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ASTRONOMY CLUB OF TULSA

# OBSERVER

JULY 2015

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PHOTO: Conjunction of Venus and Jupiter, by Stan Davis.

Stan's photo is described as follows: You know I like conjunctions. Here is Venus and Jupiter. The five brightest objects are Regulus in the upper left corner along with Pollux and Castor in the lower right with Jupiter above the brightest object Venus.

Took this on my front porch 6/11/2015 at about 10:00 PM CDT facing West.






Canon 70D f/3.5 ISO 800 5 sec exposure focal length 22 mm using a 18-135 mm lens

THE ASTRONOMY CLUB TULSA  
IS A PROUD MEMBER OF



THE ASTRONOMICAL LEAGUE

# JULY 2015

SUN	MON	TUE	WED	THU	FRI	SAT
			1 	2	3	4
5	6	7	8 	9	10	11
12	13	14	15 	16	17	18
19	20	21	22	23 	24	25
26	27	28	29	30	31 	

## MOON PHASES AND HOLIDAYS:






**FULL MOON (Buck Moon)** WED JUL 1  
**INDEPENDENCE DAY** SAT JUL 4  
**LAST QUARTER** WED JUL 8  
**NEW MOON** WED JUL 15  
**FIRST QUARTER** THURS JUL 23  
**FULL MOON** FRI JUL 31

## UPCOMING EVENTS:

<b>MEMBERS' NIGHT</b>	<b>FRI, JUL 17</b>	<b>8:30 PM</b>	<b>ACT OBSERVATORY</b>
<b>PUBLIC STAR PARTY</b>	<b>SAT, JUL 25</b>	<b>8:30 PM</b>	<b>ACT OBSERVATORY</b>
<b>SIDEWALK ASTRONOMY</b>	<b>SAT, AUG 1</b>	<b>8:00 PM</b>	<b>BASS PRO</b>
<b>MEMBERS' NIGHT</b>	<b>FRI, AUG 14</b>	<b>8:00 PM</b>	<b>ACT OBSERVATORY</b>
<b>PUBLIC STAR PARTY</b>	<b>SAT, AUG 22</b>	<b>8:00 PM</b>	<b>ACT OBSERVATORY</b>
<b>SIDEWALK ASTRONOMY</b>	<b>SAT, AUG 29</b>	<b>7:15 PM</b>	<b>BASS PRO</b>

# AUGUST 2015

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4	5	6 	7	8
9	10	11	12	13	14 	15
16	17	18	19	20	21	22 
23	24	25	26	27	28	29 
30	31					

## MOON PHASES & HOLIDAYS:



**LAST QUARTER** THURS AUG 6  
**NEW MOON** FRI AUG 14  
**FIRST QUARTER** SAT AUG 22  
**FULL MOON (Sturgeon Moon)** SAT AUG 29

# ASTRONOMY CONVENTIONS THIS SUMMER

Get your Reservations in Early and save.

Astronomy conventions are a great way to meet other astronomers and find out what is going on in other clubs in the region. They feature a variety of guest speakers plus a number of astronomer vendors are usually present. Plus you get a chance to travel and see what kind of facilities other clubs are using.



<https://alcon2015.astroleague.org/>

[https://www.astroleague.org/files/reflector/Mar\\_2015.issue\\_Web\\_.pdf](https://www.astroleague.org/files/reflector/Mar_2015.issue_Web_.pdf) page 2

The astronomical leagues national convention is in Las Cruces, New Mexico. These national events attract several 100 of the nation's leading astronomy professionals as well as amateurs. Speakers include well known astronomy authors and professionals. This year's event is held in the dark skies of SW New Mexico. A number of optional side trips are available: White Sands Missile base museum, Very Large Array Radio observatory, Apache Point observatory and Dunn Solar telescope plus many natural attractions.



Okie-Tex Star Party  
September 12-20, 2015

<http://www.okcastroclub.com>  
<http://www.okie-tex.com>

Pre-registration submissions must be post-marked no later than *August 24, 2015* and must be paid in full. Online Registrations must be completed and paid in full by midnight CDT that evening. See above websites for complete details.

Meals catered by Jody's Catering, Boise City, OK. Their meal request form and payment must be received, with a postmark, no later than August 21, 2015.

Many of our Astronomy Club of Tulsa members go to this fun star party every year and it is WELL WORTH IT! Some of the most beautiful scenery in Oklahoma and the darkest skies! Plus a swap meet, great food, great guest speakers and the Okie-Tex Giveaway! Enjoy yourself with us at this magnificent dark sky site!

