



The Prairie Astronomer

The Official Newsletter of the Prairie Astronomy Club

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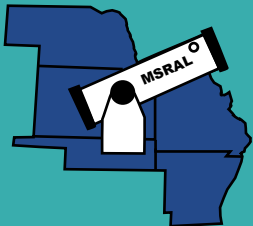
Club Offices and Duties

NSP Photos

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First Map of Rosetta's
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Book Review:
Astrophotography



September Program:

Don Cox - "Electric Cars and Radio Astronomers" Electric cars are becoming increasingly popular. Don will talk about electric car history, on reasons that electric cars are important, on important issues for electric cars, and some current examples. Also Don will talk about some Radio Astronomers that he knew and worked with. These include Robert (Bob) Wilson and Arno Penzias who received a Nobel Prize for discovery of the remnants of the "big bang" from the beginning of the universe and Ron Bracewell who made two high resolution antenna arrays (radio telescopes) at Stanford University."

Don Cox received B.S. and M.S. degrees in Electrical Engineering from the University of Nebraska; Ph.D. in Electrical Engineering from Stanford University in 1968. As a member of Technical Staff at Bell Laboratories from 1968-1973, he researched dynamic channel assignment techniques. In the 1970s, he supervised and contributed to millimeter-wave earth-space propagation experiments that provided information for designing satellite communications systems.

Featured photo: NGC 2245 (near center) and NGC 2247 are a pair of reflection nebulae in Monoceros - by Rick Johnson.



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

PAC Meeting Minutes for August 26, 2014

Dan Delzell (non-officer), called the meeting to order at 7:31.

Dan welcomed club members and visitors. Program to follow business meeting was announced (NSP Review and Drone Video) and introduced themselves (seven visitors announced, including two former members).

Upcoming events discussed included Aug 30, Slattery Vintage 8925 Adams Nehawka Ne. 7:00-10:00, Wildwood Star Party in Nebraska City September 6 @8:00-11:00, Wild Fall Festival Oct 17 @ Nature Center at Pioneers Park 4:00-8:00 needing volunteers.

Neil DeGrass Tyson will be presenting 7:00-8:30

Sept 19 @ Double Tree Hotel in Omaha.

Discussed that volunteers continue to be needed for Hyde Observatory Saturday nights.

Observing Report was provided by Jim Kvasnicka. Star Parties August 22 and 29. Lunar Party September 5. September 19 and 26.

Treasurer's Report was not provided as Treasurer was not in attendance.

September meeting will elect new officers.

Business meeting adjourned at 7:53.

Program that followed was a report on NSP and a drone video preview by Mark Dahmke.

Powerful, Pulsating Core of Star

The blue dot in this image marks the spot of an energetic pulsar -- the magnetic, spinning core of



star that blew up in a supernova explosion. NASA's Nuclear Spectroscopic Telescope Array, or NuSTAR, discovered the pulsar by identifying its telltale pulse -- a rotating beam of X-rays, that like a cosmic lighthouse, intersects Earth every 0.2 seconds.

The pulsar, called PSR J1640-4631, lies in our inner Milky Way galaxy about 42,000 light-years away. It was originally identified by as an intense source of gamma rays by the High Energy Stereoscopic System (H.E.S.S.) in Namibia. NuSTAR helped pin down the source of the gamma rays to a pulsar.

The other pink dots in this picture show low-energy X-rays detected by NASA's Chandra X-ray Observatory.

In this image, NuSTAR data is blue and shows high-energy X-rays with 3 to 79 kiloelectron volts; Chandra data is pink and shows X-rays with 0.5 to 10 kiloelectron volts.

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 September 30th,
2014 @Hyde Observatory

PAC Meeting
Tuesday October 28th, 2014
@Hyde Observatory

PAC Meeting
Tuesday November 25th,
2014 @Hyde Observatory

PAC Meeting
Tuesday December 30th,
2014 @Hyde Observatory

Newsletter submission
deadline October 11, 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



Earl Moser (1927 - 2014)

Earl A. Moser, 87, of Hickman, died September 16, 2014. Earl was born on August 16, 1927. He graduated from Hickman High School in 1944. After graduating he worked on the family farm and also helped his father run Moser Garage. With the exception of military time he worked at Moser Garage until retiring in 1989. Earl served in the United States Army during the Korean War. Earl married Marjorie DeVries on August 2, 1951.

Earl enjoyed coin collecting and amateur astronomy. He was the President of the Prairie Astronomy Club for 10 years and hosted the mid-states region Astronomical Society convention. He was involved with choosing the site for Hyde Observatory.

His daughter, Leona Barratt made this tribute video for Earl:
<http://youtu.be/w-CgZ4Fchc>.



Telescope burns its own mortgage.

This photo appeared in the Lincoln Journal on April 25, 1969. Shown is Club President Earl Moser holding what remains of the mortgage. Larry Stepp is on the left. The photo was taken at Gateway Mall. Copyright © 1969, Lincoln Journal Star. Reprinted with permission.



The following article by Larry Stepp appeared in the November, 1976 issue of the Prairie Astronomer (and was reprinted in the PAC history book):

"I would like to express the gratitude of the entire club to Earl Moser for many years of service, guidance, and hard work. As our president for many years, Earl has conducted our meetings, appointed club officers, advised many beginning amateur astronomers, presented programs, settled disputes, conducted correspondence for the club, and maintained the club observatory. He has hosted countless star parties, entertained and housed visiting amateur astronomers from outside our area, supported the Gateway sky shows, provided refreshments at the meetings, organized our yearly picnic, and recently he has helped to plan the new city observatory.

It is largely because of Earl's efforts that we are currently affiliated with the Astronomical League. He devoted extensive time and energy to enable us to host the Mid-states Convention in 1969. What prestige our club has around the region is due almost entirely to the personal respect Earl enjoys.

But most important, Earl Moser has set a standard of intellectual achievement, hard work and friendly dignity which serves as an example to us all. Thank you for all of us, Earl."

Earl Moser—Rick Johnson

Tuesday night I learned I'd lost a good friend of over 50 years and the astronomy community lost a major contributor, Earl Moser. While not a founder of the Prairie Astronomy Club he had a major impact on it for many years. He was the club's first and for decades only member to achieve Lifetime Membership status with the club. In about 1962 had just started with limited public outreach when Pete Schultz (now Dr. Peter Schultz a planetary geologist and major player in the Deep Impact and LCROSS missions to punch holes in a comet and the moon) convinced the



major shopping center in town to allow us to hold monthly "Moon Shows" to back up their Moonlight Madness sales which they had been holding randomly even when no moon was out. He even got them to pay us for this.

Soon after these started Earl, who lived on a farm west of Hickman well south of town, happened on our little show. He immediately joined the club and began to have a much needed impact on it, soon becoming president for 10 years when no one else wanted the job, nor the energy and vision he did. Among his goals was to encourage young members when most of the membership was over 50, Pete, myself and Earl about the only exceptions. One of the high school recruits was Larry Stepp who years later headed the optic team building the two 8 meter class Gemini scopes and now the Telescope Department Head working with the Thirty Meter Telescope.

