

# Celestial Observer

The Official Newsletter of the  
Amateur Observers' Society of NY, Inc.  
A 501(c)3 organization

June 2017



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Next Meeting: Sunday, June 4, 1:15pm  
Hofstra University Berliner Hall, Rm 117  
Bldg 62, California Ave, Hempstead, NY

[www.facebook.com/pages/Amateur-Observers-Society-of-New-York-AOSNY/368529386242](https://www.facebook.com/pages/Amateur-Observers-Society-of-New-York-AOSNY/368529386242)  
**In case of inclement weather, or other unusual situation, please call Hofstra at 516-463-7669**

## The President's Message-Sue Rose

Thanks very much to long time AOS member **Craig** for his fantastic presentation about the upcoming Great American total solar eclipse on Aug 21. Since he is one of the world's experts, it's always great to hear him discuss this incredible passion. If you haven't made arrangements, you may be too late, but, never give up hope. Do something or you will be confined to the 71% here in NY. There's still time to plan for April 8, 2024 so don't delay.

For our June meeting, we are very fortunate to once again host author **Dava Sobel** who will discuss her latest book, "The Glass Universe." Go to your favorite bookshop and get a copy for her to sign. Her books are always a good read. We'll also be discussing our plans for the summer since our next meeting won't be until Sept 10. There are many observing opportunities and activities during that hiatus. Hope to hear all your observing reports in Sept.

It is with deep sadness that the board accepted the resignation of Jones Beach Observatory Director **Gene**. He also removed his name from VP nomination. Gene has been an integral part of the observatory both in setting it up and in the continued operation, and in the operation of the club through his participation on the board as VP, coming off his success with the latest Astronomy Day program. His absence will surely be felt by all, but especially by me and **George**, the Assistant Director. We are very grateful for his efforts over the past few years and wish him well in his increased leisure time. He's not disappearing, just decreasing his obligations. The position of VP was left blank for the election as the remaining board was reelected. **Joe S** will be involved in other capacities. Thanks to all the board members for your continued participation and to **Phil** for his efforts in the election process.

**Picnic**-If we don't get a host volunteer by the June meeting, the 2017 picnic will be canceled.

**MAUS dates** are confirmed. See the schedule elsewhere. Volunteers are needed for these fun events.

**\*Remember, the only dumb question is the one you don't ask.\***  
**Friends are like stars....You don't always see them,**  
**but you know they are always there!**

*The AOS expresses its deepest appreciation to the Hofstra University Physics & Astronomy Dept. for hosting our meetings, the Custer Institute for hosting our Suffolk Observatory, the NYS Parks Dept for hosting our Nassau Observatory, the Sierra Club Long Island Group for the 20" telescope, <http://newyork.sierraclub.org/longisland/>, and the East Meadow Public Library for hosting our Young Astronomers series programs.*

**AOS Activities Calendar June and July- Linda Prince**

|                            | Date/time         | Event   | Location   |
|----------------------------|-------------------|---|--|
| <b>J<br/>U<br/>N<br/>E</b> | <b>2</b> TBA      | Public Star Party for Elementary School - <i>volunteers needed</i>                  | Maria Regina School<br>4045 Jerusalem Ave., Seaford        |
|                            | <b>4</b> 1:15 pm  | Club Meeting  | Rm. 117, Berliner Hall, California Ave., Hofstra U.        |
|                            | <b>10</b> 8:15 am | City of Stars Tour #1<br>(see below)  | LIRR rest area, Penn Station, Manhattan                    |
| <b>E</b>                   | <b>10</b> 8 am    | East Meadow Pride Day Outreach<br>Solar Observing - <i>volunteers needed</i>        | Speno Park, East Meadow Ave<br>East Meadow                 |
| <b>J<br/>U<br/>L<br/>Y</b> | <b>1</b> 8:15 am  | City of Stars Tour #2<br>(See below)  | LIRR rest area, Penn Station, Manhattan                    |
|                            | <b>6</b> 8 pm     | Public Stargazing Program - <i>volunteers needed</i>                                | AOSOJB***  |
|                            | <b>8</b> 7-10 pm  | <b>MAUS</b> Program (Desert Highway, the Eagles Tribute) - <i>volunteers needed</i> | Harry Chapin Lakeside Theater<br>Eisenhower Pk., E. Meadow |
|                            | <b>13</b> 8 pm    | Public Stargazing Program - <i>volunteers needed</i>                                | AOSOJB***  |
|                            | <b>20</b> 8 pm    | Public Stargazing Program - <i>volunteers needed</i>                                | AOSOJB***  |
|                            | <b>27</b> 8 pm    | Public Stargazing Program - <i>volunteers needed</i>                                | AOSOJB***  |

