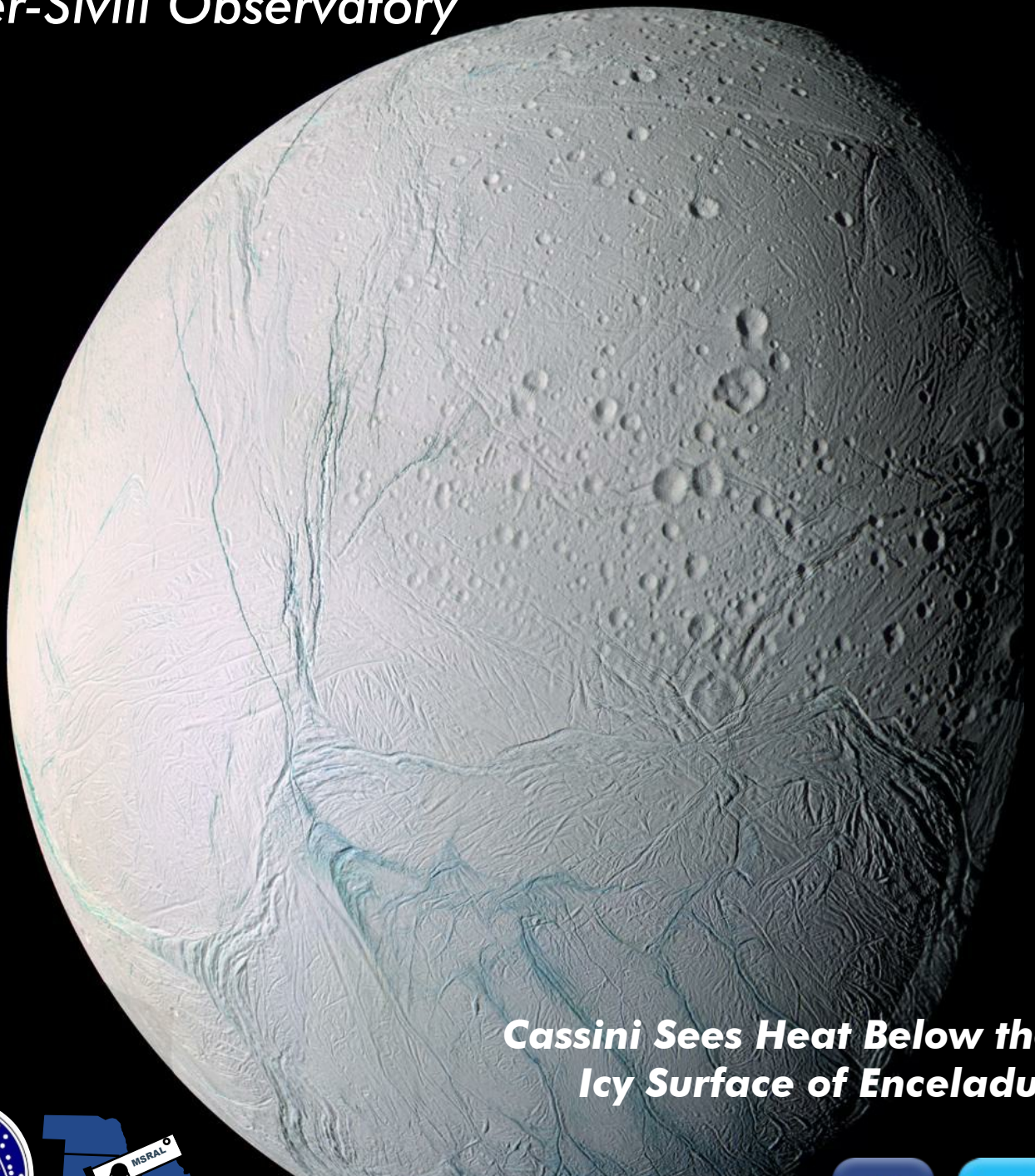


The Prairie Astronomer

March 2017 Volume 58, Issue #3

***March Program: Technologies underlying the
Boller-Sivill Observatory***



***Cassini Sees Heat Below the
Icy Surface of Enceladus***



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

NEXT PAC MEETING: March 28, 7:30pm

At Hyde Observatory

PROGRAM

“Technologies underlying the Boller-Sivill Observatory” - Brian Sivill and Brett Boller

FUTURE PROGRAMS

April: Alexandra Dominguez - The SLS Rocket

May: Club Dinner

June: Solar Star Party - and eclipse prep for public

July: NSP - no club meeting

August: NSP & Eclipse review

October: Club viewing night at Hyde

November: How to Buy a Telescope

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Buy the book! The Prairie Astronomy Club: Fifty Years of Amateur Astronomy.