Another was to expand on public outreach even when not paid by a shopping center. Soon we were going to schools and holding public star parties for scout troops and the like. We even held one for a Chevy dealer to announce the new Chevy Vega when it was first introduced, showing the public the real Vega. Also he rekindled my interest in astrophotography. I'd done some since building my first scope in 1954 but with poor results. Earl, not reading the literature of the day, developed his own ideas that actually worked

much better, at least for me and I soon was back in the game.

Since he lived on a farm he allowed members to use it for our star parties and for members interested in astrophotography to use his front yard where AC power was available. Scopes of the day required 120V AC power with its very precise 60 cycle frequency. He also got our club heavily involved in the Astronomical League. The division we were in was mostly inactive and that didn't suit him at all so he convinced the league to revise the divisions so we and the Omaha club were now in the very active Midstate's Region.

Once that happened we joined and have hosted several of their conventions over the years. He managed to get us on the local TV station several times for these conventions and other outreach projects. He also got us involved in a Naval Observatory project, run by David Dunham, of observing grazing lunar occultations. At the time the moon's orbit was still not accurately known and we were to send astronauts there in a few years. Grazing occultations were the best way, at the time, of pinning down its orbit but could only be observed along very narrow paths across the earth's surface, sometimes only a few hundred feet wide.

We went out on many such observation runs but all unfortunately failed. Before computers we had to do difficult math with mechanical calculators that took hours. Then the results plotted on paper survey maps. One mistake and we were at the wrong location. In one case fog rolled in only two minutes before the occultation, others weather got us. Once time I learned the difference between a gravel road and dirt road the hard way. We got clouded out anyway it turned out.

He worked all of those 10 years toward a goal of establishing a public observatory where we could promote astronomy every clear weekend. While a lot of groundwork was accomplished during his 10 years that goal, especially the money needed, was always out of reach. But he had kindled the interest in others and soon a planning committee was formed with Earl a principle player. A few

Earl Moser, continued

years later [Hyde Memorial Observatory](#) became reality. He became one of its first supervisors and helped every night he could.

I should mention that all this time he was going blind due to a genetic eye disease. Still he was one of the clubs best observers of faint fuzzies since his skill at using averted vision was a necessity for him. Unfortunately, this was getting worse and he soon could no longer drive so getting to town and the observatory was difficult. He soon had to "retire" to his farm home. That remained available for all to use as a dark sky site and his house a place to warm up in sub zero weather.

Eventually nearby Hickman went modern and put in a super lit sewage plant only a quarter mile from the farm as well as bright street lighting as it expanded becoming a major bedroom community for Lincoln. We had to find another location. Even that worked out well when we got a buy on an Atlas missile silo we used for a few years until a fellow offered us over 10 times what we paid for it. That was an offer too good to pass up. We now use a farm a further from town and lights thanks to the family of another club member. Still I think Earl missed all that activity for years in his front yard.

Over the years at the farm I watched is kids grow up, it was almost a second home for me. Over the years he overcame many obstacles that would have been too much for most of us. Unfortunately after 87 years his cancer was the one he couldn't overcome.

Thank you Earl for all your years of hard work spreading your love of astronomy. You made a big difference to me and many others.



Earl opening the club's tip off observatory housing a 12.5" f/7 reflector in his back yard about 1967 judging by his beard. He grew one for the Nebraska Centennial that year.



A typical gathering at Earl's farm home. The club scope seen in the top photo is in the bottom right of this one. Earl took the picture atop a ladder and ruined everyone's night vision.

Hello from South Carolina—Jack Dunn

We are setting in here in Columbia. (Well actually we live in Cayce, SC which is right across the river from downtown Columbia). Liz has the Blue Cross Blue Shield of South Carolina Planetarium is up and running (yes that mouthful is really the name). There are construction issues still to be resolved, but audiences have been big. Close to 3000 people first few weeks. NASA Administrator Charlie Bolden grew up here and dropped by during the opening. The Observatory had very big attendance for the Observe the Moon night. It was like Hyde when during Halley's Comet. They have a balcony next to the dome so they can set up more scopes. The local astronomy club is the "Midlands Astronomy Club." I know what you are thinking - Nebraska is the "midlands" because it is in the middle of the US. Columbia is in the middle of South Carolina. It is funny to us because these states are so small. Doesn't take much of a drive to be in another state. We are 100 miles from Charlotte, NC.



when I first joined PAC, Carroll Moore would take youth aside for 30 minutes before the meeting and give them some astronomy background. Not sure how either PAC or MAC can address this, but seems all clubs need to work on this. The MAC does have some good astrophotographers and observers. They do a fair amount of outreach and were helping out on Observe the Moon Night at the Museum.

I note the passing of long-time member Earl Moser. He and Carroll Moore really introduced me to PAC when I got to Lincoln (then found out Rick Johnson was there as well - I had met him when he was in Omaha). He was invaluable in the beginning of Hyde and leading the club especially with us when we were younger members. Hope you will continue in his spirit and encourage more young people to join and participate.

Jack Dunn - in Columbia, SC.



Probably three hours drive from Atlanta. See what I mean. Light pollution is similar here to Lincoln - in other words, not great for observing. But I think there is enthusiasm for astronomy. People have been waiting for this facility to be done at the museum for 17 years.

I do want to comment on the Midlands Club. It has the same issues as most today. Membership has some good people but it is aging and mostly male. Younger blood is needed. Of course I'm not helping that.(g) The image I have here from a club meeting shows president Alex Mowery who is also one of the younger members. He's about 40 so you see what I mean.

The Astronomical League has mentioned this in a number of articles for all amateur clubs. Back



Designing My Remote Observatory Part VII—Rick Johnson

The Black Hole Keeps on Growing

I thought I now had my system complete. I could now image without any of the issues I'd fought since the 1950's. I just flipped a switch turning everything on. Fired up the computer and started imaging. It all worked as I had hoped when I started down this road. I could even script a session and go out for dinner and a movie, come home and go to bed while the system worked for the entire winter's night taking the data I had scripted for it. I could get up the next day and see hundreds of megabytes of good data. What more could I possibly need? Turned out quite a bit more feeding of that super-massive black hole in the bank account was needed.

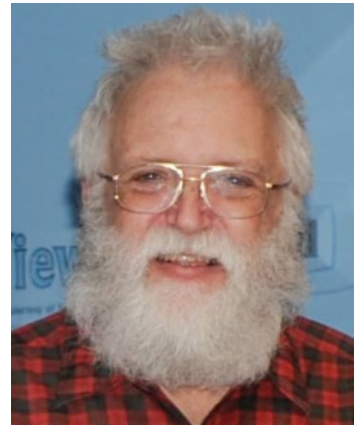
In the photo of the original set up a couple issues back you see there's a dew heater around the corrector plate but no dew shield. I'd been told by several users of SCT scope that a dew shield wouldn't help much. But a good dew heater would do the job, no dew shield needed. They didn't live on a lake! I soon was seeing my data fade as the night progressed.

