



OBSERVER

March 2022

*Bringing Stars to the eyes of Tulsa
since 1937 Editor - John Land*



Rosette Nebula NGC2237 taken @ Skiatook, OK Jan 29 - Feb 10, 2022.
ZWO ASI2600MC pro 38 - 5-min exposures 100 Gain -10°C Color
88 - 5-min exposures 100 Gain - 10°C Dual Band Filter Ha-OIII
Skywatcher-Esprit 80 ED Super APO f/5
© Stan Davis

Stan Davis shares his image of the Rosette Nebula NGC 2237

Telescope Skywatcher Esprit 80 ED Super APO f/5

Camera ZWO ASI2600MC pro - 38 - Five-minute Color Exposures 100 gain - minus 10°C

88 Five-minute Dual Band Filter Ha-OIII 100 gain - minus 10°C

Skiatook, OK Jan 29 thru Feb 10, 2022

You may read more about Stan's journey into his new adventure of astronomical imaging later in this newsletter.

- 1 Cover - Rosette Nebula - by Stan Davis
- 2 Upcoming Observing Night & Meeting Events
- 3 President's Message - by John Land
- 4 What's Up in March Skie - by John Land
- 5 Messier Marathon coming April 2nd
- 6 - 7 Telescope Workshop Photo Gallery
- 8 *New Adventures in Astro imaging* by Stan Davis
- 9 *Enjoying a Remote Telescope Session* by Eric Kingery
- 10 - 12 *Reba and Cano* (Star Pairs) by Brad Young
- 13 Planetarium Show Schedule at Jenks High School
- 14 - 15 *Embracing the Equinox* - NSN - David Prosper
- 16 Treasurer's Report and New Members -
- 17 Club Contacts - and some Astro Humor

Astronomy Club Events

Check our website AstroTulsa.com events section for updates

Observatory ONLY OPEN for SCHEDULED EVENTS. [Click for Observatory Map](#)

During Winter Months Dress in layers with hat and gloves

Our rural site is cooler than in town - there is a classroom to warm up

Saturday March 5 5:45 PM **Members Only night**
Open to members and their immediate family

Astronomy Club Meeting - Friday March 11 - 7:00 PM - IN PERSON club meetings.
At Jenks High School planetarium 105 E B Jenks OK - Guest Welcome

Saturday March 12 6:00 to 8:00 PM [Oxley Nature Center Star Gazing night](#)
Free Event - Guests Welcome

Daylight Savings Time Begins Sunday March 13

Saturday March 26 7:00 PM **Guest and Members Night** - [Guests requested to RSVP](#)

Friday April 1 7:15 PM DST - **Members Only night**
Open to members and their immediate family

Saturday - April 2 Messier Marathon Night - This is an all-night event where participants Gate opens 7:00 PM try to find as many Messier Catalogue objects in a Single night. Details later in the Newsletter and to be Announced closer to the event.

NOTE: Please check our website for Weather Cancellations before heading out.

For our program some of our club members will be giving a "Show & Tell" of some new astronomy equipment or techniques they have are enjoying. As time allows at the we will also watch a Night Sky Network program TBA

OBSERVING NIGHT GUIDELINES

Covid and Flu cases continue at an elevated level We want to keep our guests and members safe. We ask you to please be thoughtful of the health safety of others around you.

- 1 At observing sessions, please observe social distancing when not with persons of your group.
- 2 Ask if you may join others at their telescope.
- 3 Observe spacing in the classroom and respect those who choose to wear a mask for protection.
- 4 If you or a person in your household is showing signs of illness, please postpone your visit for another date.

When at the Jenks High School, we need to observe their guidelines. The Current Policy states

All Jenks Public School staff members, visitors, and students in grades 3-12 will be required to wear face coverings. Any exceptions require the approval of the site principal.

These policies are for the protection of the students who use the buildings as well as yourself

President's Message John Land



Greetings to all our Astronomy Club of Tulsa Members and Guests.

As usual our Oklahoma weather has made it challenging to get out and observe the night sky. Our Feb 3rd and 24th community observing sessions had to be cancelled as well as our Feb 4th Club meeting. We get in an observing night at a private Middle School in west Tulsa Feb 8th. When you get this newsletter the first week of March you will likely be enjoy daytime temperatures above 70 F! Such is the joy of living in Oklahoma. The weather is never boring.

Our Telescope 101 Workshop for novice telescope owners at the Tulsa Air and Space Museum Feb 19th had 54 people in attendance plus 10 club volunteers. It was especially rewarding to see so many families with young kids enthusiastic about Astronomy. Hopefully some of those will become members of our club. That evening we had another 29 or so guests come out to the observatory to enjoy a splendid evening of star gazing. As the springtime temperatures warm up we can expect larger attendance at our Guest Observing nights. We will need MORE of you as MEMBERS to VOLUNTEER to help out on those nights.

We need 5 to 7 volunteers for Community events coming up this Spring.

[Oxley Nature Center](#) Saturday - March 11 6:00 - 8:00 PM CST

[Hicks Park Community Center](#) Thursday - April 7 - 7:45 to 9:30 PM DST

Click the Links for details - Contact astrotulsa.pres@gmail.com to Volunteer.

We are also planning an **Observatory Grounds and Building Clean Up Day on Saturday March 5th** If you would like to help and didn't already get an email about Volunteering, you can contact our Observatory Manager at astrotulsa.obs@gmail.com

DAYLIGHT SAVINGS TIME returns Sunday March 13. While we astronomers are not particularly fond of having to wait an extra hour to start our evening observing, there is a bonus side of the coin. Sunrise moves from 6:40 AM CST to 7:40 DST All the bright planets - Venus, Mars, Jupiter & Saturn - are in the morning sky this Spring!

