The Prairie Astronomer

July, 2012 Volume 53, Issue #7

The Official Newsletter of the Prairie Astronomy Club

July Program

July 2012 PAC Program
NSP Recap
Prairie Astronomy Club Members

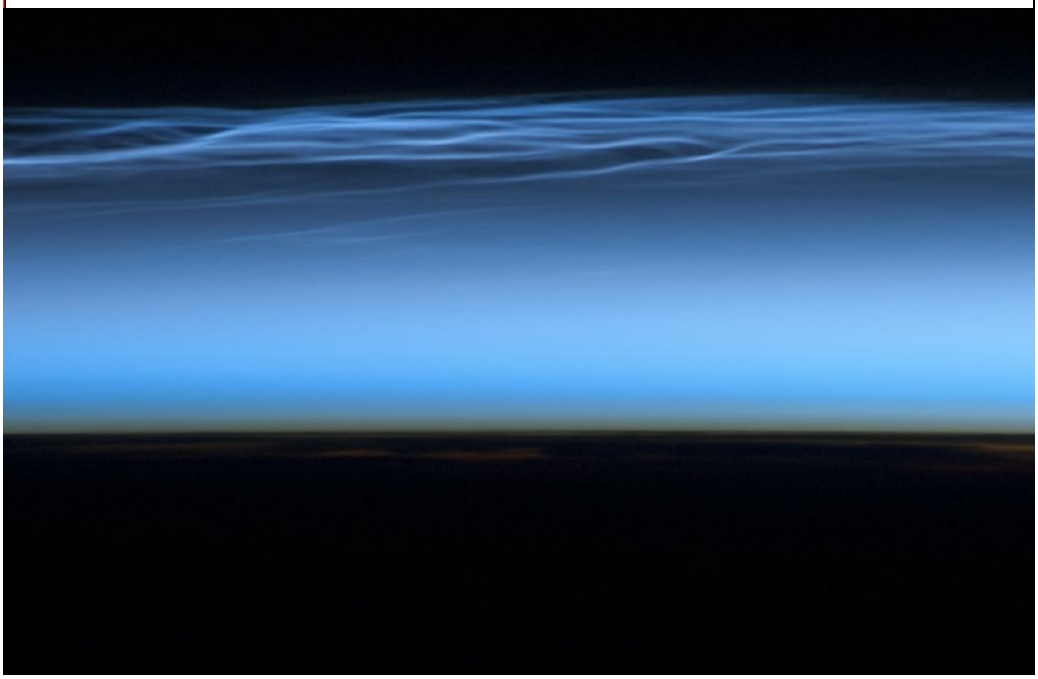
This month's PAC Meeting will be on Tuesday, July 31. The program for this meeting will be a recap (hopefully pictorially) of the Nebraska Star Party (NSP). If you're going please contact Jason Noelle to get him your pics so he can put them into a slideshow everyone can enjoy as this month's program. You can contact Jason at by emailing him at: jason.noelle@gmail.com

In This Issue:

Featured Photo

On June 13, 2012, when this image was taken from the space station as it passed over the Tibetan Plateau, polar mesospheric clouds were also visible to aircraft flying over Canada. In addition to the still image above, the station crew took a time-lapse image sequence of polar mesospheric clouds several days earlier on June 5, while passing over western Asia. It is first such sequence of images of the phenomena taken from orbit. Polar mesospheric clouds form between 47 to 53 miles (76 to 85 kilometers) above Earth's surface when there is sufficient water vapor at these high altitudes to freeze into ice crystals. The clouds are illuminated by the sun when it is just below the visible horizon, lending them their night-shining properties. In addition to the polar mesospheric clouds trending across the center of the image, lower layers of the atmosphere are also illuminated. The lowest layer of the atmosphere visible in this image--the stratosphere--is indicated by dim orange and red tones near the horizon.