# PRESIDENT'S MESSAGE

BY RICHARD BRADY



Hi everyone!

Location! Location! Location! This month the location is Pluto! Pluto! Pluto! Or for us earthbound, the location is in front of your computer watching all the images coming back from the New Horizons spacecraft. Or if you can get it on cable, NASA TV will have extensive coverage. I'll be watching online since Cox Cable doesn't carry NASA TV.

New Horizons will go zipping through Pluto and its moons on Tuesday, July 14. The closest approach is at 6:50 AM CDT. We won't get pictures back immediately because during closest approach the spacecraft won't have its main antenna pointed back towards Earth; otherwise, it would not be able to point its instruments at Pluto.

There are lots of apps available. The main one I am using is Pluto Safari. It is available for both Apple and Android. It comes from the same people who created Sky Safari 4 (a great app in its own right). Pluto Safari has both the history of New Horizons and current updates, along with views of the spacecraft and solar system from various perspectives. I highly recommend both.

Also there are many articles about the New Horizons probe in the magazines and websites. Pluto was the cover articles for both Sky & Telescope and Astronomy magazines in July. Both have coverage on their News web page. And there is lots of stuff on NASA.gov and space.com along with many others.

On to other things now.

I want to congratulate Brad Young for getting 3 more observing awards from The Astronomical League. They are for the Planetary Nebula Observing Program, Two in the View Observing Program, and the first person in the AL to get the Sketching Observing Award. Way to go Brad!

Sky & Telescope had a sale last month of everything in its store. So with the board's agreement, we bought 7 globes for basically half price. There are globes for Mercury, Venus, Earth, our Moon, and Mars, along with topographic globes showing the elevation above mean level (can't call it sea level since only Earth has seas) for the Moon and Mars. They will be housed in the classroom at the observatory. Come check them out.

If you read last month's newsletter, there was an ad for a 12" Meade Light Bridge telescope on a JMI wheeley bar cart offered for sale. No offers were made, so the scope has been donated to the club by our member Jane Johansson. The scope will also be housed at the observatory.

Every year TWAN (The World at Night) sponsors a photo contest. There is a 10 minute video of the winners on Vimeo. You can see the video at [tsanight.org](http://tsanight.org). Also there is a link to it on the Sky & Telescope News web page (titled Best Nightscapes From Across the World), along with a link at APOD for June 25.

Clear Skies!  
Richard Brady



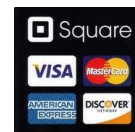
# TREASURER'S AND MEMBERSHIP REPORT

BY TIM DAVIS



**Astronomy Club of Tulsa: 144 members, including 31 new members in 2015.**

**Welcome to our new members this month:** Randy Burke, Vicki Limas, Jacob Shepherd, George Bashaw, Joel Moon and John Evans.



## Club Accounts as of June 30, 2015 :

**Checking: \$ 5,190.58; Savings: \$ 3,774.55; Investment accounts: \$ 19,033.53 (Value Fluctuates with Market); PayPal: \$ 0.00**

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 2015 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.

**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](http://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](http://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

# NITELOG—NorwayInTErurbanLocalObservingGroup

BY TOM HOFFELDER

With the attached list we've completed all of the Messier objects and about 150 of the H400 in 12 months. Twice. So next month should begin coverage of the remaining H400 objects, but after 10+ years, I'm tired. In case anyone is interested I have attached a copy of my Magnificent 1000, which covers all the H400 and the HII and has been updated to now include galaxy surface brightness. The Facebook NITELOG group will live on, where we can "talk" current events, like comets, supernova, whatever - so if you are not a member, request to be added.

**Recommended Book:** <http://www.amazon.com/gp/product/B00XIHMFGO> There are many really neat observing stories there and you all need to read them!

**COMETS:** Amazingly, Lovejoy is still hanging in around 10th mag. Heavens-Above has better comet coverage these days (after a little help from me on magnitudes) than in the past. The location info is and has been perfect, but you still need to check other sources for magnitude verification, such as:

<http://www.cobs.si/> or <http://www.shopplaza.nl/astro/> or <http://www.aerith.net/comet/weekly/current.html>

Speaking of comets, Catalina (C/2013 US10) might be 4th mag in Dec, so we'll probably be talking it up eventually on FB.

