



# Morning Star

## Fall 2021



### \*\*\* Club Info \*\*\*

#### Announcements

Check out our new Member Forum on our web site ([vtastro.org](http://vtastro.org)), under Discussions.

Several past meeting presentations and newsletter articles on imaging, observing and equipment are posted on our web site, check them out.

Past newsletters are posted on our website under What We Do.

Associate Members interested in becoming full members make your interest known to one of the board members. To become a Full Member one has to actively participate in club functions and events and be active in some other aspects of astronomy (more details are in our by-laws).

#### Moving or Changing Email?

Please send changes to Paul Walker, 53 Valley View, Middlebury, VT 05753, [paulwaav@together.net](mailto:paulwaav@together.net) ([info@vtastro.org](mailto:info@vtastro.org) will also work)

#### Hinesburg Observing Site

We have an observing site in Hinesburg, VT. (Located on town property). A locked gate (required by the town) limits access to the site.

Associate Members can request access to the gate lock. They have to be a member for 3 months. This provides access to the Warming Hut, 115v AC power and port-a-potty.

Full Members can request access to the gate lock and the observatory locks.

Board approval is required in both cases. Some training is required. There

is a training checklist and an access agreement that need to be filled out.

Contact the Secretary, Paul Walker or Jack St. Louis for more information at [info@vtastro.org](mailto:info@vtastro.org)

#### Observing List for HOS

We have an email list for members interested in getting a heads-up when someone will be at the Hinesburg Observing Site (HOS).

If interested in getting on the list contact [info@vtastro.org](mailto:info@vtastro.org)

#### Observing Certificates

Several certificates (beginner to advanced) are available to members as encouragement to get out under the stars and hone their observing skills. Follow the link on our web site.

#### Outreach

#### Acknowledgment Letter

To help record our broad community involvement with public star gazing events, projects and classes, we have developed an Outreach Acknowledgment Letter with a Sample Form. It is posted on the website and can be found under **Members, VAS Club Materials for Members, Outreach Acknowledgement Letter**.

**Direct Link:** [http://vtastro.org/wp-content/uploads/2018/03/VAS\\_Outreach\\_Ack\\_Letter\\_V3.pdf](http://vtastro.org/wp-content/uploads/2018/03/VAS_Outreach_Ack_Letter_V3.pdf)

#### Dues

**Associate Members \$15**  
**Full Members \$25**

Send dues and any address or email updates to VAS, PO Box 782, Williston, VT 05495. Or bring to any monthly meeting or Contact Paul Walker, 802-388-4220, [paulwaav@together.net](mailto:paulwaav@together.net).

#### Connect On-line

[www.vtastro.org](http://www.vtastro.org)  
[Twitter@VTAstroSociety](https://twitter.com/VTAstroSociety)  
[Facebook.com/Vermont-Astronomical-Society-113053818706458/](https://www.facebook.com/Vermont-Astronomical-Society-113053818706458/)  
Email: [info@vtastro.org](mailto:info@vtastro.org) (Goes to the President and Secretary)  
[webmaster@vtastro.org](mailto:webmaster@vtastro.org) (Goes to Secretary and Webmaster)

#### Board Members

Jack St. Louis	Pres	857-5049
Joe Comeau	VP	238-1664
Doug Williamson	Treas	388-3482
Paul Walker	Sec'y	388-4220
Bob Horton		879-7802
Keith Lawrence		453-5496
Jim Bosek		879-1697
Terri Zittritsch		598-7226
Scott Turnbull	Webmaster	
Leah Christopher	PR	919-285-6628

Editor & Publisher: Paul Walker  
Maura Kelley assistant editor

Contributors: Carrie Cruz, Lawrence Garrett, Maura Kelley, Lisa Kirchberg, Keith Lawrence, David Prosper (NASA Night Sky Network), Scott Turnbull, Paul Walker, Richard Whitehead, Terri Zittritsch.  
(My apologies if I missed anyone)

**Contents**

<b>Announcements</b>	Pg 1
<b>Club Info</b>	Pg 1
<b>Gary's Astro Events</b>	Pg 2
<b>Jack on the Radio</b>	Pg 2
<b>Events</b>	Pg 2
- VAS Events	
- Public Star Gazing	
- GMAAA Events	
<b>New Members</b>	Pg 2
<b>Meetings</b>	Pg 3
<i>October 4 Distant Galaxy Imaging - Davis Mountains, Texas</i>	
<i>November 1 Luminous (an Astronomical Documentary)</i>	
<i>December 13 Design and Operation of the James Webb Space Telescope</i>	
<b>Articles</b>	Pg 2
- New Vision for an Old Observatory	
- Weird Ways to Observe the Moon	
<b>Board and Committees</b>	Pg 5
- Board Minutes	
- Committee Updates	
<b>Under the Stars &amp; Planets</b>	
<b>OBSERVER'S CORNER</b>	Pg 6
Rare Naked-Eye Nova	
Occultation of a Star by the Asteroid 790 Pretoria	
Things to Observe	
Constellation of the "Month"	
<b>ASTRO-IMAGER'S CORNER</b>	Pg 9
Deep Sky Stacker (DSS) - Moving Beyond the Stacking Defaults	
<b>MEMBER IMAGES</b>	Pg 10
Saturn and Jupiter this Fall	
Markarian's Chain	
Rosette Nebula	
Helix Nebula	
From our Hinesburg Observing Site	
<b>Space Science Roundup</b>	Pg 15
James Webb Space Telescope - Countdown to December Launch	
<b>Locator Maps of Objects</b>	Pg 17
<b>For Sale / Wanted</b>	Pg 17

**Jack on the Radio**

Listen to Jack's astronomy update on radio station WJOY AM (AM 1230) on Ginny McGehee's 'Breakfast Table' morning show. Airls the first Wednesday of the month at 8:40 AM.

**Gary's Astronomical Events for the Month**

can be viewed via WCAX at <https://www.wcax.com/weather/astronomy>

**Stargazing and other Events**

All observing events are weather permitting unless otherwise stated.

Bring extra clothes. Even a summer evening can be chilly after standing still for a couple hours in damp air. We have an email list for members interesting in getting a heads up on impromptu events at the Hinesburg Observing Site (HOS).

If interested in being on this list contact [info@vtastro.org](mailto:info@vtastro.org)

Events are listed on our website ([vtastro.org](http://vtastro.org)) and Google Calendar (<https://calendar.google.com/calendar?cid=Nzc5dnQ1bnZrN2ljcDA2NG9vbXFnczI1M2NAZ3JvdXAuY2FsZW5kYXluZ29vZ2xlLmNvbQ>)

**Member & Invited Guest Star Gazing at HOS & other events**

**Keep watch for emails announcing impromptu observing at the Hinesburg site.**

**Note:** If you would like to be a host, greeter/orienteer or want some training on operating the scopes let Paul Walker know.

**Corona Virus Note:**

We will follow the current State COVID restrictions recommendations.

Contact [info@vtastro.org](mailto:info@vtastro.org)

**Public Star Gazing at Schools, Libraries, and other groups.**

If you know of a group or institution that would like to schedule a star gazing session have them contact: [info@vtastro.org](mailto:info@vtastro.org)

**Corona Virus Note:** We will follow the current State COVID restrictions recommendations.

**Green Mountain Astronomers (GMA)**

All events start about sunset. Check before going as some events are not cast in stone or written in the stars yet.

Contact Ron Lewis for info  
802-779-5913 (cell)  
802-247-5913 (home)  
[vtpoet@gmail.com](mailto:vtpoet@gmail.com)

Nothing scheduled yet

**New Members**

VAS welcomes the following members who joined us since the last newsletter:

Marilyn Hackett  
Sheila Ryan

**Meetings/Presentations**

Normally meetings are held at Brownell Library, however, due to COVID-19 we are currently holding them remotely. The Zoom link will be posted on the web site under "Events" a couple weeks before each meeting and emailed to members with the meeting reminders.

Meetings are held the first (non-holiday) Monday of the month, at 7:30 P.M. in the Kolvoord Community Room of the **Brownell Library**, 6 Lincoln St., Essex Jct (2nd building north of Essex 5 corners on the left on Rt. 2A). Extra parking is available in the Bank North parking lot across from the library. For inclement weather call Jack St. Louis (802-658-0184) or Paul Walker (802-388-4220) to confirm.

**October 4**

**Distant Galaxy Imaging - Davis Mountains, Texas**

By Steve Grimsley

In May, 2021 the Prude Ranch, in the Davis Mountains of west Texas, stepped up and held a small, week long, star party filling in for the Covid can-

**November 1****Luminous  
(an Astronomical Documentary)****Directed by Sam Smartt**

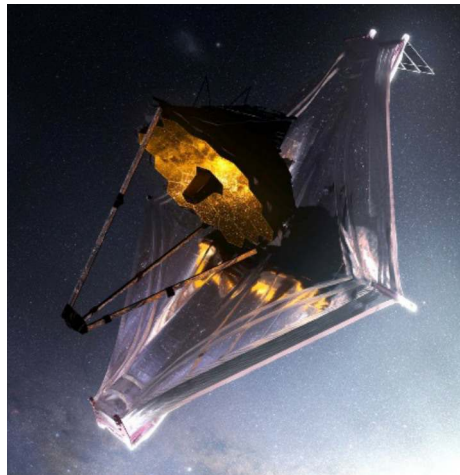
Luminous tells the story of the highly publicized prediction of a binary star merger in the constellation of Cygnus in 2022. The film follows astronomer Larry Molnar's five-year journey to make and test his historic prediction, knowing that its success or failure will unfold squarely in the international spotlight.