It stayed clear but it was as if a neutral density filter had been added. Looking at the corrector showed it heavily dewed over even with the dew heater at maximum. Adding a dew shield over the dew heater has solved the problem. The heater now runs at 25% and stays dew free.

Fortunately this was a minor expense compared to what was to come.

With the addition of the dew shield my data suddenly improved in brightness. I had been working with a fogged corrector and not known it for some time! Another piece of hardware I soon added was a computer controlled outlet box for AC power. I had a switch in the house that turned on the outlets at the pier. With the cameras, focuser and mount and dew heater plugged into these I could turn them on and off from the house but that turned everything on and off. Some nights were low humidity so I didn't need a dew heater. Usually I was only using one of two cameras. Some cloudy nights I took my darks and didn't need anything but one camera turned on. Why run gear not needed? The cheapest solution I found was offered by RoboFocus that made the controller for

the focuser. They offered a 4 outlet computer control box. With the RoboFocus plugged into the switched pier outlets the two cameras, mount and dew heater are plugged into the 4 outlet box and I can now turn on only what I need from the house. When taking darks I really don't need the focuser powered but otherwise it works well and cost half what a dedicated outlet system cost. No new software needed either. This too was a rather minor expense.



I soon found I needed one more piece of rather expensive hardware. With the system I can script a night's activity and go to bed but I found I wasn't sleeping many nights worrying about rain. What if it started to rain and there wasn't thunder to wake me up. The solution was a cloud sensor. Again, at the time there was only one available, the Boltwood.

That created a serious feeding of the black hole at \$1400! Today it is \$1800! It will sense the first hint of rain or even just clouds and park the telescope and shut the roof turning off everything. Today there are considerably cheaper alternatives in the \$350 to \$500 range. From reports they are just as effective but don't function with as many observatory control programs.

I'm still learning to process my data. That seems to be a fog that never goes away. New processing tricks are being developed all the time and I even come up with a few. The result is that everything I did a couple years ago could be greatly improved with reprocessing. But with over 800 images over two years old that's a lot of reprocessing that will likely never happen. Besides, I'd just need to redo all that and more in another two years. It would be a never ending nightmare.

Would I do things differently today. Of course I would. There are new and better scopes and camera's available today. Even mounts are better with some being direct drive with precision sensors that completely eliminate periodic error and

Designing My Remote Observatory Part VII, Continued

need only a couple dozen pointings to track without guiding (but you will really feed that black hole to get this convenience). Rather than the rag-tag software system I now use, PixInsight claims to do it all in one package and many top imagers are moving to it for most things though nearly all still use Photoshop as well for the final touches. It has a horrid learning curve but those that master it say it is all worth the hassle and they are putting out images to prove it. Some of the Photoshop plug-in I use are based on processes in Pix Insight. It was developed from the ground up for deep sky imaging. It is far cheaper than Photoshop alone let alone all the other software I use though doesn't do image acquisition. A new, inexpensive program called SG Pro is now gaining traction for that.

While it works with SBIG camera's internal guider or external guide head it uses the free PHD guide program which doesn't automatically adjust for declination but requires recalibration every image unlike Maxim D/L.

CCDSOFT is a dead program and its replacement requires a new version of The Sky with features I just don't need to buy. Or if I feel really rich I could get Maxim and ACP (nearly \$3000 for both!). Ok I don't feel that rich. For now I'll stick with CCD Soft as it still works fine for image acquisition and my script files.

One thing has changed since I mentioned Focus Max as a free solution to auto focusing images if you have a good quality computer controlled focuser (that's not free unfortunately). While the free version of Focus Max is still available at their site a new version that is said to much more user friendly is now being sold by CCDWare for \$150. The imaging community is saying this is too high but buying it anyway. The free version is nasty to get working as it requires ASCOM drivers and other support software (also free) and getting it all to talk to each other can be "interesting". I'm told the pay version is plug and play simple.

So now you have a choice. Since I have my old version running fine (not without lots of effort) I'll not feed the black hole for the new version.

Of course you can do things a lot cheaper than I have. By working wide angle with small APO re-

fractors with field flatteners you can get by with far cheaper mounts and cameras with smaller chips and somewhat less expensive scopes though the savings there is smaller. By not running remotely you can avoid automatic focusing issues and use a simple Bahtinov mask for manual focusing. Just remember to remove it for the image. Seems many are forgetting that to their dismay. There are inexpensive image acquisition programs like Nebulosity and the free PHD mentioned above for guiding. A simple guider can be made from say the inexpensive Meade DSII camera found all over the used market at very low cost. Free software is available to guide using an old web cam as well.

Free Deep Sky Stacker can do a good (not great but darned good) job of stacking low noise images. One shot color cameras, while inefficient and ill suited for some things, can save a lot of money by eliminating the filter wheel and filters.

My goal was to image no matter how cold it was or how thick the skeeters and to do so while I went out to eat and a movie or at 3 a.m. while sleeping. That has been achieved. I can run all night our long winter nights without losing any sleep. I figured that worth the cost though I'll admit I didn't realize how well fed that black hole was to become.

Still it was worth all the effort and cost. Now I just let the computer do most of the work unless I need to force an object. It will decide if it is clear enough to open, and what objects on my to-do list are best positioned for that time and take the data, shutting down before the weather goes bad on me. All I do is keep the to-do list fed with objects. It now sits at about 750 of them so I'm keeping up my side of the deal. Now if I could just automate the image processing side to a similar extent I'd have time again for fishing or time on the black powder range. In any case it is super nice to just flick a switch to turn on power to the observatory and in a couple minutes be acquiring data. While glitches can occur they are now few and far between. I have the capability to add a wide field system on top of the current system.

That keeps getting put off by all the items I keep adding to the high resolution to-do list.

Designing My Remote Observatory Part VII, Continued

This brings me to the end of my journey so far. I'm sure the black hole will continue to be fed, just not as high a calorie diet it is used to.

I'll be learning new processing tricks as well. But for now I have a system that can easily beat the images that I lusted over in the 1950's and 1960's by the 200" Palomar telescope, at least on nights of good seeing. The system goes deeper and with more dynamic range than the film days of the major observatories. And does so in about the same amount of time. This allowed me to show a rather famous "jet" in a 1965 image of Arp 192 wasn't a real feature of the galaxy. My images have been used now in nearly a dozen Masters and PhD theses by students on many continents, but not this one. One showed a previously unknown outburst of a flare star in a galaxy about 35 million light-years away that threw a monkey wrench into a student's thesis. Another showed why the rotation curve of a galaxy was so messed up. It was really two galaxies seen one directly in front of the other such that Palomar images failed to show there were really two. (Turns out a pro beat me to that one with an article on it in a rather obscure journal I didn't check). I've made a movie showing gasses flowing down the tail of a comet. Found a dozen or so previously unknown asteroids. Most still unknown since I didn't find them until too late to recover them and define an orbit. The list goes on.

I never expected any of that to happen. I just wanted to improve my imaging abilities from my crude film days. That I could actually make a contribution here and there seemed impossible. But even more advanced amateurs now work with the pros since they have image processing skills to pull out features the pros can't as they just don't have the time needed to learn how to do this. One of my images resulted in the discovery of a new planetary nebula. Unfortunately I didn't catch it.

