



OBSERVER

AUGUST 2019

Bringing Stars to the eyes of Tulsa since 1937

Editor – John Land



Photo by Frank Newby

The Veil Nebula in Cygnus is an expanding ring of hot gases from an ancient super nova. It lies 1470 light years from Earth and spans 50 light years wide. Its faint remnants extend across 3 degrees of sky requiring the viewers for move their scopes to disclose its various segments. In this image Frank has captured its brighter western section NGC 6960 – nicknamed the “Witch’s Broom” surrounding the star 52 Cygni. The eastern rim is NGC 6992.

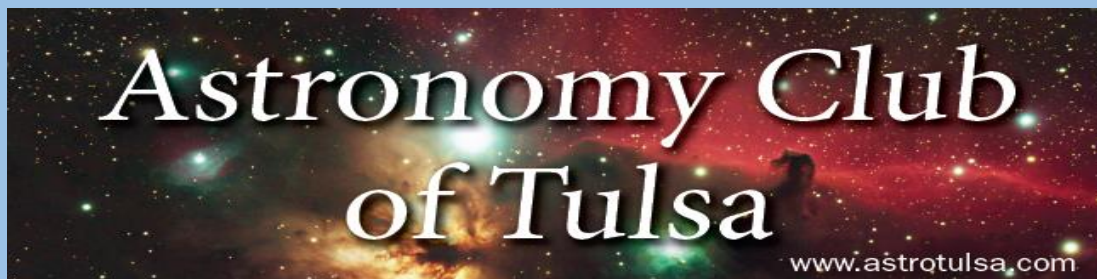
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We are trying something new this summer. If an Observing Night scheduled for FRIDAY night has to be Cancelled due to weather, we will try again on Saturday if the weather improves. CHECK the Astrotulsa.com Website on Saturday afternoon to see if the observing grounds will be open.

Astronomy Club Events Details at <http://astrotulsa.com/Events.aspx>

AUGUST				
MEMBERS' NIGHT	New	FRI, AUG 2	8:30 PM	OBSERVATORY
CLUB PICNIC (MEMBERS ONLY)		SAT, AUG 3	5:00 PM	OBSERVATORY
SIDEWALK ASTRONOMY	1ST Q	SAT, AUG 10	7:30 PM	BASS PRO
PUBLIC NIGHT	3rd Q	FRI, AUG 23	7:30 PM	OBSERVATORY
MEMBERS' NIGHT	New	FRI, AUG 30	8:00 PM	OBSERVATORY
MEMBERS' BACKUP NIGH	New	SAT, AUG 31	8:00 PM	OBSERVATORY
SEPTEMBER				
GENERAL MEETING	1ST Q	FRI, SEP 6	7:00 PM	JENKS PLANETARIUM
SIDEWALK ASTRONOMY	1ST Q	SAT, SEP 7	6:45 PM	BASS PRO
PUBLIC NIGHT	3rd Q	FRI, SEP 20	7:00 PM	OBSERVATORY
OKIE-TEX STAR PARTY		SEP 21-29	see page 3	BLACK MESA
AUTUMNAL EQUINOX		MON, SEP 23	2:50 AM CDT	
MEMBERS' NIGHT	New	FRI, SEP 27	7:15 PM	OBSERVATORY
MEMBERS' BACKUP NIGH	New	SAT, SEP 28	7:15 PM	OBSERVATORY
OCTOBER				
GENERAL MEETING	1ST Q	FRI, OCT 4	7:00 PM	JENKS PLANETARIUM
SIDEWALK ASTRONOMY	1ST Q	SAT, OCT 5	6:30 PM	BASS PRO
PUBLIC NIGHT	3rd Q	SAT, OCT 19	6:15 PM	OBSERVATORY
MEMBERS' NIGHT	New	FRI, OCT 25	6:30 PM	OBSERVATORY
MEMBERS' NIGHT BACKUI	New	SAT, OCT 26	6:30 PM	OBSERVATORY

MEMBER'S FACEBOOK FORUM - Come join us on our private Facebook group. Just search for the group "Astronomy Club of Tulsa Members Only" and click join. You will be granted access once you have been verified as a club member. This an informal group to announce things privately to only club members. Everyone please feel free to post request for astronomy help, meet ups at the observatory, post for sale astronomy gear, or general club chatter. It is a moderated group, please keep it civil. Hopefully this can become better method for everyone to keep each other in the loop.



Astronomy Club window sticker \$ 1 excellent for your car or telescope. Size ~ 6 x 2 inches
Member Michael Blaylock has created a beautiful club sticker from one of his own images of the Horsehead and Flame nebulas in Orion. Pick up one at club events or contact John Newton at Astrotulsa.tres@gmail.com

LAST CHANCE-REGISTRATIONS DUE AUGUST 31



Okie-Tex Star Party Sept 21-29, 2019

Pre-registration must be postmarked by Saturday, August 31, or Online by Sunday Sept 1.