**PLANETS:** Venus! On the first at an altitude of 17 degrees a half hour after sunset, it will be slightly more than only 1/2 degree from Jupiter! With Venus at 1/3rd crescent and both planets having nearly the same apparent diameter (32.8 and 32.4 arc seconds), they should be quite the view in a telescope! (See the NITELOG SE of 6/23.) By the 11th Venus is 12 degrees high a half hour after sunset, and the crescent has decreased to a quarter of the planet but the diameter has increased to 38 seconds. The trend continues, with the altitude being only 7 degrees a half hour after sunset on the 18th, a crescent phase of 0.2 and a diameter of 43 seconds. If you can still find it in the glow of sunset on the 25th, the crescent will be thinned down to only 1/8th.

Saturn! An hour after sunset on the first, it is approaching the meridian, so as high as it's gonna get, which ain't all that high (27 degrees in Maine), but we'll take what we can get. By month's end about the same, but slipping away from the meridian. If you enjoy knocking their socks off with sidewalk astronomy, this is the month, with the 24th and 25th the Friday and Saturday, to get out there and do it! Nothing gets more WOWS than the first quarter moon and Saturn.

**STARS:** The three carbon stars include the one (T Lyrae) that I believe to be the darkest red, so ignore the B-V value. Six doubles are included, all of which should show obvious color differences (the main reason I look at doubles), plus one triple and one quadruple. For one of the doubles, Sigma 1916, you will find magnitudes of 8.4 and 10.6 listed. Those are from stelladopie and quite different from Burnham, which has 7 and 9.5.

**THE GOOD STUFF:** Mostly globulars, since we have now moved east of Virgo/Coma, but a few galaxy stragglers are left, one of which just may be my favorite. There are 16 Messier Objects and 9 Herschel 400 Objects. Note the last two objects are a small globular and planetary that can be seen in a 30' FOV.

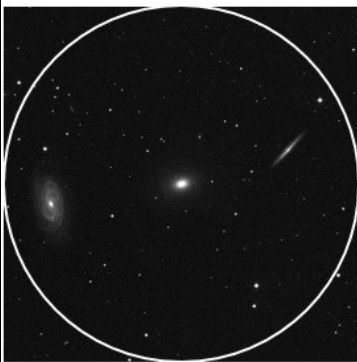


OΣ341 15' FOV

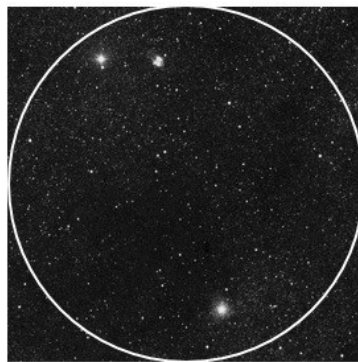


NGC 5907 30' FOV

Just for the fun of it, for those few of you who have used the Right Angle Sweep or might want to try, you can sweep up nine of the Messier globulars by hopping from one to the next, per the globhop file. Some of the sweeps are a little longer than standard, but the objects are all big and bright so with a little care in measuring the fields moved, it is not really a problem.



NGC 5985/82/81 20' FOV



NGC 6445/40 30' FOV

**QUESTIONS:** As always, questions and comments are welcome!

**THE END.... except for Facebook.**

tom hoffelder  
[rocksnstars@gmail.com](mailto:rocksnstars@gmail.com)

“Were I to write out one prescription designed to alleviate at least some of the self-made miseries of mankind, it would read like this: One gentle dose of starlight to be taken each clear night just before retiring.” – Leslie Peltier

EDITOR’S NOTE: I was unable to attach Tom’s observing list and copy of his Magnificent 1000, as they were too large to fit into this newsletter. I attempted to create hyperlinks, but either MS Publisher or Windows 8 is trying to be as big of a pain in the butt as they can and will not allow me to do so. If you are interested in seeing either list, please feel free to e-mail me at [astrotulsa.vp@gmail.com](mailto:astrotulsa.vp@gmail.com).

## Glob Hopping

NGC	M	star	N/S	E/W	Mag	Size
6121	4	α Sco	0.1 S	1.3 W	5.4	36
6093	80	prv	3.5 N	1.4 W	7.3	10
6171	107	prv	10.0 N	3.8 E	7.8	13
6218	12	prv	11.0 N	3.8 E	6.1	16
6254	10	prv	2.2 S	2.4 E	6.6	20
6402	14	prv	0.9 N	10.2 E	7.6	11
6333	9	prv	15.2 S	4.4 W	7.8	12
6273	19	prv	7.8 S	3.7 W	6.8	17
6266	62	prv	3.8 S	0.3 W	6.4	15

