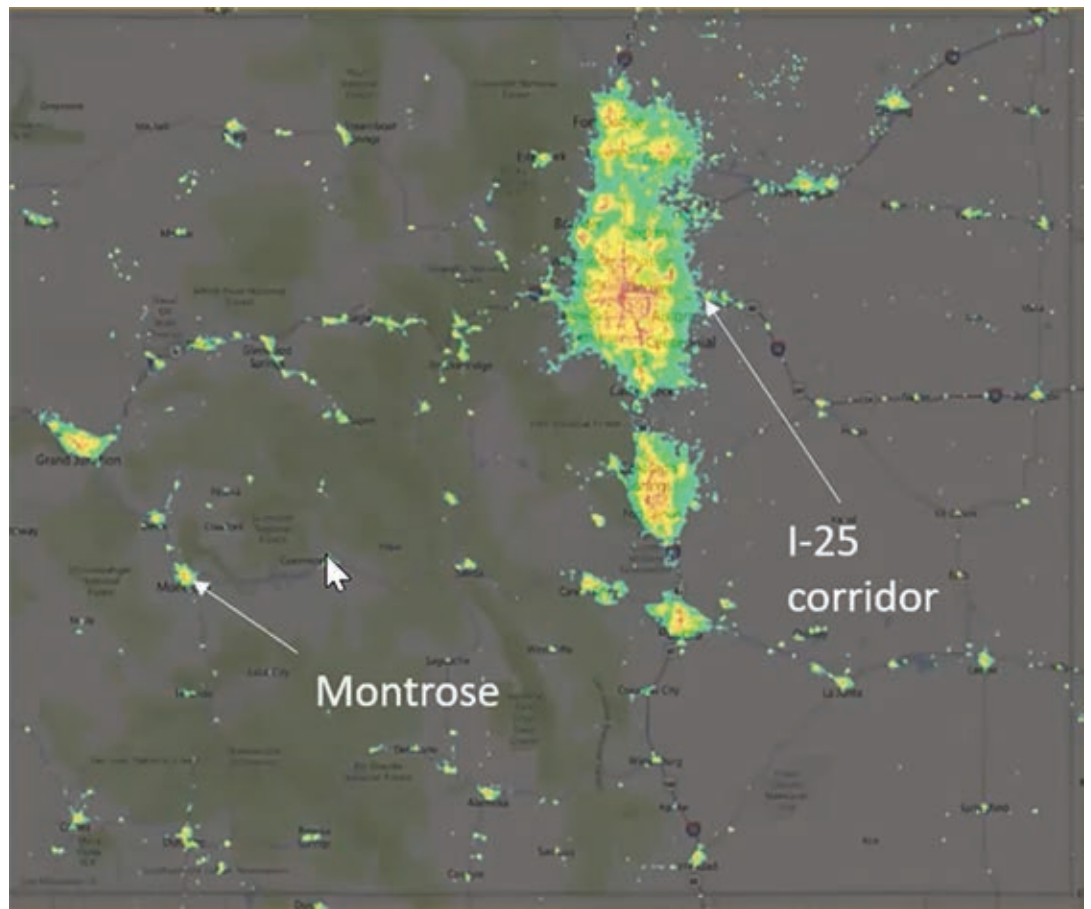
- 80% of the world population live in areas where they cannot see the Milky Way
- Satellite view of the globe, updated monthly, since it has been in operation since 2015
- Satellite VIIRS (Visual Infrared Imaging Satellite) has a lot of uses, but one is managed by a group in France that produces light production maps
- What you see here is the global production of upward directed light, this is what makes this a global effort. You can see it is massive, U.S. more or less divided east/west by what is known as 100 meridian. Quite a contrast, far more population in east that west, large part due to available water, much less rainfall, less population