Every fall nearly astronomy enthusiasts from all over the country and beyond gather under some of the darkest sky on the planet for a weeklong fest of starlight. Located at the tip of the Oklahoma Panhandle in the high dry Black Mesa near the tiny town of Kenton – **population 17** !

The nearest town, Boise City, is 35 miles away. **population 1,030** Excellent Meals are catered by Jody's Catering, of Boise City, OK. and must be prepaid by Sept 1. There's also a midnight cash grill open until 2:00 AM. Read all the details at <http://www.okie-tex.com/index.php>



The US Mint has created special coins to commemorate the Apollo 11 landing

The coin is curved to like the face of the Apollo astronaut's helmets. Several options are available. Go to [Apollo 11 Coins](http://www.usmint.gov/Apollo11Coins) or <https://www.usmint.gov/>



Caution: A number of imitation coins are being marketed - one from Fiji not USA
Also a TV ad is selling the half dollar Apollo coin for \$ 99 – It's \$40 at the mint!

PRESIDENT'S MESSAGE

BY TAMARA GREEN



I can't believe it's AUGUST now! Where has this year gone? It seems like New Year's was just last week! We have some fun events coming up in August:

On Saturday, August 3, we have our Club Members' Picnic! It will be at the Observatory, starting at 5:00 PM. (Weather Permitting)The club will be supplying meat, and condiments as well, and members are welcome to bring a potluck side item or dessert. Please bring your own drinks as well. This picnic is for club members and their families only.

We would like to emphasize that our Members-Only Observing Nights are intended to allow our members to work on observing projects. As such, we do not offer tours or programs for non-member guests on these nights. As a member, YOU ARE WELCOME to invite a few family members or a friend or two to our members' nights. They may observe along with you, but we ask you not to disturb other members working on projects unless they agree. Occasionally, we have been having non-members showing up on members' nights. So we are asking our members when you arrive to CHECK IN with one of our officers or security and let us know who else is in your group.

Sidewalk Astronomy will be on Saturday, August 10 at Bass Pro, start time 7:30 PM. We will need volunteers with telescopes to come set up and share the views with the passersby who come through.

We had a great turnout for our July 26 Public Night. The next one will be on Friday, August 23. The board has decided to move Public Night to Fridays, and have Saturdays as the back-up nights. This will be done through September. In October, the Public Nights will be moved back to Saturdays. This is so that during the summer months we can have plenty of opportunity to have a public star party, since so many of them end up being cancelled due to weather or clouds. Please be aware, though, that this will ONLY BE FOR THE SUMMER MONTHS!!! Beginning in October Public Nights will be on Saturdays. Anyway, we will need plenty of volunteers to help. If you are interested in helping, please email me at astrotulsa.pres@gmail.com.

We have another Members' Night on Friday, August 30 at the Observatory, starting at 8:00 PM.

And don't forget that **registrations for Okie-Tex** must be postmarked by NO LATER THAN Saturday, August 31, 2019, and must be paid in full. Registrations for meals must be postmarked by NO LATER THAN Sunday, September 1, 2019, and must be paid in full!

Tulsa is hosting the MidStates regional Astronomy convention June 12-14, 2020. There's lots of planning to do in advance. We will need lots of volunteers to help with that too! Contact Tamara Green or Jerry Cassity to volunteer.

Clear Skies, Tamara Green

Summer Astronomy Club Outreach events

Weather was great and attendance good at our **June and July Public observing nights**.



Guests lined up to view Jupiter in **Jerry Cassidy's 16" Dob** - foreground

Matt Jennings -- giant 22" Dob – left center
Showed great images of Jupiter & Saturn.
After midnight he treated a few of us to a view of Pluto

Image - taken by Ed Downs using a drone.

The **Jenks High School planetarium** had a packed house Saturday July 20 for their programs celebrating the 50th anniversary of the Apollo 11 moon landing.

Members **Richard Brady & Skip Whitehurst** set up H-Alpha Solar scopes on the roof
Skip – shielded by the umbrella showed Solar Prominences on his computer tablet.



Members of the **Jenks High School Robotics team** were on hand. to let the kids learn about and operate



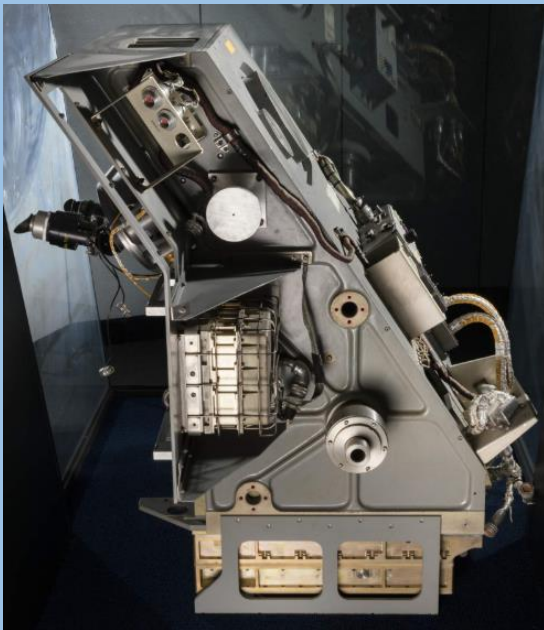
by John Newton –

The Apollo 11 Program – 5 interesting and mostly unknown facts about the mission.