Followed by a Q & A session.

**December 13****Design and Operation of the James  
Webb Space Telescope****By Scott Turnbull**

The Sombrero Galaxy in the Constellation Corvus (the Crow).

The presentation will start with a discussion of the imaging telescope, accessory optics, guide scope, mount, and the Canon Ra camera. This year's weather challenges will also be mentioned along with the mitigation strategies used during the acquisition. Then we will move to the galaxy images acquired noting their classification group according to their morphology using the Hubble - De Vaucouleurs chart. The most distant galaxies that we will be looking at are from the Abell 1656 Coma Cluster of galaxies at about 336 million light years. The presentation will be an open format with comments and questions welcome.



NASA image

This presentation will focus on the design innovations and impending operation of the James Webb Space Telescope.

A comparison of the Webb Telescope capabilities to the Hubble Space Telescope will be used to highlight the anticipated new view of the cosmos.

The presentation has been selected by NASA as an officially supported Webb Space Telescope Community Event.

As such it will contain information obtained directly from people working on the Webb Telescope.

**Articles****New Vision for an Old Observatory  
By Carrie Cruz**

In the early 1980's VAS constructed an observatory in Williston and less than 10 years later, lost the lease on the land, leaving the Alvan Clarke Telescope it was built for homeless and the observatory empty. That building has stood proud but purposeless for the last 30+ years. Last year, I purchased the property on Snowdrift Lane in Williston that includes the old observatory with hopes and a vision to bring the well-built structure back to life.

Renovations have recently begun on the observatory, which include bringing electric to the building, adding windows and replacing the roof. The anticipated completion date is early October.

The old VAS observatory in Williston will be the new home of The Planetarium Lady, LLC, where a Digitarium® Iota Digital Planetarium System will be set up and small groups, families and couples can participate in planetarium shows about the current night sky, the solar system and more. The planetarium will also be available for outreach in libraries, community centers and schools. Stay tuned for more information!

**NASA Night Sky Notes Oct 2021**

This article is distributed by the NASA Night Sky Network, a coalition



of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.gov](https://nightsky.jpl.nasa.gov) to find local clubs, events, stargazing info and more.

### Weird Ways to Observe the Moon

David Prosper

International Observe the Moon Night is on October 16 this year— but you can observe the Moon whenever it's up, day or night! While binoculars and telescopes certainly reveal incredible details of our neighbor's surface, bringing out dark seas, bright craters, and numerous odd fissures and cracks, these tools are not the only way to observe details about our Moon. There are more ways to observe the Moon than you might expect, just using common household materials.

Put on a pair of sunglasses, especially polarized sunglasses! You may think this is a joke, but the point of polarized sunglasses is to dramatically reduce glare, and so they allow your eyes to pick out some lunar details! Surprisingly, wearing sunglasses even helps during daytime observations of the Moon. One unlikely tool is the humble plastic bottle cap! John Goss from the Roanoke Valley Astronomical Society shared these directions on how to make your own bottle cap lunar viewer, which was also suggested to him by Fred Schaaf many years ago as a way to also view the thin crescent of Venus when close to the Sun:

“The full Moon is very bright, so much that details are overwhelmed by the glare. Here is an easy way to see more! Start by drilling a 1/16-inch (1.5 mm) diameter hole in a plastic soft drink bottle cap. Make sure it is an unobstructed, round hole. Now look through the hole at the bright Moon. The image brightness will be much dimmer than normal – over 90% dimmer – reducing or eliminating any lunar glare. The image should also be much sharper because the bottle cap blocks light from entering the outer portion of your pupil, where imperfections of the eye's curving optical path likely lie.” Many report seeing a startling amount of lunar detail!

You can project the Moon! Have you heard of a “Sun Funnel”? It's a way to safely view the Sun by projecting the

image from an eyepiece to fabric stretched across a funnel mounted on top. It's easy to make at home, too – directions are here: [bit.ly/sunfunnel](https://bit.ly/sunfunnel). Depending on your equipment, a Sun Funnel can view the Moon as well as the Sun— a full Moon gives off more than enough light to project from even relatively small telescopes. Large telescopes will project the full Moon and its phases, with varying levels of detail; while not as crisp as direct eyepiece viewing, it's still an impressive sight! You can also mount your smartphone or tablet to your eyepiece for a similar Moon-viewing experience, but the funnel doesn't need batteries.


Of course, you can join folks in person or online for a celebration of our Moon on October 16, with International Observe the Moon Night – find

details at [moon.nasa.gov/observe](https://moon.nasa.gov/observe). NASA has big plans for a return to the Moon with the Artemis program, and you can find the latest news on their upcoming lunar explorations at [nasa.gov](https://nasa.gov).

Sun Funnels in action! Starting clockwise from the bottom left, a stand-alone Sun Funnel; attached to a small refractor to observe the transit of Mercury in 2019; attached to a large telescope in preparation for evening lunar observing; projection of the Moon onto a funnel from a medium-size scope (5 inches).


Safety tip: NEVER use a large telescope with a Sun Funnel to observe the Sun, as they are designed to project the Sun using small telescopes only. Some eager astronomers have melted their Sun Funnels, and parts of their own





**International OBSERVE  
THE MOON NIGHT 2021**

**SATURDAY  
OCTOBER 16<sup>TH</sup>**

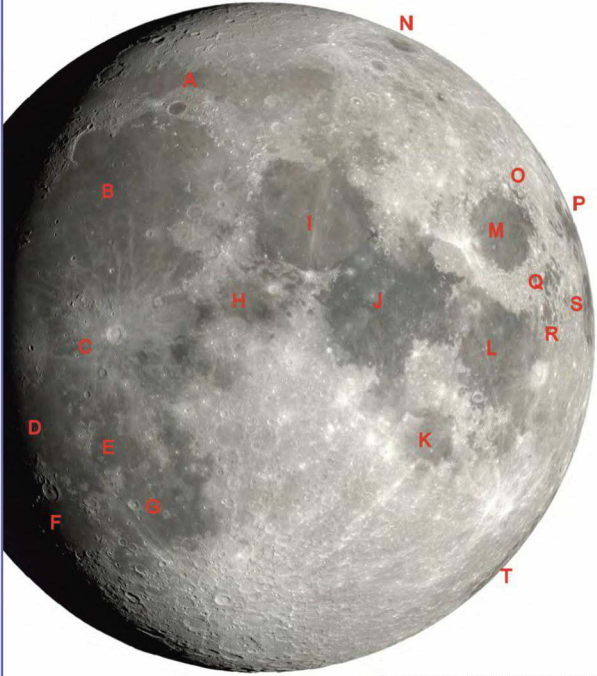


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**NORTHERN HEMISPHERE MOON MAP WITH  
LUNAR MARIA (SEAS OF BASALT)**

**Moon Map**  
This map was created for International Observe the Moon Night 2021. It depicts the Moon as it will appear from the northern hemisphere at approximately 11:00 PM EDT on October 16, 2021 (3:00 AM UTC on October 17).

**Lunar Maria (Seas of Basalt)**  
You can see a number of maria tonight. Once thought to be seas of water, these are actually large, flat plains of solidified basaltic lava. They can be viewed in binoculars or even with the unaided eye. Tonight, you may be able to identify 18 maria on the Moon. This includes four seas along the eastern edge that are often hard to see. Because of libration, a slight apparent wobble by the Moon in its orbit around Earth, tonight we get to peek slightly around the northeast edge of the Moon, glimpsing a sliver of terrain normally on the Moon's far side.



Map generated with NASA's Dial-A-Moon  
(<https://svs.gsfc.nasa.gov/4874>)

A. Mare Frigoris (Sea of Cold)
B. Mare Imbrium (Sea of Rains)
C. Mare Insularum (Sea of Isles)
D. Oceanus Procellarum (Ocean of Storms)
E. Mare Cognitum (Known Sea)
F. Mare Humorum (Sea of Moisture)
G. Mare Nubium (Sea of Clouds)

H. Mare Vaporum (Sea of Vapors)
I. Mare Serenitatis (Sea of Serenity)
J. Mare Tranquillitatis (Sea of Tranquility)
K. Mare Nectaris (Sea of Nectar)
L. Mare Fecunditatis (Sea of Fertility)
M. Mare Crisium (Sea of Crises)
N. Mare Humboldtianum (Humboldt's Sea)

O. Mare Anguis (Serpent Sea)
P. Mare Marginis (Border Sea)
Q. Mare Undarum (Sea of Waves)
R. Mare Spumans (Sea of Foam)
S. Mare Smythii (Smyth's Sea)
T. Mare Australe (Southern Sea)



**MOON.NASA.GOV/OBSERVE**

**#ObserveTheMoon**

and find objects in the sky. Jack has volunteered to do this training. With Terri's donation of her Atlas EQ-G mount, a GoTo mount, we can also provide training on using a computerized GoTo mount and astro-imaging. Paul has volunteered to do this training. We are not necessarily anticipating a lot of demand but when installation is completed (by this Fall) we will have the convenience of a setup to use.

