

The ECLIPSE

June
2017

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

June 21, 2017, 7:30 pm
Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

Topic TBD

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From the President:

Greetings,

I hope you have been keeping up with NASA's Juno mission? For Memorial Day weekend, I travelled to rural South Carolina and stayed four nights in a camper on an isolated section of my brother's farm. His zip code has about 800 people. As you can imagine, the sky there is extremely dark. I didn't take a telescope but was able to do lots of observing with a great pair of binoculars. I sat right by a pond in the company of countless frogs, crickets and yes, pesky mosquitos. As I am sure you have experienced at times, there were just too many stars to easily recognize some constellations. But there was no mistaking Jupiter. It stood out in all of its glorious brightness.

Juno launched in 2011 and has been in Jupiter's orbit since July 4, 2016. The first data-collection findings are now being published. Check out this statement from NASA, "Early science results from NASA's Juno mission to Jupiter portray the largest planet in our solar system as a complex, gigantic, turbulent world, with Earth-sized polar cyclones, plunging storm systems that travel deep into the heart of the gas giant, and a mammoth, lumpy magnetic field that may indicate it was generated closer to the planet's surface than previously thought".

Scott Bolton, Juno principal investigator said "There is so much going on here that we didn't expect that we have had to take a step back and begin to rethink of this as a whole new Jupiter." Juno's imager has captured incredible images of Jupiter's poles. I consider this enhanced composite image of Jupiter's south pole to be one of the most impressive images NASA has ever published of an object inside our solar



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Observing Highlights June and July

Open Clusters

M48, M44 (*Beehive*), M67,
Mel111 (*Coma Star Cluster*),
M6 (*Butterfly*), M7, M23

Galaxies

M81, M82,
NGC3115 (*Spindle Galaxy*), M95,
M96, M105, M108,
M65/M66/NGC3628
(*Leo Triplet*),
M109, M98, M99, M106, M61, M100,
M84, M85, M86, M49,
M87, M88, M91, M89, M90, M58,
M104 (*Sombrero Galaxy*), M59,
M60, M94,
M64 (*Black-Eye Galaxy*),
M63 (*Sunflower Galaxy*),
M51 (*Whirlpool Galaxy*),
M83, M101/M102

Variable Stars

R Leonis

Nebulae

NGC3242 (*Ghost of Jupiter*),
M97 (*Owl*), NGC6302 (*Bug*),
NGC6309 (*Box*),
NGC6543 (*Cat's Eye*)

Globular Clusters

M68, M53, M3, M5, M80, M4, M107,
M13, M12, M10, M62, M19, M92,
M9, M14

Multiple Star Systems

Gamma Leonis (*Algieba*),
M40, Gamma Virginis (*Porrima*),
Alpha Canum Venaticorum
(*CorCaroli*),
Zeta Ursae Majoris (*Mizar*),
Epsilon Bootis
(*Izar or Pulcherrima*)
Mu Bootis (*Alkalurops*),
Beta Scorpii (*Acrab*),
Alpha Herculis (*Rasalgethi*)

Upcoming Star Parties

Friday 6/16 8:30 pm to 10:30 pm	Public Star Party Bowie Nature Park (Fairview)
Saturday 6/17 8:30 pm to 10:00 pm	Public Star Party Montgomery Bell State Park
Friday 6/23 8:30 pm to 10:30 pm	Public Star Party Bells Bend Outdoor Center
Saturday 6/24	Natchez Trace Parkway mile marker 412 (Water Valley Overlook)
Saturday 7/1 9:00 pm to 11:00 pm	Public Star Party Edwin Warner Park



June 23
July 23



June 1, 30
July 30



June 9
July 8



June 17
July 16

Happy Birthday Ewen Whitaker by Robin Byrne

This month, we honor the life of a man who knew the Moon better than just about any other person... ever. Ewan Adair Whitaker was born June 22, 1922 in London, England. The son of a typesetter, George Whitaker, and housewife, Gladys, Ewen attended the John Roan School in Greenwich. This is a pricey, private boarding school, but Ewen received a scholarship to cover his expenses. When he left school, Ewen's first job was as a lab assistant, working for the Siemens Brothers electrical engineering company.

During World War II, Ewen worked for Project PLUTO (Pipe Line Under the Ocean), which was built under the English Channel to provide fuel to allied forces in France. Whitaker's job was to use UV spectral analysis to monitor the quality of the lead that surrounded the hollow cables which carried the fuel. He became quite adept at spectroscopy, which would have an influence on his later career. It was during this time that Whitaker earned a certificate in mechanical engineering from a local trade school. In 1946, Ewen married Beryl Hornswell. They had three children: Fiona, Graham, and Malcolm.