Another amateur on my update list did. He took a verifying image from central Berlin! It now is officially Le1 since he reported it and I didn't. If I'd have been on my toes it would have been Jo1. Close but no cigar!

The effort and cost has been worth it, well the effort has. I'm not so sure about that every growing black hole in the bank account. The results have far exceeded my expectations. I continue to surprise myself such as when I discovered I'd picked up a dozen or so planetary nebula in M31. I managed to image a few globular star clusters in that galaxy in the 1960's but never expected to pick up something as small and faint as a planetary nebula. I also was shocked to find a quasar at more than 12 billion light-years look back time (z greater than 4). Now that, I find, is quite common in my images. To think at one time 100 million light-years was beyond my reach. If someone had told me I'd have a system that could see gravitational arcs made famous by Hubble Space Telescope images I'd have thought them nuts but that is quite within my range given sufficiently good seeing.

Thanks to the mount's ability to track fast moving asteroids I recently picked up a rock just 22 meters across passing us at a distance of over 600,000 kilometers (almost twice the moon's distance). Today's digital equipment has greatly leveled the playing field between amateur and professional. They just do in seconds what takes me hours to do. But then my system cost many hundreds of millions of dollars less than theirs. The Sloan survey scope (2.5 meters) can easily reach 24th magnitude in 27 seconds, I need a couple hours on a good night to do this. I used to impress myself reaching 16th magnitude on film now I go 1600 times fainter in the same time and do it literally in my sleep. Today's technology is amazing but far from cheap.

Makes me wonder where it will be in another 50 years.

One warning: This series may make it seem that if you buy the right software and hardware you can simply install everything and be imaging while you sleep. It doesn't work that way. It took me several years to work out all the issues that arose along the way. You need to be able to image very accurately every time manually before you will know the many dozen values needed to enter into the automation software to get it to work. The only way to avoid this is to use one of the many rent-a-scope systems now available. They have, you

Designing My Remote Observatory Part VII, Continued

hope, set up the systems they rent out so you don't have to do that work. Still you will have the steep learning curve of coaxing an image out of your data. I recommend starting there before you

spend far bigger bucks only to find out you don't like the tedium of calibrating and processing images. ■

Club Communications—Mark Dahmke

If you haven't logged on to the Night Sky Network site, please do so - every club member has an account there. A couple of years ago when the PAC website was redesigned, we decided to take advantage of the Night Sky Network site to manage club business and the membership roster. NSN also provides a way to send email to all club members. If you move or change your email address or phone, please remember to update your profile in NSN.

The redesigned PAC website at www.prairieastronomyclub.org contains articles and news of interest to the public and club members, plus the newsletter PDFs but does not

have a members-only area that requires a login.

PAC also has a Facebook page and a Twitter account. Please follow both if you have FB/Twitter accounts and where appropriate, repost or retweet messages to increase the visibility of the club. PAC also uses CafePress.com for club apparel. You can order shirts, cups and caps at any time.

In addition to messaging to members through NSN, PAC operates "PAC-LIST" - a listserv email distribution list. PAC-LIST is not limited to PAC members. To subscribe, send an email to me at mark@dahmke.com.

The screenshot shows the Night Sky Network website interface. At the top, there is a header for Jet Propulsion Laboratory (NASA) and the California Institute of Technology, with navigation links for JPL HOME, EARTH, SOLAR SYSTEM, STARS & GALAXIES, and SCIENCE & TECHNOLOGY. Below this is the Night Sky Network logo and tagline: "Astronomy clubs bringing the wonders of the universe to the public". The user is logged in as Mark_Dahmke. The main navigation menu includes MY CLUB, CLUBS & EVENTS, NIGHT SKY PLANNER, OUTREACH RESOURCES, and ABOUT THE NETWORK. The user's profile page for the Prairie Astronomy Club is displayed, with a sub-menu for PAC Home, PAC Website, Events, Locations, Roster, My Profile, and Message Groups. The profile page has three buttons: EDIT PROFILE, CHANGE USERNAME, and CHANGE PASSWORD. Below these is the section "NAME AND CONTACT INFORMATION" with the club name "Prairie Astronomy Club". On the right side, there is a section for "OPEN ITEMS" with a dropdown arrow, listing: 10 Member Applications to be Approved, 13 Member Registrations to be Approved, 60 Completed Events ready to Log, and 51 Unscheduled Event/Service Requests. Below that is a section for "NIGHT SKY NETWORK SERVICES" with links for Request Outreach Handouts, Magazine Subscriptions and Links, Sharing the Universe Videos, Growing Your Astronomy Club Videos, and Find Other NSN Members.

October Observing—Jim Kvasnicka

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

Planets

Mars: Sets about three hours after the Sun about 4° from Antares. On 10/18 Comet Siding Spring will be 2' from Mars.

Saturn: Begins the month only about 10° high in the WSW.

Neptune: In Aquarius at magnitude 7.8.

Uranus: In Pisces at magnitude 5.7, it reaches opposition on October 7th.

Jupiter: Rises around 2:30 am at the start of October and by 1:00 am at months end.

Venus: Rises a half hour before the Sun and later is lost in the Sun glow.

Mercury: Visible in a telescope in the east after 10/16.

Moon: Total Eclipse on 10/8 starting at 3:45 am.

Messier List

M11: The Wild Duck Cluster in Scutum.

M16: Open cluster in the Eagle Nebula in Serpens Cauda.

M17: The Swan nebula in Sagittarius.

M18: Open cluster in Sagittarius.

M24: The Small Sagittarius Star Cloud.

M25: Open cluster in Sagittarius.

M26: Open cluster in Scutum.

M55: Class XI globular cluster in Sagittarius.

M75: Class I globular cluster in Sagittarius.

Last Month: M13, M14, M22, M28, M54, M69, M70, M92

Next Month: M27, M30, M56, M57, M71, M72, M73

NGC and other Deep Sky Objects

NGC 7789: Open cluster in Cassiopeia.

NGC 247: Galaxy in Cetus.

NGC 253: The Silver Coin Galaxy in Sculptor.

NGC 278: Galaxy in Cassiopeia.

NGC 288: Class X globular cluster in Sculptor.

NGC 457: The E.T. Cluster in Cassiopeia.

Double Star Program List

8 Lacerta: Four white stars.

Beta Cephei: White primary with a blue secondary.

Struve 2816: White primary with two blue stars in Cepheus.

Xi Cephei: Yellow pair.

Delta Cephei: Yellow and pale blue stars.

Eta Persei: Yellow and light blue pair.

Struve 331: White primary with a blue-white secondary in Perseus.

Epsilon Pegasi: Bright yellow and white stars.

Challenge Object

NGC 7635: The Bubble Nebula in Cassiopeia. An extremely faint large luminous shell visible with averted vision around an 8th magnitude star.



Galactic Pyrotechnics on Display



A galaxy about 23 million light-years away is the site of impressive, ongoing, fireworks. Rather than paper, powder, and fire, this galactic light show involves a giant black hole, shock waves, and vast reservoirs of gas.

