



# Observations

A Monthly Publication Of The  
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 23, No. 11 Two-Time Winner of the Astronomical League's Mabel Sterns Award ☀ 2006 & 2009 November 2015

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## Lunar Eclipse Event at Starr Farm Park



*Editor's Note: I loved this image taken by Liz Smith with her iPhone but didn't have room for it in last month's newsletter. So here it is!*

## Membership Renewals Due

11/2015	Buczynski Cavanaugh Giles Grinberg Holenstein Luttrell-Pollard Smith Taylor
12/2015	Bogard Bogusch O'Leary
01/2016	Golub Kellerman Kovacs Linskens Loeliger McElwee

## Important November 2015 Dates

- 1st** • Daylight Saving Time ends, 2:00 a.m.
- 3rd** • Last Quarter Moon, 7:23 a.m.
- 5th-12th** • Taurid Meteor Shower peaks.
- 11th** • New Moon, 12:47 p.m.
- 17th-18th** • Leonid Meteor Shower peaks.
- 19th** • First Quarter Moon, 1:27 a.m.
- 25th** • Full Moon, 5:44 p.m.



## CCAS Upcoming Nights Out

CCAS has several "nights out" scheduled over the next few months. Members are encouraged to help out during these events any way they can. See below for more information.

☀ **Friday, November 13th, 2015** - CCAS Monthly Observing Session, Myrick Conservancy Center, Brandywine Red Clay Alliance. The observing session starts at sunset.

## Autumn/Winter 2015 Society Events

### November 2015

**1st** • Daylight Saving Time ends, 2:00 A.M. EST. Turn clocks back one hour.

**4th** • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the [PA Outdoor Lighting Council](#) website.

**5th-6th** • The von Kármán Lecture Series: [The Juno Mission to Jupiter](#), at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

**10th** • CCAS Monthly Meeting, Merion Science Center, Rm 112, West Chester University. The meeting starts at 7:30 p.m. Guest Speaker: TBA.

**13th** • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

**13th** • West Chester University Planetarium Show: "Andromeda: Our Galaxy Neighbor." The show starts at 7 p.m. For more information and reservations, visit the [WCU Public Planetarium Shows](#) webpage.

**17th-18th** • Leonid Meteor Shower Peaks.

**20th** • Open call for articles and photographs for the December 2015 edition of [Observations](#).

**26th** • Deadline for newsletter submissions for the December 2015 edition of [Observations](#).

### December 2015

**2nd** • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the [PA Outdoor Lighting Council](#) website.

**3rd-4th** • The von Kármán Lecture Series: [The InSight Mission: Journey to the Center of Mars](#) at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

**5th** • CCAS Holiday Party at Don & Barb Knabb's home. See December 2015 edition of Observations for details.

**11th** • West Chester University Planetarium Show: "So You Want to Buy a Star..." The show starts at 7 p.m. For more information and reservations, visit the [WCU Public Planetarium Shows](#) webpage.

**13th-14th** • Geminid Meteor Shower Peaks.

**20th** • Open call for articles and photographs for the January 2016 edition of [Observations](#).

**21st** • Winter Solstice: first day of winter at 11:48 PM EST.

**26th** • Deadline for newsletter submissions for the January 2016 edition of [Observations](#).

## Minutes from the October 13, 2015, Society Meeting by Ann Miller, CCAS Secretary

- CCAS president Roger Taylor welcomed 23 members and guests to the October 13, 2015 meeting.
- Don Knabb presented Stellarium "What's Up" for the month of October.
- Speaker - John Conrad, NASA Solar System Ambassador
- Subject - Global Warming: The View From Space
- Presentation Main Points
  - Lots of data from the Intergovernmental Panel on Climate Change or IPCC. This panel received a Nobel Prize in 2007 for its outstanding work.
  - Focus on multiple supercomputer models, many developed on different sites by different countries. Excellent peer review on each of 23 global climate models, each compared by the IPCC.
  - Demonstrated the best way to get confirmation of the models is to look at the globe from space. Many satellites have been put into orbit since the 1950's such as GRACE, AQUA, AURA, GMP, CLOUDSAT, OCO-2. At least 25 spacecraft are currently in orbit addressing key model parameters. These are typically in low Earth orbit, 500 miles up, orbiting every 1.5 hours.

*(Continued on page 7)*

## November 2015 CCAS Meeting Agenda by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on November 10, 2015, starting at 7:30 p.m. The meeting will be held in Room 112, Merion Science Center (former Boucher Building), West Chester University. This evening we'll screen the short film "400 Years of the Telescope" with Neil DeGrasse Tyson, followed by a discussion of merits of reflecting and refracting telescopes.

Please note that inclement weather or changes in speakers'

schedules may affect the program. In the event there is a change, CCAS members will be notified via e-mail with as much advance notice as possible.

We are looking for presenters for future meetings in our spring 2016 season. If you are interested in presenting, or know someone who would like to participate, please contact me at [programs@ccas.us](mailto:programs@ccas.us).

