



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 29, No. 2 **Three-Time** Winner of the Astronomical League's Mabel Sterns Award ☼ 2006, 2009 & 2016 February 2021

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Perseverance Arrives at Mars!



Mars 2020 Rover Is Roving: In a clean room at NASA's Jet Propulsion Laboratory in Pasadena, California, engineers observed the first driving test for NASA's Mars 2020 rover on Dec. 17, 2019. Now referred to as Perseverance, the rover is due to land on Mars on February 18, 2021, at approximately 3:55 p.m. EST. Credits: NASA/JPL-Caltech. See pg. 9 for information on our CCAS members-only viewing party.

Membership Renewals Due

02/2021	Kraynik Murphy Ruggeri Tronel
03/2021	Angelini DellaPenna Fulton Sterrett Zandler Zibinski
04/2021	Chisholm Hepler Imburgia Miller Rossomando

February 2021 Dates

- 4th** • Last Quarter Moon, 12:37 p.m. EST
- 11th** • New Moon, 2:05 p.m. EST
- 19th** • The First Quarter Moon is between the Pleiades and the Hyades, 1:47 p.m. EST
- 20th** • The Lunar Straight Wall is visible
- 24th** • The Moon is near the Beehive Cluster, M44
- 27th** • Full Moon, the Full Snow Moon or the Frog Moon, 3:17 a.m. EST



Membership Dues Increase

CCAS membership dues are increasing in February 2021. They have not been increased since 2002, 18 years ago! So it is now time to put through a slight increase in our annual dues to cover our costs. All membership types will increase by \$5 except for the Student membership, which will be unchanged.

Here are the current dues and the new cost:

Type	Old Rate	New Rate
Regular	\$25	\$30
Senior	\$10	\$15
Student	\$5	\$5
Family	\$35	\$40

Winter Society Events

February 2021

9th • CCAS Monthly Meeting, ONLINE via Zoom. The meeting starts at 7:30 p.m. Guest Speaker: Dr. Sarah Dodson, Associate Professor of Physics and Astronomy, University of Delaware. Her presentation is entitled “Enceladus and Titan – A Dance of Two Saturnian Moons.”

14th • The von Kármán Lecture Series: [Planetary Protection](#). Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

18th • NASA Perseverance Rover scheduled to land on Mars, 3:55 p.m. CCAS watch party planned starting at 3:00 p.m.

20th • Open call for articles and photographs for the March 2021 edition of [Observations](#).

26th • Deadline for newsletter submissions for the March 2021 edition of [Observations](#).

March 2021

9th • CCAS Monthly Meeting, ONLINE via Zoom. The meeting starts at 7:30 p.m. Member Speaker: John Conrad, CCAS member and NASA Solar System Ambassador, will present “The James Webb Space Telescope and Other IR Missions.”

11th • The von Kármán Lecture Series: [Helicopters in Space](#). Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Open call for articles and photographs for the April 2021 edition of [Observations](#).

26th • Deadline for newsletter submissions for the April 2021 edition of [Observations](#).

Minutes from the January 12, 2021, CCAS Monthly Meeting

by *Bea Mazziotti, CCAS Secretary*

- Dave Hockenberry welcomed members and guests to the January 2021 CCAS meeting. Zoom and YouTube were the platforms. Attendance topped out at 53.
- CCAS has no events scheduled for the immediate future. There are some potential future events - Delmarva Star Watch, StarFest in W.Va. and an event at Belleplaine State Park in south Jersey - to put on your radar. Also of interest, the DVAA article in December’s Reflector describing a socially distanced event they hosted. The pandemic has forced us to rethink how we might gather for observing.
- Club Program Chair Bruce Ruggeri solicited suggestions from member for topics for the 2021/2022 fall and winter meetings.
- Don Knabb took us on a mini tour of the January night sky pointing out some amazing viewing opportunities. Look for Collinder 70, an S-chain of stars in Orion’s Belt; M 78, a reflection nebula in Orion; and NGC 2169, a star cluster remarkable for its resemblance to the number 37. Don also pointed out some of the many open star clusters that are suitable for binocular observation, including M 41, M 44, M 46, M 47 and the spectacular Pleiades M 45.
- Pete Kellerman informed the group of an upcoming opportunity to view an Antares rocket launch from Wallops Island on 2/20 at 11:30 AM, weather permitting of course. He offered some helpful hints re: where to go for the best and closest views.
- Program Chair Bruce Ruggeri introduced the evening’s speaker, Dr. Eric Jensen. Eric is a professor of Astronomy in the Physics and Astronomy Dept. at Swarthmore College. He also teaches about climate change in Swarthmore’s Environmental Studies Program. His research interests include advancing our understanding of *extrasolar planets*, planets that orbit other stars, and *astrobiology*, which studies the origin and distribution of life in the cosmos. At this point in time we know of more than 4300 planets, many of which were discovered while observing a very small patch of the sky. NASA’s TESS (Transiting Exoplanet Survey Satellite) mission, which launched in 2018, is monitoring 200,000 stars scattered over 90% of the sky. The aim is to detect 500 Earths and Super Earths, with about 100 found so far. The James Webb Space Telescope, scheduled to launch this fall (fingers crossed) will ‘tell us more about the atmospheres of extrasolar planets and maybe even find the building blocks of life elsewhere in the universe’. As Professor Jensen concluded, we are living in an exciting time of discovery and increasing knowledge about the universe.

