

# The Prairie Astronomer

April 2017 Volume 58, Issue #4

## April Program: The SLS Rocket



Alexandra  
Dominguez



Artist's Conception of SLS  
Courtesy NASA



**Night Sky Network**



The Newsletter of the Prairie Astronomy Club

# ***The Prairie Astronomer***

---

**NEXT PAC MEETING: April 25, 7:30pm**

**At Hyde Observatory**

## **PROGRAM**

Alexandra Dominguez will talk about the SLS Rocket (via Google Hangouts).

Alexandra Dominguez is a control systems engineer at NASA Marshall Space Flight Center, where she currently works on the upper stage reaction control system for NASA's new Space Launch System (SLS) rocket. Alexandra received a joint bachelor's degree in Mathematics and Electrical Engineering from the University of Nebraska-Lincoln in 2012, and a Master's Degree in Electrical Engineering from the same institution in 2014. Inspired from an early age by a love of astronomy and space exploration, she has found her haven in the "Rocket City"- otherwise known as Huntsville, Alabama- where she lives with her husband- fellow NASA engineer, David- and their two favorite felines. When she's had enough of sitting at her computer, Alexandra loves to mix it up with salsa dancing and hiking in the beautiful North Alabama wilderness.

## **FUTURE PROGRAMS**

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

## **CONTENTS**

- 5 Observatory Update
- 7 Mars
- 8 Ocean Worlds
- 12 NSP
- 13 May Observing
- 14 Focus on Virgo
- 15 JPSS
- 16 From the Archives
- 16 Club Information



**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 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.

PAC Meeting  
 Tuesday June 27, 2017, TBA  
 Hyde Observatory

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

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



## PAC E-MAIL:

[info@prairieastronomyclub.org](mailto:info@prairieastronomyclub.org)

## PAC-LIST:

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

[pac-list@googlegroups.com](mailto:pac-list@googlegroups.com)

## ADDRESS

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

## WEBSITES

- [www.prairieastronomyclub.org](http://www.prairieastronomyclub.org)
- <https://nightsky.jpl.nasa.gov>
- [www.hydeobservatory.info](http://www.hydeobservatory.info)
- [www.nebraskastarparty.org](http://www.nebraskastarparty.org)
- [www.OmahaAstro.com](http://www.OmahaAstro.com)
- [Panhandleastronomyclub.com](http://Panhandleastronomyclub.com)
- [www.universetoday.com/](http://www.universetoday.com/)
- [www.planetary.org/home/](http://www.planetary.org/home/)
- <http://www.darksky.org/>



**Night Sky Network**

# Meeting Minutes

Minutes PAC Business Meeting  
3/28/2017

President Jim Kvasnicka called the meeting to order at 7:28 p.m.

Announced coming events:

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. Star parties scheduled at the farm southeast of Cortland April 21<sup>st</sup> and 28th.

Jim gave his Observing Report for April.

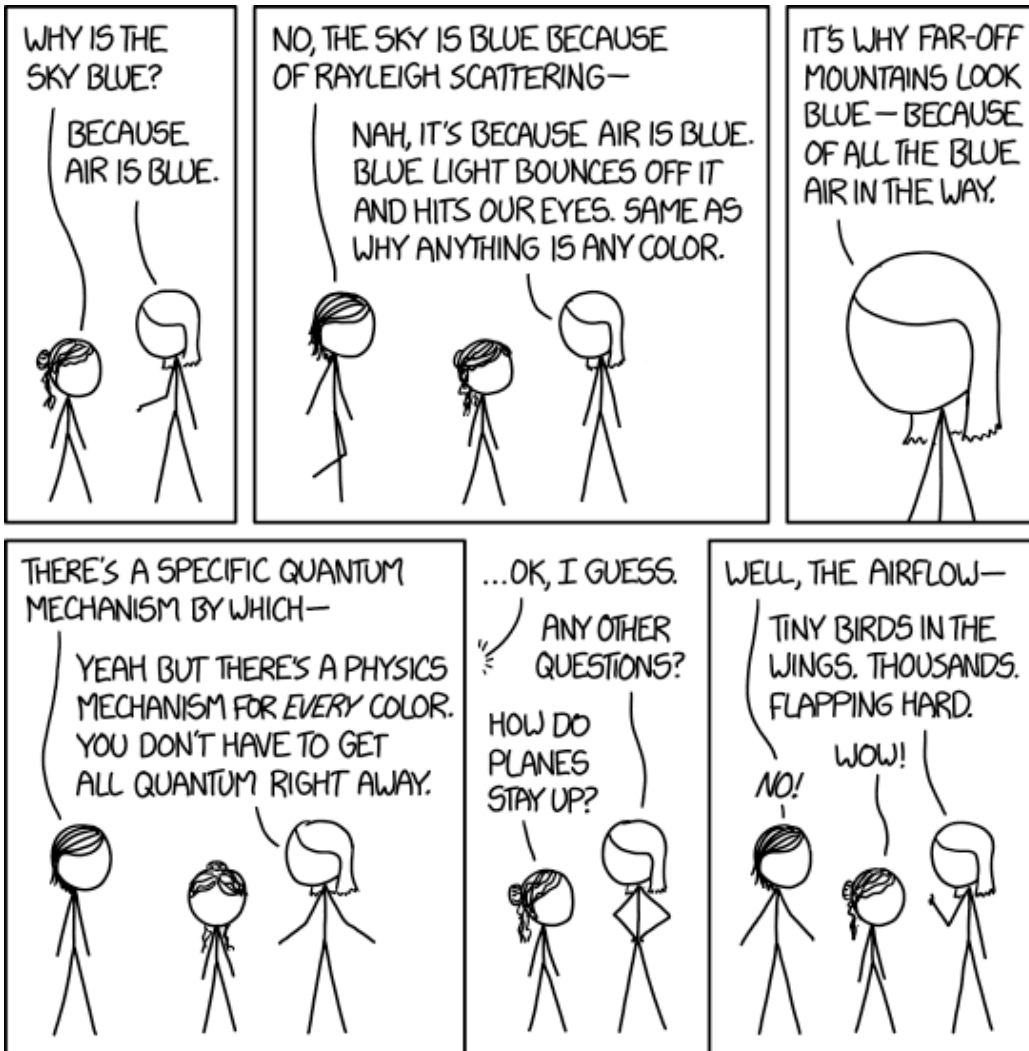
Prairie Astronomy Club received a Certificate of Recognition from NASA Space Place for its “valuable contributions to its community in the areas of science, technology, education and inspiration.”

