Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 22, No. 1 *Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009* *January 2014*

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NGC 7293: The Helix Nebula

Image Credit & Copyright: Don Goldman

Membership Renewals Due

01/2014	Golub Labroli Linskens Loeliger Lurcott, Stan Prasad
02/2014	DiGiovanni Kalinowski & Family La Para
03/2014	Angelini End LaFrance Sterrett

Important January 2014 Dates

1st • New Moon, 6:14 a.m.

3rd • Quadrantid Meteor Shower Peaks

7th • First-quarter Moon, 10:40 p.m.

15th • Full Moon, 11:53 p.m.

24th • Last Quarter Moon, 12:19 a.m.

30th • New Moon, 4:39 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, February 28, 2013.** CCAS monthly observing session at BVA. The observation session starts at dusk.

☼ **Friday, March 21, 2013.** CCAS monthly observing session at BVA. The observation session starts at dusk.

☼ **Saturday, March 22, 2013.** CCAS special observing session at Bucktoe Creek Preserve. The observation session starts at dusk.

Winter 2014 Society Events

January 2014

8th • 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.

11th • CCAS Monthly Meeting, Room 112, Merion Science Center (former Boucher Building), West Chester University. The meeting starts at 7:30 p.m. Guest Speaker: Scott Engle.

16th-17th • The von Kármán Lecture Series: The Mars Exploration Rovers: A Decade of Exploration, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

17th• Reservations start for the February 7th planetarium show at the WCU Planetarium.

20th • Open call for articles and photographs for the February 2014 edition of Observations.

26th • Deadline for newsletter submissions for the February 2014 edition of Observations.

February 2014

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.

7th • West Chester University Planetarium Show: "Andromeda: Our Galaxy Neighbor," in the Schmucker Science Building. For more information and reservations, visit the WCU Public Planetarium Shows webpage.

11th • CCAS Monthly Meeting, Room 112, Merion Science Center (former Boucher Building), West Chester University. The meeting starts at 7:30 p.m. Meeting Program: Members' Night (Open Forum).

13th-14th • The von Kármán Lecture Series: The History and Future of Space Communications—Celebrating 50 Years of the NASA Deep Space, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

14th• Reservations start for the March 7th planetarium show at the WCU Planetarium.

20th • Open call for articles and photographs for the March 2014 edition of Observations.

26th • Deadline for newsletter submissions for the March 2014 edition of Observations.

January 2014 CCAS Meeting Speaker

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on January 14, 2013, starting at 7:30 p.m. The meeting will be held in **Room 112, Merion Science Center** (former Boucher Building), West Chester University. Guest Speaker: Scott Engle. He will talk about the climate and the Sun-Earth connection, particularly the Little Ice Age.

The theme for our meeting on February 11th is a members' night, were members can share their research or ask for help from other members.

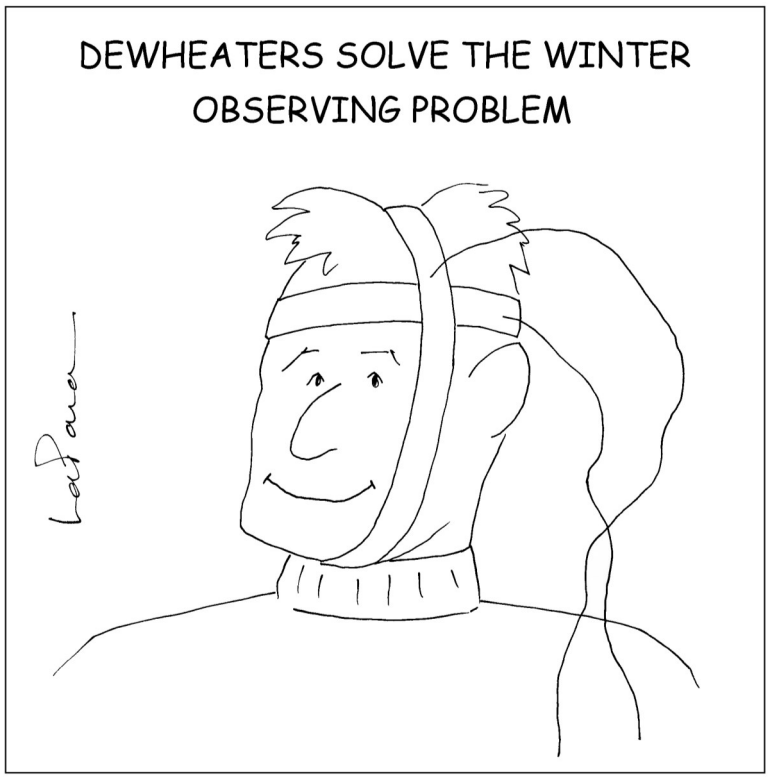
Our upcoming meeting presenters are: March 11th - Ruth Davis, Professor of Astronomy & Physics at Penn State; April 8th - Tim Larson, Astronomy Professor at Penn State Brandywine; and May 13th - John Conrad, CCAS member and NASA Solar System Ambassador.

