Star Gazer News

Newsletter of the Delmarva Stargazers
www.delmarvastargazers.org

From the Prez….

One of the things I like about cold weather is that the conditions are ideal for catching sky phenomena. I've seen two recent sun pillars in what has seemed like a series of spectacular red sunsets down the Chesapeake Bay. I've also seen a few sun dogs; one lasted so long it went from a single east sun dog to two flanking the Sun than back to a single on the east again.

The low Sun and cold weather seem to make the phenomena more common even though they can happen any time of the year under the right conditions. I've gotten to the point while I'm driving I can tell when conditions are right for an event to likely occur and I'll find a good view point to pull over to wait to see what happens. I'm usually not disappointed although sometimes it can be hard to find a safe place to park that has a good view. Make safety your first priority, sky phenomena second and don't look directly at the Sun. If you have a camera, make sure to get a picture and turn it in to the newsletter.

I've been busy working with Dr. Dean Pesnell from the Solar Dynamics Observatory preparing for our February meeting. I say this every month lately but I'm very excited about this Skype visit by a top scientist from NASA who will speak to us about this very exciting mission.

Don't forget in March we'll have from the Hubble Space Telescope team in person Ed Rezac. That promises to be a great event about what may go down in history as NASA's most successful mission of all time. It will be a sad day when Hubble finally comes to an end.

Now is a good time to start lining up public outreach events too. I've already made contact with libraries in Cecil County and hope to limit my travel this year to my own neighborhood as much as possible. We won't have any of the big planets in the spring sky but there are still plenty of big bright objects to show. I always try to work near the first quarter Moon. It enables you to show a moon that isn't too bright in the eye piece and you'll still be able to find other things in the sky.

If you haven't been to a meeting in a while you should make a real effort to make it for one of the great guest speakers coming up. I understand some of us have a good drive to get to Smyrna, I come from Elkton and many travel farther. I know you'll find it well worthwhile, we're having great speakers and the added benefit of getting to talk to fellow club members is always a plus. Until next month may we have clear skies and temperatures in the forties.

Upcoming Events:

Meeting !	**Feb 1st**	**7 PM**	**SHWC**
Observing !	**Feb 4th**	**Dusk**	**Eq. Cntr & Blackbird**

NASA Spacecraft Prepares For Valentine's Day Comet Rendezvous

WASHINGTON -- NASA's Stardust-NExT spacecraft is nearing a celestial date with comet Tempel 1 at approximately 11:37 p.m. EST, on Feb. 14. The mission will allow scientists for the first time to look for changes on a comet's surface that occurred following an orbit around the sun.

The Stardust-NExT, or New Exploration of Tempel, spacecraft will take high-resolution images during the encounter, and attempt to measure the composition, distribution, and flux of dust emitted into the coma, or material surrounding the comet's nucleus. Data from the mission will provide important new information on how Jupiter-family comets evolved and formed.

The mission will expand the investigation of the comet initiated by NASA's Deep Impact mission. In July 2005, the Deep Impact spacecraft delivered an impactor to the comet's surface to study its composition. The Stardust spacecraft may capture an image of the crater created by the impactor. This would be an added bonus to the huge amount of data that mission scientists expect to obtain.

"Every day we are getting closer and closer and more and more excited about answering some fundamental questions about comets," said Joe Veverka, Stardust-NExT principal investigator at Cornell University. "Going back for another look at Tempel 1 will provide new insights on how comets work and how they were put together four-and-a-half billion years ago."

At approximately 209 million miles away from Earth, Stardust-NExT will be almost on the exact opposite side of the solar system at the time of the encounter. During the flyby, the spacecraft will take 72 images and store them in an on board computer.

Initial raw images from the flyby will be sent to Earth for processing that will begin at approximately 3 a.m. EST on Feb. 15. Images are expected to be available at approximately 4:30 a.m. EST.

As of today, the spacecraft is approximately 15.3 million miles away from its encounter. Since 2007, Stardust-NExT executed eight flight path correction maneuvers, logged four circuits around the sun and used one Earth gravity assist to meet up with Tempel 1.