This galactic fireworks display is taking place in NGC 4258 (also known as M106), a spiral galaxy like the Milky Way. This galaxy is famous, however, for something that our galaxy doesn't have -- two extra spiral arms that glow in X-ray, optical, and radio light. These features, or anomalous arms, are not aligned with the plane of the galaxy, but instead intersect with it.

[Read more...](#)

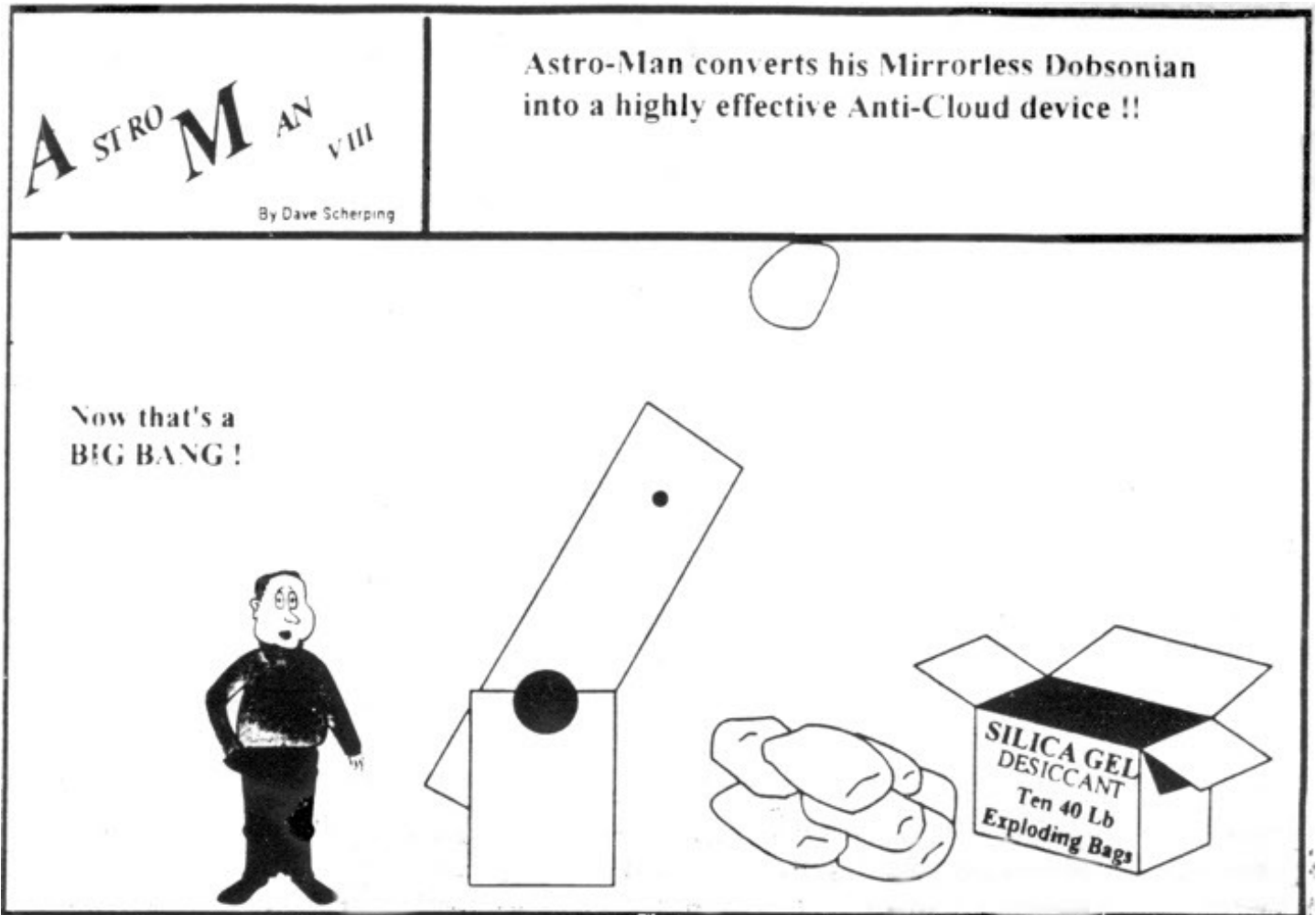
NGC Objects—Jim Kvasnicka

NGC 457 is a 6.4 magnitude open cluster in Cassiopeia. It is brighter than the two Messier objects in Cassiopeia, M52 and M103. It was discovered by William Herschel in 1787. The cluster contains around 75 stars with 25 of them brighter than 12th magnitude.

NGC 457 has several names. It is referred to as The E.T. Cluster, The Owl Cluster, or The Stick Man Cluster. Regardless of its name it is a fun cluster to show the public. Imagine the two brighter stars in the cluster as the eyes of E.T. and the dimmer stars make up his arms and legs.

NGC 457 is 8,000 light years distant and it has an apparent size of 20'. It is easy to find and always a fun object to show at outreach events.

NGC 457 is part of the Herschel 400 list and also Caldwell object 13.



Wildwood Star Party—Dan Delzell

Members of PAC and OAS participated in a Star Party hosted by the Wildwood Historical Home in Nebraska City on September 6th



The Wildwood Historical Home was built in 1869 when Jasper Anderson Ware moved his wife and three little daughters to the house which was then in the country. His wife exclaimed that she could not live in such a “wild wood” The family grew to love their home and it is now known as the Wildwood Historical Center.

Mrs. Jasper Ware enjoyed astronomy as a hobby. She obtained a telescope that was once used on a lumber ship.

Mrs. Gail Wurtele, Manager of the Wildwood Historic Center, wrote “thanks so much those of you who came to the Nebraska City Wildwood Star Party. It was counted as a success, with about 80 people (double;e that of last year’s event) and 18 different telescopes. The Historic Center provided cookies and water to all guests, and conducted a free tour of the Historic Wildwood home for the astronomers. The connection of the Historic Home to astronomy was the discovery in documents that one of the original residents of the home was interested in astronomy too. Members from both the Prairie Astronomy Club and the Omaha Astronomical Society provided 17 of the telescopes, with the 18th being the 1854 vintage Yeates & Son 2” refractor now owned by the Wildwood Historic House and recently restored by Eugene Lanning. Many of the astronomers and general public

availed themselves of the opportunity to view through the antique telescope. The picture of the Moon was taken through the Yeates and Son telescope by the reporter for the Nebraska City News Press, Tammy Partsch.”

It was a good time had by all. I want to thank all PAC and OAS members who helped and give a special thank you to Eugene Lanning who was our Nebraska City man on the ground.

This is the type of event that directly meets PAC’s mission. They’re fun to do and the public greatly appreciates them. If you’ve never worked a public event like these, sign up for one coming up. You’ll have a good time and help spread a love of the stars to people who normally wouldn’t have the opportunity to look through a telescope. The Ladies of Wildwood are already planning next year’s star party.



Ellen Jasper’s telescope

Wildwood Star Party, continued.



