



The Prairie Astronomer

The Official Newsletter of the Prairie Astronomy Club

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THIS MIGHT BE A NEW RECORD: A 21 PAGE NEWSLETTER!

What to View in September

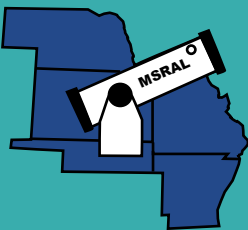
NGC Objects

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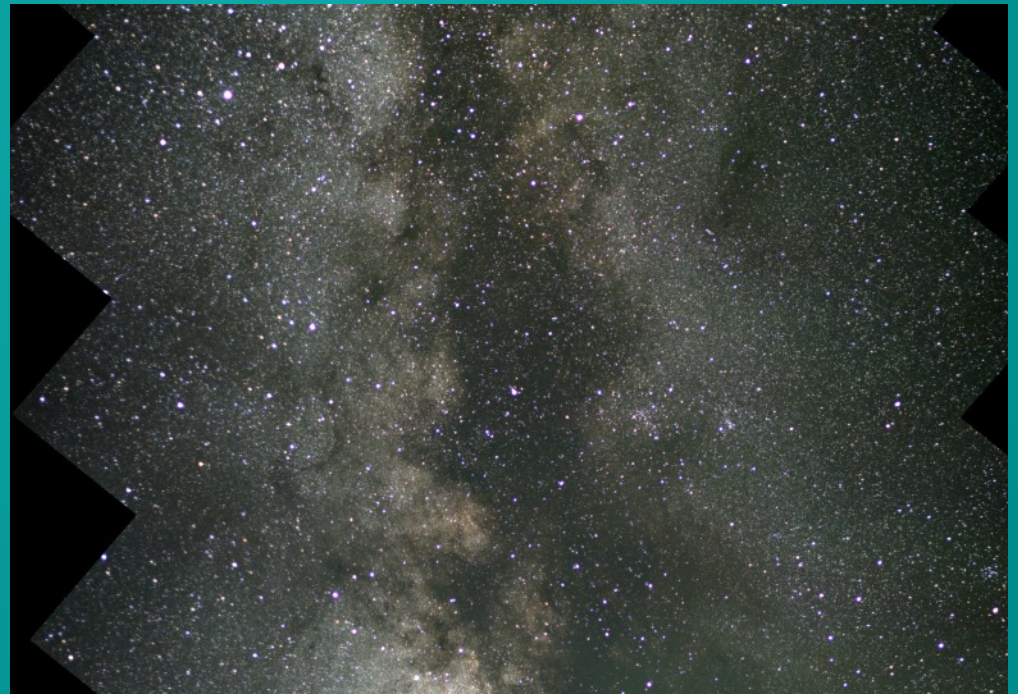
Droughts, Floods and Earth's Gravity



The August Program will be a report on the Nebraska Star Party.

Featured Photo: Brett Boller's amazing Milky Way panorama. See page 7 for the full image (it's too big for the cover page).

"On Saturday night I started taking Milky Way shots and thought it would be a really neat experiment to see how much i could get and stitch together. I ended up with 30 images that were piggybacked on my C11 CGE. I used my Canon Rebel XS with a 50mm f1.8 lens at ISO 400. Each image was 3 minutes of exposure time. The entire process was a little over an hour and a half. The image spans from the south horizon to zenith." —Brett



Night Sky Network

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular \$30/yr, Family \$35/yr.** Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585.** For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: **Mark Dahmke, P. O. Box 5585, Lincoln, NE 68505** or mark@dahmke.com, no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.



Meeting Minutes

The July meeting was canceled due to overlap with the Nebraska Star Party.



Drone video of NSP. The video will be shown at the next club meeting at higher resolution than what is on Vimeo.

Long-time PAC member Earl Moser is now staying at the WATERFORD in the assisted living area, 4966 South 48th St. Please stop by to visit him or call - 402-489-9934.



Here's a photo of Earl with the first club scope and observatory.



Above: bird's eye views of NSP from Mark Dahmke's DJI Phantom 2 Vision + quadcopter.

ANNUAL MEMBERSHIP

REGULAR MEMBER - \$30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - \$35.00 per year. Same as regular member except gets 2 votes at club meetings.

STUDENT MEMBER - \$10.00 per year with volunteer requirement.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

Club Telescopes

To check out one of the club telescopes, contact Cassie Spale. If you keep a scope for more than a week, please check in once a week, to verify the location of the telescope and how long you plan to use it. The checkout time limit will be two weeks, but can be extended if no one else has requested use of a club scope.

100mm Orion refractor:
Available

10 inch Meade Dobsonian:
Available

13 inch Truss Dobsonian:
Available

PAC Star Party Dates

Dates in bold are closest to the new moon

2014 Star Party Dates

January 24, **31**
February 21, **28**
March 21, **28**, April 25
May 2, 23, 30, June 20, **27**
July 18, **25**
NSP: July 27-Aug 1
August **22, 29**, Sept 19, **26**
Oct 17, **24**, Nov 14, **21**
Dec 12, **19**

Lunar Party Dates

May 9, June 6, Sept 5, Oct 3
* Lunar party dates are tentative, sites to be determined.