7/11			7/18			7/19		
SS	NTE	ATE	MR	SS	MS	NTE	ATE	ATB
20:26	21:48	22:45	02:25	20:22	21:36	21:41	22:35	03:03

Object (Type)	RA	Dec	Star	N/S	E/W	Mag*/(# of Stars)	Size (')/ Sep (")	Spect/ M# or H#	Dist (ly)	Urano I Page	Comment, [B-V], {~crrt mag} (opt x)
V CrB (CS)	15 49.5	+39 34	β Boo	0.8 S	9.3 E	7-12		N		79	[4.4] {10}
SU Sco (CS)	16 40.6	-32 23	ε Sco	1.9 N	2.0 W	8.0-9.4		CII		375	[4.4] {???
T Lyr (CS)	18 32.3	+37 00	α Lyr	1.8 S	0.9 W	7.5-9.3		C		117	[3.7] {9}
ε Boo (MS)	14 45.0	+27 04	-	-	-	2.5, 5	2.9	K0, A2	250	153	color (165)
Σ1916 (MS)	15 09.9	+38 58	β Boo	1.3 S	1.5 E	8.4, 10.6	10			112 (ni)	color (50)
α Her (MS)	17 14.6	+14 23	-	-	-	3.5, 5.5	4.8	M5, G5	360	202	color (100)
μ Her (MS)	17 46.5	+27 43	-	-	-	3.5, 9.8	35	G5		158	(15)
μ <sub>b</sub> Her (MS)	-	-	-	-	-	10.2, 10.7	1.1	dM3		-	(440)
*OΣ341 (MS)	18 05 50	+21 27	PRV	6.2 S	4.5 E	7,9,9,9	28,38,63			159 (ni)	(20)
39 Oph (MS)	17 18.0	-24 17	θ Oph	0.7 N	0.9 W	5.2, 6.6	10	K1, F6		337	color (50)
S694 (MS)	17 52.1	+01 07	β Oph	3.5 S	2.2 E	6.7, 7.3	80	K2, A0		248 (ni)	color (6)
ο Dra (MS)	18 51.2	+59 23	κ Cyg	6.0 N	3.2 W	4.8, 8.2	37			54	color (15)
NGC 5866 (S0-a)	15 06.5	+55 46	ι Dra	3.1 S	2.5 W	[13.0]	6.5X3.1	M102	43M	50	*H215-1
NGC 5904 (GC)	15 18.6	+02 05	α Ser	4.3 S	6.4 W	5.7	23	M5	24K	244	
*NGC 5907 (Sc)	15 15.9	+56 20	ι Dra	2.6 S	1.2 W	[13.4]	12X1.4	*H759-2	50M	50	
*NGC 5982 (E3)	15 38.7	+59 21	ι Dra	0.3 N	1.7 E	[12.8]	2.6X1.9	*H764-2	130M	51	GX *5981 0.1 W
*NGC 5985 (SBb)	15 39.6	+59 20	PRV	-	0.1 E	[14.0]	5.5X3.0	H766-2	130M	51	



NGC 6121 (GC)	16 23.6	-26 31	$\alpha$ Sco	0.1 S	1.3 W	5.4	36	M4	7.2K	336	
NGC 6093 (GC)	16 17.0	-22 58	PRV	3.5 N	1.5 W	7.3	10	M80	33K	336	
NGC 6171 (GC)	16 32.5	-13 03	$\zeta$ Oph	2.5 S	1.2 W	7.8	13	M107	21K	291	*H40-6
NGC 6205 (GC)	16 41.7	+36 28	$\eta$ Her	2.5 S	0.2 W	5.8	20	M13	22K	114	GX 6207 0.5 NE
NGC 6218 (GC)	16 47.2	-01 57	$\delta$ Oph	1.7 N	8.2 E	6.1	16	M12	16K	246	
NGC 6254 (GC)	16 57.1	-04 06	PRV	2.2 S	2.3 E	6.6	20	M10	14K	247	
NGC 6266 (GC)	17 01.2	-30 07	$\tau$ Sco	1.9 S	5.5 E	6.4	15	M62	22K	375	
NGC 6273 (GC)	17 02.6	-26 16	$\alpha$ Sco	0.2 N	7.5 E	6.8	17	M19	29K	337	
NGC 6235 (GC)	16 53.4	-22 11	PRV	4.1 N	2.1 W	8.9	5.0	*H584-2	51K	337	
NGC 6333 (GC)	17 19.2	-18 31	$\eta$ Oph	2.8 S	1.2 E	7.8	12	M9	26K	337	
NGC 6341 (GC)	17 17.1	+43 08	$\pi$ Her	6.3 N	0.4 E	6.5	14	M92	27K	81	
NGC 6402 (GC)	17 37.6	-03 15	$\beta$ Oph	7.8 S	1.5 W	7.6	11	M14	30K	248	
NGC 6426 (GC)	17 44.9	+03 10	$\beta$ Oph	1.4 S	0.4 E	10.9	4.2	*H587-2	80K	248	
NGC 6475 (OC)	17 53.8	-34 48	G Sco	2.3 N	0.8 E	3.3	75	M7	980	377	
NGC 6405 (OC)	17 40.3	-32 15	PRV	2.5 N	3.0 W	4.2	33	M6	1600	377	
NGC 6494 (OC)	17 57.1	-18 59	$\mu$ Sgr	2.0 N	4.0 W	5.5	25	M23	2150	339	
*NGC 6440 (GC)	17 48.9	-20 22	PRV	1.4 S	1.9 W	9.3	4.4	*H150-1	15K	339	
*NGC 6445 (PN)	17 49.3	-20 01	PRV	0.3 N	0.1 E	11.2	0.7	*H586-2	13K	339	