Discussion of the costs associated with the Cortland farm observing site. The club has been paying Jim \$300 per year to keep the site mowed – which he usually does from 10 to 13 times per year depending upon the amount of rain we get during the season. The land is now owned by Jim’s brother-in-law, who purchased it from his mother last year. He has asked

for no compensation for the club’s use of the land, but PAC has been paying \$200 per year as a gesture of appreciation. Motion and second followed by unanimous approval to continue this arrangement for the coming year.

Meeting adjourned at 7:45 p.m.

Program: Technologies underlying the Boller-Sivill Observatory at Branched Oak – Brett Boller and Brian Sivill.



## Observatory Update: M96 Reprocessed

---

*Rick Johnson*

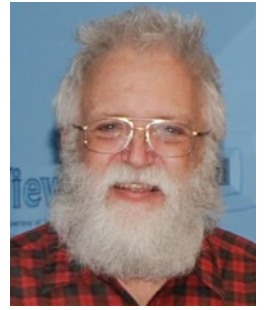
M 96 is a galaxy in Leo near and related to M 95. While M objects are numbered in the order that they were added to the list so can bounce all over the sky M 96 is in the same same part of the sky as M 95 and fits in the field of view of a very low power telescope. Both M96 and M95 were discovered the same day by Pierre Méchain, March 20, 1781. Four days later Messier observed and recorded them. For more on M96 see:

<http://messier.seds.org/m/m096.html>

Both M 96 and M 95 are at the same distance and show evidence of tidal interaction with another galaxy. Possibly each other and maybe M 105 which is part of the same group. M 96 is also about 38 million light years distant like the others in the group. Though red shift puts it much further away and NED's non redshift measurements show it a bit closer at 35 million light-years it appears most sources like the 38 million light-year distance. Note the very disturbed core in M 96. Like M 95, I processed this for the core

so the outer arms are rather weak. Though in this case they really are weak. As with M 95 many images of this guy over expose the core missing all the action. But they do pick up a large edge on spiral at the upper left edge of the galaxy in my shot.

Since the above was written in



2007 I've reprocessed the image discovering I lost a lot due to not understanding system noise and severe under exposure. For reasons I can't fathom I threw out the original data so can't go back to the very beginning to get the most out of my limited data. I prepared an [annotated](#) image showing all galaxies for which NED shows redshift distance data. Notice the outer arms of M 96 are so thin a galaxy over 4 billion light-years distant can easily be seen right through them. This indicates virtually no dust and gas exists in the outer arms, just stars. Without dust and gas no new stars are forming there. Many more galaxies are seen through the outer arms. I assume behind but without distance data this is just highly likely rather than proven. My color data is very thin so color is somewhat suspect.

The majority of galaxies in the image all are 730 to 760 million light-years distant. These would seem to be members of some cluster. All NED shows for my field is MSPM 02864 at 750 million light-years. But it gives no size, galaxy count or anything else on it. Somewhat southeast of my field is MSPM 02162 at 740 million light-years.

