The Prairie Astronomer

August 2016 Volume 57, Issue #8

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Night Sky Network

The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

NEXT PAC MEETING: August 30, 7:30pm

At Hyde Observatory

PROGRAM

August: NSP Review and “Adventures in Astrophotography” by Mark Dahmke. Google Earth and other software tools and websites make it relatively easy to plan and execute photo shoots of terrestrial subjects with the Moon or other celestial objects. Mark will show how to go find targets of opportunity and will also offer some tips on equipment and proper exposure to help you shoot great astro photos.

FUTURE PROGRAMS

September: Rick Johnson’s Astrophotography

October: Club viewing night

November: How to Buy a Telescope

December: PAC Holiday Gathering, “The Thirty Meter Telescope” by Larry Stepp

Buy the book! The Prairie Astronomy Club: Fifty Years of Amateur Astronomy.
Order online from Amazon or lulu.com.

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Tuesday August 30, 2016, 7:30pm
Hyde Observatory

PAC Meeting
Tuesday September 27th, 2016, 7:30pm
Hyde Observatory

PAC Meeting
Tuesday October 25th, 2016, 7:30pm
Hyde Observatory

Newsletter submission deadline September 17

2016 STAR PARTY DATES

Photo by Brian Sivill

	Star Party Date	Star Party Date	Lunar Party Date
January	Jan 1st	**Jan 8th**	
February	Jan 29th	**Feb 5th**	
March	Mar 4th	**Mar 11th**	
April	Apr 1st	**Apr 8th**	Apr 15th
May	Apr 29th	**May 6th**	May 13th
June	May 27th	**Jun 3rd**	
July	**Jul 1st**	Jul 8th	
NSP	**July 31st - Aug 5th**		
August	Jul 29th	**Aug 5th**	Aug 12th
August	Aug 26th	**Sep 2nd**	Sep 9th
September	Sep 23rd	**Sep 30th**	
October	Oct 21st	**Oct 28th**	
November	Nov 25th	**Dec 2nd**	
December	Dec 23rd	**Dec 30th**	

PAC E-MAIL:

info@prairieastronomyclub.org

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ADDRESS

The Prairie Astronomer
c/o The Prairie Astronomy Club, Inc.
P.O. Box 5585
Lincoln, NE 68505-0585

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Night Sky Network

Boller-Sivill Observatory - Construction Update

Brian Sivill and Brett Boller

Forward progress continues on the Boller-Sivill Observatory.

Construction had been delayed a few weeks due to the Nebraska Star Party as we focused our interests and efforts elsewhere.

Brett and I have been vetting a number of roof profile possibilities, and finally settled on a traditional low-slope center peak. We're trying to minimize the roof's outline and still maintain sufficient strength.

On August 13 we were able to construct roof truss work over the control room. We were aided considerably by Brett's friend, Curtis Johnson, who is a professional builder/framer. His expertise and advice was quite valuable and he quickly proved that he could do about as much work as Brett and I combined! Curtis gave us number of pointers and recommendations as he inspected the majority of the structure.

Sunday August 14, Brett, Bill Boller and I finished the remaining details on the control room's roof and proceeded to cover it with beautiful, shiny, red sheet metal.

Brett and Bill had found a great buy on sheet metal siding/roofing at an auction. Most of the sheet metal is white, which will serve as the building's siding. But there is enough red sheeting to cover our whole roof.... we think.

With a sporty new red roof on the control room, it’s nice to finally have a spot of shade somewhere on the structure. The Sun has been brutal the last few times we've been out.

This coming weekend, we expect to get the main outside door hung and finish up some sidewall sheathing details. Having doors and a roof on the control room will allow us to keep some tools and supplies onsite without fear of weather damage. This weekend we will also be concentrating on installing and levelling the steel rails for the rolling roof. Brett has some sample roller wheels we will be evaluating as well.

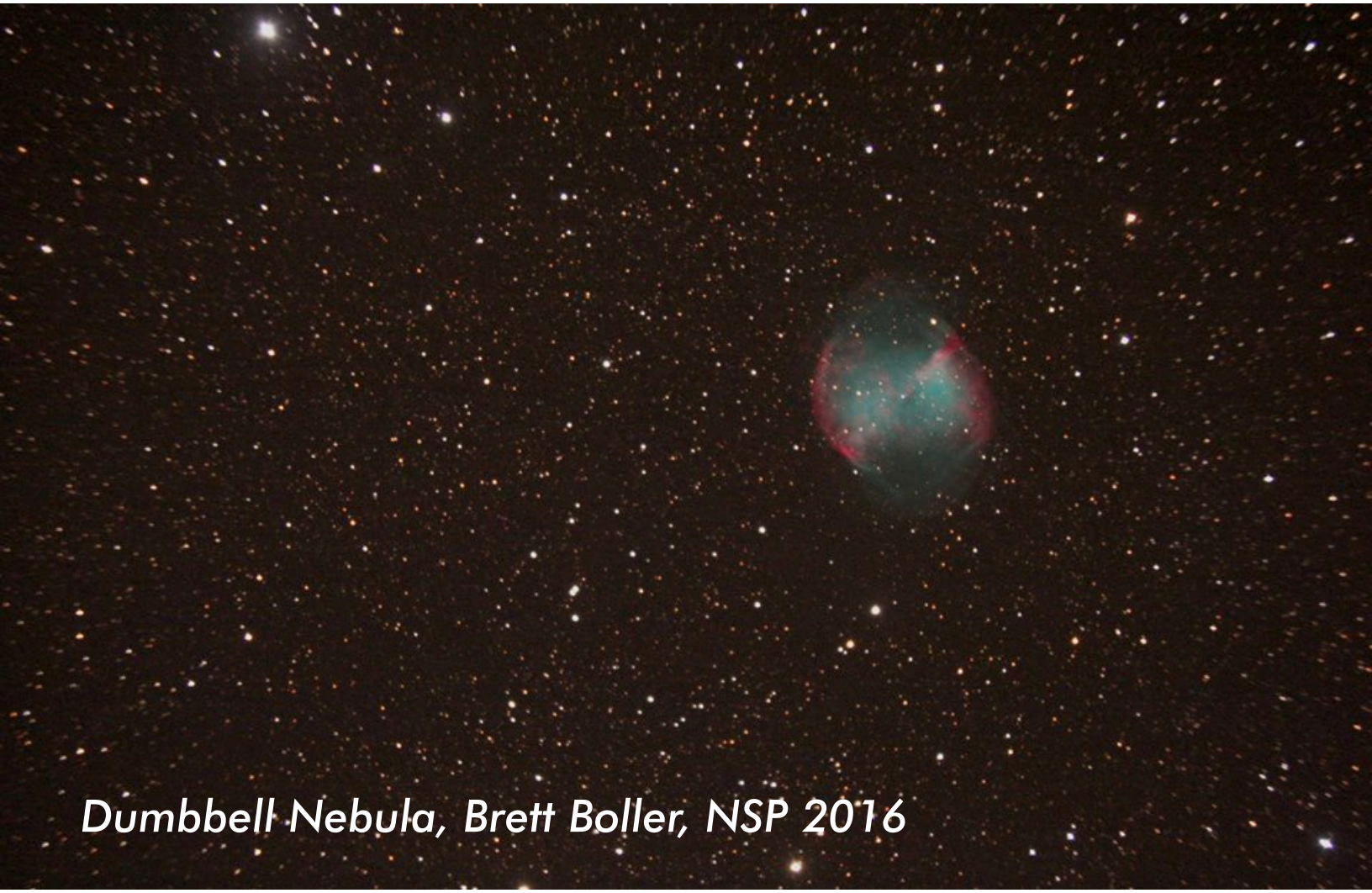
We're still making decisions on the rolling roof's truss design and evolving our electrical plan. In the coming weeks we hope to be able to announce a real, live, rolling roof! Once the roof can physically roll, we'll start working on a motor drive for it.