WARNING ASTRONOMICAL RANT ! Brace yourself for numerous CLUELESS NEWSMEDIA and POLITICIANS complaining about changing our clocks for Daylight Time. While changing our Sleep and Work patterns is an annoyance - Daylight Savings Time is not merely a matter of changing your clock. If we stayed on STANDARD TIME all YEAR as is once again introduced as a bill in our Oklahoma Legislature. - The sun will rise before 6:00 AM from April 6 to Sept 10 and BEFORE 5:10 AM from May 23 to July 6! Most of us don't head out to work until about 7:00 AM - meaning it's already been bright daylight for nearly 2 hours. Staying on CST all year would heavily impact summer evening family and sports activities. The latest Sunsets in June would be 7:42 PM CST instead of 8:42 PM on Daylight time.

Our EAST Coast "intellectuals" have repeatedly said we could "Save Energy" if we stayed on DAYLIGHT TIME - Its already pretty dark in the mornings when we switch back to Standard Time the first Sunday of November. If we stayed on Daylight time the Sun would not even come up before 8:00 AM from Nov 17 to Feb 23 and as late as 8:30 at Christmas. Our friends in western Okla wouldn't see the sunrise until 9:00 AM I'm sure Mom's will be enthusiastic about sending their kids out well before dawn to catch a bus or walk to school. Would you be eager to drive morning Rush Hour in the dark or on icy roads 1.5 hours before dawn! The farther north you travel the later the sun would rise! So maybe drop you legislators a note or post a bit of astronomical factual information on your FaceBook when your friends start complaining about changing their clock.

Let us continue our 85 years of *"Bringing Stars to the Eyes of Tulsa since 1937"*

John Land - President



Click on these images to links on the Internet

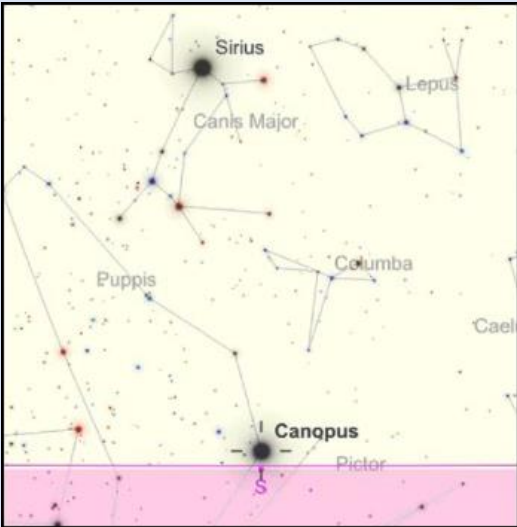
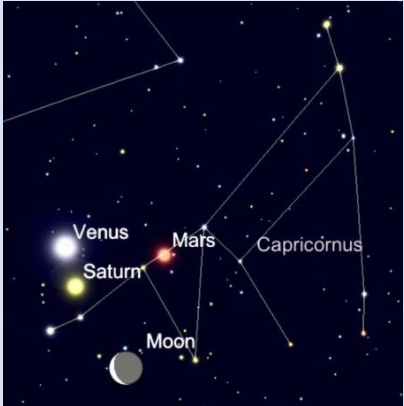


See our [website observing page](#) for a collection of [Interactive Sky Watching Tools](#) Moon phases - Sun rise & Set - [Make your own custom interactive sky chart](#) and more

March Skies. -

Moon Phases - - New Mar 2 - - 1st Q Mar 10 - - Full Mar 18 - - 3rd Q Mar 24 - - New Apr 1

All the bright planet action is in the morning sky this month. Fortunately, when we move to Daylight Savings time we won't have to get out of bed too early to enjoy the show. **Venus and Mars** can be seen in the SE moving along in tandem within 4 degrees of each other most of March. They are closest on March 16. They begin joining up with **Saturn** about March 24 to make an obtuse triangle about 7 degrees long, The Trio becomes a quartet as the waning crescent **Moon** joins the group on March 28. Finally, **Mars and Saturn** dance together within 1/2 degrees of each other on April 4 and 5. The celestial pair should both fit nicely in a low power telescope view. Jupiter and a very thin Crescent moon pass each other just before dawn on March 30 but are still likely too low to be observable. Venus reaches it furthers western distance from the Sun on March 20.



Take the CANOPUS CHALLENGE

As I mentioned in our February Newsletter the 2nd brightest star in the sky **Canopus Mag -0.62** can just be seen from Tulsa as it transits due south. Canopus is 309 Light years distance. It is 49 times the diameter of the sun and shines 13,500 times brighter.

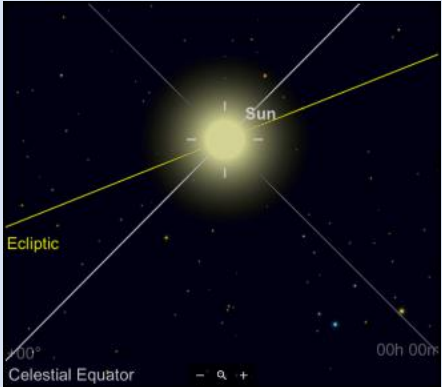
When I first moved to east Broken Arrow, I could just barely see it from the elevated area of our neighborhood park. The trees are too tall to do that now. However, I have seen it several time from our hilltop observatory location which is south of Tulsa. I remember fondly observing it easily with my mother from our driveway in McAlester.

