# The Prairie Astronomer

October, 2012 Volume 53, Issue #10

The Official Newsletter of the Prairie Astronomy Club


October Program

## Computer Astronomy

**Presented by PAC Member Brian Sivill**

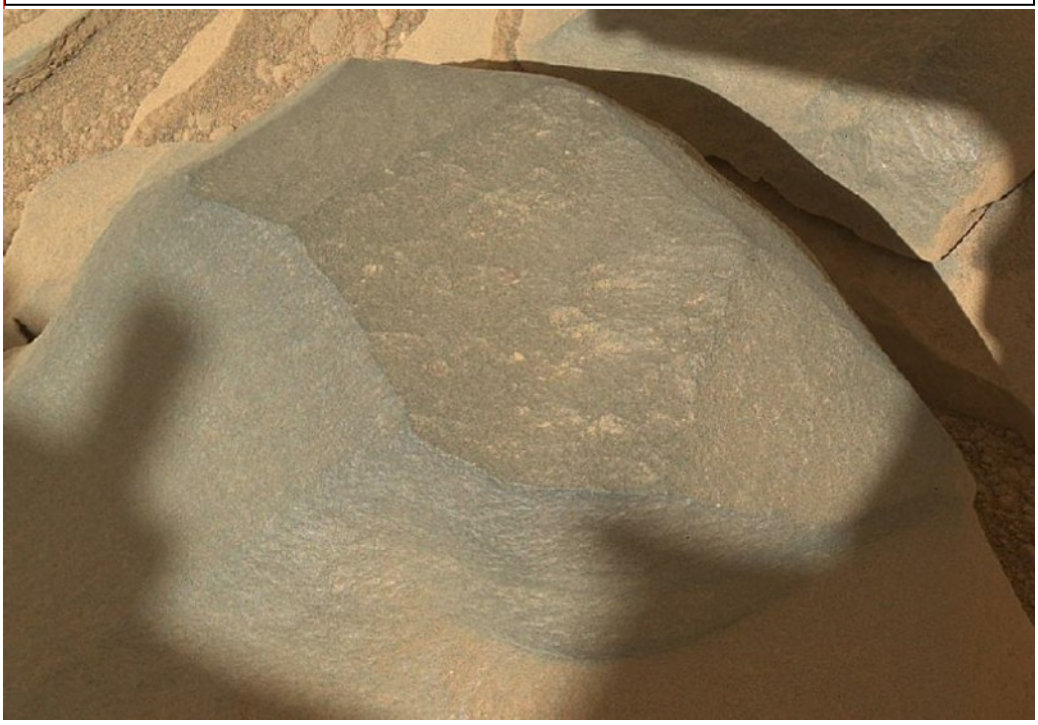
In This Issue:



NASA's Mars rover Curiosity held its Mars Hand Lens Imager (MAHLI) camera about 10.5 inches (27 centimeters) away from the top of a rock called "Bathurst Inlet" for a set of eight images combined into this merged-focus view of the rock. This context image covers an area roughly 6.5 inches by 5 inches (16 centimeters by 12 centimeters). Resolution is about 105 microns per pixel. The Bathurst Inlet rock is dark gray and appears to be so fine-grained that MAHLI cannot resolve grains or crystals in it. This means that the grains or crystals, if there are any at all, are smaller than about 80 microns in size. Some windblown sand-sized grains or dust aggregates have accumulated on the surface of the rock but this surface is clean compared to, for example, the pebbly substrate below the rock (upper left and lower right in this context image).

*Image credit: NASA/JPL-Caltech/Malin Space Science Systems*

Featured Photo



# The Bad Astronomer Fact of the Month

**Why is Uranus tipped on its side?**

One of the enduring mysteries of our solar system is why Uranus is tilted over on its side. If you measure the angle of a planet's rotation axis (the location of its north pole) compared to the plane of its orbit, you find that all the planets in the solar system are tipped. Jupiter is only 3°, but Earth is at a healthy 23° angle; Mars is too. Venus is tipped so far over it's essentially upside-down (we know this because it spins the wrong way).

