HAPPY NEW YEAR!

Above photo: January stars at the observatory. Photo taken January 2016.

Below photo: Orion over Los Cabos. Photo taken January 2014.

Both photos are by Tamara Green.
## JANUARY 2017

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### UPKOMING EVENTS:
- **GENERAL MEETING**: FRI JAN 6 7:00 PM JENKS HS PLANETARIUM
- **SIDEWALK ASTRONOMY**: SAT JAN 7 5:00 PM BASS PRO
- **PUBLIC STAR PARTY**: SAT JAN 21 5:45 PM ACT OBSERVATORY
- **MEMBERS’ NIGHT**: FRI JAN 27 5:45 PM ACT OBSERVATORY
- **GENERAL MEETING**: FRI FEB 3 7:00 PM JENKS HS PLANETARIUM
- **SIDEWALK ASTRONOMY**: SAT FEB 4 5:30 PM BASS PRO
- **PUBLIC STAR PARTY**: SAT FEB 18 6:15 PM ACT OBSERVATORY
- **MEMBERS’ NIGHT**: FRI FEB 24 6:15 PM ACT OBSERVATORY

**MEMBERS AND FAMILY ONLY PLEASE.**

### MOON PHASES AND HOLIDAYS:
- **FIRST QUARTER**: THU JAN 5
- **FULL MOON**: THU JAN 12
- **MARTIN LUTHER KING JR DAY**: MON JAN 16
- **LAST QUARTER**: THU JAN 19
- **NEW MOON**: FRI JAN 27
- **GROUNDHOG DAY**: THU FEB 2
- **VALENTINE’S DAY**: TUE FEB 14
- **PRESIDENTS’ DAY**: MON FEB 20
- **NEW MOON**: SUN FEB 26

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## FEBRUARY 2017

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### MOON PHASES AND HOLIDAYS:
- **GROUNDHOG DAY**: THU FEB 2
- **FIRST QUARTER**: FRI FEB 3
- **FULL MOON**: FRI FEB 10
- **VALENTINE’S DAY**: TUE FEB 14
- **LAST QUARTER**: FRI FEB 18
- **PRESIDENTS’ DAY**: MON FEB 20
- **NEW MOON**: SUN FEB 26
Hi everyone! Hope everyone had an enjoyable holiday season.

**Brad Young, first receiver of the Master Observer-Platinum award**
In the Astronomical League’s December Reflector, it was announced that our own Brad Young has earned the first Master Observer-Platinum award presented by the AL. To earn this honor, Brad completed 40 observing programs. Congratulations Brad!

**January General Meeting**
The General Meeting will be at the Jenks Planetarium Friday, January 6th, at 7:00 PM. Speaking this month will be Dr. Kathryn Gardner-Vandy, speaking on "Meteorites: Tour Guides of the Asteroid Belt and More". She spoke to the Bartlesville Astronomical Society in early December and showed some meteorites from her personal collection. Purely by coincidence, the latest Reflector magazine from the Astronomical League has an article about meteorites too. Check out the December 2016 Reflector at https://www.astroleague.org/reflector.

**Neptune this month**
I usually don’t mention Neptune, since it is too faint to see with the naked eye at around 8th magnitude, but this month it can be found near two other planets. On the evening of January 1st, it will be about 30° to the southwest of Mars. That’s roughly the diameter of the moon. (Around 12:45 AM it will only be about 1 arcminute from Mars! Unfortunately it is below the horizon then.) Then the next evening it will be 1/3 of the way between Mars and the Moon. There is an article about the conjunction at Sky & Telescope’s news page, "Mars Meets Neptune on New Year’s Eve". Then on January 12th it passes only 23° southeast of Venus. So get out your binoculars or telescope and check them out.

**Planets this month**
*Venus* gets higher in the southwest, not setting until nearly 4 hours after sunset all month (9:04 PM on January 1st and 9:31 PM on January 31st). Venus is getting closer to us as we orbit the sun, growing from 22" to 31", but shrinking from 56% to 40% illuminated.
*Mars* is around 40° high in the south-southwest all month. At the beginning of the month it is 11½° northeast of Venus. By months end they have closed to within 5½° of each other.
*Jupiter* is still continuing to rise earlier each night. On January 1st it will rise at 1:16 AM, and by the end in the month it will rise at 11:23 PM.
*Saturn* passed through superior conjunction is December 10. At the beginning of January it will rise roughly 1½ hours before sunrise, but 3 hours before sunrise by the end.
*Mercury* starts off 7° up at sunrise on the 1st but is only 10° up by months end.