\*SMSP = Sunken Meadow State Park, Field 3    \*\*RMSP = Robert Moses State Park, Field 2  
both require NYS Parks Stargazing Permit

\*\*\*AOSOJB = AOS Observatory at Jones Beach Nature Center

\*\*\*\*MAUS = Music and Astronomy Under the Stars

**Outreach Activities - Thanks to all of our volunteers!! - Linda Prince**

***Volunteers are unpaid, not because they are worthless, but because they are priceless!***

**The Golden Rule of Astronomy:**

**“If you own a telescope, you have a moral obligation to share the view!” – John Dobson**

**AOS City of Stars Tour June 10th and July 1st**

The **City of Stars** tour is a mostly walking all-day tour to visit astronomy-themed landmarks in New York City. The ceiling of stars at Grand Central Terminal comes to mind, but did you know that there's an eclipse clock at Penn Station? This tour, inspired by the "City of Stars" special edition of Natural History Magazine written by Hayden Planetarium director Neil deGrasse Tyson, will take us to 13 locations in Manhattan between 42nd and 111th Streets. Participants should expect to do a significant amount of walking throughout the day. The June 10 and July 1 tours are identical. Contact **Linda Prince** to register.

**Dates for 2017 MAUS events**

The AOS has for several years supported the Hofstra University Music Under the Stars programs, directed by Prof. Donald Lubowich, in which club members operate telescopes and interact with the public at concerts in the parks. This event is a wonderful opportunity to share our love of astronomy and observing with the public, and helps our treasury as well! This year's schedule is as follows:

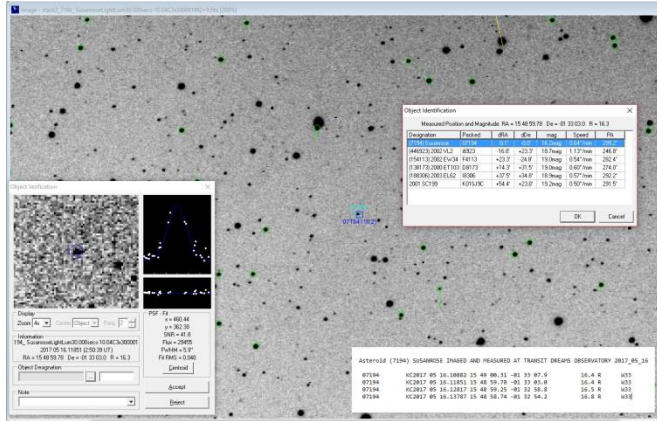
**Sat. July 8, 7-10 pm** - Harry Chapin Lakeside Theater, Eisenhower Park, East Meadow –  
*Desert Highway, the Eagles Tribute*

**Sat. Aug. 5, 6-10 pm** - Baldwin Park, Baldwin - *Reflections - A tribute to the Ladies of Motown, also Baldwin Chamber of Commerce Family Day with fireworks*

**Fri., Aug. 25, 6-11 pm (rain date Sat. Aug. 26)** - Jones Beach Central Mall Boardwalk near the band shell, Jones Beach State Park, Wantagh