Order online from [Amazon](https://www.amazon.com) or [lulu.com](https://www.lulu.com).

EVENTS



PAC Meeting
Tuesday March 28, 2017, 7:30pm
Hyde Observatory

PAC Meeting
Tuesday April 25, 2017, 7:30pm
Hyde Observatory

PAC Meeting
Tuesday May 28, 2017, 6:30pm
Club Dinner - to be announced

MSRAL June 9-11
Missouri State University, Springfield, MO.

Nebraska Star Party, July 23-28

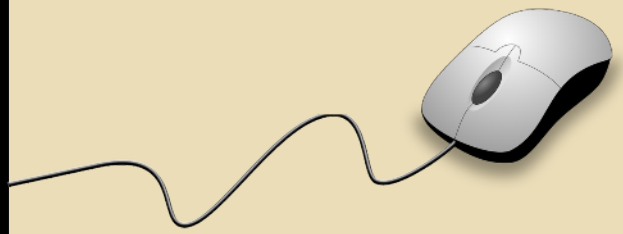
2017 STAR PARTY DATES



Photo by Brian Sivill

	Star Party Date	Star Party Date	Lunar Party Date
January	Jan 20th	Jan 27th	
February	Jan 17th	Feb 24th	
March	Mar 17th	Mar 24th	
April	Apr 21st	Apr 28th	
May	May 19th	May 26th	May 5th
June	Jun 16th	Jun 23rd	Jun 30th
July	Jul 14th	Jul 21st	
NSP	July 23rd - July 28th		
August	Aug 18th	Aug 25th	
September	Sep 15th	Sep 22nd	Sep 1st
October	Oct 13th	Oct 20th	
November	Nov 10th	Nov 17th	
December	Dec 15th	Dec 22nd	

Dates in **BOLD** are closest to the New Moon.



PAC E-MAIL:

info@prairieastronomyclub.org

PAC-LIST:

Subscribe through [GoogleGroups](#).
To post messages to the list, send to the address:

pac-list@googlegroups.com

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www.nebraskastarparty.org
www.OmahaAstro.com
Panhandleastronomyclub.com
www.universetoday.com/
www.planetary.org/home/
<http://www.darksky.org/>



Night Sky Network

Meeting Minutes

Minutes PAC Business Meeting
2/28/2017

President Jim Kvasnicka called the meeting to order at 7:35 p.m.

Announced coming events:

Covered dates for PAC and Branched Oak Observatory star parties scheduled in March and April. Also, noted that the University of Nebraska - Mueller Planetarium is not scheduling any events for Astronomy Day this year, so PAC will not be asked to help as it has in previous years.

MSRAL is scheduled for June 9-11 at Missouri State University, Springfield, MO. Nebraska Star Party July 23-28, Merritt Reservoir. Great American Eclipse (Total Solar Eclipse) August 21.

Jim gave his Observing Report for March, then reviewed Astronomical League observing awards earned by PAC members in 2016:

Two in the View – Bob Kacvinsky
Herschel 400 – Jim Kvasnicka
Transit of Venus – Brett Boller
Elizabeth Luther – Sky Puppy

Jim reviewed the AL awards available, and those earned through the years by PAC members, e.g., the Messier Award is the most popular, with 31 so far earned in the club ... but the last one earned was in 2009.

Treasurer John Reinert reported on the audit of the club's treasury, which was conducted February 11, 2017. John noted that the club last year actually made more money from its portion of merchandise sales on the Amazon Smile account than in interest on its three CD's (because of historically low interest rates). The report was accepted on unanimous vote.

A short discussion followed concerning the liability insurance that the club carries, the rate on

which John noted has not varied appreciably in recent years, although the exact coverage that it buys is unclear. The University of Nebraska periodically requests that the regents be named on the policy, a carryover from when the club last hosted the MSRAL convention in 2010. Because that was a one-time event, John has not responded to these requests.

Jim noted that this year's MSRAL convention in Springfield, MO is a joint effort by two clubs, and that this could be an approach that PAC and the Omaha Astronomical Society might consider for a future convention.

Meeting adjourned at 7:50 p.m.