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 2014. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

Nicholas's Humor Corner

by Nicholas La Para



Hubble Images Become Tactile 3-D Experience for the Blind
submitted by NASA

Image Credit: NASA, ESA, and M. Estacion/STScI

Three-dimensional printers are transforming the business, medical, and consumer landscape by creating a vast variety of objects, including airplane parts, football cleats, lamps, jewelry, and even artificial human bones.

Now astronomers Carol Christian and Antonella Nota of the Space Telescope Science Institute in Baltimore, Md., are experimenting with the innovative technology to transform astronomy education by turning images from NASA's Hubble Space Telescope into tactile 3-D pictures for people who cannot explore celestial wonders by sight. The 3-D print design is also useful and intriguing for sighted people who have different learning styles, said the researchers. Christian and Nota admit their task is a challenge because astronomers really can't see space objects in three dimensions.

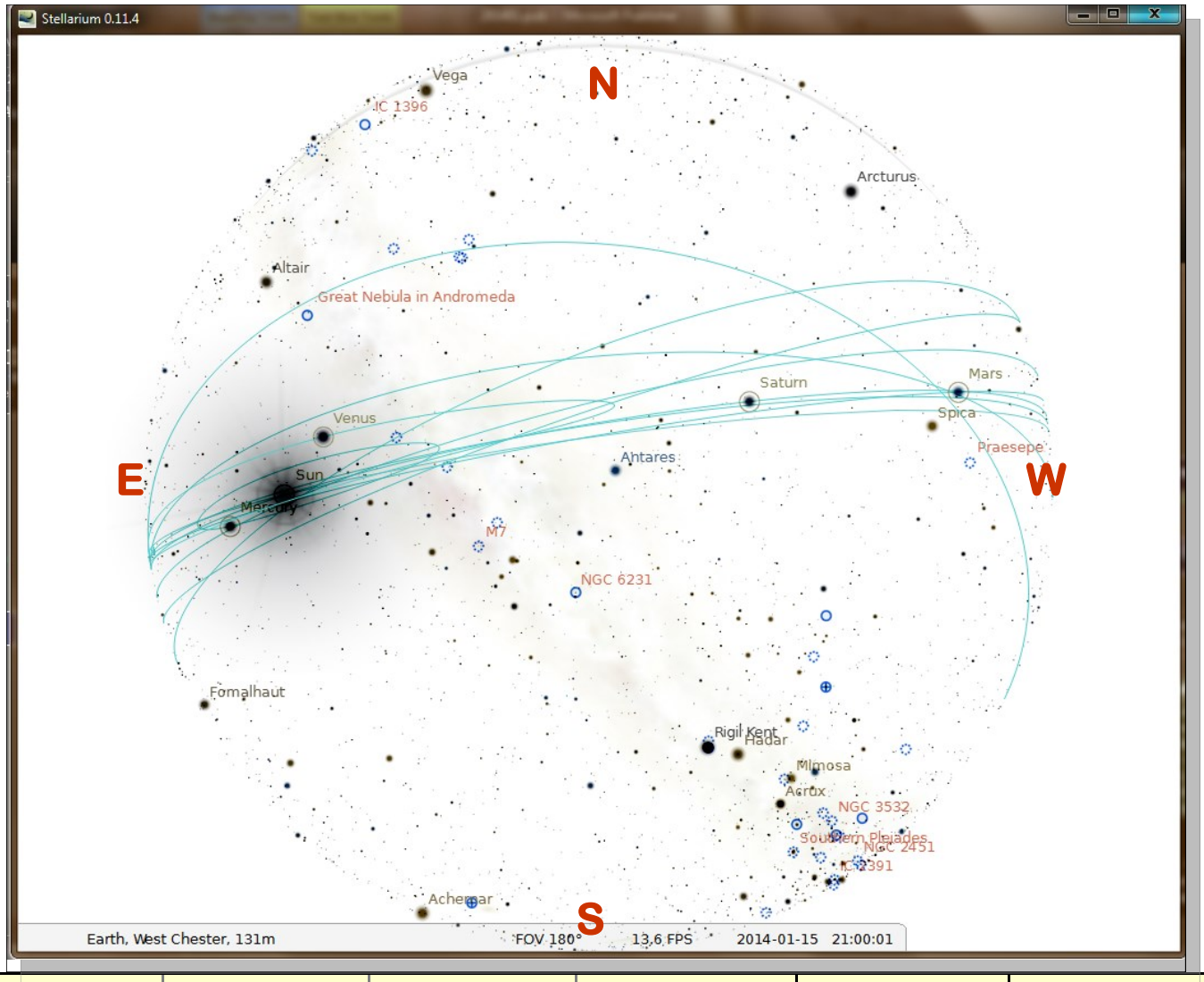
"It's very easy to take any tool or object that you can actually measure and produce a 3-D printout," Nota said. "But it's very hard to think of an astronomical object about which you know very little. You can measure the sizes and brightnesses of space objects from the images, as well as some of the distances. But it's really hard to understand their 3-D structure. The work is scientific, but it's also guesswork and artistry to try to produce an object, which printed, will look like the image that Hubble has taken. So, we are basically designing the process from scratch."