1. In the rocket business, everyone knows that the countdown to zero represents the launch of a rocket. Once a rocket fires their main engines, a new clock starts counting up from zero and becomes a critical reference point to what steps happen next. For instance, rocket staging, engine firings to change orbital positions, landing and takeoff sequencing for the moon landing, etc. were all based on specific time points throughout the mission.

The Apollo program was so well rehearsed, that when Apollo 11 first came into lunar orbit (about 75 hours into the mission), NASA determined that they were about 2 minutes early. By the time of splashdown and recovery of the command module they were actually 36 minutes behind schedule.

2. MIT Instrumentation Laboratory in Cambridge, Massachusetts designed and built the Apollo Guidance and Navigation System. This system cluster included a sextant, a combination of optical sensors, gyroscopes, a digital computer, and other devices, which managed the guidance and navigation of the Apollo Command, Service, and Lunar modules during its journey from Earth orbit to the Moon and back.



As Apollo 11 traveled to the moon facing the earth, the astronauts could not visualize their relative position to the moon. Instead, they relied on the guidance and navigation system. To check their position, Neil and Buzz used the sextant and telescope to view Vega (brightest star in Lyra) and Denebola (Deneb a bright A-type main sequence blue star in Leo) both stars can be found in the Summer Triangle, to confirm that they were on track for lunar orbit.

< *Apollo Star Sextant*

3. There were many firsts during the 1969 moon landing. This included the first ever 'digital' fly-by-wire approach used for navigation to the moon and of the moon landing.

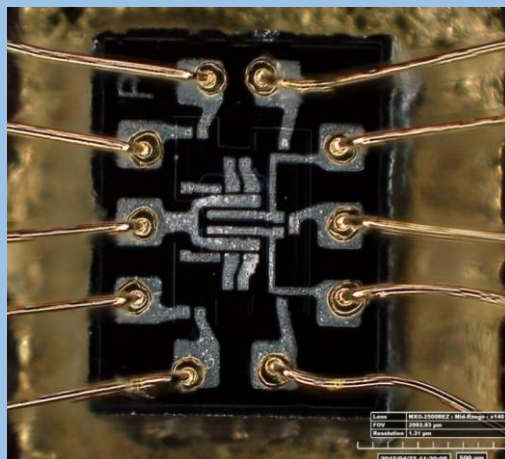
'Digital' meant that Apollo 11, (Columbia, and Eagle), used codes to activate and deactivate instrumentation onboard from either predefined software programs, or through entries that were translated and executed from the astronauts who entered two sets of digital codes through a Display Keyboard ('DSKY') – a Verb for action, and Noun for a thing.



However, it was a woman by the name Margaret Heafield Hamilton who was mostly responsible in designing the predefined programs for the guidance system, or software engineering development as we know it today.

4. In another first due to size, weight, and power constraints, Columbia and Eagle would each carry only one computer, which had to work. As a result, the designers of the on-board computer at MIT Instrumentation Laboratory, decided to build the computer using the newly-invented integrated circuit, or silicon “chip” as we now know them today.

The Lab worked closely with Fairchild Semiconductor, a California-based company where the integrated circuit was invented. MIT decided to use only one type of chip which included a series of NOR gates. These chips were tested under rigorous conditions of temperature, vibration, contamination, and so on. If a chip failed these tests, the entire lot was discarded by Fairchild. If a chip passed these tests, MIT would take them for a more thorough testing to ensure absolute reliability. No Apollo Guidance Computer, on either the Command or Lunar Modules, ever experienced a hardware failure during a mission.



Apollo Integrated Circuit

5. With less than 20 seconds of fuel left for the LM to land, an engine cut-out at any height above 10 feet would have produced a touchdown harder than the landing gear was designed to withstand, an abort was almost considered. However, when the Eagle had finally landed at 15:18 CDT in the Sea of Tranquility (lunar coordinates 00°41'15"N, 23°26'00"E) Armstrong was the first person to step onto the lunar surface 6 hours 38 minutes after on July 20 at 21:56 CDT. Aldrin joined him just 19 minutes later. They spent about 2.25 hours together outside the spacecraft and collected 47.5 pounds of lunar material to bring back to Earth. Meanwhile, command module pilot Michael Collins flew Columbia alone in lunar orbit. Altogether, Armstrong and Aldrin spent 21 hours 31 minutes on the lunar surface at a site they named Tranquility Base before lifting off to rejoin Columbia in lunar orbit.

In the event that something catastrophic were to happen during any part of the landing, former President Richard Nixon had a speech prepared if Armstrong and Aldrin did not make it back to Earth. The speech titled "In Event of Moon Disaster," was released to the public 30 years after the first moon landing. Fortunately for us all, they did succeed through the contributions of many technical advancements, the courage of three extraordinary men, and the dedication of over 400,000 scientists, engineers and technicians to the program paving the way for several other Apollo missions that followed. This month we proudly celebrate the successful 50th anniversary mission of the first landing on the moon.