Program: Illuminating Our Neighborhoods – John Reinert

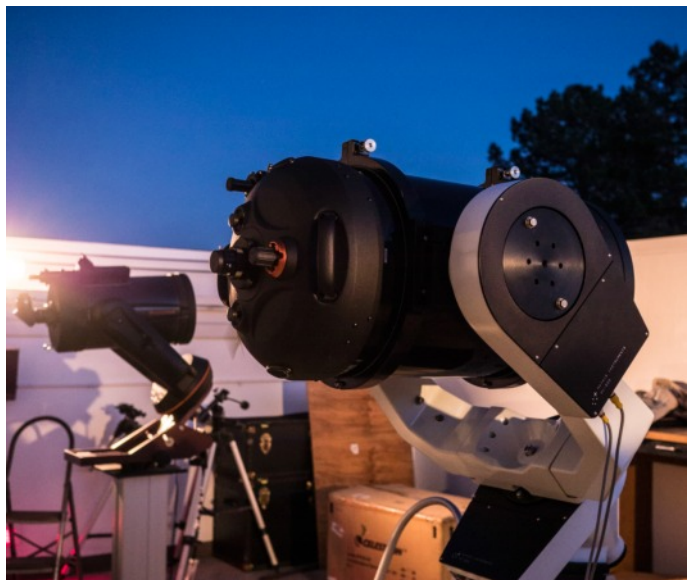
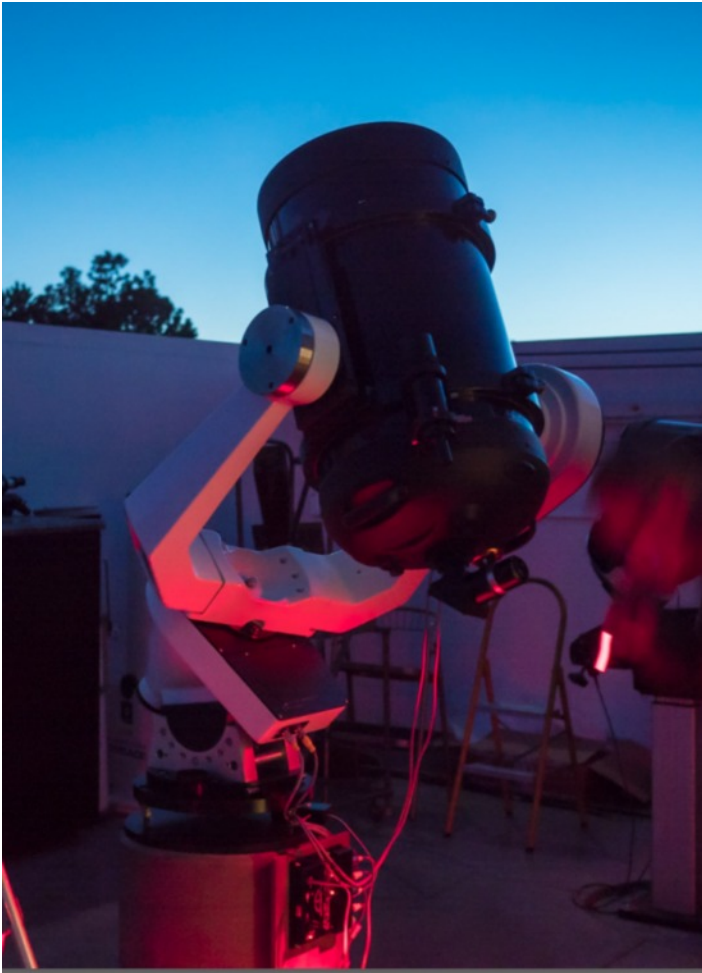


The Moon on 2-4-17. Esprit 150 with Nikon DSLR

Boller-Sivill Observatory

Hyde Observatory's New Telescope

First light for the new Celestron 14.
Photos by Mark Dahmke



The Prairie Astronomer

Observatory Update: Hubble's Variable Nebula

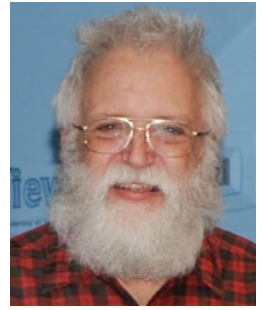
Rick Johnson

Hubble's Variable Nebula aka NGC 2261, is a highly variable nebula in Monoceros. Famous for being the first light image of the 200" Palomar Telescope in 1949 taken by Edwin Hubble himself. Movies of the nebula show it varies quite a bit over only a couple days time. Unfortunately, all my attempts to catch this have failed due to horrid weather and my failing to keep trying as my to-do list beckons strongly. So I've settled for once a year. Even then variable seeing and transparency makes for a

difficult comparison. Last year I tried extra hard to get a series only days apart but the weather had other ideas. Best I could do in 2014 was two images; one my last image of 2013 and another on February 19, 2014, 51 days apart rather than a year. In all other years I only managed the one image a year.