Parallel to our efforts, Michael Sibbernsen has drawn up a very reasonable Memo of Understanding between Branched Oak Observatory and Boller-Sivill Observatory regarding the use of the facility. The MOU helps Brett and I establish BSO as a facility focused primarily on amateur astrophotography, but will have a very important secondary function in providing public access to some of the instruments on a regular basis. It will be a multi-use facility.

PAC members take note - we still plan to partner formally with the Prairie Astronomy Club to insure that PAC members have a pathway to engage in astrophotography. We intend to support both inexperienced and advanced efforts!

- Brian Sivill, for Brian, Brett, BSO & BOO.

Using his drone, Brett has taken some incredible photos of the BSO at a number of altitudes.

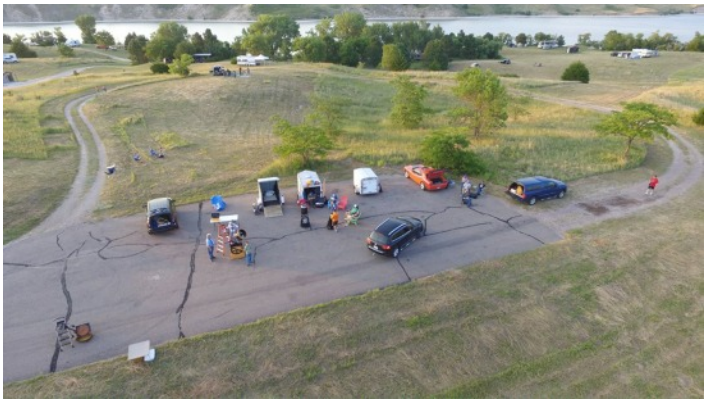


Dumbbell Nebula, Brett Boller, NSP 2016

The 22nd Nebraska Star Party

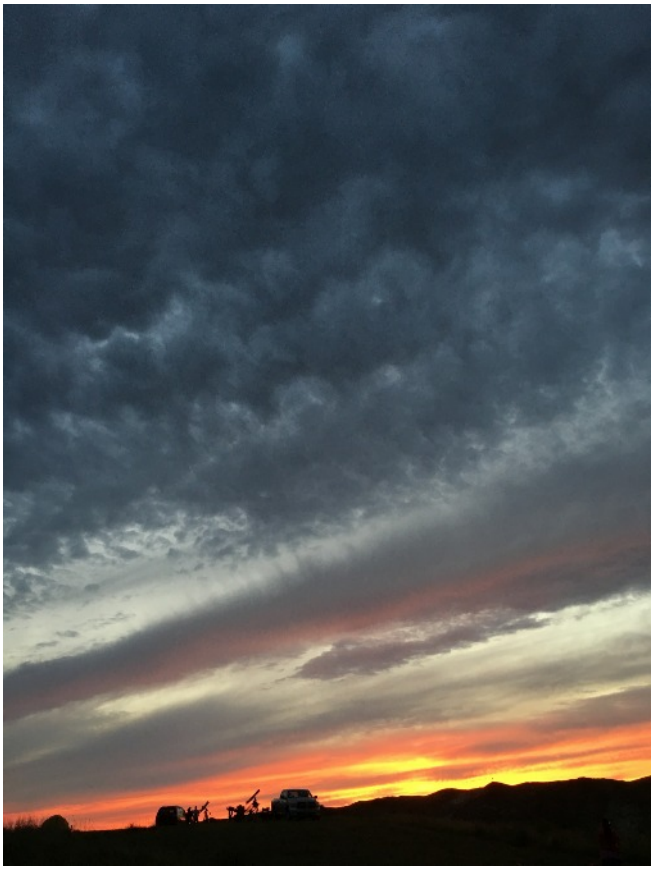
Eric Balcom. Photo by Brett Boller. Aerial photos by Brett Boller

Lexi at NSP, photo by Wendy Hind



Above: The cloud that ate NSP. Below: NSP sunrise. Bottom left: an NSP native.

Photos by John Reinert.



Above: The Knisely Nebula, by John Reinert.

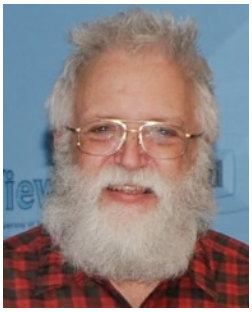
Below: Tuesday BBQ, by Mark Dahmke.

