



Astronomy Club of Tulsa
Observer
September 2014



Photo: The Big Dipper Over Black Mesa, Okie-Tex Star Party 2013, by Tamara Green.

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SEPTEMBER 2014

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				

OCTOBER 2014

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	

UPCOMING EVENTS:

Labor Day	Monday, Sep 1		
Sidewalk Astronomy	Sat, Sep 6	Bass Pro	7:15 PM
General Meeting	Fri, Sep 12	Jenks HS Planetarium	7:00 PM
Club Work Day	Sat, Sep 13	ACT Observatory	TBA
Public Star Party	Sat, Sep 20	ACT Observatory	7:00 PM
Okie-Tex Begins	Sat, Sep 20		
AUTUMNAL EQUINOX	Mon, Sep 22		9:29 PM CDT
Members' Night	Fri, Sep 26	ACT Observatory	7:00 PM
Back-Up Night	Sat, Sep 27	ACT Observatory	7:00 PM
Okie-Tex Ends	Sun, Sep 28		
General Meeting	Fri, Oct 3	Jenks HS Planetarium	7:00 PM
Sidewalk Astronomy	Sat, Oct 4	Bass Pro	6:30 PM
Public Star Party	Sat, Oct 18	ACT Observatory	7:00 PM
Members' Night	Fri, Oct 24	ACT Observatory	7:00 PM
Back-Up Night	Sat, Oct 25	ACT Observatory	7:00 PM
Halloween	Fri, Oct 31		



Treasurer's and Membership Report

By Tim Davis

Astronomy Club of Tulsa: 136 members, including 44 new members in 2014.

Welcome to our new members this month: Venket Padmanapan Rao, Tony Blakesley, Mark Ellis and Kunal Mishra.

Club Accounts as of Aug 28, 2014:

Checking: \$ 2,420.60; Savings: \$ 3,770.53; Investment accounts: \$ 19,524.41 (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 now. 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 2014 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 \$ 34.00 for 1 year, or \$ 60.00 for 2 years. www.astronomy.com

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

Sky & Telescope is \$ 33.00 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.

2015 Wall Calendar

The 2015 Astronomy Magazine Wall Calendars are here and are now available. If you would like to reserve one, send me an email at act_tres@astrotulsa.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. We have 50 available this year for \$10.00 each, cash, check or credit cards accepted. That is a 23% savings off the regular retail price.



Get yours while they last!

Tim Davis

ACT Treasurer



The Secretary's Stuff

By Tamara Green

Hello All!

Not much to report this month, other than some upcoming events you don't want to miss!

Sidewalk Astronomy will be on Saturday, September 6 at Bass Pro. Start time is 7:15 PM. As of this writing, I do not know whether or not Owen will be there, as he had dental surgery on the 29th of August (his BIRTHDAY, of all days!). I am sure he will try his best to go.

Our General Meeting is on Friday, September 12 at the Jenks High School Planetarium at 7:00 PM. Directions and maps are on pages 20 and 21.

Our Public Night will be on Saturday, September 20 at the ACT Observatory at 7:00 PM.

OKIE-TEX STAR PARTY is September 20-28 at Black Mesa! This premier star party is always lots of fun, with over 400 attendees (on average) per year, great food, many fun things to do during the day, and the most glorious dark sky in all of Oklahoma! I hope to see you there!

If you are not going to OTSP, then our Members' Night is on Friday, September 26 at ACT Observatory at 7:00 PM.

Okie-Tex 2013

by Jack Eastman

Well, it happened again, 300+ miles to the Southeast, the annual Okie-Tex Starparty in the Oklahoma panhandle, far away from any city of consequence. (Boise City, pop. 1260 is 35 miles away. No visible light dome from the site)

This year I was conscripted into slave labor to help out with the setting up of the camp, primarily laying out power lines and chalk lining the "streets". The reward was an extra day and a better choice of campsites. Meals were provided by Subway and Jody's Catering.

This time I decided to go to Boise City, get a room, and be at the camp early Friday AM for the setup. It worked out well, but I should have read the reviews of the motels in Boise City. Oh well, that's another story.

Arriving at the camp midmorning, we laid out the power lines for the Western part of the observing field and defined the "streets" as best we could. We were pretty much done by midafternoon, then the mission was to set up camp. The weather was "iffy" drizzle in Boise City, the closer to the camp the harder it rained until about 8 or so miles from camp, it cleared up and, except for a stout wind, was very pleasant.

While relaxing in the car, listening to Vaughn William's 8th symphony, I heard much howling and yelling from the field. It was Joe Gafford's observatory tent rolling along "tumble weed" like with Joe inside! Seems the wind caught it and was trying to blow it, and Joe, back to Colorado! He and I were the only ones around, we did get things under control, followed by copious use of tent stakes! Dinner after the work was provided by Jody's Catering, formerly the volunteers from the Cimarron Heritage Center. As in times past, the food was excellent, and plenty of it. They provided all the meals for the rest of the party, as well as the "Cosmic Café" a late night canteen providing coffee and snacks 'till around 3-AM. The total attendance was about 423, just 10 less than the all time record in 2010. On any given day there was from 228 to 309 at the camp, the maximum, 309, was Thursday, the 3rd.