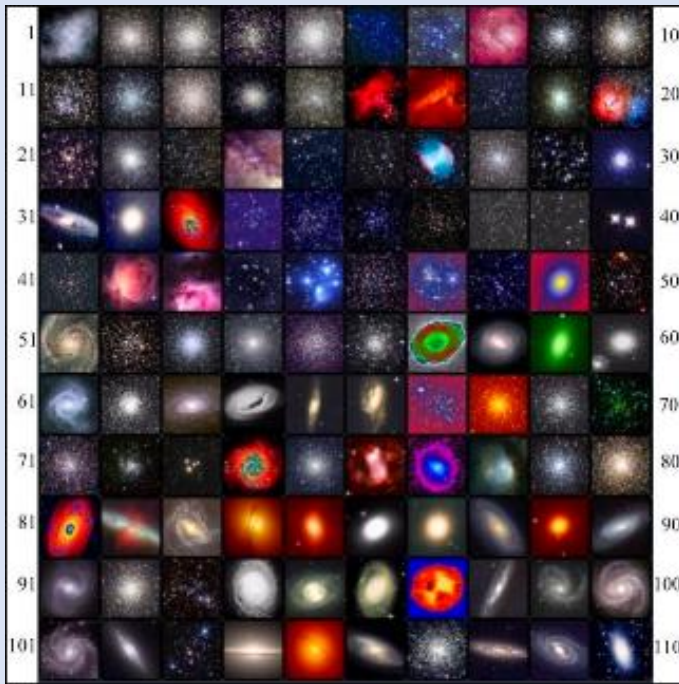
Canopus transits 20 minutes earlier than Sirius.
On March 5 it transits at 19:52 CST - March 15 @ 20:13 DST
and March 30 @ 19:14 DST

Each day it transits 4 mins earlier.

You'll need a clear horizon view to the south. Look for it about a finger width above the horizon. Binoculars may help but it can also be seen easily naked eye if the sky is clear.

Spring officially begins with the **Vernal Equinox** when the Sun crosses the Celestial Equator moving North at Declination 0 deg and Right Ascension 0 hours. This year the Vernal Equinox occurs at 10:23 AM DST on March 20, 2022





Are you up for the challenge of the Messier Marathon April 2nd

Each spring 100's of amateur astronomers are drawn into the darkness in a quest to observe all 110 objects in Charles Messier's Catalogue of Deep Sky Treasures. They turn their telescopes eagerly toward the vast denizens of Virgo cluster galaxies. Staving off drowsiness with numerous cups of coffee they welcome the Summer Milky Way as it rises in the east after midnight. Then desperately fight onward to catch the Autumn sky and the Andromeda Galaxy before it is swallowed up by the dawning Sun. Hold on there! I must be suffering from excessive starlight exposure.

Seriously, the Messier Marathon is a night that club members get together to encourage each other to find as many of the Messier Objects as they can in a single night. Whether you find a few dozen or nearly 100 it's an experience all will enjoy.

The first 10 days in March are great time to get started and hone your observing skills. Choose a couple of the charts in the links below and try to locate all the objects on that chart. Many of them can be found from suburban skies. Turn off those fancy GoTo features and find them yourself using the star charts. Our [April 2021 Newsletter](#) has a good article explaining how to find the Field of View in your telescope eyepieces. They "Star Hop" from a know star to locate your desired object. Just manually use your controls to move the scope until you find the Deep Sky object. Take a bit of time to look at it. Maybe even make a sketch of it. If you've never done the [Messier Certificate program](#) this is good time to start. Print Off Charts 3,4 & 5 in the link below and see how many you can find.

FOR OUR MEMBERS - THERE WILL BE A SIGN UP FOR THE MESSIER MARATHON LATER IN MARCH.

Messier Marathon Packet - Made in 2016 - its good in 2022 as well

<https://okmcd.com/pub/MessierMarathonCharts.pdf>

Printable PDF charts or ones that can be stored on a computer.

7 pages of Log sheets to check off your progress arranged by sequence and Suggested times for conducting your search.

17 pages of detailed charts showing the location of each object. Identified by sequence number.

Excellent Explanation and strategy for planning your observation Sequence

- Note- The resources at the end can now be found online.

<http://www.richardbell.net/marathon.html>

Single Page printout of the Sequence search list

http://www.richardbell.net/files/messier_list.pdf

Three Page Log sheets -

<http://www.astunit.com/tonkinsastro/messier/messmara.pdf>

For observers using different instruments during the night - this one has columns to identify which instrument

Messier Marathon 2022

<http://www.messier.seds.org/xtra/marathon/mm2022.html>

Notes specifically for 2022

Telescope 101 Workshop - Sat. Feb 19 at Tulsa Air & Space Museum

Our 2022 workshop was successful with 54 people attending to get help understanding how to set up their telescope and begin using them better for better observation.

A special thanks for our club, **Vice-President Bryan Kyle** - planetarium director at TASM - who helped us make all the arrangements to host the event and to set up tables and chairs.