Above left: Eagle Nebula, right: star trails, Brett Boller, NSP 2016

Trifid Nebula, Brett Boller, NSP 2016

Observatory Update: NGC 2182, 2183 and 2185

Rick Johnson



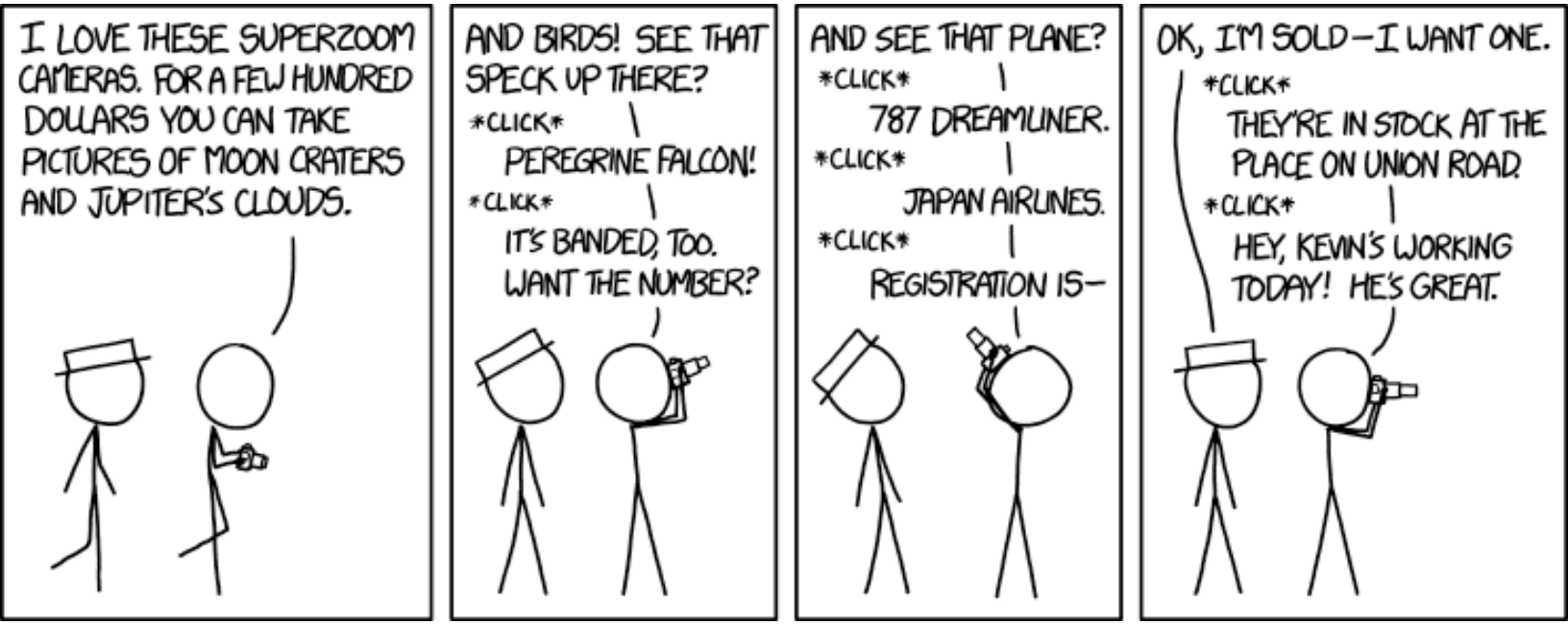
Still cleaning up here. No time to process anything new but I got lucky and found this one from 2012 on the hard drive that was never sent. It had identification issues so I suppose I was hoping to straighten them out (SIMBAD doesn't agree with the rest of the world). Now 4 years later the same SIMBAD issues remain other than their identification of 2183 used to point to the side of a tiny HII region and now points right at it. I did alter the annotated image accordingly.

NGC 2182, 2183 and 2185 are reflection nebulae in southeastern Monoceros. The area around the latter two is chock full of Young Stellar Objects and Herbig-Haro objects often associated with YSOs. Some of these probably account for the H alpha emission near NGC 2183. Most sources seem to agree as to where these are located but oddly SIMBAD has a problem with the last two. I wasn't going to make an annotated image but the odd identifications in SIMBAD changed my mind. The standard positions are noted with the labels NGC Project after the NGC number as they go with the common locations. SIMBAD however puts the center of NGC 2185 in the middle of nowhere. Maybe they consider the entire complex NGC 2185, I don't know why else they'd do this. While most sources put NGC 2183 around the 9th magnitude star GSC

4795:829 SIMBAD says this nebula is [RK68] 53. NGC 2183 is to the east at the position of a small HII region. In fact SIMBAD labels it as an HII region not a reflection nebula. NGC 2185 is placed by most sources as the nebula around the stars east of NGC 2183 rather than where SIMBAD puts it. The portion of the reflection nebula around GSC 4795:509 is also known as GN 06.08.7. I think it quite likely all these reflection nebula are caused by the same gas and dust cloud. We just see the reflection nebulae when there's a bright star behind them to illuminate them. The Sky shows the illuminating star for NGC 2182 to have a parallax of .0349" which puts it and therefore the nebula about 100 light-years away. Yet other sources say 2300 to 2700 light-years. Quite a discrepancy! The latter seem more reasonable given the angular size of the nebulae. So maybe some other star is illuminating NGC 2182 rather than the "obvious" one.

NGC 2182 was discovered by William Herschel on February 24, 1786 and is in the second Herschel 400 observing program. NGC 2183 was found by Bindon Stoney in 1850. NGC 2185 was discovered by William Herschel on October 16 1784. It is in the first Herschel 400 program. My entry for it on March 16, 1985 is rather confused. I don't know what I was on but it was apparently "good stuff". I used my 10" f/5 at 60 power (that eyepiece was a 40 degree eyepiece so if I centered NGC 2185 then NGC 2182 wouldn't even be in the field). Here's my confused entry: "With NGC 2183 and 2184 (2184 is far out of the field - did I mean 2182?). Each appears as a faint, less than 12th magnitude star with even fainter reflection nebula around it. 2183 and 85 seem to be touching. An interesting and unique sight!" Did I think that the two parts of 2185 were 2183 and 2185 and the real 2183 was 2184? I need a time machine to find out what I saw.

This image was taken February 10, 2012, processed on September 30, 2012 and the text file written but then was lost on the hard drive. Yet another run through of the drive turned it up. Every time I say I'm sure I have them all I am later proven wrong. Resting and cooling off after cutting more trees I was rummaging through the hard drive and came across it in the sent directory but I find no indication it was ever sent.



xkcd.com

Kepler Watches Stellar Dancers in the Pleiades Cluster

Like cosmic ballet dancers, the stars of the Pleiades cluster are spinning. But these celestial dancers are all twirling at different speeds. Astronomers have long wondered what determines the rotation rates of these stars.

By watching these stellar dancers, NASA's Kepler space telescope during its K2 mission has helped amass the most complete catalog of rotation periods for stars in a cluster. This information can help astronomers gain insight into where and how planets form around these stars, and how such stars evolve.

"We hope that by comparing our results to other star clusters, we will learn more about the relationship between a star's mass, its age, and even the history of its solar system," said Luisa Rebull, a research scientist at the Infrared Processing and Analysis Center at Caltech in Pasadena, California. She is the lead author of two new papers and a co-author on a third paper about these findings, all being published in the Astronomical Journal.

The Pleiades star cluster is one of the closest and most easily seen star clusters, residing just 445 light-years away from Earth, on average. At about 125 million years old, these stars -- known individually as Pleiads -- have reached stellar "young adulthood." In this stage of their lives, the stars are likely spinning the fastest they ever will.

As a typical star moves further along into adulthood, it loses some zip due to the copious emission of charged particles known as a stellar wind (in our solar system, we call this the solar wind). The charged particles are carried along the star's magnetic fields, which overall exerts a braking effect on the rotation rate of the star.