PAC E-Mail:

info@prairieastronomyclub.org

PAC-LIST:

To subscribe send a request to PAC. To post messages to the list, send to the address:

pac-list@prairieastronomyclub.org

Events

PAC Meeting
Tuesday August 26th, 2014
@Hyde Observatory

PAC Meeting
Tuesday September 30th,
2014 @Hyde Observatory

PAC Meeting
Tuesday October 28th, 2014
@Hyde Observatory

PAC Meeting
Tuesday November 25th,
2014 @Hyde Observatory

Newsletter submission
deadline Sept 20, 2014

Links

PAC: www.prairieastronomyclub.org

Night Sky Network: <https://nightsky.jpl.nasa.gov/>

CafePress (club apparel) www.cafepress.com

www.hydeobservatory.info

www.nebraskastarparty.org

www.OmahaAstro.com

Panhandleastronomyclub.com

www.universetoday.com/

www.planetary.org/home/

<http://www.darksky.org/>

NGC4603 Credit: NASA



Designing My Remote Observatory Part VI—Rick Johnson

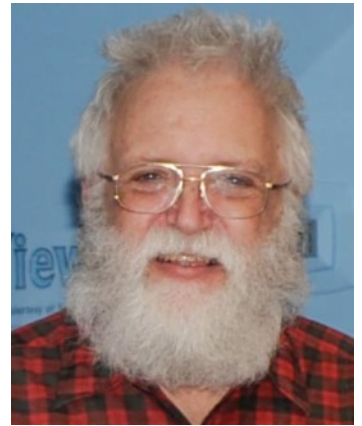
Acquiring and learning adequate software

While I now had most of the hardware I needed my software was sorely lacking and my ability to use it was also very weak. The mount came with The Sky Pro 6 and Tpoint as well as CCDSoft. The Sky was designed specifically for the Paramount by Software Bisque who made the mount. It works with other mounts as well but some features only are available with the Paramount. Tpoint was adapted from software developed for the two Gemini 8 meter scopes and can be used two ways. In one use it works much like simpler software for most go-to mounts that use a few star pointings to refine their pointing accuracy but is far more capable but more complicated to use. For this purpose it needs 6 star pointings, three on either side of the meridian for a GEM mount. After that the mount will point with sufficient accuracy to put the object on even a very small CCD chip. That is it will usually be within a couple minutes of arc accuracy. But where it really shines is when you map more than 6 stars, a lot more. Given enough points (I use 800 though most consider that overkill) it learns precisely how the mount points and tracks in all parts of the sky that are mapped. This is done using alt-azimuth coordinates so is independent of the stars themselves. It just knows that when asked to point at say an azimuth of 87 degrees and altitude of 43 degrees the mount really points to 87.12 degrees by 42.93 degrees for a made up example. The way it works it learns how gear errors, mount, scope and optic flex under gravity, atmospheric refraction and other effects cause the mount to point differently than it would under ideal conditions with perfect gears, no sag and no atmosphere to move an object higher in the sky than it really is.

It took me months to learn how to make a map quickly. Current versions will now do this automatically with just a couple mouse clicks and it takes it from there. I had to feed the black hole (very low calorie diet fortunately) for an add-on that did this. A free version I tried didn't work well but the pay one did.

Also The Sky was not intuitive (still isn't) and took me a long time to get used to. I still have to stop and think how to do some things and forgot one

minor thing I used to know how to do that I can't seem to figure out how to do easily again. Still, once mastered, it is very powerful allowing me to track fast moving asteroids and take my images without guiding, a bane of most imagers. The freedom of finding a usable guide star is wonderful!



But this is more a hardware control issue. The real problems I had were with getting good data and then turning it into a good image. There my software stunk. CCDSoft came with the mount and camera. It was a joint project (now defunct) of the camera and mount maker put out by the makers of the Paramount. It had one major competitor at the time, Maxim D/L. Both were many hundreds of dollars but when you get one "free" in the price of the camera and mount (three copies no less) and a book I bought showing how to use both seemed to indicate they were equals you go with the free copy. They aren't equals! Not even close. CCDSoft is fine for image acquisition. I still use it for that in fact (with a dither plug-in) but once the data is acquired and it is calibrated (dark subtracted and flat fielded) it is mostly very poor. But I didn't know this and used it for image stacking (the free Deep Sky Stacker that didn't exist then is far superior in this regard and some pay programs that did exist are even better). This left a lot of noise in my images that could have been removed (see the image of NGC 4565 last month for a noisy example). Noise does more than just add dark and light pixels to the image, it reduces sharpness and hides low contrast details. While it can't be avoided completely, you don't want to add any needlessly and the very basic stacking modes of CCDSoft are poor in this regard.

Once aligned (I've already mentioned I had to use the expensive RegiStar for this as it was all that existed at the time that could handle changing image scale besides misalignment) I was using good 8 bit image processing software to further

Designing My Remote Observatory Part VI, Continued

process the image. What I wasn't thinking about is that the camera generates an image that has 65536 different levels of intensity for each color while 8 bit software uses only 256. For every level 8 bit software uses 256 levels have been discarded! I was using only 0.4% of the data I collected. Now that's dumb. At one time that was all that was available but even back in 2006 there was 16 bit Photoshop that didn't discard all that data. Once I saw what another imager did with my data who used good stacking software as well as Photoshop CS (the best version at that time) I realized I had to feed that darned black hole yet again. At the time CCDStack was about \$175 and Photoshop over \$600. Having a poor internet available here I had to pay \$200 for CCDStack to get the CCD version rather than just download it. That also meant another \$100 for good tutorial CCDs to learn how to use it as on line tutorials were just too herky jerky with my connection to be usable. Then there was Photoshop...

Here I got lucky. A science teacher I've known for 30 years at a school in Walker had helped me set up the scope as some of the original tasks took three people — like lifting the scope onto the mount for one example. The school had a 36 license package for Photoshop but only was using 31 of them. It had no need for the other 5 but the package was cheaper than getting just the 31 they needed. I was allowed to use one in exchange for the school using the images in their science classes. Also since Photoshop is complex they had students who knew all of its hidden features. Turned out they knew these for ordinary photos and were nearly as lost as I was for processing deep sky images. Still they understood how to create a color image out of black and white filtered images and other things I needed to learn. So we both learned together. I also could use their computer and internet to watch some free on line tutorials on astro image processing with Photoshop. From these I quickly learned I'd need several plug-ins to Photoshop. These fortunately are either low cost or free. So the black hole wasn't being as well fed as it had been at least.