## Halloween Fireballs Will Blaze in the Sky Through November

courtesy Joe Rao, Space.com Skywatching Columnist



Amateur skywatcher John Chumack filmed a number of Taurid meteors in 2012. In 2015, the Taurids will be active all through November, but will peak between Nov. 5 and Nov. 12.  
Credit: John Chumack/www.galacticimages.com

[Editor's Note: Later in the month the Leonid meteor shower will peak around the 17th or 18th, but we have an opportunity earlier in month to enjoy shooting stars as well.]

During the next couple of weeks, there is a fairly good chance that Earth will encounter a swarm of unusually large space particles, capable of generating some eye-catching fireball meteors.

The **Taurid meteors**, sometimes called "Halloween fireballs," (fireballs are extremely bright meteors) create one of this year's longest meteor showers, with at least a couple of shooting stars per hour from Oct. 20 to Nov. 30. But a one-week time frame extending from Nov. 5 through Nov. 12 is when the Taurids are most active.

During peak times, about a dozen or so meteors may be seen per hour by an observer with

clear, dark skies. (City lights or even slight haze will reduce substantially the number of faint meteors seen.) These meteors are often yellowish-orange and, as meteors go, appear to move rather slowly.

Meteors — popularly known as "shooting stars" — are produced when debris enters and burns up in Earth's atmosphere. The meteors that make up the Taurid meteor shower are attributed to debris left behind by Encke's Comet, or perhaps by a much larger comet that upon disintegrating, left Encke and a lot of other rubble in its wake. Indeed, the Taurid debris stream contains noticeably larger fragments than those shed by other comets, which is why in certain years — and 2015 is predicted to be one — this rather elderly meteor stream occasionally delivers a few unusually bright meteors.

The Taurids are actually divided

into the Northern Taurids and the Southern Taurids. This is an example of what happens to a meteor stream when it grows old. The particles in the stream, even when they were first formed, could not have been moving in exactly the same orbit as their parent comet, and their slight divergence accumulates with time. The sun is not the only body gravitationally controlling the particles' orbits — the planets also have a subtle effects on the stream. Because the positions of the planets relative to the sun are constantly changing, the particles pass nearer to them on some revolutions than others — diverting parts of the stream, fanning it out and splitting it. So what was originally one stream diffuses into a cloud of minor streams and isolated particles in individual orbits, crossing Earth's orbit at yet more widely scattered times of the year and coming from more scattered directions until they are entirely stirred into the solar system's general haze of dust.

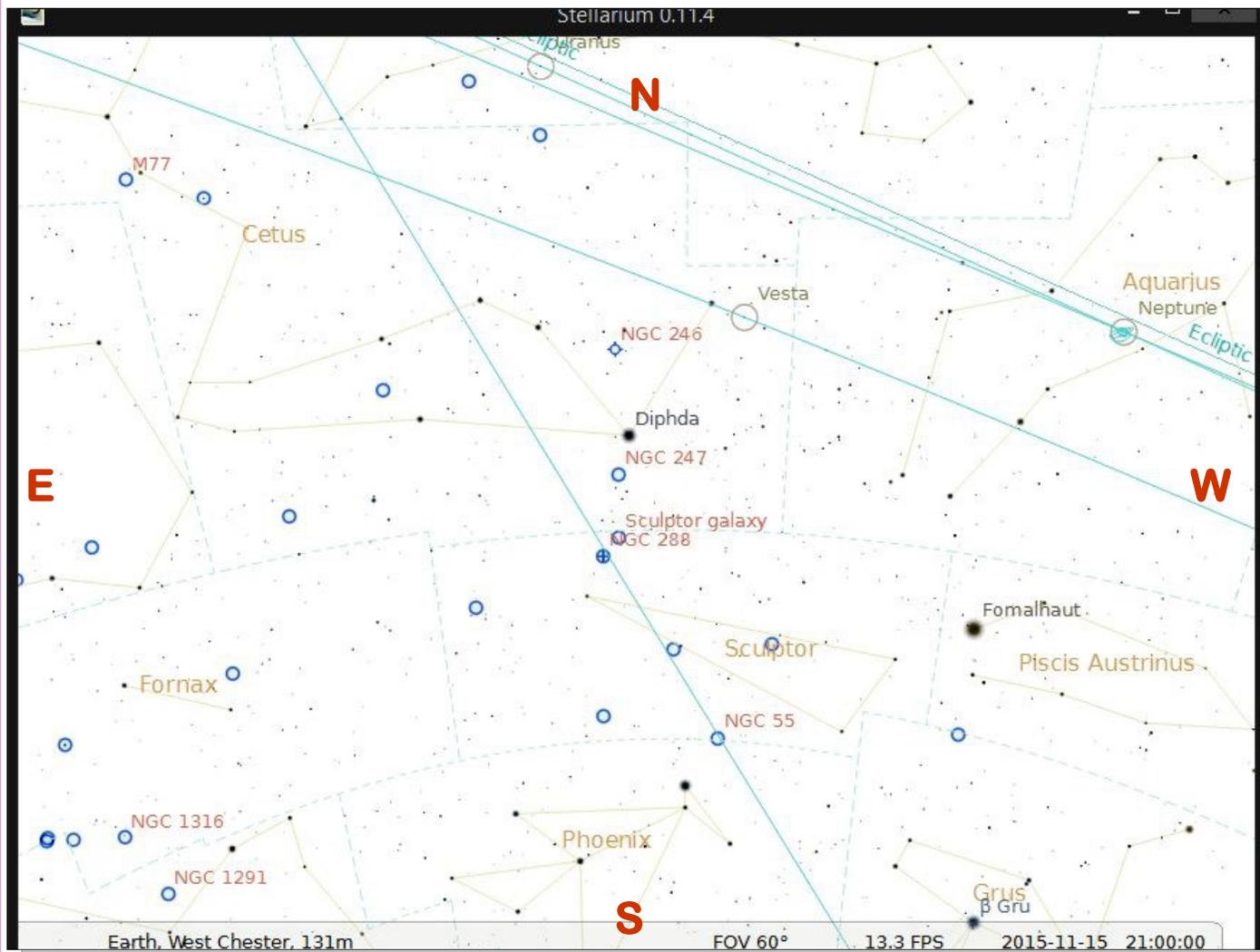
The radiant or apparent radiant of a meteor shower is the point in the sky from which meteors appear to originate. But as I just noted, the Taurid radiant is split into two, with the southern radiant most active on Nov. 5 and the northern radiant most active on Nov. 12. Both cross the southern meridian and are highest in the sky about midnight. The two radiants lie just south of the Pleiades — a cluster of stars in the constellation Taurus. So during the next couple of weeks, if you see a bright, slightly or-