\*DSS image

\*[Surf  
Brtnss for

\*H400

ni=shown,

mag per  
square

not identified

*Astronomy Club Article*

*July 2015*

### **On The Brightness Of Venus**

By Ethan Siegel

Throughout the past few months, Venus and Jupiter have been consistently the brightest two objects visible in the night sky (besides the moon) appearing in the west shortly after sunset. Jupiter is the largest and most massive planet in the solar system, yet Venus is the planet that comes closest to our world. On June 30th, Venus and Jupiter made their closest approach to one another as seen from Earth—a conjunction—coming within just  $0.4^\circ$  of one another, making this the closest conjunction of these two worlds in over 2,000 years.

And yet throughout all this time, and especially notable near its closest approach, Venus far outshines Jupiter by 2.7 astronomical magnitudes, or a factor of 12 in apparent brightness. You might initially think that Venus's proximity to Earth would explain this, as a cursory check would seem to show. On June 30th Venus was 0.5 astronomical units (AU) away from Earth, while Jupiter was six AU away. This appears to be exactly the factor of 12 that you need.

Only this doesn't explain things at all! Brightness falls off as the inverse square of the distance, meaning that if all things were equal, Venus ought to seem not 12 but 144 times brighter than Jupiter. There are three factors in play that set things back on the right path: size, albedo, and illumination. Jupiter is 11.6 times the diameter of Venus, meaning that despite the great difference in distance, the two worlds spanned almost exactly the same angular diameter in the sky on the date of the conjunction. Moreover, while Venus is covered in thick, sulfuric acid clouds, Jupiter is a reflective, cloudy world, too. All told, Venus possesses only a somewhat greater visual geometric albedo (or amount of reflected visible light) than Jupiter: 67 percent and 52 percent, respectively. Finally, while Venus and Jupiter both reflect sunlight toward Earth, Jupiter is always in the full (or almost full) phase, while Venus (on June 30th) appeared as a thick crescent.

All told, it's a combination of these four factors—distance, size, albedo, and the phase-determined illuminated area—that determine how bright a planet appears to us, and all four need to be taken into account to explain our observations.

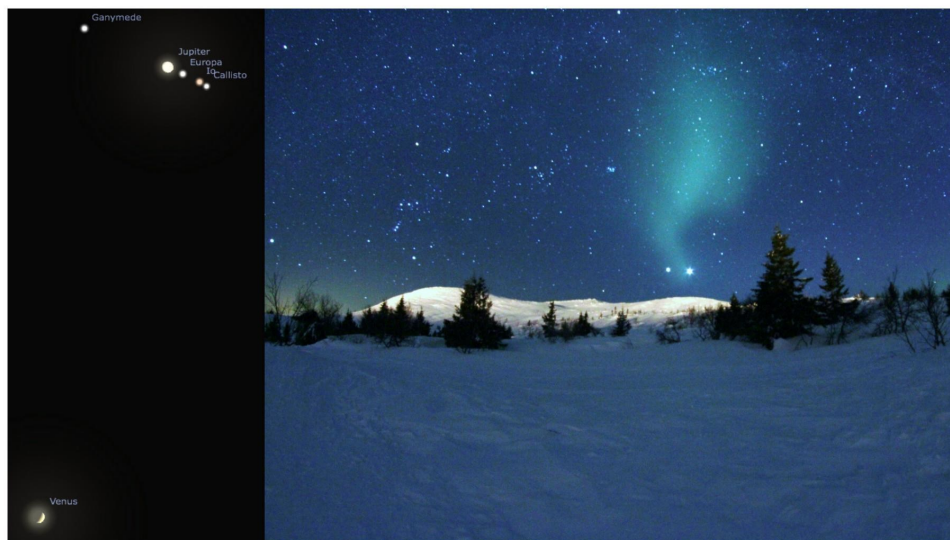
Don't fret if you missed the Venus-Jupiter conjunction; three more big, bright, close ones are coming up later this year in the eastern pre-dawn sky: Mars-Jupiter on October 17, Venus-Jupiter on October 26, and Venus-Mars on November 3.