**Sat. Oct. 7, 7-10 pm** - Sagamore Hill National Monument, Oyster Bay (non-music astronomy event)

**Asteroid Astrometry-Dennis**



I wanted to share an image of one of the asteroids I measured while conducting my asteroid astrometry program on Monday night. The images used to derive the measurements, shown at the lower right in the photo, consisted of 40 images, 30 seconds each with the ccd binned at 3x3 to increase ty. The images were captured in 4 groups of 10 with 8 minute separating the groups. The groups were stacked in Astrometrica software which also did the measuring. Stacking the image groups was necessary to create enough signal for an accurate measurement. It was measured at magnitude 16.5. It is

currently cruising through the constellation of Serpens Caput. What's significant about this asteroid is its name. It is named for our president Sue Rose, for her decades of support to the astronomical community. Sue was surprised with the announcement, and presentation of a beautiful plaque at the 2009 ALCon convention hosted by the AOS at Hofstra University.

**Anagram - ASTRONOMER:** When you rearrange the letters: **MOON STARER**

**Notes from Our Observatories**



**Observatory East (Susan F. Rose Observatory) - Dir. Bill Crispino, Operator Alan Cousins**  
 Open to the public every clear Saturday night on the grounds of Custer Institute in Southold. Additional help is welcome; private observing can be made afterward. Contact Bill for equipment training.

**Observing Projects for Month [www.theskyscrapers.org](http://www.theskyscrapers.org)**

The June 9<sup>th</sup> the Moon will be at the farthest point in its' orbit, apogee, providing a smaller diameter full Moon or micro Moon. If you want to take a photo to compare the apogee and perigee full Moons, start now. The next micro is July 2018. Saturn will be at opposition on June 15, which presents a great opportunity to see the majestic rings at its' best. Jupiter is still visible in the evening so keep watching those moons wink in and out. Mars will be leaving our evening sky early on and Venus has already moved to the morning skies. On June 20, we will celebrate the Summer Solstice, the point at which the Sun is at the highest elevation in our sky for the year causing the shortest shadows. It's all downhill after this. On June 22, we delight in many occultations as the Moon finds its' way through the Hyades and ultimately covers the bright red Bull's eye of Aldebaran. Always a fun few hours as stars peek in and out around the Moon.

**International Dark Sky Association** learn more about light pollution and its effects on us and our world <http://darksky.org/>

**Lunar X & V Observations** See <http://www.eyesonthesky.com/Moon/LunarX.aspx>. June 1 after 5pm. Let us know if you see it.

**Meteor Showers** <http://www.theskyscrapers.org/meteor-showers>, <http://www.amsmeteors.org/>

**Heavens Above**-Information on when the International Space Station and other satellites are visible in your sky. <http://www.heavens-above.com/>

**Start hunting for supernovae** [www.zooniverse.org/projects/dwright04/supernova-hunters](http://www.zooniverse.org/projects/dwright04/supernova-hunters)

**Astronomical Phenomena for 2017** [http://aa.usno.navy.mil/publications/reports/ap17\\_for\\_web.pdf](http://aa.usno.navy.mil/publications/reports/ap17_for_web.pdf)

