



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 24, No. 6

Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009

June 2016

In This Issue

CCAS Spring/Summer Events.....	2
May 2016 Meeting Minutes.....	2
September 2016 Meeting.....	2
Dwarfs and Bullies.....	3
The Sky Over Chester County:	
June 2016.....	4
June 2016 Observing Highlights.....	5
Through the Eyepiece:	
Algieba.....	8
CCAS Founder Earns Astro League Award.....	9
Amateur Astro-imagers Get Ready for Juno.....	9
Mercury Transit Collage.....	10
CCAS Observing Chair Earns AstroLeague Award.....	11
CCAS Original Astrophotography.....	11
NASA Space Place.....	12
CCAS Directions: Brandywine Red Clay Alliance.....	13
Membership Renewals.....	14
New Member Welcome.....	14
CCAS Directions: WCU Map.....	14
Treasurer's Report.....	14
CCAS Information Directory.....	15-16

M13, The Great Hercules Cluster



Image courtesy of Dave Hockenberry. For more details, see pg. 11.

June 2016 Dates

- 3rd • Saturn at Opposition in Ophiuchus.
- 4th • New Moon, 10:59 p.m.
- 12th • First Quarter Moon, 4:09 a.m.
- 20th • Summer Solstice, 6:43 p.m.
- 20th • Full Moon, 7:02 a.m.
- 27th • Last Quarter Moon, 2:18 p.m.



CCAS Upcoming Nights Out

CCAS has several special "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, June 3rd, 2016** - CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

☼ **Saturday, June 4th, 2016** - star party at Nottingham County Park near Oxford, PA. CCAS members do not need to sign up for the event, but the general public must register with the park office. For more information, contact our Observing Chair, Don Knabb.

Membership Renewals Due

06/2016	Hanspal Hebding Panger
07/2016	Johnston Piehl
08/2016	Buki Knabb Family Lurcott, L.

Spring/Summer 2016 Society Events

June 2016

1st • 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 • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

4th • Star party at Nottingham County Park near Oxford, PA. CCAS members do not need to sign up for the event, but the general public must register with the park office. Sunset is around 8:30; meet at park at 8:00. For more details, contact Observing Chair [Don Knabb](#).

16th-17th • The von Kármán Lecture Series: [2015-2016 El Niño Winter and California Water: What did we see from space?](#), at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

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

20th • Summer Solstice, 6:43 p.m. First day of summer.

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

July 2016

1st • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

4th • Juno spacecraft scheduled to arrive at Jupiter at 8:35 p.m. PDT (Earth Received Time). At 10:30 p.m. orbit insertion and NASA TV commentary will begin. Watch the events online at <http://www.nasa.gov/nasatv>

6th • 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.

8th • [6th Annual Friday Night Lights at ChesLen Preserve](#), Coatesville, PA.

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

24th-25th • The von Kármán Lecture Series: [To Boldly Go... Well, You Know: NASA's Dawn Mission to the Asteroid Belt](#), Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

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

Minutes from the May 10, 2016, Society Meeting

by Ann Miller, CCAS Secretary

- The May 10, 2016 meeting of CCAS was greeted with photos of Kennedy Space Center and Space Shuttle Atlantis. Club members Kathy Buczynski, Don Knabb, and Barb Knabb visited the space center last month.
- Don Knabb distributed post cards advertising ALCON 2016 to be held in Washington, DC on August 10-13, 2016. Don and Barb will be attending. For more details on the conference sponsored by the Astronomical League go to the website at alcon2016.astroleague.org. Tour highlights and speaker lists as well as registration can be found there.
- President Roger Taylor welcomed 29 guests and members to the meeting. Roger then presented the Astronomical League Outreach Award to our club founder, Ed Lurcott.
 - The Outreach Award recognizes individuals who have promoted the hobby of astronomy through educational programs. Ed has certainly far exceeded the award requirements. We as a club are grateful for his years of educational excellence and club guidance.
 - We were delighted that 3 of Ed's children, Stan, Linda, and Nancy, could be present when he received this award. Photos of Ed at various club events were shared with our group.
- Roger next presented the Astronomical League Outreach Award to our observing Chair, Don Knabb. He extended our many thanks for all that Don does for our club and the astronomy community.
- Don Knabb presented Pete Kellerman with a CCAS tee shirt for his 70th birthday which was the day of the meeting. Happy Birthday Pete!
- Don Knabb observing chair shared the upcoming night sky with Sky Safari. May 12th the Lunar X will be visible. Mars will at opposition this month and easily observed in the constellation Scorpius.
- Don announced upcoming events. There will be a star party at Anson Nixon Park in Kennett Square, PA on Saturday, May 14, 2016. On June 4, 2016 a star party is planned for Nottingham Park in Oxford, PA. A club star party will be held at Frank Angelini's observatory on Thursday, May 26, 2016.
- Pete Kellerman updated the club on The CCAS Star Party at Blue Mountain Vista

(Continued on page 13)

September 2016 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on September 13, 2016, starting at 7:30 p.m. The meeting will be held in Room 112, Merion Science Center (former Boucher Building), West Chester University. Our speaker will be Alex Hill, a senior post-doctorate fellow at Haverford College. His research is on interstellar gas mediums.

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.

As for future meetings, Frank Angelini will speak at the October meeting, and John Conrad will be presenting in November. We are looking for presenters for future meetings in our spring 2017 season. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

Dwarfs and Bullies ... or ... When Is a Planet Not a Planet?

by John Conrad, CCAS Member and NASA/JPL Solar Ambassador



IAU vote in Prague in 2006 to demote Pluto. Credit: IAU/Robert Hurt (SSC)

Pluto was a centerpiece of the most recent NEAF (NorthEast Astronomy Forum) in April. Five of the 11 main talks were given by those associated with Pluto's discovery, demotion from planetary status, or recent New Horizons visit. Two talks in particular – one by Alan Stern, New Horizons Principal Investigator, and one by Gerard van Belle, a Lowell Observatory astronomer who participated in the 2006 IAU vote which demoted Pluto – provided insights into both the IAU voting process and the IAU definitions. I have now joined the ranks – as I believe these two speakers hoped – of those who are troubled by both the IAU's process and the current status of “what's what” in the solar system.

I won't waste your time by summarizing or selectively detailing the facts about things you already know (the history of Pluto, Clyde Tombaugh, IAU, the IAU definitions of solar sys-

tem bodies, etc.) or the impressive credentials of the speakers (easily Googled or Wikied). For context on Alan Stern's perspective, I will note that “New Horizons was originally planned as a voyage to the only unexplored planet in the Solar System.