Keep watching the skies, and enjoy the spectacular dance of the planets!

# ON THE BRIGHTNESS OF VENUS BY ETHAN SIEGEL, CT'D.

*Astronomy Club Article*

*July 2015*



*Image credit: E. Siegel, using the free software Stellarium (L); Wikimedia Commons user TimothyBoocock, under a c.c.-share alike 3.0 license (R). The June 30th conjunction (L) saw Venus and Jupiter pass within  $0.4^\circ$  of one another, yet Venus always appears much brighter (R), as it did in this image from an earlier conjunction.*

National Aeronautics and Space Administration



# the Space Place

June - July 2015 / Vol. 8, Issue 2

## 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 and Earth science and technology.

Summer is upon us! What will you do with the extra sunlight and, hopefully, a little bit of extra time? At Space Place, we have you covered with new articles and activities.

*New!*

### The Age of the Sun

We see it in the sky every day, but how much do we know about the sun? What about something basic, like its age? Find out the sun's age, and just how it is that we know how old it is.

<http://spaceplace.nasa.gov/sun-age>



### Space Place en Español

We are always adding new articles and activities translated into Spanish for our language learner audiences. Be sure to check out our Spanish language site.

<http://spaceplace.nasa.gov/sp>



*New!*

### How Far Away is the Moon?

It seems close because we can see it easily with the naked eye, but 30 Earths could fit between us and the moon.

<http://spaceplace.nasa.gov/moon-distance>

*New!*

### How Many Moons?

Go on a tour of our solar system and meet some of the most popular moons. Saturn has the most confirmed moons, but Jupiter has the biggest one, Ganymede. Do you know why Mercury doesn't have any moons at all?

<http://spaceplace.nasa.gov/how-many-moons>



Where kids and grown-ups have fun with space science and technology



#### Printable Content

You can decorate your classroom with the official **Space Place calendar** for the **2015-2016** school year. It has beautiful images, NASA facts and trivia, and links to relevant content. Download individual months or the entire set today.



<http://spaceplace.nasa.gov/calendar>

#### The Space Place Experiment Center



Introducing a new way to spice up your classroom or after-school experience—the “Space Place Experiment Center.” Loaded with two classic bean-sprout experiments, this web app brings the excitement of the scientific method into the digital age with a framework for students to input observations and record daily changes—all online. How much water does a bean need to sprout? What happens if you try to grow a bean plant without light? Start your investigation today!

<http://spaceplace.nasa.gov/experiment>



[www.nasa.gov](http://www.nasa.gov)

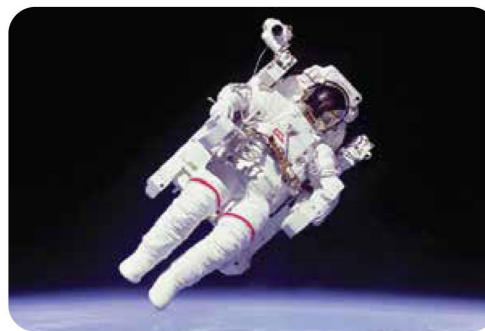
#### Special Days

##### June 5 — World Environment Day

Play the Missions to Planet Earth card game.  
<http://spaceplace.nasa.gov/earth-card-game>

##### June 18 — Sally Ride became first U.S. woman in space, 1983.

Look at our photo gallery of astronauts and rockets!  
<http://spaceplace.nasa.gov/gallery-technology>



##### June 21 — Summer Solstice and the First Day of Summer

Find out why we have seasons on Earth, and how it's related to long and short days.  
<http://spaceplace.nasa.gov/seasons>

##### July 6 — Aphelion: on this day we are farthest from the sun.

Learn about the sun and Earth's special relationship in our animated storybook, “Super Star Meets the Plucky Planet.”  
<http://spaceplace.nasa.gov/story-superstar>

##### July 16 — Apollo 11 launched in 1969, bringing astronauts to the moon for the first time.

Why does the moon have so many craters?  
<http://spaceplace.nasa.gov/craters>

##### July 29 — NASA established in 1958.

Download your own Space Place desktop wallpaper to celebrate!  
<http://spaceplace.nasa.gov/wallpaper>



## **WHERE WE MEET**

JENKS HIGH SCHOOL PLANETARIUM

105 E. B ST. JENKS, OK

### **DIRECTIONS TO THE JENKS HIGH SCHOOL CAMPUS:**

#### **FROM THE WEST: (MARKED IN RED ON MAPS)**

TAKE US 75 TO THE MAIN ST. - JENKS EXIT

FOLLOW MAIN ST. APPROXIMATELY 2 MILES AND CROSS THE RAILROAD TRACKS

TURN LEFT ON 1ST ST.