(Continued on page 8)

The Sky Over Chester County

January 15, 2014 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
01/01/2014	6:52 a.m. EST	7:22 a.m. EST	4:46 p.m. EDT	5:17 p.m. EST	09h 23m 54s
01/15/2014	6:51 a.m. EST	7:21 a.m. EST	5:00 p.m. EDT	5:30 p.m. EST	09h 39m 31s
01/31/2014	6:41 a.m. EST	7:10 a.m. EST	5:19 p.m. EDT	5:47 p.m. EST	10h 08m 45s

Moon Phases					
New Moon	01/01/2014	6:14 a.m. EST	Full Moon	01/15/2014	11:53 p.m. EST
First Quarter	01/07/2014	10:40 p.m. EST	Last Quarter	01/24/2014	12:19 a.m. EST
New Moon	01/30/2014	4:39 p.m. EST			

January 2014 Observing Highlights
by Don Knabb, CCAS Treasurer & Observing Chair

1	New Moon, 6:14 A.M. EST
2	A thin crescent Moon is near Venus shortly after sunset
3	The Quadrantid meteor shower peaks
5	Jupiter is at opposition
7	First-quarter Moon, 10:40 PM EST
9	The Lunar Straight Wall is visible
14	Jupiter is near the Moon
15	Full Moon, 11:53 P.M. EST
24	Last Quarter Moon, 12:19 A.M. EST
30	New Moon, 4:39 P.M. EST

The best sights this month: We have planets to look at on opposite sides of the sky early in January with Venus setting as Jupiter rises. Jupiter is at its best, reaching opposition on January 5th. There is also the possibility of a nice meteor shower on the night of January 2nd/3rd when the Quadrantid meteor shower peaks.

Mercury: Conditions are good at the end of the month to see Mercury. It will be 10 degrees high about 45 minutes after sunset and a thin crescent Moon will be to its right.

Venus: During the first few days of January a telescope will show Venus as a dramatic crescent, just 3% lit on New Year's Day. By the 11th Venus will pass us in our race around the Sun and will become a dawn object.

Mars: The red planet rises around midnight in January and brightens considerably by the end of the month. The best viewing of Mars is just before dawn when it is highest in the sky.

Jupiter: Jupiter is opposite the Sun on January 5th so it is visible all night. And what a view we have, with Jupiter high in the sky a few hours after sunset and shining at a brilliant -2.7 magnitude.

Saturn: Saturn rises around 1:30 a.m. by the end of January and is highest in the sky just before dawn.

Uranus and Neptune: Uranus is reasonably high in the southwest at nightfall in the constellation Pisces. Neptune is considerably lower and will be harder to find. You can find a sky map to help you locate these gas giants at skypub.com/urnep, the website of Sky and Telescope magazine.

The Moon: Full moon is on January 15th. According to Native Americans, this is the Full Wolf Moon. Amid the cold and deep snows of midwinter, the wolf packs howled hungrily outside Indian villages, so it was named the Full Wolf Moon. Sometimes it was also referred to as the Old Moon or the Moon after Yule. Some called it the Full Snow Moon, but most tribes applied that name to the next full Moon.

Constellations: Auriga, Taurus, Orion and Gemini are the highlights of the January skies. But the nights are so long that you can see many "summer" constellations setting early in the evening and many "spring" constellations rising if you stay up late. Dress warmly and sit in your lounge chair and see how many constellations you can record toward the Constellation Hunter club.

Messier/deep sky: During the winter months we are looking away from the center of the Milky Way, so the sky is not as full of deep sky wonders as during the summer. But, the sky is clear and there are still many beautiful objects for us to enjoy. Don't miss the trio of clusters in Auriga, and not far away is another nice cluster, M35, at the feet of the twins of Gemini. And below and behind Orion is Canis Major with the cluster M41, the Little Beehive, not far from the brightest star in the night sky, Sirius.