Explore a Detailed NASA archived Log of the Apollo 11 mission at
https://history.nasa.gov/ap11ann/apollo11_log/log.htm **Times are given in EDT**

July 2, 2019 Solar Eclipse Viewing from Space

By John Land

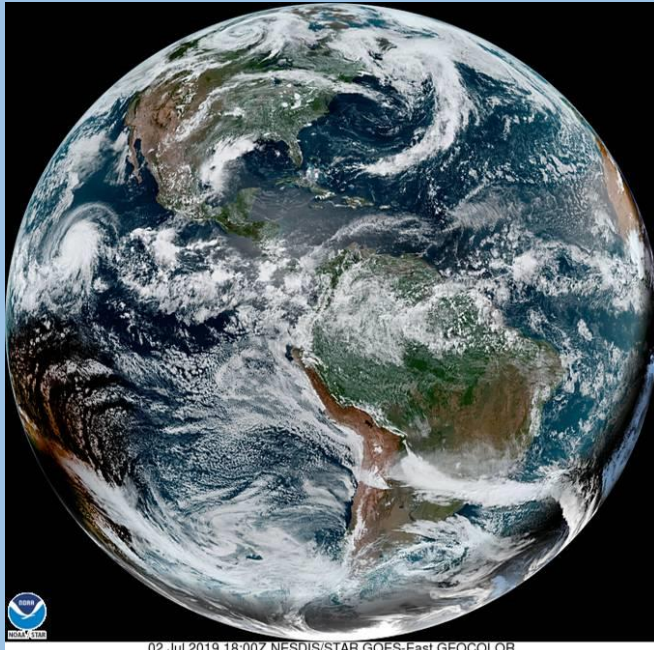
**Image showing the umbral shadow on the Earth from lunar orbit.
Taken by a Chinese satellite orbiting the moon.**



On July 2, 2109 a Total Solar Eclipse swept across the southern Pacific ending near sunset as it crossed Chile and Argentina.

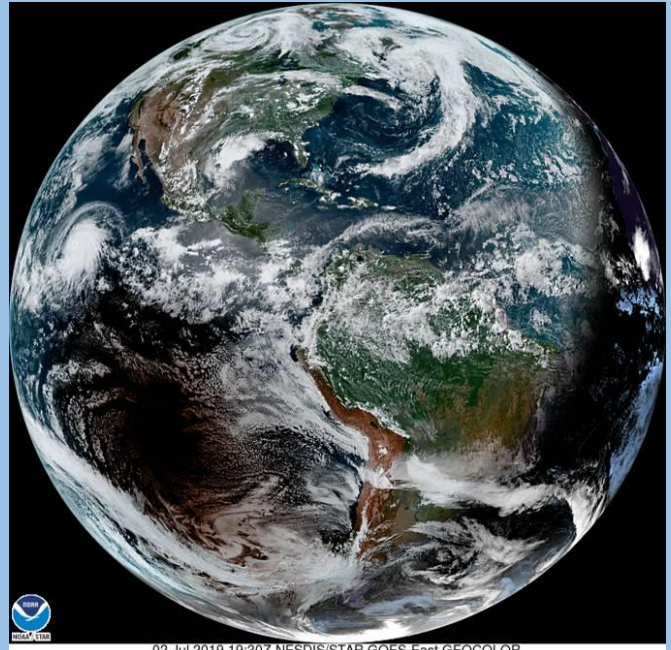
Below is a series of images taken from the GOES East satellite showing the Moon's shadow (Umbra) racing eastward across the planet. The GOES satellite takes images in 16 different wavelengths. The color image is a simulated image using both visible and infrared wavelengths. In this case it gives the Umbra a slightly red tinge.

<https://www.star.nesdis.noaa.gov/GOES/index.php>



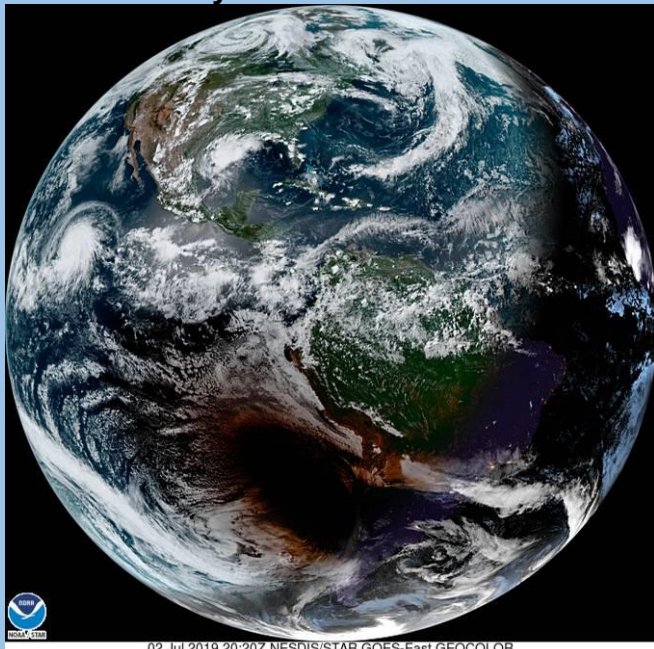
02 Jul 2019 18:00Z NESDIS/STAR GOES-East GEOCOLOR