*Bob Kacvinsky helping a young
Nebraska City man view M57*



Our hosts wore period dress to the event.

*Rick Brown sharing views of the moon with the Ladies of
Wildwood in 2013 – Credit Tammy Partsch*



Moon through the Yeates & Son 2" refractor – Credit Tammy Partsch

Club Offices and Duties

Club officer nominations are made in September and elections are held in October. The following is a list of responsibilities of each of the officers and what is required to maintain a functioning club.

As stated in the bylaws, the club has five officers: President, Vice President, Secretary, Treasurer and Second Vice President. The business of the club is managed by a Board of Directors. The Board consists of the five elected officers. Each decision of the Board requires an affirmative vote by at least three Board members. The Board can also create additional non-elected offices as required and can initiate impeachment proceedings against officers who have been negligent in performing their duties.

The Prairie Astronomy Club has a fifty year history of service to club members and the community. Potential club officers should have a good understanding of the history of the club, its formation and mission, its relationship with Hyde Observatory and the types of events, activities and outreach that is part of the tradition of the club. The most complete resource is the book *The Prairie Astronomy Club: Fifty Years of Amateur Astronomy*, which is in the club library or available as a PDF document.

President

The President organizes and directs the regular monthly meetings and all other club activities. The President also prepares the meeting agenda and PowerPoint for the meeting.

The President also officially represents the club at meetings at the regional and national level where he/she is in attendance or delegates this authority. The President has the authority to call meetings of the Board and to appoint non-elected officers.

The President should have good communication skills and be comfortable interacting with the media and public, be a good public speaker, be available to do radio and TV interviews and to deliver prepared introductions and remarks at club-sponsored events.

Another duty of the President is the annual club audit. Within 10 days of assuming office, the President must appoint a committee of three club

members to perform the audit. The audit must be completed within 45 days of the close of the fiscal year which is October 31.

When assuming office, the President should hold a meeting of the Board to present his/her direction and ideas for the club for the coming year, and appoint any unfilled non-elected positions.

Vice President

The Vice President is responsible for running club meetings and other events in the absence of the President. The VP is also to be the mediator in cases of procedural dispute and must be available to assume the duties of any officer at the direction of the President. The VP also maintains control of the current inventory of all club property.

Secretary

The Secretary handles all Club correspondence, is responsible for the distribution of information received through official club correspondence and is in charge of Club publicity (often the job of Publicity or Outreach Coordinator is delegated to a non-elected member). The Secretary also sends out membership renewal notices and delivers meeting minutes to the newsletter editor. The Secretary is responsible for maintaining an accurate club membership roster. The master copy of the roster is currently maintained on the Night Sky Network website. The bylaws also require publication of the complete roster in the newsletter on an annual basis.

Treasurer

The Treasurer is responsible for all Club funds and for keeping accurate records of all monetary transactions. The Treasurer must submit a written report of the club's monetary status at the request of the President or give a verbal report at the request of any member during regular meetings. He/she also prepares an annual financial report in November for publication in the newsletter and presentation at the November meeting. The Treasurer is also responsible for all tax filings and reporting requirements, to maintain the club's 501c3 status.

Club Offices and Duties, continued.

Second Vice President (and Program Chair)

The Second Vice President is responsible for the formation and presentation of the monthly club programs. Ideally the 2nd VP should try to plan ahead six months to one year to build a list of potential presenters or programs. The 2nd VP also sends out email announcements of upcoming programs to the membership, and sends a program description to the newsletter/website editors.

The club usually has several non-elected officers:

The **Publications Chairperson** (or Newsletter Editor) is responsible for editing and publishing the *Prairie Astronomer*. The newsletter editor may also be the website manager/editor. The newsletter editor should have a good working knowledge of desktop publishing software (and computers in general), graphics, photo editing, some design and layout experience and some experience with social networking and Internet marketing. The Website editor needs to be familiar with WordPress (or similar CMS software) and HTML, graphics and word processing applications. Ideally the newsletter and website editor(s) should have prior experience with the publication of a newsletter or website, or demonstrated skills. The publications chairperson is also responsible for social networking for the club - posting Facebook and Twitter announcements for club meetings and events.

If the club has an appointed **Outreach Coordinator**, the coordinator takes on some of

the roles performed by other officers – organizes outreach events, shares in media communications tasks, puts together flyers, etc.

The **Club Librarian** (often the Vice President) manages the club library. He/she keeps a current bibliographic listing of all Club library material including the archive of all back issues of *The Prairie Astronomer*. The Club Librarian and Secretary work together to maintain a record of club activities and regularly update the official club history.

The **Observing Chairman** presents a monthly report at Club meetings and/or in the *Prairie Astronomer*. He/she keeps members informed of upcoming celestial events, sky objects of special interest and star parties.

The **Recording Secretary** (often the Club's elected Secretary) is responsible for keeping the minutes of the club meetings and filing a copy with the Club Secretary. Minutes need to be kept in a systematic fashion as they record the history and life of the club and need to be published in the *Prairie Astronomer* on a monthly basis.

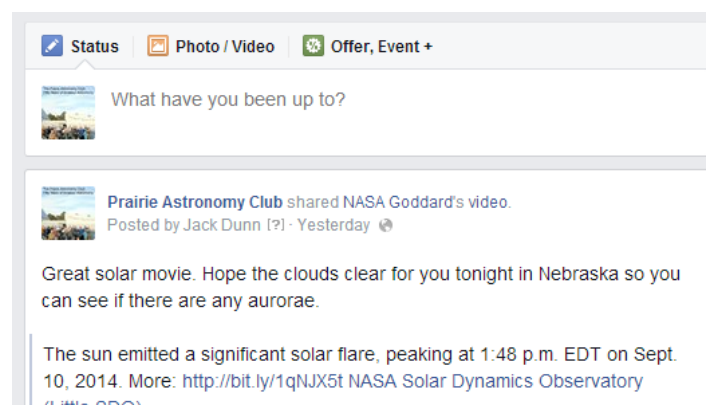
The **Site Chairperson** (if one is appointed) is responsible for establishing a site committee to oversee the maintenance and security of the club observing site.

While not a requirement of the bylaws, all club officers and appointees should have good computer and social media skills, should be accessible and responsive via email and phone.

Help Increase PAC's Visibility on Social Networking Sites

Help spread the word about club meetings and upcoming events. If you haven't joined PAC's Facebook page, please do so now.