Comets: There are no bright comets in the sky during January since Comet ISON was destroyed when it passed close to the Sun in November.

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Through the Eyepiece: M44, The Beehive Cluster

by Don Knabb, CCAS Treasurer & Observing Chair

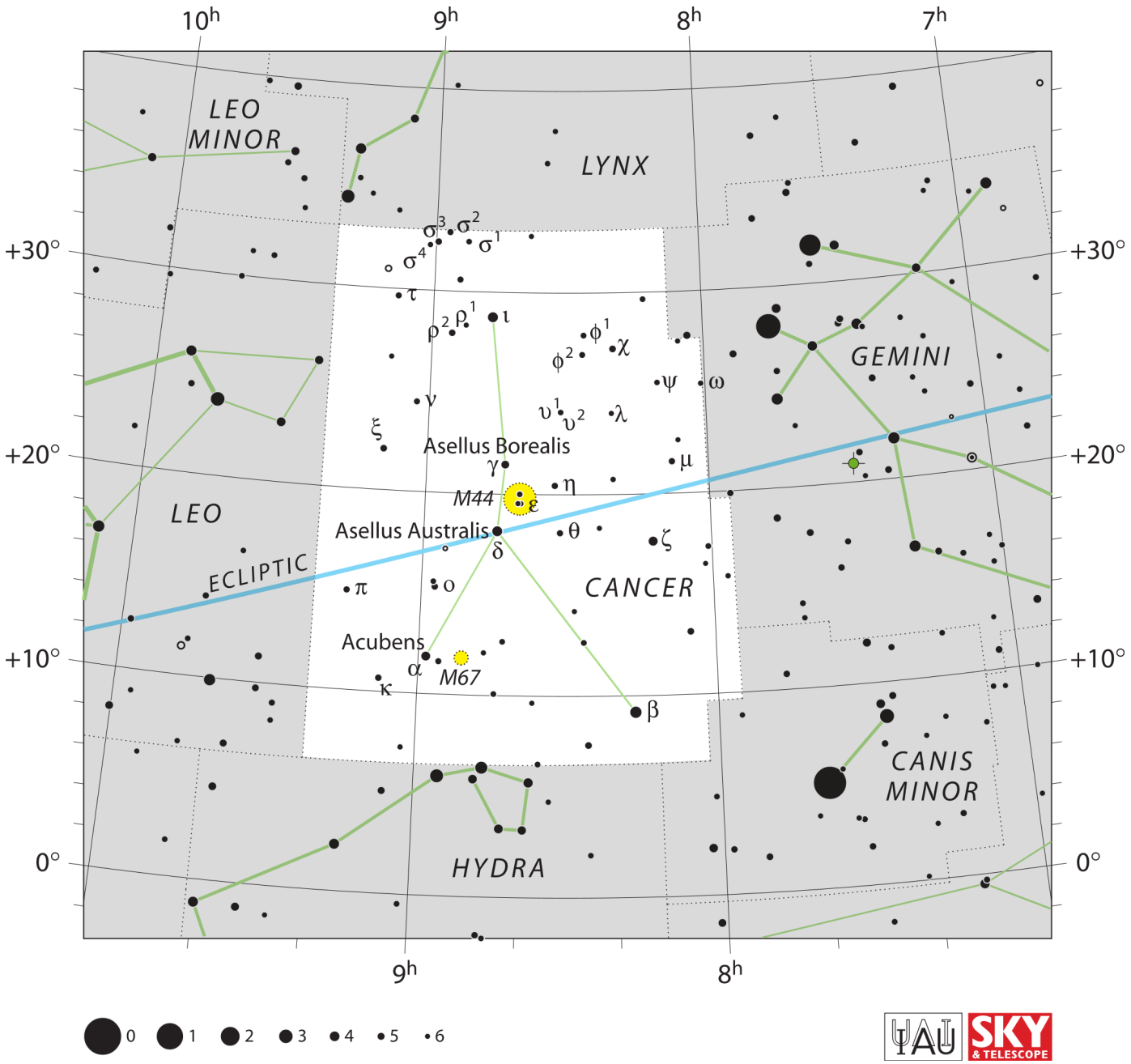

Image credit: http://en.wikipedia.org/wiki/ Image: Cancer_constellation_map.png

My favorite winter and spring open cluster is without a doubt M44. M44 (NGC 2632) is better known by the name the Beehive Cluster, or the Latin equivalent: Praesepe, which not only means a hive but also a crib, or manger. Greeks and Romans saw this "nebula" as the manger associated with two donkeys that eat from it, the gamma and delta stars of Cancer. The myth states that these were the donkeys on which the gods Dionysos and Silenus rode into the battle against the Titans, who were frightened by the animals' braying so that the gods won. As a reward, the donkeys were put in sky.