Going from mono to color added additional complications. The atmosphere scatters blue

light. The lower the scope is pointed the more blue that is lost to scattering (think red sunsets to see the issue). A method of color correction is needed to put that blue back into the image. Also color filters are not designed for a particular sensor. Each sensor has a different response curve. Some are red sensitive, mine is blue sensitive. Filters are generic. Some manufacturers (Astrodon being the main one) do make filters that are either for red sensitive or blue sensitive cameras. But again this is only a general trait. None are a close enough. So you have to learn to compensate for both filter and atmospheric effects. I first learned what is known as G2V processing where you take a white star at the same altitude as your image and use it as a white reference. Now I often use a free program called eX-calibrator that compares the color frames you've taken to Sloan survey photometric data and gives you the needed white balance figures. Unfortunately Sloan doesn't cover the entire sky and its fall back survey, NOMAD, isn't all that good. I usually fall back to G2V for those areas. Even this however was leaving a green cast to my images (in making the adjustment green is not adjusted, only red and blue are. I fought this for years until a free plug-in for Photoshop (based on a Pix Insight routine) called Hasta La Vista Green was made available. This eliminates the green glow of air glow and light pollution that tainted even the G2V and Sloan data. Not everything needed feeds that black hole! Other plug-ins and helper programs are now in my list of "required" software.

This teaming with the school had another unexpected consequence. That school told others who told others etc. Now I send the images out to hundreds of schools most of which are NOT in the US. Most would but the idiot "Teach the Exam" system we have now gives the US schools little time for it. Even now at Walker it is an after school event. That is now going away as the teacher retired as of June 30 and isn't being replaced. Since my updates now go to mostly foreign destinations but for a hundred or so amateurs (again many not in the US) I've shifted to using only metric in the updates which surprisingly riled some the few US schools on the list. I'd think science teachers would appreciate

Designing My Remote Observatory Part V, Continued

that. Apparently not all did. I've not lost many but they do grump and many ask for US units and grump more when I make them do that work. Many in the club now get it either direct or via relay by Dave Churilla. That version includes comments after the pictures not sent to the schools about life here in Minnesota which some love and some don't. It goes out usually every other day, sometimes more or less. That has become more of a chore than I expected keeping to a regular schedule but teachers want that and since they are in both northern and southern hemispheres (more in the southern interestingly enough) it is an all year project.

It also attracts the "fringe" out there as it gets forwarded many times reaching some rather mentally challenged folks out there. I could write a book of all the wacko junk they think is real science. You don't know to laugh or cry reading it. I used to think I heard from the crazy folks at Hyde like the one who insisted that the computer glitch that temporarily took out Spirit shortly after it landed was due to the CIA destroying it to hide their base on Mars. Those can't compete with the stuff I now get in thanks to my Observatory Updates being forwarded over and over again until it reaches a "crazy". Every NEO (Near Earth

Asteroid) is going to destroy us not by hitting us but with its magnetic field that will rip all the iron out of the earth or create electric bolts that will electrocute everyone. You don't want to know how many tell me "Yeah, I was wrong about it last time but this time it has been confirmed by NASA." Every fall with the sun getting lower in the sky I get this as "proof" the earth's axis is tilting over and will soon flip. But in the spring when the sun is rising rapidly each day they say nothing. Apparently a sun moving lower is bad but one moving higher is good. But I digress.

I thought the observatory was now complete though it was obvious I'd need more time to get the most out of my image processing software. Still it was my lack of ability to use it rather than its lack of ability that was now the problem. That would come in time. At least the hardware was now all in place.

Ok by now you likely have guessed I was wrong again. It turned out I needed to feed that super-massive black hole in my bank account yet a few more times and one of those wouldn't be a small purchase. I'll cover that in the last installment next month. I'll also cover what I might have done differently if today's equipment and software had been available in 2005.



NGC 4565 a third time. This time using proper software to acquire, calibrate, stack and process the image using the color data I'd collected but didn't know how to use effectively. Still this one is a couple years old and I'd likely get more out of it if I redid it today. Note that the ends of the galaxy are warped. The full size image, too big for the newsletter, is at:

<http://www.spacebanter.com/attachment.php?attachmentid=4114&stc=1>

Hello from South Carolina—Jack Dunn

Sending a message to my friends in PAC. Unlike Rick, we have not relocated to the wilderness to be interacting with lots of wild creatures. The folks in Columbia have been very gracious.

I'm enjoying retirement from UNL (not having to pay for their outrageous parking fees). Of course there is plenty of bureaucracy to getting my retirement totally set up. Gee, I would have thought the retirement plan would have gotten into the 21st century, but I had to run around and get set up with actually providing them with a physical check (with new address), voided, so I can get my retirement deposited into my bank account (which they already had on file). Don't they know nobody uses checks any more?(g) Our pod will get here Friday so I'll have more than the one pair of pants I brought with me and a limited amount of shirts and underwear. Isn't moving fun?

On my way here I did get to stop in Kansas City to visit friends Rick Henderson and Bentley Ouseley of the Astronomical Society of Kansas City along with Jeff Rosenblatt the director of Science City in Union Station. Photo shows us having a celebratory dinner in Pierponts, the fine restaurant in the Station. Rick and Bentley were the two



gentlemen really responsible for rescuing the Gottlieb Planetarium in Science City which had closed several times before they contacted me and I went down there and loaned them a mirror and some software. Bentley even improved the mirror system. Jeff went along with our experiment and has been very complimentary on the results. Three years later the planetarium is going strong.