Image Credit: NASA



The Bad Astronomer Fact of the Month

Go outside on a dark, moonless night. Look up. Is it December or January? Check out Betelgeuse, glowing dully red at Orion's shoulder, and Rigel, a laser blue at his knee. A month later, yellow Cape. Is it July? Find Vega, a sapphire in Lyra, or Antares, the orange-red heart of Scorpius. In fact, any time of the year you can find colors in the sky. Most stars look white, but the brightest ones show color. Red, orange, yellow, blue… almost all the colors of the rainbow. But hey, wait a sec. Where are the green stars? Shouldn't we see them?

Nope. It's a very common question, but in fact we don't see any green stars at all. Here's why. Take a blowtorch (figuratively!) and heat up an iron bar. After a moment it will glow red, then orange, then bluish-white. Then it'll melt. Better use a pot holder. Why does it glow? Any matter above the temperature of absolute zero (about -273 Celsius) will emit light. The amount of light it gives off, and more importantly the wavelength of that light, depends on the temperature. The warmer the object, the shorter the wavelength. Cold objects emit radio waves. Extremely hot objects emit ultraviolet light, or X-rays. At a very narrow of temperatures, hot objects will emit visible light (wavelengths from roughly 300 nanometers to about 700 nm).

Mind you — and this is critical in a minute — the objects don't emit a single wavelength of light. Instead, they emit photons in a range of wavelengths. If you were to use some sort of detector that is sensitive to the wavelengths of light emitted by an object, and then plotted the number of them versus wavelength, you get a lopsided plot called a blackbody curve (the reason behind that name isn't important here, but you can look it up if you care — just set your SafeSearch Filtering to "on". Trust me here). It's a bit like a bell curve, but it cuts off sharply at shorter wavelengths, and tails off at longer ones. An object that is at 4500 Kelvins (about 4200 Celsius or 7600 F) peaks in the orange part of the spectrum. Warm it up to 6000 Kelvin (about the temperature of the Sun, 5700 C or 10,000 F) and it peaks in the blue-green. Heat it up more, and the peaks moves into the blue, or even toward shorter wavelengths. In fact, the hottest stars put out most of their light in the ultraviolet, at shorter wavelengths than we can see with our eyes. Now wait a sec (again)… if the Sun peaks in the blue-green, why doesn't it look blue-green? Ah, this is the key question! It's because it might peak in the blue-green, but it still emits light at other colors. Look at the graph for an object as hot as the Sun. That curve peaks at blue-green, so it emits most of its photons there. But it still emits some that are bluer, and some that are redder. When we look at the Sun, we see all these colors blended together. Our eyes mix them up to produce one color: white. Yes, white. Some people say the Sun is yellow, but if it were really yellow to our eyes, then clouds would look yellow, and snow would too (all of it, not just some of it in your back yard where your dog hangs out). OK, so the Sun doesn't look green. But can we fiddle with the temperature to get a green star? Maybe one that's slightly warmer or cooler than the Sun? It turns out that no, you can't. A warmer star will put out more blue, and a cooler one more red, but no matter what, our eyes just won't see that as green.

The fault lies not in the stars (well, not entirely), but within ourselves. Our eyes have light-sensitive cells in them called rods and cones. Rods are basically the brightness detectors, and are blind to color. Cones see color, and there are three kinds: ones sensitive to red, others to blue, and the third to green. When light hits them, each gets triggered by a different amount; red light (say, from a strawberry) really gets the red cones juiced, but the blue and green cones are rather blasé about it. Most objects don't emit (or reflect) one color, so the cones are triggered by varying amounts. An orange, for example, gets the red cones going about twice as much as the green ones, but leaves the blue ones alone. When the brain receives the signal from the three cones, it says "This must be an object that is orange." If the green cones are seeing just as much light as the red, with the blue ones not seeing anything, we interpret that as yellow. And so on. So the only way to see a star as being green is for it to be only emitting green light. But as you can see from the graph above, that's pretty much impossible. Any star emitting mostly green will be putting out lots of red and blue as well, making the star look white. Changing the star's temperature will make it look orange, or yellow, or red, or blue, but you just can't get green. Our eyes simply won't see it that way. That's why there are no green stars. The colors emitted by stars together with how our eyes see those colors pretty much guarantees it. But that doesn't bug me. If you've ever put your eye to a telescope and seen gleaming Vega or ruddy Antares or the deeply orange Arcturus, you won't mind much either. Stars don't come in all colors, but they come in enough colors, and they're fantastically beautiful because of it.