When the spacecraft was launched [January 2006], Pluto was still classified as a planet, later to be reclassified as a dwarf planet by the International Astronomical Union (IAU). Some members of the New Horizons team, including Alan Stern, disagree with the IAU definition and still describe Pluto as the ninth planet.”

Timing is everything, they say, and the IAU vote on new definitions for “planet” and a newly-defined category of solar system body, “dwarf planet,” took place in August 2006. So when the New Horizons spacecraft was launched, NASA was on the way to completing its initial visits to

all the *nine* planets, Uranus and Neptune having been visited in the 1980s. Only a few months later, with the IAU demotion of Pluto's status, NASA could effectively check the box for *visiting all the planets* nine years earlier than expected, no longer having to wait for New Horizons to complete its journey in 2015.

Thank goodness the planetary definition change hadn't taken place a few years earlier. In 2002, Sean O'Keefe, President Bush's new NASA Administrator, had cancelled New Horizons and it took some heroic lobbying by Alan Stern – to get the New Horizons mission the number one priority in the Planetary Science Decadal Survey of 2003-2013 – to get the funding re-established. Had it no longer been an official planet, I would guess we wouldn't have today's awesome new understanding of the Pluto system.

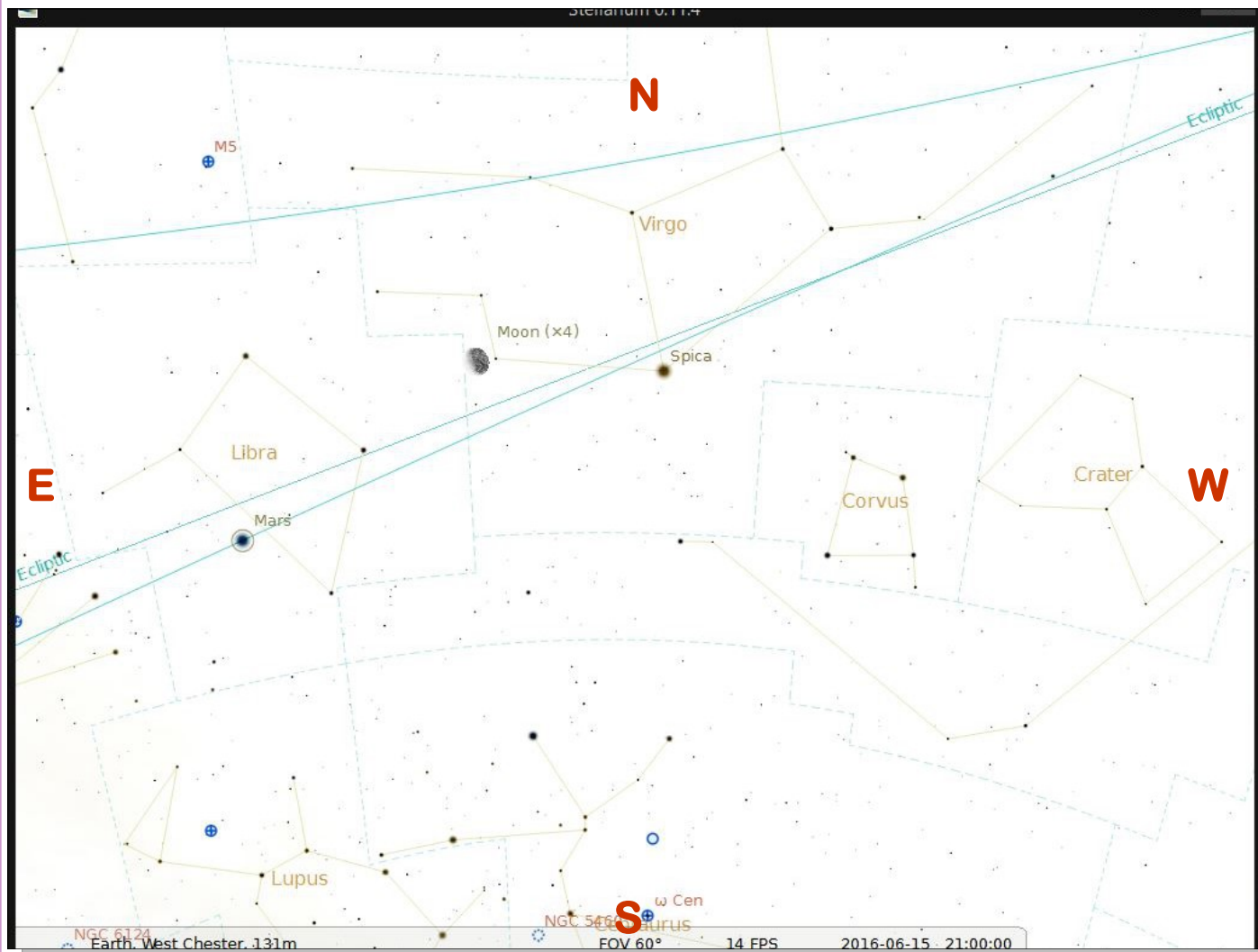
What's What in the Solar System. The discussion and decision about what qualifies a solar system object to be a planet is not new. Without going through the exhaustive history, it's quite interesting to note that the first half of the 19th century saw a number of quantity – and definitional – changes. In 1800, Earth had been joined by Mercury, Venus, Mars, Jupiter, Saturn, and Uranus to give us seven “wanderers” or planets. With the discovery of Ceres in the asteroid belt in 1801, things got trickier. Ceres was added to the planet catalog and three more asteroids were discovered in the next six years, another in 1845, and it

(Continued on page 6)

The Sky Over Chester County

June 15, 2016 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.



Date	Civil Twilight Begins	Sunrise	Sunset	Civil Twilight Ends	Length of Day
6/01/2016	5:02 a.m. EDT	5:34 a.m. EDT	8:24 p.m. EDT	8:56 p.m. EDT	14h 49m 47s
6/15/2016	4:59 a.m. EDT	5:31 a.m. EDT	8:31 p.m. EDT	9:04 p.m. EDT	14h 59m 49s
6/30/2016	5:03 a.m. EDT	5:35 a.m. EDT	8:33 p.m. EDT	9:06 p.m. EDT	14h 57m 46s

Moon Phases

New Moon	6/04/2016	10:59 p.m. EDT	First Quarter	6/12/2016	4:09 a.m. EDT
Full Moon	6/20/2016	7:02 a.m. EDT	Last Quarter	6/27/2016	2:18 p.m. EDT

June 2016 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

3	Saturn, in Ophiuchus, is at opposition
4	New Moon
9	The crescent Moon is near Regulus, the brightest star in Leo
10	The crescent Moon is between Regulus and Jupiter
11	Jupiter visible during daylight near the Moon, just before sunset
12	First Quarter Moon
16	The Moon, Mars and Saturn make a nice group in the evening sky
20	Full Moon, the Full Strawberry Moon, and Summer Solstice
26	Pluto passes 2.7' south of Pi Sagittarii
27	Last Quarter Moon

The best sights this month: Oh my there are planets in the evening sky! Starting just as it gets dark, bright Jupiter is in the southwest. Just a little later Mars and Saturn rise in the east and are visible nearly all night. Of course the nights are short in June, but they are warm and lovely, filled with the sights and sounds of summer.