By the time I got here, Liz had been here about three and one half weeks. She had to be here

July 7th as things were down to the wire on getting the new Planetarium open. Construction was way behind when she got here and the big push was to get open by the week of August 11th - 16th as the Museum had already announced the 16th as their public opening. Right off the bat, Liz spent a week in Salt Lake City getting training at Evans & Sutherland on the Digistar 5 system. The new theater is the Blue Cross and Blue Shield of South Carolina Planetarium. Yes, that's a mouthful. But they paid for the naming rights some time ago. Planetarium is a 55ft. tilted dome (16 degrees) with the D5, 5.1 sound system, skylase laser system and a "student response" system. Don't ask about the latter as it a legacy of old plans for the theater. The museum has been wanting to have this facility 17 years and it is very eagerly anticipated. A few years ago, they were close, but didn't make the final amount needed to complete the project. In the last year they received a big grant from Boeing and earlier one from NASA that finished it out. However, some of what was built does labor under the plans from several years ago. As you know, technology never stands still. Originally, the Digistar was a D3. By now, that is old tech and not supported. Fortunately, they were able to find funding for the upgrade.

To explain, the D5 outputs a 4k by 4k image to two projectors (each covering one half of the dome). The projections are edge blended - but that means alignment can be affected by changes in temperature and settling of the building. So they have to do realignment quite often.

For comparison, at Mueller, as I left we were running 1920x1920 movies on a single projector on a



Hello from South Carolina, continued.



31 ft. Dome. D5 also has a lot of power in its 8 array processors. So you can drive in three dimensional space out through the rings of Saturn or land on Mars. Digistar lets you move to see that the stars of any constellation are not all the same distance from us. So if you went elsewhere - Orion wouldn't be Orion. This was part of the training Liz received in Salt Lake.

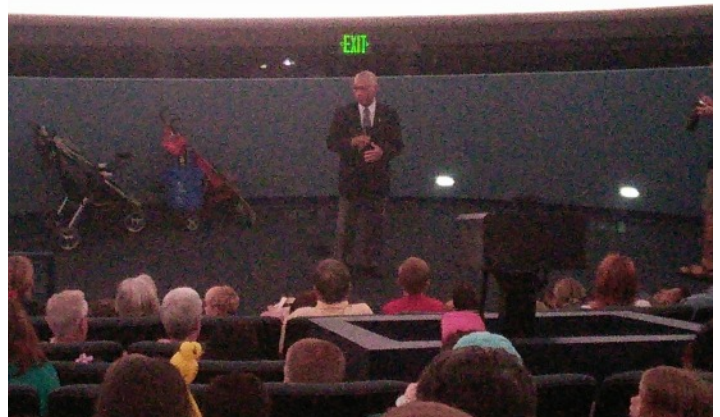
Before anyone asks if I'm going to be giving shows here, I need to explain this is Liz's theater, I'm just a volunteer helping out sometimes. I have no intention of going in to do shows every day just like at Mueller. What I can do is to help with my contacts and experience. And if pressed, like on Saturday the 16th, I can herd crowds.



Opening day there were 9 shows. Only the late one at 6 p.m. didn't sell out and it was about 2/3 full. The South Carolina State Museum is a very big museum. This is a much larger operation than Morrill Hall. And the bureaucracy is a lot more.

Yet they are good folks. We've already met some outstanding volunteers and people I think who will back up and support Liz to give her help. On that big day, we did need at least 6 people just to handle the crowds. There are four potential entrances to the theater. One prefers people enter at the two at the bottom and leave out the top two. But to keep things under control, it was best to funnel them into one entrance and block them from sneaking in the back. Yes, it's complicated. And they have a ticketing system with scanners for the tickets. Nobody had a chance to test them in advance. Fortunately, after a day of experimenting, they worked.

I'll add a few pictures here and follow up as we know more. NASA Administrator Charlie Bolden is from South Carolina. He showed up for about 3 minutes and addressed the crowd. But it was a nice gesture.