Again no other information is available. Searching one degree around my image center showed no other galaxy clusters at this distance. MSPM stands for the MultiScale Probability Mapping survey. It's an automated survey to find galaxies that may be related based on user provided input. So apparently it saw all these galaxies same as I did and lumped them into these groups but since whoever defined the size, count, distance parameters knew what they were that wasn't preserved at least in the data NED used. I didn't take time to dig further. If someone does please let me know what you find and I'll include it here.

Several asteroids were within my image frame but due to my poor technique only two are

seen even in the raw data. There's a wide gap between the luminance trails, far wider than can be explained by my taking the color data half way through the luminance. If I kept notes they were discarded with the original data so I can only surmise that clouds stopped the imaging for a couple hours then skies cleared and I continued. This was back before I had a cloud sensor that does this automatically now. So I knew what happened back then. Not 10 years later unfortunately.





## Does Mars Have Rings? Not Right Now, But Maybe One Day

Source: [NASA Website](#)

As children, we learned about our solar system's planets by certain characteristics -- Jupiter is the largest, Saturn has rings, Mercury is closest to the sun. Mars is red, but it's possible that one of our closest neighbors also had rings at one point and may have them again someday.

That's the theory put forth by NASA-funded scientists at Purdue University, Lafayette, Indiana, whose findings were published in the journal *Nature Geoscience*. David Minton and Andrew Hesselbrock developed a model that suggests that debris that was pushed into space from an asteroid or other body slamming into Mars around 4.3 billion years ago alternates between becoming a planetary ring and clumping together to form a moon.

One theory suggests that Mars' large North Polar Basin or

Borealis Basin -- which covers about 40 percent of the planet in its northern hemisphere -- was created by that impact, sending debris into space.

"That large impact would have blasted enough material off the surface of Mars to form a ring," Hesselbrock said.

Hesselbrock and Minton's model suggests that as the ring formed, and the debris slowly moved away from the Red Planet and spread out, it began to clump and eventually formed a moon. Over time, Mars' gravitational pull would have pulled that moon toward the planet until it reached the Roche limit, the distance within which a planet's tidal forces will break apart a celestial body that is held together only by gravity.

Phobos, one of Mars' moons, is getting closer to the planet. According to the model, Phobos

will break apart upon reaching the Roche limit, and become a set of rings in roughly 70 million years. Depending on where the Roche limit is, Minton and Hesselbrock believe this cycle may have repeated between three and seven times over billions of years. Each time a moon broke apart and reformed from the resulting ring, its successor moon would be five times smaller than the last, according to the model, and debris would have rained down on the planet, possibly explaining enigmatic sedimentary deposits found near Mars' equator.

"You could have had kilometer-thick piles of moon sediment raining down on Mars in the early parts of the planet's history, and there are enigmatic sedimentary deposits on Mars with no explanation as to how they got there," Minton said.

"And now it's possible to study that material."

Other theories suggest that the impact with Mars that created the North Polar Basin led to the formation of Phobos 4.3 billion years ago, but Minton said it's unlikely the moon could have lasted all that time. Also, Phobos would have had to form far from Mars and would have had to cross through the resonance of Deimos, the outer of Mars' two moons. Resonance occurs when two moons exert gravitational influence on each other in a repeated periodic basis, as major moons of Jupiter do. By passing through its resonance,

Phobos would have altered Deimos' orbit. But Deimos' orbit is within one degree of Mars' equator, suggesting Phobos has had no effect on Deimos.

"Not much has happened to Deimos' orbit since it formed," Minton said. "Phobos passing through these resonances would have changed that."

"This research highlights even more ways that major impacts can affect a planetary body," said Richard Zurek of NASA's Jet Propulsion Laboratory, Pasadena, California. He is the project scientist for NASA's Mars Reconnaissance Orbiter, whose gravity mapping

provided support for the hypothesis that the northern lowlands were formed by a massive impact.

Minton and Hesselbrock will now focus their work on either the dynamics of the first set of rings that formed or the materials that have rained down on Mars from disintegration of moons.

For more information about NASA missions investigating Mars, visit:

<https://mars.nasa.gov/>

## ***NASA Missions Provide New Insights into 'Ocean Worlds' in Our Solar System***

Source: [\*NASA Website\*](#)

Two veteran NASA missions are providing new details about icy, ocean-bearing moons of Jupiter and Saturn, further heightening the scientific interest of these and other "ocean worlds" in our solar system and beyond. The findings are presented in papers published Thursday by researchers with NASA's Cassini mission to Saturn and Hubble Space Telescope.

In the papers, Cassini scientists announce that a form of chemical energy that life can feed on appears to exist on Saturn's moon Enceladus, and Hubble researchers report additional evidence of plumes erupting from Jupiter's moon Europa.