Rebull and colleagues sought to delve deeper into these dynamics of stellar spin with Kepler. Given its field of view on the sky, Kepler observed approximately 1,000 stellar members of the Pleiades over the course of 72 days. The telescope measured the rotation rates of more than 750 stars in the Pleiades, including about 500 of the lowest-mass, tiniest, and dimmest cluster members, whose rotations could not previously be detected from ground-based instruments.

Kepler measurements of starlight infer the spin rate of a star by picking up small changes in its brightness. These changes result from "starspots" which, like the more-familiar sunspots on our sun, form when magnetic field concentrations prevent the normal release of energy at a star's surface. The affected regions become cooler than their surroundings and appear dark in comparison.

As stars rotate, their starspots come in and out of Kepler's view, offering a way to determine spin rate. Unlike the tiny, sunspot blemishes on our middle-aged sun, starspots can be gargantuan in stars as young as those in the Pleiades because stellar youth is associated with greater turbulence and magnetic activity. These starspots trigger larger brightness decreases, and make spin rate measurements easier to obtain.

During its observations of the Pleiades, a clear pattern emerged in the data: More massive stars tended to rotate slowly, while less massive stars tended to rotate rapidly. The big-and-slow stars' periods ranged from one to as many as 11 Earth-days. Many low-mass stars, however, took less than a day to complete a pirouette. (For comparison, our sedate sun revolves fully just once every 26 days.) The population of slow-rotating stars includes some ranging from a bit larger, hotter and more massive than our sun, down to other stars that are somewhat smaller, cooler and less massive. On the far end, the fast-rotating, fleet-footed, lowest-mass stars possess as little as a tenth of our sun's mass.

"In the 'ballet' of the Pleiades, we see that slow rotators tend to be more massive, whereas the fastest rotators tend to be very light stars," said Rebull.

The main source of these differing spin rates is the

internal structure of the stars, Rebull and colleagues suggest. Larger stars have a huge core enveloped in a thin layer of stellar material undergoing a process called convection, familiar to us from the circular motion of boiling water. Small stars, on the other hand, consist almost entirely of convective, roiling regions. As stars mature, the braking mechanism from magnetic fields more easily slows the spin rate of the thin, outermost layer of big stars than the comparatively thick, turbulent bulk of small stars.

Thanks to the Pleiades' proximity, researchers think it should be possible to untangle the complex relationships between stars' spin rates and other stellar properties. Those stellar properties, in turn, can influence the climates and habitability of a star's hosted exoplanets. For instance, as spinning slows, so too does starspot generation, and the solar storms associated with starspots. Fewer solar storms means less intense, harmful radiation blasting into space and irradiating nearby planets and their potentially emerging biospheres.

"The Pleiades star cluster provides an anchor for theoretical models of stellar rotation going both directions, younger and older," said Rebull. "We still have a lot we want to learn about how, when and why stars slow their spin rates and hang up their 'dance shoes,' so to speak."

Rebull and colleagues are now analyzing K2 mission data from an older star cluster, Praesepe, popularly known as the Beehive Cluster, to further explore this phenomenon in stellar structure and evolution.

"We're really excited that K2 data of star clusters, such as the Pleiades, have provided astronomers with a bounty of new information and helped advance our knowledge of how stars rotate throughout their lives," said Steve Howell, project scientist for the K2 mission at NASA's Ames Research Center in Moffett Field, California.

The K2 mission's approach to studying stars employs the Kepler spacecraft's ability to precisely observe miniscule changes in starlight. Kepler's primary mission ended in 2013, but more exoplanet and astrophysics observations continue with the K2 mission, which began in 2014.

Ames manages the Kepler and K2 missions for NASA's Science Mission Directorate. NASA's Jet Propulsion Laboratory in Pasadena, California, managed Kepler mission development. Ball Aerospace & Technologies Corporation operates the flight system with support from the Laboratory for Atmospheric and Space Physics at the University of Colorado at Boulder.

This image shows the famous Pleiades cluster of stars as seen through the eyes of WISE, or NASA's Wide-field Infrared Survey Explorer.Image credit: NASA/JPL-Caltech/UCLA

September Observing: What to View

Jim Kvasnicka

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

Planets

Venus: Just a few degrees above the western horizon at magnitude -3.9.
Jupiter: To the lower right of Venus, it reaches superior conjunction on September 26th.
Mars: Dims in magnitude from -0.3 to 0.1. Mars passes 1.5° south of M8 on the 28th.
Saturn: Shines at magnitude 0.5 with its rings still tilted 26° from edge on.
Uranus / Neptune: In Pisces and Aquarius.

Messier List

M13: The Great Hercules Cluster, Class V globular cluster.
M14: Class VIII globular cluster in Ophiuchus.
M22: Class VII globular cluster in Sagittarius.
M28: Class IV globular cluster in Sagittarius.
M54: Class III globular cluster in Sagittarius.
M69: Class V globular cluster in Sagittarius.
M70: Class V globular cluster in Sagittarius.
M92: Class IV globular cluster in Hercules.

Last Month: M6, M7, M8, M9, M10, M12, M19, M20, M21, M23, M62, M107
Next Month: M11, M16, M17, M18, M24, M25, M26, M55, M75

NGC and other Deep Sky Objects

NGC 6826: Blinking Planetary in Cygnus.
NGC 6703: Crescent Nebula in Cygnus.
IC 5146: Cocoon Nebula and open cluster in Cygnus.
NGC 6960: Veil Nebula – Western Segment
NGC 6974/6978/Pickering's Triangular Wisp: Veil Nebula – Central Segment.
NGC 6992/6995: Veil Nebula – Eastern Segment.

Double Star Program List

Otto Struve 525: Yellow and blue pair in Lyra.
Gamma Delphinus: Yellow primary with a yellow-green secondary.
Zeta Aquarii: Yellow-white pair.
94 Aquarii: Yellow primary with a pale blue secondary.
Alpha Capricornus: Wide pair of yellow stars.
Beta Capricornus: Yellow primary with a blue secondary.
36 Ophiuchi: Equal pair of yellow-orange stars.
Omicron Ophiuchi: Yellow and light yellow pair.
70 Ophiuchi: Yellow and orange pair.

Challenge Object

NGC 7103 Area: Faint cluster of galaxies in Capricornus. NGC 7103 is the largest and brightest.

Focus on Constellations: Cygnus

Jim Kvasnicka

Cygnus

Cygnus, the Swan, is also know and the Northern Cross. The Swan's head id marked by the double star Albireo, and the tail by Deneb. The Swan seems to be flying SW down the Milky Way toward Aquila, the Eagle. Cygnus covers 804 square degrees and contains the most visually beautiful part of the northern Milky Way. Cygnus contains a number of individual objects that are pleasing to look at. Albireo is the most observed double star in the night sky. The North America and Veil Nebula are often photographed. Cygnus contains a number of planetary nebulae and open clusters. The constellation Cygnus is best seen in September.