Friday evening the weather clouded up, there were numerous lightning flashes all around us, but no thunder, suggesting the weather wasn't all that close. Wind, yes, but no rain. The next day, and for the rest of the starparty, except the final Friday, the conditions were essentially perfect, Sky Quality Meter* (SQM) readings from 21.2 to 21.8 (I'd give it a Bortle scale of 2.5 to 3**) for the duration of the event, little or no wind and seeing from just O.K. to reasonably good. Did get a few double stars, Epsilon Bootes, at 3-arc seconds low in the West, Zeta Aquarii, 1.8 arc seconds plus several wider pairs. Poking through the Milky Way with both the 6-inch Clark with its "comet eyepiece", (31X 1.2 degrees on the sky), and the "David Levy" Comet Hunter with its 20mm Ethoslike eyepiece, (2.78 degrees field), provided spectacular views. M-33 and the Helix nebula as well as the Veil in Cygnus. All very low surface brightness objects (21.5 magnitudes/square arc second for the helix) were easily seen in both these 'scopes. An OIII filter really helped a bunch with the Helix and the Veil, making them almost jump out and grab my nose! M-31, 32 and 110 were easily seen in my tiny 40mm Newtonian as well. I had mounted a red-dot finder on my 20X80 binoculars, and hunting down objects with these then pointing them out on the sky with the red-dot worked very well. On the subject of low surface brightness, the Gegenschein was fairly easy to see, a big, very faint glow, about 7 x 15 degrees in extent, just below the Great Square of Pegasus. This is the glow, at the antisolar point of the Zodiacal Light, faint reflection from dust in the ecliptic plane. With skies like this, there's certainly a feeling of guilt in hitting the sack before dawn! Minimum temperatures ranged from 34F, getting a tad warmer each night to around 47, then a 30 the final Saturday AM and a chilly 22, with frost Sunday AM.

Brrr!

Wildlife abounded, from a single tarantula that seemed to want to stay around my camp to many other beasts. We finally evicted the tarantula for fear of stepping on it later on. You that were at the 2009 starparty recall the march of the tarantulas, apparently a migration of the beasts. There were the usual batch of flies and this year, and highly unwelcome mosquitoes. I suggested to Mike, from Oklahoma City, that they issue a flyswatter to each of the highschool students that come out and pay 'em a penny a fly/mosquito.

Okie-Tex 2013, by Jack Eastman, Ct'd.

Mike said "No, that would bankrupt our club on the first day!" Then there were "Cody's Slippers" a pair of cute, tiny Yorkies brought in by Cody Lawson of Tulsa. Some of us referred to them as "Barking Mice" although we never heard a bark out of either of them. A couple of the nights we were serenaded by a pack of coyotes in the distance, after one particularly vociferous serenade, (someone referred to this as the Howl-lelujah Chorus) there was the unmistakable whiff of skunk. I think a few of those coyotes were probably very sorry! Then, a fair amount of mooing from a nearby bunch of cows. Fortunately, no snakes!

Again we were blessed by a number of students from Tulsa Community College and Norman North highschool coming out for a few nights under the stars. For a number of these students, this was their second or third Okie-Tex. Very gratifying to see their enthusiasm and that the schools do this sort of field trip.

As before, there were no formal activities until Wednesday, when the talks, swap meet and door prize drawings took place. Although I took the bicycle, there was so much meeting, greeting and eating that I didn't get to ride! Also, many first timers, as was the case at Big Bear last Spring. Hopefully this is a trend...more folks getting interested in astronomy and observing under dark skies.

Wednesday the talks began, as in past Okie-Texs. Mike Roos, Ft. Collins Colorado, kicked things off with "A Photographic Messier Marathon", a sort of Messier Marathon, only for imaging about 100 objects. There were some NGC, and I think a Herschel or two substituted in lieu of M-objects that weren't visible at this time of year. Mike Lockwood, master optician, Lockwood Custom Optics, talked first about the fabrication of 40- and 50- inch mirrors. His second talk revolved around tuning up your telescope, diagnosing troubles related to poor mirror cell construction and the importance for exact collimation, especially for large fast reflectors. The evening presentation was from John A. Davis, Dallas TX. "Photographing the Northern lights. Excellent, very reminiscent of our own Bryan White's expeditions to Yellow knife and his beautiful book "Prelude Lake". Tuesday evening, around midnight I saw what appeared to be a light pollution dome to the North. Lamar?, but that's over 100 miles away, and it wasn't there on previous nights, or earlier on this night. It appeared greenish, then a slight pinkish as it seemed to brighten. Aurora! Yes we had a bit of aurora, John showed a couple of photos of it during his talk, crimson red in the images! We expected more later on, but no more appeared. This was, perhaps the best sky with SQM of 21.77. Really tired about 3-AM. Yes guilt at giving up on such a fine sky!