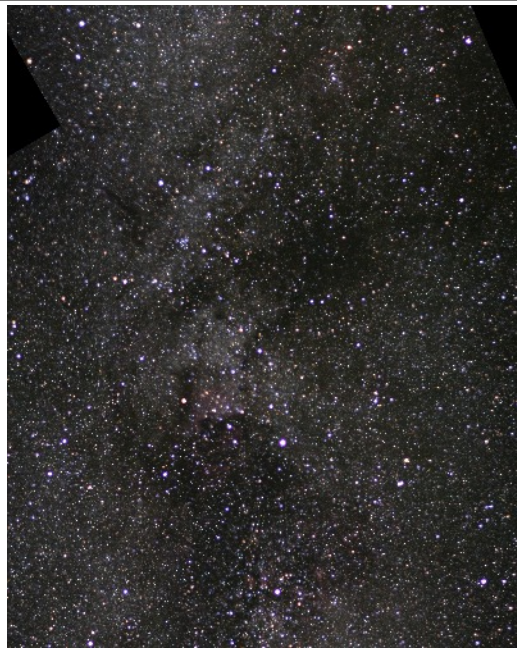
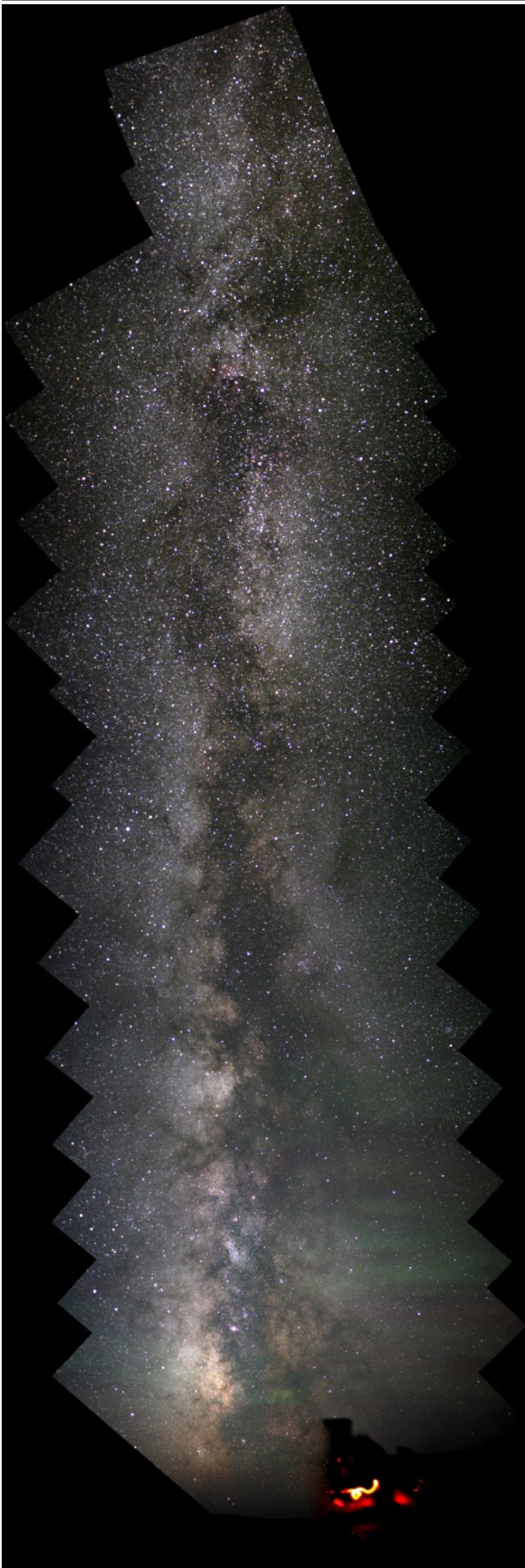


I'm trying to contact the local astronomy club. Their meeting was right before I arrived.