Observing challenge: I have never seen Pluto, but there is a chance to see it on June 26th when it passes 2.7' due south of the 2.9 magnitude star Pi Sagittarii, known as Albaldah. Have your electronic star chart nearby and give it a try!

Mercury: Mercury is low in the pre-dawn sky this month and not easily observed. But it was the center of attention last month as it passed in front of the Sun.

Venus: Our sister planet passes behind the Sun on June 6th so it is not visible this month.

Mars: The red planet was at its closest approach to Earth in 11 years on May 30th, so it is still big and bright during June. It is now falling behind us in our race around the Sun, but will continue to be an impressive sight in a telescope, especially if you wait until it is high in the sky, near midnight early in June and just after it is fully dark at the end of the

month. Look on a very clear night to see if you can pick out any surface features.

Jupiter: Look at Jupiter just after it gets fully dark for the best view of the king of the planets. Jupiter will set around midnight by the end of the month so the observing window is fairly short near the Summer Solstice.

Saturn: The ringed planet reaches opposition on June 3rd so it will be visible all night. The rings are tilted at 26 degrees toward Earth so they are nearly as wide open as we can ever see them. Be sure to share this sight with friends and family if you want to hear some shouts of joy!

Uranus and Neptune: The outer gas giants are best observed just before dawn, when the cats and I will be sleeping soundly. But then, I could say that for most of the day for the cats.

The Moon: Full Moon is on June 20th, the same day as the Summer Solstice. The June full Moon was called the Full Strawberry Moon by Native American tribes. This name was universal to every Algonquin tribe. However, in Europe they called it the Rose Moon. Personally, I prefer the Strawberry Moon since strawberries go better with granola than roses.

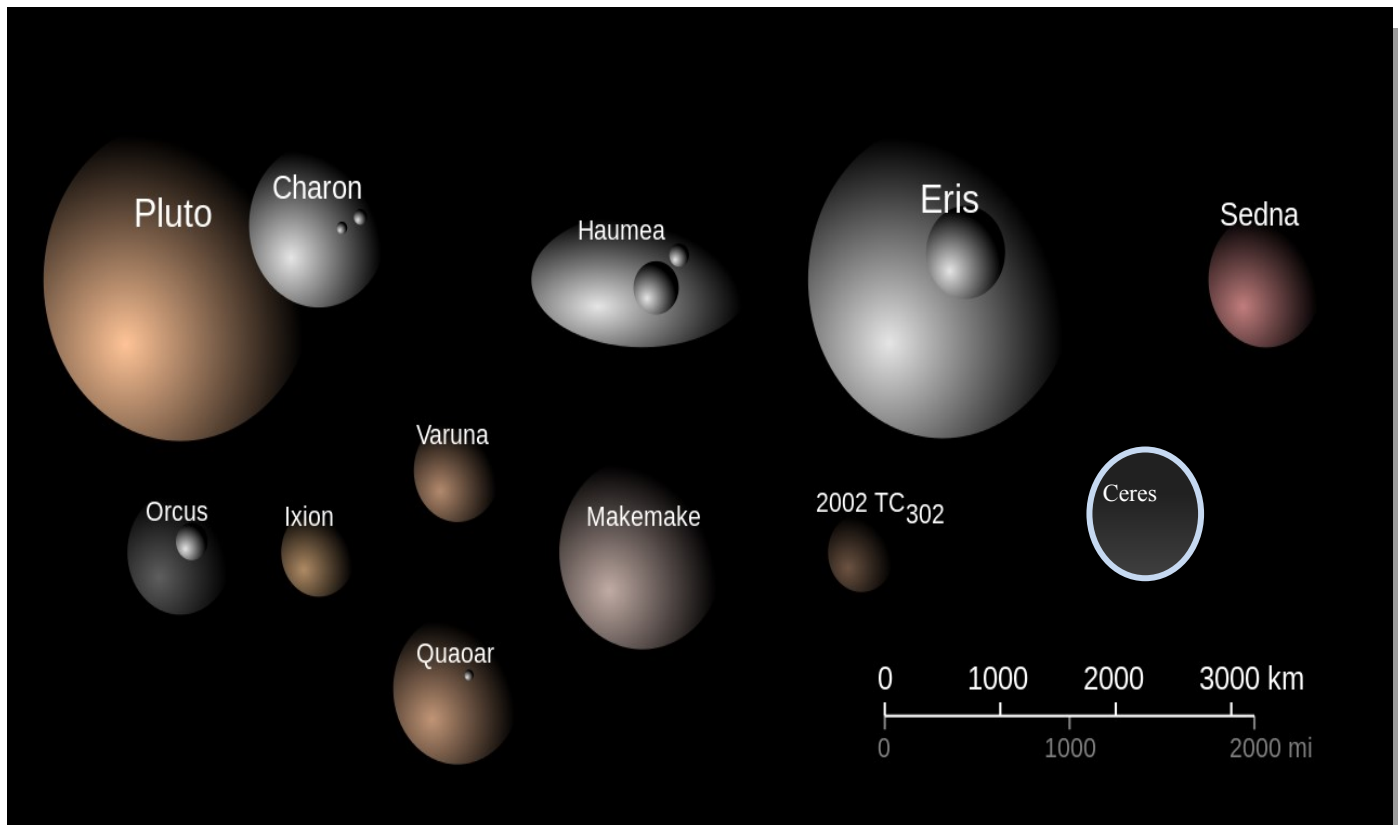
During summer the Earth leans toward the Sun placing it high in our sky and bringing us warm days and late sunsets. The tilt of the Earth also places the Moon low in the night sky. I always enjoy the way the low, full Moon lights up the trees, more from the side than from above.