**Solar Eclipse Trivia Facts-Larry Gerstman**

Baily's Beads were named by Francis Baily in 1836 from his observations of an ANNULAR not a total solar eclipse. [https://en.wikipedia.org/wiki/Francis\\_Baily](https://en.wikipedia.org/wiki/Francis_Baily) Actually Edmund Halley first described these beads after witnessing the 1715 total solar eclipse in Great Britain. The pink prominences seen during totality were a mystery to the early astronomers who thought they were part of the moon's atmosphere until an eclipse in 1851. The centerline of the total eclipse path does not have the longest totality. The moon's gravitational center being different from the center of the moon's figure plus effects of the lunar limb profile generally puts the longest totality just south of the centerline up to several kilometers. Also, duration of totality falls off faster going north of the centerline than going south of it so being a just a couple of miles north of the center line is likely to have several seconds shorter totality than being the same distance south. Ever wonder who named the white atmosphere of the sun, the corona? It was Jose´ Ferrer. No not the actor, but Jose´ Joaquin de Ferrer in 1806. [https://en.wikipedia.org/wiki/Jose\\_Joaquin\\_de\\_Ferrer](https://en.wikipedia.org/wiki/Jose_Joaquin_de_Ferrer) The attachment is from a great old book (about 1900) by Mable Loomis on total solar eclipses that can be read for free online at [https://books.google.com/books?id=FI0-AAAAYAAJ&dq=Total+Eclipses+of+the+Sun+By+Mabel+Loomis+Todd&printsec=frontcover&source=bl&ots=7P4T7ghgPe&sig=WvDlzF7jbU8FEfnI8Yk6lGNfH9s&hl=en&ei=2wdFS6LVA4XgNb-hpPEB&sa=X&oi=book\\_result&ct=result#v=onepage&q&f=false](https://books.google.com/books?id=FI0-AAAAYAAJ&dq=Total+Eclipses+of+the+Sun+By+Mabel+Loomis+Todd&printsec=frontcover&source=bl&ots=7P4T7ghgPe&sig=WvDlzF7jbU8FEfnI8Yk6lGNfH9s&hl=en&ei=2wdFS6LVA4XgNb-hpPEB&sa=X&oi=book_result&ct=result#v=onepage&q&f=false)

**Moonstock Eclipse Accommodations-Bill Bradley**

I booked reservations at Moonstock for the upcoming solar eclipse. For those who may be trying to stay mobile and possibly undetermined this could be a great option for you. I paid \$100 for 4 nights camping at the festival (very reasonable if I need to abandon due to clouds) The Festival which runs from Friday through Monday has facilities for RV's, campers, showers, bathrooms, general store, electric hookups etc. The best part is it's just 10 miles north of Southern Illinois University as well as the junction of the 2024 eclipse. The actual campsite is at 2 min and 25 sec of totality compared with the actual centerline and greatest duration 2 min 40.3 sec, a short 15 minutes away as the crow flies. <https://www.moonstock2017.com/moonstock-2017-camp>

**2017 Total Solar Eclipse Mobile Apps-** Dr. Gordon Telepun, plastic surgeon in Decatur, Alabama.

My hobby is astronomy and within that hobby I have a fascination with Total Solar Eclipses. My main website with further information, YouTube instructional videos and links to the apps is [www.solareclipseimer.com](http://www.solareclipseimer.com).

1. Eclipse USA Quiz Game - This FREE download comes with 2 quiz games. Solar Fun Quiz 1 has 50 basic questions. The second is Eclipse USA Quiz which has 25 questions about the path of the total eclipse crossing the country. I guarantee you will know more about this eclipse than 90% of the US population when finished. There are some optional in app upgrades. Solar Pro Quiz 2 has 60 more advanced questions for the more serious observer. Totality combines all of the 135 questions into one quiz game. There are 12 quiz games, one for each of the states in the path of totality, which takes the main 135 questions and adds 20 trivia questions specific to that state in its special quiz.

<https://itunes.apple.com/us/app/solar-eclipse-usa-quiz-game/id1205533218?mt=8>

2. Solar Eclipse Timer - a "Crown Jewel" of solar eclipse timing apps, iOS version. Get into the path of totality, tap a "location" button, tap a "load the times" button and the app is set up and will "talk" you through the entire eclipse. The total eclipse video also teaches first time observers about partial phases. For astronomers and photographers, it provides exact voice announcements for contact times, max eclipse, and calculates the clock times needed for an equal spaced sequence of 10 partial phase images. <https://itunes.apple.com/us/app/solar-eclipse-timer/id1203105865?mt=8>

3. Totality Observer – This game for younger children is designed to get them interested in the eclipse! .The child as an eclipse tour guide and his/her job is to make sure all the guests see totality. They must move clouds out of the way to allow the guest's eyeballs to see the total eclipse!