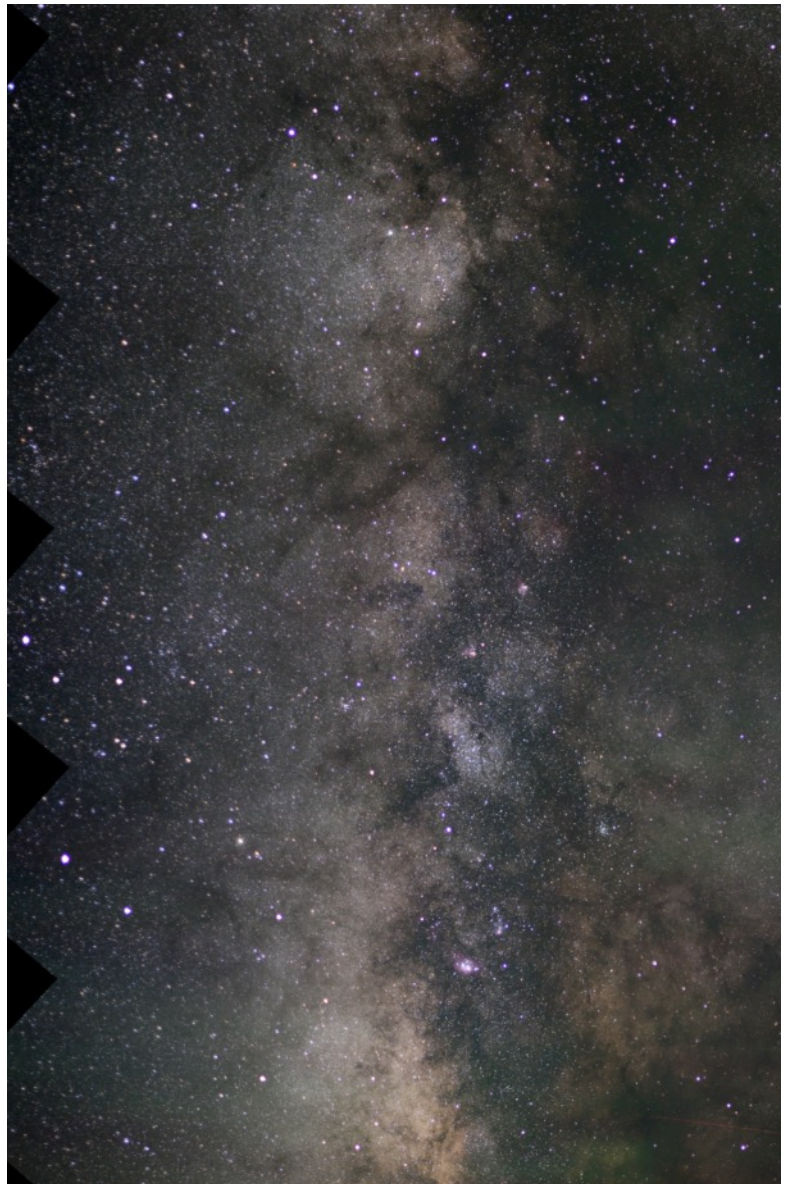
Clear DARK Skies,
Jack Dunn



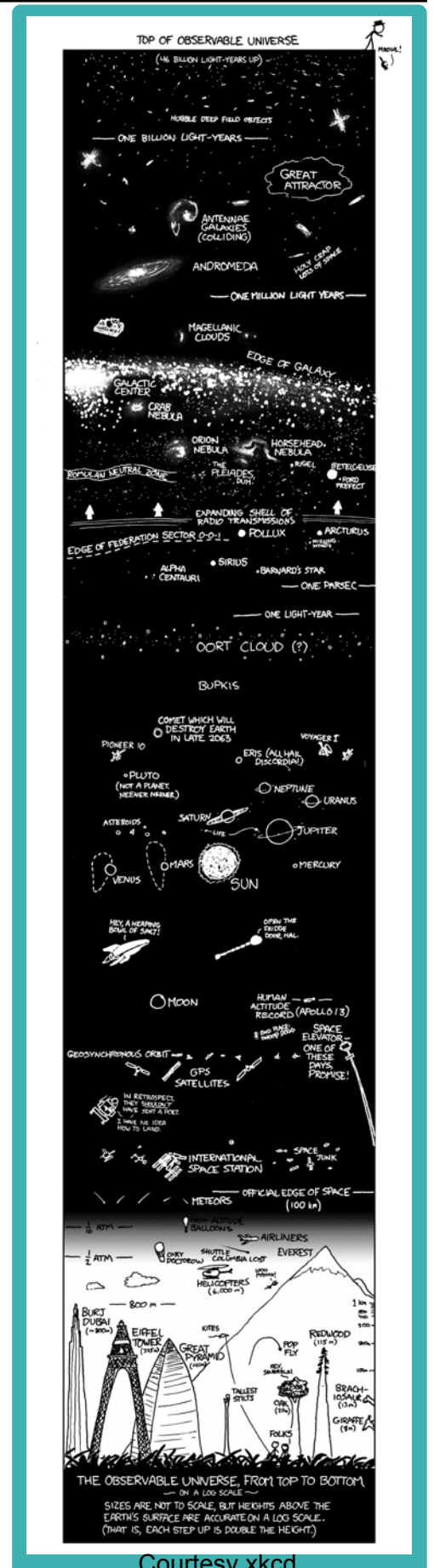
Milky Way Panorama—Brett Boller



*Stitched from
30 images.
Photos on the
right are
sections of the
full-size image,
to show detail.*



Brett Boller's NSP Photos



Courtesy xkcd

NSP 2014 Photos—John Reinert



Incoming and outgoing PAC Presidents (Brett and Jack)

Right: Neligh casts a shadow in my review mirror (sunset) Wed night drive home.



Mike, setting up his scope.



Dave Knisely



Above left: Raindog or Sunbow?



Above right: Contemplating a low speed turn to the right (Dave Hamilton and Lee Thomas)

September Observing—Jim Kvasnicka

This is a partial list of objects visible for the upcoming month.

Planets

Mercury: Very low at dusk and difficult to see without a telescope.

Mars and Saturn: The two begin the month less than 6° apart but the distance between them widens quickly.

Neptune: In Aquarius at magnitude 7.8. It reached opposition on August 29th.

Uranus: In Pisces, it reaches opposition on October 7th.

Jupiter: Jupiter rises sooner and sooner before Venus in the east.

Venus: Rises about an hour after the Sun in the east.

Messier List

M13: The Great Hercules Cluster, Class V globular cluster.

M14: Class VIII globular cluster in Ophiuchus.

M22: Class VII globular cluster in Sagittarius.

M28: Class IV globular cluster in Sagittarius.

M54: Class III globular cluster in Sagittarius.

M69: Class V globular cluster in Sagittarius.

M70: Class V globular cluster in Sagittarius.

M92: Class IV globular cluster in Hercules.

Last Month: M6, M7, M8, M9, M10, M12, M19, M20, M21, M23, M62, M107

Next Month: M11, M16, M17, M18, M24, M25, M26, M55, M75

NGC and other Deep Sky Objects

NGC 7293: The Helix Nebula in Aquarius, best seen with an OIII filter.

NGC 7331: Galaxy in Pegasus.

NGC 7662: The Blue Snowball planetary nebula in Andromeda.

NGC 40: The Bow-Tie Nebula in Cepheus.



Double Star Program List

Otto Struve 525: Yellow and blue stars in Lyra.

Gamma Delphinus: Yellow primary with a yellow-green secondary.

Zeta Aquarii: Yellow and white pair.

94 Aquarii: Yellow and pale blue stars.

Alpha Capricornus: Wide pair of yellow stars.

Beta Capricornus: Yellow and blue pair.

36 Ophiuchi: Equal pair of yellow-orange stars.

Omicron Ophiuchi: Yellow primary with a light yellow secondary.

70 Ophiuchi: Yellow and orange stars.

Challenge Object

Stephan's Quintet: A group of five galaxies in Pegasus 300 million light years away. Made up of NGC 7317, NGC 7318A, NGC 7318B, NGC 7319, and NGC 7320. It helps to have a large aperture telescope of 12 inches or greater.

NSP Photos—Brian Sivill



Brian Sivill NSP 2014



NGC Objects—Jim Kvasnicka

The Deer Lick Group NGC 7331

NGC 7331 is the largest and brightest member in The Deer Lick Group of galaxies in Pegasus. It is 46 million light years distant and is at magnitude 9.5. Through a 10 inch telescope it has an apparent size of 6' x 2'. It is one of the brightest galaxies not included in Messier's catalog.

NGC 7331 was discovered by William Herschel on September 5, 1784. American amateur astronomer Tom Lorenzin came up with the common name of the galaxy group to honor the Deer Lick Gap which lies high in the mountains of North Carolina.

From dark skies NGC 7331 can be seen in binoculars. With large aperture telescopes you can pick up three galaxies to the east. These three galaxies are not companions to NGC 7331 but are much farther away. Through a telescope NGC 7331 has a bright nucleus surrounded by a nebulous glow. The galaxy is three times as long as it is wide.

