



OBSERVER

MARCH 2021

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



See more Mars 2020 Links on page 5



Mark your calendars <http://www.okie-tex.com/>

Friday Oct 1st to Saturday Oct 9th

The Oklahoma City astronomy club has announced plans for the 2021 Okie-Tex Star Party dark skies at the western tip of the panhandle

Tuesday March 23 - 7:00 PM - Monthly Club Zoom Meeting.

Zoom link will be emailed closer to meeting date.

Amateur Astronomer Searching for Exoplanets -



Presenter Philip Scott shares his successful quest to search for and discover an Exoplanet. On July 14, 2020, the [Habitable Exoplanet Hunting Project](#) announced the discovery of a candidate planet orbiting the red dwarf star GJ3470. The planet will be the first totally amateur discovery of a planet since William Herschel's discovery of Uranus in 1781. Phillip Scott discusses the history of planet discovery, what it takes to detect new planets and how he got involved with a project managed by a worldwide network of amateur astronomers looking for nearby habitable planets.

Phillip retired from teaching science at McAlester High School in 2014 and Eastern Oklahoma State College in 2017. In 2007 he built a domed observatory at McAlester High School. It houses the Phillip R. Scott telescope, a 12" Meade LX-200. Scott is an active member of the Oklahoma City Astronomy Club and helps put on the annual Okie-Tex Star Party. Scott credits a seventh-grade science teacher with sparking his interest in astronomy in 1964. That is when he purchased a 2.4" refractor. He was later part owner of a 24" Newtonian reflector at Eastridge Observatory near Savanna, OK. He now operates a 12.5" Newtonian, with which he hunts exoplanets.

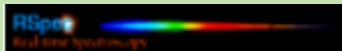
He was a 2002 recipient of the AOK Physics Teacher of the Year award and in 2008 Phillip was a finalist for Oklahoma Teacher of the Year. Last month the OKC Astronomy Club awarded Phillip, and his wife Caren, the E. Ken Owen award for their contribution to astronomy. Phillip and Caren operate a ranch near Kiowa, OK and enjoy astronomy from the OKSky Observatory located in their backyard.



A YouTube of our [January 19 Zoom meeting](#) is now available online
Featured short talks Stacking Digital Photos, Books for Novice astronomers, Meteorites samples.

Main program - [NASA's Search for Meteorites in Antarctica](#)

Our Feb 16, 2021 meeting is now at YouTube recording at <https://youtu.be/2F-HjCNiefw>



Our Presenter Tom Field of www.RSpec-astro.com gave an entertaining and informative presentation about how astronomers and chemists have learned to read the composition stars by examining the spectrum of starlight. He also demonstrated how amateur astronomers can imagine and examine these spectra



June 4-6, 2021 MidStates Regional astronomy Conference will be held at the NSU campus in Broken Arrow.

Fellow astronomy enthusiasts from a five-state region will gather to hear a variety of presentations. We will also have an opportunity to learn and share ideas from other clubs in our region.

Key Note Speaker - **Dr Kat Gardner-Vandy** - Planetary Scientist - Assistant professor of Aviation & Space at OSU

Others include: **Don Ficken Jr** - International Dark Sky Association

Gary Fugman - NE Nebraska club, **Bill Murrell** OKC club

Seth Fenderson, Horkheimer/O'Mera award winner

Peggy Walker - Astronomical League

There will also be astronomy product vendors and banquet. Registration details will follow later.

PRESIDENT'S MESSAGE

BY TAMARA GREEN



Hey Y'all !!

Spring is arriving! Daylight Saving Time begins on Sunday, March 14, and Saturday, March 20 is the Vernal Equinox! Yay warmer weather! This makes me happy, because my body can no longer handle bitter cold temperatures for very long, so warmer weather means I will get to come out and observe with y'all again!

Sadly, though, we will not be doing an official Messier Marathon this year due to the ongoing pandemic. Ron and Maura still do not feel comfortable having people over, despite this event being members-only, and I really don't blame them. They would like for us to consider doing a star party with them later in the year, maybe in the Summer or Fall. Plans for that are on my calendar. I do not see, however, why those who want to can't just do an "unofficial" marathon at the observatory during the New Moon weekend though. If you want to spend the night hunting M objects, that's great! New Moon is on Saturday, March 13. However, due to concerns about Corona and communal food, there would not be a potluck. We would have to bring our own snacks and drinks. It's just an idea. Let me know what y'all think!