We will have the Friday night potluck at Stellafane but no fried turkey (Howie has family obligations).

Jim brought up a suggestion Gary made about marking high value donated items with the donor's name. Everyone agreed we should do that.

Joe is still planning to hold his "Spontaneous Night Under the Stars" in late August.

Keith- Urged caution due to the Delta variant of COVID for members planning to attend Stellafane. He has placed the 20<sup>th</sup> Library Loaner Scope. Per the board's approval he will refurbish the 6" f/5 RFT for use by members at the site and as a teaching tool for beginners.

Jim- He and Jack had an Eclipse Committee meeting to talk about the 2024 eclipse planning.

**August  
No Board Meeting**

**September 21  
Board Meeting**

telescopes, by pointing them at the Sun - large telescopes create far too much heat, sometimes within seconds! However, large instruments are safe and ideal for projecting the much dimmer Moon. Small telescopes can't gather enough light to decently project the Moon, but larger scopes will work.

You can download and print NASA's observer's map of the Moon (see above) for International Observe the Moon Night! This map shows the view from the Northern Hemisphere on October 16 with the seas labeled, but you can download both this map and one of for Southern Hemisphere observers, at: [bit.ly/moonmap2021](http://bit.ly/moonmap2021) The maps contain multiple pages of observing tips, not just this one.

## Board & Committee Meetings

### July 20 Board Meeting

Jack opened the meeting. Discussed Gary Nowak's concerns about the naming of the domed observatory that was donated (along with a 14.5" Newtonian and a large Byers mount) by Dr Patterson. After some discussion and suggestions we settled on "The Teaching Observatory", reflecting Jack's thoughts when he took Dr. Patterson up on his offer to donate the dome, scope and mount back about 3 years ago.

We plan to use this observatory to teach beginners how to use a telescope

Jack and Sharon have been painting the Teaching Observatory including redoing the "brick work". Jack stopped by Brownell Library the other day. He asked them when the Kolvoord Community Room might be available for meeting again. It will still be a while.

Joe- Spontaneous Night Under the Stars went well in spite of interference from clouds.

Doug- Updated on the financials. We have ~\$1300 invested in 5 Library Loaner scopes, 4 of which are currently slated for libraries.

Jim- In reference to the 2024 Total Solar Eclipse, Jim has been thinking about composing a letter to send out to Public Safety and Service organizations



and one to send out to the business community.

Paul- Need to schedule one or more work parties to clear bush at the Hinesburg Observing Site (HOS).

Jack- Connie Park (wife of former VAS Member, C. J. Park) donated a scope CJ had built, a 6" Newtonian on a combo alt-az / equatorial mount. We may auction off this scope at some time.

Keith- Has 5 Library Loaner Scopes, 4 of which are just waiting on the libraries. Suggested we may want to reconsider our current grass cutting strategy at the Hinesburg site. When he cut it a couple weeks ago it had been several weeks since the last cutting and it was a bit much for his riding mower. (Paul usually goes up, with help from others, to mow the grass but he's been distracted with working on his observatory deck)

Doug- Suggests we order more solar eclipse glasses, maybe 1000 or so to distribute for the 2024 eclipse.

#### VAS Membership Committee

No meeting was held this quarter.

#### Observatory Site Committee

No meeting was held this quarter.

### Under the Stars & Planets

#### OBSERVER'S CORNER

##### Observing Tips

► Sketching is a good way to increase your observing skills.

If you have other tips to share whether for beginners or experienced observers send them our way at [info@vtastro.org](mailto:info@vtastro.org)

##### On-line Resources

► Discussion of the best star atlases: <https://astronomy.com/observing/get-to-know-the-night-sky/2014/04/choose-a-star-atlas-thats-right-for-you?page=1>

### Observing Articles

#### Fall Meteor Showers 2021

By Lisa Kirchberg

Date	Name / Radiant	Best Time	Hourly Rate
Oct 9,10	Draconid	late evening	6
Oct 20, 21	Orionid	pre-dawn	15
Nov 11, 12	North Taurid	late evening	3
Nov 16, 17	Leonid	pre-dawn	10
Nov 25,26,27	Andromedid	late evening	5
Dec 13, 14	Geminid	all evening	75
Dec 21, 22	Ursid	pre-dawn	5/evening

'late evening' is 10 pm- 12:30am

'pre-dawn' is 4am-6am

From The Old Farmers Almanac 2021

Meteors are actually very small particles in space, ranging from a grain of sand up to a small pebble! The one's that originate from asteroids can be composed of dense, stony or metallic material. Less common for shower shows, those of cometary origin tend to be 'not dense' but a conglomerate of particles referred to as a "dust-ball".

The brilliant flash of light from a meteor is not so much from it's size and mass but from it's level of kinetic energy as it collides with Earth's atmosphere. Meteors enter our atmosphere at speeds ranging from 25,000 to 160,000 mph. The speed of our earth has an effect on the speed the meteor enters the atmosphere. Earth, orbiting the Sun at 67,000 mph, means evening showers enter slower as the particles have to 'catch-up' to the earth motion. They enter faster for pre-dawn showers as the particles are colliding head-on into our orbital motion. Similar to why you see bugs smashed on the front windshield but not the rear window. Source: [amsmeteors.org](http://amsmeteors.org)

##### Meteor Colors:

Here is a list of possible substances that might cause a meteor to have a colored hue:

- Bright yellow - sodium
- Green - nickel
- Blue-white - magnesium
- Red - nitrogen and oxygen atoms.

The rate of speed can also effect the apparent color; faster speeds tend to be bluish and slower red/orange.

Source: 9/2021 Astronomy magazine

Remember to give yourself 15 minutes to dark adapt, allow a good hour for relaxed viewing and hydrate before you go out. Try to observe as many of this Fall's events as you can, as gazing into a dark sky with just our eyes, helps us to develop a deeper perception of objects. Dress comfortably and give yourself a blanket if you are laying down, an Adirondak-like chair if you are sitting or a wall or fence to lean against if you are standing. I encourage you to journal or sketch when you come back or if you're able to, while gazing.

Please enjoy this YouTube clip about historical showers and the Leonid shower of 1833:

<https://youtu.be/jODvVasrz5s>

#### Member's Observations

##### Rare Naked-Eye Nova

RS Ophiuchus, a recurring nova had an outburst that was bright enough to be seen with the naked eye. Recurring novae are white dwarf (dead) stars with a companion star close enough that gas, which is mostly hydrogen, from the companion is pulled onto the white dwarf. When enough hydrogen accumulates on the surface it "ignites", that is nuclear fusion of the hydrogen occurs causing the white dwarf to briefly light up again. Depending on how quickly the gas is being transferred this can occur every few years, decades or centuries. The distance from us determines how bright the nova appears. For more info go to - [www.aavso.org/vsots\\_rsoph](http://www.aavso.org/vsots_rsoph)

##### August 10 from Lawrence Garrett--

Observations last night with 7x 35mm binoculars, at 1h25m UT and 4h45m UT, both estimates at Mv 4.9. These were in line with the reports to the AAVSO (American Association of Variable Star Observers).

To see the light curve for this star to go [www.aavso.org/LCGv2/](http://www.aavso.org/LCGv2/)

(aavso.org) and enter RS Oph for the light curve.

### August 10 from Keith Lawrence--

I was able to view RS Ophiuchus last night. It was visible by naked eye, I estimate the mag. at about 4. In my telescope it had a very slight red cast that came and went, perhaps atmospheric induced, as there is much haze and some thin clouds.

Interesting in my Wil Tirion atlas at those coordinates it showed a designation 'N 1967' [the "N" is the designation for a nova].

### Occultation of a Star by the Asteroid 790 Pretoria

Several members went to the Hinesburg Observing Site on August 15 for this occultation. Mark Moyer used the club's 18" scope, Paul Walker used his 12.5" Dob. George Viscome from the Lake Placid area came over with his 12" GoTo Dob to video tape and time the event. Maura Kelley was there with her 80mm refractor, and Jerry Davis to witness this event.

The star being occulted was magnitude 9.9 would normally be fairly easy for experienced observers to locate. However, with the Sun setting only an hour earlier and a first quarter Moon lighting up the southern sky, it was very difficult to find by star hopping. Paul found that he had to pause from time to time waiting for it to get dark enough for him to spot the next set of "hopping" stars. He did manage to find the star shortly before the occultation. Neither Mark or Paul saw the occultation. Checking with George, we found out the reason was that it was a miss for our location even though the predictions indicated we had an 80% chance of seeing it.

Luckily Lawrence from his site in Fairfax was in the path of the shadow and did catch the event, capturing and timing it with his old Celestron 8" SCT.

From Lawrence Garrett

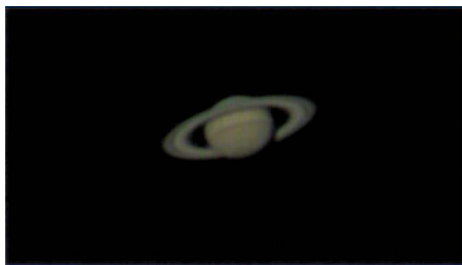
"This was a premier event with bright field stars and large magnitude drop during occultation."