Constellations: Leo the Lion is diving into the west as Hercules the Hunter follows him across the sky. In the east the big birds of summer, Aquila the Eagle and Cygnus the Swan are rising. But I'll spend most of my time staring at Sagittarius and Scorpius in the southern sky for the next few months, enjoying their brief time above the horizon.

Messier/deep sky: For a telescopic treat seek out M3 in Canes Venatici in the southwest, one of the three brightest globular clusters in the northern sky. Then switch to a low power/wide field eyepiece and

(Continued on page 9)

Dwarfs & Bullies (Cont'd)



Original Image Source: https://en.wikipedia.org/wiki/Dwarf_planet#/media/File:TheTransneptunians_Size_Albedo_Color.svg

(Continued from page 3)

took the discovery of Neptune in 1846 to bring the count back down. For almost 50 years, the solar system had 11 planets; with Neptune, the decision was made to demote the growing number of discovered asteroids to be – well – asteroids rather than planets.

So the planet count has gone – first six, then seven, up to eleven, down to eight, then finally nine in 1930 with the discovery of Pluto. Then things remained stable until our observational powers improved *a lot* in the late 20th century. Then came the Kuiper Belt objects, the ‘scattered disc’ objects, the *exoplanets*, and a growing number of newly-discovered distant orbs which

were round and matched or exceeded Ceres in size. By 2003, the IAU was working on new definitions and nomenclature. When Eris was discovered in the Kuiper Belt in 2005 *rivalling Pluto in size*, the question of what was a planet and what wasn’t had come to a head. The IAU scheduled a General Assembly meeting in Prague in August 2006 to put all this to a vote.

In his talk to the NEAF audience in April, Gerard van Belle described how the meetings proceeded. First of all, the IAU has about 10,000 members, the large majority of which were not in attendance for any of the sessions; and voting would be done only by those in attendance. Gerard was present only because

he was giving a paper and was not scheduled to leave until the 12-day General Assembly had ended. Many of those who attended had left before the final day when the vote was taken. At any rate the resolutions were put before the attendees and voted on by only the 411 people remaining for the Closing Ceremony.

Regarding the specific vote counts, in the words of the official IAU minutes, “Resolution 5A “Definition of Planet” was not counted but was passed with a great majority.” Furthermore, since the passage of 5A removed Pluto from the planet category, there was another vote – “Resolution 6A: “Definition of

(Continued on page 7)

Dwarfs & Bullies (Cont'd)

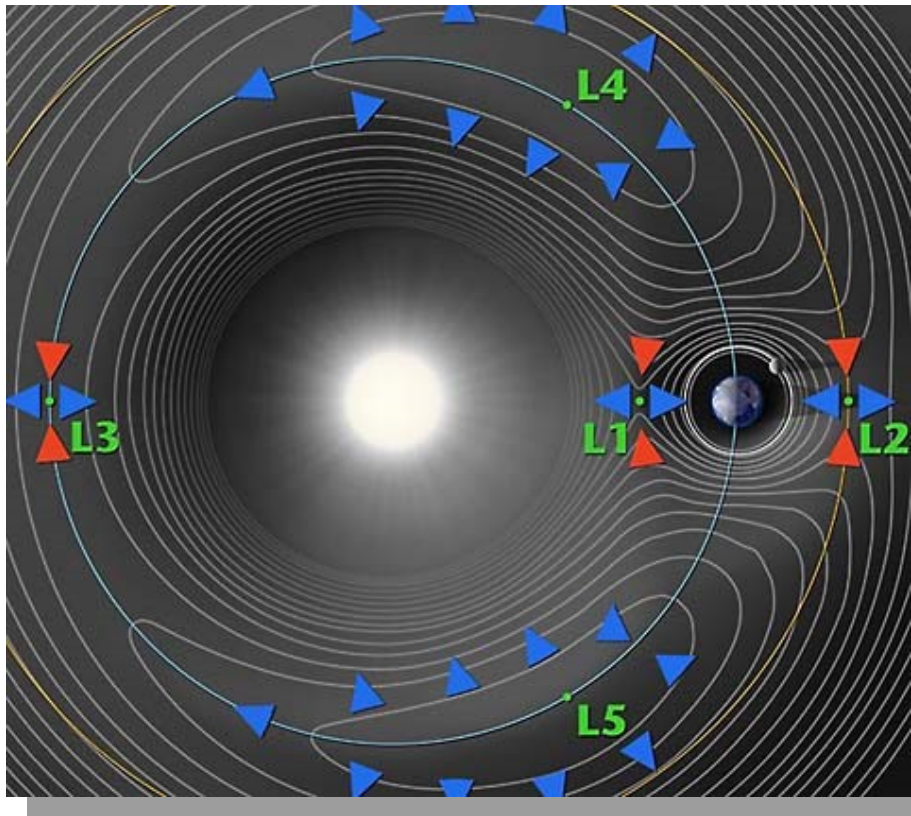


Diagram of Lagrange Points Credit: NASA / WMAP Science Team

(Continued from page 6)

Pluto-class objects" was passed with 237 votes in favour, 157 against and 17 abstentions" (IAU.org).

Gerhard in his NEAF talk, explained the 'laymen's test' of how a planet is now to be defined, three simple questions to ask of each orb in the solar system:

1. Does it orbit the Sun?
2. Is it big enough to be a ball?
3. Is it a bully?

If the answer to all three questions is YES (Resolution 5A), then you have a planet. If YES to only the first two questions, it's something else. The proposal of what to call these 'non-bully'

orbs was Resolution 6A – they are 'dwarf planets.'

Let's look a little deeper. Question 1 is straightforward, easily answered. Question 2 is really asking if the object had sufficient mass / gravity to achieve 'hydrostatic equilibrium', that is, make itself *roundish* (sometimes ellipsoidal rather than spherical). Question 3 is not at all simple. The IAU criterion is stated as whether the solar-orbiting ball "has cleared the neighborhood around its orbit." There are many problems with trying to achieve a simple yes/no answer to this question. Gerhard has plenty of company (including Alan Stern) in raising many valid arguments to this question being included in the IAU definition of a planet. I invite you to

read his [blogpost](#) for a fascinating discussion of the many flaws in this unfinished debate.

I'll choose only one of Gerhard's challenges to illustrate why I agree with him, Alan Stern, and others who wish the current 'planet' definition to be re-examined. That is the presence of the 'Trojans' in the orbits of several currently-designated planets. These Trojans are the groups of asteroids discovered to be co-orbiting at two of the Lagrangian points in the orbits of 6 of the 8 planets: Jupiter (where they were first discovered), Neptune, Mars, Uranus, Venus, and ... Earth. Clearly these 6 of the remaining 8 planets have not "cleared the neighborhood around its orbit." Therefore these 6 planets are not the 'bullies' required to qualify as a planet!