I will be calling a board meeting shortly to discuss upcoming events, projects, etc. I have not called one in a while, since Owen and I have had some things happen that we are having to take care of right away. During the nasty winter weather, we had recently, DESPITE our leaving the water on to drip, our pipes froze and busted! We have been trying to contact plumbers, and finally got one who can come out on the 5th! So, we have not had any running water so neither of us have been in the best of moods. We are ready to get this mess over and done with so we can get back to doing Astronomy! I hope that all of y'all have been luckier than us!

Hopefully, with the new vaccines, the number of new cases will drop dramatically, and we will soon be back to normal! I look forward to seeing you in the Spring and throughout the rest of the year.

Stay Safe and Clear Skies, Tamara Green



New additions on our [website observing page](#) Click each image to see what's new.

Links to Mars Perseverance Rover [Mars 2020 Mission Home page](#)

Videos - [Mission Control Final moments](#) [Perseverance Onboard Camera views](#)

[Mars 2020 Perseverance Rover - What's Different This Time?](#)

[MRO Orbit image of Landing site](#) [Mars Image Gallery](#) [Make your own Selfie on Mars](#)

March Skies. - The winter constellations are still observable on early March evenings. So plan to get few them before they bid farewell until December evenings. Many nebula and star clusters await eyes eager to peel back the curtain and peer into the depths of the sky. [Try this site](#) to learn more about these jewels in the night.

Alas the bright planets we enjoyed all winter are gone from the evening sky. Only Mars and dim Uranus linger for evening viewers. Mars is passing near the Pleiades cluster in Taurus the first week of March but is now too distant to see much surface detail. Uranus is a 6th magnitude target accessible in binoculars or small scopes that lingers in the SW a couple of hours after dark.

Daylight Savings time begins March 14th robbing us of an hour of darkness in the evening. As a result, many will be rising well before sunrise to enjoy the "summer" constellations as they reappear before dawn. Jupiter and Saturn in Capricorn have emerged in the dawn sky low in the SE but are now 10 degrees apart. Mercury & Jupiter have a close conjunction on Friday morning March 5 - 1/3 degree apart but only 10 degrees up an hour before sunrise. On March 10 a thin waning crescent moon joins the trio of Saturn, Jupiter and Mercury strung out in a row 14 deg. long. Venus is at superior conjunction behind the sun Mar 26 and will not be visible until it emerges in the evening sky in late April.



Spring arrives officially with the Vernal Equinox on March 20 at 4:37 CDT as the sun crosses the equator at 0 hrs Right Ascension. That evening you can observe the "Lunar X" formed as the sun rises on crater rims near the shadow terminator. The best time will be at sunset 7 to 8 PM CDT. The moon will be easily visible high in the southern sky. See our [June 2020 Newsletter](#) for details and images taken by our members.

The brightest asteroid [4 Vesta](#) reaches **opposition March 4** in the tail region of Leo near the star Theta Leonis. At 6.2 magnitude it is an easy target in binoculars and small telescopes. Make drawings of your observations a couple nights apart and you can easily see it change position among the stars. The Dawn spacecraft orbited Vesta for a year in 2011-12.

For an interactive finder chart go to <https://in-the-sky.org/findercharts.php?objtxt=A4&duration=5>

Planetarium shows are a good way to enjoy astronomy without the hassle of clouds and cold. [Tulsa Air & Space museum](#) planetarium is now open Thursday thru Saturday.

[Jenks High School Planetarium](#) - has a variety of shows from 6:30 to 7:30 PM on Tuesdays
Preregistration is required and seating is limited for social distancing.

By Editor John Land

As Far as the Eye Can See

How to see Flares of Geostationary Satellites

By Brad Young

Twice a year, near the equinoxes in spring and fall, there is a short period of time when the geostationary satellites are visible in small telescopes, binoculars, and even naked eye. You need to know when and where to look; it takes a little preparation and effort. The reward is seeing the most distant man-made objects out there visible to us.

First a little information about the satellites themselves. Geostationary satellites are so named because they have been placed in an orbit that keeps them over one spot on earth all the time. Because of this placement, these satellites are often used for TV or communication transfer and linkages (e.g. Dish Network). The satellites are placed as close to over the equator as possible and at the desired longitude for the market.

Around the equinoxes, the sun is moving in the sky from one side of the equator on the earth to the other. This means that for a few nights, the alignment of geostationary satellites, which have large solar panels for power, reflect the sun back to an observer on Earth. Because a geostationary satellite is, well, stationary relative to the observer, it may flare for up to 10 minutes or more. The flares can be as bright as magnitude 2. Most flares are in the magnitude 6 to 11 range, so they are better seen in binoculars or a small telescope.