Showpiece Objects

Planetary Nebulae: NGC 6826 (Blinking Planetary)
Open Clusters: M29, M39
SNREM: NGC 6960-92 (Veil Nebula)
Double Stars: Albireo, 18 Cygni, 61 Cygni

Mythology

Cygnus was identified with the Swan into which Jupiter turned himself when he wished to seduce Leda, the wife of Tyndareus, King of Sparta. From this union was born Pollux and Helen of Troy. Castor was fathers by Tyndareus, and was therefore, unlike Pollux, was not immortal.

Number of Objects Magnitude 12.0 and Brighter

Galaxies: 2
Globular Clusters: 0
Open Clusters: 28
Planetary Nebulae: 6
Dark Nebulae: 15
Bright Nebulae: 3
SNREM: 5

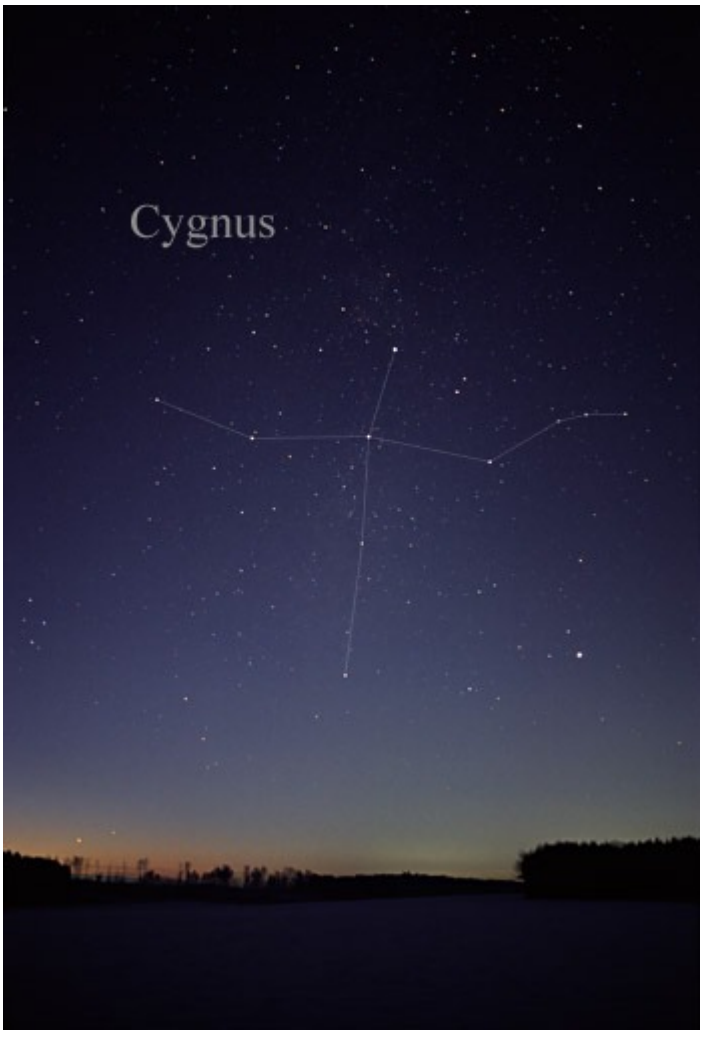


Photo: Till Credner - Own work: AlltheSky.com

The Great American Total Eclipse
August 21, 2017

Planning your eclipse trip? Take a look at Fred Espanak's presentation on YouTube:

https://www.youtube.com/watch?v=K4KnxE6yAuI

Did Cirrus Clouds Help Keep Early Mars Warm & Wet?