The *sun* will be closest to the earth, perihelion, on January 4th around 8 AM. It will be 91,404,322 miles from us, or 0.983 A.U.

**Upcoming meteor shower**
*Quadrantids* - The peak for this shower is only a few hours long. It is predicted to occur at roughly 8 AM on January 3rd. (Sunrise is at 7:34 AM.) The moon will be a 5 day old waxing crescent. The radiant is in the north-northeast in Bootes. For more information go to Sky & Telescope’s news web page "Catch the Quadrantid Meteors (If You Can)".

**Messier Marathon**
Once again we have been invited to Ron Wood's TUVA observatory down near Checotah for the Messier Marathon. It will be on Saturday, March 25th. More information to come.

Clear skies!
Richard Brady
Astronomy Club of Tulsa: 173 members, including 68 new members in 2016.

Welcome to our new members this month: Dacey Curtis, Jane McClain, Cody McAlester, Dennis Burdette, Christopher Dickey and Caleb Perkins-Taber.

Club Accounts as of December 31, 2016:
Checking: $7,378.49; Savings: $4,776.10; Investment accounts: $20,446.04 (Value Fluctuates with Market)

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. Contact their websites for details.

Membership rates for 2016 are as follows:
Adults: $45.00 per year, includes Astronomical League Membership.
Sr. Adult: $35.00 per year for those 65 or older, includes Astro League Membership.
Students: $30.00 with League membership; Students: $25.00 without League membership.
Additional Family membership: $20.00 with voting rights and League membership, $15.00 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.


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.

Note: You may renew your Sky & Telescope subscription directly by calling the number on the renewal form, be sure to ask for the club rate.

NEW SUBSCRIPTIONS must still be sent to the club.
2017 Wall Calendar

The 2017 Astronomy Magazine Wall Calendars are here and are now available. If you would like to reserve one, send me an email at astrotulsa.tres@gmail.com, or call me at 918-665-8134 and let me know how many you would like. Otherwise, they will be available on a first come, first served basis at our upcoming events. Calendars are available for $10.00 each, cash, check or credit cards accepted. Calendars must be picked up in person at a club event, we cannot ship these to you. If you reserve one, just let me know at which event you will pick it up.

Get yours while they last!

Tim Davis
ACT Treasurer
or just Google APOD to find it quickly

APOD features all kinds of astronomical images from Hubble wonders to talented astrophotographers. A brief description accompanies each image and is often filled with Internet links to further explain the topic. The APOD archive contains the largest collection of annotated astronomical images on the internet.

Get the FREE APOD App for Iphone or Android at http://apodapp.com/
Note: Some of the Apps have ads with option to pay for ad free version.
You can DOWNLOAD a FREE 2017 APOD calendar
( PDF version is 15.6 meg ) http://asterisk.apod.com/viewtopic.php?f=28&t=36171

America’s Oldest Continuously Published Periodical turns 225! The Old Farmer’s Almanac is also the nation’s oldest continuous Astronomical Calendar. First published in 1792 while George Washington was president and the White House was under construction.

Each month’s calendar pages contains a variety of astronomical information. Sunrise and set, length of day, solar declination, lunar phases, tides, planetary conjunctions and other astronomical events.

In a radio interview with the current editor of The Old Farmer’s Almanac described how they make their long range weather predictions. They have a long record of being more than 80% correct with their region forecasts. These are not day to day predictions but rather trends for certain periods of time. Above or below normal temps – wet or dry – late or early frosts – the kind of things farmers and gardeners would be interested in for planting or harvesting. The almanac got a real boost in 1816 when it predicted snow fall in New England in July! July 1816 was the “year without a summer” in New England due to the eruption of the mega volcano Mt. Tambora in the East Indies in 1815.

The weather section of the book says that these predictions are based on a formula of their founder, Robert Thomas, who in 1792 was convinced that “Weather on Earth is influenced by sunspots”? This was a half century before Heinrich Schwabe’s decades long observations showed that sunspot activity waxes and wanes in an approximately 11 year cycle. In the radio interview their editor confirmed that they compare current sunspot activity to historical records of weather trends with similar solar patterns. They also use regional meteorological data over a 30 year period to further refine their predictions.