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# The Sky Over Chester County

November 15, 2015 at 9:00 p.m. ET

Note: This screen capture is taken from Stellarium, the free planetarium software available for download at [www.stellarium.org](http://www.stellarium.org).



Date	Civil Twilight Begins	Sunrise	Sunset	Civil Twilight Ends	Length of Day
11/01/2015	6:01 a.m. EST	6:29 a.m. EST	4:59 p.m. EST	5:27 p.m. EST	10h 29m 14s
11/15/2015	6:16 a.m. EST	6:45 a.m. EST	4:45 p.m. EST	5:14 p.m. EST	9h 59m 12s
11/30/2015	6:32 a.m. EST	7:02 a.m. EST	4:36 p.m. EST	5:36 p.m. EST	9h 34m 31s

## Moon Phases

Last Quarter	11/03/2015	7:23 a.m. EST	New Moon	11/11/2015	12:47 p.m. EST
First Quarter	11/19/2015	1:27 a.m. EST	Full Moon	11/25/2015	5:44 p.m. EST

## November 2015 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

1	Daylight Savings Time ends
3	Last Quarter Moon
7	Venus, Mars and the crescent Moon are in the pre-dawn sky
11	New Moon
17	The Leonid meteors peak tonight at 11 p.m.
19	First Quarter Moon
19	The Lunar Straight Wall is visible
25	Full Moon, the Beaver Moon
26	The Moon occults Aldebaran around 5:45 a.m.

**The best sights this month:** With no bright planets visible during the evening hours we need to rise before dawn on November 7th to see a nice grouping of the crescent Moon, Venus and Mars. Then on the night of November 17/18 the Leonid meteor shower peaks. We cannot expect to see a lot of shooting stars, but the ones we are lucky to see should be quite bright since the Leonids are considered the fastest of any meteors!

**Mercury:** Mercury is hiding behind the Sun for most of November.

**Venus:** Our sister planet continues to light up the pre-dawn sky through November and is less than a degree away from Mars on the morning of November 3rd. Then on November 7th the crescent Moon joins the party when it is very close to Venus and Mars to give a nice show an hour before sunrise. Sounds like it is worth getting up early on a Saturday morning!

**Mars:** Throughout November Mars hangs close to Venus in the pre-dawn sky.

**Jupiter:** The king of the planets rises around 3 a.m. and spends November pulling away from Venus and Mars.

**Saturn:** Saturn can be seen early in the month just after sunset, then it falls into the glow of the Sun and passes behind the Sun on November 30th.

**Uranus and Neptune:** Uranus reached opposition on October 12th so it will be high in the sky at midnight. Neptune is in good viewing position just after the sky fully darkens. Finder charts for both gas giants are at available [skypub.com/urnep](http://skypub.com/urnep), provided by Sky and Telescope magazine.

**The Moon:** Full moon occurs on November 25th. The November full Moon is the Full Beaver Moon. For Native Americans, the time of this full moon was the time to set beaver traps before the swamps froze, to ensure a supply of warm winter furs. It is sometimes also referred to as the Frosty Moon.