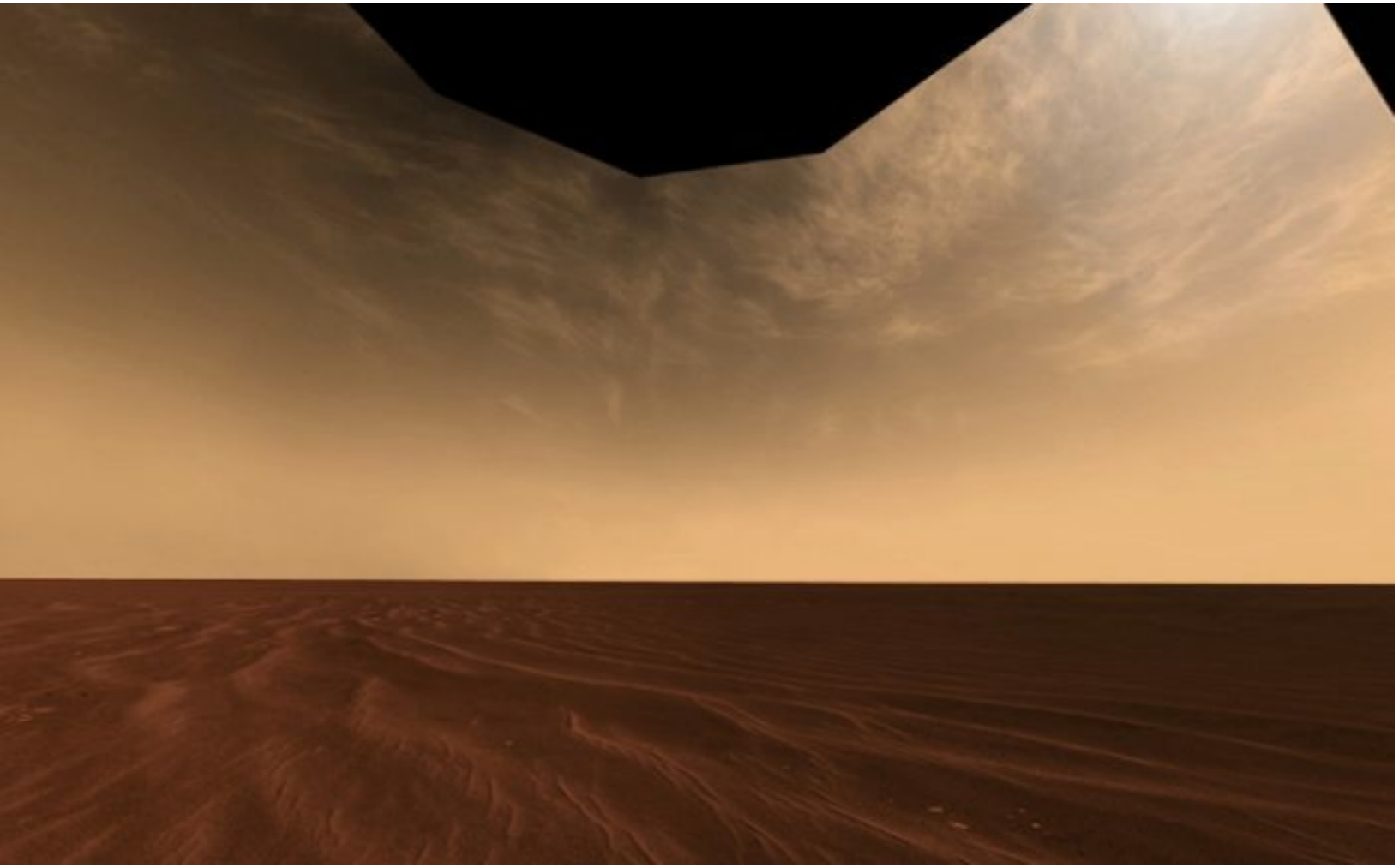
Evan Gough, Universe Today

Many features on the surface of Mars hint at the presence of liquid water in the past. These range from the Valles Marineris, a 4,000 km long and 7 km deep system of canyons, to the tiny hematite spherules called “blueberries“. These features suggest that liquid water played a vital role in shaping Mars.

Some studies show that these features have volcanic origins, but a new study from two researchers at the Carl Sagan Institute and the NASA Virtual Planet Laboratory put the focus back on liquid water. The model that the two came up with says that, if other conditions were met, cirrus clouds could have provided the necessary insulation for liquid water to flow. The two researchers, Ramses M. Ramirez and James F. Kasting, constructed a climate model to test their idea.

Cirrus clouds are thin, wispy clouds that appear regularly on Earth. They’ve also been seen on Jupiter, Saturn, Uranus, possibly Neptune, and on Mars. Cirrus clouds themselves don’t produce rain. Whatever precipitation they produce, in the form of ice crystals, evaporates before reaching the surface. The researchers behind this study focussed on cirrus clouds’ because they tend to warm the air underneath them by 10 degrees Celsius.

If enough of Mars was covered by cirrus clouds, then the surface would be warm enough for liquid water to flow. On Earth, cirrus clouds cover up to 25% of the Earth



Cirrus clouds in the Martian atmosphere may have helped keep Mars warm enough for liquid water to sculpt the Martian surface. Image: Mars Exploration Rover Mission, Cornell, JPL, NASA

and have a measurable heating effect. They allow sunlight in, but absorb outgoing infrared radiation. Kasting and Ramirez sought to show how the same thing might happen on Mars, and how much cirrus cloud cover would be necessary.

The cirrus clouds themselves wouldn't have created all the warmth. Impacts from comets and asteroids would have created the heat, and extensive cirrus cloud cover would have trapped that heat in the Martian atmosphere.

The two researchers conducted a model, called a single-column radiative-convective climate model. They then tested different ice crystal sizes, the portion of the sky covered by cirrus clouds, and the thicknesses of those clouds, to simulate different conditions on Mars.

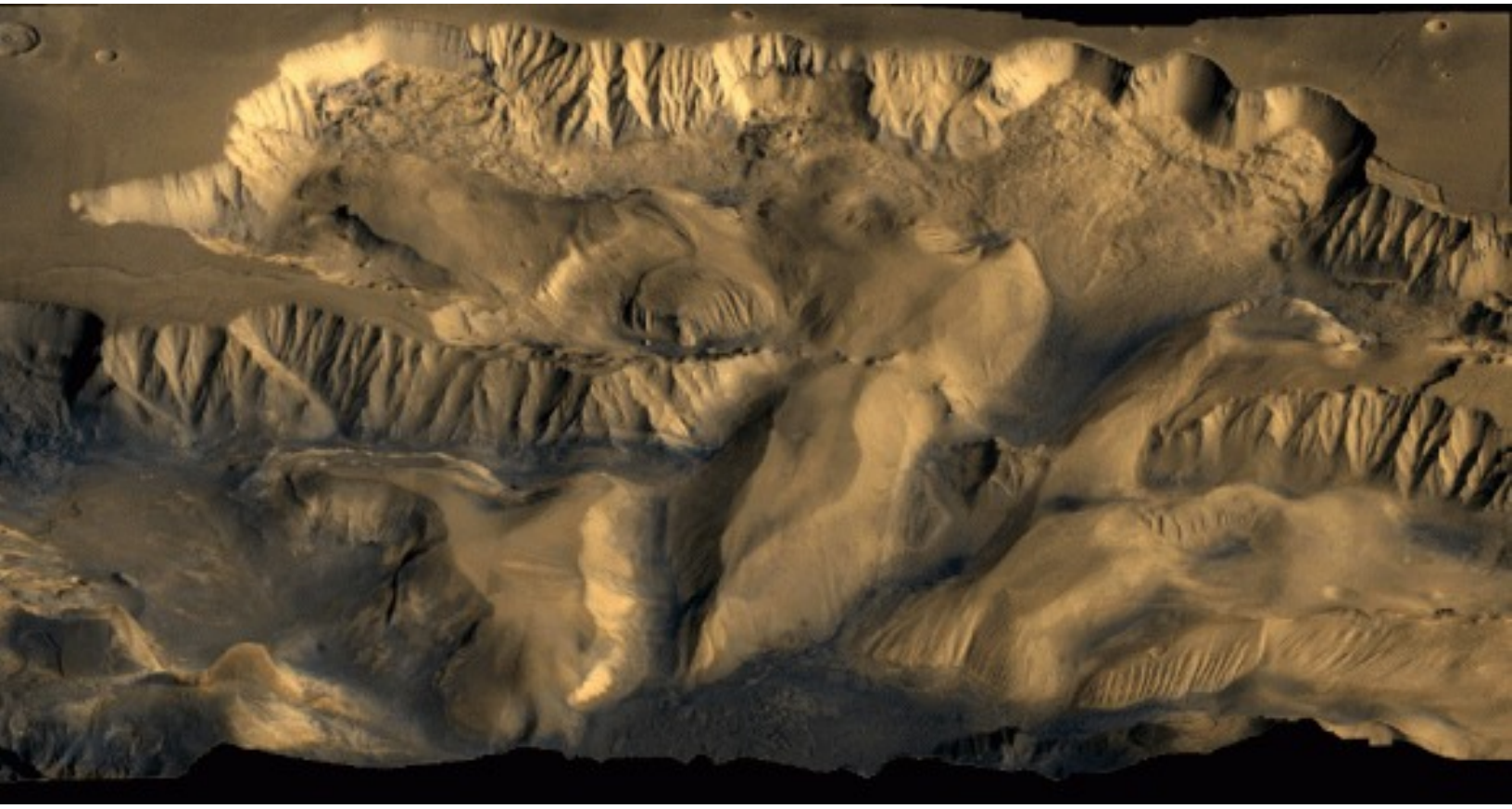
They found that under the right circumstances, the clouds in the early Martian atmosphere could last 4 to 5 times longer than on Earth. This favors the idea that cirrus clouds could have kept Mars warm enough for liquid water. However, they also found that 75% to 100% of the planet would have to be covered by cirrus. That amount of cloud cover seems unlikely according to the researchers, and they suggest that 50% would be more realistic. This figure is similar to Earth's cloud cover, including all cloud types, not just cirrus.