February 2021 CCAS Meeting Agenda

by *Bruce Ruggeri, CCAS Program Chair*

Our next meeting will be held on February 9, 2021, starting at 7:30 p.m. The meeting will be held online via [Zoom.us](#). Guest Speaker: Dr. Sarah Dodson, Associate Professor of Physics and Astronomy, University of Delaware. Her presentation is entitled “Enceladus and Titan – A Dance of Two Saturnian Moons.”

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, we are looking for presenters for our 2021-2022 season and beyond. If you are interested in presenting, or know someone who would like to participate, please contact me at pro-grams@ccas.us.

Dr. Sarah Dodson, Guest Speaker at Our February 2021 Monthly Meeting

by Bruce Ruggeri, CCAS Program Chair



Sarah Dodson, Ph.D.

The guest speaker for our February 2021 meeting is Dr. Sarah Dodson, Ph.D., Associate Professor of Physics and Astronomy, University of Delaware. The

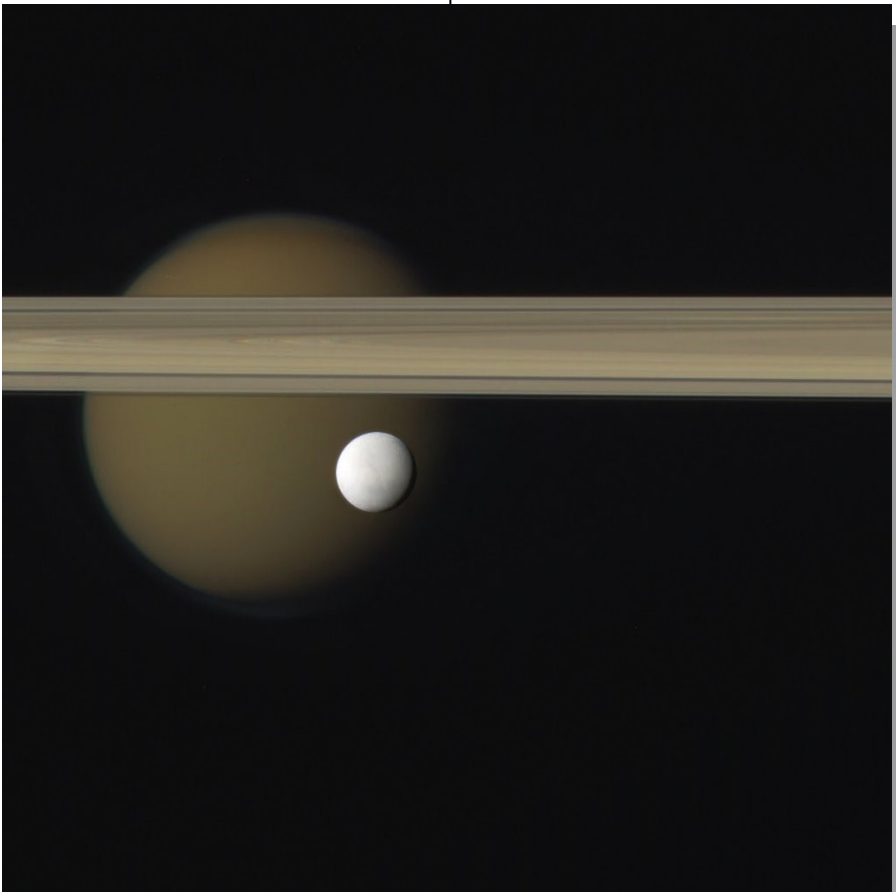
CCAS meeting presentation will commencing at approximately 7:50- 8:00PM ET on Tuesday, February 9, 2021. Dr. Dodson's presentation is entitled "Enceladus and Titan – A Dance of Two Saturnian Moons."