There are many resources on the internet that explain further what the satellites are, how they are designed, details on the orbits and other topics that you may want to explore further. But for the purposes of this article, I would like to focus on trying to see a few of these in spring and fall, using simple methods and a few pointers on when and where to look for each season.

When I first began looking for flaring geostationary satellites, I read all kinds of articles and spent many nights staring right at the spot in the sky where I thought they would be. I was looking in the center of the shadow of the Earth projected into space, which, it turns out, is the only place you can be *absolutely certain* you will *never* see one.

What I needed was a practical guide to help me, and when I found one, it was both easy and fun. Watching a single "bird" appear to glide through a field of stars, or a group of up to five move along in formation is one of my favorite astronomical activities. And, if you need to take a break, even with no drive on your scope, feel free. When you come back, the satellite will still be there (unless it went into the Earth shadow). After all, its stationary.

Finding the Coordinates

To find the targets, we will need the following coordinates:

1. Declination of travel **(DOT)** – constant for your location
2. Date of best alignment **(DOBA)** – constant for your location
3. Location of Earth's shadow **(LES)** – moves 1° east each day
4. Date

Declination of Travel (DOT)

The declination of travel (DOT) is a line in the sky along which all the geostationary satellites will appear to travel as seen from your location. The DOT along which the satellites appear can be calculated easily using trigonometry. For convenience, refer to Table 1 and the end of this article for the DOT for several cities in the world. You can interpolate for other locations. The DOT is the same for both spring and autumn.

Date of Best Alignment (DOBA)

Another coordinate that is constant is the date of predicted brightest flares. This day is found by determining the date sun reaches the declination line of travel for your site. This angle maximizes solar panel reflection back to you on the surface of the Earth at night. I also list on Table 1 the typical DOBA for each season. Remember that flaring may occur for several days before and after DOBA.

Location of Earth's shadow (LES)

The next coordinate does change every night. The LES lies along the DOT and guides us to where we will have the best chance of a bright flare from the satellite. As the satellites get closer to lining up to reflect the sun back at you on the ground, they also get closer to being blocked from the sun by the Earth. So, the point along the DOT to see a flare is 20-30 minutes before the satellite enters the shadow of the Earth (shadow *ingress*), and then again (up to 30 minutes), when it emerges (*egress*). There is about 60 minutes between the two best times to look – this is the time it takes for the satellite to “move” across the width of Earth’s shadow in the sky.

I have included Table 2 (for March / April) with suggested search areas based on the location of the Earth’s shadow for the period of interest. The shadow location is simply 180° from the sun. Since the shadow is about 15° wide, you will want to look at least 10° to 20° west of the center of the shadow for flares before shadow ingress and the same distance east for flares after shadow egress. The Right Ascension (RA) is the same for all locations, only the declination changes, based on the DOT, so you can interpolate if necessary. You can also interpolate before and after the table range, using a change in sweep range positions of about 4m of RA every day.

Typically, flares are brighter before ingress in the evening before local midnight. The flares after egress are often the brighter ones after local midnight. Remember that local midnight is actually 1:00 a.m. during Daylight Saving Time.

Date

Our final coordinate is the date, and it leads to where in the sky to look for flaring geostationary satellites. Sweep your eye or scope along the DOT as shown on Table 1, along the range of Right Ascension given by Table 2. As an example:

Location = Tulsa

Date = March 6

DOT (from Table 1) = -5.6 deg

From Table 2:

Sweep range before shadow ingress = 9h 56m to 10h 32m along -5.6° declination

Sweep range after shadow egress = 11h 40m to 12h 16m along -5.6° declination

You may find a star that seems to be moving with respect to the other stars in the field. Note that this movement may be quite slow especially with binoculars or naked eye. The speed at which the satellite appears to go along the DOT is 1° (two full moon widths) every 4 minutes. (Because this is the speed at which Earth rotates about its axis). If you are using a telescope at 50 power, this motion will appear to be 50 times faster. That will probably be noticeable, especially if the satellite passes by a group of stars. It may be more difficult to notice the movement with binoculars or eyes alone.

My advice at least for your first attempt would be to go ahead and sweep along the DOT with a telescope at least 50 power. Keep in mind that if you increase the power too much - say 150x or above - the field of view may be too small, and you may not be at the position you need. Even small telescopes will pick up some flares, and the objects are easier to notice with the effect of magnification.

Instead of trying to predict and find targets that may be flaring, I have found more success sweeping along the DOT, checking on star groups or asterisms along the way. As a flaring satellite appears to move past a group of stars, you can record the time and identify which satellite it was later. The Right Ascension is given by the stars you see the satellite pass, and the declination is always the DOT.