"This is the closest we've come, so far, to identifying a place with some of the ingredients needed

for a habitable environment," said Thomas Zurbuchen, associate administrator for NASA's Science Mission Directorate at Headquarters in Washington. "These results demonstrate the interconnected nature of NASA's science missions that are getting us closer to answering whether we are indeed alone or not."

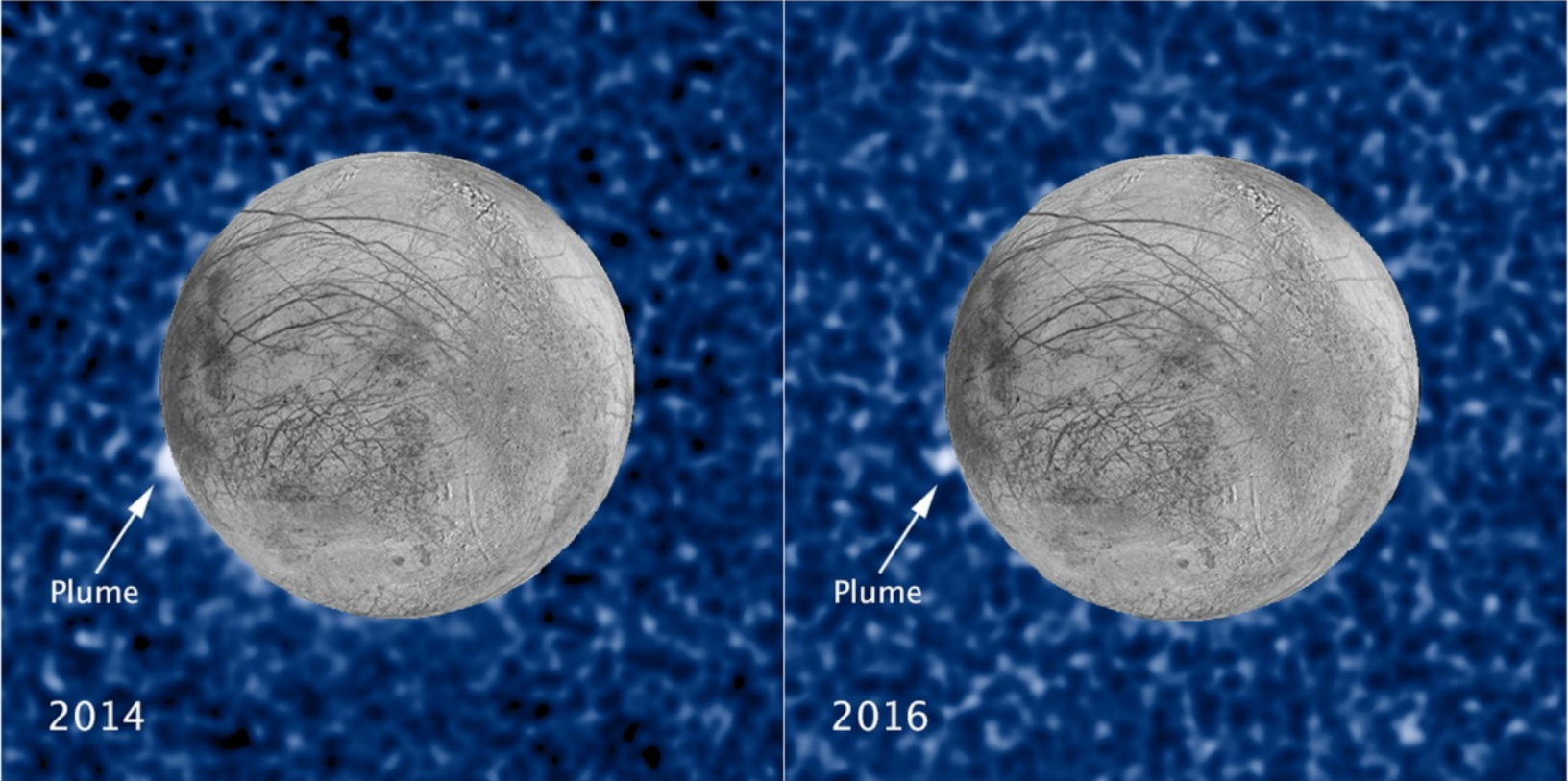
The paper from researchers with the Cassini mission, published in the journal *Science*, indicates hydrogen gas, which could potentially provide a chemical energy source for life, is pouring into the subsurface ocean of Enceladus from hydrothermal activity on the seafloor.

The presence of ample hydrogen in the moon's ocean means that microbes - if any exist there - could use it to obtain energy by

combining the hydrogen with carbon dioxide dissolved in the water. This chemical reaction, known as "methanogenesis" because it produces methane as a byproduct, is at the root of the tree of life on Earth, and could even have been critical to the origin of life on our planet.