Another three maneuvers are planned to refine the spacecraft's path to the comet. Tempel 1's orbit takes it as close in to the sun as the orbit of Mars and almost as far away as the orbit of Jupiter. The spacecraft is expected to fly past the 3.7 mile-wide comet at a distance of approximately 124 miles.

In 2004, the Stardust mission became the first to collect particles directly from comet Wild 2, as well as interstellar dust. Samples were returned in 2006 for study via a capsule that detached from the spacecraft and parachuted to the ground southwest of Salt Lake City.

Mission controllers placed the still viable Stardust spacecraft on a trajectory that could potentially reuse the flight system if a target of opportunity presented itself. In January 2007, NASA re-christened the mission Stardust-NExT and began a four-and-a-half year journey to comet Tempel 1.

"You could say our spacecraft is a seasoned veteran of cometary campaigns," said Tim Larson, project manager for Stardust-NExT at NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif. "It's been half-way to Jupiter, executed picture-perfect flybys of an asteroid and a comet, collected cometary material for return to Earth, then headed back out into the void again, where we asked it to go head-to-head with a second comet nucleus."

The mission team expects this flyby to write the final chapter of the spacecraft's success-filled story. The spacecraft is nearly out of fuel as it approaches 12 years of space travel, logging almost 3.7 billion miles since launch in 1999. This flyby and planned post-encounter imaging are expected to consume the remaining fuel.

JPL manages mission for the agency's Science Mission Directorate in Washington. Lockheed Martin Space Systems in Denver built the spacecraft and manages day-to-day mission operations.

For more information about the Stardust-NExt mission, visit:
http://stardustnext.jpl.nasa.gov/

How to Join the Delmarva Stargazers: Anyone with an interest in any aspect of astronomy is welcome

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Do you need the newsletter snail mailed to you (Y/N)?_____

Please attach a check for $15 made payable to Delmarva Stargazers and mail to Kathy Sheldon, 20985 Fleatown Rd, Lincoln, DE 19960. Call club President Don Surles at 302-653-9445 for more information.

The Sun Rising Azimuth...For Central Delaware

Have you noticed the position of the Sun along the horizon as it rises since late December? A better question would be..."Have you been outside at sunrise lately?" Well, if you have risen early and braved the early morning cold you should have noted the Sun has been rising is in the southeast. But twixt now and June 21, the Sun will rise earlier each day...and set later. To do this the Sun must change it's position of rising and setting since the speed of Earth's travel around the Sun is very close to constant. The result is longer days and shorter nights from now until June 21, the Summer Solstice. As a matter of fact, for Dover, DE, the day is 49 minutes longer on Feb 1 than Dec 21 and by the end of Feb the day will add another 53 minutes making it 1 hour and 52 minutes longer than Dec 21.

As the Sun rises earlier it moves northward around the azimuth from southeast to due east on March 21 and over into the northeast by June 21. You might be surprised to learn 'zactly how far, in degrees, the Sun moves around the horizon. Here is a chart to show the Sun's movement for latitude 39N...Dover is very close to 39N.

Sunrise Azimuth Data for Latitude 39N

	Sunrise AZ	Sunrise	Sunset	Daylight Hours
Winter Solstice	121	7:21	16:36	9:15
Spring Equinox	90	6:09	18:07	11:58
Summer Solstice	59	4:39	19:34	14:55
Fall Equinox	90	5:53	17:52	11:59

Note: the Sunrise moves 121-59 = 62 degrees from Winter to Summer for Latitude 39N and Daylight hours increase from 14:55-9:15 = 5:40

So, the question for today and the days following is..."What are you doing with all those extra daylight minutes?"

Along with the increasing daylight minutes there is an accompanying shift in the tilt of Earth's northern hemisphere from 23.5 degrees away from the Sun on Dec 21 to 23.5 degrees toward the Sun on June 21...which should improve the warmth of Ol Sol's rays because the path of the Sun moves up the zenith each day from Dec 21 to June 21 resulting in the Sun's rays striking our surface at an angle approaching straight overhead. I hope you still have that straw chapeau when you no longer need your wooly toboggan. Try not to forget January's frigid days next summer when it is HHH...Hazy, Hot and Humid...with copious amounts of skeeters. BTW...how do those little critters survive without central heating and air conditioning?