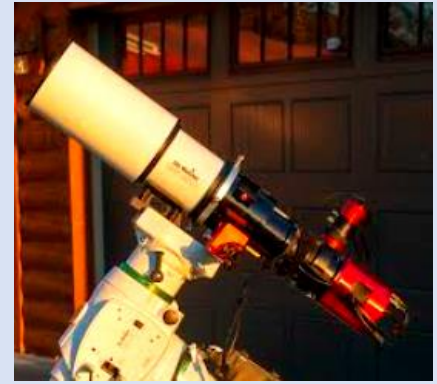
Big Thanks also to all our Astronomy Club Volunteers - **Jerry Cassidy, Tamara & Owen Green, Adam Koloff, John Land, Jack Reeder, Krystal Reyes, Dana Swift and Skip Whitehurst**





My New Adventures in Astro imaging - By Stan Davis

I purchased a new astrophotography camera late last year. It has been a real struggle to get everything going. Upgrading from a DSLR camera (Digital Single Lens Reflect) is more complicated than I expected. I had to learn new software for controlling the camera, focuser, telescope and guide camera. I had been using a Cannon software called Backyard EOS premium. It is a very well written program with a very user-friendly interface. I have used it for many years. My telescope is a Skywatcher Esprit 80 ED Super APO f/5



My new camera is a ZWO ASI2600MC pro. I decided on a color camera in hopes of keeping the learning curve down, but I did get a manual filter drawer for a dual band filter I bought with it. I also upgraded to a ZWO focuser and a ZWO OAG and ZWO 290mm mini for a guide camera. In order to control and operate all of this I had to find a program to operate my new equipment. I tried Sequence Generator Pro and Astrophotography Tool. I liked both of them but decided to go with Astrophotography Tool for now. It seems to be more like Backyard EOS.

Anyway, after loading many drivers and testing everything indoors, I moved the setup outside and spent a couple nights trying to get it focused and aligned. I had to do a rough focus during the day on both the Telescope and the guide camera. That moved things to a more positive evening. I was able to focus with a Bahtinov mask. Eventually got plate solving to work and was able to guide and take images. Plate Solving is a software algorithm that looks at the image and moves the telescope to center the object.

I am running a separate program called PHD2 to guide the telescope. It communicates with the guide camera (ASI290 mini) and the mount. My guide camera is mounted in the ZWO OAG. (Off Axis Guider) The OAG has a small prism that is just out of view of the camera sensor but still in the field of view of the telescope. I am also using an external computer that is outside with the telescope and mount. It has all of the astronomy software and drivers installed. I have an ethernet cable that runs from the computer into my house. It is plugged into my router or my laptop. That depends if I want it on my home network or if I want to just connect it directly to my laptop. The computer outside is a Kingdel industrial fanless PC running Windows 10. I can remote control it from my laptop with Windows Remote Desktop Connection.

I still have a few kinks to work out, but I am really excited about the quality of this camera. The new CMOS cameras are very low noise and have very small pixels. I hope this gives you some insight toward making the bold leap into astronomy imaging

Click the images below for Recordings of our January Meeting on the James Webb Telescope

Zoom Meeting

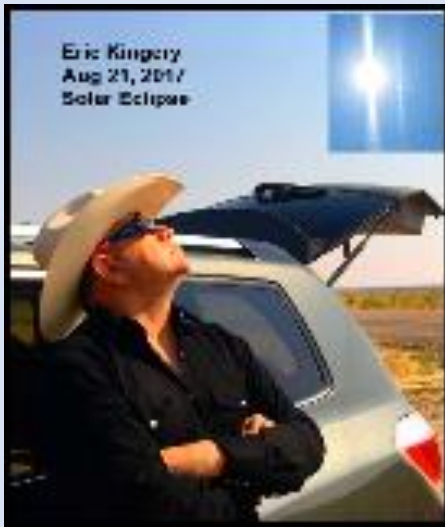


Interview - Dr John Mather



Insane Engineering of JWT





Enjoying a Remote Telescope Session via Zoom

Member Eric Kingery - shown here in Idaho observing the Aug. 21, 2017 Total Solar Eclipse shared his experience participating in a live Remote Telescope imaging session hosted by the [Kalamazoo Astronomical Society](#). The club shares space at a remote observatory in Sky Village Arizona featuring a 20" Planewave Telescope and a 4" Takahashi.

Each session selects an area of sky to explore over two hours. The telescopes use CCD cameras which produce images live during the viewing sessions. The one I attended at the end of January focused on the star clusters in and around Orion's sword.

The session was chaired by a member of the club, while Richard Bell, the club president, ran the telescope. These are informal sessions with everyone invited to participate and to ask questions. All levels of amateurs participate in the sessions that are broadcast on Zoom. I was amazed at the clear images Richard put up on the screen as well as the expert running commentary of interesting dialogue about each object and location of each object. Anyone interested in astronomy from beginners to more advanced observers, especially those devoted to astrophotography, would find these sessions interesting.

Over 100 people from all over the country, as well as Canada, attended the same session that I did. In the session that I watched, old familiar objects, like the Orion nebula and the Horsehead nebula were viewed along with ones new to me, such as the Cosmic Bat in the constellation Eridanus. Our members are welcome to join any of these for free and all that is required is that you register online in advance. I really did enjoy the informal exchange of the club members and how much fun more experienced, and newcomers shared in the viewing experience.

You can watch YouTube a recording of the [January 16 Online Viewing Session](#) Older ones are also on their [KAS YouTube channel](#) - Scroll down toward the end of the list.

Due to the time zone differences they only do the live Zoom sessions from November through February. So, the winter 2022 session will have concluded by the time you read this newsletter. However, you can see recordings of previous sessions on their YouTube Channel.

Astronomy, as a hobby, can often be a solitary pursuit. This forum gives everyone an opportunity to engage with others across the country with the same love of the sky.