Life as we know it requires three primary ingredients: liquid water; a source of energy for metabolism; and the right chemical ingredients, primarily carbon, hydrogen, nitrogen, oxygen, phosphorus and sulfur. With this finding, Cassini has shown that Enceladus - a small, icy moon a billion miles farther from the sun than Earth - has nearly all of these





*These composite images show a suspected plume of material erupting two years apart from the same location on Jupiter's icy moon Europa. Image Credit: NASA/ESA/W. Sparks (STScI)/USGS Astrogeology Science Center*

ingredients for habitability. Cassini has not yet shown phosphorus and sulfur are present in the ocean, but scientists suspect them to be, since the rocky core of Enceladus is thought to be chemically similar to meteorites that contain the two elements.

"Confirmation that the chemical energy for life exists within the ocean of a small moon of Saturn is an important milestone in our search for habitable worlds beyond Earth," said Linda Spilker, Cassini project scientist at NASA's Jet Propulsion Laboratory in Pasadena, California.

The Cassini spacecraft detected the hydrogen in the plume of gas and icy material spraying from Enceladus during its last, and deepest, dive through the plume on Oct. 28, 2015. Cassini also sampled the plume's

composition during flybys earlier in the mission. From these observations scientists have determined that nearly 98 percent of the gas in the plume is water, about 1 percent is hydrogen and the rest is a mixture of other molecules including carbon dioxide, methane and ammonia.

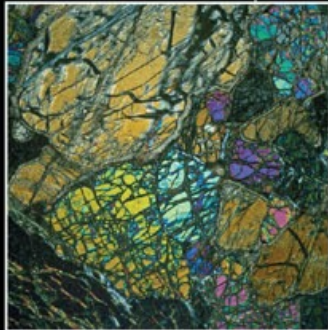
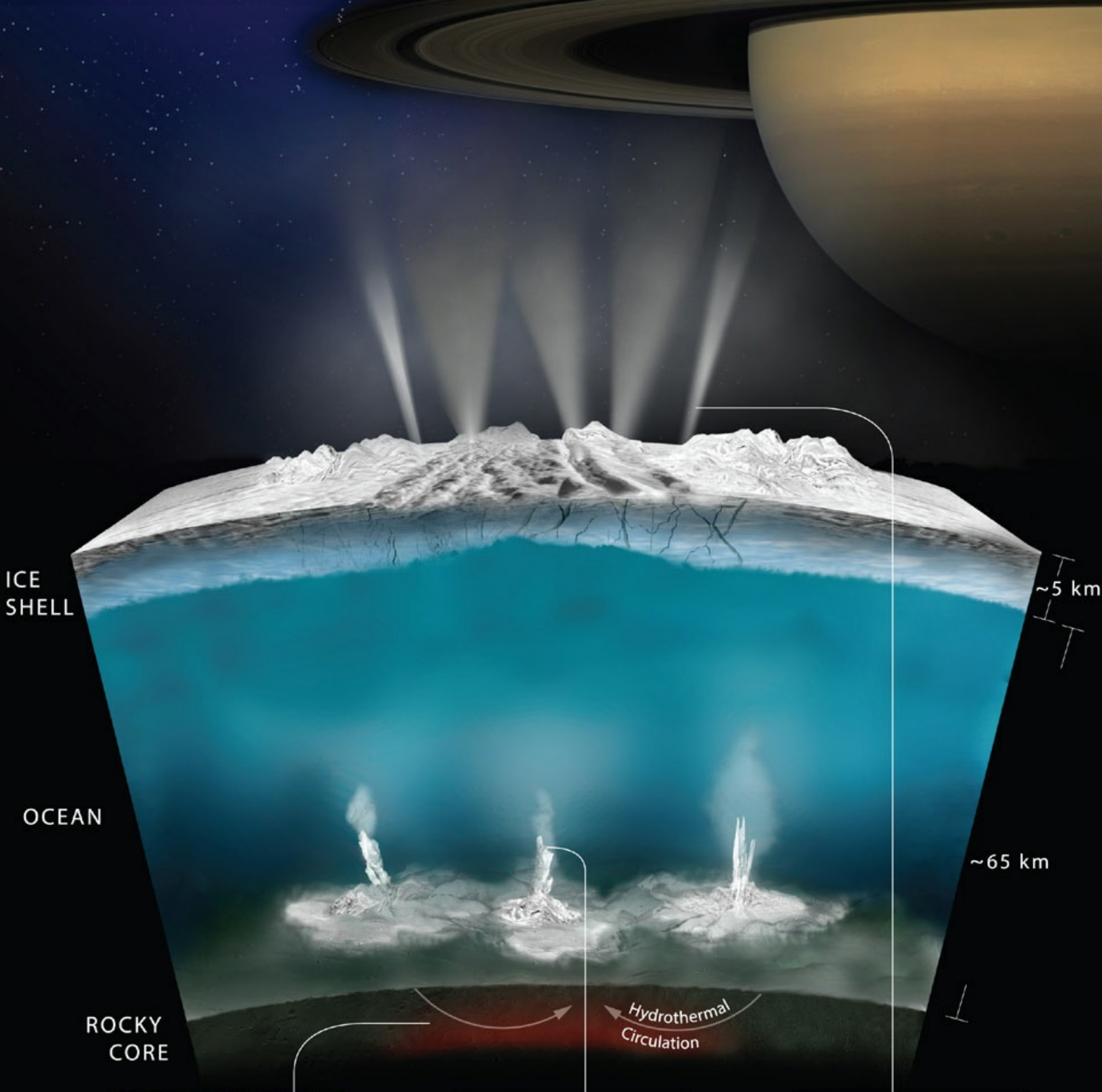
The measurement was made using Cassini's Ion and Neutral Mass Spectrometer (INMS) instrument, which sniffs gases to determine their composition. INMS was designed to sample the upper atmosphere of Saturn's moon Titan. After Cassini's surprising discovery of a towering plume of icy spray in 2005, emanating from hot cracks near the south pole, scientists turned its detectors toward the small moon.