<https://itunes.apple.com/us/app/solar-eclipse-totality-observer/id1206021116?mt=8>

Twitter:

@eclipse\_timer *To witness a total solar eclipse is a once in a lifetime opportunity. Get in the path!*

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**August 21 Eclipse Help Request-**The Cradle of Aviation Museum is planning an event the day of the eclipse; while I am sure a lot of AOS will be travelling for a better view, are there any members staying in the area who would like to come to the museum for the day. Please pass my info along to anyone you think might be interested or send their info to me. Thanks for any help you can offer! Kerri Kiker, Planetarium Education Coordinator (516)572-4049 [KKiker@cradleofaviation.org](mailto:KKiker@cradleofaviation.org)

**Eclipse weather-**This article is from **Joe Rao**. It provides good information about this year's eclipse. [www.weatherwise.org/Archives/Back%20Issues/2017/March-April%202017/2017\\_Total\\_Eclipse\\_full.html](http://www.weatherwise.org/Archives/Back%20Issues/2017/March-April%202017/2017_Total_Eclipse_full.html) One note: the eclipse occurs at a different local time of day as it travels across the continent. People who compile the averages regarding cloud cover must take this into account. After all, some areas have more or less clouds in the morning vs the afternoon. This is more complicated than just looking at the day's averages.

**2017 Total Solar Eclipse Request-** NOAO is looking for volunteer observers to help them map the inner corona for 90 minutes. <http://www.noao.edu/noao/staff/mpenn/eclipse2017.html>

**Eclipse Day Events** <https://eclipse2017.nasa.gov/event-calendar-view> Somewhere on the dropdown menu are lists of libraries, museums, fairgrounds, etc who are hosting parties and events on Aug 21.

**NASA** has just released its [2017-2018 software catalogue](#), and everything is available for [free download](#), without any royalty or copyright fees. Here's what's worth downloading. <http://www.sciencealert.com/nasa-s-just-released-a-bunch-of-its-software-for-free>

**Looking for a sky almanac? EarthSky recommends**

**Custom Sunrise Sunset Calendar-**This site provides a printable monthly calendar that gives you the sunrise/sunset and moonrise/moonset times, and the phases of the moon. Optional features include times for civil, nautical and astronomical twilight, and the definitions for these different shades of twilight. <http://www.sunrisesunset.com/predefined.asp>

**Old Farmer's Almanac-**Calculate rise and set times for the sun, moon and planets (including the dwarf planet Pluto!) for any location in the U.S. and Canada.

<http://www.almanac.com/astronomy/rise/NY/Seaford/2016-09-04>

**US Naval Observatory-**Gives rise/transit/set times for the sun, moon, planets and the brighter stars anywhere worldwide. Also provides sunrise/sunset azimuths, and transit altitudes.

<http://www.usno.navy.mil/USNO/astronomical-applications/data-services>

[Timeanddate.com sunrise/sunset calculator](#)-Obtain the sunrise/sunset times for cities all around the world.

**Light Pollution Projects**

The **Globe at Night**, <http://www.globeatnight.org/>, constellation for June 16-25, July 15-24 and August 14-23 is Hercules. See the charts at <https://www.globeatnight.org>. Adjust for your latitude.

Join thousands of people around the world in measuring how bright the night sky is where you live. The results from this experiment will help scientists to understand how the night sky is changing over time, as cities switch to LED street lighting. All you need is a place that's not too close to any street lamps where you have a view of a good portion of the night sky, and clear skies on that night. There are three ways to take part. In Globe at Night, citizens compare the visibility of the stars in constellations like Orion to a set of star charts. You can either print the charts out in advance and report online later, or use their webapp on your smartphone or submit night sky brightness measurements using a device called a "Sky Quality Meter" available through Unihedron.com. See [globeatnight.org/webapp/](http://globeatnight.org/webapp/).

**Loss of the Night app** (free for Android and iOS, [www.cosalux.de/#/en/portfolio-en/loss-of-the-night-android-app/](http://www.cosalux.de/#/en/portfolio-en/loss-of-the-night-android-app/)) The loss of the Night app directs you to specific stars in the sky, and asks whether you can see them with your own eyes or not. The faintest star that you are able to see tells us how bright the sky is. The app is available in many languages. Step-by-step instructions.