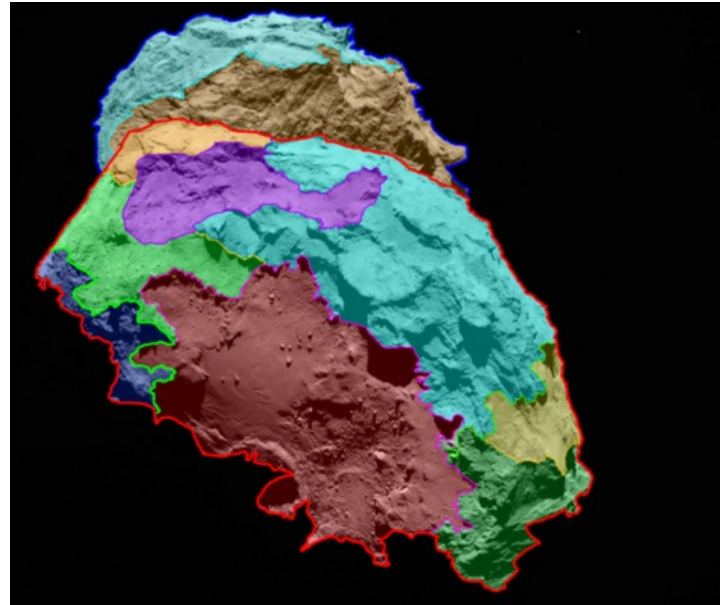
When news items and meeting announcements are posted to the page, share them with your friends. This has a tremendous **multiplier effect** - news of PAC meetings and events can **reach thousands of people** who might otherwise not be aware that PAC (or Hyde Observatory) even exists!



First Map of Rosetta's Comet

Scientists have found that the surface of comet 67P/Churyumov-Gerasimenko -- the target of study for the European Space Agency's Rosetta mission -- can be divided into several regions, each characterized by different classes of features. High-resolution images of the comet reveal a unique, multifaceted world.

ESA's Rosetta spacecraft arrived at its destination about a month ago and is currently accompanying the comet as it progresses on its route toward the inner solar system. Scientists have analyzed images of the comet's surface taken by OSIRIS, Rosetta's scientific imaging system, and defined several different regions, each of which has a distinctive physical appearance. This analysis provides the basis for a detailed scientific description of 67P's surface. A map showing the comet's various regions is available at: <http://go.nasa.gov/1pU26L2>



"Never before have we seen a cometary surface in such detail," says OSIRIS Principal Investigator Holger Sierks from the Max Planck Institute for Solar System Science (MPS) in Germany. In some of the images, one pixel corresponds to a scale of 30 inches (75 centimeters) on the nucleus. "It is a historic moment -- we have an unprecedented resolution to map a comet," he says.

The comet has areas dominated by cliffs, depressions, craters, boulders and even parallel grooves. While some of these areas appear to be quiet, others seem to be shaped by the comet's activity, in which grains emitted from below the surface fall back to the ground in the nearby area.

"This first map is, of course, only the beginning of our work," says Sierks. "At this point, nobody truly understands how the surface variations we are currently witnessing came to be."

As both comet 67P and Rosetta travel closer to the sun during the next few months, the OSIRIS team and other instruments on the payload will monitor the surface to look for changes. While scientists do not expect the borderlines they have identified for the comet's different regions to vary dramatically, even subtle transformations of the surface may help to explain how cometary activity created such a breathtaking world.

The new comet maps will offer valuable insights for members of the Rosetta team, who plan to gather in Toulouse, France, on September 13 and 14, to determine a primary and backup landing site from five

candidates they previously had selected.

The scientific imaging system, OSIRIS, was built by a consortium led by the Max Planck Institute for Solar System Research (Germany) in collaboration with Center of Studies and Activities for Space, University of Padua (Italy), the Astrophysical Laboratory of Marseille (France), the Institute of Astrophysics of Andalusia, CSIC (Spain), the Scientific Support Office of the European Space Agency (Netherlands), the National Institute for Aerospace Technology (Spain), the Technical University of Madrid (Spain), the Department of Physics and Astronomy of Uppsala University (Sweden) and the Institute of Computer and Network Engineering of the TU Braunschweig (Germany). OSIRIS was financially supported by the national funding agencies of Germany (DLR), France (CNES), Italy (ASI), Spain, and Sweden and the ESA Technical Directorate.

Rosetta is an ESA mission with contributions from its member states and NASA. Rosetta's Philae lander is provided by a consortium led by DLR, MPS, CNES and ASI. Rosetta will be the first mission in history to rendezvous with a comet, escort it as it orbits the sun, and deploy a lander to its surface.

For more information on the U.S. instruments aboard Rosetta, visit:

<http://rosetta.jpl.nasa.gov>

More information about Rosetta is available at:

<http://www.esa.int/rosetta>

Nebraska Star Party Photos—Dave Knisely



Twinkle, twinkle Variable Star, Dr. Ethan Siegel

As bright and steady as they appear, the stars in our sky won't shine forever. The steady brilliance of these sources of light is powered by a tumultuous interior, where nuclear processes fuse light elements and isotopes into heavier ones. Because the heavier nuclei up to iron (Fe), have a greater binding energies-per-nucleon, each reaction results in a slight reduction of the star's mass, converting it into energy via Einstein's famous equation relating changes in mass and energy output, $E = mc^2$. Over timescales of tens of thousands of years, that energy migrates to the star's photosphere, where it's emitted out into the universe as starlight.

There's only a finite amount of fuel in there, and when stars run out, the interior contracts and heats up, often enabling heavier elements to burn at even higher temperatures, and causing sun-like stars to grow into red giants. Even though the cores of both hydrogen-burning and helium-burning stars have consistent, steady energy outputs, our sun's overall brightness varies by just ~0.1%, while red giants can have their brightness's vary by factors of thousands or more over the course of a single year! In fact, the first periodic or pulsating variable star ever discovered—Mira (omicron Ceti)—behaves exactly in this way.

There are many types of variable stars, including Cepheids, RR Lyrae, cataclysmic variables and more, but it's the Mira-type variables that give us a glimpse into our Sun's likely future. In general, the cores of stars burn through their fuel in a very consistent fashion, but in the case of pulsating variable stars the outer layers of stellar atmospheres vary. Initially heating up and expanding, they overshoot equilibrium, reach a maximum size, cool, then often forming neutral molecules that behave as light-blocking dust, with the dust then falling back to the star, ionizing and starting the whole process over again. This temporarily neutral dust absorbs the visible light from the star and re-emits it, but as infrared radiation, which is invisible to our eyes. In the case of Mira (and many red giants), it's Titanium Monoxide (TiO) that causes it to dim so severely, from a maximum magnitude of +2 or +3 (clearly

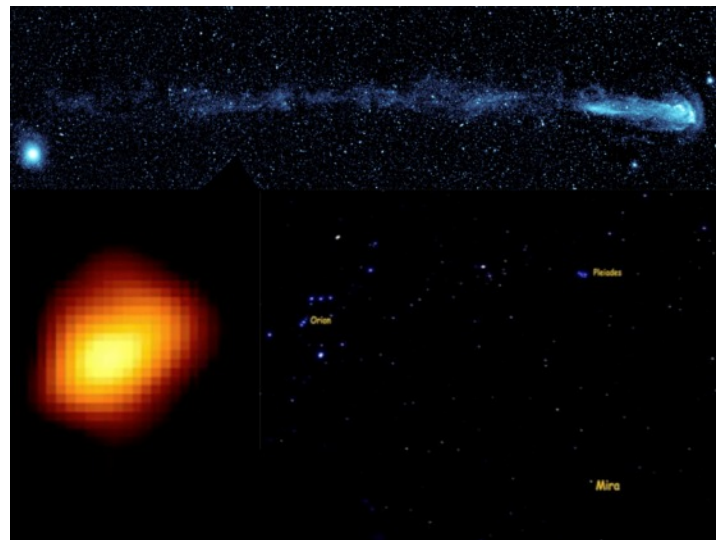
visible to the naked eye) to a minimum of +9 or +10, requiring a telescope (and an experienced observer) to find!