Despite having no formal training as an astronomer, in 1949, Whitaker found himself working at the Royal Greenwich Observatory. His experience with spectroscopy got Whitaker a job working on UV spectra of stars. However, it wasn't long before Ewen found his true calling: the Moon. A hand-drawn lunar map published in 1935 was the primary resource for all studies of the Moon. Whitaker spent his spare time updating the map with the use of information from photographs of the Moon. He was not only a member of the Lunar Section of the British Astronomical Association, but Whitaker soon took on a leadership role. In 1954, Whitaker published the first accurate chart of the Moon's South Polar region. Working with D. W. Arthur, they created names for various craters near the Moon's limb. All the names they suggested were adopted by the International Astronomical Union (IAU).



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Ewen Whitaker, continued

In 1955, Whitaker attended the IAU meeting held in Dublin, Ireland. It was here that he met Gerard Kuiper, who was the Director of Yerkes Observatory at the time. He must have made a good impression on Kuiper, because in 1958, Kuiper invited Whitaker to join the Lunar Project at Yerkes. Whitaker accepted. Their primary project was to create a high-quality photographic atlas of the Moon. Whitaker took images of the Moon with both the 40-inch telescope at Yerkes, and the 82-inch telescope at McDonald Observatory. After taking hundreds of images over a couple years, the Photographic Lunar Atlas was published in 1960.

That same year, Kuiper moved to the University of Arizona to establish the Lunar and Planetary Laboratory (LPL). Whitaker, along with over 300 others, joined the staff. Whitaker's first task was to use the facility's new 61-inch telescope to photograph the Moon. Meanwhile, a combination of the images from Yerkes and the new images were compiled into the Orthographic Atlas of the Moon (1961) and the Rectified Lunar Atlas (1963). Those images ultimately were published all together in the Consolidated Lunar Atlas (1967), which is still available for use through the Lunar and Planetary Institute's web page.

With the Moon being the ultimate goal of the space race, it was natural for the LPL to be at the forefront of information used by the space program. In 1964, Whitaker, along with Kuiper, Urey, Shoemaker, and Heacock, worked on the Lunar Ranger Project. Whitaker chose impact locations on the Moon for both Rangers 6 and 7. Ranger 7 provided the first up-close images of the Moon's surface. As the missions became more complex, Whitaker began using a technique developed by Fritz Zwicky, that looked at features in both UV and infrared light. By "subtracting" one image from the other, you could get information about the chemical composition of the features. Whitaker used this technique to choose landing sites for the Surveyor spacecraft, and later for Apollo landing sites. This project culminated in 1967 with the Lunar Orbiter 5 Scientific Site Selection Team, of which Whitaker was a member. The Lunar Orbiter 5 provided the most detailed images yet for choosing Apollo landing sites, as well as images of the Moon's far side that had never been photographed before.

Whitaker was a member of the Lunar Surveyor TV Investigator Team. Using images taken by the Surveyor landers of the area around the landing sites, Whitaker compared them to other images of the Moon, in an attempt to pinpoint where the landers were located. One of the goals of the Apollo 12 mission was to land near Surveyor

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Ewen Whitaker, continued

3 and retrieve some of the parts. Whitaker used Surveyor 3's images and saw two unique-looking rocks. After scanning through images of over 1000 craters, he found the rocks. Whitaker made the bold prediction that the astronauts would only have to walk a few hundred feet to the Surveyor 3 spacecraft. "If they don't, boy, I'm dead," Whitaker told The New York Times. They did. In 1969, Whitaker received a letter of commendation from President Nixon for this achievement. Whitaker also was responsible for briefing astronauts about the landing sites for the Apollo 13, 15, and 16 missions.

While Whitaker retired from LPL in 1978, he certainly didn't stop working. One project he worked on was to try to determine when Galileo made his famous sketches of the Moon that were published in *Sidereus Nuncius* in 1610. Whitaker used tables of solar data, along with his own photographs of the Moon, to prove that Galileo made 10 of his sketches on Nov. 30 - Dec. 18, 1609. Identifying a star in the last sketch as Theta Librae, Whitaker established that date as Jan. 19, 1610. Another project involved studying photographs of Uranus and its moon, Miranda. Using a plate-measuring technique that he devised, Whitaker determined the moon's orbital eccentricity and inclination.

Still, our moon continued to be his passion. Whitaker remained active in the IAU's Task Group for Lunar Nomenclature. In 1999, Whitaker published *Mapping and Naming the Moon*, on the history of lunar maps and nomenclature. In 2006, the IAU adopted a lettering system that Whitaker developed for designating unnamed craters on the Moon's far side. Whitaker also chose the craters on the far side of the Moon that were named for the astronauts who died in both the Challenger and Columbia tragedies. And, in 2007, Whitaker built a telescope based on a 16th century design created by Leonard Digges, which provided magnified wide-field views.