NGC 7331 is part of the Herschel 400 list and also Caldwell object 30.



Star Party Report-Jason Noelle

NSP Wednesday night recap: Last night bunch of people including myself set with the hope that it would clear up because at sunset the sky was 75% covered. We waited around for a few hours, drank some beers, played with lasers, and talked some other people and sure enough just after midnight the northern sky cleared up quite alot. The southern half of the sky was pretty much covered the entire night so I hunted galaxies for most of the night. Spent some time in Draco, Ursa Major, Andromeda, and Hercules looking for faint smudges in the eyepiece. Probably looked at 20-30 in a few hours. I also spent some time looking through the big 30 inch scope. The sky wasn't nearly as good as saturday night and sunday night, which were the best skies I have ever seen, but it was good enough to see some faint stuff. Packed it in about 330am and was back in the hotel by 430am. BEST NSP EVER....

NSP Tuesday night recap: Turned out to be more a social night last night than an observing night. Clouds early stayed around awhile and didn't really clear out all night. The seeing was wasn't good so most of us didn't even set up the scopes. The only scope on Dob row that was set up was the 30 inch monster so we did quite a few views of some really faint objects through that. We watched two satellites that were tumbling through the sky. They would occasionally flash bright enough as lightning as they were spinning. It was really cool. Caught 20-30 meteors through out the night with a few fireballs. It was clear enough about 130am that I probably could have got my scope out but they sky was pretty fuzzy, even the bright stars were dim. Hardly any detail in the milky way could be seen. Got back to the hotel about 330am.

NSP monday night recap: It was looking pretty good until about midnight then the clouds started rolling in. There were a few holes in the clouds for a few hours but you had to move fast to see much of anything through the clouds. We ended up sitting around for awhile though drinking beers and having a quite epic laser pointer battle between a 1 watt blue laser and 10-12 other green ones scattered around the observing site. Many bugs were killed.... The lightning and

storms that popped up close by made us shut down about 2am and was in bed by 330am.

NSP Sunday night recap: I had quite few a people who this was their first time out at NSP look through the scope. It's hard to point things out in the sky without a laser pointer! I showed them a variety of objects to try and give them as much as a full dark sky experience as I could provide until about 1am. I went on to look for galaxies for most of the night. Saw quite a bit of detail in Andromeda and saw dust lanes in M82, which I have never seen before! and maybe picked out a few globular clusters in M33! Probably looked at 20-30 different galaxies and a few pairs and triplets. Looked at the Veil, The Dumbell, The Little Dumbell, the Blinking Planetary nebula, the Saturn Nebula, the Helix nebula and many others. I also discovered that I am completely fascinated with Dark Nebula. It's pretty amazing when you are scanning a Milky Way star field filled with 1000's of stars and then you find an area almost completely void of stars! it is quite awesome. I observed until about 415am and was in bed at 530am.

NSP Saturday night recap: wasn't complete dark until about 11pm and man, was it ever dark. How dark was it? The North American nebula could be seen easily with out a scope along with M7, Lagoon nebula, Andromeda, M13! You could see distinctly the different spiral arms of the whirlpool galaxy through my scope. Lots of detail in the Milky Way could be seen without a scope. One of the best nights I have ever seen. We spotted 6 moons of Saturn, right before it got too dark and then moved on the good stuff. Spent some time looking through the big 24 inch scope. Saw lots of detail in the sunflower galaxy, Stephens quintet, the central star of the Ring nebula. Lots of amazing things.

Star Party Report-Jason Noelle



Attendees: Dan Delzell, Jim Kvasnicka, Jason Noelle, Dave Hamilton, Dave Knisle, Brett Boller, John Lammers, Brian Sivill, Mike and Linda Kerns, Bill Lohrberg, Rick and Sandy Brown, Jack Dunn, Mark Dahmke, Lee Thomas, John Reinert, Bob Kacvinsky

The PAC members began to arrive on Friday through Monday for differing number of nights. Several were camping at the Snake Campgrounds or traveled from other nearby hotel areas. Several of the campers set up on Dob Row along the main drive and those that had to leave each night took over the high hill on the far SW side of the observing field. This year there was a 30", 24", 22", and several 16" scopes in attendance. The 30" scope was an Obsession and got a lot of attention during the week.

Saturday night was an excellent night with cool light breeze and clear skies. Dark skies began after 10:30 PM with Saturn and Mars popping out first. Saturn was clear and stable with 5-6 moons out depending on scope aperture. The Milky Way filled the central corridor north to south with many of the Messiers naked eye objects. The North American nebula and Pelican were clear showings the Florida and Mexico sections an easy view. The Whirlpool (M51) showed both sets of spirals with the outside arms completely to the back of the smaller companion. Dave Hamilton had a new Meade Extreme Wide 100 degree 30 that we put an O III filter for the 16" Lightbridge. It allowed for a beautiful detailed view of both main parts of the veil nebula and Pickering's Triangle. We then powered up to 203x with the 9 Nagler and could see the nebula form strands like a loose weaved rope.

Several of us were working on our observing clubs including Messiers, Herschels, Caldwell's, and Messiers Binocular. On PAC hill we established on the hour a 5 minute break to help manage eye relief and insure rehydration. The temps dropped about 3:00 AM below the dew point creating a rather cold raw breeze so many started to pack up around that time. This was a similar

theme all week with cool temps much of the week.

During the week we experienced continued shows of meteors from two separate showers. Each clear night it was common to see 3-5 bright streaks each hour depending on which direction you were observing. Several were bright enough to create a brightening of the sky on the observing field. Pretty cool.