Their [KAS YouTube channel](#) also has a variety of tutorial session on other topics.

Here are three our new members may enjoy.

Introduction to Amateur Astronomy Part 1 - [Our Place among the Infinities](#)

Introduction to Amateur Astronomy Part 2 - [Discovering the Night Sky](#)

Introduction to Amateur Astronomy Part 3 -

[The Ideal Started Instrument - Binocular Basics](#)

More lessons are planned

Reba and Cano

By Brad Young

Winter can make it hard on a person to do astronomy outside at night. Sometimes it's just too frigid to drag out the scope, and you must enjoy little things, like watching well known pairs of bright stars rising together on clear cold nights. (Valentine's Day "pairs" inspired this article a bit too). A few couples that I enjoy watching include Betelgeuse and Rigel in Orion, Procyon and Sirius (the Dog Stars), Regulus and Alphard, and Arcturus and Spica. These pairs are bright enough to see from your window, while you enjoy hot chocolate inside. I particularly like watching the Dog Stars rise, because I have a big dog ([Cano](#)) and a smaller one ([Reba](#)), just like the legend associated with these constellations.

I wondered how closely each pair rises together, and what effect latitude would have on the closeness of their rise time. I called this delta in the table below, defined as first star rise time until second star rise. The calculations are shown [here](#).

Folks read these articles at many latitudes, even in the Southern Hemisphere, but I decided to focus on three latitudes, all in the Northern. I'm sure the southerners have their own pairs, and if they let me know I could prepare a table like this for them. The latitudes I selected are for Lansing Michigan, Tulsa Oklahoma, and Gurudev Observatory, India.

PAIR	LANSING DELTA	TULSA DELTA	GURUDEV DELTA
BETELGUESE / RIGEL	0:17	0:05	(0:15)
PROCYON / SIRIUS	0:29	0:11	(0:18)
REGULUS / ALPHARD	0:36	0:20	(0:06)
ARCTURUS / SPICA	1:07	0:42	0:01

The effect of latitude is interesting on these pairs, especially seeing that Procyon (ancient Greek for "before the dog") doesn't precede Sirius in India but is instead 18 minutes slow.

I was also surprised that some of the pairs I thought rose together at my latitude are further apart than it seems when you watch them rise. Arcturus and Spica don't come up that closely together, but they are nice to see, knowing all the treasures in the sky between them. Speaking of that, I don't need to tell you that there are a lot of deep sky objects between each of these star pairs and in their respective constellations. The one case that doesn't quite fit this pattern is Procyon, and its constellation Canis Minor. More on that later; first, a look at the stories behind the star group and its lucida.



The modern view of the Greco-Roman tale is that Canis Minor is the smaller of Orion's two hunting dogs. [Ancient and non-European cultures often saw star patterns differently](#), but there are several similar tales about the Dog Stars. The 15th century Tartar astronomer Ulug Beg designated it as Al Shamiyyah, essentially "northern Sirius". Euphratean scholars identify it with the Kakkab Paldara of the cylinders, the Star of the Crossing of the Waterdog, a title evidently given with some reference to the River of Heaven, and the adjacent Milky Way. The ancient Chinese had Procyon as Nan Ho, "the Southern River", in which beta (β Gomeisa) and eta (η) were included. With the natives of the Manuae [Cook] Islands it was their goddess Vena. [\(1\)](#)

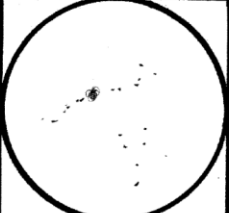
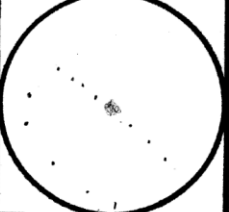
A look at Canis Minor to see what deep sky objects are there and which ones I have seen before led to the conclusion that there aren't very many. In the New General Catalog list (NGC), there are only 19, and several of those are just close multiple stars that look fuzzy and were mistaken for a cluster or galaxy. Rejecting those, I reviewed my records and sketches and found four I have visually observed. Be aware, though, that these observations were all made using a 22" Dobsonian telescope.

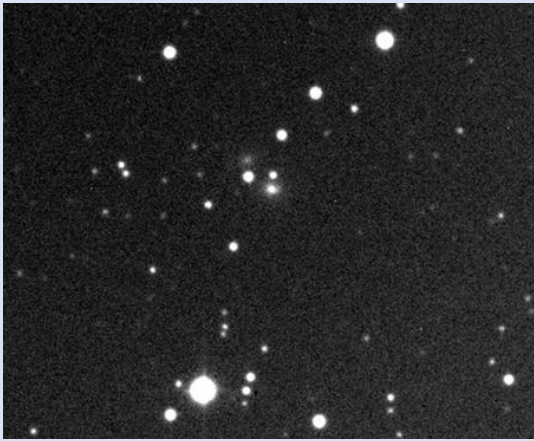
NGC	R.A.	Dec	TYPE	MAG
2394	7 h 29 m	+ 7 ° 02 '	Open Cluster	N/A
2402	7 h 31 m	+ 9 ° 39 '	Galaxy	15
2470	7 h 54 m	+ 4 ° 27 '	Galaxy	14
2508	8 h 2 m	+ 8 ° 34 '	Galaxy	14

Below are the sketches I have made.

For comparison, I decided to image them again because my [survey images](#) were poor.