Thus in a few hours last month at NEAF my somewhat apathetic acceptance of the IAU 2006 planet definition was replaced with an eagerness to keep this debate open. In fact, I've joined the campaign not only to drop the problematic "bully" criterion from the planet definition but also to get Pluto – along with a growing number (at least 5 and likely two or three times that many) of other solar-orbiting balls promoted to the status of planets. And in the process do away with the very temporary and unnecessary category of dwarf planet!

Sources

<https://www.iau.org/news/pressreleases/detail/iau0603/>
<http://gerardstravelnotes.blogspot.com/>
https://en.wikipedia.org/wiki/New_Horizons

Through the Eyepiece: Algieba, Double Star in the Constellation Leo the Lion

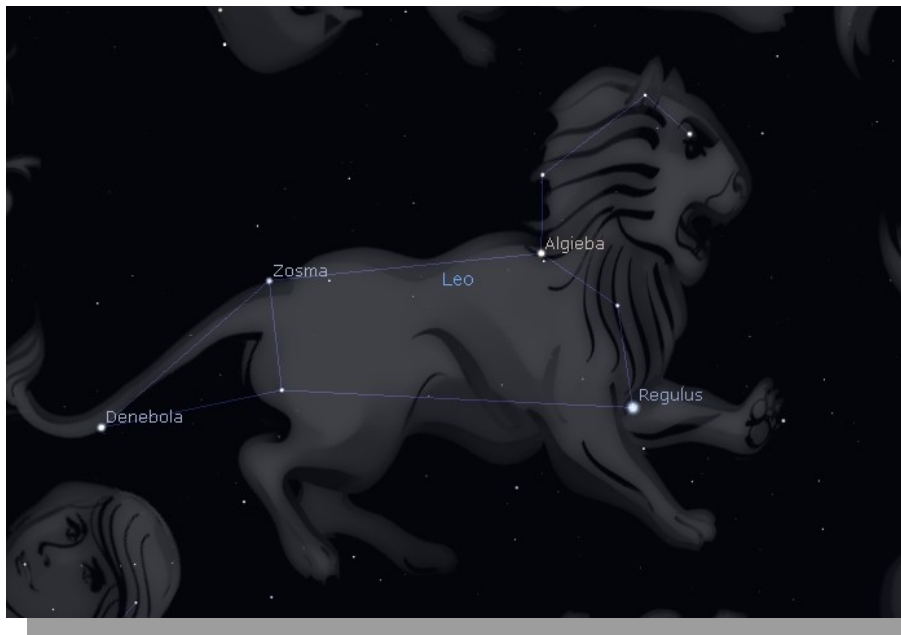
by Don Knabb, CCAS Treasurer & Observing Chair

Although we spend most of our time under the stars using our binoculars and telescopes to look at planets, clusters and nebula, double stars are also a source of enjoyment. Some of the more famous double stars are Albireo in Cygnus, the “double-double” in Lyra and Mizar in the handle of the Big Dipper.

Another often overlooked but fine double star is 2nd magnitude Algieba, in the constellation Leo the Lion. Algieba is easy to find in Leo, which will be low in the western sky just as darkness falls during June. Algieba is the second brightest star (after Regulus) in Leo. To the right is a sky map of Leo the Lion.

Algieba is one of the finest double stars in the spring sky. Its name comes from the Arabic, meaning “the forehead.” Despite this meaning, the star actually appears in the mane of Leo. Both stars are yellow-orange giants about twice the mass of our Sun, which have run out of hydrogen and are now burning helium in their cores.

William Herschel discovered Algieba in 1782. They are a slowly widening binary system (that is, they are gravitationally bound, not a chance alignment of stars) with an orbital period between 5 and 6 centuries. In the recent television series *Cosmos: A Spacetime Odyssey*, it is stated that Herschel’s careful observation of Algieba led him to the conclusion that gravity binds not only us to the planet Earth, but distant stars to each other. He was the first scientist



Sky map created with Stellarium planetarium software.

to make this assertion. (Note for all science fiction geeks: the voice of William Herschel is provided by Patrick Stewart, otherwise known as Captain Jean Luc Picard in the series *Star Trek the Next Generation*).

The stars of Algieba, at 4 arc-

seconds separation, are too close to split with binoculars, but almost any telescope will show you the two stars. At 60 power the pair is barely seen as a double, but at 100X I was able to easily split the stars. The stars are a nice golden/

(Continued on page 9)



Image credit: Dr. F. Ringwald, Dept. of Physics, California State University, Fresno

Eyepiece (cont'd)

(Continued from page 8)

yellow color to my eyes, although some observers note a pale red or a slight greenish color in the smaller of the two stars. To the right is an image taken by Dr. F. Ringwald with a 16-inch Meade LX-200. The image was taken as digital video with a Philips ToUcam II and processed with Registax.

The radiant of the Leonid meteor shower is only 2 degrees northwest of Algieba. This shower peaks in mid-November. This shower gave us a great show in 1998, but it paled in comparison to the shower in 1833 when over 100,000 meteors per hour were observed.

Information credits:

Dickinson, Terence 2006. *Nightwatch: a practical guide to viewing the universe*. Buffalo, NY. Firefly Books

www.theskyscrapers.org/algieba

www.oneminuteastronomer.com/9819/algieba

Sky Safari Pro iPad app

Observing (Cont'd)

(Continued from page 5)

swing over to the east where M39, a loosely structured open cluster is rising with Cygnus. The rest of the evening you can spend in the southern sky enjoying open clusters M6, the Butterfly Cluster, and M7, Ptolemy's Cluster. To see nebulas, nearby are M8 the Lagoon Nebula and M20 the Trifid Nebula.

Comets: There are no bright comets in the sky during June.

Meteor showers: There are no major meteor showers during June. If you do happen to see a very slow meteor late in the month it could be a Boötid meteor, but this shower is so sparse and unpredictable it cannot be called a meteor shower.

Amateur Astro-imagers Get Ready for Juno

by Christophe Pellier, *Sky & Telescope Magazine*

When it comes to solar-system studies, planetary scientists have long valued the contributions made by amateur observers.

So it's not surprising that, on May 12–13, amateurs and professionals interested in supporting NASA's Juno mission met in Nice, France, for a workshop dedicated to projects and techniques related to Jupiter observations.