Uranus, weirdly, is at 98°, like it's rolling around the outer solar system on its side. The best guess is that it got hit hard by something planet-sized long ago, knocking it over (though there are other, more speculative, ideas). The problem with that is that its moons and rings all orbit around its equator, meaning their orbital planes are tipped as well. It's hard to see how that might have happened, even if you assume the moons formed in that collision (as, apparently, our Moon formed in an ancient grazing impact with Earth by a Mars-sized body).

Well, a team of astronomers have come up with a new idea: maybe Uranus wasn't hit by one big object. Maybe it was hit by two smaller ones. It would've happened when the planet was still forming, and surrounded by a disk of leftover material that was in the process of forming its moons. A proto-planet could've hit it, knocking it over somewhat, and sending up a vast cloud of debris that puffed the disk up into a torus (that's what us scientist-types call a donut). A second collision some time later would've completed the task. After more time elapsed things settled down and Uranus would've been rotating sideways, and the torus would've flattened back into a disk aligned with Uranus' equator due to tidal forces.

It's an interesting, if surprising idea. If there were only one collision at that time, the astronomers found the dynamics would've made the moons orbit the planet the wrong way (retrograde, against the spin of the planet). It would've taken a second hit to add enough momentum to the debris disk to get the moons orbiting prograde. I wonder if this would also somehow explain the weird magnetic field of Uranus. It's not aligned at all with the rotation axis, and is even off-center from the core of the planet! It's unclear why this might be, though it may have to do with Uranus being an ice giant (PDF), with a different composition and structure than Jupiter and Saturn, the two gas giants. I'll note Earth's magnetic field isn't well aligned with our spin axis either, but at least it has the courtesy to be centered on the center of our planet! One idea I've seen is that the magnetic field of Uranus isn't generated in its core, like ours is (or, to be more accurate, in the outer layer of our core — this stuff gets complicated pretty quickly), but might be created higher up in the interior. Clearly, there's a lot left to figure out here.

All of these things are clues to Uranus' origin and evolution, its history. The characteristics we see today had some cause, and by piecing all this together we can, perhaps, understand the story of this giant planet. And we need to sometimes entertain unusual ideas — as long as the science supports them — because if there's one thing that's usual about the bodies inhabiting the solar system, it's that they're unusual.

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

# Club Events

Newsletter submission deadline November 15, 2012

PAC Meeting
Tuesday October 30, 2012 @Hyde Observatory
Computer Astronomy

PAC Meeting
Tuesday November 27, 2012 @Hyde Observatory
How To Buy a Telescope

PAC Meeting
December - Holiday Social

**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.**

# October/November Observing: What to View--Jim Kvasnicka

## Planets

Venus and Saturn: The two are within 4º of each other from November 23-30 and are less than 1º apart on November 26th and 27th. The rings of Saturn are 18º from edge on.

Mercury: By the end of November look for Mercury to the lower left of Venus.

Mars: Look for it 10º high in the southwest just to the right of the Teapot of Sagittarius.

Jupiter: Jupiter will be high in the sky mid to late evening all month long. It will increase in brightness to -2.8 and its disk will increase to 48".

Uranus and Neptune: In Pisces and Aquarius.

## Meteor Showers

Leonids: Peaks predawn on the 17th of November. You can expect up to 20 per hour.

## Messier List

M27: The Dumbbell Nebula in Vulpecula.
M30: Class V globular cluster in Capricornus.
M56: Class X globular cluster in Lyra.
M57: The Ring Nebula in Lyra.
M71: Class XII globular cluster in Sagitta.
M72: Class IX globular cluster in Aquarius.
M73: Y shaped asterism in Aquarius.
Last Month: M11, M16, M17, M18, M24, M25, M26, M55, M75
Next Month: M2, M15, M29, M31, M32, M39, M110

## NGC and Other Deep Sky Objects

NGC 253: The Silver Coin Galaxy in Sculptor.
NGC 288: Class X globular cluster in Sculptor.
NGC 457: The E.T. Cluster in Cassiopeia.
NGC 7662: The Blue Snowball in Andromeda.