**Constellations:** Now that we are well into autumn and back to Eastern Standard Time there are many hours of star gazing possible without staying up late. The Summer Triangle is past center stage and is heading for the western horizon. Pegasus is well up in the southern sky in the early evening, and the jewels that are the Pleiades are rising in the east. Capella in Auriga is a bright point of light above Taurus. As it gets a bit later our old friend Orion returns from his summer vacation.

**Messier/deep sky:** I always look forward to autumn for viewing the Double Cluster between Cassiopeia and Perseus. This is a really nice binocular object. Rising behind Perseus is the constellation Auriga and its three star clusters M36, M37 and M38. If you stay up for late night observing you can get an early view of M42, the Great Orion Nebula.

**Comets:** Comet Catalina should be visible late in the month. It is possible this early morning comet could reach 4th magnitude! A finder chart is available in Astronomy magazine.

**Meteor showers:** The Leonid meteor shower peaks on the night of November 17/18 when we can expect up to 15 fast moving meteors per hour. The best time for observing shooting stars is in the early morning hours. Expect bright meteors because the Leonids are considered the fastest of any meteors!

## Through the Eyepiece: The Helix Nebula, NGC 7293

by Don Knabb, CCAS Treasurer & Observing Chair

It is difficult for me to select a single astronomy photograph as my favorite, but this picture of the Helix Nebula would certainly be a finalist. One can see why this photograph was widely circulated on the Internet several years ago as the “Eye of God”.

The Helix Nebula, also known as The Helix or NGC 7293, is a large planetary nebula located in the constellation of Aquarius. Discovered by Karl Ludwig Harding, probably before 1824, this object is one of the closest to the Earth of all the bright planetary nebula. It is similar in appearance to the Ring Nebula in the constellation Lyre.

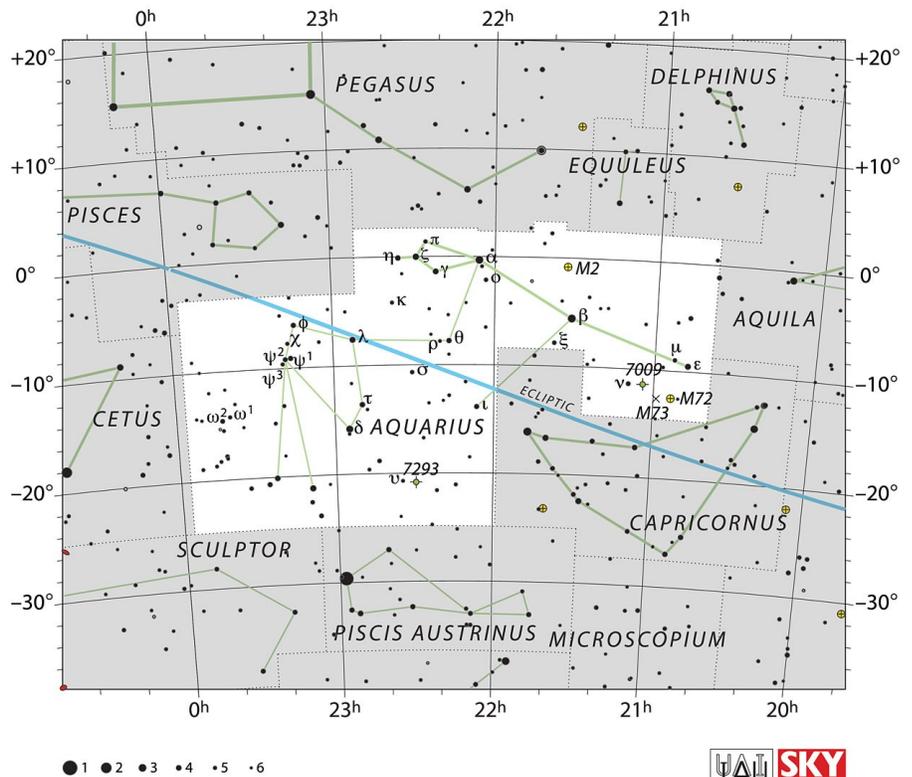
The Helix Nebula is an example of a planetary nebula formed at the end of a star's evolution. Gases from the star in the surrounding space appear, from our vantage point, as if we are looking down a helix structure. The remnant central stellar core is destined to become a white dwarf star. The glow of the central star is so energetic that it causes the previously expelled gases to brightly fluoresce.

During November the Helix Nebula will be visible just after the sky is fully dark. You will need to be at a dark sky observing site and have a good size “light bucket” telescope to pick out this large and dim fuzzy object. A large Dobsonian would be ideal to seek out the Helix Nebula, and you’ll probably see it best using averted vision. The nebula is located below the constellation Aquarius the Water Bearer.

(Continued on page 7)



Credit: NASA, ESA, C.R. O'Dell (Vanderbilt University), and M. Meixner, P. McCullough, and G. Bacon (Space Telescope Science Institute)



Credit: IAU and Sky & Telescope

## Eyepiece (Cont'd)



Photo credit: Brent Crabb, astrophotographer, Fountain Valley, CA

(Continued from page 6)

The apparent size of the Helix Nebula covers an area of 16 arc minutes diameter, more than half of that of the full moon. Its halo extends even further to 28 arc minutes or almost the moon's apparent diameter. Although the nebula is quite bright, its light is spread over this large area so that it is not an easy object for visual observing. But it is a good object for amateur astrophotographers. Here is a photograph taken by Brent Crabb in southern California.