As they adjusted the parameters of their model, they found that thicker clouds and smaller particle sizes reduced the heating effect of the cirrus cloud cover. This left a very thin set of parameters in which cirrus clouds could have kept Mars warm enough for liquid water. But their modelling also showed that there is one way that cirrus clouds could have done the job.

If the ancient Martian surface temperature was lower than 273 Kelvin, the value used in the model, then it would be possible for cirrus clouds to do their thing. And it would only have to be lower by 8 degrees Kelvin for that to happen. At times in Earth's past, the surface temperature has been lower by 7 degrees Kelvin. The question is, might Mars have had a similarly lower temperature?

So, where does that leave us? We don't have a definitive answer yet. It's possible that cirrus clouds on Mars could have helped to keep the planet warm enough for liquid water. The modelling done by Ramirez and Kasting shows us what parameters were required for that to happen.Saturn's moons

Cirrus clouds over Poznan, Poland. Image: Radomil,



A color mosaic of Candor Chasma (part of Mars' Valles Marineris) based on data from Voyager 1 and Voyager 2. Credit: NASA

Is there a super-Earth in the Solar System out beyond Neptune?

Ethan Siegel

This article is provided by NASA Space Place.
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When the advent of large telescopes brought us the discoveries of Uranus and then Neptune, they also brought the great hope of a Solar System even richer in terms of large, massive worlds. While the asteroid belt and the Kuiper belt were each found to possess a large number of substantial icy-and-rocky worlds, none of them approached even Earth in size or mass, much less the true giant worlds. Meanwhile, all-sky infrared surveys, sensitive to red dwarfs, brown dwarfs and Jupiter-mass gas giants, were unable to detect anything new that was closer than Proxima Centauri. At the same time, Kepler taught us that super-Earths, planets between Earth and Neptune in size, were the galaxy's most common, despite our Solar System having none.

The discovery of Sedna in 2003 turned out to be even more groundbreaking than astronomers realized. Although many Trans-Neptunian Objects (TNOs) were discovered beginning in the 1990s, Sedna had properties all the others didn't. With an extremely eccentric orbit and an aphelion taking it farther from the Sun than any other world known at the time, it represented our first glimpse of the hypothetical Oort cloud: a spherical distribution of bodies ranging from hundreds to tens of thousands of A.U. from the Sun. Since the discovery of Sedna, five other long-period, very eccentric TNOs were found prior to 2016 as well. While you'd expect their orbital parameters to be randomly distributed if they occurred by chance, their orbital orientations with respect to the Sun are clustered extremely narrowly: with less

than a 1-in-10,000 chance of such an effect appearing randomly.

Whenever we see a new phenomenon with a surprisingly non-random appearance, our scientific intuition calls out for a physical explanation. Astronomers Konstantin Batygin and Mike Brown provided a compelling possibility earlier this year: perhaps a massive perturbing body very distant from the Sun provided the gravitational "kick" to hurl these objects towards the Sun. A single addition to the Solar System would explain the orbits of all of these long-period TNOs, a planet about 10 times the mass of Earth approximately 200 A.U. from the Sun, referred to as **Planet Nine**. More Sedna-like TNOs with similarly aligned orbits are predicted, and since January of 2016, another was found, with its orbit aligning perfectly with these predictions.

Ten meter class telescopes like Keck and Subaru, plus NASA's NEOWISE mission, are currently searching for this hypothetical, massive world. If it exists, it invites the question of its origin: did it form along with our Solar System, or was it captured from another star's vicinity much more recently? Regardless, if Batygin and Brown are right and this object is real, our Solar System may contain a super-Earth after all.

A possible super-Earth/mini-Neptune world hundreds of times more distant than Earth is from the Sun. Image credit: R. Hurt / Caltech (IPAC)

Distant Moons

Tethys and Hyperion appear to be near neighbors in this Cassini view, even though they are actually 930,000 miles (1.5 million kilometers) apart here. Tethys is the larger body on the left.

These two icy moons of Saturn are very different worlds. To learn more about Hyperion (170 miles or 270 kilometers across), see PIA14583; to learn more about Tethys (660 miles or 1,062 kilometers across) see PIA09766.

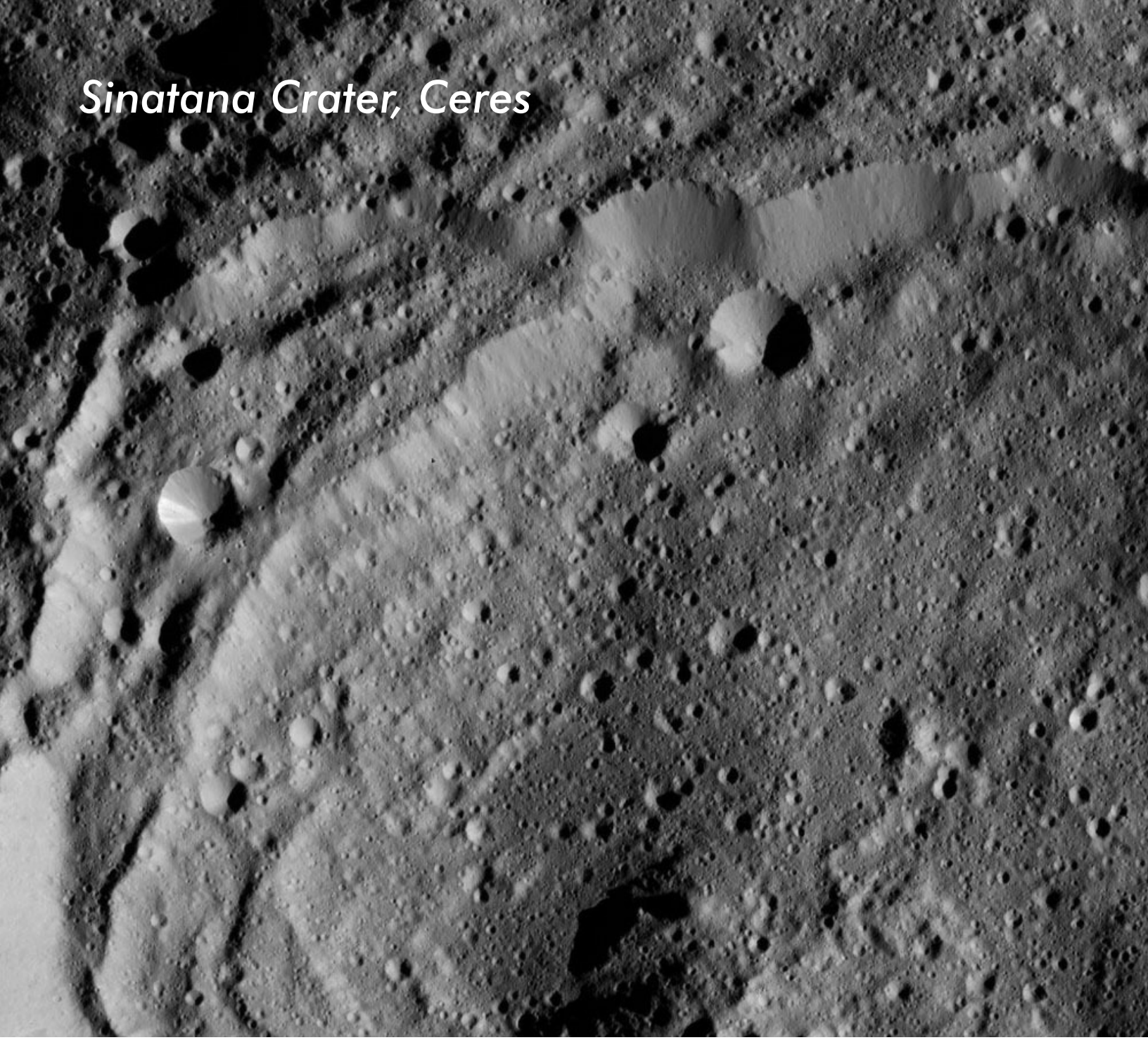
This view looks toward the trailing side of Tethys. North on Tethys is up and rotated 1 degree to the left. The image was taken in visible light with the Cassini spacecraft narrow-angle camera on Aug. 15, 2015.