I've included my annual (and twice annual from the winter of 2013-14) images since 2011. Color of the 2011 image is highly suspect. Exposure times vary as does my processing so

these aren't usable for scientific comparison. Thanks to bad weather this year while I got 4 luminance frames frames they were through clouds that limited my ability to pull out faint details. I took my usual 2 color frames but for the clouds only one of each was usable. Being highly variable due to the clouds I had to do severe color



balancing that is likely only somewhat successful but was all I had to work with. Seeing however was better than average as the star southeast of the illuminating star is easily seen but in many prior years was lost in the glare and fuzz of the illuminating star. Some of this was due to poor transparency dimming the illuminating star but mostly I think it was seeing that helped it be resolved. Being a variable star I may have caught it near its minimum as well.

Note that not only does the nebula change above the illuminating star but the faint hook shaped piece of nebulosity south of the star also has changed. Being faint some of this is likely conditions. In 2011 it was rather obvious but then it faded. Last few years the part

of the hook coming back north is getting stronger but the down-stroke is virtually gone. North of the star the main changes are on the east side though the dark band crossing the lower part of the nebula that was strong a few years ago has vanished in 2015 but seemed to be returning in 2016 only to vanish this year. I expect there were lots of other changes I missed due to the very long time between images. The color in the 2011 image is somewhat suspect as my attempts at color balance were primitive back then. Likely it is redder than it would have been if processed today. I suppose I should go back and redo it.

R Mon, the variable star at its base, illuminates the nebula. It is a brand new star just exiting its birth cocoon. It is thought dust clouds from this cocoon are

still orbiting the star casting various shadows on the nebula causing the variations in its details and color. In animations taken only days apart it appears illumination of the nebula flows upward from the star hitting more distant parts of the nebula over time. This gives an illusion of material moving but I am quite certain this is more like shining a flashlight beam around on a mostly stationary object. The first animation link is from a University observatory, the second is by amateur Tom Polakis in Tempe, Arizona where clear skies are much more common than here.

<http://umanitoba.ca/faculties/science/astronomy/cbrown/imaging/hvn/hvnanimation.html>
http://m2.i.pbase.com/o9/64/297864/1/163069532.N1hWgJJX.ngc2261_200_crop.gif

[Comparison \(click to see high resolution image\)](#)



Cassini Sees Heat Below the Icy Surface of Enceladus

Source: [NASA Website](#)

A new study in the journal *Nature Astronomy* reports that the south polar region of Saturn's icy moon Enceladus is warmer than expected just a few feet below its icy surface. This suggests that Enceladus' ocean of liquid water might be only a couple of miles beneath this region -- closer to the surface than previously thought.

The excess heat is especially pronounced over three fractures that are not unlike the "tiger stripes" -- prominent, actively venting fractures that slice across the pole -- except that they don't appear to be active at the moment. Seemingly dormant fractures lying above the moon's warm,

underground sea point to the dynamic character of Enceladus' geology, suggesting the moon might have experienced several episodes of activity, in different places on its surface.