### Information credits:

Dickinson, Terence 2006. Night-watch: a practical guide to viewing the universe. Buffalo, NY. Firefly Books  
[http://en.wikipedia.org/wiki/Helix\\_Nebula](http://en.wikipedia.org/wiki/Helix_Nebula)  
<http://antwrp.gsfc.nasa.gov/apod/ap030510.html>  
<http://www.seds.org/messier/xtra/ngc/n7293.html>

## Minutes (cont'd)

(Continued from page 2)

- Data presented on sea level rise, tidal gauges, acoustic sensors, buoys. In space information from TOPEX and POSEIDON satellites to confirm the data. 9000 years ago sea rise was very slow, about 0.25 mm/year. Gravity Recovery and Climate Experiment (GRACE) satellite, which senses the mass from the earth below them, gathers data on ice sheet thickness, water storage, drought, and snow cover. Since 1900, rise in sea level has been about 2.0 mm/year. Dramatic increase.
- Evidence from GRACE is used by NOAA and weather stations to visualize drought areas. JASON satellite is also used to gather information on soil moisture. For California, relief is on the way in the form of El Nino. If you want to track El Nino, look up <http://sealevel.jpl.nasa.gov/science?elnino>
- Also, look up NASA spacecraft GPM, MODIS, HISPIRI for information about water in a given area.
- In summary, spacecraft are playing a major role investigating climate change and confirming or adjusting climate simulation models.

## How We Know Mars Has Liquid Water on Its Surface

by Dr. Ethan Siegel

Of all the planets in the solar system other than our own, Mars is the one place with the most Earth-like past. Geological features on the surface such as dried up riverbeds, sedimentary patterns, mineral spherules nicknamed "blueberries," and evidence of liquid-based erosion all tell the same story: that of a wet, watery past. But although we've found plenty of evidence for molecular water on Mars in the solid (ice) and gaseous (vapor) states, including in icecaps, clouds and subsurface ices exposed (and sublimated) by digging, that in no way meant there'd be water in its liquid phase today.

Sure, water flowed on the surface of Mars during the first billion years of the solar system, perhaps producing an ocean a mile deep, though the ocean presence is still much debated. Given that life on Earth took hold well within that time, it's conceivable that Mars was once a rich, living planet as well. But unlike Earth, Mars is small: small enough that its interior cooled and lost its protective

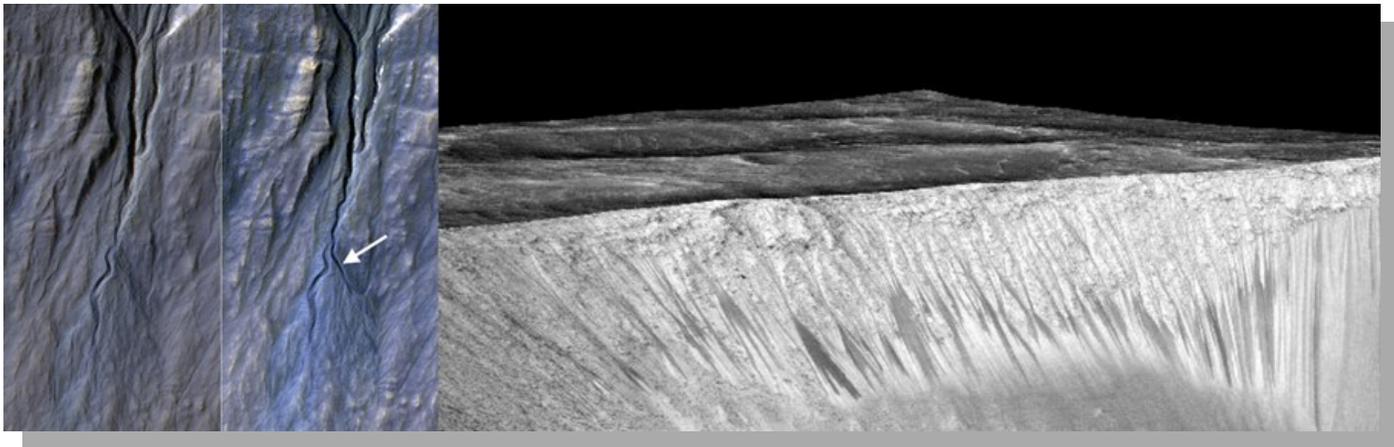


magnetic field, enabling the sun's solar wind to strip its atmosphere away. Without a significant atmosphere, the liquid phase of water became a virtual impossibility, and Mars became the arid world we know it to be today.