Mike and Linda Kerns set up their camper on the observing field. They had a larger tarp outside their camper. After dark Mike heard something scratching across the tarp. Knowing that Merritt is rattle snake country, he tells of a couple minutes of worried excitement. Come to find out, it was a ground squirrel that was running on the tarp and could not get any traction. Their tarp apparently covered its home entrance. This was one of many fun stories experienced during the week.

Sunday night was a repeat of Saturday only with improved skies and excellent viewing. Telescopes were offering good views even with objects that were reaching their magnitude limits. Many began packing up again around 3:00 or a bit later due to the dew and cold winds. I got several objects in Camelopardalis with the dim guide stars just able to be viewed naked eye.

Monday night had cloud cover that about 11 PM offered a nice opening in the southern skies with good opportunity to work in Scorpius and Sagittarius. Most were able to observe up until 12:30 when the clouds began to fill in. About 3 a lightning/thunder storm passed 5-10 miles to the south of the observing field. We did not have much wind but did have a great storm show to the south with heavy lightening and thunder.

Tuesday night was poor visibility at dusk and forecast for deteriorating conditions. Many did not set up their scopes and left the area for other activities. By 12:30 though the skies began to improve and I was able to get several Messier objects logged with binoculars. Several reported getting out between 3-4:30 AM and observe. Bri-

NSP 2014 Report-Bob Kacvinsky, continued.

an Sivill and Bill Lohrberg brought out their guitars and entertained a small group till early morning. The entire observing field was filled with little groups of 3-10 people all circled up getting a change to catch social updates and share stories.

Wednesday included a great program at Valentine High school including a presentation on building an Observatory in the Arizona desert, Hawaii cultural mix with Astronomy, and the featured speaker on Eclipses. Several of the photo contest winners included Brett Boller and Brian Sivill. Mark Dahmke brought his drone to the observing field Tuesday and showed a great video of the observing field during the afternoon session. Everyone was talking about the video so next year the NSP committee will probable have to assign a flight controller on the field to address potential flight lanes since everyone was talking "I need to get one of those."

Wednesday night the weather forecast was again marginal but most of us decided to defy the odds and set up to avoid getting wishful like Tuesday night. The moon was just up in the west and came out for a brief visit just enough to get a great "Halloween" view of the crescent with dark cloud bands passing through. By 11:30 the skies to the north and above began to open up and allowed for a good night of viewing in Ursa Major, Cygnus, Perseus, to Hercules. Sagittarius and Scorpius were completely clouded over, so if you viewed on Monday and Wednesday night you had a change to get a complete view of the entire sky.

One highlight was powering up to 366x on the Ring Nebula with the 16" Lightbridge that created a view of the outer rings that showed a donut thickness to the rings with a distinct inside and outside border. Dave Knisely then recommended lower power with a UHC filter that showed the faint "doily" of faint nebula around the outside of the ring. The group began to pack up about 1 AM with Bill and I finally giving in a little past 2 AM.

Thursday night turned out to be an excellent night with clear cool skies. Bill and I moved down to "Dob Row" to join other PAC and OAS members.

The blacktop area was busy with large Dobs and visitors throughout the night. Brett Boller and Bill Lohnberg were working on their Messier lists while I worked back and forth on the telescope and binoculars. We had several key fun objects including the Ring, Veil, Stephen's Quintet, etc.

Due to traveling home on Friday morning, I packed up around 4 AM and Bill came in a little after that. A family reunion had moved in Thursday evening and they were up making breakfast by 7 am. So... Bill and I packed up the camper and headed back to Lincoln.

This year's NSP had 3 exceptional nights compared to the previous couple of years and 2.5 nights that were good viewing. The social times were great as we had several new friends join our PAC Hill group for observing. If you have never been to an NSP, mark your calendars for July 12-17 next year. Whether you have a telescope or not, it is a great opportunity to spend time with others who share our passion for discovery and awe.



NSP 2014 Report-Bob Kacvinsky, continued.



The Nebraska Star Party - 2014, misc.



Jack Dunn and Fred Espenak



Another drone view of NSP from 300' altitude.

Droughts, Floods and the Earth's Gravity, by the Grace of NASA, 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/>

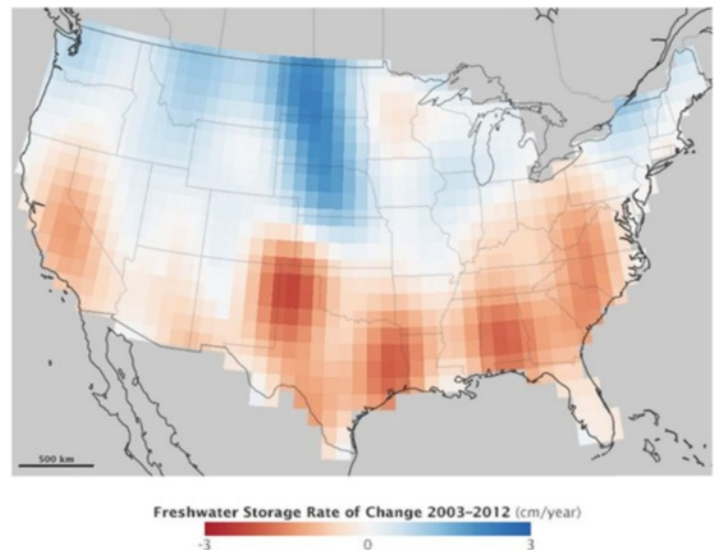


Image credit: NASA Earth Observatory image by Jesse Allen, using GRACE data provide courtesy of Jay Famigleitti, University of California Irvine and Matthew Rodell, NASA Goddard Space Flight Center. Caption by Holli Riebeck



**Amateur Astronomy —
A Hobby as Big as the
Universe**

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FIRST CLASS MAIL

**Next PAC Meeting
TUESDAY
August 26, 2014
7:30 PM
Hyde Observatory**