Dark Sky Colorado

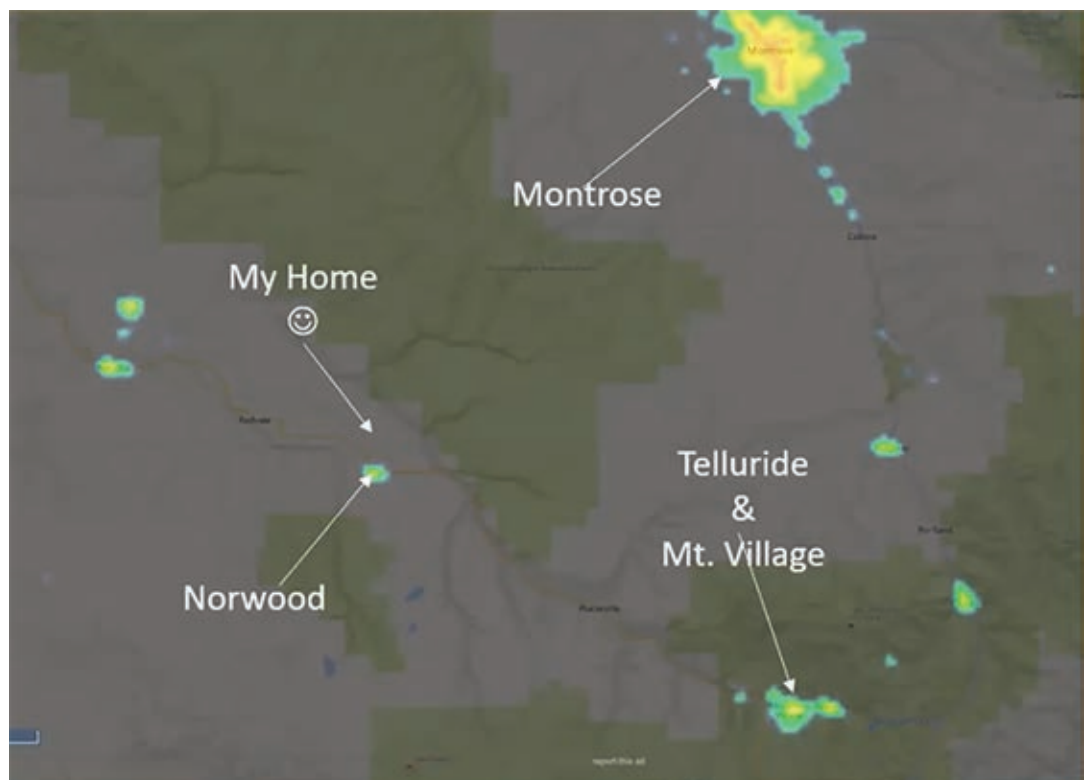
Zoom in on Colorado

- Can see light pollution of the well-known Front Range 1-25 corridor.
- Fort Collins North to Pueblo South



Zoom in on San Miguel Basin Region

- Western slope by comparison, much less populated, much darker
- Large area of light pollution near Montrose is the Highway-550 corridor
- Smaller green/yellow area on right: Telluride & Mt. Village
- Smaller green/yellow areas on left: Norwood, Nucla and Naturita
- Can see Bob's cabin is within very dark sky



Dark Sky and Astronomy: Rotation Rules



Photos by Dave Muller

Dark sky and astronomy are intertwined but the Dark Sky global movement is more than stargazing. There is now also a serious attention to the environment. Here's why:

- Astronomy shows us that rotation is a primary feature of the Universe
- Most galaxies rotate including our own
- We are finding that many stars in those galaxies rotate, including our own sun
- Planetary systems around those stars rotate, including our solar system
- Those planets rotate, including Earth; Earth's rotation produces Day and Night



As life emerged the Earth's rotation produced the seasons and day and night affecting its evolution. Scientists have labeled the day/night effect The Circadian Rhythm.

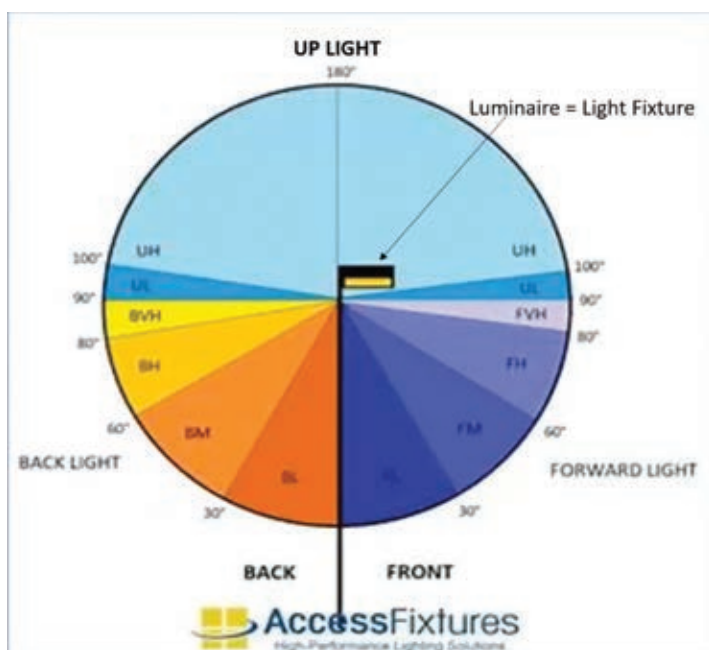
- The circadian rhythm affects all organisms except, perhaps, those living in the abysmal ocean and in deep caves
- Disturbance of the circadian rhythm by Artificial Light at Night (ALAN) has a negative effect on life that evolved to be active at night (bats, moths, some predators, snakes) and for life that expects to be inactive at night (humans, most wildlife, livestock, birds)
- This is a very important effect on endocrine system, is powerful enough to feel negative effects of even with the hourly switch of daylight savings time



Photo by Dave Muller

Even though we will talk a lot about the bureaucracy here, the underlying theme of this presentation is the reduction of the negative effects of ALAN on Life

How is ALAN Described?



- Schematic of the light
- Bug = Backward light; Glare = forward and sideways
- B & G is the primary component of light trespass
- Light trespass is light that crosses property boundaries and disturbs other people

Smart Lighting Principles

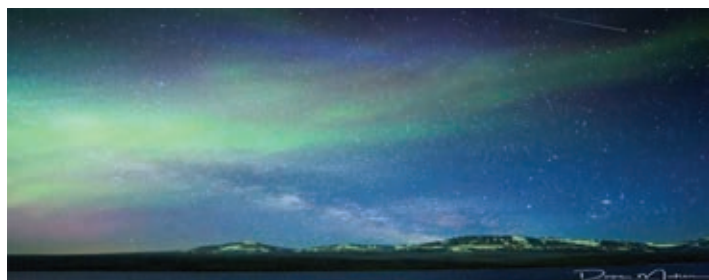
- Smart light principles are simple, effective, relatively inexpensive, easy to do
- All regulations of smart lighting are based on these principles
- Use exterior light where and when you need it
- Lower intensity (Lumens) to safe eye levels, lower intensity allows the eyes to adjust properly, allowing eyes to see more than in high intensity
- Light should be warm not cool color, blue light dis-

turbing to eyes and psyche, color temperature based on Boltzmann/Wien's Law; relates frequency of light to its color, warmer light lower temperature, cooler lights are higher temperatures

- Shade it so light goes to where you want it (purple on BUG Figure)

What is Dark Sky International?