Visit the Bad Astronomer at his website http://blogs.discovermagazine.com/badastronomy/

Club Events

Newsletter submission deadline, August 15, 2012

Nebraska Star Party
July 15 - 20 Snake Campground, Merritt Reservoir
Valentine, Nebraska

PAC Meeting
Tuesday July 31, 2012 @Hyde Observatory
NSP Wrap up

PAC Meeting
Tuesday August 28, 2012 @Hyde Observatory
Space and NASA Update

2012 PAC Star Party Dates - Dates in bold are closest to the new moon

January		**Jan 20th**
February	Feb 17th	**Feb 24th**
March	Mar 16th	**Mar 23rd**
April	Apr 13th	**Apr 20th**
May	May 11th	**May 18th**
June	Jun 15th	**Jun 22nd**
July	Jul 13th	**Jul 20th**
NSP	**July 15-20**	
August	Aug 10th	**Aug 17th**
September	Sep 7th	**Sep 14th**
October	Oct 5th	**Oct 12th**
November	Nov 9th	**Nov 16th**
December	Dec 7th	**Dec 14th**

Lunar Party Dates:

Apr 27th
May 25th

Jul 27th

Aug 24th
Sep 21st

Internet Links of Interest

http://www.universetoday.com/

http://www.thespacereview.com

http://www.thespacereview.com/article/1945/1

http://space.flatoday.net/

http://www.spaceportamerica.com/

http://www.planetary.org/home/

http://www.nasaspaceflight.com/

http://www.spacex.com

ON THE NET

PAC:
www.prairieastronomyclub.org

PAC E-Mail:
info@prairieastronomyclub.org

NSP:
www.nebraskastarparty.org

NSP E-Mail:
info@nebraskastarparty.org

OAS
www.OmahaAstro.com

Hyde Observatory
www.hydeobservatory.info

Panhandle Astronomy Club
Panhandleastronomyclub.com

PAC-LIST: You may subscribe to the PAC listserv by sending an e-mail message to: imailsrv@prairieastronomyclub.org. In the body of the message, write "Subscribe PAC-List your-email-address@your-domain.com"

For example:
Subscribe pac-list me@myISP.com

To post messages to the list, send to the address

pac-list@prairieastronomyclub.org

PAC can also be found on Twitter and Facebook.

Buy club apparel through the club website. Shirts, hats, mugs, mouse pads and more.

July/August Observing: What to View--Jim Kvasnicka

Planets

Mars and Saturn: Mars passes between Saturn and Spica low in the WSW at dusk before mid-month. Both are less than 20º high.

Jupiter: Rises around 2 am to start August and two hours earlier at the end.

Venus: Rises around 3 am for all of August.

Mercury: Rises about 1½ hours before the Sun. After August 10th it reaches magnitude zero. Look for Mercury to the lower left of bright Venus.

Uranus and Neptune: In Cetus and Aquarius.

Meteor Showers

The Perseids: They reach their peak the night of August 11-12, a Saturday night and Sunday morning. The waning crescent Moon rises around 2 am.

Messier List

M6/M7: Open clusters in Scorpius.
M8: The Lagoon Nebula in Sagittarius.
M9/M10/M12: Class VIII, VII, and IX globular clusters in Ophiuchus.
M19/M62/M107: Class VIII, IV, and X globular clusters in Ophiuchus.
M20: The Trifid Nebula in Sagittarius.
M21/M23: Open clusters in Sagittarius.
Last Month: M3, M4, M5, M53, M68, M80, M83
Next Month: M13, M14, M22, M28, M54, M69, M70, M92

NGC and Other Deep Sky Objects

NGC 6818: The Little Gem, planetary nebula in Sagittarius.
B86: The Ink Spot, dark nebula in Sagittarius.
NGC 6755: Open cluster in Aquila.
NGC 6781: Planetary nebula in Aquila.