July 2 – 18:00 UT



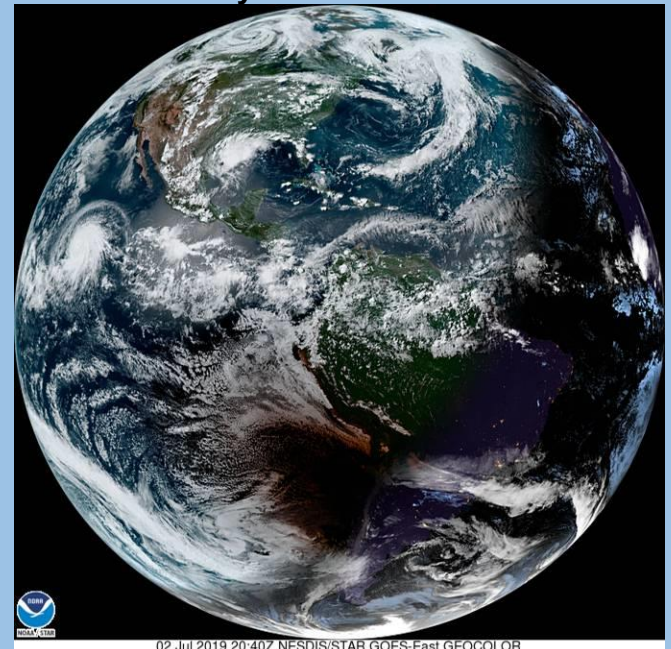
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July 2 – 19:30 UT



02 Jul 2019 20:20Z NESDIS/STAR GOES-East GEOCOLOR

July 2 – 20:20 UT



02 Jul 2019 20:40Z NESDIS/STAR GOES-East GEOCOLOR

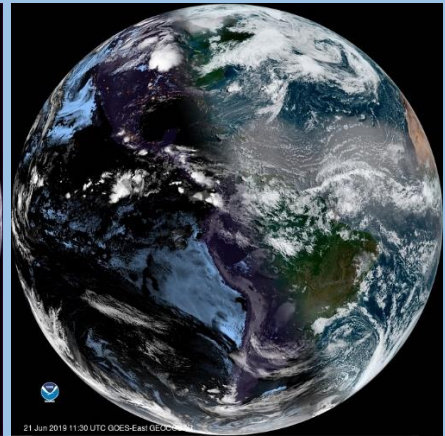
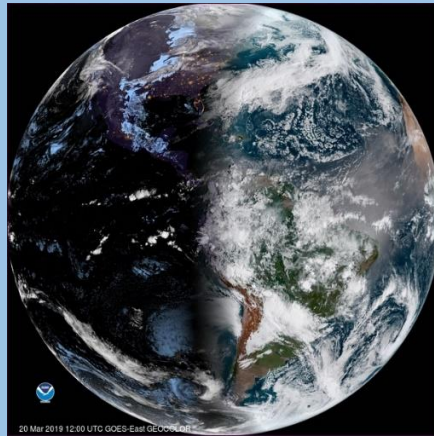
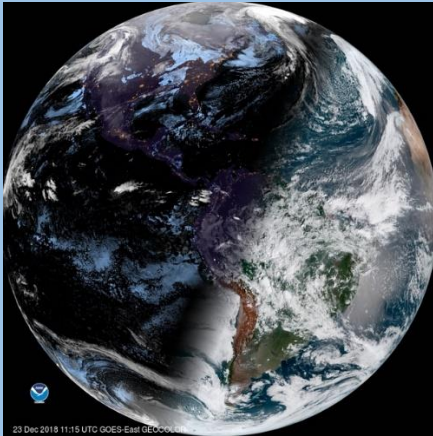
July 2 – 20:40 UT

Images of Earth's Seasons from the GOES East Satellite Full Disk View By John Land
 The GOES Satellite takes in 16 wavelengths. This "True Color" composite uses a simulated green in daylight and infrared wavelengths at night. The Full Disk updates every 10 minutes and can produce 96 images spanning 16 hours. The regional close-ups update every 5 mins spanning 8 hours. These high resolution regional images are an excellent resource for astronomers to estimate the possible cloud cover for an evening of observing. They are also easily accessed on phones and tablets. GOES East shows the continents of the western hemisphere as well as the Atlantic and Eastern Pacific. The New GOES West satellite images the western coast of the USA and a large portion to the Pacific. Image credit **CIRA/NOAA**