But certain ions—potassium, calcium, sodium, magnesium, chloride and fluoride, among others—get left behind when the liquid water disappears, leaving a "salt" residue of mineral salts (that may include table salt, sodium chloride) on the surface. While pure liquid water may not persist at standard Martian pressures and temperatures, extremely salty, briny water can indeed stay in a liquid state for extended periods under the conditions on the Red Planet. It's more of a

"sandy crust" like you'd experience on the shore when the tide goes out than the flowing waters we're used to in rivers on Earth, but it means that under the right temperature conditions, liquid water does exist on Mars today, at least in small amounts.

The measured presence and concentration of these salts, found in the dark streaks that come and go on steep crater walls, combined with our knowledge of how water behaves under certain physical and chemical conditions and the observations of changing features on the Martian surface supports the idea that this is the action of liquid water. Short of taking a sample and analyzing it in situ on Mars, this is the best current evidence we have for liquid water on our red neighbor. Next up? Finding out if there are any single-celled organisms hardy enough to survive and thrive under those conditions, possibly even native to Mars itself!



Images credit: NASA/JPL-Caltech/Univ. of Arizona, of a newly-formed gully on the Martian surface (L) and of the series of gullies where the salt deposits were found (R).

## Taurids (Cont'd)

(Continued from page 3)

ange-tinted meteor sliding rather lazily away from that famous little smudge of stars, you can feel sure it is a Taurid.

Another reason 2015 will be an excellent year for the Taurids is the very favorable situation regarding the moon. On the morning of Nov. 5, it will be a fat waning crescent in the constellation Leo and will not rise until after 12:30 a.m. local time, causing only a minor hindrance to meteor watchers. It will then get progressively thinner and rise progressively later on successive mornings, until finally it will arrive at a new phase on Nov. 11, leaving the entire night dark and moonless for meteor watchers.

Encke has the shortest-known orbital period for a comet, taking only 3.3 years to make one complete trip around the sun. Meteor expert David Asher discovered that the Earth can periodically encounter swarms of larger particles shed by this comet in certain years and lo and behold, 2015 is predicted to be one of those years. [Check this link](#) for more information.

The year 2005 was also an exceptional swarm year. Many stupendously bright meteors were seen, especially along the U.S. East Coast on Halloween evening, when fireballs as bright as the full moon were witnessed. Will 2015 offer a repeat performance? Only by going out and

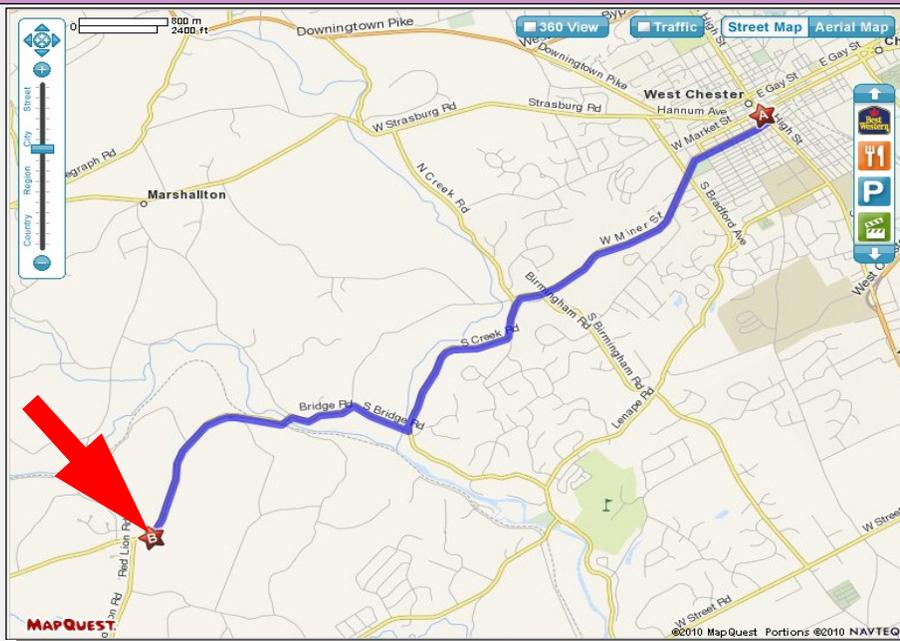
(Continued on page 10)

## Join the CCAS Breakfast Club by Don Knabb

Riffing on the title of a 1980's teen flick, a few members have formed a "breakfast club" to gather informally once a month to have breakfast to talk about all things astronomy and anything else that suits our fancy (no in-school detention required). We rotate the location around the area and typically meet on a Tuesday or Thursday at 9:00 around mid-month. Past breakfasts have been held at Goose Creek Grill, Green Street Grill, and the County Deli.

If you are interested to join the group send a note to Don Knabb at [dknabb01@comcast.net](mailto:dknabb01@comcast.net) and you will be added to the e-mail list for the group.