Double Star Club List

Struve 2404: Close orange pair in Aquila.

57 Aquilae: Two white stars.

Beta Cygni: Albireo, yellow primary with a blue secondary.

31 Cygni: Yellow and blue pair.

61 Cygni: Orange pair.

Epsilon Lyrae: The Double Double.

Zeta Lyrae: A pair of yellow stars.

Beta Lyrae: Shellak, yellow primary with multiple white stars.

Focus on Observing Clubs

Open Cluster Observing Program

The purpose of the Open Cluster Program is not just observation of the selected open clusters, but the ability to classify them based on the Trumpler classification system. Trumpler identified three features in an open cluster.

Degree of Concentration

I. Detached clusters with strong central concentration.
II. Detached clusters with little central concentration.
III. Detached clusters with no noticeable concentration.
IV. Clusters not well detached, but has a strong field concentration.

Range of Brightness

1. Most of the cluster stars are nearly the same brightness.
2. A medium range of brightness between the stars in the cluster.
3. Cluster is composed of faint and bright stars.

Number of Stars in Cluster

a. Poor clusters with less than 50 stars.
b. Medium clusters with 50 – 100 stars.
c. Rich clusters with over 100 stars.

Some clusters may be surrounded by nebulosity. Trumpler noted these clusters with an "n" at the end of the classification.

There are two levels of programs in the Open Cluster Program.

Basic Program

- Observe any 100 of the 125 open clusters on the list.
- Sketch any 25 of the 100 clusters you observe.
- Classify all 100 using the Trumpler classification system.

Advanced Program

- Observe all 125 open clusters on the list.
- Sketch any 50 of the 125 clusters.
- Classify all 125 using the Trumpler classification system.

Any observing technique may be used to find the clusters including GO-TO. If you choose to do the Advanced program a 15 inch telescope will be required to see some of the clusters.

If you have any questions regarding the Open Cluster Program or need help getting started in any observing program please ask me and I will be glad to assist you.

Open Cluster Observing Program Awardees from PAC

No PAC members have completed the Open Cluster Program.

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.

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 telescope contact **Jason Noelle.** If you keep a scope for more than a week, please check in with Jason 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

Program Chair Minute - Dave Churilla

For those of you who missed it, the June Meeting was fantastic. We had the PAC June BBQ with smoked meat from Bob Kacvinsky. The meat was tremendous and I think everyone had a great time visiting with each other. A HUGE thanks go out to Bob Kacvinsky and Jim Kvasnicka for tall their work and efforts in putting on the BBQ. Without them it just wouldn't be possible.

I also hope that all of you enjoy the social time that we've tried to build into our meetings and of course in our BBQ Social, the Solar Star Party and the Holiday Social. We've sort of mandated that programs stay within a 20 to 30 minute framework (30 -40 minutes for outside guests) to allow for people to still visit afterward. One of the biggest enjoyments I get out of the club is having met so many great people to talk to. But we seem to rarely have the time to do that. So we decided to build that into our meetings every week.

This month's PAC Meeting will be on Tuesday, July 31. The program for this meeting will be a recap (hopefully pictorially) of the Nebraska Star Party (NSP). If you're going please contact Jason Noelle to get him your pics so he can put them into a slideshow everyone can enjoy as this month's program. You can contact Jason at by emailing him at: jason.noelle@gmail.com

I think it will be fun to see what went on at NSP.

Upcoming programs:

Aug 2012: ***Space Update*** Jason Noelle will give a program – subject yet to be determined.

Sep 2012: ***Fun With Astronomy*** The PAC Executive Board will put together a short collection of fun, humorous clips about space and astronomy. You don't want to miss the fun.