Remember also that these are suggested ranges; there may be flares beyond the suggested sweep range, or even slightly different than the DOT.

Naked Eye Observations

Although it can be more difficult to notice the satellite “moving” using just your eyes, here are some helpful hints. If you see a star along the DOT that was not there before, and isn’t on star charts, it is probably a flaring satellite. For instance, in spring, my sweep area in Tulsa (before shadow ingress) crosses Sextans, a dim constellation. If there are any stars that can be seen without optical aid between Regulus and Alphard, it’s worth checking on as a target. Also, it is probably a satellite if the “star” brightens and then disappears (ingress) or appears quickly and slowly dims (egress).

Imaging Flaring Geostationary Satellites

Another article could be written about imaging these objects. In fact, there are several on the web. Long exposures and very wide fields will show the “string of pearls” effect as the satellites brighten and fade along the DOT over several hours. The basic principles for locating and identifying are the same, and great images can be had with a wide-angle setup, preparation, and a little effort.

Finder Charts

I have attached to this article two star charts that may help in your attempt to find these fascinating objects. I have included charts for spring (autumn in Southern Hemisphere) and will develop charts and tables for September-October before then and reissue this article. There are several star groups and asterisms along the DOTs, and I’ve found it useful to sweep among them when observing, to see if anything seems to “fly” through the field.

These instructions have been generic, as I often find search and observation methods are best approached with guidance rather than procedure. If you have any questions, feel free to contact me at allenb_young@yahoo.com

Breaking news:

The Moon can be detrimental to your chances of observing geostationary satellites flaring up. Of course, the fuller the moon, the brighter the sky, with the problem that around the equinoxes a full moon will be both opposite the sun and near the equator where the satellites appear.

Luckily, in both spring and fall 2021, the moon is out of the way (in temperate zones). And this year, the Astronomy Club of Tulsa members observing night happens to be on March 6th, a Saturday night, and the best night of spring to observe flaring geostationary satellites. I'll plan to be out there to help folks look for these if they want.

Even if you can’t make it or observe on March 6th, any night 4-5 days before or after the best date will still have good chances for some flaring.

Editor - Suggested Additional Resources :

Video of Geostationary Satellites above the ALPS <https://apod.nasa.gov/apod/ap120411.html>

HOW TO SEE AND PHOTOGRAPH GEOSYNCHRONOUS SATELLITES

<https://skyandtelescope.org/observing/how-to-see-and-photograph-geosynchronous-satellites/>

Geostationary Orbit article “Three Classes of Orbits”

<https://earthobservatory.nasa.gov/features/OrbitsCatalog/page2.php>

TABLE 1
Site Specific Data

Location		Lat	Long	DOT	DOBA 1	DOBA 2
Edinburgh	UK	56	-3	-7.6 deg	1-Mar	13-Oct
Detroit	USA	42	-83	-6.4 deg	4-Mar	10-Oct
Tulsa	USA	36	-96	-5.6 deg	6-Mar	8-Oct
Vadodara	India	22	73	-3.6 deg	11-Mar	3-Oct
Singapore		1	104	0.0 deg	18-Mar	24-Sep
Cairns	AUS	-17	146	2.9 deg	28-Mar	16-Sep
Cape Town	SA	-34	19	5.3 deg	3-Apr	10-Sep
Punta Arenas	Chile	-53	-71	7.6 deg	9-Apr	4-Sep