Formally known as International Dark Sky Association; An international group of lighting engineers, administrators, lawyers in various countries, and advocates devoted to the reduction of ALAN in those light contaminated areas shown on the satellite map and keeping exterior lighting to a minimum in the dark areas. www.darksky.org



Spectacular image of air glow taken by Dave Muller

This greenish light will contaminate any attempt to measure or quantify darkness in a spot if using a photometer to measure as well as other starlight.

One of the ways Dark Sky International attempts to preserve darkness is by the designating of Dark Places. Areas that are dark and to maintain the designation, remain dark. Here are current designations for dark places:

- Dark Sky Park – Publicly or privately owned conservation areas that implement good outdoor lighting and provide dark sky programs. The National Park Service has several Dark Sky Parks, NPS Curecanti, NPS Grand Canyon, Black Canyon, Mesa Verde, and Ouray County Top of the Pines near Ridgway, CO.
- Dark Sky Reserve – Dark “core” zones surrounded by a populated periphery where policy controls protect the

darkness of the core. There are 21 worldwide, 2 in USA (Central Idaho and Big Bend). More about a San Miguel Country Dark Sky Reserve later.

- Dark Sky Sanctuary – The most remote (and often darkest) places in the world, whose conservation state is most fragile. Cosmic Campground in the Gila National Forest of western New Mexico.
- Dark Sky Community – Cities and towns with quality outdoor lighting ordinances that educate residents about the importance of dark skies. Five in Colorado, three in the region: Norwood (2nd in the State, 1st on Western Slope) Ridgway, Nucla-Naturita (Joint Community due to proximity).
- Urban Night Sky Places – Urban sites that promote an authentic nighttime experience despite being in the midst of significant artificial light. Palos Preserves near Chicago.
- Dark Sky Nation? New Zealand is lobbying DSI for this designation.

The San Miguel Basin Region Dark Sky Effort Began in Norwood

“The work on the San Miguel Basin Dark Sky effort began one Spring night in 2015 in my cabin on Deer Mesa north of Norwood, about to go to sleep, listening to the radio, when an announcement was made that a town (Ridgway?) had become a Dark Sky Community.” I thought, if they can do it I know Norwood can do it!”

- Called Dark Sky International the next day and soon things were set in motion after call to Gretchen Wells (town clerk); Creighton Wood, a local astronomer and Bob create the Norwood Dark Sky Advocates, get a bank account and PO Box
- Val Szwarc, an astronomer from Ridgway joins
- We begin documenting darkness with a SQM, an astronomical photometer
- DSI had rough guidelines for required ordinance
- Other local ordinances are addressed and consultants

join; we wrote articles, held public events and radio interviews

- With help of others, town planning and zoning, local lighting designer, Bob creates an ordinance, negotiate for DSI approval and unanimously pass P & Z and Town Board. This was the hardest thing we had to do
- Brady Barkemeyer helped with photography, creating iconic logo photo for Dark Sky Advocates which is in June, July period, of Scorpio over Lone Cone Mountain and he also created a website



Photo by David Muller

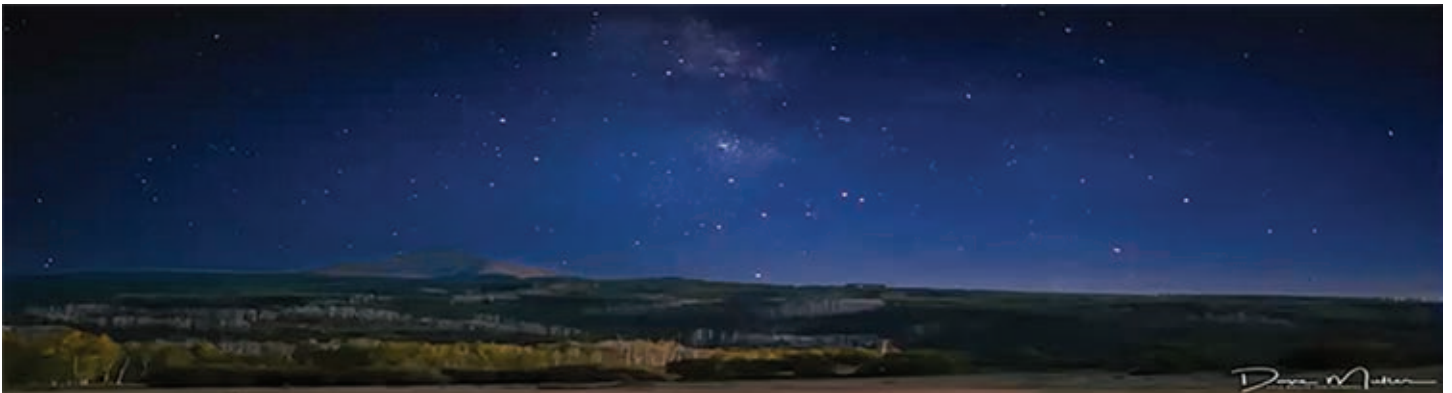


Photo by David Muller

- Bob invites David Elmore, LAS for a visit and at an astronomical star party, David takes the iconic Andromeda photograph, first deep space image from Wright's Mesa
- The slam dunk really took three years, but when it finally was done we became the second Dark Sky community in Colorado and the First Dark Sky community on the Western Slope