After all his years of work, and in recognition of his many contributions to astronomy, the University of Arizona awarded Ewen Whitaker an Honorary doctorate in 2011.

Ewen Whitaker died in Tucson, Arizona on October 11, 2016, at the age of 94. What an amazing life this man led, and what important contributions he made to the world of astronomy and space exploration. The next time you have a chance to gaze at the Moon, pause a moment and remember the man who knew that celestial body better than anyone else: Ewen Whitaker.

Ewen Whitaker, continued

References:

[Ewen Whitaker - Wikipedia](#)

[Ewen Whitaker, Who Guided NASA to the Moon, Dies at 94](#)

By William Grimes

New York Times, Oct 27, 2016

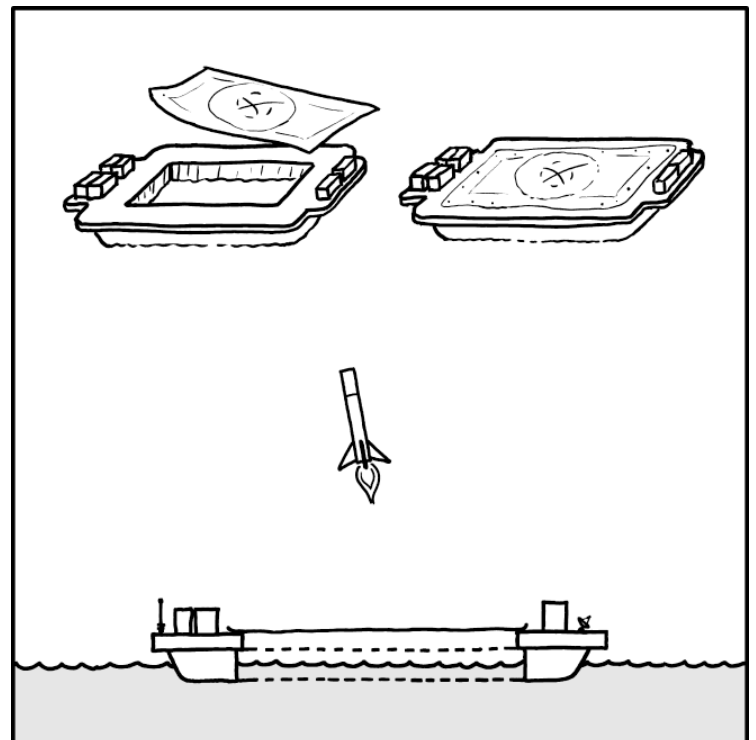
[Remembering Ewen A. Whitaker, 1922-2016](#)

By Charles A. Wood

Sky and Telescope Magazine, Oct. 17, 2016

[Lunar Orbiter 5 - Wikipedia](#)

[xkcd](#)



MY HOBBY: HOLLOWING OUT THE CENTER OF A BARGE, STRETCHING PAPER OVER THE HOLE PAINTED WITH THE SPACEX LOGO, AND LEAVING IT FLOATING OFFSHORE NEAR LAUNCH SITES.