The real appeal of the almanac is its tips on all kinds of activities common to rural life. Recipes, Tips on preserving seeds for the next season, best times to plant or pick your vegetables and many other anecdotes of rural wisdom.

You can purchase the 2017 anniversary issue for about $ 7 at many farm and gardening stores or the expanded edition online or bookstores for $ 12
They also have a digital copy available http://www.almanac.com/ and a FaceBook Page. https://www.facebook.com/theoldfarmersalmanac
NEWS AND NOTES FOR FORMAL AND INFORMAL EDUCATORS

Space Place is a NASA website for elementary school-aged kids, their teachers, and their parents.

- It’s colorful!
- It’s dynamic!
- It’s fun!
- It’s rich with science, technology, engineering, and math content!
- It’s informal.
- It’s meaty.
- It’s easy to read and understand.
- It’s also in Spanish.
- And it’s free!

It has over 150 separate modules for kids, including hands-on projects, interactive games, animated cartoons, and amazing facts about space, Earth science, and technology.

Don’t forget to subscribe to our monthly e-newsletter, the NASA Space Place Gazette!
http://spaceplace.nasa.gov/subscribe

New!

What is an asteroid?
Asteroids are small, rocky objects that orbit the sun. While there are many asteroids in our solar system, most of them live in the main asteroid belt—a region between the orbits of Mars and Jupiter. But where did they come from, and are they all the same? Find out here!
http://spaceplace.nasa.gov/asteroid

New!

Exoplanets
All of the planets in our solar system orbit around the sun. Planets that orbit around other stars are called exoplanets. How do we know they exist? Check out our new article!
http://spaceplace.nasa.gov/all-about-exoplanets

Be sure to also check out our new video and poster about exoplanets!
http://spaceplace.nasa.gov/exoplanet-snap

New!

Moon Cookies
Make our delicious no-bake moon cookies! Follow along with our video for simple instructions.
http://spaceplace.nasa.gov/moon-cookies

Explore Earth and space at spaceplace.nasa.gov
All About Planets
Our solar system is home to eight amazing planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. No two of them are the same! Some are small and rocky; some are freezing cold. Learn all about each planet and what makes each one unique!
http://spaceplace.nasa.gov/planets

What are black holes?
And are they really as scary as they sound? A black hole is an area of such immense gravity that nothing—not even light—can escape from it. Check out our short video and poster to learn more. http://spaceplace.nasa.gov/black-holes

Special Days
Noteworthy days in NASA and space history you can observe in your classroom.

Jan. 7 - In 1610, Galileo discovered several of Jupiter’s moons!
Jupiter has many moons. Have you heard of its moon Io?
http://spaceplace.nasa.gov/io-tides

Jan. 16 — NASA selected the first U.S. women astronauts in 1978.
See some photos of astronauts in action!
http://spaceplace.nasa.gov/gallery-technology

Jan. 24 — Voyager 2 encountered Uranus on this day in 1986.
Did you know that Uranus has faint rings? Learn all about this blue planet here!
http://spaceplace.nasa.gov/all-about-uranus

Why were Spirit and Opportunity sent to Mars in the first place?
http://spaceplace.nasa.gov/mars-spirit-opportunity

Feb. 6 — In 1971, Alan Shepard played golf on the moon.
How far away is the moon? The answer might surprise you!
http://spaceplace.nasa.gov/moon-distance

Feb. 18 — Pluto was discovered in 1930 by astronomer Clyde Tombaugh.
Why is Pluto no longer considered a planet?
http://spaceplace.nasa.gov/ice-dwarf
Big Science in Small Packages

By Marcus Woo

About 250 miles overhead, a satellite the size of a loaf of bread flies in orbit. It’s one of hundreds of so-called CubeSats—spacecraft that come in relatively inexpensive and compact packages—that have launched over the years. So far, most CubeSats have been commercial satellites, student projects, or technology demonstrations. But this one, dubbed MinXSS (“minks”) is NASA’s first CubeSat with a bona fide science mission.

Launched in December 2015, MinXSS has been observing the sun in X-rays with unprecedented detail. Its goal is to better understand the physics behind phenomena like solar flares—eruptions on the sun that produce dramatic bursts of energy and radiation.

Much of the newly-released radiation from solar flares is concentrated in X-rays, and, in particular, the lower energy range called soft X-rays. But other spacecraft don’t have the capability to measure this part of the sun's spectrum at high resolution—which is where MinXSS, short for Miniature Solar X-ray Spectrometer, comes in.