How the regional movement began

Photo by David Elmore

Photo by David Muller



- After the Norwood success, Deb Stueber (Nucla) reads about it and wanted to try for Nucla and Naturita, and Bob went to Nucla to show her and others how to use the Sky Quality Meter to measure darkness
- Deb creates West End Dark Sky Alliance for Nucla and Naturita
- Community vs Reserve - a community's ordinance ends at Town limit, A reserve is a large area beyond but including towns. After Deb obtained Joint Community for Nucla-Naturita, she wanted to turn the entire Western Slope into a Reserve!
- We initially thought it possible until reality came knocking at the door. Loudly!!
- With 22 Counties and a complexity of Federal and State managed land

- involved, impossible for a small organization with no money, saw the need to shrink to fit, so
- Set goal to San Miguel Basin (San Miguel County and West end of Montrose County)

Creation of the Western Slope Dark Sky Coalition

- Three Dark Sky Communities already and others in the pipeline
- A reserve comprised of the San Miguel Basin, West End to Paradox made sense and seemed achievable (only two counties, USFS, and two BLM districts to convince)
- Three-member Board was convened
- Registered as a non-profit with State
- By-laws created based on templates from Central Idaho DS Reserve, Black Canyon Astronomical Society and DSI
- Applied for 501c3 non-profit with IRS
- Created bank account in Norwood
- Shared POB with Norwood Dark Sky Advocates
- This seems hard but wasn't, just some bureaucracy and a donation

The Movement Grows



Photo by David Muller

- While this is going on, Val Szwarc and Ridgway citizens have DSI designate Ridgway a Dark Sky community
- Val and team create Top of the Pines Dark Sky Park in Ouray County
- The Coalition joins Colorado Non-Profits and Community Resource Center
- US Forest Service Uncompaghere District Ranger is supportive
- Uncompaghere and Tres Rios BLM Directors are supportive
- Bob is currently reviewing the Gunnison Gorge Dark Sky Park application from BLM
- DSI Colorado and the Coalition find mutual goals. Aaron Watson, Chair of DSI Colorado joins the Board. Kris Holstrom, San Miguel County Commissioner, becomes Coalition Advisor

Coalition Mission Statement and Dark Sky Reserve Philosophy

Mission Statement

The Western Slope Dark Sky Coalition has the purpose of coordinating, collaborating with, and assisting citizen-sponsored groups and Federal, county, and local governments with the intent of preserving the increasingly rare dark, star-filled sky of the Western Slope of Colorado by reducing light contamination. The main method used by the Coalition is by lawful ordinances (Towns and Cities) and Land Use Codes (Towns, Cities, and Counties). Collaborative and cooperative interaction with Federal and State land managers is also part of this method.

Dark Sky Reserve Philosophy

*Change or Amend current County Land Use Code to become Dark Sky Reserve Compliant
Then*

*County-by-County apply for and have Dark Sky Reserve designated by DSI
To*

Create a Regional Dark Sky Reserve

Website

www.westcoloradodarksky.org



Dark Sky Coalition Logo

- now has instead of a single sentence, a separate lighting section with several subsections
- Puts Smart Lighting Principles into legal language

While all this is going on Bob is negotiating having a special section in the local Norwood Ace Hardware store for Dark Sky friendly lighting supplies. This would provide a special section in the Norwood Ace Hardware store for Dark Sky friendly lighting and accessories.



- It was recently installed as a test end cap in front of the lighting sections with the Norwood Town and San Miguel County Land Use Codes available for Contractors, Builders, and DIYers to use as reference, timers, motion detectors, and low lumen, and warm light bulbs on the end cap
- The Coalition is assembling a project book to order luminaires, shades, and specialty bulbs from a wide range

The San Miguel County Land Use Code lighting regulation was Dark Sky friendly, but it was one sentence buried in the obscure Scenic Design section, we needed to address this.

- So after an informal meeting with two County Commissioners Deb and Bob create an information package for the Board of County Commissioners
- Bob starts working with Senior Planner John Huebner
- Deb forwards Naturita LUC she had just negotiated as template
- John turns it into "County Language"
- They negotiate with DSI to ensure the LUC is Reserve Compliant
- Planning Commission and BOCC unanimously pass a revised LUC which



- of producers
- Local and regional artists are being encouraged to produce luminaires and shades, and a list of local lighting designers is being assembled, if this proves healthy and profitable for the store, it will probably expand
- This may be the first time this has ever happened in a Colorado rural area or anywhere in Colorado or anywhere in the country
- Dark Sky International website has sections on lighting

DSI Accepts the Boundary of the San Miguel County Dark Sky Reserve

- With the LUC approved, County Commissioner Kris Holstrom and Bob meet with the Dark Sky International Dark Place Manager and negotiate the Boundary of the San Miguel County Dark Sky Reserve
- Dark sky reserve has two components: a core; (black area on map) supposed to be pristine, very low light, accessible to the public, and recreational in nature; the periphery is the surrounding area and designed to protect the core from any light threats
- The large black area is the Core USFS Thunder Trails Recreational Area and the Periphery is the rest of the County making the Reserve area 1390 sq. miles. The smaller gray areas are Telluride/Mt Village and Norwood
- Able to convince The DSI people the area is so remote and landscape so difficult there would be very little building, and is mostly federal land: they took the whole county as the periphery, which turns the entire San Miguel county into dark sky reserve!
- This has never happened before, never has a whole county become a dark sky reserve
- According to DSI, making a county a Reserve is precedent setting

If the LUC is so good, why need a DSI Dark Sky Reserve?