Next BSAS meeting
June 19, 2017, 7:30 pm

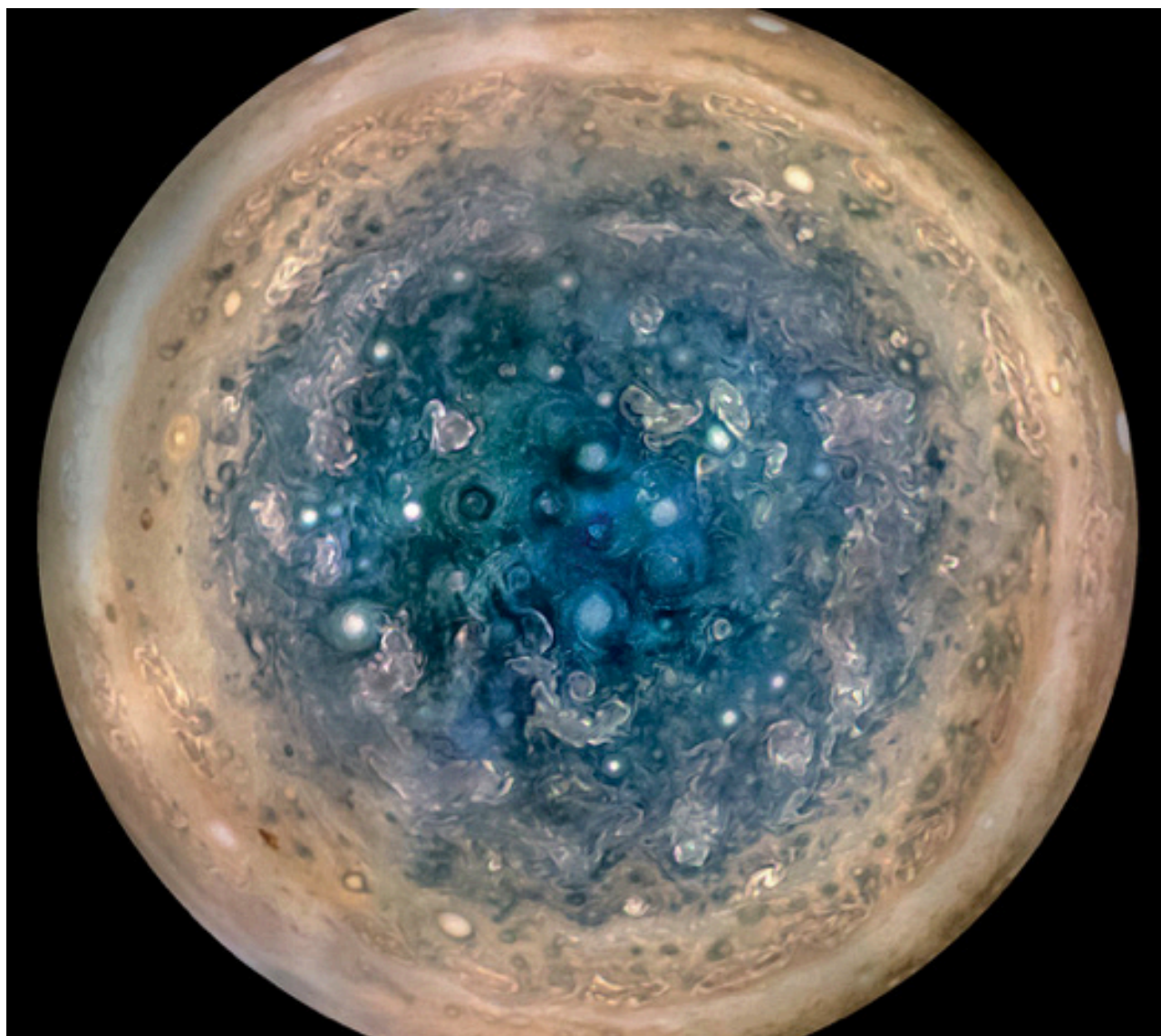
Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

Topic: TBD

From the President, continued

system. It never ceases to amaze me that whenever we are able to better explore a planet we come away with surprises and more questions than we had to begin with. The next flyby on July 11 will be directly over the Great Red Spot, so stay tuned. For the next several star parties, I'm confident more than one of our telescopes will be aimed at Jupiter. Perhaps telling a little more about Juno and the new discoveries it is bringing will heighten the interest of those viewing "a whole new Jupiter".

Gary Eaton



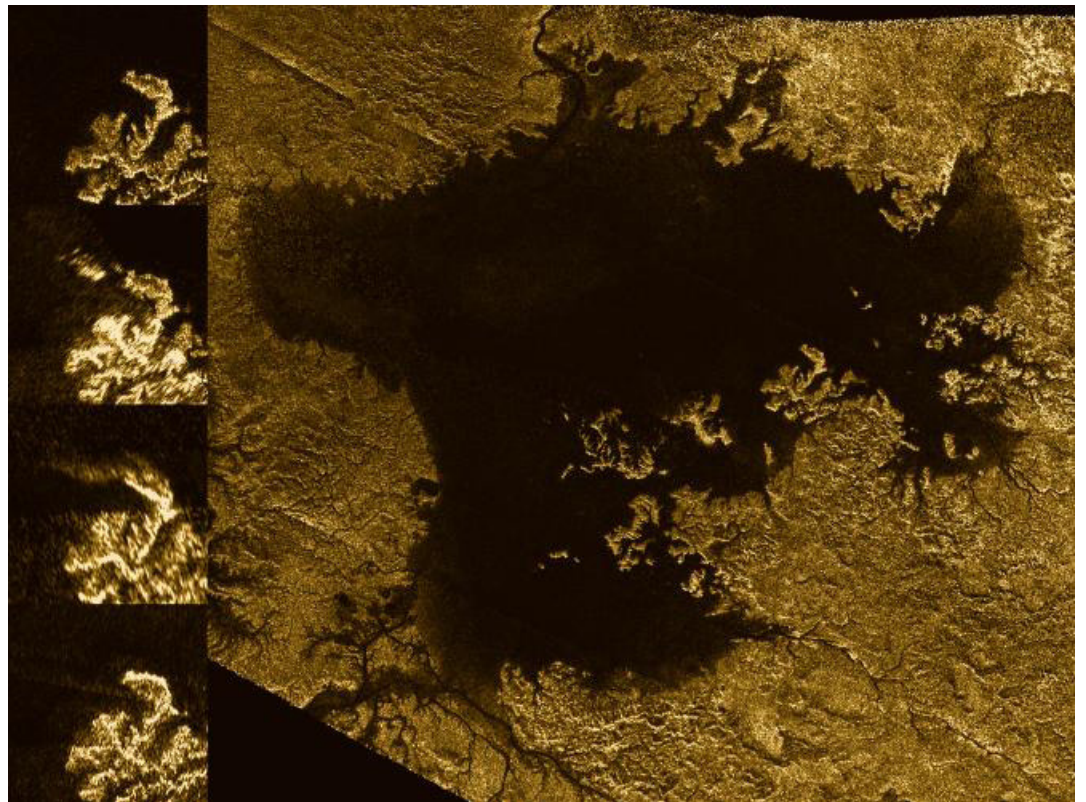
This image shows Jupiter's south pole, as seen by NASA's Juno spacecraft from an altitude of 32,000 miles (52,000 kilometers). The oval features are cyclones, up to 600 miles (1,000 kilometers) in diameter. Multiple images taken with the JunoCam instrument on three separate orbits were combined to show all areas in daylight, enhanced color, and stereographic projection.