Winter Solstice

Spring Equinox

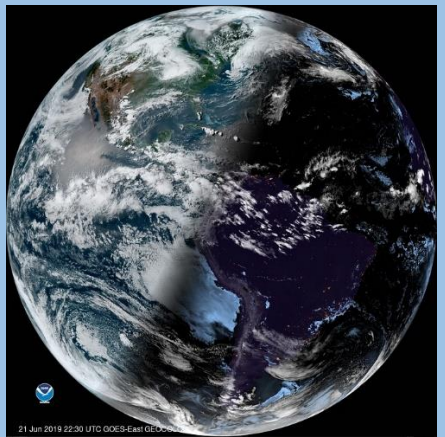
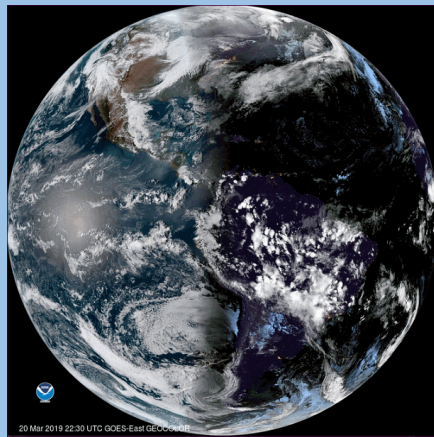
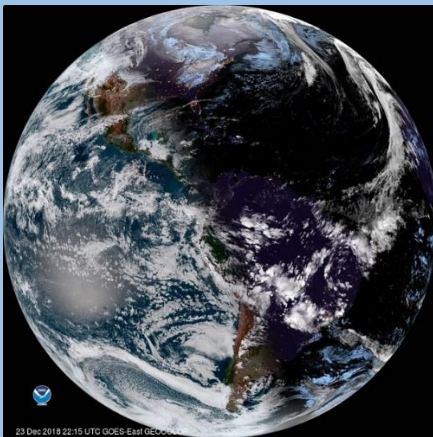
Summer Solstice



December 23, 2018

March 20, 2019

June 21, 2019



As seen in the Winter image the nighttime region is much wider in the north than in the south. The opposite is true in the Summer. At the latitude of Tulsa (36 deg. N) we get only 9.5 hrs. of daylight in the winter but 14.5 hrs. in the summer. This is the result of Earth's Axis being tilted 23.5 degrees to the plane of its orbit around the Sun. These images show the changing angle of the Day / Night line called the terminator. Note that the line is not a distinct line like the moon's terminator. There is a gradual dimming at Dusk or Dawn.



Particularly evident in this close up image of the North Pole at the Equinox as the Sun is just skimming the horizon – neither rising or setting.



This article is distributed by NASA Night Sky Network

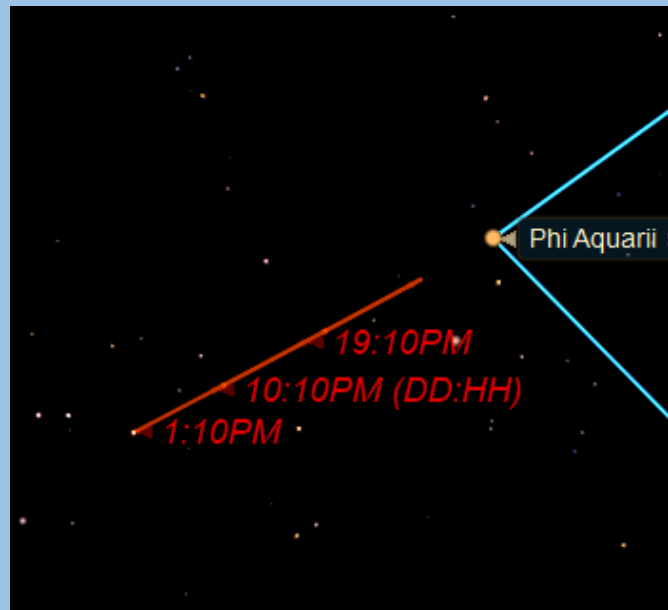
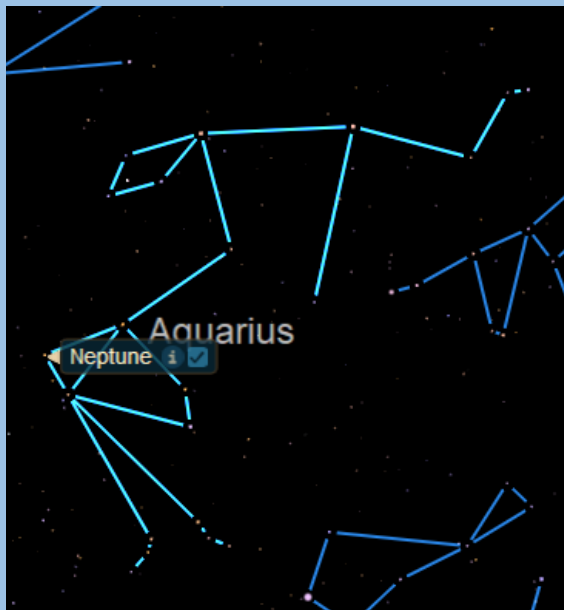
August 2019

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

Chill Out: Spot an Ice Giant in August By David Prosper

Is the summer heat getting to you? Cool off overnight while spotting one of the solar system's ice giants: Neptune! It's the perfect way to commemorate the 30th anniversary of Voyager 2's flyby.