M44 is found at the center of the constellation Cancer the Crab. This is a bright open cluster clearly visible to the naked eye

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Eyepiece (Cont'd)

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on a dark night under excellent conditions, but in our area it is best appreciated with binoculars. One of the largest clusters, its 1.5 degree size is equivalent to three full moons end-to-end! Any optical aid will start to resolve the brightest stars with dozens visible in telescopes, although through larger instruments it appears loose and consequently some of its appeal is lost.

The Beehive is one of the nearest open clusters to Earth. According to ESA's astrometric satellite Hipparcos, the cluster is 577 light years distant and its age is estimated at about 730 million years.

This grouping is so large it was well-known in antiquity, when it was thought to be a nebula, or gaseous region of the sky. The cluster often served to predict the weather: if the view of the Beehive was not crystal clear inclement weather might be on the way.

Nearly 2000 years ago, the astronomer Ptolemy described M44 as "the nebulous mass in the breast of Cancer", but it was Galileo who first telescopically observed the Praesepe. He did this in 1609 and was able to resolve 40 stars. Charles Messier added the item to his catalog on March 4, 1769.

Information credits:
http://en.wikipedia.org/wiki/Beehive_Cluster
http://freestarcharts.com/index.php/20-guides/messier/146-messier-44-m44-the-praesepe-open-cluster

3-D Printing (Cont'd)

(Continued from page 3)

The duo started their foray into 3-D printing seven months ago when they received a small Hubble education and public outreach grant that allowed them to buy a 3-D printer and experiment with the technology to make Hubble tactile images. They started with a Hubble image of the bright star cluster NGC 602, located in our neighboring galaxy the Small Magellanic Cloud. The Hubble portrait reveals the brilliant blue glow of newly formed stars nestled within a cavity of gas and dust, shaped like a geode. Turning this stunning 2-D image into a 3 -D tactile picture involved plenty of trial and error. Their quest was to create 3-D pictures that allow visually impaired people to feel what they cannot see and form a picture of the cluster in their minds.

So far, the scientists have developed 3-D tactile prototype representations in plastic showing the stars, filaments, gas, and dust seen in the visual image using textures such as raised open circles, lines, and dots in the 3-D printout. These features also have different heights to correspond with their brightness. The tallest, and therefore brightest, features are a tight group of open circles, which represent the stars in the core of the cluster. The astronomers will present their 3-D representations of NGC 602 at a press conference Tuesday, Jan. 7, at the American Astronomical meeting in National Harbor, Md.

The 3-D printouts of NGC 602 are just the first few baby steps toward Christian and Nota's goal of creating a 3-D model of the cluster in the shape of a geode that people will be able to hold in their hands and study.

"Imagine making a visualization that you visually fly through, and as you fly through, first you encounter filaments, and then you see some dust and also some stars," Christian said. "As you fly to the back side of the cavity, you see other features. I want to represent that in 3-D and have people feel it with their fingers because they can't see it. They would be able to spatially understand where important features are relative to everything else and what the structure is. We may have to do it in layers, or we may have to do it in some other way. At this point we're jumping off the platform and seeing what happens."

To accomplish their goal, the two scientists have assembled a team of experts adept in software design and in developing programs for people with visual impairments. Perry Greenfield, manager of the Space Telescope Science Institute's science software branch, took on the task of producing a combination of inexpensive commercial and custom-developed software to turn the measurements from Hubble images into something the 3-D printers could successfully print. This software is being used to make the Hubble 3-D tactile prototypes of the texture maps and the 3-D printouts that combine the textured features and their brightnesses.

Noreen Grice, an author of several tactile astronomy books, helped select the textures to represent the individual features in the Hubble 3-D images. Grice, the president of You Can Do Astronomy L.L.C., based in Connecticut, is a pioneer in making astronomy accessible to people with visual impairments, including creating tactile embossed images of astronomical objects on a specially coated paper, called swell form. The challenge for the group was to come up with distinct textures for the gas, dust, and stars that would be clearly perceived by blind and visually impaired viewers.

"We want to make sure that they can experience the texture and correctly identify it," Christian explained. "We were amazed during testing how quickly people identified the individual features and appreciated the complexity of the star cluster after using the printouts for a few minutes."