## Double Star Club List

Iota Trianguli: Yellow primary with a pale blue secondary.

Gamma Arietis: Two equal white stars.

Lambda Arietis: Yellow and pale blue stars.

65 Piscium: Equal pair of yellow stars.

Psi 1 Piscium: Equal bluish white pair.

Zeta Piscium: White and yellow pair.

Alpha Piscium: Alrisha, close white stars.

Gamma Andromedae: Almach, yellow and blue pair.

# Focus on Observing Clubs

Like the Messier Program the Caldwell Program consists of various deep sky objects to observe. Sir Patrick Caldwell-Moore has put together a list of 109 beautiful and interesting objects to go out of your way to observe.

The 109 objects on the Caldwell list range from magnitude 1 through 13, and Declination +85º to -80º. To observe all 109 objects will require some travel.

The Caldwell Program has been broken into two award categories: 70 objects, and the complete list of 109 objects. The 70 object award includes the objects that can be seen from northern latitudes. The 70 object award will count towards the Master Observer Award.

**Caldwell List of 70 Objects by Type**
Open Cluster – 14 objects
Globular Cluster – 4 objects
Planetary Nebula – 10 objects
Bright Nebula – 10 objects
Galaxies – 32 objects

A detailed list of the Caldwell Objects can be downloaded from the Astronomical League website.

To qualify for a Caldwell Award you must observe and record your observations. Your observations should include a detailed description of the object and a drawing if you want to include one. A photo or CCD image may be added but cannot replace the visual observation. The objects must be located manually, no GO-TO or PUSH-TO are allowed. Once you complete the Caldwell Program you will need to submit your observing logs to me for review. I will forward them to the Caldwell Program chair for approval. Once I receive your certificate and pin I will present them to you at the next PAC meeting.

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

**Caldwell Program Awardees from PAC**
No PAC members have completed the Caldwell 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

This month's PAC Meeting will be on Tuesday, October 30th.

The October PAC Meeting Program will be Computer Astronomy by Brian Sivill. Brian will give a program about different things one can get involved in on the internet concerning astronomy. Brian has been with the club for over 15 years and involved with the hobby of astronomy for over 30 years. Not only do I think this will be an interesting topic, Brian is a very dynamic speaker (no pressure there, huh Brian) as well as very entertaining. I think this will be a very interesting evening. Of course we'll also have a report from the world's best program chair, Jim Kvasnicka.

Hope to see everyone at the meeting.

***Upcoming programs:***

**Nov 2012**: ***How to Buy a Telescope (Club Members)*** - This will be our Learn to Buy a Telescope Program for the public. More later.

**Dec 2012**: ***PAC Holiday Social*** - No public meeting (Club Holiday Get-Together). More later.

**Jan 2013:** ***How to Use a Your Telescope (Club Members)*** - This is the follow up to the November Meeting. So if you received a telescope for Christmas or have one laying around your house, bring it to the meeting and let us help you become familiar with it.

# Challenge Observing Objects for October/November

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 467/470/474

This group of galaxies is also known as the Pisces Galaxy Trio and is located at distance of about 100 million light-years. NGC 467 and NGC 474 are prominent examples of shell galaxies, with complex shell-like structures created by gravitational interactions with neighboring galaxies. Their magnitudes are 12.1, 11.7, and 11.3.

*Image Credit: Alson Wong*

## Beginner Object

### NGC 7293

Commonly called the Helix Nebula, this planetary nebula is one of the nearest and brightest in the sky. It sits about 600 light years from Earth and has a total visual magnitude of 7.3. That may seem bright but its light is spread out over an area about half the angular diameter of the moon. It is best to observe this under low power and a wide field of view.