Using MinXSS to monitor how the soft X-ray spectrum changes over time, scientists can track changes in the composition in the sun's corona, the hot outermost layer of the sun. While the sun's visible surface, the photosphere, is about 6000 Kelvin (10,000 degrees Fahrenheit), areas of the corona reach tens of millions of degrees during a solar flare. But even without a flare, the corona smolders at a million degrees—and no one knows why.

One possibility is that many small nanoflares constantly heat the corona. Or, the heat may come from certain kinds of waves that propagate through the solar plasma. By looking at how the corona's composition changes, researchers can determine which mechanism is more important, says Tom Woods, a solar scientist at the University of Colorado at Boulder and principal investigator of MinXSS: "It's helping address this very long-term problem that's been around for 50 years: how is the corona heated to be so hot."

The $1 million original mission has been gathering observations since June.

The satellite will likely burn up in Earth's atmosphere in March. But the researchers have built a second one slated for launch in 2017. MinXSS-2 will watch long-term solar activity—related to the sun's 11-year sunspot cycle—and how variability in the soft X-ray spectrum affects space weather, which can be a hazard for satellites. So the little-mission-that-could will continue—this time, flying at a higher, polar orbit for about five years.

If you’d like to teach kids about where the sun’s energy comes from, please visit the NASA Space Place:
http://spaceplace.nasa.gov/sun-heat/
Astronaut Tim Peake on board the International Space Station captured this image of a CubeSat deployment on May 16, 2016. The bottom-most CubeSat is the NASA-funded MinXSS CubeSat, which observes soft X-rays from the sun—such X-rays can disturb the ionosphere and thereby hamper radio and GPS signals. (The second CubeSat is CADRE — short for CubeSat investigating Atmospheric Density Response to Extreme driving - built by the University of Michigan and funded by the National Science Foundation.) Credit: ESA/NASA
Our Club General meetings are held at the
Jenks Public Schools Planetarium
105 East B St, Jenks, OK

When you enter the building lobby, take the elevator to the 3rd floor.

Meetings begin at 7:00 PM


We hope to see you there!
MEMBERSHIP RATES FOR 2016 WILL BE AS FOLLOWS:

ADULTS - $45 PER YEAR. INCLUDES ASTRONOMICAL LEAGUE MEMBERSHIP.

SENIOR ADULTS - $35 PER YEAR. FOR THOSE AGED 65 AND OLDER. INCLUDES ASTRONOMICAL LEAGUE MEMBERSHIP.

STUDENTS - $30 PER YEAR. INCLUDES ASTRONOMICAL LEAGUE MEMBERSHIP.

STUDENTS - $25 PER YEAR. DOES NOT INCLUDE ASTRONOMICAL LEAGUE MEMBERSHIP.

THE REGULAR MEMBERSHIP ALLOWS ALL MEMBERS OF THE FAMILY TO PARTICIPATE IN CLUB EVENTS, BUT ONLY ONE VOTING MEMBERSHIP AND ONE ASTRONOMICAL LEAGUE MEMBERSHIP PER FAMILY.

ADDITIONAL FAMILY MEMBERSHIP - $15 WITH ASTRONOMY CLUB OF TULSA VOTING RIGHTS, $20 WITH CLUB VOTING RIGHTS AND ASTRONOMICAL LEAGUE MEMBERSHIP.

THOSE WISHING TO EARN ASTRONOMICAL LEAGUE OBSERVING CERTIFICATES NEED TO HAVE A LEAGUE MEMBERSHIP.

MAGAZINE SUBSCRIPTIONS:

ASTRONOMY IS $34 FOR ONE YEAR OR $60 FOR 2 YEARS.

WEBSITE: www.astronomy.com

SKY & TELESCOPE IS $33 PER YEAR.

WEBSITE: www.skyandtelescope.com

SKY & TELESCOPE OFFERS A 10% DISCOUNT ON THEIR PRODUCTS.

IF YOU ARE AN EXISTING S&T SUBSCRIBER, YOU CAN RENEW DIRECTLY WITH S&T AT THE SAME CLUB RATE. BOTH S&T AND ASTRONOMY NOW HAVE DIGITAL ISSUES FOR COMPUTERS, IPADS AND SMART PHONES.
Above photo: Orion, Hyades and Pleiades, taken in February 2014. 
Below: The Big Dipper Tipped on its Handle, taken in February 2013. 
Both photos by Tamara Green.