## Things to Observe

### Saturn and Jupiter

These planets may be low in the south for us but they are still worth checking out on a regular basis.

There have been a number of nights where the seeing (atmospheric turbulence) allowed good views of them at 200X or more magnification.



Saturn 2021-09-19, 10:40 PM EDT, by Paul Walker, 10" f/5.6 Newt., 2x Barlow, 24mm eyepiece, Canon HF21 camcorder at 15x optical zoom. Stack of 1000 video frames.



Jupiter, the Red Spot and Europa (right edge of disk) 2021-09-19, 10:50 PM EDT, by Paul Walker, 10" f/5.6 Newt., 2x Barlow, 24mm eyepiece, Canon HF21 camcorder at 15x optical zoom. Stack of 1350 video frames.



Jupiter, the Red Spot and Europa's shadow (right edge of disk). Europa at this time was left of center but not visible against the clouds of Jupiter. The disks of Io and Ganymede are discernable on the right. 2021-09-20, 12:37 AM EDT, by Paul Walker, 10" f/5.6 Newt., 2x Barlow, 24mm eyepiece, Canon HF21 camcorder at 15x optical zoom. Stack of 1350 video frames.

These images show the details only a little better than I could see them visually in the same telescope at 200x.

The camcorder records in HD (1920x1080). These images are down sampled (960 x 540) but not cropped.

### Constellation of the "Month"

*Adapted from Terri Zittrich's "Constellation of the Month" that she presents at the club's monthly meetings.*

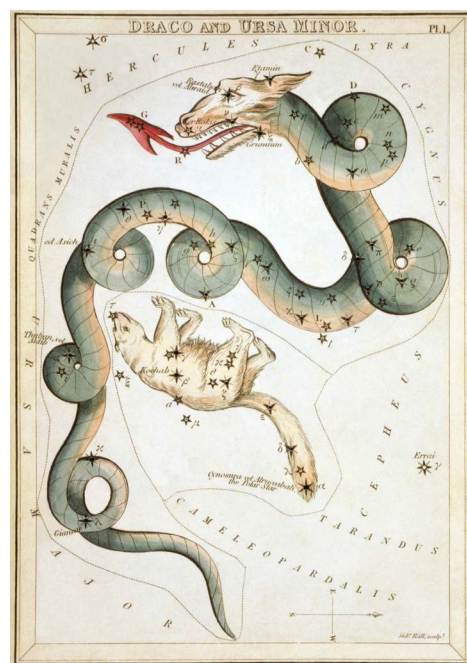
### Draco and Ursa Minor

**Pronounced DRAY-ko, Draco is the 8th largest constellation in the sky**

- A Greek constellation first documented by Ptolemy in the 2nd century
- Associated with the dragon Ladon
- Ladon is famous for guarding the gardens of the Hesperides which bore the golden apples
- The Hesperides were the nymphs of the evening and of the golden light at sunset and the daughters of the titan Atlas
- The golden apples were a wedding gift to Hera
- The golden apples were also Hercules's 11th labor which he successfully executed by defeating Ladon with poison arrows. Hera subsequently put Ladon in the sky to honor him.

**Pronounced URR-sah MY-ner and 56th largest constellation**

- Ursa Minor, Arcas, was known as the son of Zeus and the maiden Callisto (Ursa Major).
- Zeus turned both Arcas and Callisto into bears to hide them from his jealous wife Hera

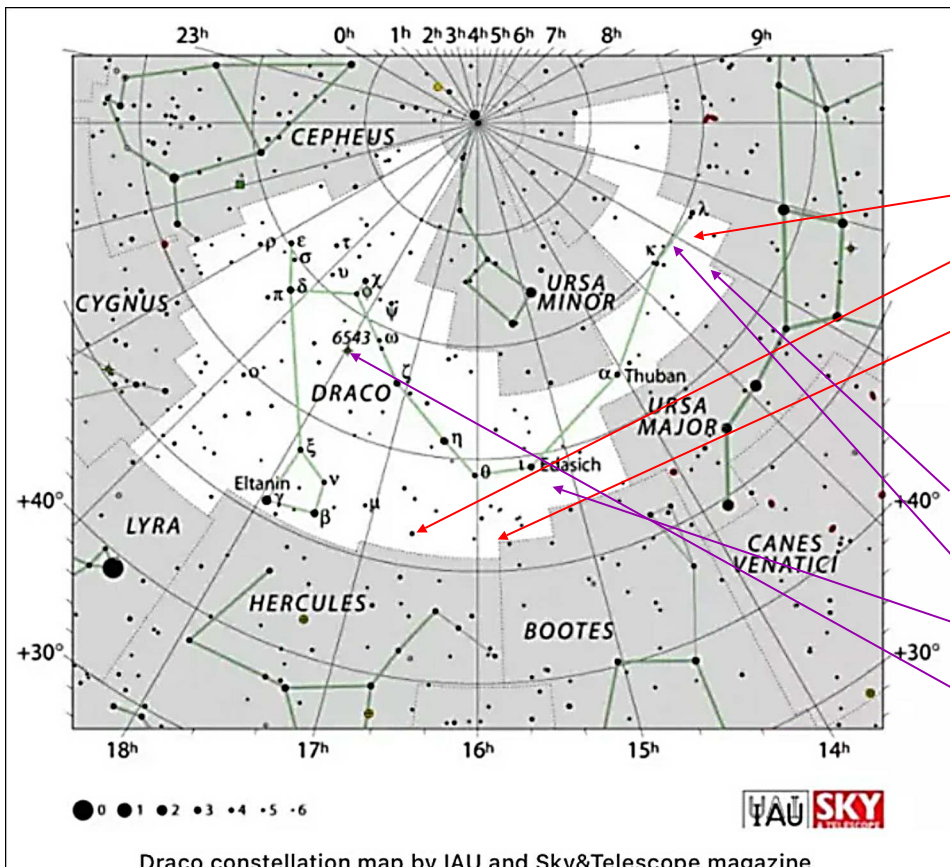
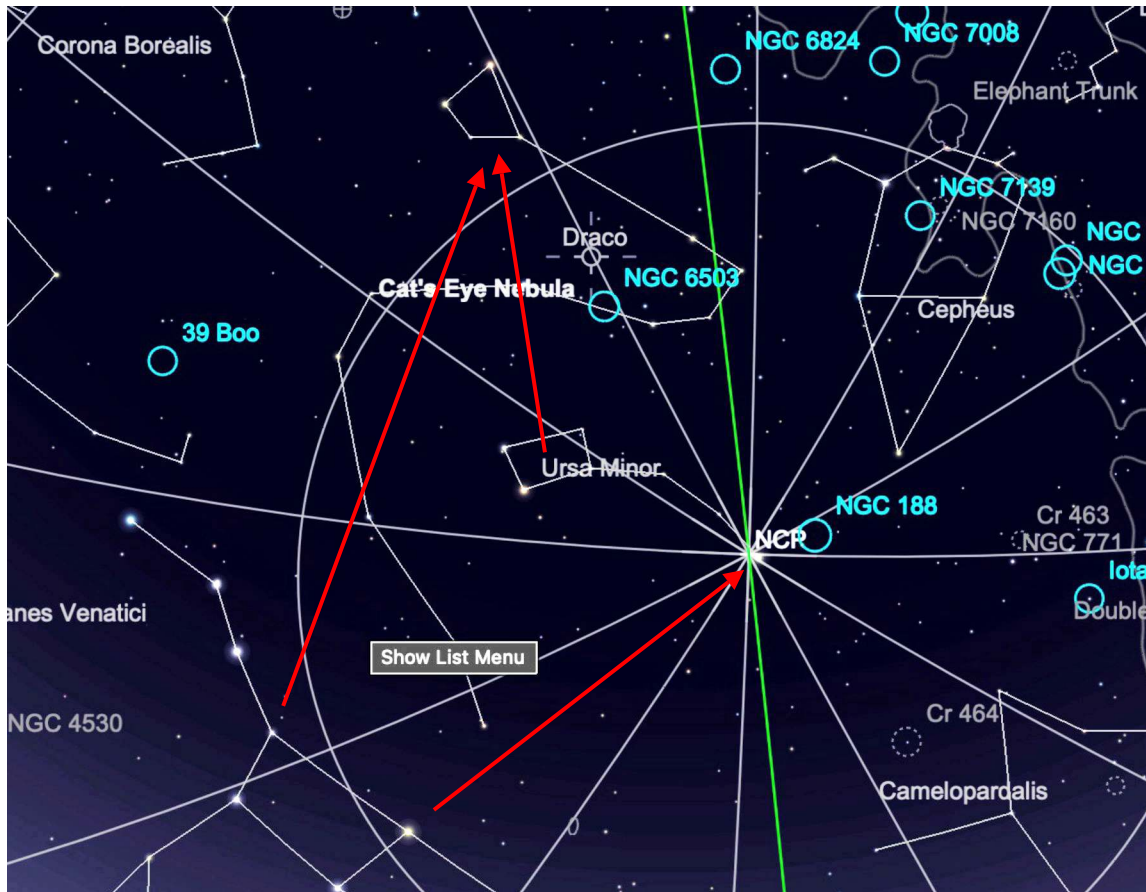