H4's

HERSCHEL OBSERVATIONS				
NOC 2402		SITE ACT	SEING II	TRANS II-
CONST		INSTR 22UC	EYEPICE 10	POWER 240
DATE 4/9/19		COMMENTS SMALL, DIM, SOME FS OR HII REGIONS QUINSED		
TIME 4:15		MCE LINE OF FS IN/OUT OF π		
NOC 2508		SITE ↓	SEING ↑	TRANS ↑
CONST		INSTR ↓	EYEPICE ↑	POWER ↑
DATE 11		COMMENTS SIMILAR FS LINE, BUT $\phi + 90^\circ!$ GX MORE EVEN		
TIME 4:25		LESS DETAIL, HINT OF ARM OR CLUB ON ONE EDGE		

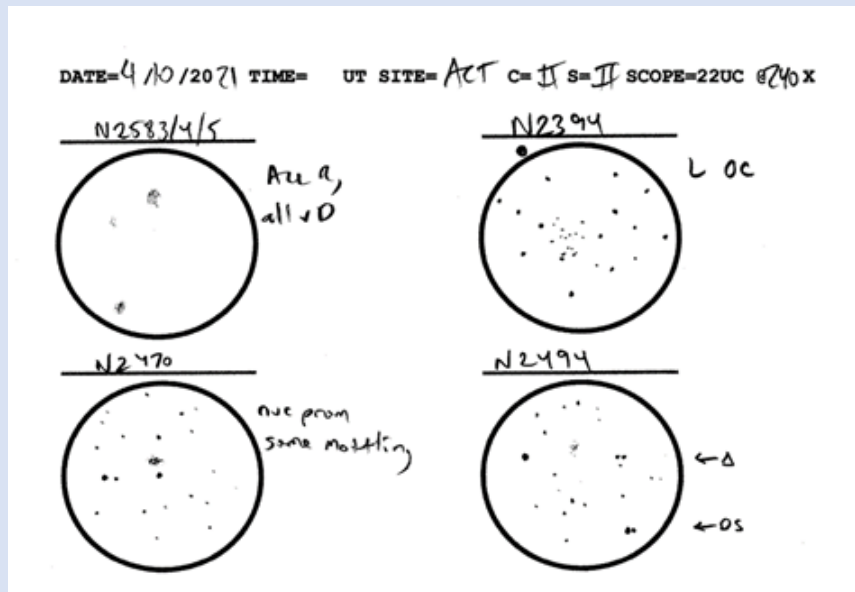


NGC 2402



NGC 2508

NGC 2402 and 2508 seemed alike to me, small and dim with some hints of detail [not borne out by images]. A line of faint field stars was noted for each.



NGC 2394



NGC 2470

NGC 2394 did not impress – a large, poor open cluster. However, it is easy to locate, with eta (η) Canis Minoris in the same field. In my sketch, NGC 2470 was called “not prominent” with “some mottling”. It was seen between two stars as listed in the catalog.

Note: you can also find the NGC 2402 / 2508 sketches, and the majority of all the ones I’ve done for AL Astronomical Programs [here](#). These are in the Herschel 3 and 4 list.

The NGC 2394 / 2470 sketches are among those [here](#), in my ongoing project to visually observe all the NGCs. Those sketches are grouped by date of observation.

Although I love my smaller dog Reba a lot, I can't say the same for her representative in the sky. Canis Minor has one of the brightest stars, Procyon, and a rich history of star lore. But for deep sky objects, I'm afraid it is not the leader of the pack. Even so, the next time you have a clear winter night, check out a few of these objects and see for yourself. Or stay in with your sweetie and watch these famous star pairs rise together with a cup of hot cocoa.

References:

(1) <https://www.space.com/22929-procyon.html>

Image of Orion and his dogs: <https://bobmoler.wordpress.com/2020/02/17/02-17-2020-ephemeris-a-look-at-orion-and-his-hunting-dogs/>

<https://hafsnt.com/index.php/2021/08/24/cano/>

<https://hafsnt.com/index.php/barks-and-parks/>

<https://hafsnt.com/index.php/2022/02/15/rise-time-table/>

<https://hafsnt.com/index.php/ngc-new-general-catalog-project/>

<https://hafsnt.com/index.php/al-programs/>

<https://hafsnt.com/index.php/ngc-new-general-catalog-project/>

<https://www.astroleague.org/content/alternate-constellation-observing-program>

All deep sky images and sketches by author



Tired of Cold or Cloudy nights? Enjoy the Stars Indoors by taking in a show at the spacious Jenks High School Planetarium. Most shows are on Tuesday evenings. Check the schedule of shows and make your reservation at

<https://www.jenkscommunityed.com/jenks-planetarium>

Mar. 1	Earth, Moon & Sun*	6:30pm
Mar. 8	Family Space Talk: <i>New!</i> Space Flight	6:30pm
Mar. 22	My House Has Stars*	6:30pm
Mar. 29	The Sistine Chapel**	6:30pm
Apr. 5	Family Space Talk: <i>New!</i> Coral Reef Preservation <i>Guest Speaker from Jenks Aquarium - Holly Moth</i>	6:30pm
Apr. 12	Animals of the Sky*	6:30pm
Apr. 19	Compass, Calendar, Clock	6:30pm
Apr. 25	Spacepark 350*	6:30pm
SATURDAY EVENING SHOWS		
Feb. 12	The Winter Sky	8pm
Mar. 12	How to Use My Telescope	8pm
Apr. 9	The Spring Sky	8pm



This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach.

Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Embracing the Equinox

David Prosper

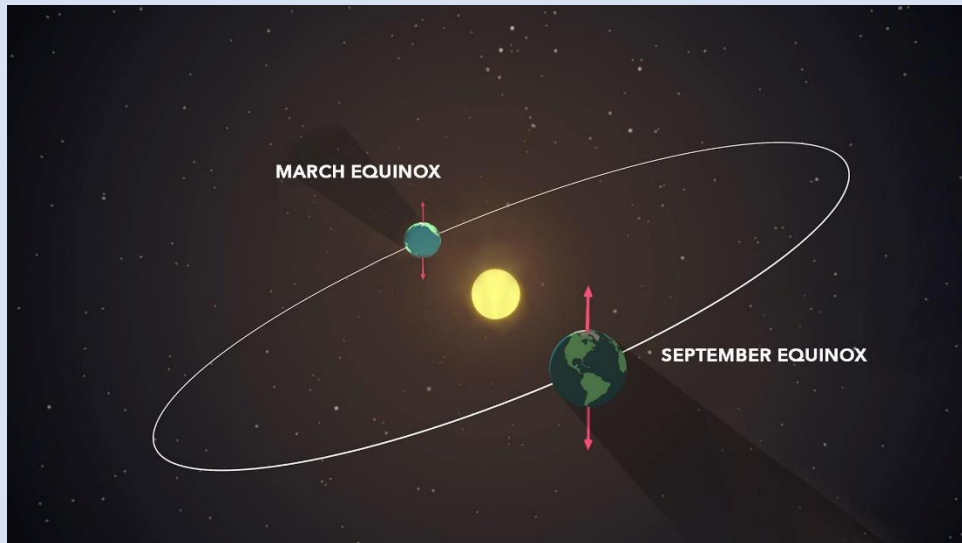
Depending on your locale, equinoxes can be seen as harbingers of longer nights and gloomy weather, or promising beacons of nicer temperatures and more sunlight. Observing and predicting equinoxes is one of the earliest skills in humanity's astronomical toolkit. Many ancient observatories around the world observed equinoxes along with the more pronounced solstices. These days, you don't need your own observatory to know when an equinox occurs, since you'll see it marked on your calendar twice a year! The word "equinox" originates from Latin, and translates to **equal** (equi-) **night** (-nox). But what exactly is an equinox?

An **equinox** occurs twice every year, in March and September. In 2022, the equinoxes will occur on March 20, at *or 10:23 am CDT*, and again on September 23, at *8:00 pm CDT*. The equinox marks the exact moment when the center of the Sun crosses the plane of our planet's equator. The day of an equinox, observers at the equator will see the Sun directly overhead at noon. After the March equinox, observers anywhere on Earth will see the Sun's path in the sky continue its movement further north every day until the June solstice, after which it begins traveling south. The Sun crosses the equatorial plane again during the September equinox, and continues traveling south until the December solstice, when it heads back north once again. This movement is why some refer to the March equinox as the **northward equinox**, and the September equinox as the **southward equinox**.

Our Sun shines equally on both the Northern and Southern Hemispheres during equinoxes, which is why they are the only times of the year when the Earth's North and South Poles are simultaneously lit by sunlight. Notably, the length of day and night on the equinox aren't precisely equal; the date for that split depends on your latitude and may occur a few days earlier or later than the equinox itself. The complicating factors? Our Sun and atmosphere! The Sun itself is a sphere and not a point light source, so its edge is refracted by our atmosphere as it rises and sets, which adds several minutes of light to every day. The Sun doesn't neatly wink on and off at sunrise and sunset like a light bulb, and so there isn't a *perfect* split of day and night on the equinox - but it's very close.

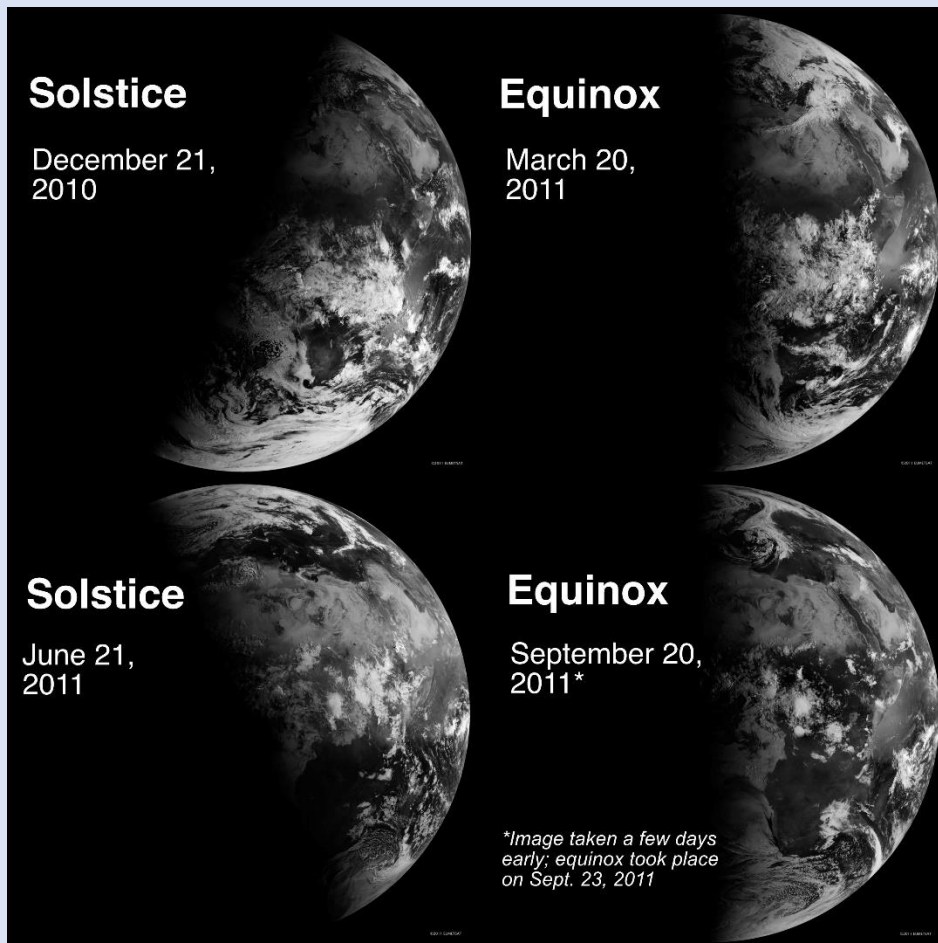
Equinoxes are associated with the changing seasons. In March, Northern Hemisphere observers welcome the longer, warmer days heralded by their **vernal**, or spring, equinox, but Southern Hemisphere observers note the shorter days – and longer, cooler nights - signaled by their **autumnal**, or fall, equinox. Come September, the reverse is true. Discover the reasons for the seasons, and much more, with NASA at