DOT is Declination of Travel

DOBA is Date of Best Alignment

DOBA 1 is for Northern Spring / Southern Fall

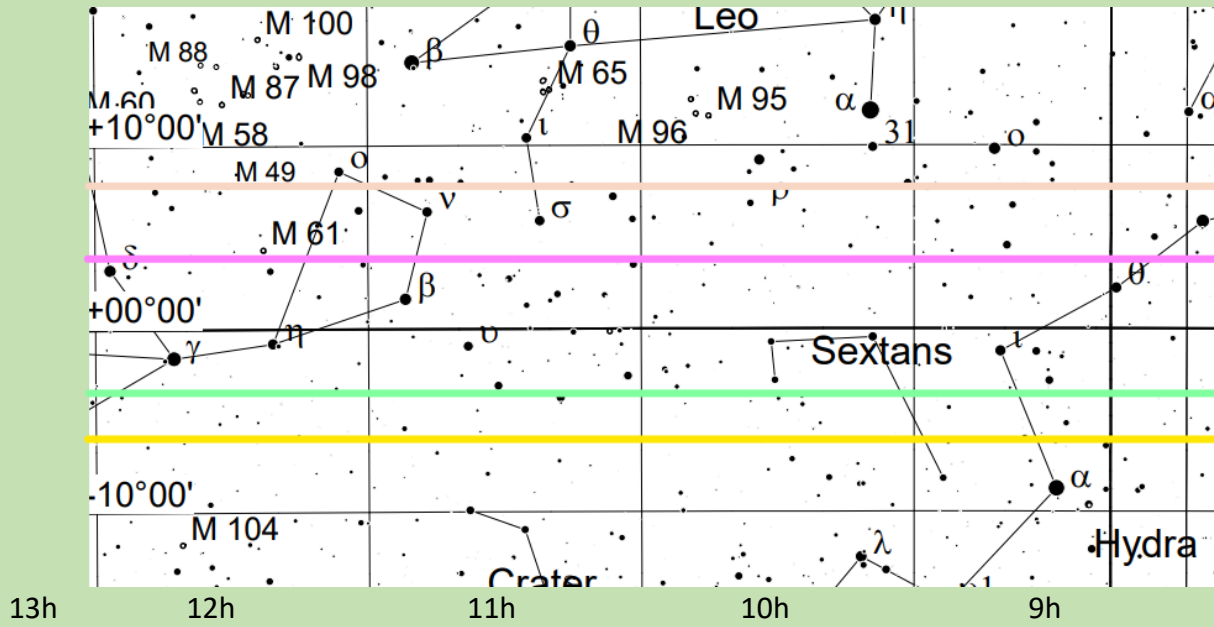
DOBA 2 is for Northern Fall / Southern Spring

TABLE 2A
Northern Spring / Southern Fall

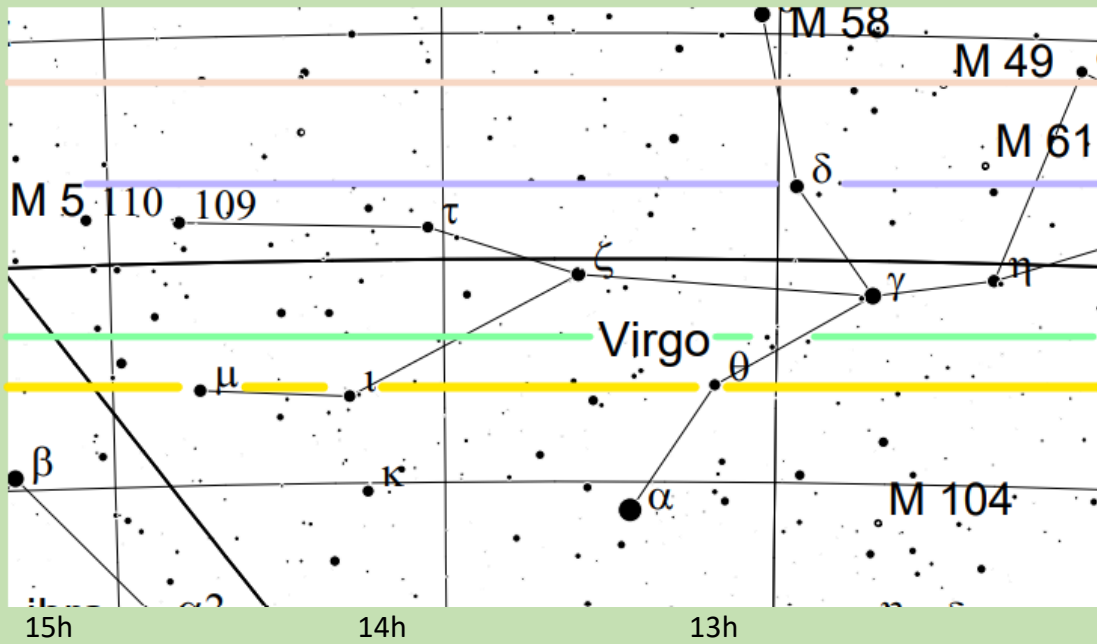
Date	Ingress			Egress	
	From	To		From	To
1-Mar	9 h 37 m	10 h 13 m		11 h 21 m	11 h 57 m
2-Mar	9 h 41 m	10 h 17 m		11 h 25 m	12 h 1 m
3-Mar	9 h 45 m	10 h 21 m		11 h 29 m	12 h 5 m
4-Mar	9 h 49 m	10 h 25 m		11 h 33 m	12 h 9 m
5-Mar	9 h 52 m	10 h 28 m		11 h 36 m	12 h 12 m
6-Mar	9 h 56 m	10 h 32 m		11 h 40 m	12 h 16 m
7-Mar	9 h 60 m	10 h 36 m		11 h 44 m	12 h 20 m
8-Mar	10 h 3 m	10 h 39 m		11 h 47 m	12 h 23 m
9-Mar	10 h 7 m	10 h 43 m		11 h 51 m	12 h 27 m
10-Mar	10 h 11 m	10 h 47 m		11 h 55 m	12 h 31 m
11-Mar	10 h 14 m	10 h 50 m		11 h 59 m	12 h 34 m
12-Mar	10 h 18 m	10 h 54 m		12 h 2 m	12 h 38 m
13-Mar	10 h 22 m	10 h 58 m		12 h 6 m	12 h 42 m
14-Mar	10 h 26 m	11 h 2 m		12 h 10 m	12 h 46 m
15-Mar	10 h 30 m	11 h 5 m		12 h 14 m	12 h 50 m