Visible in the constellation of Cetus during the fall-and-winter from the Northern Hemisphere, Mira is presently at magnitude +7 and headed towards its minimum, but will reach its maximum brightness again in May of next year and every 332 days thereafter. Shockingly, Mira contains a huge, 13 light-year-long tail -- visible only in the UV -- that it leaves as it rockets through the interstellar medium at 130 km/sec! Look for it in your skies all winter long, and contribute your results to the AAVSO (American Association of Variable Star Observers) International Database to help study its long-term behavior!

Check out some cool images and simulated animations of Mira here:

http://www.nasa.gov/mission_pages/galex/20070815/v.html



Images credit: NASA's Galaxy Evolution Explorer (GALEX) spacecraft, of Mira and its tail in UV light (top); Margarita Karovska (Harvard-Smithsonian CfA) / NASA's Hubble Space Telescope image of Mira, with the distortions revealing the presence of a binary companion (lower left); public domain image of Orion, the Pleiades and Mira (near maximum brightness) by Brocken Inaglory of Wikimedia Commons under CC-BY-SA-3.0 (lower right).

Book Review: Learn from the Master with “Astrophotography” by Thierry Legault

by NANCY ATKINSON, [Universe Today](#).

If you’re looking for detailed, step-by-step instructions of how to start or improve your photography of astronomical objects, look no further. Astrophotographer Thierry Legault shares the expertise he has garnered from over 20 years of “amateur” photography in his newly translated book titled simply — and appropriately — “Astrophotography.”

“It took me more than two years to write the first edition of the book (published in French in 2006),” Legault told Universe Today, “and I worked several months on the second edition (2013), and worked several months again for this new English edition.”

This softcover book is filled with dramatic images, helpful graphs, charts, and more – plus over 100,000 words of text to provide detailed, guided instructions on everything from choosing the right camera for your needs to how to process imagery for the best and most accurate results.

100% of the astronomical images in the book are Legault’s own photos, just a few of which are featured here in this review. “I really wanted to use my own images,” Legault said.

While each page is a treasure trove of Legault’s beautiful images, he’s not just showing off: he tells you how you can try to get the same results.

Of course, we’ve featured Legault’s stunning and sometimes ground-breaking astrophotography here on Universe Today, and his work has been published and broadcast worldwide. You’ll likely recall images of the space shuttle or International Space Station crossing the Sun or Moon, views of spy satellites in orbit, beautiful deep sky views, or shots like the striking image above of a ‘moonbow’ and meteor over Australia’s Wallaman Falls.

His continued dedication to his craft, along with his attention to detail and quality has earned Legault the reputation as one of the top amateur astrophotographers in the world. And he now shares his tips and know-how in this well-organized and detailed — but highly accessible

— manual. Legault’s descriptions and instructions will not lose even those just beginning with astronomical imaging.

So, with experts like Legault and so many other accomplished astrophotographers taking incredible photos (which we love to feature on Universe Today) why would someone want to bother with trying to just start out and learn the craft?

Legault addresses that question immediately in the forward of his book.

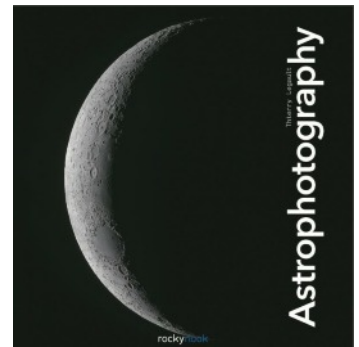
“Part of the answer to that question lies in the desire to get our own pictures of the stars: after all most of the tourists who visit the Egyptian pyramids, Niagara Falls, or The Great Wall of China also take photographs, even though these sites have already been photographed millions of times with beautiful tomes devoted to them,” Legault writes. “The pleasure of photographing the sky is a natural progression from the visual observations of the night sky...”

Plus, Legault continues, with current equipment that is now available, the expanding avenues of citizen science offers the chance for anyone to add to the body of astronomical knowledge.

“It is entirely possible to go beyond the purely aesthetic aspect of astrophotography and use images of celestial bodies to study their behavior and deduce the physical mechanisms that govern them, or even reveal new insights,” Legault writes. “In some cases, advanced amateurs can do useful work assisting professionals who, while certainly having more sophisticated means and deeper skills are so few that it is impossible for them to perform a complete survey of a celestial object to continuously monitor it.”

So not only can you create beautiful imagery but you can contribute to science as well.

The book begins with the simplest ways for amateurs to begin photographing the night sky,



Book Review, continued.

and you don't even need to own a telescope. For example, Legault's video, below, of fireworks and a big Moon over Paris is something anyone can record. But using the right settings — and planning ahead — are key to capturing beautiful images and video.

But then Legault delves into the details of telescopic photography, and provides information on using telescopes and tracking mounts. He shares how to precisely capture everything from incredible solar imagery, to deep sky photos, to his 'trademark' transits of satellites, like those seen below:



Also key is image processing. While Legault has provided details for Universe Today before on how not to over-process and be fooled by image artifacts, his book offers much more thorough information on how to start — as well as knowing when to quit — processing images for the best results.

Other areas Legault covers are how to:

Select the most useful equipment: cameras,

adapters, filters, focal reducers/extenders, field correctors, and guide telescopes

Set up your camera (digital, video, or CCD) and your lens or telescope for optimal results

Plan your observing sessions

Polar-align your equatorial mount and improve tracking for pin-point star images

Make celestial time-lapse videos

Calculate the shooting parameters: focal length and ratio, field of view, exposure time, etc.

Combine multiples exposures to reveal faint galaxies, nebulae details, elusive planetary structures, and tiny lunar craters

Postprocess your images to fix defects such as vignetting, dust shadows, hot pixels, uneven background, and noise

Identify problems with your images and improve your results

“Astrophotography” is not just a dry manual: Legault tells stories and explains details in a manner that seems like he is talking directly to you. For a translated book, the text flows extremely well, making for a very readable book. Legault credits Alan Holmes from the Santa Barbara Instruments Group (SBIG) – one of the main manufacturers of CCD cameras for astronomy — for his assistance with the translation from French. “He did a tremendous job of correcting my bad translation!” Legault told UT.

“Astrophotography” is available on Amazon in a large format book or as a Kindle edition for those who might like to have a lit version while out in the field. It is also available at book retailers like Barnes and Noble and Shop Indie bookstores. This English version of “Astrophotography” was published by Rocky Nook Publishing, a leader in books on photography. You can also purchase the book directly from Rocky Nook.

For additional imagery and information, visit [Legault's website](#).



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A Hobby as Big as the
Universe**

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FIRST CLASS MAIL

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