Oct 2012: ***Computer Astronomy*** This one is still tentative. Brian Sivill is considering giving a program on computer astronomy. Just what that entails – well, you'll have to wait for the trailers☺.

I'll try to keep you apprised of upcoming programs so you can plan to attend.

Challenge Observing Objects for July/August

Each month I will have two objects, one for the more seasoned observer and one for the beginning observer. Each object I hope will challenge you just a little bit. I will provide you with a little bit of information about the object. It is your job to find it and if you would write a little report or draw what you see. The first person to report back on each object will have their report published in the next issue of the newsletter. Happy Hunting!

Advanced Object

NGC 6522 and NGC 6528

These two globular clusters are in the constellation Sagittarius. They are separated by only 16 arcminutes. The have an estimated age of 12 billion years and lie approximately 25,000 light years from Earth.

Image credit of the Stardust Observatory, Baguio, Philippines

Beginner Object

NGC 7000

Also known as the North American Nebula, this emission nebula is fairly easy to locate in Cygnus. It has a listed magnitude of 4 but since the nebula is spread out over a large area it is a lot dimmer than you might think. Can be seen with a UHC filter with the naked eye. The Pelican Nebula sits just off the east coast.

Image Credit: Gregg L. Ruppel

NASA's Car-Sized Rover Nears Daring Landing On Mars

Sciencedaily.com

NASA's most advanced planetary rover is on a precise course for an early August landing beside a Martian mountain to begin two years of unprecedented scientific detective work. However, getting the Curiosity rover to the surface of Mars will not be easy. "The Curiosity landing is the hardest NASA mission ever attempted in the history of robotic planetary exploration," said John Grunsfeld, associate administrator for NASA's Science Mission Directorate, at NASA Headquarters in Washington. "While the challenge is great, the team's skill and determination give me high confidence in a successful landing."

The Mars Science Laboratory mission is a precursor for future human missions to Mars. President Obama has set a challenge to reach the Red Planet in the 2030s. To achieve the precision needed for landing safely inside Gale Crater, the spacecraft will fly like a wing in the upper atmosphere instead of dropping like a rock. To land the 1-ton rover, an airbag method used on previous Mars rovers will not work. Mission engineers at NASA's Jet Propulsion Laboratory in Pasadena, Calif., designed a "sky crane" method for the final several seconds of the flight. A backpack with retro-rockets controlling descent speed will lower the rover on three nylon cords just before touchdown. During a critical period lasting only about seven minutes, the Mars Science Laboratory spacecraft carrying Curiosity must decelerate from about 13,200 mph (about 5,900 meters per second) to allow the rover to land on the surface at about 1.7 mph (three-fourths of a meter per second). Curiosity is scheduled to land at approximately 10:31 p.m. PDT on Aug. 5 (1:31 a.m. EDT on Aug. 6). "Those seven minutes are the most challenging part of this entire mission," said Pete Theisinger, the mission's project manager at JPL. "For the landing to succeed, hundreds of events will need to go right, many with split-second timing and all controlled autonomously by the spacecraft. We've done all we can think of to succeed. We expect to get Curiosity safely onto the ground, but there is no guarantee. The risks are real."

During the initial weeks after the actual landing, JPL mission controllers will put the rover through a series of checkouts and activities to characterize its performance on Mars, while gradually ramping up scientific investigations. Curiosity then will begin investigating whether an area with a wet history inside Mars' Gale Crater ever has offered an environment favorable for microbial life. "Earlier missions have found that ancient Mars had wet environments," said Michael Meyer, lead scientist for NASA's Mars Program at NASA Headquarters. "Curiosity takes us the next logical step in understanding the potential for life on Mars." Curiosity will use tools on a robotic arm to deliver samples from Martian rocks and soils into laboratory instruments inside the rover that can reveal chemical and mineral composition. A laser instrument will use its beam to induce a spark on a target and read the spark's spectrum of light to identify chemical elements in the target. Other instruments on the car-sized rover will examine the surrounding environment from a distance or by direct touch with the arm. The rover will check for the basic chemical ingredients for life and for evidence about energy available for life. It also will assess factors that could be hazardous for life, such as the radiation environment "For its ambitious goals, this mission needs a great landing site and a big payload," said Doug McCuistion, director of the Mars Exploration Program at NASA Headquarters. "During the descent through the atmosphere, the mission will rely on bold techniques enabling use of a smaller target area and a heavier robot on the ground than were possible for any previous Mars mission. Those techniques also advance us toward human-crew Mars missions, which will need even more precise targeting and heavier landers."