Draco is plate 1 of 32



# FINDING DRACO AND URSA MINOR

HINT: THE DIPPERS POINT THE WAY



## Observing in Draco and Ursa Minor

### Binary stars:

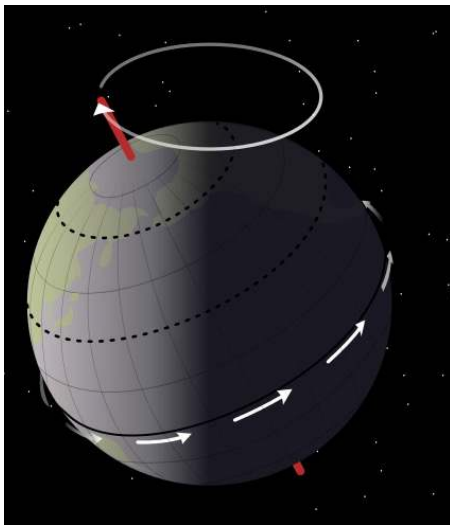
- STF 1573 – Mags 7.4, 8.3 separated by 10.9"
- Draconis 16, 17, Mag 5.5, 6.5 separated by 90" (bino target)
- Draconis 16 is a double itself of mags 5.5, 11.2 separated by 3.1"
- STF 1984 – Mags 6.9, 8.9 separated by 6.4"

### Deep sky objects:

- NGC 4125 – Elliptical galaxy, mag 9, 6'x3'
- NGC 4236 – Barred spiral galaxy, mag 9.7, 18' across (challenging)
- NGC 5907 – Spiral galaxy, mag 10, 11' x 2' across
- NGC 6543 – Cat's eye nebula, planetary nebula, mag 8.1, 18" across (bino target)



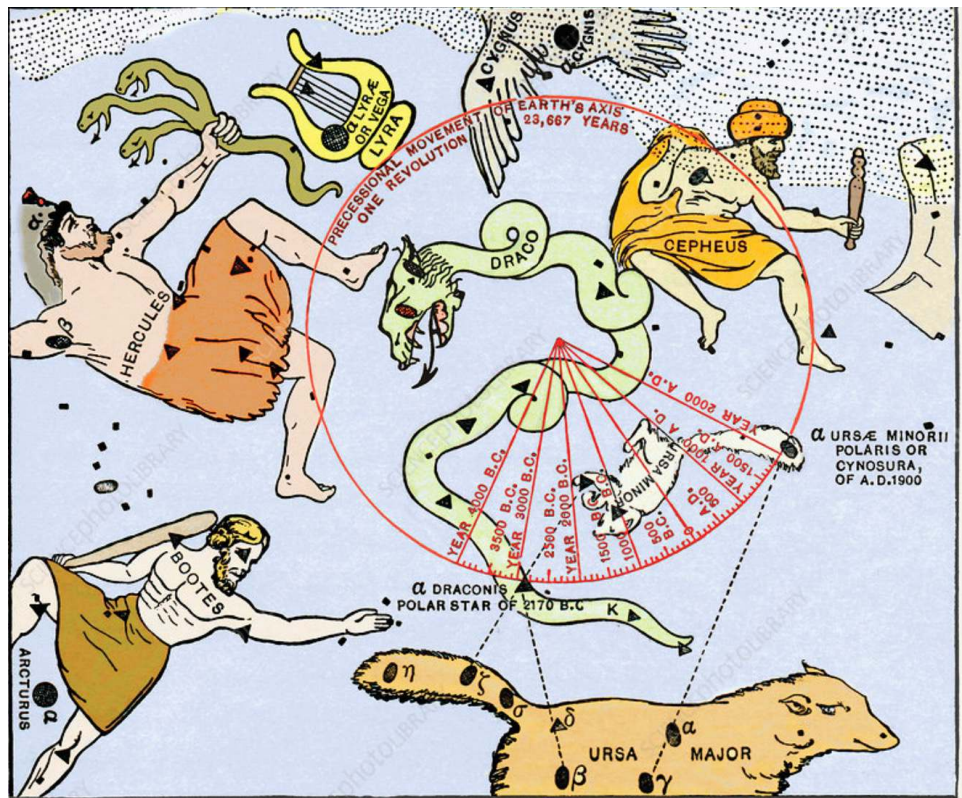
## PRECESSION



- The Earth's pole is not stable and precesses in a circle much like a toy top.
- The period of the precession is 26000 years over which the equinoxes will span all 12 constellations of the zodiac.
- The graphic to the upper right shows the circle that Earth's wobble traces projected against the sky. The center of that circle is in Draco.
- Where as today Polaris is the "pole star" 3000 BC (5000 years ago) Alpha Draconis was and will be again in 21,000.
- We live in a "special" time as the celestial pole is close to the brightest of the stars that take turns marking the pole. Most of the other stars are 4<sup>th</sup> to 3<sup>rd</sup> magnitude and the celestial pole gets no closer than a few degrees.
- Polaris is 2/3 of a degree and at its closest in 100 years just under 1/2 degree. The only star the pole gets closer to is Alpha Draconis at 12 arc minutes (just over 1/10 of a degree). But Alpha Draconis notably dimmer at 3.6 mag, versus Polari's 2.0 mag.

### INFORMATION SOURCES

Constellation-guide.com  
Space.com  
earthsky.com  
Wikipedia.com  
Sky Safari 6.0 Pro



### ASTRO-IMAGER'S CORNER

*All things astrophotography, for the beginner to the expert.*

#### Imaging Tips

If one is taking short exposures, the polar alignment is not as critical as it is for long exposures even if one is planning to stack several images. There will be a little bit of image rotation from frame to frame but most stacking software can de-rotate these images (Registax does not handle rotated images well). Polar alignment becomes more important for long exposure times and especially when one uses an autoguider.

#### Software/Online Info

##### *How to Learn Astrophotography*

<https://www.allaboutastro.com/how-to-learn-astrophotography.html>

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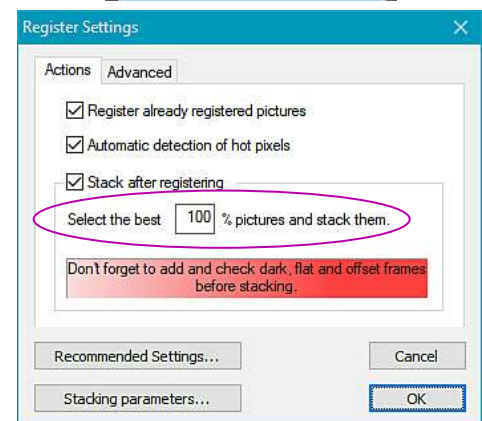
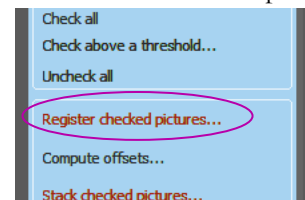
#### Imaging Articles

#### Deep Sky Stacker (DSS)-

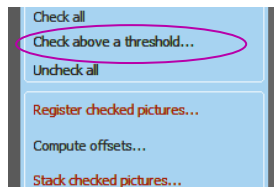
#### Moving Beyond the Stacking Defaults

By Paul Walker

After opening your images in DSS, there are a couple ways you can reject poorer quality images from being stacked. After clicking on "Register checked picture.." (halfway down in the left hand pane) a dialog box pops up. In that box you have the option to limit the stack to the best XX% of pictures.

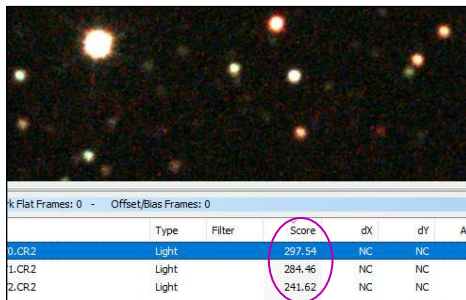


Another way is to select “Check above a threshold...” and type in an image score number. This gives you more

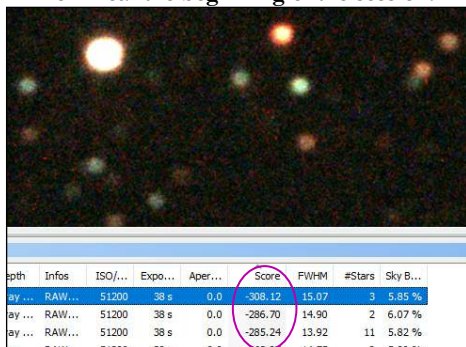


direct control. To compute the scores you first have to register the images by selecting “Register checked pictures...” and selecting “OK”. To save some time, uncheck “Stack after registering”. The score # can now be used to control which images get stacked. DSS also saves the information so that the next time you open this set of lights the scores will be displayed and will be available as a means to limit which images get stacked. Also note, when you use “Check above a threshold...” the images below the threshold will automatically be unchecked.

What is a score number you say? DSS analyses your images and gives them a score based on how round the stars are and how well focused they are. This score is displayed in the bottom pane of the DSS window. (Take a moment to note the other information displayed for each image). High numbers are given to the best and low numbers are given to the the worst images.