Neptune is too dim to see with your unaided eye, so you'll need a telescope to find it. Neptune is at opposition in September, but its brightness and apparent size won't change dramatically as it's so distant; the planet is usually just under 8th magnitude and 4.5 billion kilometers away. You can see Neptune with binoculars, but a telescope is recommended if you want to discern its disc; the distant world reveals a very small but discernible disc at high magnification. Neptune currently appears in Aquarius, a constellation lacking in bright stars, which adds difficulty to pinpointing its exact location. Fortunately, the Moon travels past Neptune the night of August 16th, passing less than six degrees apart (or about 12 Moon widths) at their closest. If the Moon's glare overwhelms Neptune's dim light, you can still use its location that evening to mark the general area to search on a darker night. Another Neptune-spotting tip: Draw an imaginary line from bright southern star Fomalhaut up to the Great Square of Pegasus, then mark a point roughly in the middle and search there, in the eastern edge of Aquarius. If you spot a pale blueish star, swap your telescope's eyepiece to zoom in as much as possible. Is the suspect blue "star" now a tiny disc, while the surrounding stars remain points of white light? You've found Neptune !



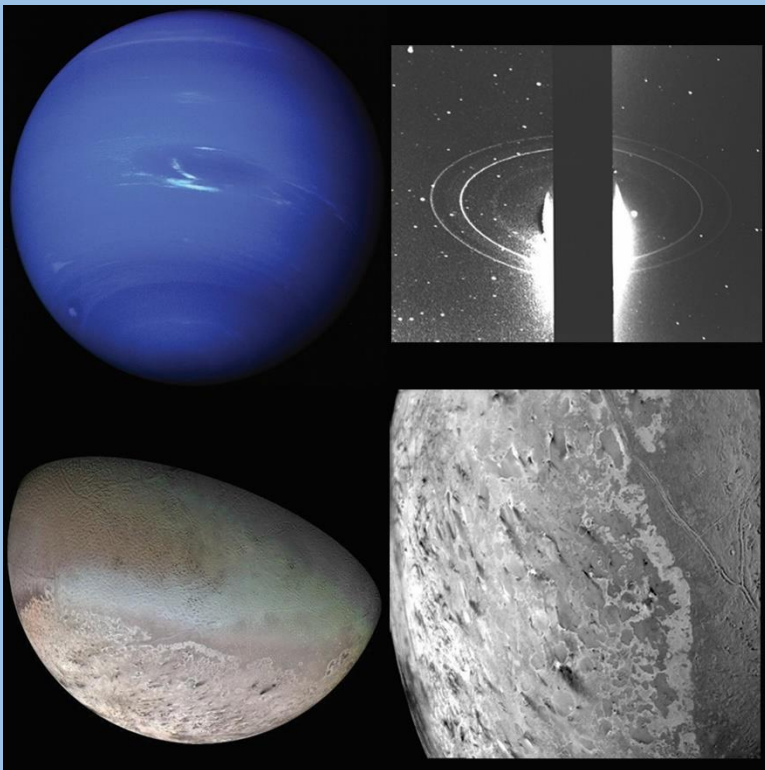
Neptune Finder Chart – Neptune is in Retrograde Motion Aug 1 – Aug 31 at 10 PM

Neptune and Uranus are ice giant planets. These worlds are larger than terrestrial worlds like Earth but smaller than gas giants like Jupiter. Neptune's atmosphere contains hydrogen and helium like a gas giant, but also methane, which gives it a striking blue color. The "ice" in "ice giant" refers to the mix of ammonia, methane, and water that makes up most of Neptune's mass, located in the planet's large, dense, hot mantle. This mantle surrounds an Earth-size rocky core.

Neptune possesses a faint ring system and 13 confirmed moons. NASA's Voyager 2 mission made a very close flyby on August 25, 1989. It revealed a dynamic, stormy world streaked by the fastest winds in the solar system, their ferocity fueled by the planet's surprisingly strong internal heating.

Triton, Neptune's largest moon, was discovered to be geologically active, with cryovolcanoes erupting nitrogen gas and dust dotting its surface, and a mottled "cantaloupe" terrain made up of hard water ice. Voyager images of Triton's surface revealed geysers of liquid nitrogen erupting from its icy surface as the sun heated them to its boiling point of -320 F.

Triton is similar to Pluto in size and composition, and orbits Neptune in the opposite direction of the planet's rotation, unlike every other large moon in the solar system. These clues lead scientists to conclude that this unusual moon is likely a captured Kuiper Belt object.