nasa.gov



This (not to scale) image shows how our planet receives equal amounts of sunlight during equinoxes.

Credit: NASA/GSFC/Genna Duberstein



Scenes of Earth from orbit from season to season, as viewed by EUMETSAT. Notice how the terminator - the line between day and night - touches both the North and South Poles in the equinox images. See how the shadow is lopsided for each solstice, too: sunlight pours over the Northern Hemisphere for the June solstice, while the sunlight dramatically favors the Southern Hemisphere for the December solstice.

Source: bit.ly/earthequinox Images: NASA/Robert Simmon

TREASURER'S and MEMBERSHIP Report

BY JOHN NEWTON



As of Feb 22, we had **211 members** - **9 New member for 2022**

We welcome this month our newest members - **Charles Bear, Mahogany Jones, Susan Sailing, Lauren Herrington, Cortney Scott, Timothy Potteiger and Amanda Sparks Hello and welcome to ACT!**

In addition, we want to recognize our long-term members who continue to renew their memberships with the club even in these restricted times. Finally, we can breathe easy again soon as restrictions continue to lift. Also, we look forward to seeing everyone at our virtual meetings by Zoom, General Meetings and at club events throughout the year when possible.

Accounts as of February 22, 2022

Checking: \$ 6,143.78

Savings: \$ 13,787.00

Investments: \$ 31,981.32 (Value tends to fluctuate with markets).

The club now has **PayPal available for you** to start or renew memberships and subscriptions using your credit or debit cards. Fill out the registration form at <https://astrotulsa.com/page.aspx?pageid=16> **Click Submit** and you will be given the choice of either **mailing in your dues** with a check **or using PayPal** which accepts most major credit cards. A modest processing fee is added to PayPal transactions.

You may also renew your membership or join at one of our club events using your credit card by seeing one of our officers. We can take payments with the Square card reader. A small fee is also added on to these transactions.

ALSO NOTE: For our current members who are renewing their memberships, you can now go to a new link on the website to start your renewal process. On the home page, hover over the "Member" tab on the ribbon menu near the top of the page. Then select the "Membership Renewal" link and this will take to a page to fill out your information. Fill this out, submit it, then pay your dues by the method you choose.

NEWS NOTE: Both Sky & Telescope and Astronomy have free Digital subscriptions available with print subscriptions, or Digital subscriptions may be purchased separately. Details - Contact their websites

Membership rates for **2021** are as follows:

Adults: \$ 45 per year, includes Astronomical League Membership.

Sr. Adult: \$ 35 per year for those 65 or older, includes Astro League Membership.

Students: \$ 30 with League membership; Students: \$ 25 without League membership.

Additional Family membership: \$ 20 with voting rights and League membership.

\$ 15 with voting rights but without League Membership.

The regular membership allows all members in the family to participate in club events but only **ONE Voting Membership** and one **Astronomical League membership**.

Join Online – Add or renew magazine subscriptions. <https://www.astrotulsa.com/page.aspx?pageid=16>

Magazine Subscriptions: If your magazines are coming up for renewal, try to save the mailing label or renewal form you get in the mail. Forms are available on the club website. Both magazine now include online access with paid subscription.

Astronomy is \$ 34 for 1 year, or \$ 60 for 2 years. www.astronomy.com

To get the club discount you must go through the club group rate.

Sky & Telescope is \$ 33 per year <https://skyandtelescope.org/>

Sky & Telescope also offers a 10% discount on their products.

You may renew Sky & Telescope subscriptions directly by calling their number **-be sure to ask for the club rate**

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SIDEWALK ASTRONOMY – **Open Position**

PR AND OUTREACH – **Open Position**

GROUP DIRECTOR – **Open Position**

NIGHT SKY NETWORK – **Open Position**

WEBMASTER JENNIFER JONES

Shared by Skip Whitehurst



Do you have ideas for our club In Person or ZOOM Meetings?

Want to share an observing experience or astrophoto.
Know someone willing to be a Guest presenter?

We would also welcome YOU to do a short 5-10
minute section of interest or new equipment you'd
like to review.

Create a Cartoon on a Space Theme

Contact our Editor John Land

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