This image had the highest rating and came from near the beginning of the session.



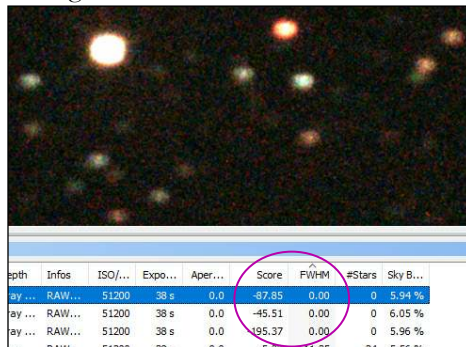
Where as this image was rated the lowest and was taken near the end of the sequence. It is

clear that the focus had gone soft (due to the change in the length of the telescope tube as it got colder).

The image list is automatically sorted by the Score best to worse. By selecting an image you can view and critique the image yourself and decide whether you want to limit the images stacked based on the the quality rating.

You can sort the images by clicking any of the headings and clicking the same heading again sorts in reverse order.

I noticed another handy heading, FWHM (full width half max value). This is a measure of how “tight” the star images are and can be used to see if your scope went out of focus over time. I also noticed that poorly tracked images have a FWHM value of 0. By sorting on that column all images with 0's will go to the top of the list where you can quickly check them out and decide whether to uncheck them so they don't get stacked. Or you can even delete them from your computer via DSS by right mouse clicking on a row and selecting “Erase from disk...”



This image has oblong stars due to poor tracking. The focus had also gone “soft” by the time this image was taken.

Talking about erasing, DSS creates files in the folder in which you have your images. These files can be deleted. There are “autosave” files which are the stacked images and XXXX.Info files, one for each “light” image. The autosave image files are very large and not needed when you are done. The .Info files are text files with information on the quality of the image (the score # for the image), how many stars it found and the data on each of those stars. If you want to start the stacking process from scratch the .Info files must be deleted. Remember not to delete your final stacked Autosave.fts file or .tif if that is what you are using.

## MEMBER'S IMAGES

### Saturn and Jupiter this Fall

By Paul Walker

The night I took video to create these image was one of a handful I experienced this Summer with very good seeing (for Vermont).

I would say these are among the best images of Saturn and Jupiter that I have produced, though I don't plan to check. The fine scale seeing was steady enough that I could make out the disks of Jupiter's Galilean moons visually. The large scale seeing, which causes the whole planet to jump around was much better than usual as well and helped minimize blurring.

The video clips are all about 1 minute long (~3600 frames). These are the same images as on page 7 only processed to enhance the detail (see page 7 for the technical data).

I lucked out as well with all the activity going on with Jupiter starting with visibility of the Great Red Spot. Later the ingress of Europa on the disk about 10:45 PM, the ingress of Europa's shadow at 12:14 AM and finally Io joining up with Ganymede for a family portrait.







**Markarian's Chain**  
**By Steve Grimley**

Taken from the Davis mountains of west Texas.

Telescope is the Astro-Physics 155 EDfs at f/5.2 (806mm f.l.).

Camera is a Canon Ra 30 Mp (full frame, mirrorless) 7 minute subs and total exposure time of an hour.

These newer cameras with high pixel counts and improved sensor technology do a great job capturing small details and faint objects using modestly sized telescopes.

To the right is a 2X blowup of a portion of the image to better show detail and the many small faint galaxies recorded, some maybe globular clusters orbiting galaxy cluster members.

The dark skies of west Texas also helps one to go fainter with less total exposure time.





**The Rosette Nebula**  
**By Richard Whitehead**

This is my SHO rendering [sulfur II, H-alpha, oxygen III narrow band images used for the RGB color channels] of the Rosette Nebula (Caldwell 49) or the "Flaming Skull" Nebula as I like to call it. A beautiful winter and early spring deep sky object sitting to the left of Orion. I've been so busy this year I only just got around to processing this image [in early July] that I shot in January, with an additional session in April when it was very low in the sky.

The Rosette Nebula is an HII star forming region lying about 5,200 Light Years from earth in the Monoceros Constellation and spans a massive 65LY across. The bright stars at its center (NGC 2244 or Caldwell 50) are associated with the nebula, having formed from the gas and dust, leaving the hollowed out center "Eye socket".

But you can still think of it as a Rosette if you like.

Tech stuff

Scope : RASA 11"  
Mount : Celestron CGX  
Camera : ZWO ASI 6200 MMPro  
Filters : Astronomik 12nm Ha, OIII, SII  
All 5 min subs 3 hrs Ha, 1.5 hrs each OIII, SII  
Location: Vermont and New Mexico  
Processing : Pixinsight and PS 2021





### **The Helix Nebula** **By Richard Whitehead**

The Helix Nebula is a nearby planetary Nebula in the constellation of Aquarius. The progenitor star of this stellar remnant was very similar to our own sun and likely in a few billion years this is what will happen to our sun as it runs out of fuel. The original star (or what's left of it) can be seen in the center of the nebula.

This star ran out of fuel about 11000 years ago and lost its outer layers which we can see expanding into space now around 2.5 light years across. The Helix Nebula is one of the nearest Planetary nebulae to earth, around 650 LY distant.

There are some interesting features in this nebula which we can see well because its so close.

The central star is on its way to becoming a white dwarf but shines so energetically that the surrounding gasses fluoresce wildly making this very colorful in both RGB and narrowband images.

There are what are called "Cometary knots" which you can see as whitish elongated blobs radiating out and can be seen clearly against the ionized Oxygen green background. These are concentrations of gas that are more than a thousand times more dense than the surrounding gasses. For a scale and mass comparison each one of these is something like the size of our Solar system, but with about as much mass as Earth, so still pretty tenuous!. The size of the Helix Nebula is also something like the size of our solar system if you include the Oort cloud - the hypothesized source of non-periodic comets and other icy bodies.

#### **About this image**

Taken with a full Moon (and actually very close to the Moon in angular distance) I'm still working hard to get my remote scope in New Mexico anywhere near as good as it should be- and it's a battle!

With skies cloudy for weeks this is the first image I've taken since some work was done on the scope to improve

its balance and tracking, particularly its resistance to gusts of wind. So I'm testing and making changes ( sometimes its people down there making changes). So this is a test image - it shows me that things have improved somewhat but the Polar alignment that I was left with after installation is too far out and needs improvement - something I've been asking for, for months. The L-350 is a nice mount but not a trivial task to polar align due to its weight and way its connected to the pier -( it's not turning a couple of knobs!)

I also do not have a working guider yet. My goal is to get this all fixed in the next week, weather allowing. [written in late August]

#### **Tech stuff**

Scope: Planewave CDK14  
Mount Planewave L-350  
Camera ZWO ASI1600MMPro with Astronomik 12nm filters  
HOO image (H-alpha, OIII, OIII data used for the RGB color channels)  
14 x 5 mins Ha , 35 x 5 min OIII (all subs unguided)

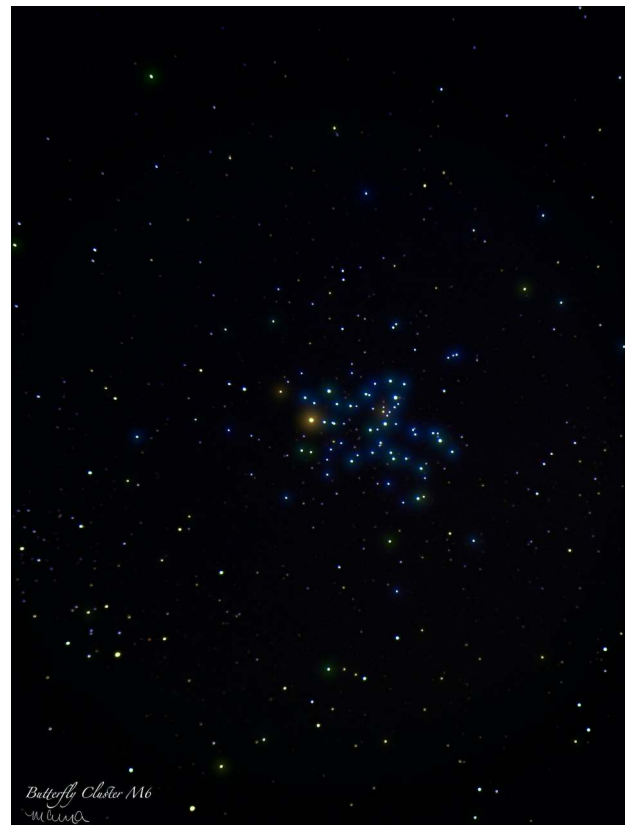
## From our Hinesburg Observing Site:

Goodbye to the short window of time just above our southern horizon. Several trips hauling my 80mm refractor produced only 2 nights of viable subexposures. With weather predictions incorrect, smoke from the BC/Oregon fires, and the horizon's humid atmosphere, it was challenging. Here are 2 star clusters located near the scorpion's tail ~ Ptolemy Cluster (M7), and just above it, the Butterfly Cluster (M6).