Discover more about Voyager 2, along with all of NASA's past, present, and future missions, at www.nasa.gov

Clockwise from top left: Neptune and the Great Dark Spot traced by white clouds; Neptune's rings; Triton and its famed icy cantaloupe surface; close of up Triton's surface, with dark streaks indicating possible cryovolcano activity. Find more images and science from Voyager 2's flyby at bit.ly/NeptuneVoyager2
Image Credit: NASA/JPL

TREASURER'S and MEMBERSHIP Report

BY JOHN NEWTON



As of July 23, 2019 the Astronomy Club of Tulsa has **156 members**. We welcome our newest member starting this month – **Bianca Delgado** and **Scott Whittenburg**

Accounts as of July 23, 2019 - Checking: \$ 5,595.73 Savings: \$ 5,781.87

Investments: \$ 24,405.74 If you follow this report each month, you might see a dip in our checking account. We had two major annual expenses which were expected:

1. Each year usually at the end of June, we pay our dues to the Astronomical League (AL). Most of our members are registered with AL and I recommend that you peruse their website to learn more about astronomy, meetings they hold and open to you, and about their astronomical certificate programs.

2. Each year around July, we pay an annual liability insurance premium. This year we found a comparable insurance carrier to what we had previously used and saved the club some money. This insurance is necessary to host public events, such as Sidewalk Astronomy at Bass Pro Shops in BA.

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 <http://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 whatever 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 **2018** 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.

<http://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 www.skyandtelescope.com

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.**

Telescopes for Sale

Meade ETX 90 - \$ 150 Aperture 90mm FL 1250mm

This is a handy grab and go scope that packs a lot of scope in a small portable package.

The scope is one of the early models - has the same optics as the newer models but without the GoTo technology. It has slow motion knobs for RA and Dec. and a small motor to track in RA if polar aligned.

Comes with a 26mm Eyepiece 48 X and attached 6 x 20 finder scope.

Accepts standard 1.25" eyepieces.

Contact **Bob Stephens** bobateve@cox.net 918-949-5888



Orion SkyQuest 12XXi Dobsonian IntelliScope Telescope for sale.

It's one year old & in absolutely perfect condition! We built a backyard observatory & viewing deck for it & have taken excellent care of it! We are moving & selling everything.

IntelliScope computerized object locating technology uses encoders to allow you to move the scope by hand to any of 14,000 objects in its data base.

We bought lots of extra lenses, eyepieces, filters, Barlow's for it.

Call or text, **Shawn or Carla**, 918.237.2127. Paid over \$2500, asking \$1700.

Included Accessories

Orion High Power 2", 2x4 element Barlow Lens paid \$220.

24mm Ultra Flat Field 2" Eyepiece \$200.

Orion 1.25" Shorty 2x Barlow Lens

Camera T Adapter paid \$65.

Orion 13% Transmission Moon Filter \$16.

Orion 12" Dob Scope Cloak \$150.

Smartphone Adapter \$85.

Medium Orion Deluxe Accessory Case \$40.

Custom Light Shroud & 3 Case

Set for easy mobile transport of Telescope.



Dates and Times for Events are found at www.AstroTulsa.com under EVENTS tab
Be sure to check the Website for Weather Cancellations before coming.

You are invited to come join us to learn more about
Astronomy and view the wonderful sights in the night sky.
Check our Events Page of Dates [Link to Events Page](#)



During the school year our club holds a
Monthly General Club meetings at
Jenks Public Schools Planetarium
205 East B St, Jenks, OK
Located North of the intersection of
1st and B St

Meetings begin at 7:00 PM

When you enter the building lobby,
take the elevator to the 3rd floor.
[Click for Google Map Link](#)



Sidewalk Astronomy Night

East side of Bass Pro in Broken Arrow near the lake.
101 Bass Pro Drive, Broken Arrow, OK
[Click Map Link here](#)

On a Saturday evening near the 1st Quarter moon Astronomy Club volunteers set up telescopes to share views of the moon, planets and other bright objects. It's a come and go event where shoppers and restaurant goers get a chance to experience glimpses of the universe with their own eyes.



ASTRONOMY CLUB OBSERVATORY

Located on a hilltop about 25 miles SW of Tulsa
Features: classroom, restroom, dome with 14 inch telescope
and an acre to set up your telescopes.

Weather permitting, we host two types of observing nights.

PUBLIC OBSERVING NIGHT on a Saturday
This event is open to individuals and families.
Club members set up telescope for public viewing.
* Groups need to make separate arrangements.

MEMBERS OBSERVING NIGHT usually on a Friday near new moon
Reserved for club members and their families to allow them to pursue observing projects.

The Observatory is **ONLY OPEN** for SCHEDULED EVENTS. [Link to Events Page](#)
[Click for Observatory Map](#)

CAUTION: **DO NOT** use GPS it will likely send you on some nearly impassible back roads.

ASTRONOMY CLUB OFFICERS:

PRESIDENT – TAMARA GREEN
astrotulsa.pres@gmail.com
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Contact our Newsletter Editor about details at
Tulsaastrobiz@gmail.com

Submissions preferred in MS Word and submitted by the 20th of each month.

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