Thursday began with Ed Wiley with the title "Autocorrelation Techniques for Double Stars with Small Telescopes with comments on Lucky Imaging". Sounds complicated, but he told of how to get useful data from bad images in poor seeing. Software is available, called REDUC, free out of France, that will examine a speckly image and correlate speckles to eke out the separation and position angle of a double star. Not true speckle interferometry, but somewhat related. Lucky imaging refers to just that, the few images caught in moments of good enough seeing to reveal the star directly. Ed's work in this area compares very favorably with that of the professionals. Following this there were a couple of trip reports from Dave Cotterell, from Ontario, Canada, the Atacama Desert followed by an account of an eclipse expedition to Mongolia. The keynote evening talk was from Dr. Kerry Magruder, where he's the curator of the History of Science Collections at the University of Oklahoma. First he mentioned the rare book collection at the University, containing many original books by Newton, Kepler, Galileo and others. His talk was the "Works of Johann Kepler, a guided tour". Revealing that Kepler was more than just a scientist (one of the first), involved deeply in music, philosophy, and mathematics, as well as astronomy. As we all know he was the one to reduce the extensive observations of Tycho Brahe, to derive the orbits of the planets as ellipses and derive his laws of planetary motion. After this talk, Dano Black presented some excerpts from his documentary, "Pitch Bright" regarding the plague of light pollution. Very good, it's a work in progress that Dano started a couple of years ago at Okie-Tex. Then it was out to the telescopes for another great night under the stars. Sleep? What's that? SQM readings were from 21.45 (early) to 21.70 later on.

Okie-Tex 2013, by Jack Eastman, Ct'd.

Friday afternoon talks began with Dr. Magruder again, this time with an equally in depth discussion of the works of Galileo and the upcoming exhibit at the University of Oklahoma, "Galileo's World". Then it was again Dave Cotterell with an introduction to double star observing, defining many of the terms regarding double stars, telescopic resolution and the data to be collected. Following this was Dr. Terry Trees, from Pennsylvania discussing observing the smaller fainter moons of the Solar System. He discussed the use of an occulting bar in the focal plane of the eyepiece to hide the glare of any nearby planet that would drown out the faint moon. He also suggested cutting a filter in half and using that as a glare reducer with the advantage of still seeing the primary, brightness greatly reduced, through the filtered half of the field. The evening talk was from Dr. Bill Romanishin, Norman OK, who spoke on the Hilda and Trojan asteroids and their interaction with Jupiter "Dancing with Jupiter--the Hildas and Trojans". He discussed the orbital resonances that keep these groups of bodies where they are. A very interesting discussion of orbital dynamics, resonances and the stable LaGrange points. Then, again out to a mostly clear, but really windy night. It seemed much colder. Although it was still in the high 50s, but the wind made it seem much colder. It did get down to 30 later on, the coldest night so far.

Saturday afternoon brought the second round of swap meet. Lots and lots of "stuff" I didn't bite on anything the first go on Tuesday, but did pick up a book, a "14 week course in astronomy" by Steele, Dated 1872. It is interesting to compare the published distances of the planets from the Sun... to 3-digit accuracy they are identical to modern values except for Neptune, which was only 1.3% off! Then it was Ed Wiley again, speaking on the philosophy of Science, "Evolution, Cosmology and the structure of Science" observing that there are two aspects of investigation, Logos, the natural system and Mythos the mythological or supernatural. He emphasized that reality is the natural explanation, not the supernatural, which isn't science at all. He was followed by a furry-faced old buzzard from Sheridan CO, Yours Truly, Ridiculously Tiny Telescopes, or how I beat Aperture Fever. This was based on my article of the same name in the Denver Observer for February and March, 2013. It went well, nobody threw eggs or overripe tomatoes. The evening talk, and the final one of the session was Dave Eicher, the editor of Astronomy magazine, talking about comets, discussing some of the great comets to visit the inner solar system. The latest Sky and Telescope also has an article devoted to this subject. Then, the door prize drawing, part II. Many had gone, there were quite a few names drawn of folks who had already left. Since one has to be present to win, another name was drawn until someone claimed the prize. Define "present" as some in the past were not in the tent but nearby. The rule is one has to be within $9.66522E-16$ light years of the tent... about 30 feet...to win! Again, a perfect night under the stars. Sunday AM was the coldest yet at 22F and lots of frost.

Sunday morning, break camp, pack up and be gone by 10-AM. There was no final breakfast as the case at Big Bear, and in times past I didn't see any sort of café in Boise City, just a couple of fast food joints to the East near the highway. As it turns out there are a couple, and the Rocking A came highly recommended. I stopped, the place was packed! several tables, the Oklahoma City astronomers, and a couple more tables occupied by the Tulsa bunch. Too late for breakfast, so it was lunch. Then get on the road, home about 6 hours later. The van performed perfectly! It should have with all the surgery before and after Big Bear last Spring!

Truly a great time, the people, the stars, the weather (for the most part) and the meals. Many, many kudos to Jody's Catering! As I have said before... many times... I'm caught. Will do this again in '14

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Many thanks to Ed Wiley and Dave Cotterell for reviewing this article and keeping me honest.

*Sky Quality Meter (SQM) an extremely sensitive light meter for assessing the brightness of the background sky. The units are magnitude/(arc-second)². Also referred to "skies" where a perfectly dark background is, by definition, 22 on the SQM. Each unit smaller number is a "sky" 1 magnitude, or 2.5119 times, brighter. This would be designated as 2.51 skies.

**Bortle Scale, a subjective estimate of the quality of a dark sky. See <http://www.skyandtelescope.com/resources/darksky/3304011.html>

NITELOG - Norway InTErurban Local Observing Group

by Tom Hoffelder

This is your second second (that is not a typo) installment of all the M's in 12 months and the H 400's in 24.