Cassini wasn't designed to detect signs of life in the

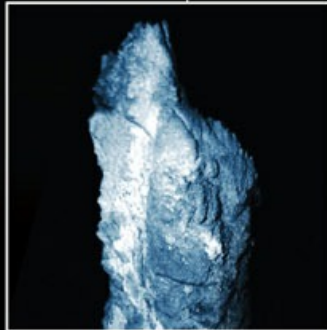
Enceladus plume - indeed, scientists didn't know the plume existed until after the spacecraft arrived at Saturn.

"Although we can't detect life, we've found that there's a food source there for it. It would be like a candy store for microbes," said Hunter Waite, lead author of the Cassini study.

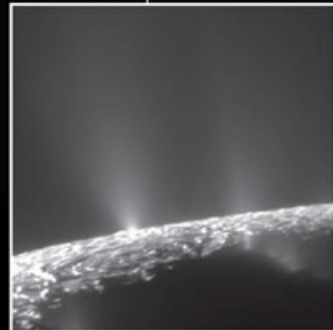
The new findings are an independent line of evidence that hydrothermal activity is taking place in the Enceladus ocean. Previous results, published in March 2015, suggested hot water is interacting with rock beneath the sea; the new findings support that conclusion and add that the rock appears to be reacting chemically to produce the hydrogen.



WATER-ROCK REACTIONS



HYDROTHERMAL VENTS  
("WHITE SMOKERS")



SURFACE JETS

# ENCELADUS



The paper detailing new Hubble Space Telescope findings, published in *The Astrophysical Journal Letters*, reports on observations of Europa from 2016 in which a probable plume of material was seen erupting from the moon's surface at the same location where Hubble saw evidence of a plume in 2014. These images bolster evidence that the Europa plumes could be a real phenomenon, flaring up intermittently in the same region on the moon's surface.

The newly imaged plume rises about 62 miles (100 kilometers) above Europa's surface, while the one observed in 2014 was estimated to be about 30 miles (50 kilometers) high. Both correspond to the location of an unusually warm region that contains features that appear to be cracks in the moon's icy crust, seen in the late 1990s by NASA's Galileo spacecraft. Researchers speculate that, like Enceladus, this could be evidence of water erupting from the moon's interior.

"The plumes on Enceladus are associated with hotter regions, so after Hubble imaged this new plume-like feature on Europa, we looked at that location on the Galileo thermal map. We discovered that Europa's plume candidate is sitting right on the thermal anomaly," said William Sparks of the Space Telescope Science Institute in Baltimore.

Sparks led the Hubble plume studies in both 2014 and 2016.

The researchers say if the plumes and the warm spot are linked, it could mean water being vented from beneath the moon's icy crust is warming the surrounding surface. Another idea is that water ejected by the plume falls onto the surface as a fine mist, changing the structure of the surface grains and allowing them to retain heat longer than the surrounding landscape.

For both the 2014 and 2016 observations, the team used Hubble's Space Telescope Imaging Spectrograph (STIS) to spot the plumes in ultraviolet light. As Europa passes in front of Jupiter, any atmospheric features around the edge of the moon block some of Jupiter's light, allowing STIS to see the features in silhouette. Sparks and his team are continuing to use Hubble to monitor Europa for additional examples of plume candidates and hope to determine the frequency with which they appear.

NASA's future exploration of ocean worlds is enabled by Hubble's monitoring of Europa's putative plume activity and Cassini's long-term investigation of the Enceladus plume. In particular, both investigations are laying the groundwork for NASA's Europa Clipper mission,

which is planned for launch in the 2020s.