Credits: [NASA/JPL-Caltech/SwRI/MSSS/Betsy Asher Hall/Gervasio Robles](#)

The Fizzy Seas of Titan By Marcus Woo

With clouds, rain, seas, lakes and a nitrogen-filled atmosphere, Saturn's moon Titan appears to be one of the worlds most similar to Earth in the solar system. But it's still alien; its seas and lakes are full not of water but liquid methane and ethane.

At the temperatures and pressures found on Titan's surface, methane can evaporate and fall back down as rain, just like water on Earth. The methane rain flows into rivers and channels, filling lakes and seas.



Radar images from Cassini showed a strange island-like feature in one of Titan's hydrocarbon seas that appeared to change over time. One possible explanation for this "magic island" is bubbles. Image credits: NASA/JPL-Caltech/ASI/Cornell

Nitrogen makes up a larger portion of the atmosphere on Titan than on Earth. The gas also dissolves in methane, just like carbon dioxide in soda. And similar to when you shake an open soda bottle, disturbing a Titan lake can make the nitrogen bubble out.

But now it turns out the seas and lakes might be fizzier than previously thought. Researchers at NASA's Jet Propulsion Laboratory recently experimented with dissolved nitrogen in mixtures of liquid methane and ethane under a variety of temperatures and pressures that would exist on Titan. They measured how different conditions would trigger nitrogen bubbles. A fizzy lake, they found, would be a common sight.

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The Fizzy Seas of Titan, continued

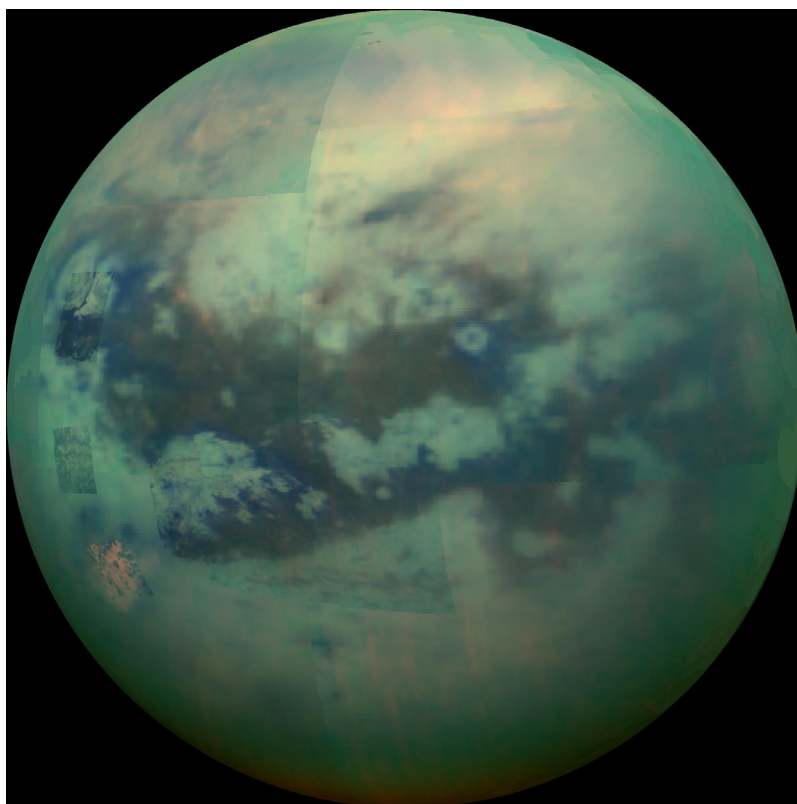
On Titan, the liquid methane always contains dissolved nitrogen. So when it rains, a methane-nitrogen solution pours into the seas and lakes, either directly from rain or via stream runoff. But if the lake also contains some ethane—which doesn't dissolve nitrogen as well as methane does—mixing the liquids will force some of the nitrogen out of solution, and the lake will effervesce.