In 2004, 60 years after Dutch astronomer Gerard Kuiper discovered methane in Titan's atmosphere, radar on board the Cassini spacecraft penetrated the thick haze and delivered the first images of the exotic moon's surface. But how did Titan get its haze? With only nitrogen and methane to work with, it's difficult to concoct an atmosphere opaque enough to hide the surface from the Voyager observations that preceded Cassini's powerful radar. Oxygen, howev-

er, has prodigious smog-forming capabilities. With oxygen supplied by geysers on the neighboring moon Enceladus, Titan's atmosphere became the red-orange shroud we see today. In this talk, Dr. Dodson will discuss the ways Enceladus' cryovolcanic version of Old Faithful affects the chemistry of the Saturnian system, from Titan's haze to O₂ gas in Saturn's rings, and finally Saturn's puzzlingly weak ionosphere. These new insights into the dynamics of the Saturnian system will be discussed.

About the speaker: Dr. Dodson received her Ph.D. in Astronomy and Astrophysics from University of California at Santa Cruz in 2008, after which she held a Spitzer Space Telescope Fellowship at Caltech for one year before starting a faculty position at University of Texas. In January 2014, she moved to University of Delaware where she is currently an Associate Professor in the Department of Physics and Astronomy. Sarah is past recipient of the Annie Jump Cannon Award from the American Astronomical Society and a Career Award from the National Science Foundation. Her major research interests are focused on planetary formation, especially of gas giants, and planetary archaeology, but also more traditional astronomy topics including protostellar disk chemistry, galactic chemical evolution, and brown dwarfs. With the use of analytical theory and numerical simulations of the dynamical and chemical environment of planet growth, Sarah is studying

(Continued on page 12)