"If there are plumes on Europa, as we now strongly suspect, with the Europa Clipper we will be ready for them," said Jim Green, Director of Planetary Science, at NASA Headquarters.

Hubble's identification of a site which appears to have persistent, intermittent plume activity provides a tempting target for the Europa mission to investigate with its powerful suite of science instruments. In addition, some of Sparks' co-authors on the Hubble Europa studies are preparing a powerful ultraviolet camera to fly on Europa Clipper that will make similar measurements to Hubble's, but from thousands of times closer. And several members of the Cassini INMS team are developing an exquisitely sensitive, next-generation version of their instrument for flight on Europa Clipper.

For more information on ocean worlds in our solar system and beyond, visit:

<https://www.nasa.gov/specials/ocean-worlds>

*Previous page: This graphic illustrates how Cassini scientists think water interacts with rock at the bottom of the ocean of Saturn's icy moon Enceladus, producing hydrogen gas. Credit: NASA/JPL-Caltech/Southwest Research Institute*



# 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!**

# May Observing: What to View

Jim Kvasnicka

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

## Planets

**Mars:** This is the last month Mars will be visible before it's lost in the Sun's glare.

**Jupiter:** Visible all night at magnitude -2.3 with a disk 41" wide.

**Saturn:** Rises just before 11:30 pm to start May and by 9:30 pm to end the month.

**Venus:** Venus is at its brightest at magnitude -4.7 to start May just before sunrise.

**Mercury/Uranus/Neptune:** Not visible in May.

## Messier List

**M49:** Galaxy in Virgo.

**M51:** The Whirlpool Galaxy in Canes Venatici.

**M61:** Galaxy in Virgo.

**M63:** The Sunflower Galaxy in Canes Venatici.

**M64:** The Black Eye Galaxy in Coma Berenices.

**M85:** Galaxy in Coma Berenices.

**M94:** Galaxy in Canes Venatici.

**M101:** The Pinwheel Galaxy in Ursa Major.

**M102:** Galaxy in Draco.

**M104:** The Sombrero Galaxy in Virgo.

**Last Month:** M40, M65, M66, M95, M96, M105, M106, M108, M109

**Next Month:** M58, M59, M60, M84, M86, M87, M88, M89, M90, M91, M98, M99, M100

## NGC and other Deep Sky Objects

**NGC 4244:** The Silver Needle Galaxy in Canes Venatici.

**NGC 4490:** The Cocoon Galaxy in Canes Venatici.

**NGC 4631:** The Whale Galaxy in Canes Venatici

**NGC 4666:** Elongated galaxy in Virgo.

## Double Star Program List

**Kappa Bootis:** Yellow primary with a blue secondary.

**Iota Bootis:** Yellow and dim blue stars.

**Pi Bootis:** Pair of white stars.

**Epsilon Bootis:** Yellow and greenish yellow stars.

**Xi Bootis:** Two yellow stars.

**Delta Bootis:** Yellow primary with a blue-white secondary.

**Mu Bootis:** Yellow pair.

**Zeta Corona Borealis:** Light blue and greenish yellow stars.

## Challenge Object

**NGC 5044 Group:** NGC 5044 is the brightest

member in a group of galaxies in Virgo that includes NGC 5037, NGC 5047, and NGC 5049.



## 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: Virgo

---

Jim Kvasnicka

## Virgo

Virgo, The Virgin, is well away from the dust of the Milky Way and contains a super abundance of galaxies. Eleven of them are Messier objects. Virgo is in the heart of the Coma-Virgo supercluster. In the central  $12^\circ \times 10^\circ$  area some 3,000 galaxies can be counted, and those are just the brightest members. Virgo covers 1,294 square degrees and is best seen in May.

## Showpiece Objects

**Galaxies:** M49, M58, M59, M60, M61, M84, M86, M87, M89, M90, M104

## Mythology

Virgo is named for the Greek goddess Demeter, the Earth goddess, and is associated with the arrival of spring and the growing season. Hades, the god of the Underworld, fell in love with Demeter's daughter, Persephone and carried her back to the Underworld. Demeter became worried and went to look for her. Zeus pleaded with Demeter to return. Demeter refused and continued to search for her daughter. People everywhere were starving and could not understand how the Earth goddess could be so cruel. Zeus sent Hermes to Hades telling him that Persephone must return home to Olympus. Demeter was happy but her Persephone told her mother she was in love with Hades. Zeus solved

the problem saying that Persephone would spend half of her time with Hades in the Underworld and half of her time with her mother in Olympus. Winter comes when Persephone goes to the Underworld and spring begins when she returns to Olympus.