- The answer came from an informal discussion with the District Ranger who pointed out that while the LUC has to be respected by the Federal government, if there was also international recognition of how unique and special this area is, it would give another important fact to consider in making lighting decisions that would determine future development
- In other words RESERVES PRESERVE

What's Next?

- By using the same "Land Use Code method" grow from the San Miguel County seed to include the counties

contiguous to it: the west end Montrose, Ouray, and Dolores which will make the region a Dark Sky Reserve

All the Dark Sky Parks and Sanctuaries in this local area In Colorado, New Mexico, Arizona and Utah, can see it is really going strong. We are also part of large regional Dark Sky Basin and Range Group

National Parks designated as International Dark Sky Places



Science currently being done using cloud reflection to monitor upward directed light with statistical confidence limits research group has been working on for past three years: "Abstract of Monitoring Light Contamination from Cloud Reflection".

Dr. Bob Grossman has taken us on the journey from one night in his Norwood, Colorado cabin to development of an unprecedented San Miguel County Reserve and beyond. Bob leaves us with the thoughts that it is education, community and common purpose that create these kinds of results of getting things done. The West was built by love of landscape and community, and we are an embodiment of that. There is a wide range of diversity and of political attitudes here, but one thing that binds people on the western slope together is love of landscape and community, they see the worth in this. It's a pioneer heritage, back from when the dark sky at night was all the cowboys had at end of day. Education is the main thing. Once people see that this makes sense, it works, it is easy to do and doesn't cost a lot of money, they are in, and they get it done.

Discussion continued with questions and comments from members. In these dark sky reserves, do you have same

problem as around here that they are closed at night? Can you talk to/interact with the Environmental Protection Agency about lighting effects on natural cycles/ health of such as on animals, wildlife? Was there a lot of push back from the residents of the community about making changes for dark sky purposes? Seems things here In Boulder and area, are not enforced unless it is pushed, is enforcement possible? What about difference in products, lighting such as upward directing light. What is future for places like Boulder? Is it too late for the Front Range?

Full recording of meeting available on LAS members site: <http://members.longmontastro.org>

III. Business Report – By Treasurer Bruce Lamoreaux



Longmont Astronomical Society

P.O. Box 806
Longmont, CO 80502-0806

LAS Treasurer's Report - Bruce Lamoreaux

10/20/2023

Main Checking Account (xxx-1587)

Begin Balance:	\$ 9,160.00	9/5/2023
Deposits:	\$ 100.00	Membership
Expenses:	\$ (70.00)	Bank Charges, Library Telescope Parts, Stripe
Current Balance:	\$ 9,190.00	10/3/2023

2-Year Savings Account (xxx-1478) (matures 10/23/23)

Past Balance:	\$ 8,170.00	6/30/2023
Interest:	\$ 15.00	
Balance:	\$ 8,185.00	9/29/2023

Telescope Fund (xxx-0165)

Past Balance:	\$ 1,100.00	8/30/2023
Deposits:	\$ -	
Expenses:	\$ -	
Balance	\$ 1,100.00	9/28/2023