*Image Credit: NASA, ESA, C.R. O'Dell (Vanderbilt University), M. Meixner and P. McCullough (STScI)*

## Keck Observations Bring Weather of Uranus Into Sharp Focus

Sciencedaily.com

In 1986, when Voyager swept past Uranus, the probe's portraits of the planet were "notoriously bland," disappointing scientists, yielding few new details of the planet and its atmosphere, and giving it a reputation as a bore of the solar system. Now, however, thanks to a new technique applied at the Keck Observatory, Uranus is coming into sharp focus through high-resolution infrared images, revealing in incredible detail the bizarre weather of the seventh planet from the sun.

The images were released in Reno, Nev. Oct. 17, 2012, at a meeting of the American Astronomical Society's Division of Planetary Sciences and provide the best look to date of Uranus's complex and enigmatic weather.

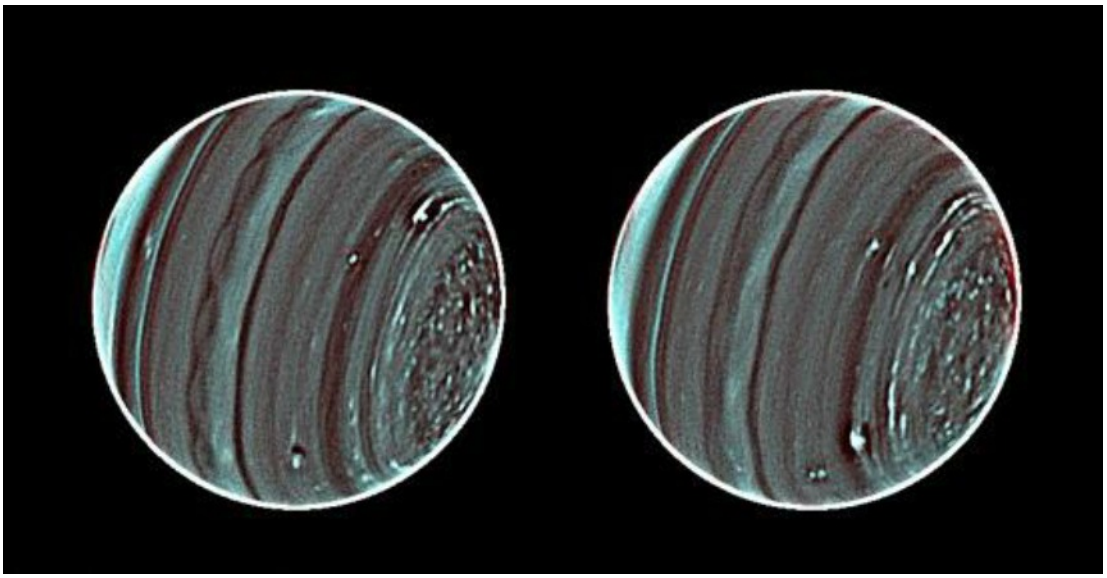
The planet's deep blue-green atmosphere is thick with hydrogen, helium and methane, Uranus's primary condensable gas. Winds blow mainly east to west at speeds up to 560 miles per hour, in spite of the small amounts of energy available to drive them. Its atmosphere is almost equal to Neptune's as the coldest in our solar system with cloud-top temperatures in the minus 360-degree Fahrenheit range, cold enough to freeze methane. Large weather systems, which are probably much less violent than the storms we know on Earth, behave in bizarre ways on Uranus, explains Larry Sromovsky, a University of Wisconsin-Madison planetary scientist who led the new study using the Keck II telescope. "Some of these weather systems," Sromovsky notes, "stay at fixed latitudes and undergo large variations in activity. Others are seen to drift toward the planet's equator while undergoing great changes in size and shape. Better measures of the wind fields that surround these massive weather systems are the key to unraveling their mysteries."