If you care to dive into astronomical movements further be my guest. You may want to explore the relationship of Earth's orbit around the Sun and Earth's Solstices and Equinoxes for the next 25,000 years...remember very little is "constant" in celestial mechanics except continuous change. Yeah, I know about the speed of light...but even that may change in the future.

See you at the next meeting, February 1, 2011 or 02012011 or as the Brits would have it 01022011. Don...

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Planets in Strange Places

Trudy E. Bell

Red star, blue star, big star, small star—planets may form around virtually any type or size of star throughout the universe, not just around mid-sized middle-aged yellow stars like the Sun. That's the surprising implication of two discoveries in 2006 from the 0.85-meter-diameter Spitzer Space Telescope, which is exploring the universe from orbit at infrared (heat) wavelengths blocked by the Earth's atmosphere.

At one extreme are two blazing, blue "hypergiant" stars 180,000 light-years away in the Large Magellanic Cloud, one of the two companion galaxies to our Milky Way. The stars, called R 66 and R 126, are respectively 30 and 70 times the mass of the Sun, "about as massive as stars can get," said Joel Kastner, professor of imaging science at the Rochester Institute of Technology in New York. R 126 is so luminous that if it were placed 10 parsecs (32.6 light-years) away—a distance at which the Sun would be one of the dimmest stars visible in the sky—the hypergiant would be as bright as the full moon, "definitely a daytime object," Kastner remarked.

Such hot stars have fierce solar winds, so Kastner and his team are mystified why any dust in the neighborhood hasn't long since been blown away. But there it is: an unmistakable spectral signature that both hypergiants are surrounded by mammoth disks of what might be planet-forming dust and even sand.

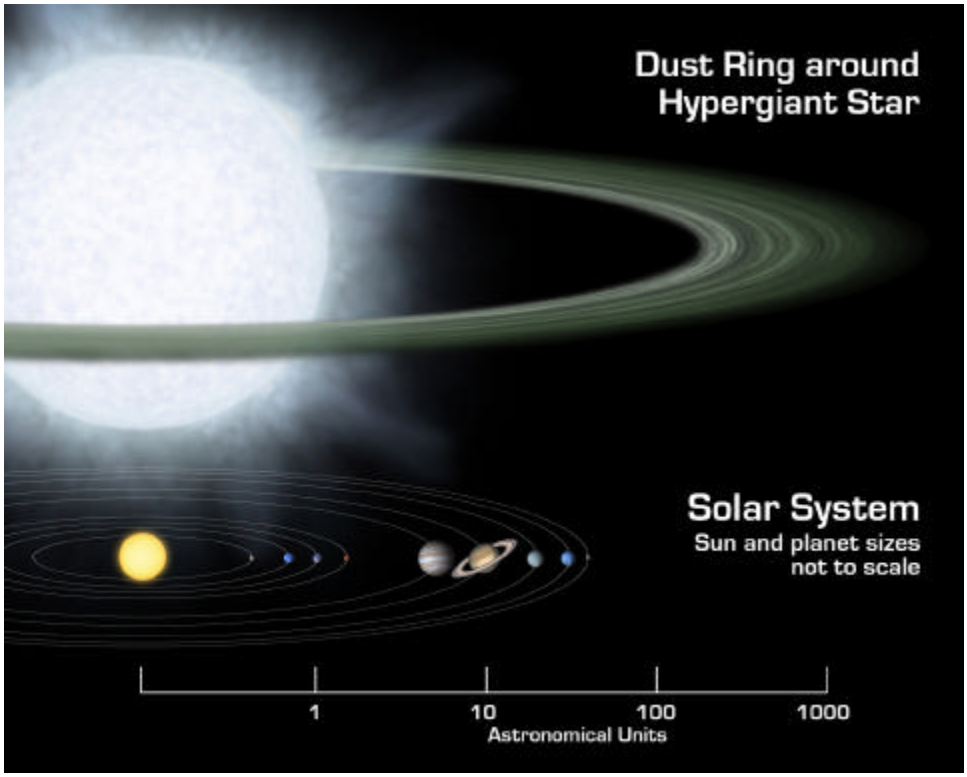
At the other extreme is a tiny brown dwarf star called Cha 110913-773444, relatively nearby (500 light-years) in the Milky Way. One of the smallest brown dwarfs known, it has less than 1 percent the mass of the Sun. It's not even massive enough to kindle thermonuclear reactions for fusing hydrogen into helium. Yet this miniature "failed star," as brown dwarfs are often called, is also surrounded by a flat disk of dust that may eventually clump into planets. (This brown dwarf discovery was made by a group led by Kevin Luhman of Pennsylvania State University.)