By Maura Kelley w/ Explore Scientific 80mm triplet refractor and Olympus micro four thirds DSLR)

M7 (left) = 2 hours (combined with 2 nights in 2020)

M6 (right) = 30 minutes, integrated exposure time





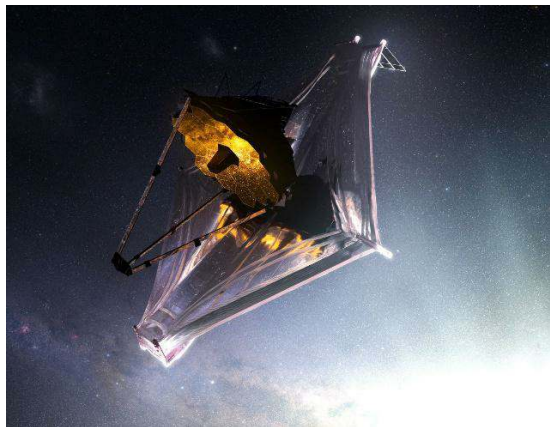
## Space Science Roundup



### James Webb Space Telescope - Countdown to December Launch

By Scott Turnbull, VAS Member and Solar System Ambassador volunteering for JPL/NASA

Over twenty years in the making, the James Webb Space Telescope is built, tested, and being staged for its scheduled launch on December 18th, 2021. It's been a long road to get to this point. Let's review some of the milestones and design decisions that have brought us here.



#### What is the James Webb Space Telescope?

The James Webb Space Telescope, sometimes called JWST or just Webb, is an orbiting infrared observatory. It is designed to complement the discoveries of the Hubble Space Telescope using longer wavelength imaging and greatly improved sensitivity. The longer wavelengths enable Webb to look deeper into space and give it the ability to look inside dust clouds where stars and planetary systems are forming today.

#### When was JWST proposed and Who Built It?

In 1996 Webb was conceived as the "Next Generation Space Telescope" (NGST). It was renamed in Sept. 2002 after former NASA administrator James Webb. The telescope was originally supposed to launch in 2007, but a seemingly endless chain of design changes, launch vehicle changes, and

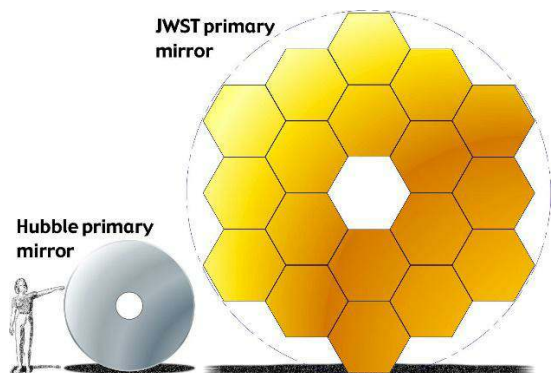
funding issues have stretched the project development to nearly 24 years.

Webb is an international collaboration between NASA, the European Space Agency (ESA), and the Canadian Space Agency (CSA). The main industrial partner is Northrop Grumman. The Space Telescope Science Institute will operate Webb after launch.

#### Why Infrared?

The JWST is designed to image infrared frequencies, versus that portion of the spectrum that is normally visible to the human eye. This enables the JWST to see through dust clouds and image new stars in their nursery. The figure on the right is a comparison of two Hubble images of the same object. It demonstrates what delving into the near-infrared can do to alter our view of the cosmos.

Another feature of infrared wavelengths is that it enables imaging of objects that are more distant than those that can be viewed with visible wavelengths. More distant objects are moving away from Earth at a much higher speed. They are moving so quickly that they are more highly redshifted. That means their light is pushed from the visible wavelengths into the infrared. What would otherwise be a red giant at relatively near distances becomes an infrared star at great distances. The extended wavelength sensitivity of the JWST will enable viewing these infrared sources.



#### Comparing JWST to Hubble

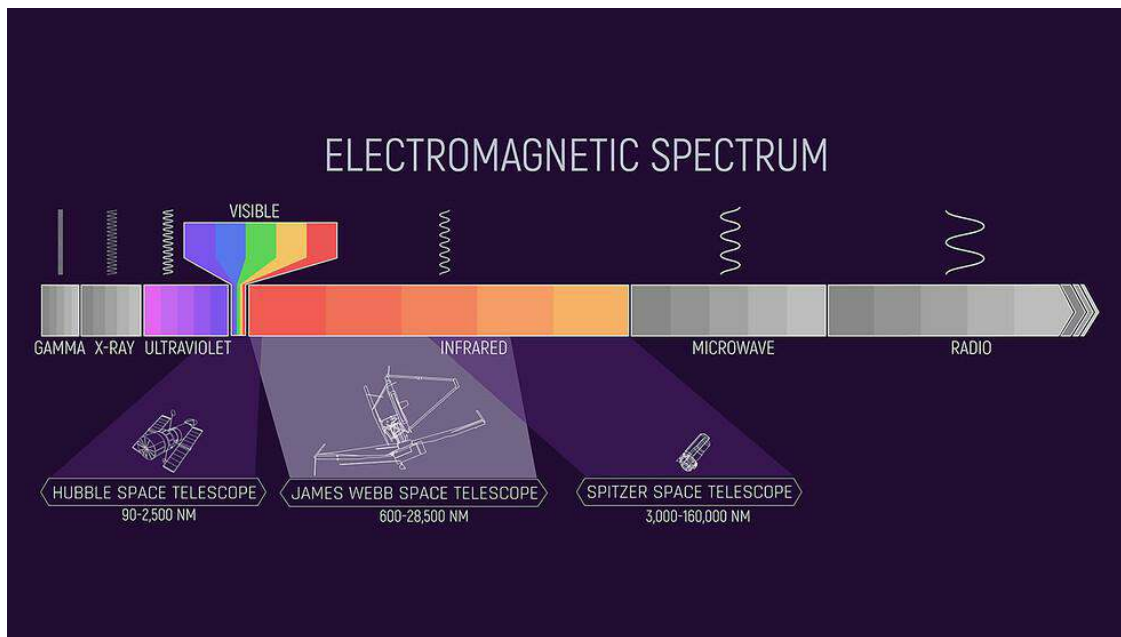
We have been benefiting from the capabilities of the Hubble Space Telescope for over 30 years. Let's take a moment to compare the construction and capabilities of the JWST to those of the Hubble.

The first thing to note is that both telescopes are by nature optical. They use mirrors to gather light and focus that light on instrument packages. The primary mirror of the Hubble is a single piece of glass 2.4 meters in diameter. The primary mirror of the JWST is 6.5 meters across but is comprised of 18 Beryllium hexagons that are independently aligned and focused after the telescope is deployed.

The next thing to note is the significant difference in the orbits of the

two telescopes. The Hubble is in Low Earth Orbit. It was designed and deployed to operate in an orbit that the Space Shuttle could reach to provide servicing for the telescope. The JWST will be at the L2 LaGrange Point one million miles from the Earth. That distant orbit precludes any planned service missions. The JWST is locked into its launched hardware capabilities for its entire life cycle.

As mentioned above, the Hubble predominately operates in visible wavelengths. It has some capability to image in near-infrared, which overlaps the upper end of the sensitivity range for the JWST. The JWST predominately operates in longer infrared wavelengths. The figure below shows the relative coverage of the electromagnetic spectrum each telescope can image.



## The Remaining Timeline

The launch has recently been rescheduled for December 18, 2021. Following that launch the JWST will begin a 30-day, million-mile journey out to the L2 LaGrange Point as shown in the right hand figure. During that phase of the mission the solar arrays are deployed, and the sunshield is deployed. The sunshield is needed to keep the sensor package cooled to the ambient temperature of deep space. Without the shield the sensitive electronics would be influenced by the solar energy directly from the Sun and reflected from the Earth and Moon.

In the second through fourth month of the mission the optics will undergo their initial checkout. The 18 mirrors making up the primary will be aligned and focused.

This is also when the halo orbit around the L2 LaGrange Point will be stabilized. Months five through six of the mission will be when instrument calibration will take place and the first science images will be obtained.

The lifetime of the JWST is expected to be a minimum of five years, with likely lifetime of over ten years. The anticipated constraint on the mission lifetime is the consumable fuel needed to execute station keeping in the stable halo orbit around L2.

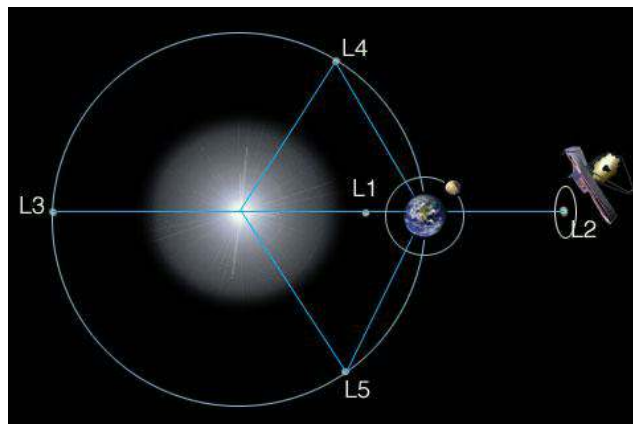
## Coming Soon to a VAS Meeting Near You

The featured talk for the December meeting of the Vermont Astronomical Society will be an extended presentation of the design and capabilities of the James Webb Space Telescope. The VAS presentation has been selected by the James Webb Space Telescope Team as an approved Community Outreach Event. As such it will benefit from information obtained directly from the designers and future operators of the telescope. See you in December.