The chosen landing site is beside a mountain informally called Mount Sharp. The mission's prime destination lies on the slope of the mountain. Driving there from the landing site may take many months. "Be patient about the drive. It will be well worth the wait and we are apt to find some targets of interest on the way," said John Grotzinger, MSL project scientist at the California Institute of Technology in Pasadena. "When we get to the lower layers in Mount Sharp, we'll read them like chapters in a book about changing environmental conditions when Mars was wetter than it is today." In collaboration with Microsoft Corp., a new outreach game was unveiled Monday to give the public a sense of the challenge and adventure of landing in a precise location on the surface. Called "Mars Rover Landing," the game is an immersive experience for the Xbox 360 home entertainment console that allows users to take control of their own spacecraft and face the extreme challenges of landing a rover on Mars.

"Technology is making it possible for the public to participate in exploration as it never has before," said Michelle Viotti, JPL's Mars public engagement manager. "Because Mars exploration is fundamentally a shared human endeavor, we want everyone around the globe to have the most immersive experience possible."

New Findings Expand Apollo Observations of Lunar Atmosphere

Sciencedaily.com

In December 1972 the astronauts of Apollo 17 -- the last manned mission to the moon -- deployed the Lunar Atmospheric Composition Experiment (LACE), a spectrometer designed to measure and characterize the thin lunar atmosphere. Forty years later, Stern et al. built upon those initial measurements, providing the first remotely-sensed measurement of the Moon's gaseous environment from lunar orbit.

Using the Lyman Alpha Mapping Project's (LAMP's) far ultraviolet spectrograph aboard the Lunar Reconnaissance Orbiter, the authors determined the atmospheric concentration of helium.

By angling LAMP's sensors towards the lunar limb and comparing those observations against measurements of the interstellar background, the authors were able to estimate the helium concentration of the near-surface lunar environment. They calculate a density of 7,000 atoms per cubic centimeter at 120 degrees Kelvin (-244 degrees Fahrenheit), the assumed atmospheric temperature. The previous LACE observations ranged between 10,000 -- 20,000 and 50,000 atoms per cubic centimeter depending on the time of day, increasing at nighttime and decreasing during the day. The nighttime decrease occurs because the atmosphere cools and contracts, yielding an increased density.

The authors suggest that the next steps should involve looking for spatial or temporal variations in lunar atmospheric helium. Such observations could help to determine whether the helium is produced locally by radioactive decay of lunar material or if it is formed from trapped and neutralized solar wind.

The Lunar Atmospheric Composition Experiment was deployed on Apollo 17. It was a mass spectrometer that measured the composition of the lunar atmosphere. On earlier missions, only the total abundance of the lunar atmosphere was measured by the Cold Cathode Gauge. The three primary gases in the lunar atmosphere are neon, helium, and hydrogen, in roughly equal amounts. Small amounts of methane, carbon dioxide, ammonia, and water were also detected. In addition, argon-40 was detected, and its abundance increased at times of high seismic activity. Argon-40 is produced by the radioactive decay of potassium-40 in the lunar interior, and the seismic activity may have allowed escape of argon from the interior to the surface along newly created fractures.

Image Credit: Lunar and Planetary Institute

THE *Prairie Astronomy Club*

Amateur Astronomy --
A Hobby as Big as the Universe

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: **Jason Noelle at jason.noelle@gmail.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.

FIRST CLASS MAIL

Next PAC Meeting
Tuesday
August 28, 2012
7:30 PM
Hyde Observatory