Gold Line is Tulsa

STAR CHART FOR MARCH / APRIL INGRESS (ENTERING SHADOW)



STAR CHART FOR MARCH / APRIL EGRESS (EXITING SHADOW)



- GOLD = TULSA
- GREEN = VADODARA
- PURPLE = CAIRNS
- PEACH = PUNTA ARENAS

Astronomy Club Observatory Receives New Land

By Skip Whitehurst

The Astronomy Club of Tulsa received a bequest of roughly 40 acres of land surrounding our observatory in the will of Stephanie Windler, a long-time club member, who died in November 2019.

In 1989, Double W Ranch granted the ACT a 25-year lease on the approximately 1 acre of land where our observatory and observing field are located. The lease includes the observing field outside the AT&T property line and to the south as far as the road. In 1993 this lease was renewed and extended for 100 years. Later in 1993 the Double W Ranch was sold, subdivided, and parts were re-sold. When the land came up for sale in 1993, M. Windler

generously purchased the parcel and leased it to us in order to protect the club's observatory from the possibility of being surrounded by a hostile owner or other unfavorable situation.

The new property is an irregular tract of land in Okmulgee County, Oklahoma. It is shown by the outer yellow and orange outline in this Google Earth image. Several board members, Don Bradford, Mike Blaylock, and Skip Whitehurst have been working to resolve some questions about the boundary in the southwestern part of the property near the gate across the paved road (the part of the outline in orange). Based on research by Don Bradford, we believe the outline shown is close to what will eventually be deemed correct, but resolving this issue will most likely require some legal work, and possibly a professional land survey.

The old AT&T building and tower are in separately-owned 350' X 350' parcel (approximately 2.8 acres) that is not part of our property.



Astronomy Club Receives Gift of Used Metal Dome

By Skip Whitehurst

And there's MORE EXCITING NEWS !



The University of Central Oklahoma has donated to ACT a used 12' 6" diameter commercially designed and built galvanized steel observatory dome (it's an Ash Dome, if you're curious).

<https://ashdome.com/>

<https://www.facebook.com/ashmfgco/>

We already have some volunteers to help fetch the dome from where it's now stored in Owasso to James Taggart's workshop south of Mounds – probably in late March - but may still want a couple of young and spry volunteers willing to help loading and unloading some heavier pieces (and maneuvering some not-too-heavy but awkward ones out of an attic).

Once the parts for the dome have been moved, we will need a few volunteers at a time to go through the parts and instructions, and assemble it inside James' workshop, most likely over several weekends. By doing that, we will see if it's complete and in good enough shape for us to use (it's more than 50 years old and has been disassembled and moved a few times since it was last used).

If it is usable, we would love to have members (and friends!) who are architects, engineers, carpenters, electricians, mechanically inclined, or just willing to move materials and equipment, dig, and all those hard but necessary jobs to help with the planning, design, and construction of a small observatory building.

In addition to a new domed observatory building, other possible projects to utilize more of our new acreage are being considered. If you want to be involved in all phases of this, please shout out ! If you have been wanting to help out but haven't been sure how you could contribute, this could be your chance to get involved and make a difference!

Between the legal work on the property and the awesome possibilities having it provides, we will be looking for ways to raise money. Anyone with experience writing grant proposals who would like to help us raise money for these great projects, please speak up! Donations from members will not be declined. The ACT is a 501(c)(3) charitable organization. If you wish to make a contribution and your company matches individual charitable donations, so much the better! .

To volunteer for the dome project or others, contact Skip Whitehurst (ACT.gadfly@gmail.com), or let any board member know (see the contacts list at the end of the newsletter or use the Contacts page of the website). Please get in touch with our Treasurer, John Newton (astrotulsa.tres@gmail.com), with questions or suggestions about donations or fundraising.