Petty Cash

Past Balance:	\$ 50.00
Deposits:	\$ -
Expenses:	\$ -
Balance	\$ 50.00

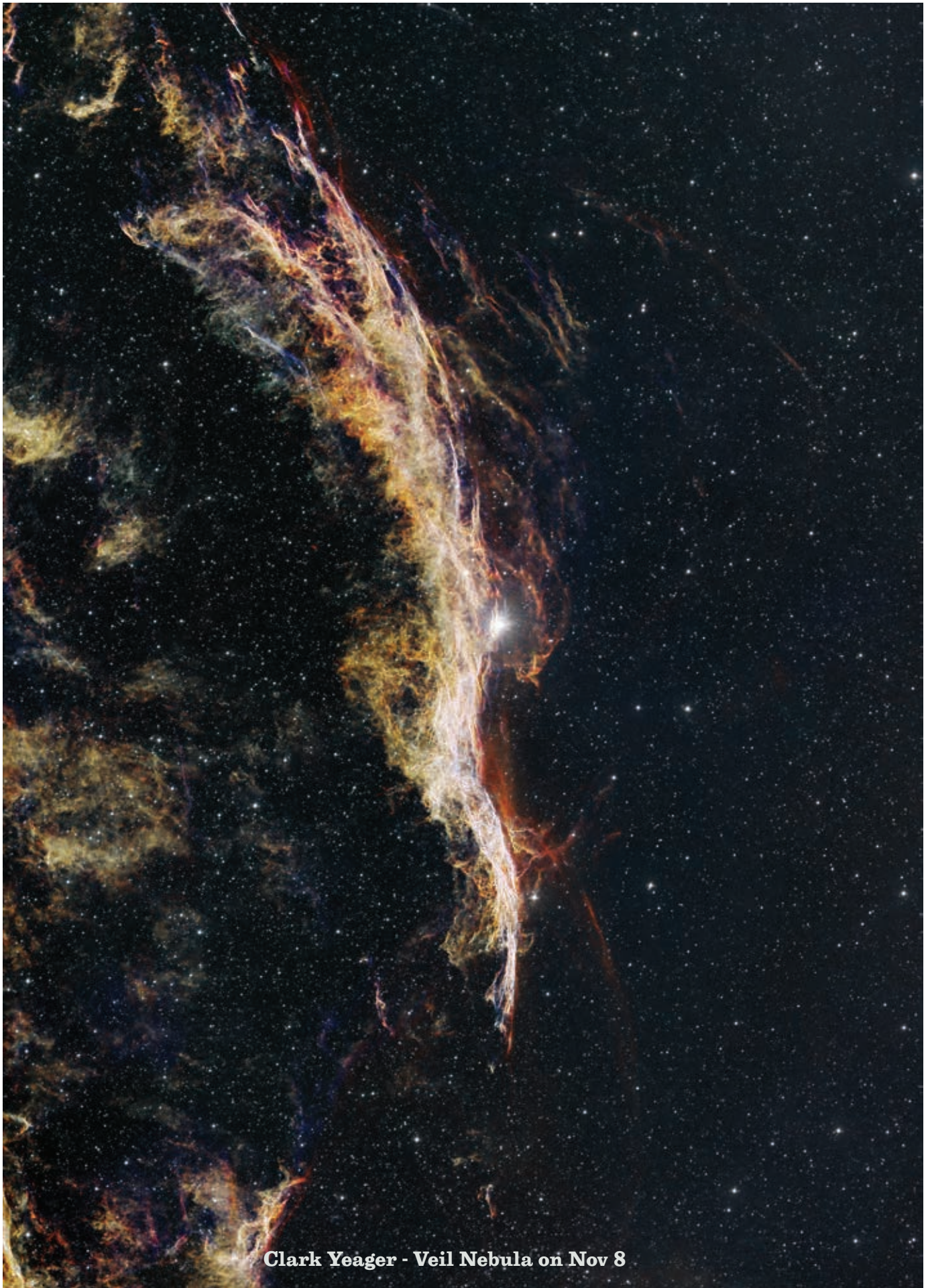
<u>Total Assets</u>	\$ 18,525.00	\$18,480.00	\$ 45.00 Up from last report
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Active Membership:	98
Student Membership:	2
Total	100

IV. Old/New Business:

- Will have elections in January for LAS Officers and Board Members for 2024
- There is no monthly meeting in December
- Do we want to continue in-person meetings in 2024 – Where?
- If so, we need to allocate funds for meeting space
- Motion was made to allocate for next year – motion passed for in-person meetings next year
- Do we want to do a banquet? We will need a certain amount of people to attend to set up banquet, guessing \$25-\$30 per person for cost, will be sending out email
- Website – Stay on Squarespace or move? Subscription fee with current website, Squarespace is coming up early (February)
- Fees are approximately ~ \$500 yearly, this includes charges for membership section and also the site itself. The issue is; the membership part does not work for us. Keeps track of only name and email address, and that they have paid dues, but no other information that we might like to have on file, such as when you joined.
- Have also looked at WordPress, which Vern has set up the members site on for now. The service provider is Hosting-er.com which provides a managed WordPress service which takes care of security, updates and so on. Would fill our needs, cost is around \$120.00 year.
- Another consideration in this choice of websites is that the current webmaster does not want to use Wordpress. Squarespace is her specialty, so moving to Wordpress might also require a new webmaster. The board will have to discuss this further in coming weeks.