The Juno spacecraft, launched by NASA in August 2011, is set to arrive at the giant planet on July 4th and go into orbit around it. The spacecraft's key objectives are to investigate the internal structure, atmospheric composition, and magnetospheric surveys.

Although Juno will image the planet at very high resolution, especially in the polar regions, it lacks the ability to create global portraits. So it falls to Earth-based observations to watch of regions out of view from the probe, and to acquire the large-scale views to provide context for the spacecraft's small-scale scrutiny.

Amateur images will be important not only before Juno's arrival but also during the planned 20 months of high-resolution imagery. Features and activity in the Jovian atmosphere must be identified and followed long before the beginning of the Juno mission's high-resolution phase.

Fortunately, amateur observers have maintained regular, near-

(Continued on page 11)

CCAS Founder Receives Astronomical League Award

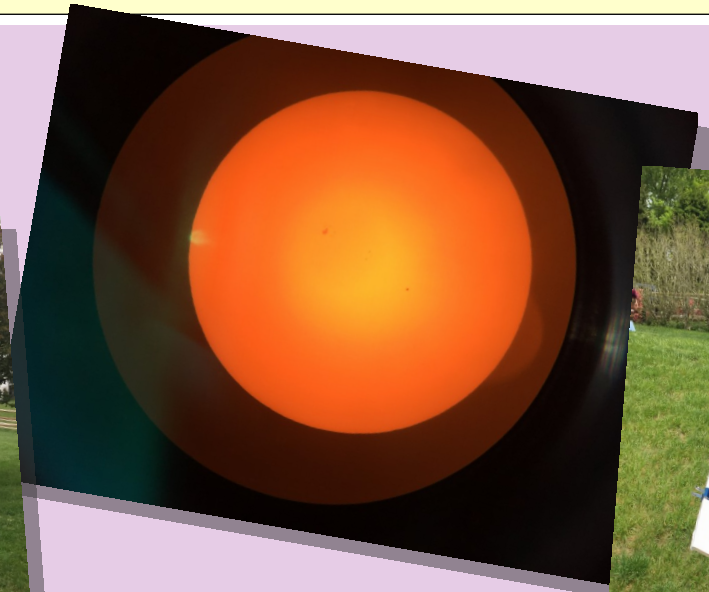
by Ann Miller, CCAS Secretary



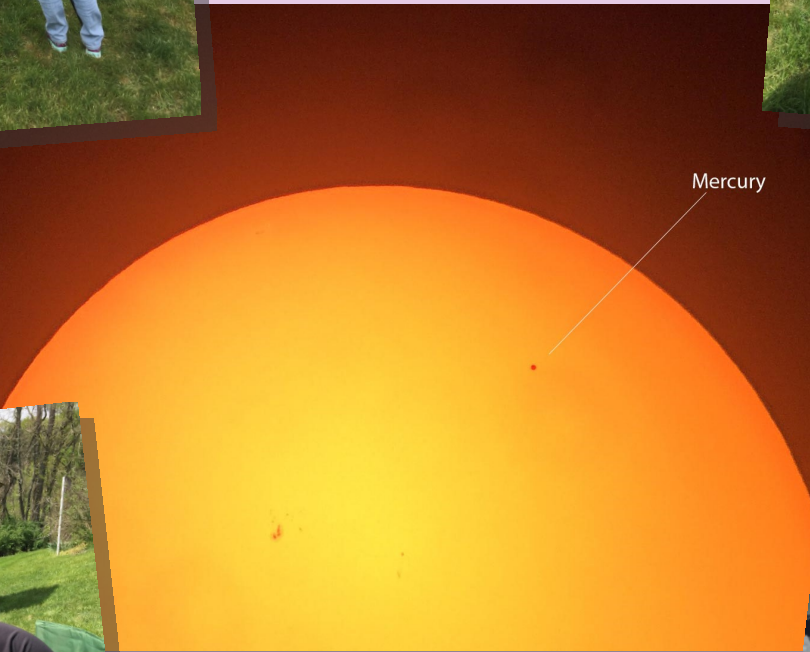
CCAS President Roger Taylor presents the Astronomical League Outreach Award to our club founder, Ed Lurcott, at the May 10, 2016, meeting. Standing behind Ed are three of his children, Nancy, Stan, and Linda. The Outreach Award recognizes individuals who have promoted the hobby of astronomy through educational programs.

Images of the Transit of Mercury

Photos submitted by CCAS Members Dave Hockenberry and Don Knabb



Herb and Projector



Mercury



Frank at Scope

On Monday, May 9th, 2016, Mercury transited the Sun. Frank Angelini, Sr., invited fellow CCAS members to join him at his observatory near Downingtown to witness the astronomical event. Dave Hockenberry took the center photograph through a Questar 3.5" telescope, TeleVue 19mm Panoptic eyepiece, with an iPad held over the eyepiece! Sunspots are also visible lower and left of Mercury. Unsharp mask and text tool processing were done using Photoshop CS3.



Frank with his big scope!

Juno (Cont'd)

(Continued from page 9)

continuous scrutiny of Jupiter for many years, and this long-term monitoring will help scientists to adjust the mission goals.

The workshop's 30 attendees shared a great deal in their two days together. The various talks, recorded on video, are now accessible to anyone interested in

this rewarding observing activity.

Highest on the "to-do" list for the months ahead is to help maintain the ground-based survey of Jupiter, so lots of discussion focused on the necessary equipment, imaging, and processing tools and techniques needed for that task. For example, more and more planetary imagers are utilizing infrared and methane-band filters, as well as atmospheric-dispersion correctors.

Cooperation between amateur and professionals will be supported by maintaining or improving some specific projects and websites. The JunoCam homepage, for example, is built to collect amateur images in a special format for science use during the Juno mission.

The JunoCam homepage is not the only website that will help observers and scientists to work together: a new version of the Planetary Virtual Observatory and Laboratory (PVOL) website will be set up in coming months to facilitate image analysis.

Interested amateurs have many opportunities to participate in this exciting pro-am project during the Juno mission!

For more details, see the complete article at <http://www.skyandtelescope.com/astronomy-news/observing-news/juno-pro-am-workshop-05252016>

CCAS Treasurer Receives Astronomical League Award

by Ann Miller, CCAS Secretary



Founder Ed Lurcott wasn't the only award recipient at the final spring meeting. CCAS treasurer and observing chair, Don Knabb, was also awarded the Astronomical League's Outreach Award. CCAS President Roger Taylor thanked Don for his hard work supporting club members and the astronomical community in general.