#### **FROM CENTRAL PART OF TULSA: (MARKED IN GREEN ON THE MAPS)**

TAKE RIVERSIDE DRIVE TO THE 96TH STREET BRIDGE

TURN RIGHT AND GO OVER THE RIVER

FOLLOW A ST. APPROXIMATELY 7 BLOCKS

TURN RIGHT ON 1ST ST.

#### **FROM THE EAST: (MARKED IN BLUE ON THE MAPS))**

TAKE THE CREEK TURNPIKE TO S. ELM ST. IN JENKS

FOLLOW ELM ST. NORTH TO MAIN ST.

TURN RIGHT ON MAIN ST. AND CROSS THE RAILROAD TRACKS

TURN LEFT ON 1ST ST.

#### **FOR EACH:**

PARK IN THE LOT AT THE END OF 1ST ST.

USE THE DOORS AT THE NORTH SIDE OF THE BUILDING

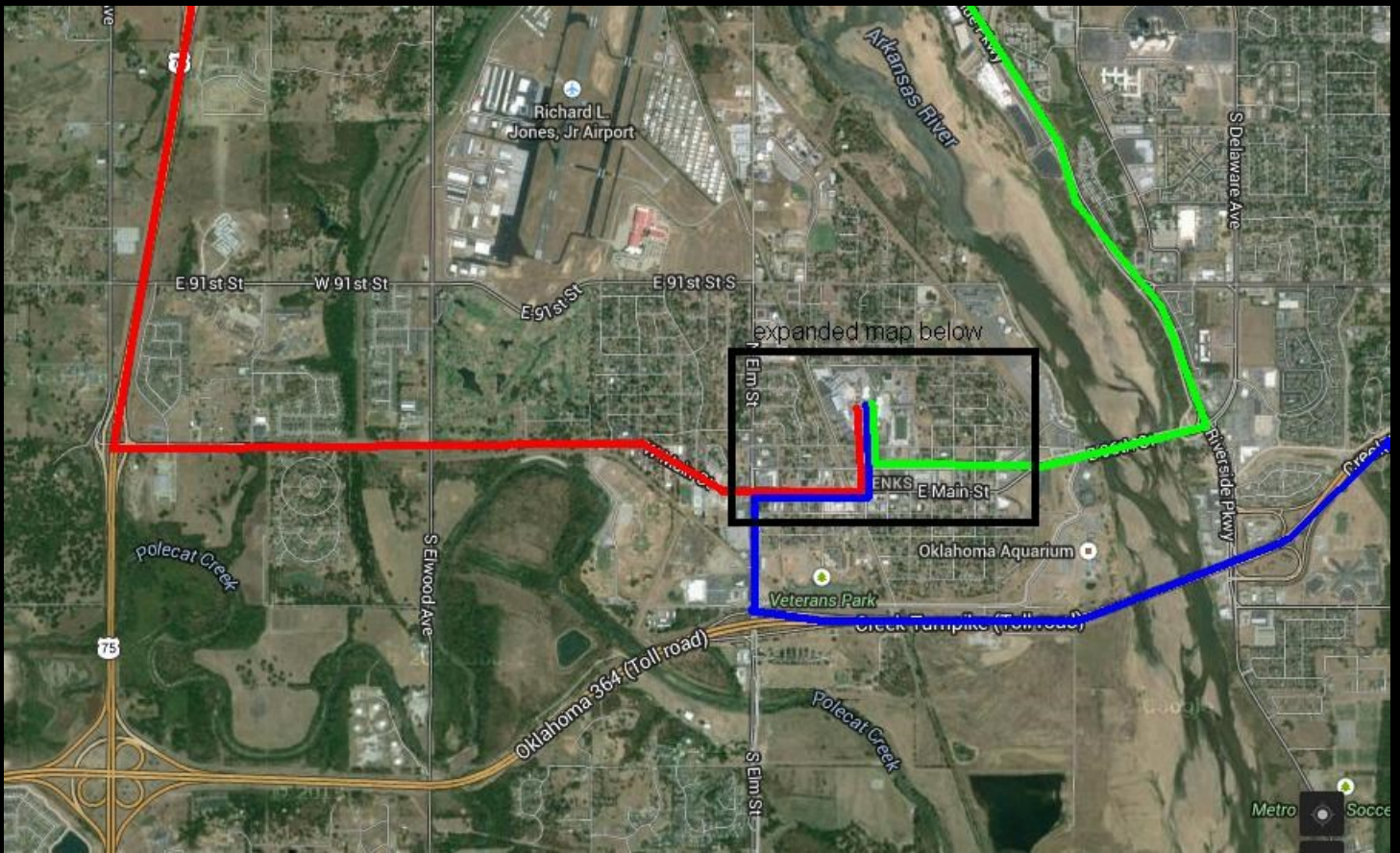
GO UP THE STAIRS TO THE 3RD FLOOR (THERE IS AN ELEVATOR FOR THOSE WHO NEED IT)