## CCAS Directions



### Brandywine Red Clay Alliance

1760 Unionville Wawaset Rd  
West Chester, PA 19382  
(610) 793-1090

<http://brandywinewatershed.org/>

BRC was founded in 1945 and is committed to promoting and protecting the natural resources of the Brandywine Valley through educational programs and demonstrations for all ages.

### Brandywine Red Clay Alliance

The monthly observing sessions (held February through November) are held at the Myrick Conservation Center of the Brandywine Red Clay Alliance.

To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route 842 into the parking lot by the office: look for the signs to the office along Route 842. From that parking lot, go left through the gate and drive up the farm lane about 800 feet to the top of the hill. The observing area is on the right.

If you arrive after dark, *please turn off your headlights and just use parking lights* as you come up the hill (so you don't ruin other observers' night vision).

## CCAS Directions

### West Chester University Campus

The monthly meetings (September through May) are held in Room 112 in Merion Science Center (formerly the Boucher Building), attached to the Schmucker Science Center. The Schmucker Science Center is located at the corner of S. Church St & W. Rosedale Ave. Parking is generally available across Rosedale in the Sykes Student Union parking lot (Lot K).



### Taurids (Cont'd)

*(Continued from page 9)*

watching for these colorful and slow-moving meteors will we know for sure.

*Joe Rao serves as an instructor and guest lecturer at New York's Hayden Planetarium. He writes about astronomy for Natural History magazine, the Farmer's Almanac and other publications, and he is also an on-camera meteorologist for News 12 Westchester, N.Y. Originally published on [Space.com](http://Space.com).*

### CCAS Membership Information and Society Financials

#### Treasurer's Report

by Don Knabb

#### Oct. 2015 Financial Summary

Beginning Balance	\$2,129
Deposits	\$95
Disbursements	\$0
Ending Balance	\$2,224

#### New Member Welcome!

Welcome new CCAS member Tom Caldwell from West Chester. We're glad you decided to join us under the stars! Clear skies to you!

#### Membership Renewals

You can renew your CCAS membership by writing a check payable to "Chester County Astronomical Society" and sending it to our Treasurer:

**Don Knabb**  
**988 Meadowview Lane**  
**West Chester PA 19382**

The current dues amounts are listed in the *CCAS Information Directory*. Consult the table of contents for the directory's page number in this month's edition of the newsletter.

**Join the Fight for Dark Skies!**



You can help fight light pollution, conserve energy, and save the night sky for everyone to use and enjoy. Join the nonprofit International Dark-Sky Association (IDA) today. Individual memberships start at \$30.00 for one year. Send to:

**International Dark-Sky Association**  
3225 North First Avenue  
Tucson, AZ 85719

Phone: 520-293-3198  
Fax: 520-293-3192  
E-mail: [ida@darksky.org](mailto:ida@darksky.org)

For more information, including links to helpful information sheets, visit the IDA web site at:

<http://www.darksky.org>

**Dark-Sky Website for PA**

PENNSYLVANIA OUTDOOR



The Pennsylvania Outdoor Lighting Council has lots of good information on safe, efficient outdoor security lights at their web site:

<http://www.POLCouncil.org>

**Find out about Lyme Disease!**

Anyone who spends much time outdoors, whether you're stargazing, or gardening, or whatever, needs to know about Lyme Disease and how to prevent it. You can learn about it at:

<http://www.LymePA.org>

Take the time to learn about this health threat and how to protect yourself and your family. It is truly "time well spent"!

**Good Outdoor Lighting Websites**

One of the biggest problems we face in trying to reduce light pollution from poorly designed light fixtures is easy access to good ones. When you convince someone, a neighbor or even yourself, to replace bad fixtures, where do you go for good lighting fixtures? Check out these sites and pass this information on to others. Help reclaim the stars! And save energy at the same time!



Light pollution from poor quality outdoor lighting wastes billions of dollars and vast quantities of valuable natural resources annually. It also robs us of our heritage of star-filled skies. Starry Night Lights is committed to fighting light pollution. The company offers the widest selection of ordinance compliant, night sky friendly and neighbor friendly outdoor lighting for your home or business. Starry Night Lights is located in Park City, Utah.

Phone: 877-604-7377  
Fax: 877-313-2889

<http://www.starrynightlights.com>



**LIGHTHOUSE**  
OUTDOOR LIGHTING

Lighthouse Outdoor Lighting is a dedicated lifetime corporate member of the [International Dark-Sky Association](#). Lighthouse's products are designed to reduce or eliminate the negative effects outdoor lighting can have while still providing the light you need at night.

Phone: 484-291-1084

<https://www.lighthouse-lights.com/landscape-lighting-design/pa-west-chester/>

**Local Astronomy-Related Stores**

Listing retail sites in this newsletter does not imply endorsement of any kind by our organization. This information is provided only as a service to our members and the general public.



Skies Unlimited is a retailer of telescopes, binoculars, eyepieces and telescope accessories from Meade, Celestron, Televue, Orion, Stellarvue, Takahashi, Vixen, Losmandy and more.