**Dark Sky Meter app** (free for iOS) The Dark Sky Meter app uses the iPhone's camera to directly measure how bright the night sky is. You first take a dark image with the phone in your pocket to calibrate the camera, then point the phone straight up into the sky and take a second photo.

**Star Parties, Special Events, Conventions, etc.**

June 2 Astronomy Festival on the National Mall 6 - 11 pm

June 3 AOS City of Stars Tour

June 22-25 Cherry Springs Star Party [www.astrohbg.org/CSSP/index.php/future-star-party-dates](http://www.astrohbg.org/CSSP/index.php/future-star-party-dates)

July 20-23 Stellafane <http://stellafane.org/>

July 14-23 Rockland Summer Star Party <http://www.rocklandastronomy.com/ssp.html>

Aug 16-19 ALCON, Casper, WY <https://astrocon2017.astroleague.org/>

August 21 Total Solar Eclipse <https://astrocon2017.astroleague.org/>

Sept 22-24 Black Forest Star Party <http://bfsp.org/>

Nov 3, 4, 5 Custer Institute Jamboree [www.custerobservatory.org](http://www.custerobservatory.org)

July 11-14, 2018 ALCON, Minneapolis/St Paul, MN <http://www.mnastro.org/>

Amateur Astronomers Association, AAA [www.aaa.org](http://www.aaa.org) for calendar of upcoming events

Alley Pond Environmental Center (APEC) <http://www.alleypond.com> Monthly adult & family astronomy program "Star Searchers – Exploring the Night Sky" 7pm; \$9 members / \$15 non-members. Entrance at 228-06 Northern Blvd., Douglaston, NY

Columbia Astronomy Public Outreach 7pm <http://outreach.astro.columbia.edu> Observing following a discussion. To be continued in the Fall.

**Cradle of Aviation Museum** Cradle of Aviation Museum Sat and Sun at noon- a unique astronomy experience! Educator led, interactive, full dome, 40-50 min programs utilizes simulation software aimed at presenting and teaching astronomy, astrophysics and earth sciences. The full dome theater is a largescale immersive environment, featuring real time digital planetarium and large-format cinema. <http://www.cradleofaviation.org>. Aug 21-special eclipse program.

**Custer Institute & Observatory** <http://www.custerobservatory.org> Stargazing every clear Sat eve Call 631-765-2626 Fundraising to replace the telescope in the dome. Help at [www.gofundme.com/custer](http://www.gofundme.com/custer). Donations welcome

**Montauk Observatory** <http://www.montaukobservatory.com/> Star Parties (weather permitting) Montauk County Park (formerly Theodore Roosevelt County Park) Entrance off Rt 27 (Montauk Hwy) at the Ross School Tennis Center, 20 Goodfriend Drive, East Hampton, NY 11937

**NYSkies Seminars** 1st and 3rd Fri of each month. 6:30-9PM McBurney Hall, 125 W 14th St, 6/7 Ave, NYC [www.nyskies.org/seminar.htm](http://www.nyskies.org/seminar.htm) Join their hotline for local activities at [nyskies@nyskies.org](mailto:nyskies@nyskies.org)

**SUNY@Stony Brook Science Open Nights** - 7:30pm in Earth & Space Sciences Bldg, ESS 001. Astronomy Open Night [www.astro.sunysb.edu/openight/opennite.html](http://www.astro.sunysb.edu/openight/opennite.html) Back in the Fall.

**Sidewalk Astronomy in Lynbrook** AOS member Tom Lynch

<https://www.facebook.com/pages/Sidewalk-Astronomy-in-Lynbrook/133963613371631?ref=hl>

**10th annual World Science Festival! May 30-June 4, New York City- 2017 World Science Festival**

The festival is a celebration of science with original programming that includes in-theater events, interactive exhibitions, free events for young innovators and social experiences that transform the city and bring the world's brightest minds in direct contact with the broader public. We are offering AOS members a discount to our upcoming programs. Use the 15% off code WSFPAR17 at checkout. Specifically, on Friday, June 2, we will be hosting exciting and intimate conversation with leading women space scientists at NYU Grand Hall. Please find an event description below:

**[HIDDEN FIGURES NO MORE! HEROINES OF SPACE SCIENCE PAST, PRESENT, AND FUTURE](#)**

*Hidden Figures* revealed hidden heroines in the history of space science. Through their curiosity, tenacity, and courage, these women helped send rockets into space and solve the mysteries of planets, stars, galaxies, and beyond. Join this exciting conversation with scientists, astronauts, and other luminaries who broke down barriers in a male-dominated discipline, as they reflect on the many pivotal but unsung figures of space science, assess the cutting-edge of space exploration initiatives across the globe, and envision the essential role for women in the coming era of discovery.

**Other Star Party lists** [http://earthsky.org/astronomy-essentials/astronomy-events-star-parties-festivals-workshops?utm\\_source=EarthSky+News&utm\\_campaign=7d79fa2dee-](http://earthsky.org/astronomy-essentials/astronomy-events-star-parties-festivals-workshops?utm_source=EarthSky+News&utm_campaign=7d79fa2dee-)

[EarthSky\\_News&utm\\_medium=email&utm\\_term=0\\_c643945d79-7d79fa2dee-394585393](http://EarthSky_News&utm_medium=email&utm_term=0_c643945d79-7d79fa2dee-394585393)



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### **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 world's 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.

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.

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.

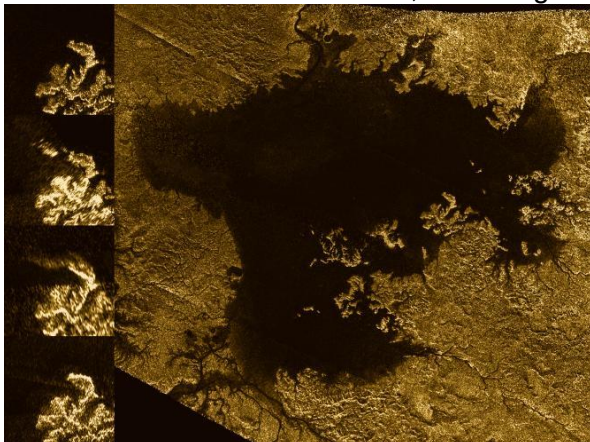
"It will be a big frothy mess," says Michael Malaska of JPL. "It's neat because it makes Earth look really boring by comparison."

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.

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/planet-weather/>

*Caption: 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*

**Websites to Explore**

NASA's Curiosity Rover Sharpens Paradox of Ancient Mars [www.jpl.nasa.gov/news/news.php?feature=6734](http://www.jpl.nasa.gov/news/news.php?feature=6734)  
Blue jets studied from Space Station  
[http://www.esa.int/Our\\_Activities/Human\\_Spaceflight/iriss/Blue\\_jets\\_studied\\_from\\_Space\\_Station](http://www.esa.int/Our_Activities/Human_Spaceflight/iriss/Blue_jets_studied_from_Space_Station)  
One Role of Mars Orbiter: Check Possible Landing Sites [www.jpl.nasa.gov/news/news.php?feature=6738](http://www.jpl.nasa.gov/news/news.php?feature=6738)  
Shedding Star [http://www.esa.int/spaceinimages/Images/2017/02/Shedding\\_star](http://www.esa.int/spaceinimages/Images/2017/02/Shedding_star)  
It's Never 'Groundhog Day' at Jupiter <http://www.jpl.nasa.gov/news/news.php?feature=6733>  
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**Poet of the Stars** By *Dr. Michael West*, Lowell Observatory's Deputy Director for Science Artists, musicians and writers have long looked to the starry skies for inspiration. Yet few have been as inspired by the heavens as the great New England poet Robert Frost. Frost had a lifelong love of astronomy. As a teenager, he sold magazine subscriptions to earn enough money to buy a telescope. The night sky fascinated him, and astronomical imagery is woven into many of his poems, as reflected in titles like, *On Looking Up By Chance at the Constellations*, *Acquainted With the Night*, *The Star-Splitter*, *The Literate Farmer and the Planet Venus*, *As-trometaphysical*, *Choose Something Like a Star*, *Canis Major*, *The Freedom of the Moon* and *Lost in Heaven*.