CCAS Original Astrophotography

by Dave Hockenberry, CCAS Program Chair

On the newsletter cover: M13, or NGC6205. Data acquired 5/15/2016 with a Hyperion 12.5" astrograph telescope, QSI 583wsg camera on an AstroPhysics 1200 GEM. Image capture/observatory control with MaxImDL. Guiding with SX Lodestar 2 and SXV-AOLF Active Optics unit. Broadband filters by Astrodon, Generation 2 red, green, blue and clear (Lum). Images calibrated, stacked, RGB color image creation, and Lum deconvolution in CCDStack. LRGB merge and further adjustments in Photoshop CS3. Com-

pilation of 13 X 200-second Lum, 10 X 200-second Red, Green and Blue subexposures all binned 1 x 1.

M13 is also known as the Great Hercules Cluster, found in the constellation Hercules. A globular cluster approximately 22,000 light years distant it is actually just visible to the naked eye in good dark sky conditions, and is easily spotted from anywhere with binoculars or a small telescope. This makes M13 a delectable target for visual observers and astrophotographers alike!

NOAA's Joint Polar Satellite System (JPSS) to Revolutionize Earth-watching

by Dr. Ethan Siegel

If you want to collect data with a variety of instruments over an entire planet as quickly as possible, there are two trade-offs you have to consider: how far away you are from the world in question, and what orientation and direction you choose to orbit it. For a single satellite, the best of all worlds comes from a low-Earth polar orbit, which does all of the following:

- orbits the Earth very quickly: once every 101 minutes,
- is close enough at 824 km high to take incredibly high-resolution imagery,
- has five separate instruments each probing various weather and climate phenomena,
- and is capable of obtaining full-planet coverage every 12 hours.

The type of data this new satellite – the Joint Polar Satellite System-1 (JPSS-1) -- will take will be essential to extreme weather prediction and in early warning systems, which could have severely mitigated the impact of natural disasters like Hurricane Katrina. Each of the five instruments on board are fundamentally different and complementary to one another. They are:

1. The Cross-track Infrared Sounder (CrIS), which will measure the 3D structure of the atmosphere, water vapor and temperature in over 1,000 infrared spectral channels. This instrument is vital for weather forecasting up to seven days in advance of major weather events.

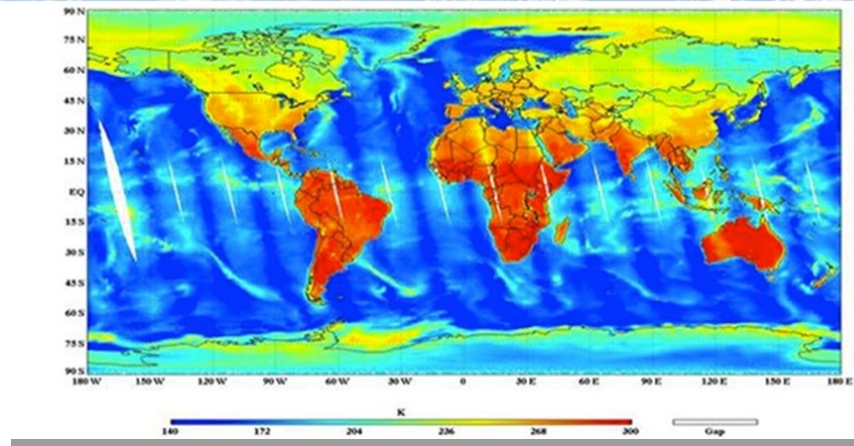


2. The Advanced Technology Microwave Sounder (ATMS), which assists CrIS by adding 22 microwave channels to improve temperature and moisture readings down to 1 Kelvin accuracy for tropospheric layers.

3. The Visible Infrared Imaging Radiometer Suite (VIIRS) instrument, which takes visible and infrared pictures at a resolution of just 400 meters (1312 feet), enables us to track not just weather patterns but fires, sea temperatures, nighttime light pollution as well as ocean-color observations.

4. The Ozone Mapping and Profiler Suite (OMPS), which measures how the ozone concentration varies with altitude and in time over every location on Earth's surface. This instrument is a vital tool for understanding how effectively ultraviolet light penetrates

(Continued on page 13)



Images credit: an artist's concept of the JPSS-2 Satellite for NOAA and NASA by Orbital ATK (top); complete temperature map of the world from NOAA's National Weather Service (bottom).

Space Place (Cont'd)

(Continued from page 12)
the atmosphere.

5. Finally, the Clouds and the Earth's Radiant System (CERES) will help understand the effect of clouds on Earth's energy balance, presently one of the largest sources of uncertainty in climate modeling.

The JPSS-1 satellite is a sophisticated weather monitoring tool, and paves the way for its' sister satellites JPSS-2, 3 and 4. It promises to not only provide early and detailed warnings for disasters like hurricanes, volcanoes and storms, but for longer-term effects like droughts and climate changes. Emergency responders, airline pilots, cargo

(Continued on page 14)

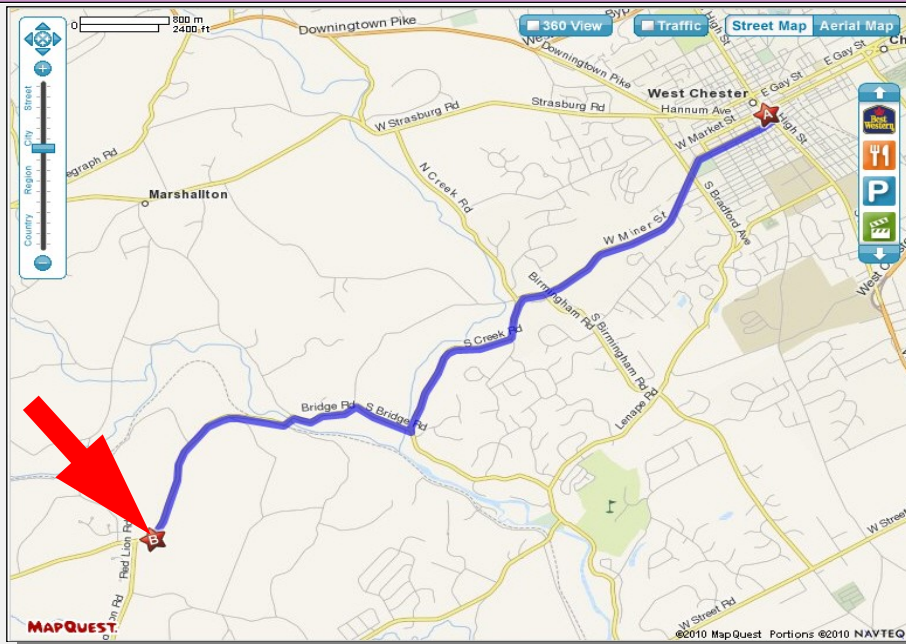
Minutes (Cont'd)

(Continued from page 2)

in New Ringgold, PA on July 27-July 30, 2016. This is a private dark sky observing site owned by Frank Colissimo. Pete also brought his home made telescope (3", F14) to share with the group and explained the details of construction.