## Number of Objects Magnitude 12.0 and Brighter

**Galaxies:** 69

**Globular Clusters:** 1

**Open Clusters:** 0

**Planetary Nebulae:** 0

**Dark Nebulae:** 0

**Bright Nebulae:** 0

**SNREM:** 0

*Photo: Till Credner - Own work: AlltheSky.com*





## NOAA's Joint Polar Satellite System (JPSS) to monitor Earth as never before

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](http://spaceplace.nasa.gov) to explore space and Earth science!

Ethan Siegel



Later this year, an ambitious new Earth-monitoring satellite will launch into a polar orbit around our planet. The new satellite—called JPSS-1—is a collaboration between NASA and NOAA. It is part of a mission called the Joint Polar Satellite System, or JPSS.

At a destination altitude of only 824 km, it will complete an orbit around Earth in just 101

minutes, collecting extraordinarily high-resolution imagery of our surface, oceans and atmosphere. It will obtain full-planet coverage every 12 hours using five separate, independent instruments. This approach enables near-continuous monitoring of a huge variety of weather and climate phenomena.

JPSS-1 will improve the prediction of severe weather events and will help advance early warning systems. It will also be indispensable for long-term climate monitoring, as it will track global rainfall, drought conditions and ocean properties.

The five independent instruments on board are the main assets of this mission:



*Caption: Ball and Raytheon technicians integrate the VIIRS Optical and Electrical Modules onto the JPSS-1 spacecraft in 2015. The spacecraft will be ready for launch later this year. Image Credit: Ball Aerospace & Technologies Corp.*

The Cross-track Infrared Sounder (CrIS) will detail the atmosphere's 3D structure, measuring water vapor and temperature in over 1,000 infrared spectral channels. It will enable accurate weather forecasting up to seven days in advance of any major weather events.

The Advanced Technology Microwave Sounder (ATMS) adds 22 microwave channels to CrIS's measurements, improving temperature and moisture readings.

Taking visible and infrared images of Earth's surface at 750 meter resolution, the Visible Infrared Imaging Radiometer Suite (VIIRS) instrument will enable monitoring of weather patterns, fires, sea temperatures, light pollution, and ocean color observations at unprecedented resolutions.

The Ozone Mapping and Profiler Suite (OMPS) will measure how ozone concentration varies with altitude and in time over every location on Earth's surface. This can help us

understand how UV light penetrates the various layers of Earth's atmosphere.

The Clouds and the Earth's Radiant System (CERES) instrument will quantify the effect of clouds on Earth's energy balance, measuring solar reflectance and Earth's radiance. It will greatly reduce one of the largest sources of uncertainty in climate modeling.

The information from this satellite will be important for

## From the Archives: April, 1971

---

### The President's Report 4-27-71

One night recently, Brian Rugg and Dan Cowell came out to my place to do some Messier observing. Brian brought along his recently purchased 6" telescope. This is the same instrument that I had bought new long ago, and it served me well as I went through the Messier catalog in 1963.

I became very interested in their progress when I was asked to confirm their location of the "pretty finder double, Rho Virginis." I now began to recall fond memories of my own adventures down the starry paths of Virgo, that are so well mapped out by Dr. Holyoke in his *Observe* book. Once again I went "2 degrees north to find M59 and M60 in the same field." I then took complete possession of the telescope and found M58, which is "1½ degrees west and very little north." I would have probably continued on the entire evening, but I had been a bit under the weather and the chill evening air soon got to me. I reluctantly gave the scope back to Brian and Dan.

I still contend that my excursion through the Messier objects was one of the most rewarding pleasures among my astronomical experiences.

I hope that more of our members will try for the Astronomical League Messier Award. It certainly would be well worth your while. Don't let the lack of a telescope stop you. My 6 and 8 inch telescopes are always available and of course there is the club's 12½ inch for everyone to use.

There have been a lot of requests recently for a star party, so we'll have one. Friday May 21st is the date and the place is my home near Hickman. If the weather is bad then we'll have it on the following night which is Saturday, May 22. Mark your calendar and come out for a good show one and all. And don't forget to bring your telescopes.

Earl Moser

## 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](http://cafepress.com):



Shop through Amazon Smile to automatically donate to PAC:



## CLUB OFFICERS

President Jim Kvasnicka  
(402) 423-7390  
[jim.kvasnicka@yahoo.com](mailto:jim.kvasnicka@yahoo.com)

Vice President Brett Boller

2nd VP Mark Dahmke  
(Program Chair)

Secretary Lee Thomas

Treasurer John Reinert  
[jr6@aol.com](mailto:jr6@aol.com)

Club Observing Chair Jim Kvasnicka  
[jim.kvasnicka@yahoo.com](mailto:jim.kvasnicka@yahoo.com)

Outreach Coordinator Mike Kearns  
[mkearns@neb.rr.com](mailto:mkearns@neb.rr.com)

Website and Newsletter Editor Mark Dahmke  
[mark@dahmke.com](mailto: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](mailto: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.