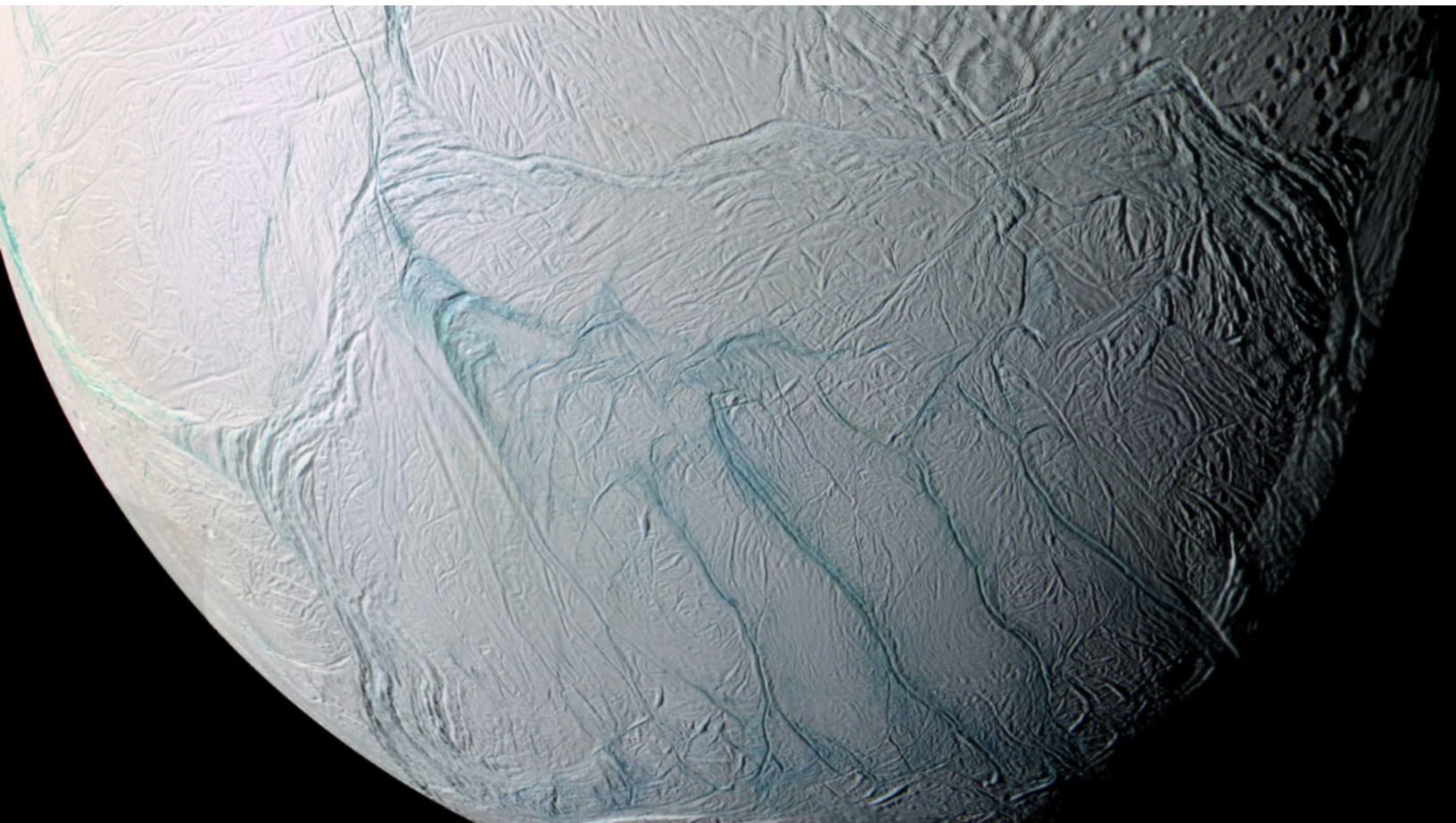
The finding agrees with the results of a 2016 study by a team independent of the Cassini mission that estimated the thickness of Enceladus' icy crust. The studies indicate an average depth for the ice shell of 11 to 14 miles (18 to 22 kilometers), with a thickness of less than 3 miles (5 kilometers) at the south pole.

"Finding temperatures near these three inactive fractures that are unexpectedly higher

than those outside them adds to the intrigue of Enceladus," said Cassini Project Scientist Linda Spilker at NASA's Jet Propulsion Laboratory, Pasadena, California. "What is the warm underground ocean really like and could life have evolved there? These questions remain to be answered by future missions to this ocean world."

More information about this study is available from ESA, the European Space Agency, at:

<http://sci.esa.int/cassini-huygens/58877-enceladus-south-pole-is-warm-under-the-frost>



Mars Rover Opportunity's Panorama of 'Marathon Valley' _____

Source: [NASA Website](#)

"Marathon Valley" on Mars opens northeastward to a view across the floor of Endeavour Crater in this scene from the panoramic camera (Pancam) of NASA's Mars Exploration Rover Opportunity.

The scene merges multiple Pancam exposures taken during the period April 16 through May 15, 2016, corresponding to sols (Martian days) 4,347 through 4,375 of Opportunity's work on Mars. It spans from north, at the left, to west-southwest, at the right.

The high point in the right half of the scene is "Knudsen Ridge," which forms part of the southern edge of Marathon Valley. Portions of the northeastern and eastern rim of Endeavour crater appear on the distant horizon. Endeavour Crater is 14 miles (22 kilometers) in diameter. The