OBSERVING: Summer is over in Maine and the monthly observing schedule is back in swing at the Twitchell Observatory! **Monday Sept 1st, Labor Day, at 8 PM!!!**

COMETS: A three-comet night? That question was there last year at this time, but the infamous ISON already lagged behind predictions so there were "only" two. This year's Sept features three bright comets, relatively speaking, but they are rather spread out in the sky and thru the month, so that two is the most you'll see at once, and that is only the first few days of the month just before dawn. All that will make sense with a quick scan of the comet spreadsheet. The PanSTARRS in the morning at the end of the month is the same PanSTARRS we were looking at back in May and June in the evening but it is a couple magnitudes brighter now, so if you are a morning person you might want to check it out. I'll probably try for the one with the long name in the morning early in the month, since that will be the only opportunity to add it to my list of comets. The most interesting date on the comet spreadsheet could be the 20th, when Jacques will be very close to the Coat Hanger, resulting in a cool view in a wide field scope.

PLANETS: There are some planets out there of course in various locations, but Neptune is the only one I'm going to be looking for. Lying only 0.6 N/0.5 E of Sigma Aqr on the 1st and 0.3 N/0.2 W on the 30th, it should be easy to locate since it is always less than one degree from the star. (For go-toers, RA 22 32.6/Dec -09 58 and 22 29.8/-10 15.) Next month Mars, even tho near conjunction, will be very interesting for a couple days.

STARS: Two very good carbons, two nice doubles and two triples, one with all components being the same magnitude.

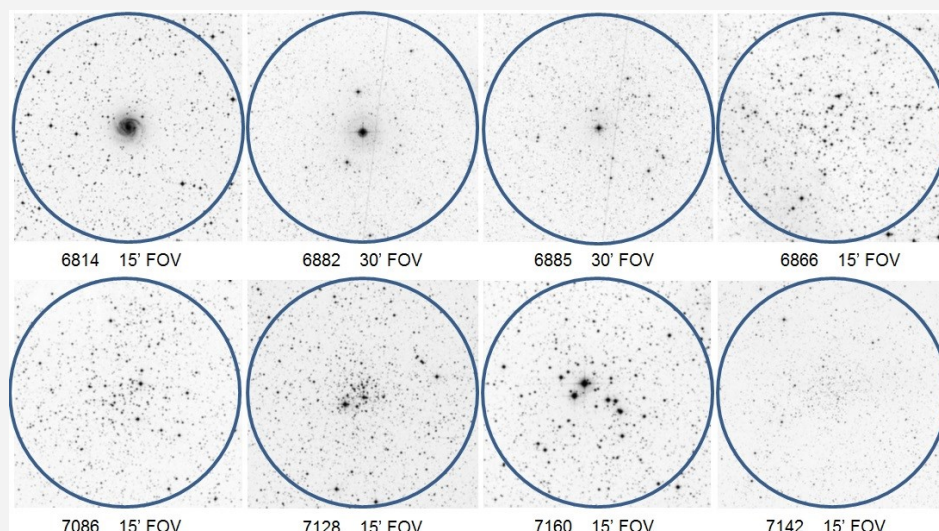
THE GOOD STUFF: Twelve M's and nine H400's, consisting of 10 open clusters, 8 globulars, 2 planetaries and one diffuse nebula. Also included is the Veil and one lonely galaxy. Not many DSS negatives this month due to their globular and planetary photos not providing much information - unlike galaxy and diffuse nebulae - in regard to what you might see in your scope.

QUESTIONS: As always, questions and comments are welcome!

tom hoffelder

rocksnstars@gmail.com

"I like my photons fresh, not collected by CCD or analyzed by computer. I want to encounter the cosmos head on, letting it wash over my retina." ~ Robert Provine, neuroscientist, psychologist, amateur astronomer (as noted in This Explains Everything, edited by John Brockman)



9/20		(9/21)		9/27					
SS	CTE	NTE	ATE	MR	SS	CTE	NTE	ATE	MS
18:44	19:12	19:46	20:21	03:55	18:30	18:59	19:33	20:07	20:20

Object (Type)	RA	Dec	Star	N/S	E/W	Mag*/(# of Stars)	Size (')/ Sep (")	Spect/ M# or H#	Dist (ly)	Urano l Page	Comment [B-V] {current mag} (opt x)
X Sge (CS)	20 05.1	+20 39	γ Sge	1.2 N	1.6 E	8.7-9.7		CII		163	{9} [B-V=3.3]
RT Cap (CS)	20 17.1	-21 19	π Cap	3.1 S	2.4 W	6.5-8.1		CII		343	{8} [B-V=3.9]
Σ 2703 (MS)	20 37.0	+ 14	β Del	0.1 N	0.2 W	8, 8, 8	25, 74			209 ni	(30)
γ Del (MS)	20 46.7	+16 07	-	-	-	4.5, 5	10	K2, F8	100	209	(75)
12 Aqr (MS)	21 04.1	-05 49	ϵ Aqr	3.7 N	4.1 E	5.5, 7.5	2.8	gG4, A3		299	(270)
Σ 2816	21 39.0	+57 30	μ Cep	1.3 S	0.6 W	6, 8, 8	12, 20			57 ni	(60)
NGC 6779 (GC)	19 16.6	+30 11	β Cyg	2.2 N	3.0 W	8.4	8.8	M56	45K	118	
NGC 6809 (GC)	19 40.0	-30 58	ζ Sgr	1.1 S	8.1 E	6.3	19	M55	19K	379	
NGC 6814* (SBbc)	19 42.7	-10 19	57 Aql	2.0 S	3.0 W	[13.5]	3.0	H744-3	75M	297	
NGC 6818 (PN)	19 44.0	-14 09	α^1 Cap	1.6 S	8.2 W	9.3	0.8	H51-4*	2850	297	GX 6822 is
NGC 6838 (GC)	19 53.6	+18 47	γ Sge	0.8 S	1.2 W	8.4	7.2	M71	18K	162	
NGC 6853 (PN)	19 59.6	+22 43	γ Sge	3.2 N	0.2 E	7.4	6.7	M27	1000	162	
NGC 6882* (OC)	20 11.8	+26 49	prv	4.1 N	2.7 E		10	H22-8*	3800	163ni	includes 19 Vul