**Skies Unlimited**  
**Suburbia Shopping Center**  
**52 Glocker Way**  
**Pottstown, PA 19465**

Phone: 610-327-3500 or 888-947-2673  
Fax: 610-327-3553

<http://www.skiesunlimited.net>



Located in Manayunk, Spectrum Scientifics educates and entertains customers with an array of telescopes, microscopes, binoculars, science toys, magnets, labware, scales, science instruments, chemistry sets, and much more.

**4403 Main Street**  
**Philadelphia, PA 19127**

Phone: 215-667-8309  
Fax: 215-965-1524

**Hours:**  
Tuesday thru Saturday: 10AM to 6PM  
Sunday and Monday: 11AM to 5PM

<http://www.spectrum-scientifics.com>

## CCAS Information Directory

### CCAS Lending Telescopes

Contact Don Knabb to make arrangements to borrow one of the Society's lending telescopes. CCAS members can borrow a lending telescope for a month at a time; longer if no one else wants to borrow it after you. Don's phone number is 610-436-5702.

### CCAS Lending Library

Contact our Librarian, Barb Knabb, to make arrangements to borrow one of the books in the CCAS lending library. Copies of the catalog are available at CCAS meetings, and on the CCAS website. Barb's phone number is 610-436-5702.

### Contributing to *Observations*

Contributions of articles relating to astronomy and space exploration are always welcome. If you have a computer, and an Internet connection, you can attach the file to an e-mail message and send it to: [newsletter@ccas.us](mailto:newsletter@ccas.us)

Or mail the contribution, typed or handwritten, to:

**John Hepler**  
21103 Stripper Run  
Rock Hall, MD 21661

### CCAS Newsletters via E-mail

You can receive the monthly newsletter (in full color!) via e-mail. All you need is a PC or Mac with an Internet e-mail connection. To get more information about how this works, send an e-mail request to John Hepler, the newsletter editor, at: [newsletter@ccas.us](mailto:newsletter@ccas.us).

### CCAS Website

John Hepler is the Society's Webmaster. You can check out our Website at: <http://www.ccas.us>

John welcomes any additions to the site by Society members. The contributions can be of any astronomy subject or object, or can be related to space exploration. The only requirement is that it is your own work; no copyrighted material! Give your contributions to John Hepler at (410) 639-4329 or e-mail to [webmaster@ccas.us](mailto:webmaster@ccas.us)

### CCAS Purpose

The Chester County Astronomical Society was formed in September 1993, with the cooperation of West Chester University, as a non-profit organization dedicated to the education and enjoyment of astronomy for the general public. The Society holds meetings (with speakers) and observing sessions once a month. Anyone who is interested in astronomy or would like to learn about astronomy is welcome to attend meetings and become a member of the Society. The Society also provides telescopes and expertise for "nights out" for school, scout, and other civic groups.

### CCAS Executive Committee

For further information on membership or society activities you may call:

<b>President:</b>	Roger Taylor 610-430-7768
<b>Vice President:</b>	Liz Smith 610-842-1719
<b>ALCor, Observing, and Treasurer:</b>	Don Knabb 610-436-5702
<b>Secretary:</b>	Ann Miller 610-558-4248
<b>Librarian:</b>	Barb Knabb 610-436-5702
<b>Program:</b>	Dave Hockenberry 610-558-4248
<b>Education:</b>	Kathy Buczynski 610-436-0821
<b>Webmaster and Newsletter:</b>	John Hepler 410-639-4329
<b>Public Relations:</b>	Deb Goldader 610-304-5303



### CCAS Membership Information

The present membership rates are as follows:

<b>REGULAR MEMBER</b> .....	\$25/year
<b>SENIOR MEMBER</b> .....	\$10/year
<b>STUDENT MEMBER</b> .....	\$ 5/year
<b>JUNIOR MEMBER</b> .....	\$ 5/year
<b>FAMILY MEMBER</b> .....	\$35/year

### Membership Renewals

Check the Membership Renewals on the front of each issue of *Observations* to see if it is time to renew. If you need to renew, you can mail your check, made out to "Chester County Astronomical Society," to:

**Don Knabb**  
988 Meadowview Lane  
West Chester PA 19382-2178  
Phone: 610-436-5702  
e-mail: [treasurer@ccas.us](mailto:treasurer@ccas.us)

### Sky & Telescope Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **\$32.95**, much less than the newsstand price of \$66.00, and also cheaper than individual subscriptions (\$42.95)! Buying a subscription this way also gets you a 10% discount on other Sky Publishing merchandise.

To **start** a new subscription, make **sure** you make out the check to the **Chester County Astronomical Society**, note that it's for *Sky & Telescope*, and mail it to Don Knabb.

To **renew** your "club subscription" contact Sky Publishing directly. Their phone number and address are in the magazine and on their renewal reminders. If you have **any** questions call Don first at 610-436-5702.

### Astronomy Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **\$34.00** which is much less than the individual subscription price of \$42.95 (or \$60.00 for two years). If you want to participate in this special Society discount offer, **contact our Treasurer Don Knabb**.