Although actual planets have not been detected (in part because of the stars' great distances), the spectra of the hypergiants show that their dust is composed of forsterite, olivine, aromatic hydrocarbons, and other geological substances found on Earth.

These newfound disks represent "extremes of the environments in which planets might form," Kastner said. "Not what you'd expect if you think our solar system is the rule." Hypergiants and dwarfs? The Milky Way could be crowded with worlds circling every kind of star imaginable—very strange, indeed.

Keep up with the latest findings from the Spitzer at www.spitzer.caltech.edu. Kids and their grownup friends can enjoy beautiful images from Spitzer while playing Spitzer Concentration at The Space Place (spaceplace.nasa.gov/en/kids/spitzer/concentration).

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Artist's rendering compares size of a hypothetical hypergiant star and its surrounding dusty disk to that of our solar system.

An Excerpt from HISTORY OF ASTRONOMY

ANCIENT GREEK ASTRONOMY

from

GEORGE FORBES, M.A., F.R.S., M. INST. C. E.,

(FORMERLY PROFESSOR OF NATURAL PHILOSOPHY, ANDERSON'S COLLEGE, **GLASGOW)**

We have our information about the earliest Greek astronomy from **Herodotus** (born 480 B.C.). He put the traditions into writing. **Thales** (639-546 B.C.) is said to have predicted an eclipse, which caused much alarm, and ended the battle between the Medes and Lydians. Airy fixed the date May 28th, 585 B.C. But other modern astronomers give different dates. **Thales** went to Egypt to study science, and learnt from its priests the length of the year (which was kept a profound secret!), and the signs of the zodiac, and the positions of the solstices. He held that the sun, moon, and stars are not mere spots on the heavenly vault, but solids; that the moon derives her light from the sun, and that this fact explains her phases; that an eclipse of the moon happens when the earth cuts off the sun's light from her. He supposed the earth to be flat, and to float upon water. He determined the ratio of the sun's diameter to its orbit, and apparently made out the diameter correctly as half a degree. He left nothing in writing.

His successors, **Anaximander** (610-547 B.C.) and **Anaximenes** (550-475 B.C.), held absurd notions about the sun, moon, and stars, while **Heraclitus** (540-500 B.C.) supposed that the stars were lighted each night like lamps, and the sun each morning. **Parmenides** supposed the earth to be a sphere.

Pythagoras (569-470 B.C.) visited Egypt to study science. He deduced his system, in which the earth revolves in an orbit, from fantastic first principles, of which the following are examples: "The circular motion is the most perfect motion," "Fire is more worthy than earth," "Ten is the perfect number." He wrote nothing, but is supposed to have said that the earth, moon, five planets, and fixed stars all revolve round the sun, which itself revolves round an imaginary central fire called the Antichthon. **Copernicus** in the sixteenth century claimed **Pythagoras** as the founder of the system which he, **Copernicus**, revived.

Anaxagoras (born 499 B.C.) studied astronomy in Egypt. He explained the return of the sun to the east each morning by its going under the flat earth in the night. He held that in a solar eclipse the moon hides the sun, and in a lunar eclipse the moon enters the earth's shadow—both excellent opinions. But he entertained absurd ideas of the vortical motion of the heavens whisking stones into the sky, there to be ignited by the fiery firmament to form stars. He was prosecuted for this unsettling opinion, and for maintaining that the moon is an inhabited earth. He was defended by **Pericles** (432 B.C.).