NGC 6885* (OC)	20 12.0	+26 29	pV	0.3 S	0.2 E	(35)	20	H20-8*	3800	163	
NGC 6864 (GC)	20 06.1	-21 55	β Cap	7.1 S	3.5 W	8.6	6.8	M75	78K	343	
NGC 6866* (OC)	20 03.9	+44 10	δ Cyg	1.2 S	3.4 E	(50)	7.0	H59-7*	3100	84	
NGC 6913 (OC)	20 24.0	+38 30	γ Cyg	1.7 S	0.3 E	(20)	10	M29	3100	84	
NGC 6960 (SNR)	20 45.7	+30 43	ϵ Cyg	3.2 S	0.1 W	-	70X6	H15-5	1300	120	+6992 0.9N/2.3E = Veil
NGC 6981 (GC)	20 53.5	-12 32	ϵ Aqr	3.0 S	1.5 E	9.2	6.6	M72	59K	299	
NGC 6994 (OC)	20 58.9	-12 38	pV	0.1 S	1.3 E	(4)	1.4	M73		299	
NGC 7000 (DN)	20 59.3	+44 31	α Cyg	1.0 S	3.0 E	4.0	120x10 0	H37-5*	900	85	North American
NGC 7078 (GC)	21 30.0	+12 10	ϵ Peg	2.3 N	3.5 W	6.3	18	M15	49K	210	
NGC 7089 (GC)	21 33.5	-00 49	β Aqr	4.8 N	0.5 E	6.6	16	M2	52K	255	
NGC 7092 (OC)	21 31.7	+48 25	α Cyg	3.2 N	8.5 E	(25)	31	M39	820	86	
NGC 7086* (OC)	21 30.5	+51 36	pV	3.2 N	0.2 W		12	H32-6*		57	
NGC 7128* (OC)	21 44.0	+53 43	pV	2.1 N	2.1 E	(20)	4.0	H40-7*	9400	57	
NGC 7099 (GC)	21 40.4	-23 11	γ Cap	6.5 S	-	6.9	12	M30	41K	346	
NGC 7160* (OC)	21 53.7	+62 36	α Cep	-	4.1 E	(25)	5.0	H67-8*	4500	33	
NGC 7142* (OC)	21 45.2	+65 46	pV	3.2 N	0.8 W	(35)	12	H66-7*	7600	33	

*[Surf
Brtnss
for GX's]

*DSS image

*H400

ni=shown but

not
identi-
fied

mag per
square
arcmin

SEPT
2014
COM-
ETS

Comet	RA*	Dec*	Star	N/S	E/W	N/S/ day	E/W/ day	Mag ¹	Urano I	Alt ²	Date	EDT	² E/ BoAT	² MR/ MS
Jacques 2014 E2	21 19.0	+55	μ Cep	3.1 S	3.5 W	2.3 S	2.3 W	7	56	42	1	04:20	04:20	
Oukaimeden 2013 V5	07 10.4	-02 03	α CMi	7.3 S	7.3 W	1.1 S	1.4 E	7.5	229	11				
Jacques 2014 E2	20 18.0	+43	γ Cyg	3.5 N	0.8 W	2.2 S	1.4 W	7.5	84	24	6	04:30	04:30	03:05 S
Oukaimeden 2013 V5	07 45.3	-08 41	α CMi	13.9 S	1.3 E	1.7 S	2.3 E	6	275	5				
Jacques 2014 E2	19 31.0	+25	β Cyg	2.1 S	-	1.4 S	0.5 W	8.5	162	70	15	20:35	20:35	23:20 R
Jacques 2014 E2	19 20.7	+19	β Cyg	8.3 S	2.3 W	1.0 S	0.3 W	9.5	161	64	20	20:20	20:20	
Jacques 2014 E2	19 14.6	+14	ζ Aql	1.0 N	2.2 E	0.8 S	0.2 W	10.5	206	60	25	20:10	20:10	

	08 39.0	-07 21	α CMi	12.5 S	15.0 E	0.8 S	0.5 W	6.0	276	~25	26	05:00	05:00
PanSTARRS 2012 K1													
PanSTARRS 2012 K1	08 37.5	-08 07	α CMi	13.3 S	14.5 E	0.8 S	0.3 W		276		27	05:00	
PanSTARRS 2012 K1	08 36.0	-08 55	α CMi	14.1 S	14.2 E	0.8 S	0.3 W		276		28	05:00	
PanSTARRS 2012 K1	08 34.4	-09 43	α CMi	14.9 S	13.7 E	0.8 S	0.2 W		276		29	05:00	
PanSTARRS 2012 K1	08 32.7	-10 33	α CMi	15.7 S	13.3 E	0.8 S	0.2 W		276		30	05:00	

¹<http://www.aerith.net/comet/future-n.html>

*At time noted

²Maine, at time noted

Droughts, Floods and the Earth's Gravity, by the GRACE of NASA

By Dr. Ethan Siegel

When you think about gravitation here on Earth, you very likely think about how constant it is, at 9.8 m/s^2 (32 ft/s^2). Only, that's not quite right. Depending on how thick the Earth's crust is, whether you're slightly closer to or farther from the Earth's center, or what the density of the material beneath you is, you'll experience slight variations in Earth's gravity as large as 0.2%, something you'd need to account for if you were a pendulum-clock-maker.