“It will be a big frothy mess,” says Michael Malaska of JPL. “It’s neat because it makes Earth look really boring by comparison.”

Bubbles could also arise from a lake that contains more ethane than methane. The two will normally mix, but a less-dense layer of methane with dissolved nitrogen—from a gentle rain, for example—could settle on top of an ethane layer.

In this case, any disturbance—even a breeze—could mix the methane with dissolved nitrogen and the ethane below. The nitrogen would become less soluble and bubbles of gas would fizz out.

Heat, the researchers found, can also cause nitrogen to bubble out of solution while cold will coax more nitrogen to dissolve. As the seasons and climate change on Titan, the seas and lakes will inhale and exhale nitrogen.



This composite image shows an infrared view of Saturn's moon Titan from NASA's Cassini spacecraft, acquired during the mission's "T-114" flyby on Nov. 13, 2015. The spacecraft's visual and infrared mapping spectrometer (VIMS) instrument made these observations, in which blue represents wavelengths centered at 1.3 microns, green represents 2.0 microns, and red represents 5.0 microns. A view at visible wavelengths (centered around 0.5 microns) would show only Titan's hazy atmosphere. The near-infrared wavelengths in this image allow Cassini's vision to penetrate the haze and reveal the moon's surface.

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The Fizzy Seas of Titan, continued

But such warmth-induced bubbles could pose a challenge for future sea-faring spacecraft, which will have an energy source, and thus heat. “You may have this spacecraft sitting there, and it’s just going to be fizzing the whole time,” Malaska says. “That may actually be a problem for stability control or sampling.”

Bubbles might also explain the so-called magic islands discovered by NASA’s Cassini spacecraft in the last few years. Radar images revealed island-like features that appear and disappear over time. Scientists still aren’t sure what the islands are, but nitrogen bubbles seem increasingly likely.

To know for sure, though, there will have to be a new mission. Cassini is entering its final phase, having finished its last flyby of Titan on April 21. Scientists are already sketching out potential spacecraft—maybe a buoy or even a submarine—to explore Titan’s seas, bubbles and all.

To teach kids about the extreme conditions on Titan and other planets and moons, visit the [NASA Space Place](https://spaceplace.nasa.gov).

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!



Barnard-Seyfert Astronomical Society
Minutes of a Regular Meeting of the Board of Directors
Held On Wednesday, May 3, 2017.

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held May 3, 2017, in the board room at the Girl Scouts office, Nashville, TN 37204. Present were Mike Benson, Spencer Buckner, Gary Eaton, Drew Gilmore, Tom Guss, Bud Hamblen, Todd Nannie and Theo Wellington. Gary asked for a motion to approve the minutes of the April 5, 2017, meeting of the board. Spencer made the motion, Todd seconded and the minutes were approved by unanimous voice vote. Tom reported there was \$2,849.44 in the checking account and \$1,870.26 in the savings account. No membership report was made.

Upcoming public star parties were discussed: Long Hunter State Park on May 13 from 8:30 to 10:30 PM, Cornelia Fort Air Park on June 3 from 9:00 to 11:00 PM, Bowie Nature Park on June 16 from 8:30 to 10:30 PM, Montgomery Bell State Park on June 17 from 2:00 to 4:00 PM (Chuck Schlemm) and 8:30 to 10:00 PM, Fairview Nature Fest at Bowie Nature Park on September 9 from 10:00 AM to 4:00 PM (Chuck). The Bells Bend makeup date was set for June 23.

Upcoming meeting programs were discussed: the Middle Tennessee Science and Engineering Fair astronomy winners will be at the May meeting, Paul Lewis will be asked to be at the June meeting, Terry Reeves and Gary Eaton will present a "What's Up" at the July meeting, there will be an eclipse panel discussion at the August meeting to be at Adventure Science Center, there will be a post-eclipse photo show and discussion and a report on the Citizen Cate project at the September meeting, Keith Rainey will present Telescope and Optics Maintenance at the October meeting, Spencer Buckner will present All I Want for Christmas are Astronomy Toys at the November meeting, and JanaRuth Ford and Lonnie Puterbaugh will be asked to present meteorites and meteorite impacts at the pot-luck dinner meeting in December.