Solon dabbled, like many others, in reforms of the calendar. The common year of the Greeks originally had 360 days—twelve months of thirty days. Solon's year was 354 days. It is obvious that these erroneous years would, before long, remove the summer to January and the winter to July. To prevent this it was customary at regular intervals to intercalate days or months. **Meton** (432 B.C.) introduced a reform based on the nineteen-year cycle. This is not the same as the Egyptian and Chaldean eclipse cycle called *Saros* of 223 lunations, or a little over eighteen years. The Metonic cycle is 235 lunations or nineteen years, after which period the sun and moon occupy the same position relative to the stars. It is still used for fixing the date of Easter, the number of the year in Melon's cycle being the golden number of our prayer-books. Melon's system divided the 235 lunations into months of thirty days and omitted every sixty-third day. Of the nineteen years, twelve had twelve months and seven had thirteen months.

Callippus (330 B.C.) used a cycle four times as long, 940 lunations, but one day short of Melon's seventy-six years. This was more correct.

Eudoxus (406-350 B.C.) is said to have traveled with **Plato** in Egypt. He made astronomical observations in Asia Minor, Sicily, and Italy, and described the starry heavens divided into constellations. His name is connected with a planetary theory which as generally stated sounds most fanciful. He imagined the fixed stars to be on a vault of heaven; and the sun, moon, and planets to be upon similar vaults or spheres, twenty-six revolving spheres in all, the motion of each planet being resolved into its components, and a separate sphere being assigned for each component motion. **Callippus** (330 B.C.) increased the number to thirty-three. It is now generally accepted that the real existence of these spheres was not suggested, but the idea was only a mathematical conception to facilitate the construction of tables for predicting the places of the heavenly bodies. **Aristotle** (384-322 B.C.) summed up the state of astronomical knowledge in his time, and held the earth to be fixed in the centre of the world.

Nicetas, **Heraclides**, and **Ecphantes** supposed the earth to revolve on its axis, but to have no orbital motion.

Carina Nebula

Stars Bursting to Life in Chaotic Carina Nebula

These two images of a huge pillar of star birth demonstrate how observations taken in visible and in infrared light by NASA's Hubble Space Telescope reveal dramatically different and complementary views of an object.

The pictures demonstrate one example of the broad wavelength range of the new Wide Field Camera 3 (WFC3) aboard the Hubble telescope, extending from ultraviolet to visible to infrared light.

Composed of gas and dust, the pillar resides in a tempestuous stellar nursery called the Carina Nebula, located 7,500 light-years away in the southern constellation Carina. The pair of images shows that astronomers are given a much more complete view of the pillar and its contents when distinct details not seen at visible wavelengths are uncovered in near-infrared light.

The top image, taken in visible light, shows the top of the 3-light-year-long pillar, bathed in the glow of light from hot, massive stars off the top of the image. Scorching radiation and fast winds (streams of charged particles) from these stars are sculpting the pillar and causing new stars to form within it. Streamers of gas and dust can be seen flowing off the top of the structure.

Nestled inside this dense structure are fledgling stars. They cannot be seen in this image because they are hidden by a wall of gas and dust. Although the stars themselves are invisible, one of them is providing evidence of its existence. Thin puffs of material can be seen traveling to the left and to the right of a dark notch in the center of the pillar. The matter is part of a jet produced by a young star. Farther away, on the left, the jet is visible as a grouping of small, wispy clouds. A few small clouds are visible at a similar distance on the right side of the jet. Astronomers estimate that the jet is moving at speeds of up to 850,000 miles an hour. The jet's total length is more than 15 light-years.

In the image at bottom, taken in infrared light, the dense column and the surrounding greenish-colored gas all but disappear. Only a faint outline of the pillar remains. By penetrating the wall of gas and dust, the infrared vision of WFC3 reveals the infant star that is probably blasting the jet. Part of the jet nearest the star is more prominent in this view. These features can be seen because infrared light, unlike visible light, can pass through the dust.