The view was acquired at a distance of approximately 750,000 miles (1.2 million kilometers) from Tethys. Image scale is 4.4 miles (7.0 kilometers) per pixel. The distance to Hyperion was 1.7 million miles (2.7 million kilometers) with an image scale of 10 mile (16 kilometers) per pixel.

The Cassini mission is a cooperative project of NASA, ESA (the European Space Agency) and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the mission for NASA's Science Mission Directorate, Washington. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. The imaging operations center is based at the Space Science Institute in Boulder, Colorado.

For more information about the Cassini-Huygens mission visit http://saturn.jpl.nasa.gov and http://www.nasa.gov/cassini. The Cassini imaging team homepage is at http://ciclops.org.

Sinatana Crater, Ceres



This view of Ceres from NASA's Dawn spacecraft shows the rim of Sintana Crater (36 miles, 58 kilometers wide). Sinatana is also seen in PIA20149, an image taken from a higher altitude earlier in Dawn's mission. The image is centered at approximately 47 degrees south latitude, 43 degrees east longitude. Dawn took this image on May 27, 2016, from its low-altitude mapping orbit, at a distance of about 240 miles (385 kilometers) above the surface. The image resolution is 120 feet (35 meters) per pixel.

Dawn's mission is managed by JPL for NASA's Science Mission Directorate in Washington. Dawn is a project of the directorate's Discovery Program, managed by NASA's Marshall Space Flight Center in Huntsville, Alabama. UCLA is responsible for overall Dawn mission science. Orbital ATK, Inc., in Dulles, Virginia, designed and built the spacecraft. The German Aerospace Center, the Max Planck Institute for Solar System Research, the Italian Space Agency and the Italian National Astrophysical Institute are international partners on the mission team. For a complete list of mission participants, see http://dawn.jpl.nasa.gov/mission.

From the Archives: August, 1969

This month's meeting will be held Tuesday, September 30, at 7:30 p. m. at Olin Science Hall, Nebraska Wesleyan University. We will have an interesting program of Apollo 11 slides and pictures of the nationall convention of the Astronomical League in Denver. Also we will elect officers for the coming year. The following have been nominated thus far:

President.....Earl Moser
Vice President.....Larry Stepp
Ed Woerner
Secretary.....Jess Williams
Treasurer.....Rick Johnson
Program Chairman.....Monte Cole
Publications Chairman.....Larry Stepp
Recording Secretary.....Eric Rudd
Roger Severns

Nominations will still be acceepted at the meeting.

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The President's Report

A partial eclipse of the sun on September 11 was viewed by the public at Gateway. Our club had the honor of putting on this show for a large number of interested spectators. Three of the scopes were reflectors and used the projection method for viewing the eclipse. The other two scopes were Questars, and they used their own sun filters and direct viewing. Ten club members were on hand to help in giving th e public a safe view of the sun. Thanks to our public relations chairman this event was well covered by the radio, television, and newspapers.

Although the eclipse show was well attended by club members, some of the evening sky shows in the past were not. There were times when as few as three or four showed up for a sky show at Gateway, even on clear nights. Our club was presented with another $50 check a few weeks ago. If we want to keep receiving this money for the club, the least we could do is have a decent number of members on hand for these sky shows. So come to the Gateway shows whether you have a telescope or not. We need the extra help for answering questions and setting up equipment. You may not receive this newsletter in time for the September 18 Gateway show, but let's have a real good turn-out in October.

Earl Moser

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In his article this month, Roger Severns mentions test double stars for various telescopes. But many doubles can be split with very small apatures. Alpha and Beta Capricorni, Epsilon Lyrae, Psi Aquarius (a triple), and Omicron Cygni can all be split without a telescope. In a 2.4-inch refractor , Monte Cole and Ed Woerner have split Antares (magnitudes 1 and 7--separation 2"9) and in a similar instrument Rick Johnson has split Epsilon Lyrae into four components.

CLUB MEMBERSHIP INFO

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, please contact a club officer. Scopes can be checked out at a regular club meeting and kept for one month. Checkout can be extended for another month if there are no other requests for the telescope, but you must notify a club officer in advance.

100mm Orion refractor: David Pennington
10 inch Meade Dobsonian: Lee Taylor
13 inch Truss Dobsonian: Available

CLUB APPAREL

Order club apparel from cafepress.com:

Shop through Amazon Smile to automatically donate to PAC:

amazonsmile

CLUB OFFICERS

President	Jim Kvasnicka (402) 423-7390 jim.kvasnicka@yahoo.com
Vice President	Brett Boller proboller86@yahoo.com
2nd VP (Program Chair)	Beth Jenckes beth.jenckes@yahoo.com
Secretary	Lee Taylor otaylor88@gmail.com
Treasurer	John Reinert jr6@aol.com
Club Observing Chair	Jim Kvasnicka jim.kvasnicka@yahoo.com
Outreach Coordinator	Dan Delzell dan@delzell.net
Website and Newsletter Editor	Mark Dahmke mark@dahmke.com

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.