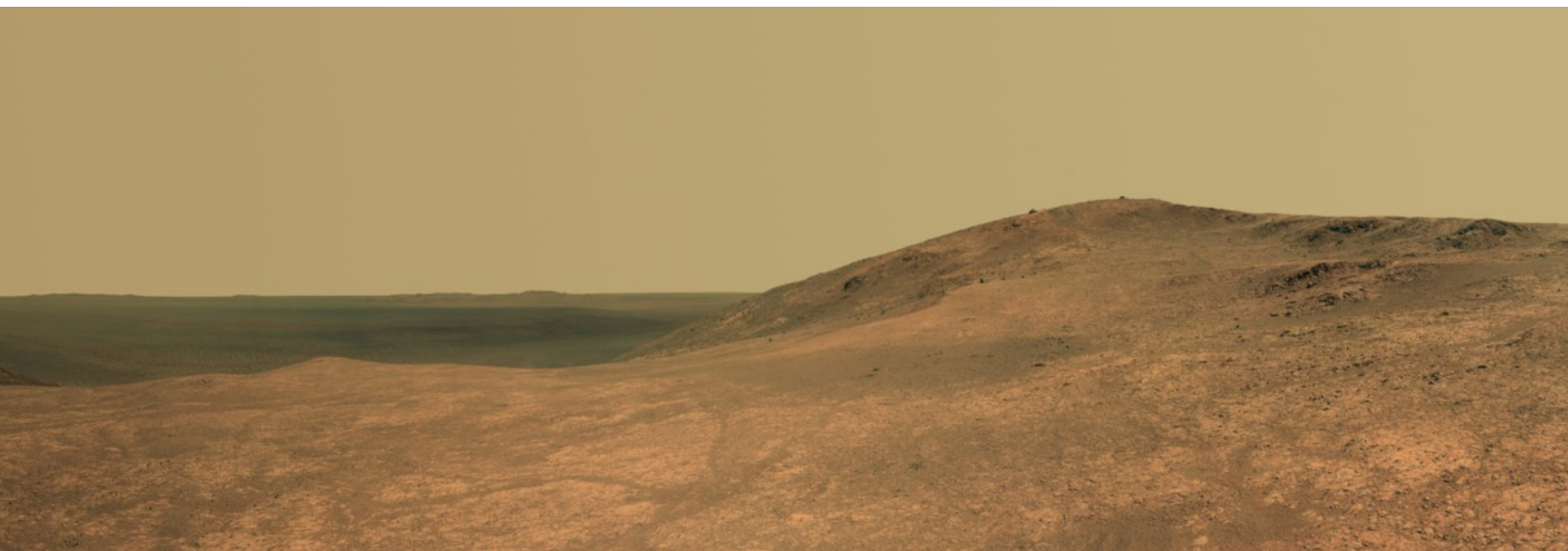
fractured texture of Marathon Valley's floor is visible in the foreground.

The view merges exposures taken through three of the Pancam's color filters, centered on wavelengths of 753 nanometers (near-infrared), 535 nanometers (green) and 432 nanometers (violet). It is presented in approximately true color.

The rover team calls this image the mission's "Sacagawea Panorama," for the Lemhi Shoshone woman, also commemorated on U.S. dollar coins, whose assistance to the Lewis and Clark expedition helped enable its successes in 1804-1806. Many rocks and other features in Marathon Valley were informally named for members of Lewis and Clark's "Corps of Discovery" expedition.

Opportunity entered Marathon Valley in July 2015. The valley's informal name was chosen because Opportunity's arrival at this point along the western rim of Endeavour Crater coincided closely with the rover surpassing marathon-footrace distance in its total driving odometry since landing on Mars in January 2004. The team's planned investigations in the valley were nearing completion when the component images for this scene were taken.

JPL manages the Mars Exploration Rover Project for NASA's Science Mission Directorate in Washington. For more information about Spirit and Opportunity, visit <http://marsrovers.jpl.nasa.gov>.



24th Nebraska Star Party - July 23-28, 2017



Mark Dahmke

Photo Credit: Fred Hultstrand History in Pictures Collection, NDIRS-NDSU, Fargo.

The early registration deadline is July 1st!

Join us this summer as we gather families from all over the US and around the world in the sparsely populated sand hills of North Central Nebraska to spend a good week under a galaxy of stars.

NSP Schedule of Events

Sunday: registration and check-in, optional dinner.

Monday: registration and check-in, field school, optional dinner.

Tuesday: registration and check-in, swap meet, field school, free “Cattle Country” hamburger dinner.

Wednesday: (All at Valentine High School) field school, registration, swap meet, speaker program, children’s program, dinner on your own.

Thursday: Brewer’s Niobrara Canoe or tube float, optional dinner.

Friday: public star party at 9pm.

For more information see the [NSP website](#).

Register online!

April Observing: What to View

Jim Kvasnicka

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

Planets

Mercury: Starts the month at magnitude -0.2 setting 1½ hours after the Sun in the west.

Mars: Look for Mars 20° high in the west about one hour after sunset.

Jupiter: Reaches opposition on April 7th with a disk 44" wide.

Saturn: In Sagittarius at magnitude 0.3. Its rings are tilted 26° from edge on.

Venus: Rises in the east about an hour before the Sun as a thin crescent.

Uranus/Neptune: Not visible in April.

Messier List

M40: Multiple star in Ursa Major.

M65/M66: Part of the Leo Triplet Group of galaxies.

M95/M96: Galaxies in Leo that fit in the same FOV.

M105: Galaxy in Leo.

M106: Galaxy in Canes Venatici.

M108: Galaxy in Ursa Major.

M109: Galaxy in Ursa Major.

Last Month: M41, M44, M46, M47, M48, M50, M67, M81, M82, M93

Next Month: M49, M51, M61, M63, M64, M85, M94, M101, M102, M104

NGC and other Deep Sky Objects

NGC 2903: Elongated galaxy in Leo.