Other infant stars inside the pillar also appear to emerge. Three examples are the bright star almost directly below the jet-producing star, a fainter one to its right, and a pair of stars at the top of the pillar. Winds and radiation from some of the stars are blowing away gas from their neighborhoods, carving out large cavities that appear as faint dark holes.

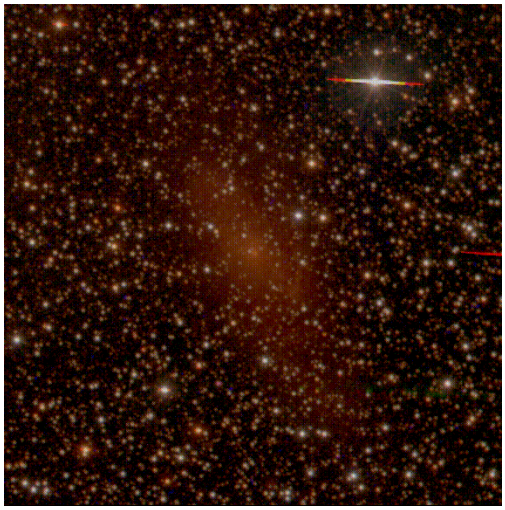
Surrounding the stellar nursery is a treasure chest full of stars, most of which cannot be seen in the visible-light image because dense gas clouds veil their light. Many of them are background stars.

Hubble's Wide Field Camera 3 observed the Carina Nebula July 24 through July 30, 2009. WFC3 was installed aboard Hubble in May 2009 during Servicing Mission 4. The composite image was made from filters that isolate emission from iron, magnesium, oxygen, hydrogen, and sulfur.

These Hubble observations of the Carina Nebula are part of the Hubble Servicing Mission 4 Early Release Observations.

Credit: NASA, ESA, and the Hubble SM4 ERO Team

The Hidden Galaxy



The Hidden Galaxy
Maffei 2 is the poster child for an infrared galaxy that is almost invisible to optical telescopes. Foreground dust clouds in our Milky Way galaxy block about 99.5 percent of its visible light. But this infrared image from NASAs Spitzer Space Telescope penetrates the dust to reveal the galaxy in all its glory.

The astronomer Paolo Maffei first noted the galaxy as a mysterious smudge on an infrared photographic plate in 1968. Four years later, he identified the strange object to be a galaxy, now named after him. This discovery was made in the infancy of infrared astronomy, and it would take many technological innovations in the following decades to allow astronomers to study obscured objects like this one in detail.

Most other galaxies the size of Maffei 2 had been cataloged for over a century. Because this galaxy was hidden behind dust lanes in our own galaxy, it did not become one of the entries in the famous 18th century catalog of bright deep-sky objects compiled by Charles Messier.

This Spitzer image clearly shows the unusual structure of Maffei 2. The strong central bar and asymmetric spiral arms help identify why the galaxy also harbors a "starburst" in its very core. Such dramatic bursts of star formation occur when massive amounts of dust and gas are driven into the center of a galaxy, often by gravitational interactions that create the barred spiral structures.

Image credit: NASA/JPL-Caltech/UCLA

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the California Nebula

This is a three pane mosaic I put together of the California Nebula. It was taken with my AP 130mm scope with a Canon 350d Rebel DSLR at prime focus. Each pane has ten 4 min images stacked.

Here's what Wikipedia has to say, "The California Nebula (NGC 1499) is an emission nebula located in the constellation Perseus. It is so named because it appears to resemble the outline of the US State of California on long exposure photographs. It is almost 2.5° long on the sky and, because of its very low surface brightness, it is extremely difficult to observe visually. It can be observed with a H-Beta filter (isolates the H-Beta line at 486 nm) in a rich-field telescope under dark skies. It lies at a distance of about 1,000 light years from Earth.

The California Nebula was discovered by E. E. Barnard in 1884."

Joe Morris

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