So far, the group has tested the prototype images with about 100 people with visual impair-

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3-D Printing (cont'd)

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ments at several events sponsored by the Baltimore-based National Federation of the Blind (NFB), including at its national convention last July in Orlando, Fla., and at a science, technology, engineering, and mathematics education program for blind youth last summer, hosted at Towson University in Maryland. Early low-resolution prototypes were created in partnership with Amy Hurst and Shaun Kane at the University of Maryland Baltimore County in Catonsville. Tested at the NFB's national convention in July, the early prototypes gave a glimpse of the potential the technology could have for astronomy.

The testing has helped the group fine-tune the 3-D representations. Grice discovered through testing, for example, that the textures that were distinctive on the swell-form paper were not always as clearly perceived on the 3-D plastic prints. Greenfield agreed that selecting the right textures was a challenge. "I think the important thing for blind and visually impaired people is to be able to move easily across the image, and anything that sticks up a lot gets in the way," he said. "You don't want these sudden, big obstacles. So, to represent the stars, for example, we decided to use what looks like craters. They have a very distinctive edge to them, as opposed to a flat circle."

The 3-D tactile prototypes already have been a big hit with many people with visual impairments. More than 60 of them provided feedback on the 3-D tactile images of NGC 602 at the National Federation of the Blind state conventions in Maryland and Connecticut. "These 3-D images make me feel great because images of space objects were inaccessible and now all of a sudden they are accessible," said Nijat Worley of Baltimore, at the NFB's state convention Nov. 8 in Ocean City, Maryland. "Sure, we cannot see the image, so we don't know exactly what it looks like. It can never replace pictures, but with this 3-D image you can get an idea of what it's supposed to look like and then use your imagination for the rest."

Natalie Shaheen, director of education for the National Federation of the Blind, believes the 3-D technology opens a new way to provide access to information for the blind. "The nice thing about 3-D printing is that it's a mainstream technology," Shaheen said. "It is not specific to blindness. There are many people who want and need and have 3-D printers who are not blind. Three-dimensional technology shows that you don't have to have some blindness-specific technology necessarily in order to provide a blind person with access to information."

Greenfield, the project's computer programmer, is now helping Christian and Nota design a way of rendering the nebula's structure onto a sphere that represents its true three-dimensional shape. Grice can't wait to see it. She thinks the 3-D technology is taking tactile astronomical images to a whole new level that will benefit everyone, both sighted and blind people. "When you look up at the night sky and you see the stars against a dark, velvety texture, the stars look like they are flat on the sky," she said. "But imagine that you could reach up and touch the stars up there. I think the 3-D tactile images are akin to that: being able to put yourself in the object. It really takes you to a completely different level."

Christian and Nota's long-term goal is to produce 3-D tactile pictures of all Hubble images and make them available online to schools, libraries, and the public to print using 3-D printers.

"Our ultimate goal of having the 3-D image files available to everybody is for the long-term future," Nota said. "But you have to think big when you're doing something like this. Maybe sometime in the future you will be able to press a button and out comes the object Hubble has imaged, and you will be able to hold it in your hands."

For images and more information about the Hubble 3-D printing tactile images project, visit: http://hubblesite.org/news/2014/03

The Big Picture: GOES-R and the Advanced Baseline Imager

by Kieran Mulvaney

The ability to watch the development of storm systems – ideally in real time, or as close as possible – has been an invaluable benefit of the Geostationary Operational Environmental Satellites (GOES) system, now entering its fortieth year in service. But it has sometimes come with a trade-off: when the equipment on the satellite is focused on such storms, it isn't always able to monitor weather elsewhere.

"Right now, we have this kind of conflict," explains Tim Schmit of NOAA's National Environmental Satellite, Data, and Information Service (NESDIS). "Should we look at the broad scale, or look at the storm scale?" That should change with the upcoming launch of the first of the latest generation of GOES satellites, dubbed the GOES-R series, which will carry aloft a piece of equipment called the Advanced Baseline Imager (ABI).

According to Schmit, who has been working on its development since 1999, the ABI will provide images more frequently, at greater resolution and across more spectral bands (16, compared to five on existing GOES satellites). Perhaps most excitingly, it will also allow simultaneous scanning of both the broader view and not one but two concurrent storm systems or other small-scale patterns, such as wildfires, over areas of 1000km x 1000km.

Although the spatial resolution will not be any greater in the

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The Advanced Baseline Imager. Credit: NOAA/NASA.

Space Place (cont'd)

(Continued from page 10)

smaller areas than in the wider field of view, the significantly greater temporal resolution on the smaller scale (providing one image a minute) will allow meteorologists to see weather events unfold almost as if they were watching a movie.

So, for example, the ABI could be pointed at an area of Oklahoma where conditions seem primed for the formation of tornadoes. "And now you start getting one-minute data, so you can see small-scale clouds form, the convergence and growth," says Schmit.