NGC 3003: Elongated galaxy in Leo Minor.

NGC 3115: The Spindle Galaxy in Sextans.

NGC 3242: Ghost of Jupiter, planetary nebula in Hydra.

NGC 3432: Elongated galaxy in Leo Minor.

NGC 3521: Bright, elongated galaxy in Leo.

Double Star Program List

Alpha Leonis: Regulus, white primary with a pale yellow secondary.

Gamma Leonis: Algieba, pair of yellow stars.

54 Leonis: Yellow primary with a greenish colored secondary.

Alpha Canum

Venaticorum: Cor Caroli, blue-white and greenish yellow pair.

Zeta Ursa Majoris: Mizar, white pair.

Gamma Virginis:

Porrina, close pair of yellow stars.

24 Comae Berenices: Yellow and pale blue stars.

Delta Corvi: White primary with a rose colored secondary.



Challenge Object

NGC 3166 Group: Located in Sextans, NGC 3166 and NGC 3169 are almost identical. Small and dim NGC 3165 is 5' SW of NGC 3166.

The Great American Total Eclipse August 21, 2017



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

<https://www.youtube.com/watch?v=K4KnxE6yAul>

Focus on Constellations: Hydra

Jim Kvasnicka

Hydra, the Water Serpent, is the largest and longest of the constellations. Its star pattern from its Head to its Tail-tip extends for nearly 100°, and the constellation covers 1,303 degrees. The Head is a very conspicuous asterism, however the curves of the Water Serpent's body are best traced on clear dark nights because of its dim stars. Hydra extends from the eastern edge of the constellations of winter to the western edge of the constellations of summer. Hydra, partly because of its size, has a large number of objects of great variety. The majority of objects are galaxies but the constellation contains some fine planetary nebulae, a couple of globular clusters, and even a good open cluster. It does contain three Messier objects; open cluster M48, globular cluster M68, and the spiral galaxy M83. Hydra extends through seven hours of right ascension, and should be observed in separate sessions. Start with the western section and then its eastern section.

Showpiece Objects

Open Clusters: M48

Globular Clusters: M68

Galaxies: M83

Planetary Nebulae: NGC 3242 (Ghost of Jupiter)

Photo: Till Credner - Own work: AlltheSky.com

Mythology

Hydra represents the multi-headed serpent which would grow two new heads for every one that was cut off. Killing it was a bit of a problem. Hercules got around this problem by burning the Hydra's heads.

Number of Objects Magnitude 12.0 and Brighter

Galaxies: 13

Globular Clusters: 2

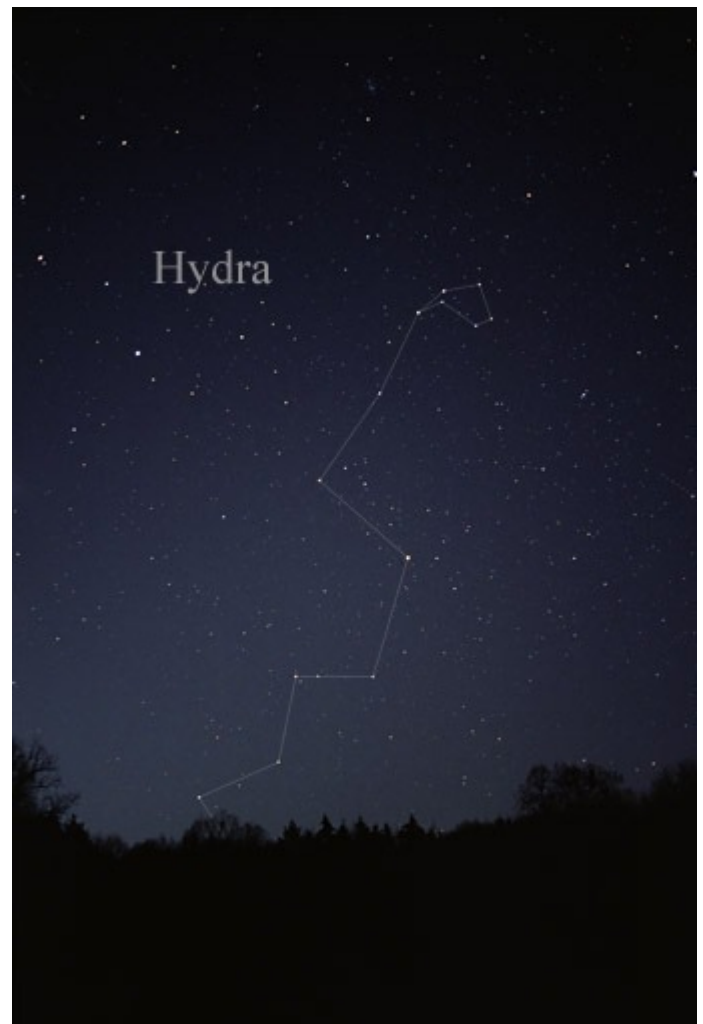
Open Clusters: 1

Planetary Nebulae: 2

Dark Nebulae: 0

Bright Nebulae: 0

SNREM: 0



What It's Like on a TRAPPIST-1 Planet

This article is provided by NASA Space Place.