Metro Parks are holding public events and needed solar telescopes at the Parthenon in Centennial Park on June 21 from 9:45 to 11:15 AM, and at the Nature Center in Edwin Warner Park on July 12 from 10:00 AM to noon. There is a booth request at the Adventure Science Center on August 19 and 20.

Drew noted that he is updating the club web site with new eclipse events.

Resolution 2017-05-03-1: Authorize Tom Guss to pay the Astronomical League dues for the BSAS. Mike Benson made the motion, Spencer Buckner seconded, and the motion carried unanimously by voice vote.

There being no further business, Tom moved to adjourn, Spencer seconded, and the meeting was adjourned.

Respectfully submitted,

Bud Hamblen
Secretary

**Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held On Wednesday, May 17, 2017.**

The Barnard-Seyfert Astronomical Society held its monthly meeting in the City Room at the Girls Scout office, 4522 Granny White Pike, Nashville, Tennessee, on Wednesday, May 17, 2017. About 30 members were present.

Gary Eaton called the meeting to order at 7:30pm. The minutes of the April 19 meeting as printed in the May issue of the Eclipse were adopted, without discussion, by voice vote.

Keith Rainey reported that there were 106-107 members.

Lonnie Puterbaugh, John Walker and Gary Eaton were at Brentwood Baptist Church on April 1, 2017. Gary reported that there were about 150 attendees.

Upcoming events include the Earth Day Festival at Centennial Park on April 22, a public star party at Bells Bend Outdoor Center on April 28, and a public star party at Long Hunter State Park on May 13. Pickett State Park will hold an International Dark-Sky Association celebration on April 22. The club meeting on August 16 will be oriented toward solar eclipse preparation. Public solar viewing events are scheduled at the Parthenon on June 21 from 9:45 to 11:15, and at the Warner Park Nature Center (not the Special Events Field) on July 21 from 10 to 12. Solar telescopes will be needed.

Todd Nannie asked that members let him know what club owned equipment they currently have.

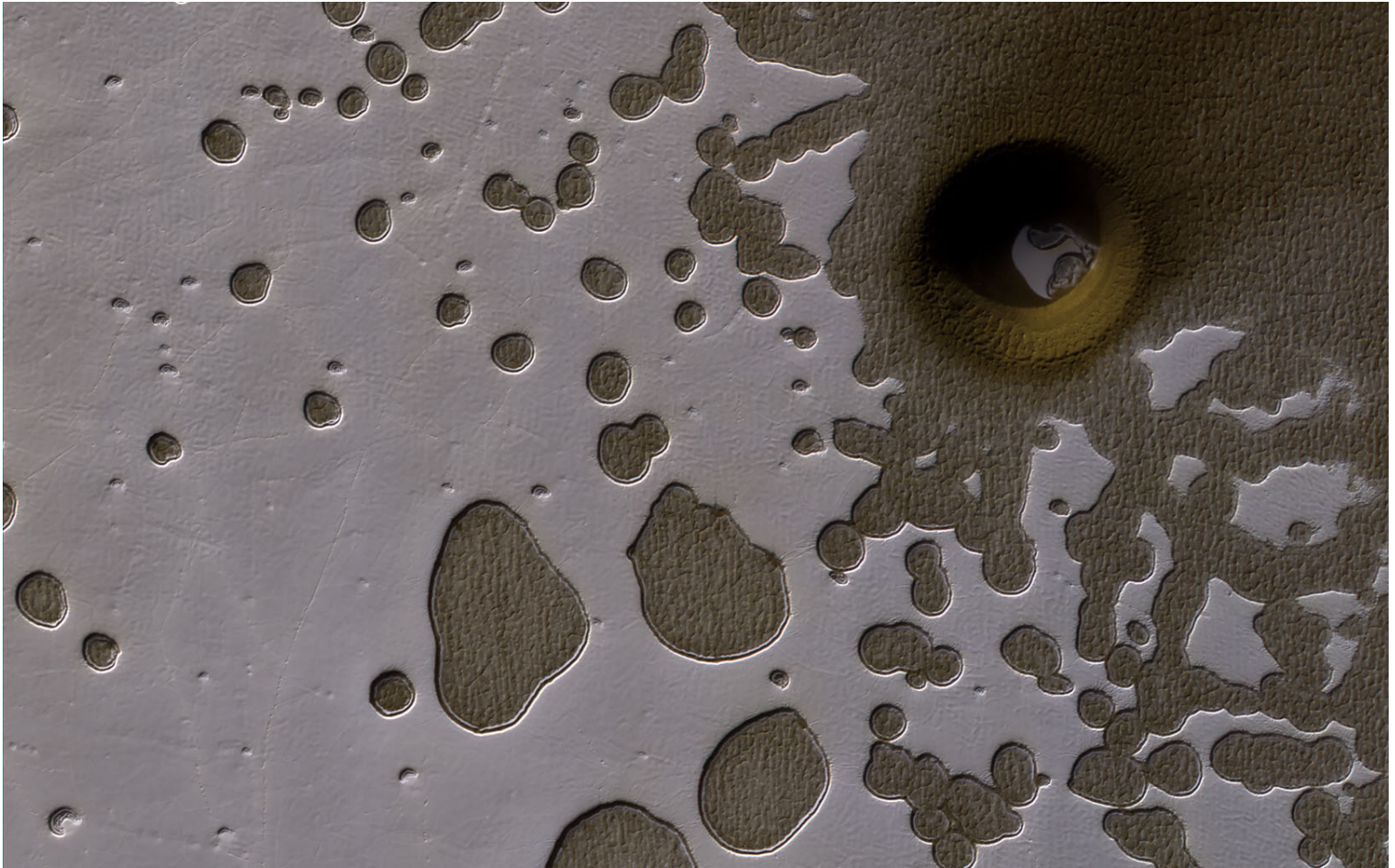
Dr JanaRuth Ford made a presentation on meteorite impact sites in Tennessee and Alabama, and discussed the material available for outreach at the Night Sky Network. One incentive for using NSN material is that when the club is credited for using NSN material, it becomes eligible to receive more goodies from NASA.