These acquisitions open exciting possibilities for significantly improving our facility, and members' and visitors' experience!

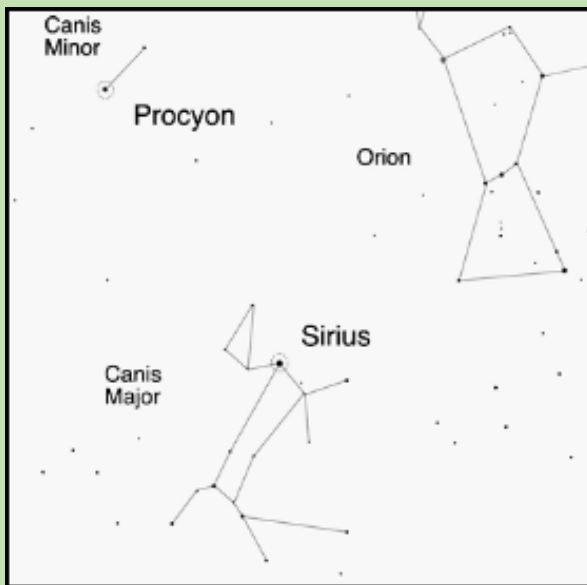


This article is distributed by NASA Night Sky Network March 2021

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!

Taking the Dog Stars for a Springtime Walk: Sirius and Procyon

by David Prosper



March skies feature many dazzling stars and constellations, glimmering high in the night, but two of the brightest stars are the focus of our attention this month: Sirius and Procyon, the dog stars!

Sirius is the brightest star in the nighttime sky, in large part because it is one of the closest stars to our solar system at 8.6 light years away. Compared to our Sun, Sirius possesses twice the mass and is much younger. Sirius is estimated to be several hundred million years old, just a fraction of the Sun's 4.6 billion years. Near Sirius - around the width of a hand with fingers splayed out, held away at arm's length - you'll find Procyon, the 8th brightest star in the night sky. Procyon is another one of our Sun's closest neighbors, though a little farther away than Sirius, 11.5 light years away. While less massive than Sirius, it is much older and unusually luminous for a star of its type, leading astronomers to suspect that it may "soon" - at

some point millions of years from now - swell into a giant star as it nears the end of its stellar life.

Sirius and Procyon are nicknamed the "Dog Stars," an apt name as they are the brightest stars in their respective constellations - Canis Major and Canis Minor - whose names translate to "Big Dog" and "Little Dog." Not everyone sees them as canine companions. As two of the brightest stars in the sky, they feature prominently in the sky stories of cultures around the world. Sirius also captures the imaginations of people today: when rising or setting near the horizon, its brilliance mixes with our atmosphere's turbulence, causing the star's light to shimmer with wildly flickering color. This vivid, eerie sight was an indication to ancient peoples of changes in the seasons, and even triggers UFO reports in the modern era!

Both of these bright stars have unseen companions: tiny, dense white dwarf stars, the remnants of supermassive companion stars. Interestingly, both of these dim companions were inferred from careful studies of their parent stars' movements in the 1800s, before they were ever directly observed! They are a challenging observation, even with a large telescope, since their parent stars are so very bright that their light overwhelms the much dimmer light of their tiny companions. The white dwarf stars, just like their parent stars, have differences: Sirius B is younger, brighter, and more energetic than Procyon B. Careful observations of these nearby systems over hundreds of years have helped advance the fields of: astrometry, the precise measurement of stars; stellar evolution; and astroseismology, the study of the internal structure of stars via their oscillations. Discover more about our stellar neighborhood at

<https://www.nasa.gov/>

TREASURER'S and MEMBERSHIP Report

BY JOHN NEWTON



As of Feb. 22nd, we had **214 members**. We welcome this month our newest members **Charles Nobles, Rod Coulter, Patrick Aguilar, Annie Heartfield, and Ralph McLendon**. Hello and welcome to ACT!

In addition, we want to recognize our long-term prominent and well-respected members who continue to renew their memberships with the club, even during these restricted times. We look forward to seeing you all at meetings, even if virtual by Zoom, and at club events throughout the year when possible.

Accounts as of February 21, 2021

Checking: \$ 6,507.85

Savings: \$ 10,785.42

Investments: \$ 28,452.10 (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 2020 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.