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!

Marcus Woo



With seven Earth-sized planets that could harbor liquid water on their rocky, solid surfaces, the TRAPPIST-1 planetary system might feel familiar. Yet the system, recently studied by NASA's Spitzer Space Telescope, is unmistakably alien: compact enough to fit inside Mercury's orbit, and surrounds an ultra-cool dwarf star—not much bigger than Jupiter and much cooler than the sun.

If you stood on one of these worlds, the sky overhead would look quite different from our own. Depending on which planet you're on, the star would appear several times bigger than the sun. You would feel its warmth, but because it shines stronger in the infrared, it would appear disproportionately dim.

"It would be a sort of an orangish-salmon color—basically close to the color of a low-wattage light bulb," says

Robert Hurt, a visualization scientist for Caltech/IPAC, a NASA partner. Due to the lack of blue light from the star, the sky would be bathed in a pastel, orange hue.

But that's only if you're on the light side of the planet. Because the worlds are so close to their star, they're tidally locked so that the same side faces the star at all times, like how the Man on the Moon always watches Earth. If you're



This artist's concept allows us to imagine what it would be like to stand on the surface of the exoplanet TRAPPIST-1f, located in the TRAPPIST-1 system in the constellation Aquarius. Credit: NASA/JPL-Caltech/T. Pyle (IPAC)

on the planet's dark side, you'd be enveloped in perpetual darkness—maybe a good thing if you're an avid stargazer.

If you're on some of the farther planets, though, the dark side might be too cold to survive. But on some of the inner planets, the dark side may be the only comfortable place, as the light side might be inhospitably hot.

On any of the middle planets, the light side would offer a dramatic view of the inner planets as crescents, appearing even bigger than the moon on closest approach. The planets only take a few days to orbit

TRAPPIST-1, so from most planets, you can enjoy eclipses multiple times a week (they'd be more like transits, though, since they wouldn't cover the whole star).

Looking away from the star on the dark side, you would see the outer-most planets in their full illuminated glory. They would be so close—only a few times the Earth-moon distance—that you could see continents, clouds, and other surface features.

The constellations in the background would appear as if someone had bumped into them, jostling the stars—a

perspective skewed by the 40-light-years between TRAPPIST-1 and Earth. Orion's belt is no longer aligned. One of his shoulders is lowered.

And, with the help of binoculars, you might even spot the sun as an inconspicuous yellow star: far, faint, but familiar.

Want to teach kids about exoplanets? Go to the NASA Space Place and see our video called, "Searching for other planets like ours":

<https://spaceplace.nasa.gov/exoplanet-snap/>

From the Archives: February, March 1983

PRESIDENT'S MESSAGE ...

You know what? I did something strange the other nite. I decided on the spur of the moment to go out and view. That's right, old computerized, organized, pre-planned out Russ didn't do any of that. I just grabbed my eyepieces, flashlight and went outside.

Once outside I swung my telescope around and started looking. As it happens it was in the area of Orion. So I just sat there and looked, not for anything in particular, just looked. Then I started sweeping the sky. Sometimes I'd stop at some obscure area of the sky and look at a patch of dim stars, then single out the dimmest of them and found myself looking at it for as long as a couple of minutes. Thinking, was I looking at a star that was my very own? Maybe uncharted. Left alone. Maybe this one out of all of them had planets orbiting it. Some with an atmosphere...oh well. Then my neck would get a little stiff and I'd back away and stretch. Then I'd take in the whole sky. Pointing my flashlight to the sky I flipped it on. "Wonder where those little lite particles will end up"? After a while I went back to sweeping the sky at random. And as before not for anything in particular, just to look. Every once in awhile I could sense myself smiling. Occasionally I would come across a galaxy. Although they are one of my passions, this time I didn't worry whether it was spiral or elliptical, SB, or SC I just looked. After some time my back was beginning to get sore. So I looked at my watch. Good Lord has it really been two hours! As I packed up my eyepieces I thought, well, no charting tonite, no work with the calculator, no drawing of sketches of my viewing. Boy, all I did was just...look. As I walked back to the house I thought to myself smiling. Now I know what the true meaning of the word "Hobby" is.

Russ Genzmer

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:



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