In *The Star-Splitter*, Frost tells of a man who burns his house down and uses the insurance money to buy a telescope. "The best thing that we're put here for's to see," explains the man. "The strongest thing that's given us to see with's a telescope."

*A Question*, written in 1942, is a short but powerful poem about suffering – but whose?

*A voice said, Look me in the stars*

*And tell me truly, men of earth,*

*If all the soul-and-body scars*

*Were not too much to pay for birth*

Frost often blended the cosmic with the commonplace, as in his 1921 poem, *A Star in a Stone Boat*:

*Never tell me that not one star of all*

*That slip from heaven at night and softly fall*

*Has been picked up with stones to build a wall*

In *Lost in Heaven*, the poet recalls a night when clouds made it impossible for him to recognize any constellations in the sky. Exhilarated by the feeling of disorientation, he surrendered himself to the unknown, imploring, "Let's let my heavenly lostness overwhelm me."

One of Frost's best-known poems, *Fire and Ice*, might have been influenced by astronomer Harlow Shapley, who was director of Harvard's observatory. The poem's nine lines consider how the world might end:

*Some say the world will end in fire,*

*Some say in ice.*

*From what I've tasted of desire*

*I hold with those who favor fire.*

*But if it had to perish twice,*

*I think I know enough of hate*

*To say that for destruction ice*

*Is also great*

*And would suffice.*

Although the poem's symbolism extends beyond astronomy, examining elements of human nature such as love and hate, Shapley suggested that it was inspired by a chance encounter with Frost at a party. According to Shapley, an inquisitive Frost asked him if astronomers knew how the world would end someday. Shapley replied that the Earth might be incinerated by the dying sun or might gradually succumb to a permanent ice age. There's no proof of Shapley's anecdote, but it's consistent with Frost's frequent use of astronomical imagery in his poetry.

Yet perhaps the greatest affirmation of Frost's love for the heavens was this simple line from one of his poems,

*As a confirmed astronomer*

*I'm always for a better sky.*

"The greatest adventure of man is science," the great poet said in an interview three years before his death. We can only imagine what inspiration he would have drawn from the many fascinating astronomical discoveries that have been made in the half-century since then.

# Getting ready for the Great American Eclipse <http://www.greatamericaneclipse.com/>



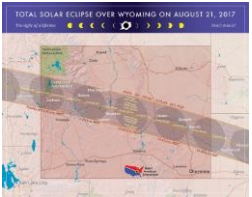
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Are You Ready for the Great American Eclipse?



Where is the best place to see the Great American Eclipse? This is the most frequently asked question about the **Great American Eclipse** of August 21, 2017. There are many excellent places to view the eclipse across the entire path of totality, and this graphic and article can help you decide the place for you.



## New state maps online

A new set of individual state maps is now online! These are revised and will be a part of our new app under development. All the total solar eclipse information you need will be right there on your mobile device when the big day arrives!



## Astronomy Magazine recommended

We're thrilled and honored that Astronomy Magazine just listed our maps of the 2017 eclipse as one of the STAR PRODUCTS of 2016! These are very detailed maps with times, durations and road networks. Find our maps and over 50 other quality eclipse-related items at our online store.



**Worldwide overview**-An overview map of the August 21, 2017 total solar eclipse. A very broad area, including five continents, will see at least a partial solar eclipse, but the real treasure is in the yellow path of total solar eclipse. Learn more at [www.GreatAmericanEclipse.com](http://www.GreatAmericanEclipse.com)



Come tour the path of totality! On August 21, 2017, the Great American Eclipse will cross the continental US for the first time in 38 years. Share on social media to help build awareness about this spectacular upcoming event.



## Commemorative poster

This beautiful poster is a collaboration between Michael Zeiler of GreatAmericanEclipse.com and Tyler Nordgren of SpaceArtTravelBureau.com and [TylerNordgren.com](http://TylerNordgren.com).