### Resources

Information presented in this article was provided by the NASA mission web sites.

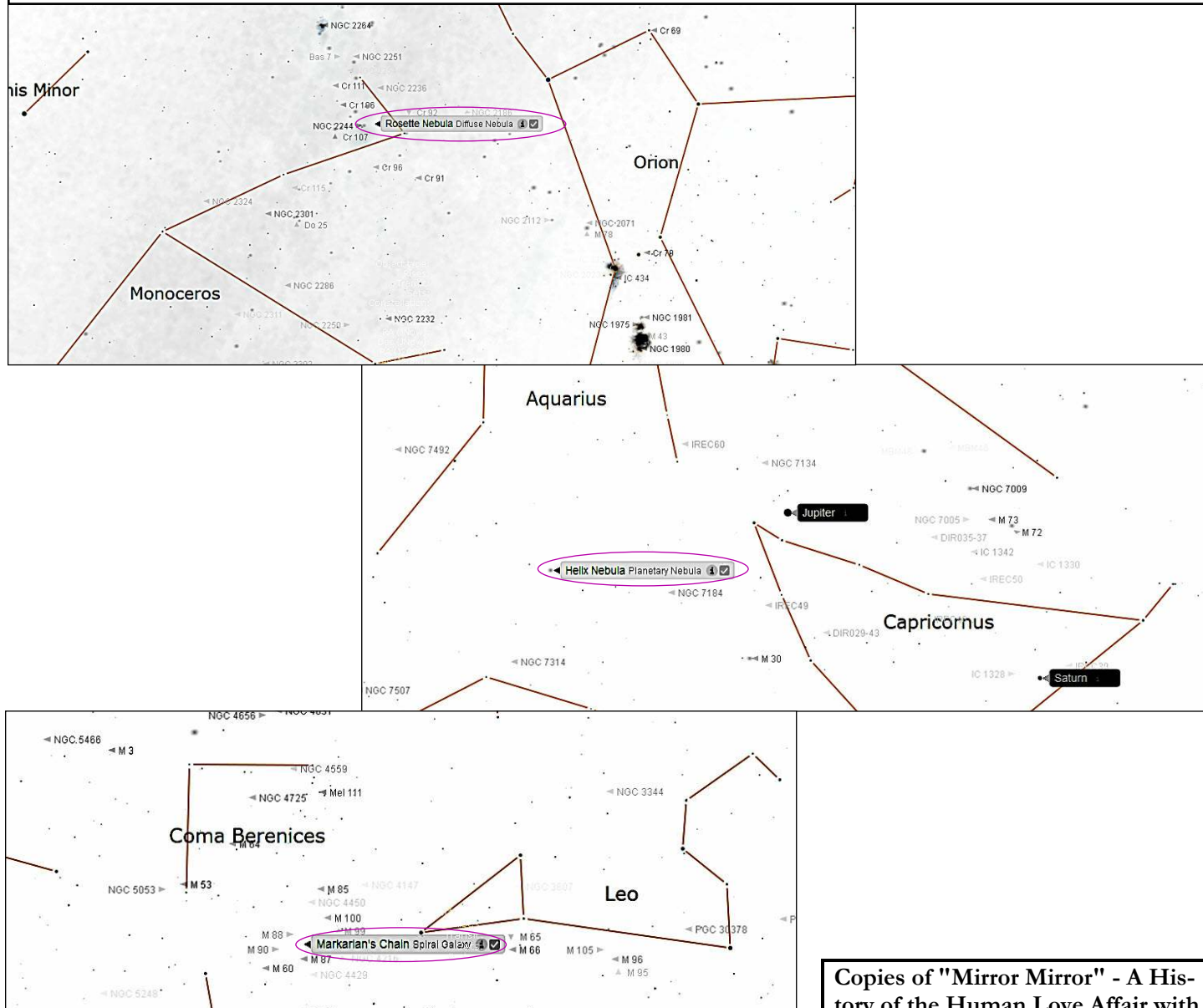
For more information, please refer to NASA JWST Mission Page- <https://www.jwst.nasa.gov/>





## Location Charts for the deep sky object images in this issue.

Created using Starry Night Pro 8 & Picture Window Pro 7.



### Wanted

**Wanted** - First telescope program - I am working to recycle old 4.5" reflectors to construct starter Dobsonian telescopes for first time users. I am looking for donations of old telescopes, 1 1/4" rack and pinion focusers, Plossl eyepieces and other parts..

Contact Keith Lawrence, 802-453-5496, [sleepingbearwoodworking@yahoo.com](mailto:sleepingbearwoodworking@yahoo.com)

### For Sale

#### 8" Celestron Schmidt-Cassegrain on a CGEM computerized mount

Accessories:

9.25" Glass solar Filter	\$ 124
9mm eyepiece	\$ 30
25mm MA eyepiece	\$ 30
90 deg star diagonal	\$ 44
T-Adapter-SC	\$ 25
Universal camera adapter	\$ 75

**Total Cost New** **\$2828**

**Asking** **\$2500**

Myron Dunbar, 405-779-8102  
[Medunbar54@gmail.com](mailto:Medunbar54@gmail.com)

**Copies of "Mirror Mirror" - A History of the Human Love Affair with Reflection** by Mark Pendergrast of Colchester, Vt. available for **\$25**. Mark will split the profits with VAS. [Contact Mark at markp508@gmail.com](mailto:markp508@gmail.com) or see Jack St. Louis at any monthly meeting.

**Light duty machining for custom brackets/adapters and modifications to existing hardware for astronomy purposes.**

Nominal fee (~\$10 - \$50 depending on size and complexity).

I have a mini milling machine and a mini lathe.

Paul Walker 802-388-4220 or [paulwaav@together.net](mailto:paulwaav@together.net)

**Complete astro observatory with 8-ft Exploradome. Equipped with Meade 14-inch Advanced Coma Free SCT and accessories including heavy-duty polar-alignment wedge, heavy duty tripod, autoguider, dew shield, and other accessories. Over \$11K invested, asking \$5K.**

[Al Boudreau at astromanvt@gmavt.net](mailto:AlBoudreau@astromanvt@gmavt.net)



### Celestron NexGuide Autoguider

I purchased used at the Stellafane Swap Tables as a backup to the one I am using, however, I forgot had already purchased a backup at the Swap Tables the previous year. I don't really need 2 spares.

**\$140 OBO.** (\$300 new)

[Paul Walker 802-388-4220 or paulwaav@together.net](mailto:Paul Walker 802-388-4220 or paulwaav@together.net)

### Telescope mirrors and a couple mounting cells

**3.5" f/10** with 3/4" diagonal.

**6", probably f/8.**

**8", probably f/8, in nice cast aluminum cell.**

**10" f/9, 1/10 wave** (measured by Bob several years ago), Beral coating that is in good condition though the edge has several chips (edge not beveled) and a note from the coater says there are a few scratches and it is not fully polished (may be saying that because of the scratches). From St. Michael's College.

Other than the 10" f/9 I cannot vouch for the figure of the mirrors.

The only one that may be Pyrex is the 8" mirror, I'd have to pull it out of the cell and look again. The rest have the slight greenish-yellow tint of plate glass.

**Make an offer on any of the items.**

[Paul Walker 802-388-4220 or paulwaav@together.net](mailto:Paul Walker 802-388-4220 or paulwaav@together.net)

### Observing Aids for sale

**Observing chairs** - Enjoy longer observing sessions. Adjustable seat height for comfort and better viewing. **Starting at \$90.**

**Binocular parallelogram mounts** - Raise and lower your binoculars while maintaining an object in the field of view. Work well for use with lounge chair for observing at higher elevation or for multiple observers of different height. I will fit your binoculars to the mount for optimum performance. **Starting at \$195.**

**Binocular mount for your tripod** - replace the bracket with a system that keeps the binoculars in balance. Find an object, release the binoculars and they stay where their pointed. **\$50**

**Clip on red book lights** with variable brightness - I am working on modifying these for use on clip boards etc. If you have an interest please email or call me to discuss your need.

Contact Keith Lawrence, 802-453-5496, [sleepingbearwoodworking@yahoo.com](mailto:sleepingbearwoodworking@yahoo.com)

### First Telescope Program



With the support of the VAS Board, I am developing a First Telescope Program for new members of the club. For now I am seeking a few of the old 4 1/2" f/8 Newtonian telescopes that I can renovate, fit with 1 1/4" rack and pinions and eyepieces then outfit with Dobsonian mounts. **My target is to sell these to club members for \$100 or non-members for \$125.** For the first year the new owners can return it for full refund in case of non-use or to upgrade, etc. After a year the refund will depend on condition. Sales will depend on availability of telescopes and components, so if you have old telescopes, eyepieces or parts you want to sell or donate or if you know of someone who would like an inexpensive telescope that really works, please contact me.

Contact Keith Lawrence, 802-453-5496, [sleepingbearwoodworking@yahoo.com](mailto:sleepingbearwoodworking@yahoo.com)