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**

Astronomy Club of Tulsa

2020 Accounts Summaries Income & Expenses

Treasurer - John Newton

For more complete details
Contact astrotulsa.tres@gmail.com

A little [Easter Egg](#) for reading the treasurer report

2020 Astronomy Club Accounts Summary

Memberships			
	1-Jan-20		155
	31-Dec-20		207
	Net Total		52
Bank Accounts			
Checking:	1-Jan-20	\$	6,796.87
	31-Dec-20	\$	5,671.55
		\$	(1,125.32)
Savings:	1-Jan-20	\$	5,783.33
	31-Dec-20		10785.42
		\$	5,002.09
	Net Total	\$	3,876.77
Investment Funds			
Total Investment	1-Jan-20	\$	25,592.53
	31-Dec-20	\$	27,181.36
		\$	1,588.83
	Increase/Decrease:		6.21%
	Market Fluctuation		
Total Assets			
	1-Jan-20	\$	38,172.73
	31-Dec-20	\$	43,638.33
		\$	5,465.60

Banking Summary -2020

INCOME REPORT		
Bumper Sticker Sales		1.00
Calendar Sales- 2020		5.00
Calendar Sales- 2021		291.44
	Calendar Sales	297.44
Donation- General		654.79
Donation- Group Event		88.00
	Donations	742.79
	Bank Interest	2.09
Magazine- Member payment- Astronomy		732.00
Magazine- Member payment- Sky & Tel		889.33
	Magazine Subscriptions (Income)	1,621.33
Member Dinner Event		-
Membership- New		3,845.78
Membership- Renewal		3,388.66
	Memberships	7,234.44
Refunded MSRAL Cancellation		500.00
Adjustment		(1.48)
	Misc. Income	498.52
TOTAL INCOME		10,396.61

EXPENSE REPORT

Magazine- Club Payment to Astronomy		766.00
Magazine Astronomy- Calendars		211.29
Magazine- Club Payment to Sky & Tel		955.55
	Magazine Subscriptions (Expense)	1,932.84
Operating Expense- Astro League dues		760.00
Operating Expense- Events		67.39
Operating Expense- Insurance		1,823.00
Operating Expense- Misc Expense		307.77
Operating Expense- Observatory		203.67
Operating Expense- Post Office Box		168.00
QuickBooks Annual Right to Use		51.99
	Operating Expenses	3,381.82
Investment Fund Expense		386.57
Utilities- Electric Co.		479.16
Utilities- Water Co.		284.30
	Utility Bills	763.46
TOTAL EXPENSES		6,464.69
OVERALL INCOME-EXPENSES TOTAL		\$3,931.92

ASTRONOMY CLUB OFFICERS:

PRESIDENT – TAMARA GREEN
astrotulsa.pres@gmail.com

VICE PRESIDENT – DANIEL SMITH
astrotulsa.vp@gmail.com

SECRETARY – RICHARD BRADY
astrotulsa.secy@gmail.com

TREASURER – JOHN NEWTON
astrotulsa.tres@gmail.com

BOARD MEMBERS-AT-LARGE:

MIKE BLAYLOCK
DON BRADFORD
JERRY CASSITY
JIM DANFORTH
ADAM KOLOFF
BRYAN KYLE
JOHN LAND
JAMES TAGGART
SKIP WHITEHURST

STAFF:

FACILITIES MANAGER –
JAMES TAGGART
astrotulsa.obs@gmail.com

EDITOR - JOHN LAND
tulsaastrobiz@gmail.com

PROGRAM CHAIR - JOHN LAND
tulsaastrobiz@gmail.com

Public FaceBook Page Coordinator
Adam Koloff
akoloffuso@gmail.com

OBSERVING CHAIRS
OWEN AND TAMARA GREEN
darthnewo@yahoo.com
astrotulsa.pres@gmail.com

SIDEWALK ASTRONOMY –
OWEN GREEN darthnewo@yahoo.com
PR AND OUTREACH –

GROUP DIRECTOR – **Open Position**
Astrotulsa.outreach@gmail.com

NIGHT SKY NETWORK –
Open Position

WEBMASTER JENNIFER JONES

From John Blaesie - Bartlesville Club
Harry Potter and the Stars

*I spy with my little eye,
With binoculars to the sky.*

*Harry Potter I do not see,
But I here, he has many friends to be.
Looking at the constellations above,
How many can you name and love?*

Name at least five Harry Potter characters
named after constellations.

Can you name at least six constellations
and six stars from which J.K. Rowling
drew inspiration to name characters in the
Harry Potter series of books?

Better yet - go out and locate them!

Do you have ideas for our club ZOOM Meetings?
Know someone who 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
Tulsaastrobiz@gmail.com

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