But surprisingly, the amount of *water content* stored on land in the Earth actually changes the gravity field of where you are by a significant, measurable amount. Over land, water is stored in lakes, rivers, aquifers, soil moisture, snow and glaciers. Even a change of just a few centimeters in the water table of an area can be clearly discerned by our best space-borne mission: NASA's twin Gravity Recovery and Climate Experiment (GRACE) satellites.

Since its 2002 launch, GRACE has seen the water-table-equivalent of the United States (and the rest of the world) change significantly over that time. Groundwater supplies are vital for agriculture and provide half of the world's drinking water. Yet GRACE has seen California's central valley and the southern high plains rapidly deplete their groundwater reserves, endangering a significant portion of the nation's food supply. Meanwhile, the upper Missouri River Basin—recently home to severe flooding—continues to see its water table rise.

NASA's GRACE satellites are the only pieces of equipment currently capable of making these global, precision measurements, providing our best knowledge for mitigating these terrestrial changes. Thanks to GRACE, we've been able to quantify the water loss of the Colorado River Basin (65 cubic kilometers), add months to the lead-time water managers have for flood prediction, and better predict the impacts of droughts worldwide. As NASA scientist Matthew Rodell says, "[W]ithout GRACE we would have no routine, global measurements of changes in groundwater availability. Other satellites can't do it, and ground-based monitoring is inadequate." Even though the GRACE satellites are nearing the end of their lives, the GRACE Follow-On satellites will be launched in 2017, providing us with this valuable data far into the future. Although the climate is surely changing, it's water availability, *not* sea level rise, that's the largest near-term danger, and the most important aspect we can work to understand!

Learn more about NASA's GRACE mission here:

http://www.nasa.gov/mission_pages/Grace/

Kids can learn all about launching objects into Earth's orbit by shooting a (digital) cannonball on NASA's Space Place website. Check it out at:

<http://spaceplace.nasa.gov/how-orbits-work/>

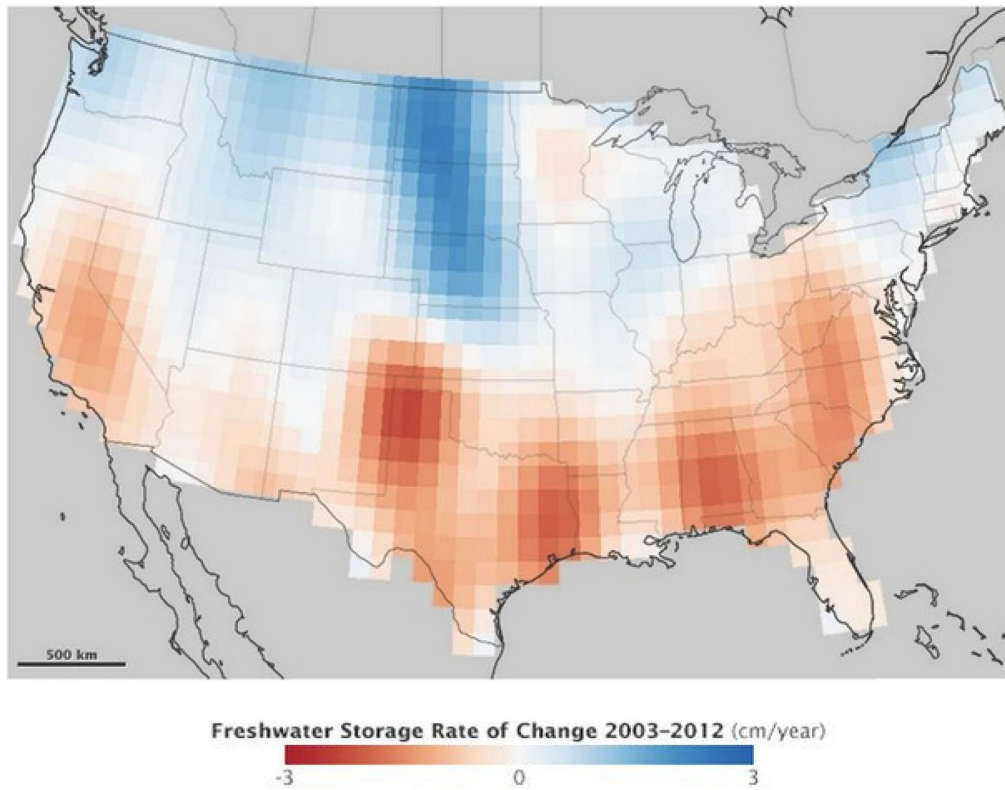


Image credit: NASA Earth Observatory image by Jesse Allen, using GRACE data provide courtesy of Jay Famigleitti, University of California Irvine and Matthew Rodell, NASA Goddard Space Flight Center. Caption by Holli Riebeck.