In August, Schmit and colleagues enjoyed a brief taste of how that might look when they turned on the GOES-14 satellite, which serves as an orbiting backup for the existing generation of satellites.

"We were allowed to do some experimental imaging with this one-minute imagery," Schmit explains. "So we were able to simulate the temporal component of what we will get with ABI when it's launched."

The result was some imagery of cloud formation that, while not of the same resolution as the upcoming ABI images, unfolded on the same time scale. You can compare the difference between

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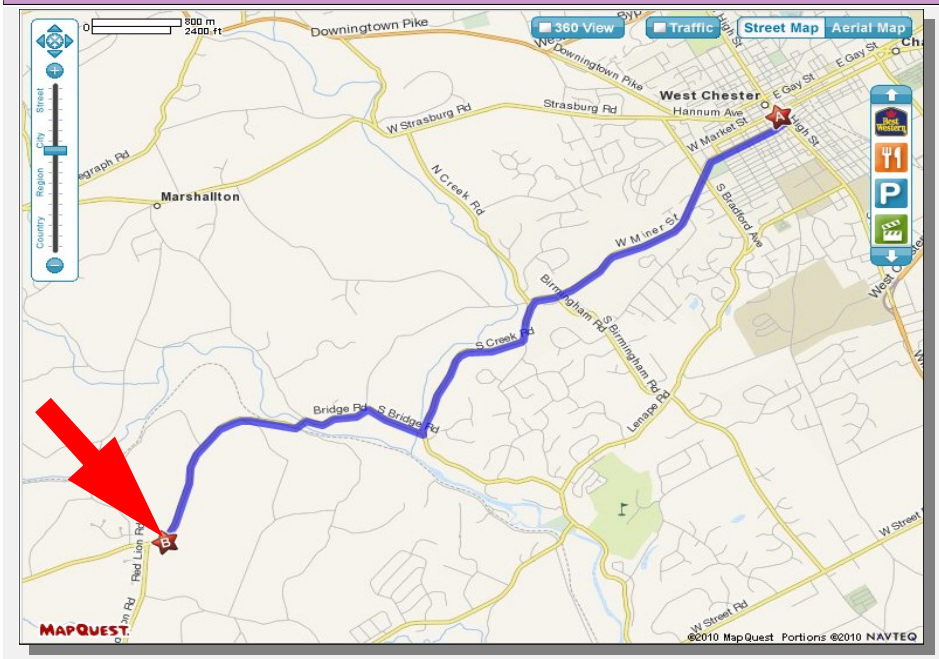
Observing (Cont'd)

(Continued from page 5)

Meteor showers: Conditions are good for an excellent showing from the Quadrantid meteor shower during the early morning hours of January 3rd. This is only 2 nights past New Moon, so moonlight will not wash out the shooting stars, which could number 60 to 120 per hour at the peak of activity. Let's hope this shower does not get clouded out as happened for the Geminid shower.

Some astronomers believe it is possible that we could get some meteors as we pass through the debris from Comet ISON in mid-January, but I am not getting my hopes up considering how disappointing a show the comet gave us.

CCAS Directions



Brandywine Valley Association
1760 Unionville Wawaset Rd
West Chester, PA 19382
(610) 793-1090
http://brandywinewatershed.org/

BVA 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 Valley Association

The monthly observing sessions (held February through November) are held at the Myrick Conservation Center of the Brandywine Valley Association.