To get a better picture of atmospheric flow on Uranus, Sromovsky and colleagues Pat Fry, also of UW-Madison, Heidi Hammel of the Association of Universities for Research in Astronomy (AURA), and Imke de Pater of the University of California at Berkeley, used new infrared techniques to detect smaller, more widely distributed weather features whose movements can help scientists trace the planet's pattern of blustery winds. "We're seeing some new things that before were buried in the noise," says Sromovsky, a senior staff scientist at UW-Madison's Space Science and Engineering Center. "My first reaction to these images was 'wow' and then my second reaction was WOW," says AURA's Heidi Hammel, a co-investigator on the new observations and an expert on the atmospheres of the solar system's outer planets. "These images reveal an astonishing amount of complexity in Uranus's atmosphere. We knew the planet was active, but until now much of the activity was masked by noise in our data."

The complexity of Uranus's weather is puzzling, Sromovsky explains. The primary driving mechanism must be solar energy because there is no detectable internal energy source. "But the sun is 900 times weaker there than on Earth because it is 30 times further from the sun, so you don't have the same intensity of solar energy driving the system," explains Sromovsky. "Thus the atmosphere of Uranus must operate as a very efficient machine with very little dissipation. Yet the weather variations we see seem to defy that requirement."

The new Keck II pictures of the planet, according to Sromovsky, are the "most richly detailed views of Uranus yet obtained by any instrument on any observatory. No other telescope could come close to producing this result."

Sromovsky and his colleagues used Keck II, located on the summit of Hawaii's 14,000-foot extinct volcano Mauna Kea, to capture a series of images that, when combined, help increase the signal to noise ratio and thus tease out weather features that are otherwise obscured. In two nights of observing under superb conditions, Sromovsky's group was able to obtain exposures of the planet that provide a clear view of the planet's cloudy features, including several new to science. The group used two different filters in an effort to characterize cloud features at different altitudes.



*A paired picture of Uranus, the sharpest, most detailed picture of the distant planet to date, reveals a raft of new details about the planet's enigmatic atmosphere. The north pole of Uranus (to the right in the picture) is characterized by a swarm of storm-like convective features, and an unusual scalloped pattern of clouds encircles the planet's equator. The infrared image was taken using the Keck II telescope in Hawaii. (Credit: Lawrence Sromovsky, Pat Fry, Heidi Hammel, Imke de Pater)*

"The main objective was to find a larger number of cloud features by detecting those that were previously too subtle to be seen, so we could better define atmospheric motions," Sromovsky notes. New features found by the Wisconsin group include a scalloped band of clouds just south of Uranus's equator and a swarm of small convective features in the north polar regions of the planet, features that have never been seen in the southern polar regions. "This is a very asymmetric situation," says the Wisconsin scientist. "There is certainly something different going on in those two polar regions."

One possible explanation, is that methane is pushed north by an atmospheric conveyor belt toward the pole where it wells up to form the convective features observed by Sromovsky's group. "The 'popcorn' appearance of Uranus's pole reminds me very much of a Cassini image of Saturn," adds de Pater. Saturn's South Pole is characterized by a polar vortex or hurricane surrounded by numerous small cloud features indicative of strong convection, analogous to the heavily precipitating clouds encircling the eye of terrestrial hurricanes, she notes. Her group suggested a similar phenomenon would be present on Neptune, based upon Keck observations of that planet. "Perhaps we will also see a vortex at Uranus's pole when it comes into view," she says. The phenomena may be seasonal, Sromovsky notes, but the group has so far been unable to establish a clear seasonal trend in the winds of Uranus. Uranus is changing," he says. "We don't expect things at the north pole to stay the way they are now." The scalloped band of clouds near the planet's equator may indicate atmospheric instability or wind shear: "This is new and we don't fully understand what it means. We haven't seen it anywhere else on Uranus."

# 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**
**November 27, 2012**
**7:30 PM**
**Hyde Observatory**