Editors: Download photo here:

<http://spaceplace.nasa.gov/review/partners/2014-08/2014-grace1.en.png>



the Space Place

Sept – October 2014 / Vol. 7, Issue 4

NEWS AND NOTES FOR FORMAL AND INFORMAL EDUCATORS

The 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.

It's that time again—the beginning of a new school year! Here at the Space Place, we know that it can be a stressful time for educators. That's why we think it's a great idea to remind you of all the helpful resources we have developed specifically for you. Want material presented in visual, written, and animated formats for reading exercises in line with the Common Core? Look no further than our new "Space Place in a Snap" series. Want a handy way to provide Space Place activities to all your students even if they don't have a computer? We've made all of them available in PDF! Struggling to come up with material relevant to the Next Generation Science Standards? Check out our helpful NGSS search feature in the educators' section. While you are there, be sure to check out all the other great resources we provide.

What's New? Jupiter!

From massive planets, long distances, and extreme forces, it's a challenge for educators—let alone students—to fully grasp the sizes and scales behind astronomical and planetary science. The Space Place grapples with just this issue in one of its latest additions—a new article titled "What's it like inside Jupiter?" Building up from the pressure you might feel at the bottom of a pool all the way to the pressure felt in Jupiter's core, this article uses mid-size sedans as its primary unit of measurement. It comes with a fun animation too. Check it out at <http://spaceplace.nasa.gov/jupiter>.



What's New? Tectonics 'Snap!'

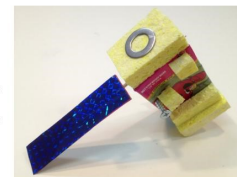


We've got a new release in our popular series "Space Place in a Snap." This time the combined poster and animation presentation tackles the concepts behind plate tectonics and the shifting nature of Earth's crust. This is a great resource for any Earth science curriculum. Check it out at <http://spaceplace.nasa.gov/tectonics-snap>.

Spotlight on Activities

With the arrival of the new school year, it's a good time to remember that our popular make-and-do activities are now available to download as easy-to-hand-out, ready-to-print PDF files. Perfect for the classroom or afterschool programs, these activities are a great way to bring the Space Place to all your students even if there are a limited number of computers or Internet connections. Check out popular activities like "Build your own spacecraft," "Make Oreo Moon phases," and "Get your gummy greenhouse gases."

The downloads are sorted by topic and can be found at <http://spaceplace.nasa.gov/make-do-pdf>.



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

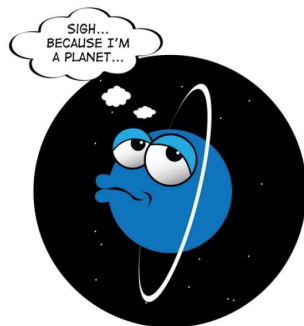
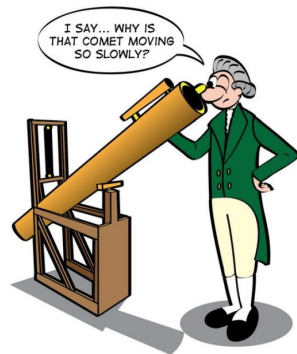
For the Classroom



What better way to decorate your classroom than with the Space Place calendar? It's now available for the 2014–2015 school year! The calendar has beautiful images and a plethora of fascinating NASA facts and trivia. You can download it month by month, or as a complete set, at <http://spaceplace.nasa.gov/calendar>.

For Out-of-School Time

Everybody loves a good story. Why not read an educational one? We've posted an entertaining new article on the discovery of Uranus. Despite being visible to the naked eye in the night sky, it was discovered thousands of years after the other visible planets of our solar system. Find out the reasons why and learn the story behind this much-delayed discovery at <http://spaceplace.nasa.gov/uranus>.



Share

Want some help spreading the word about NASA's Space Place? We've got a page with ready-to-use website descriptions, logos, and links to all our social media. Check out <http://spaceplace.nasa.gov/share>.

Send Feedback

Please let us know how you'd like to use NASA's Space Place in your teaching. Send your ideas to info@spaceplace.nasa.gov.

Special Days

September 5 – National Cheese Pizza Day.

Make a galactic mobile with the cardboard from your pizza. <http://spaceplace.nasa.gov/galactic-mobile>

September 13 – Positive Thinking Day.

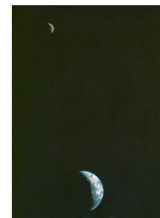
Make your positive ions outnumber your negative ions when you do the "Ions in Action" experiment. <http://spaceplace.nasa.gov/ion-balloons>

September 16 – Collect Rocks Day.

Asteroids are big rocks in space. But how are they different from comets? <http://spaceplace.nasa.gov/posters/#solarsystem>

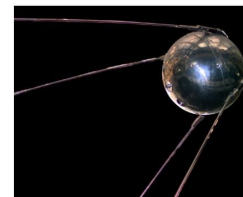
September 18 – Voyager I took first full-frame photo of Earth and Moon together, 1977.

Check out other photos of the solar system at the Space Place. <http://spaceplace.nasa.gov/gallery-solar-system>



October 4 – First satellite, Sputnik, launched by Soviet Union, 1957.