There being no further business the meeting was adjourned at 9:00pm.

Respectfully submitted,

Bud Hamblen

Secretary



A South Polar Pit or an Impact Crater?

This observation from NASA's Mars Reconnaissance Orbiter shows it is late summer in the Southern hemisphere, so the Sun is low in the sky and subtle topography is accentuated in orbital images. We see many shallow pits in the bright residual cap of carbon dioxide ice (also called "Swiss cheese terrain"). There is also a deeper, circular formation that penetrates through the ice and dust. This might be an impact crater or it could be a collapse pit.

The University of Arizona, Tucson, operates HiRISE, which was built by Ball Aerospace & Technologies Corp., Boulder, Colo. NASA's Jet Propulsion Laboratory, a division of Caltech in Pasadena, California, manages the Mars Reconnaissance Orbiter Project for NASA's Science Mission Directorate, Washington. Image credit: [NASA/JPL-Caltech/Univ. of Arizona](https://www.nasa.gov/jpl-caltech-univ-of-arizona)



Become a Member of BSAS!
Visit bsasnashville.com to join online.

All memberships have a vote in BSAS elections and other membership votes. Also included are subscriptions to the BSAS and Astronomical League newsletters.

Annual dues:

Regular: \$25
Family: \$35
Senior/Senior family: \$20
Student:* \$15

* To qualify as a student, you must be enrolled full time in an accredited institution or home schooled.

About BSAS

Organized in 1928, the Barnard-Seyfert Astronomical Society is an association of amateur and professional astronomers who have joined to share our knowledge and our love of the sky.

The BSAS meets on the third Wednesday of each month at the Cumberland Valley Girl Scout Building at the intersection of Granny White Pike and Harding Place in Nashville. Experienced members or guest speakers talk about some aspect of astronomy or observing. Subjects range from how the universe first formed to how to build your own telescope. The meetings are informal and time is allotted for fellowship. You do not have to be a member to attend the meetings.

Membership entitles you to subscriptions to *Astronomy and Sky & Telescope* at reduced rates; the club's newsletter, the *Eclipse*, is sent to members monthly. BSAS members also receive membership in the Astronomical League, receiving their quarterly newsletter, the *Reflector*, discounts on all astronomical books, and many other benefits.

In addition to the meetings, BSAS also sponsors many public events, such as star parties and Astronomy Day; we go into the schools on occasion to hold star parties for the children and their parents. Often the public star parties are centered on a special astronomical event, such as a lunar eclipse or a planetary opposition.

Most information about BSAS and our activities may be found at bsasnashville.com. If you need more information, write to us at info@bsasnashville.com.

Free Telescope Offer!

Did someone say free telescope? Yes, you did read that correctly. The BSAS Equipment & Facilities Committee has free telescopes ranging in size from 2.6" to 8" that current members can actually have to use for up to 60 days at a time. We also have some other items in the loaner program such as a photometer, H-alpha solar telescope, educational CDs, tapes, DVDs, and books. Some restrictions apply. A waiting list is applicable in some cases. The BSAS Equipment Committee will not be held responsible for lost sleep or other problems arising from use of this excellent astronomy gear. For information on what equipment is currently available, contact info@bsasnashville.com.