TURN RIGHT AND GO DOWN THE HALLWAY TO EITHER SIDE OF THE PLANETARIUM

### **MAPS ON NEXT PAGE**

**THE GENERAL MEETINGS ARE FREE AND OPEN TO THE PUBLIC.**

**WE HOPE TO SEE YOU THERE!**



**ABOVE:** DIRECTIONS TO JENKS HIGH SCHOOL FROM CENTRAL TULSA, WEST OF TULSA AND EAST OF TULSA

**BELOW:** MAP SHOWING ROUTE INTO PARKING LOT





## MEMBERSHIP INFORMATION

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### MEMBERSHIP RATES FOR 2015 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](http://www.astronomy.com)

SKY & TELESCOPE IS \$33 PER YEAR.

WEBSITE: [www.skyandtelescope.com](http://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.*

### ONLINE REGISTRATION

WE NOW HAVE AN AUTOMATED ONLINE REGISTRATION FORM ON THE WEBSITE FOR NEW MEMBERSHIPS, MEMBERSHIP RENEWALS AND MAGAZINE SUBSCRIPTIONS. JUST SIMPLY TYPE IN YOUR INFORMATION AND HIT "SEND" TO SUBMIT THE INFORMATION. YOU CAN THEN PRINT A COPY OF THE FORM AND MAIL IT IN WITH YOUR CHECK, OR USE OUR CONVENIENT PAYPAL OPTION. .

LINK: <http://www.astrotulsa.com/Club/join.asp>

OR, IF AT A STAR PARTY OR MEETING, SIMPLY FIND A CLUB OFFICER TO ASK ABOUT JOINING OR RENEWING WITH YOUR DEBIT OR CREDIT CARD THROUGH OUR CONVENIENT SQUARE OPTION!




THE ASTRONOMY CLUB OF  
TULSA INVITES YOU TO MAKE  
PLANS THIS SUMMER TO JOIN  
US AT A STAR PARTY!

OPEN TO THE PUBLIC

FOR MORE INFORMATION  
PLEASE VISIT  
WWW.ASTROTULSA.COM.

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3 NON-PROFIT ORGANIZATION OPEN TO  
THE PUBLIC. THE CLUB STARTED IN  
1937 WITH THE SINGLE MISSION TO  
BRING THE JOY AND KNOWLEDGE OF  
ASTRONOMY TO THE COMMUNITY OF  
TULSA, OK AND THE SURROUNDING  
AREA. TODAY OUR MISSION REMAINS  
EXACTLY THE SAME. WE TRAVEL TO  
LOCAL SCHOOLS, CHURCHES AND  
MANY OTHER VENUES WITH SCOPES  
AND PEOPLE TO TEACH. OUR  
OBSERVATORY IS LOCATED IN MOUNDS  
AND MANY PUBLIC PROGRAMS ARE  
OFFERED THERE. TO JOIN THE  
ASTRONOMY CLUB OF TULSA, PLEASE  
VISIT WWW.ASTROTULSA.COM WHERE  
YOU WILL FIND ALL THE INFORMATION  
NECESSARY TO BECOME A MEMBER.

 Also find us on Facebook!

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



WE ALSO ARE A PROUD PARTICIPANT IN  
NASA'S NIGHT SKY NETWORK.

THE EDITOR WISHES TO THANK THE FOLLOWING FOR  
THEIR CONTRIBUTIONS TO "THE OBSERVER" FOR

TOM HOFFELDER

STAN DAVIS

DR. ETHAN SIEGEL

RICHARD BRADY

TIM DAVIS

TAMARA GREEN

PHOTOS: Above—Venus and Jupiter conjunction; Below—Venus and  
Jupiter Over Water, both by Tom Hoffelder.