- Our program chair, David Hockenberry announced upcoming programs for CCAS for the Fall of 2016. September's program will be a presentation by a Haverford College professor on the Highest Energetic Galaxies. In October, Frank Angelini will present the Sudden Ionospheric Disturbances program that he is participating in sponsored by the American Association of Variable Star Observers.
- David introduced our evening's speaker, John Conrad. John is a NASA Solar System Ambassador and CCAS member. The program was "Looking Deep and Deeper" Machines that allow us to look deep into space. More information about the Hubble Space Telescope and the James Webb Telescope can be found at Space Telescope Science Institute at stsci.edu. John presented Hubble Ultra Deep Field Observations. The Frontier Fields program will combine Chandra, Spitzer, and Hubble data to build a catalogue of distant objects. Hubble has now "looked back" to a $Z=11.1$ or 97% of the way back to the Big Bang. John next gave an update on the James Webb Space Telescope with all mirrors on board, the WFIRST program, and the AURA program. To follow progress on the programs go to YouTube and search Hubble Hangout for videos on the Hubble Space Telescope, progress on the James Webb Space Telescope, and WFIRST-Wide Field IR Space Telescope program.
- Roger concluded the evening's meeting with "see you in September or lose you to a summer love" when the next regular meeting of CCAS will be held on Tuesday, September 13, 2016.

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.

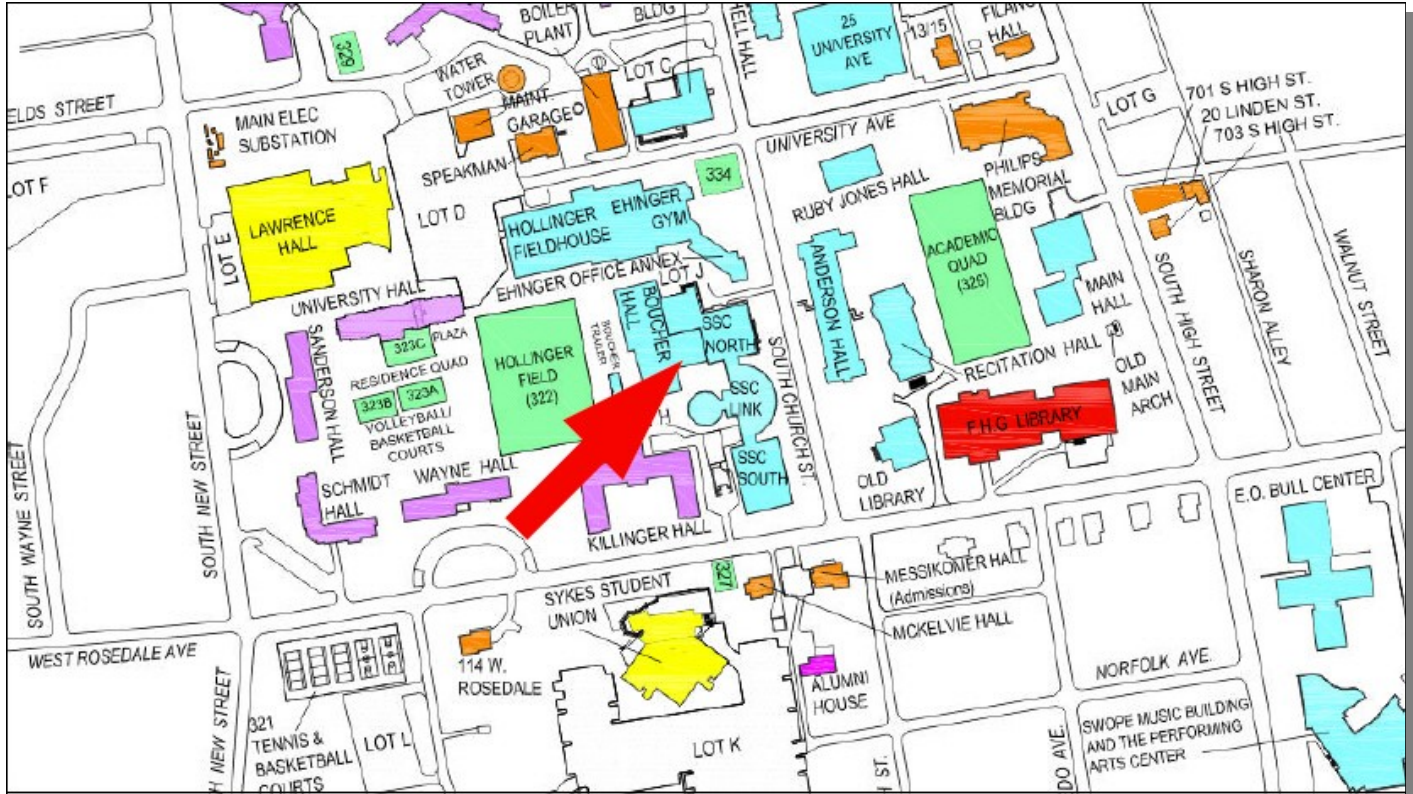
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route 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).



Space Place (Cont'd)

(Continued from page 13)

ships, farmers and coastal residents all rely on NOAA and the National Weather Service for informative short-and-long-term data. The JPSS constellation of satellites will extend and enhance our monitoring capabilities far into the future.

Did You Know?

We often think of the Asteroid Belt as being crammed full of debris like a celestial traffic jam, but if all of the asteroids were combined, the object they would form would have a diameter a little less than half that of the moon, with 1/10th the moon's volume.

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

May 2016 Financial Summary

Beginning Balance	\$2,939
Deposits	\$45
Disbursements	\$0
Ending Balance	\$2,984

New Member Welcome!

Welcome new CCAS member Sean McCausland 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

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

<http://www.darksky.org>

Dark-Sky Website for PA



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 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

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.

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

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:

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



CCAS Membership Information

The present membership rates are as follows:

REGULAR MEMBER	\$25/year
SENIOR MEMBER	\$10/year
STUDENT MEMBER	\$ 5/year
JUNIOR MEMBER	\$ 5/year
FAMILY MEMBER	\$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

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**.