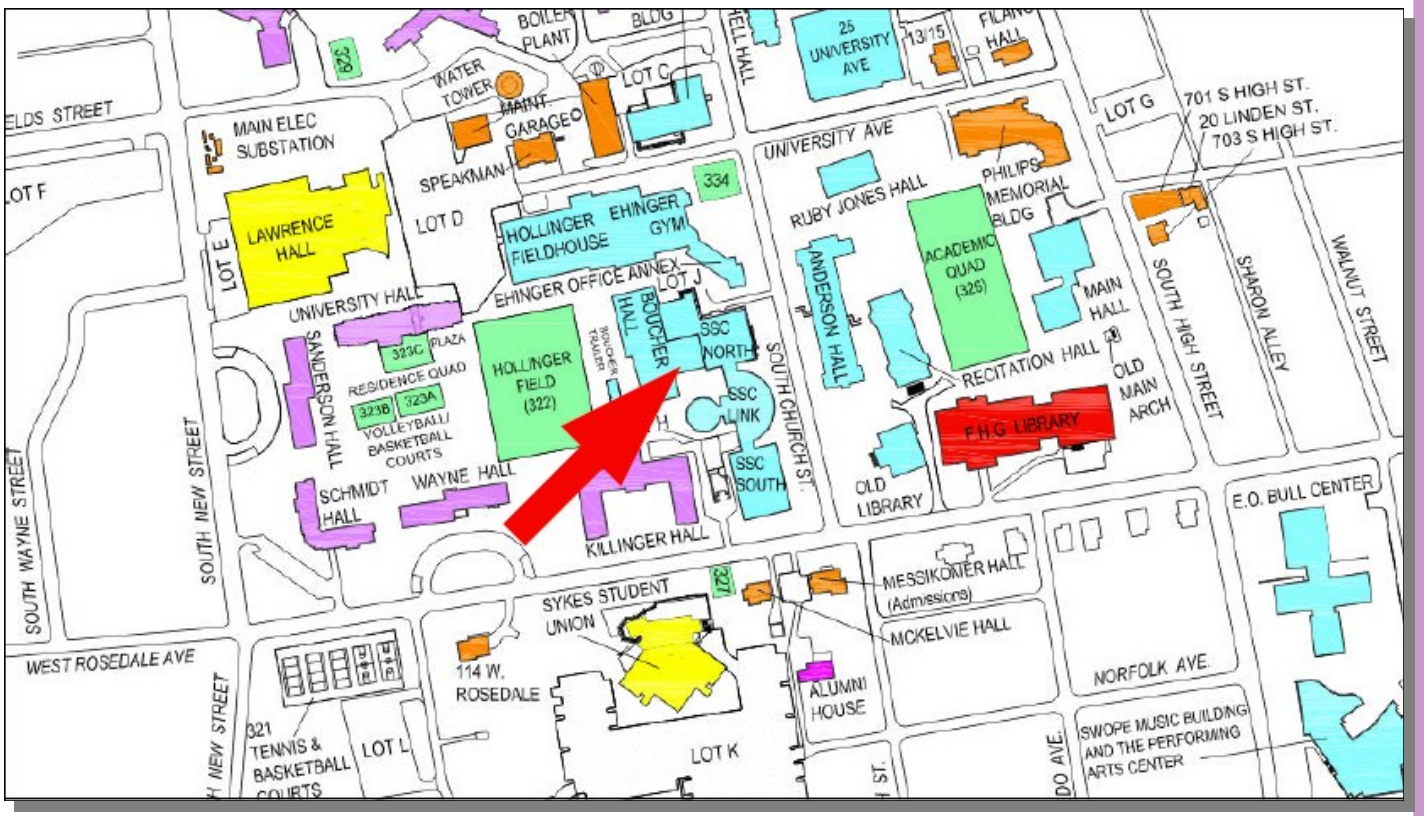
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route 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 11)

it and the existing GOES-13 imagery here: http://cimss.ssec.wisc.edu/goes/blog/wp-content/uploads/2013/08/GOES1314_VIS_21AUG2013loop.gif

Learn more about the GOES-R series of satellites here: http://www.goes-r.gov

Kids should be sure to check out a new online game that's all about ABI! It's as exciting as it is educational. Check it out at http://scijinks.gov/abi

CCAS Membership Information and Society Financials

Treasurer's Report

by Don Knabb

Dec. 2013 Financial Summary

Beginning Balance	$1,746
Deposits	$85
Disbursements	$0
Ending Balance	$1,831

New Member Welcome!

Welcome new CCAS members Charles McElwee of West Chester, PA. 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.

CCAS Information Directory

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

Note that our CCAS Webmaster John Hepler has a link to the IDA home page set up on our Society's home page at **http://www.ccas.us**.

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"!

CCAS Event Information

We've set up a special phone number you can dial to find out if our monthly observing session and other scheduled events will be held or postponed. Call **610-436-0829** after 5 PM ET to hear a recording to find out the latest news.

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!

Starry Night Lights

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

★ ★ ★ ★ ★

Green Earth Lighting
Formerly
Outdoor Lighting Associates

Green Earth Lighting is a dedicated lifetime corporate member of the International Dark-Sky Association. GEL's products are designed to reduce or eliminate the negative effects outdoor lighting can have while still providing the light you need at night.

Green Earth Lighting LLC
620 Onion Creek Ranch Rd
Driftwood, Texas 78619

Phone: **512-944-7354**

http://www.greenearthlighting.com

Local Astronomy-Related Stores

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

Skies Unlimited

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

★ ★ ★ ★ ★

Spectrum Scientifics
Quality Science Products for All Ages

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
2115 Lazor St.
Apt. 227
Indiana, PA 15701

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 (724) 801-8789 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 724-349-5981
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 & Tele*scope 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.**