We have come a long way with satellites. <http://spaceplace.nasa.gov/earth-card-game>

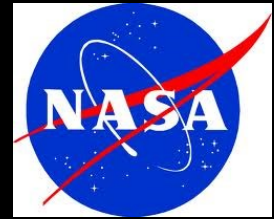


October 14 – Desert Day.

Make yummy "El Niño Pudding" for dessert today. <http://spaceplace.nasa.gov/el-nino>

October 29 – Internet Day.

Celebrate by downloading some Space Place wallpaper for your computer desktop. <http://spaceplace.nasa.gov/wallpaper>



And For The Young Stargazers:

Check out these fun websites from NASA!

<http://climate.nasa.gov/kids>

<http://scijinks.gov>

<http://spaceplace.nasa.gov>



Where We Meet:
JENKS HIGH SCHOOL PLANETARIUM
105 E. B St., Jenks, OK

From the West: (marked in red on maps below)

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 below)

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 below)

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

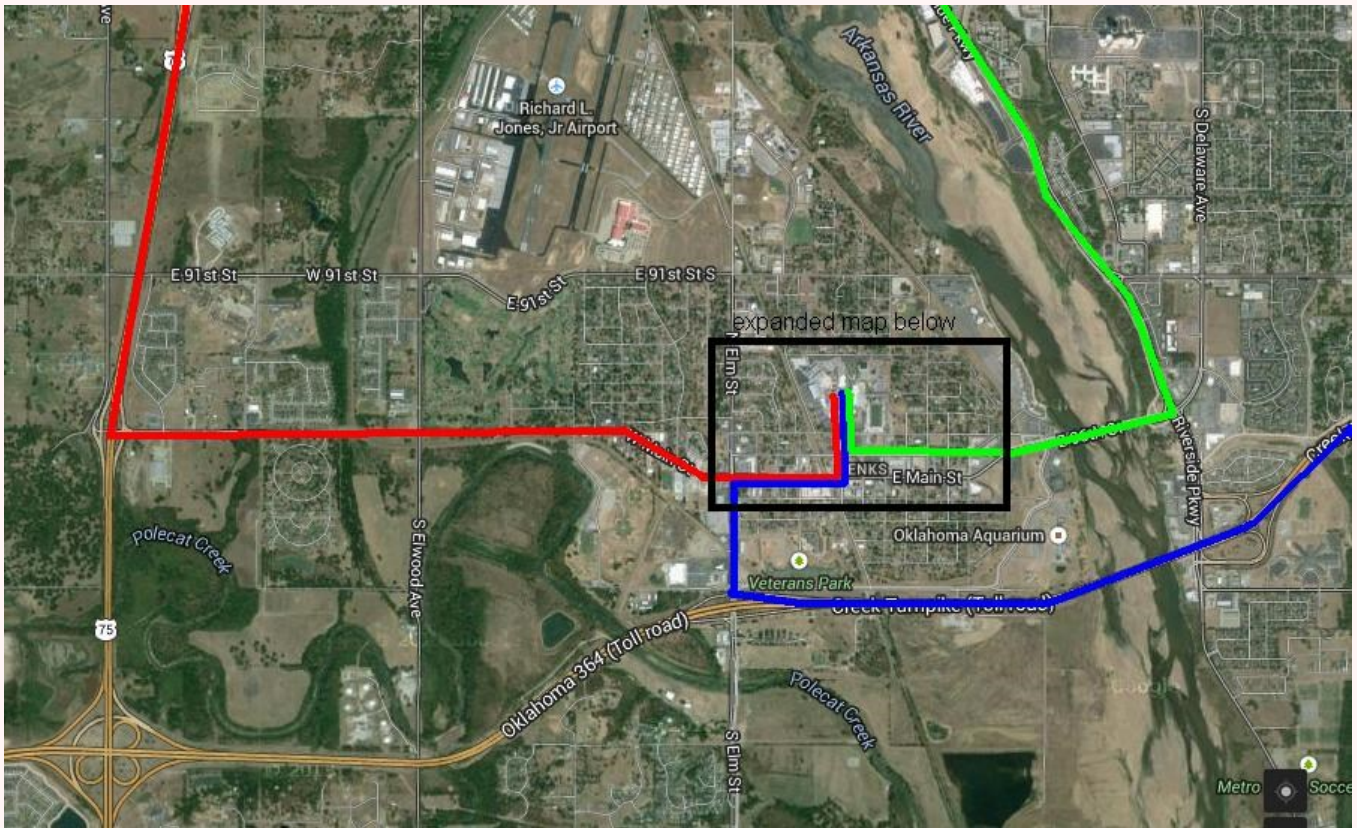
MAPS ON NEXT PAGE

The General Meetings are free and open to the public.

We hope to see you there!

Maps to Jenks High School Planetarium:

To get there via any of the three routes shown on previous page:



To get into planetarium parking lot:



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MEMBERSHIP INFORMATION

MEMBERSHIP RATES FOR 2014 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.

MAGAZINES:

Astronomy is \$34 for one year or \$60 for 2 years.

www.astronomy.com

Sky & Telescope is \$33 per year.

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>



Astronomy Club of Tulsa



Photo: Autumn Stars Rising Over the Eastern Ridge of Camp Billy Joe, Okie-Tex Star Party 2013, by Tamara Green.

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

OPEN TO THE PUBLIC

For more information please visit www.astrotulsa.com.

The Observer is a publication by the Astronomy Club of Tulsa. The Astronomy Club of Tulsa is a 501C 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.