Clark Yeager - Veil Nebula on Nov 8



Clark Yeager - Equipment set up at Marty's on Nov 8



David Elmore - SH 2-84 on Nov 14



Eddie Hunnell - M33 on Nov 19



Gary Garzone - M31 on Nov 20



12P Pons- Brook

Gary Garzone - 12P/Pons-Brook on Nov 23



Gary Garzone - Comet Lemon on Nov 23



M 33

Gary Garzone - M33 on Nov 23



Jim Pollock - NGC 1333 on Nov 5



Rolando Garcia - IC 1805 on Nov 5



Jim Pollock - M57, Ring Nebula on Nov 15



M. J. Post- Wizard Nebula on Nov 5



M. J. Post - Wizard Nebula on Nov 5



M. J. Post - Wizard Nebula on Nov 5



M. J. Post - HB3, Starless on Nov 8

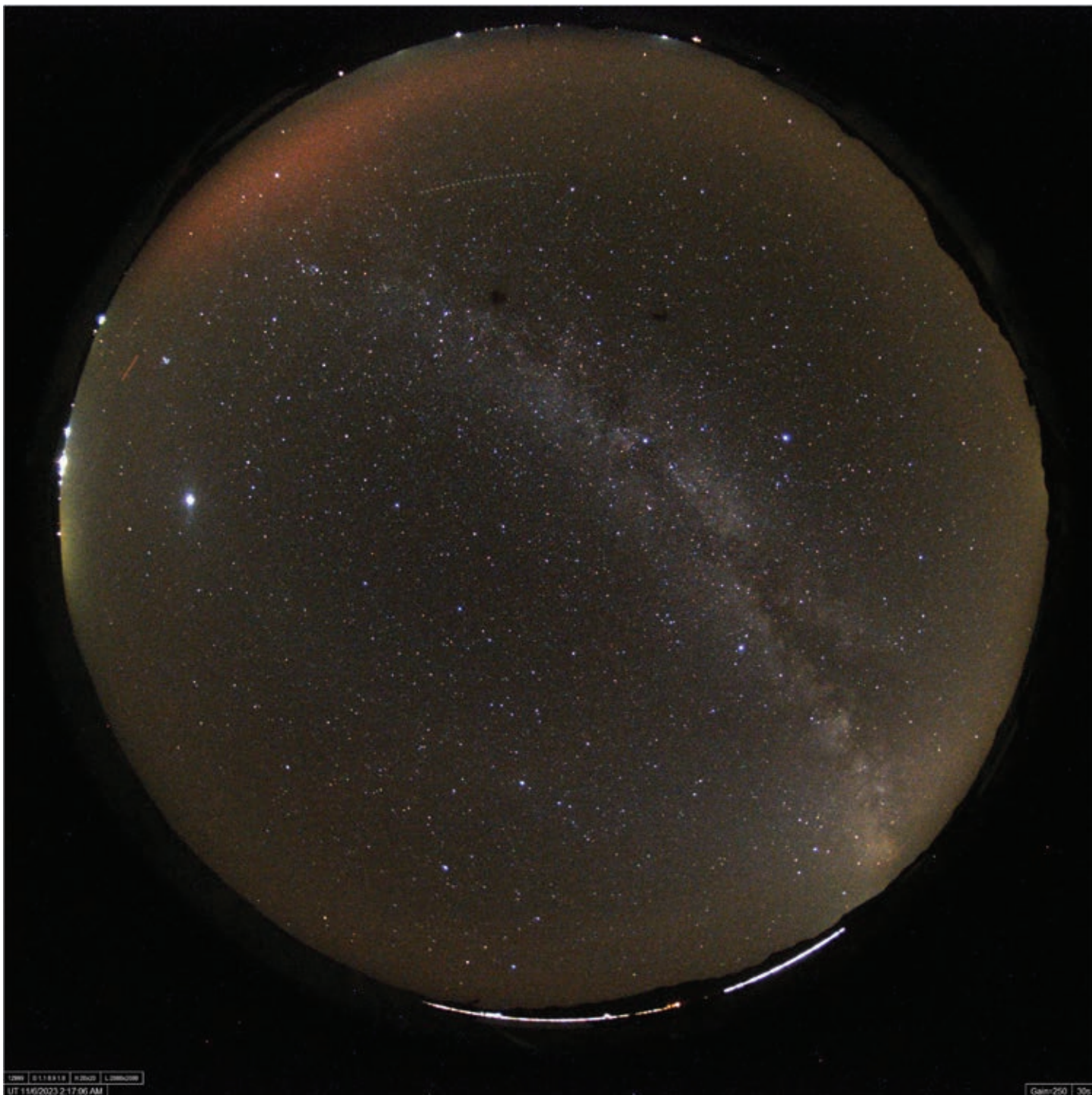




Rolando Garcia - M33 on Nov 11



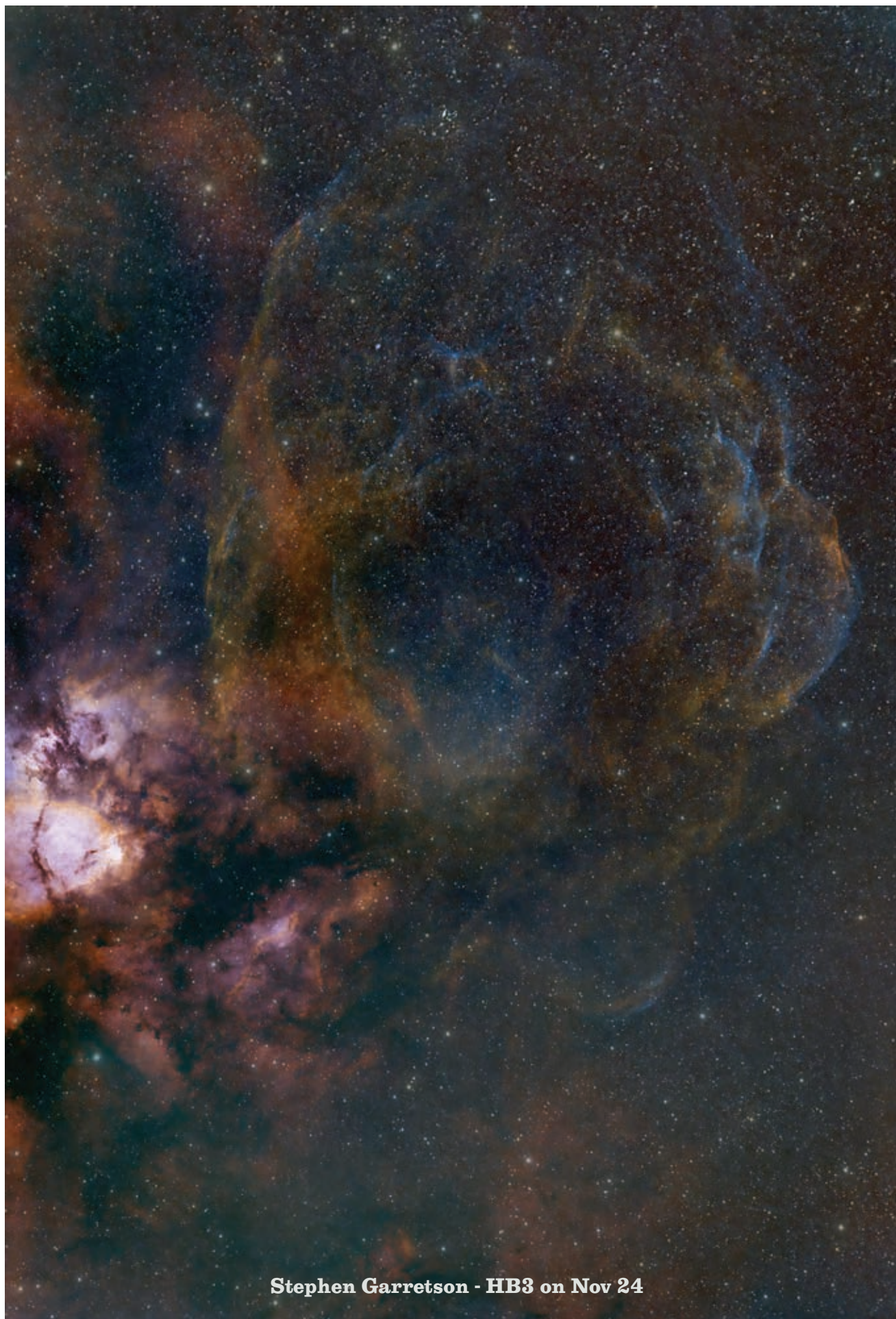
Rolando Garcia - IC 1848 on Nov 14



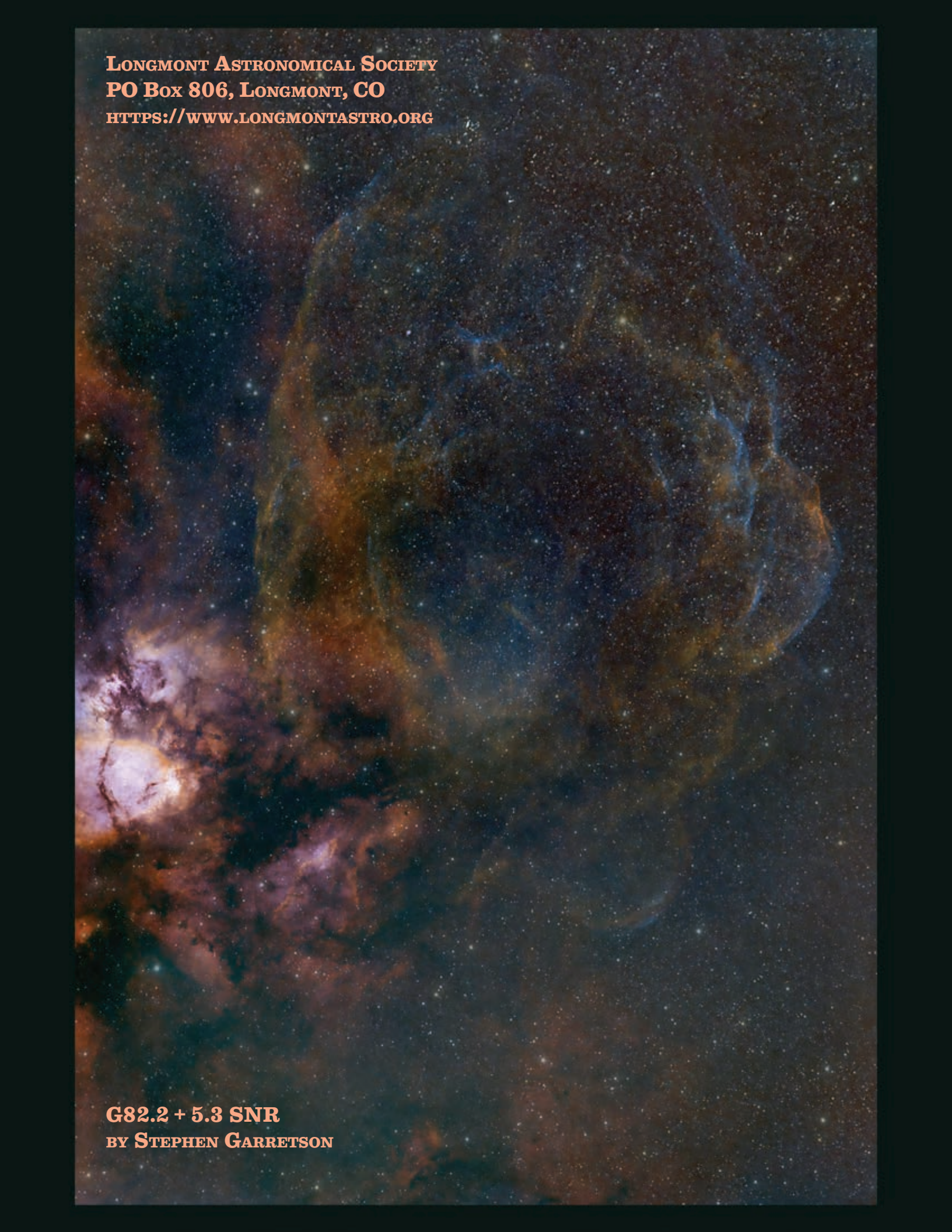
All Sky camera image from Tally's observatory at Dark Sky New Mexico on Nov 6 at 2:17 am UTC. Aurora may be seen in the north east (upper left).



Stephen Garretson - SH 2-140 to SH 2-150 on Nov 22



Stephen Garretson - HB3 on Nov 24



LONGMONT ASTRONOMICAL SOCIETY
PO Box 806, LONGMONT, CO
[HTTPS://WWW.LONGMONTASTRO.ORG](https://www.longmontastro.org)

G82.2 + 5.3 SNR
BY STEPHEN GARRETSON