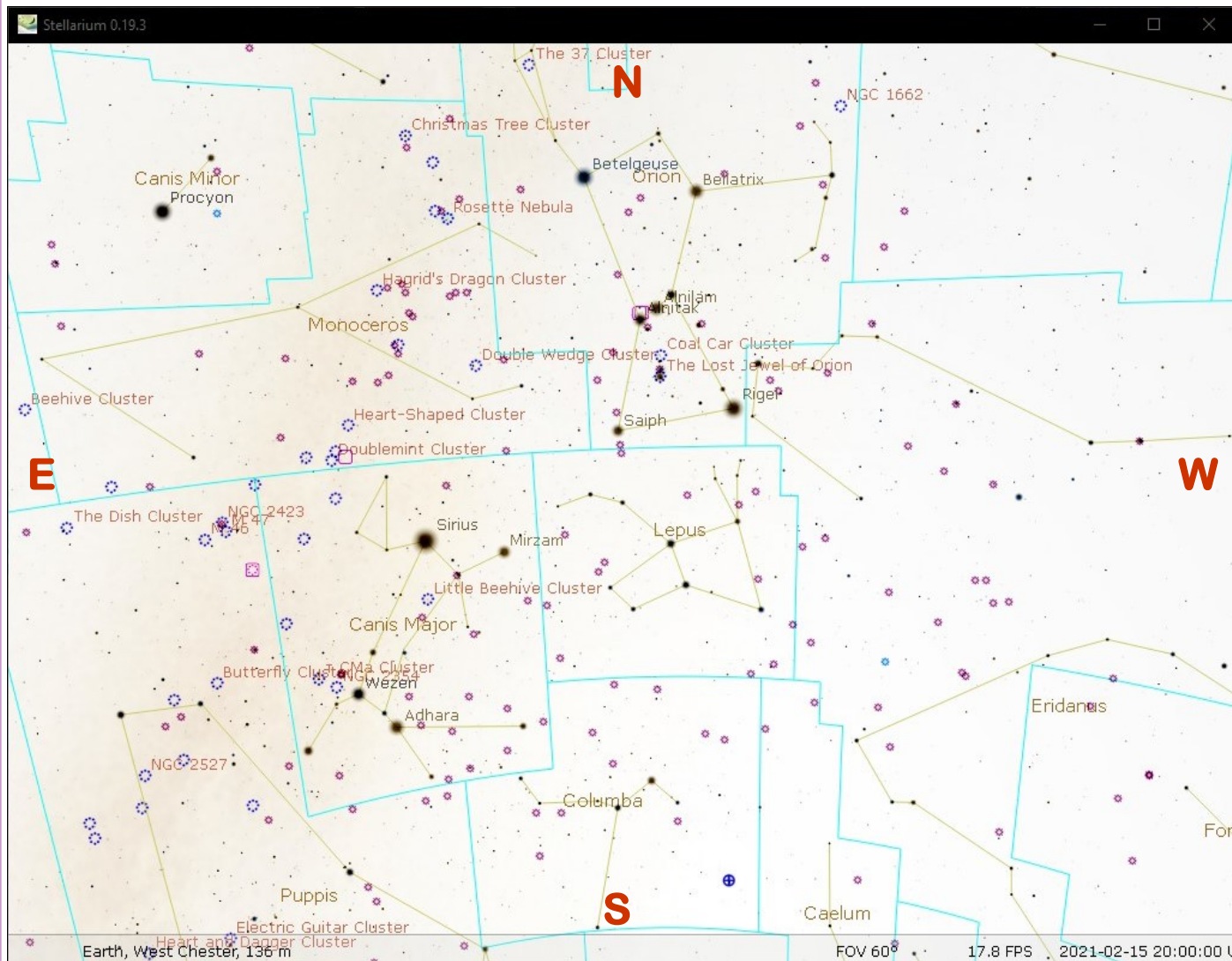


Enceladus in foreground with Titan and the Saturnian ring plane. Image credit: NASA/JPL/Space Science Institute. Edited by Jason Major.

The Sky Over Chester County

February 15, 2021 at 8:00 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
02/01/2021	6:41 a.m. EST	7:10 a.m. EST	5:22 p.m. EST	5:50 p.m. EST	10h 11m 30s
02/15/2021	6:27 a.m. EST	6:54 a.m. EST	5:38 p.m. EST	6:06 p.m. EST	10h 43m 54s
02/28/2021	6:09 a.m. EST	6:36 a.m. EST	5:53 p.m. EST	6:20 p.m. EST	11h 16m 44s

Moon Phases					
Last Quarter	02/02/2021	12:37 p.m. EST	New Moon	02/11/2021	2:05 p.m. EST
First Quarter	01/19/2021	1:47 p.m. EST	Full Moon	02/27/2021	3:17 a.m. EST

February 2021 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

4	Last Quarter Moon, 12:37 p.m. EST
11	New Moon, 2:05 p.m. EST
19	The First Quarter Moon is between the Pleiades and the Hyades, 1:47 p.m. EST
20	The Lunar Straight Wall is visible
24	The Moon is near the Beehive Cluster, M44
27	Full Moon, the Full Snow Moon or the Frog Moon, 3:17 a.m. EST

The best sights this month: The evening sky is full of the bright constellations of winter, so brave the cold nights and use your binoculars to scan for the many Messier objects that are visible this time of year. For the planet seekers, only Mars and Uranus are visible during the evening hours. If you really want to see planets, get up an hour before dawn at month's end and look for Jupiter, Saturn and Mercury low in the eastern sky.

Mercury: Mercury is not visible until late in the month when it can be found low in the east just before dawn.

Venus: Venus is not visible during February as it passes behind the Sun. But our sister planet will reappear in the evening sky in April.

Mars: Mars spends February underneath Taurus the Bull. Although it continues of fade, it is still reasonably bright at magnitude 0.8.

Jupiter: Jupiter becomes an inhabitant of the pre-dawn sky with its buddy Saturn late in February.

Saturn: To see the ringed planet one must wait until late February and rise about an hour before dawn. Saturn and Jupiter will rise just before the Sun in the east.

Uranus and Neptune: Uranus can be found during the evening hours with binoculars about 6 degrees from Mars in the constellation Aries the Ram. Neptune however is much lower and by mid-month is lost from view.

The Moon: Full Moon is on February 27. According to Native Americans, this is the Full Snow Moon since the heaviest snow usually falls during this month. Some tribes also referred to this Moon as the Full Hunger Moon, since harsh weather conditions in their areas made hunting very difficult. Native Canadian tribes called this the Full Frog Moon.

Constellations: Go outside around 8 p.m. and look south to see Orion the Hunter filling the southern sky. Above and to his right is the "V" shape of the face of Taurus the Bull with bright Aldebaran shining like one of the bull's eyes. Just beyond the bull's head is the Pleiades, the Seven Sisters. Running under Orion's feet is Lepus the Rabbit and to the east (left) of Lepus is Canis Major, Orion's "big dog" hunting companion with the brightest star in the sky, Sirius, shining like a jewel in Canis Major's collar. The twins of Gemini are nearly overhead and glancing to the east you'll see Leo the Lion rising, a sign of warmer spring nights to come!

Messier/deep sky: Winter is a great time to use binoculars to seek out Messier objects in the sky since the cold temperatures make it difficult to set up a telescope. Messier objects are a set of over 100 astronomical objects first listed by French astronomer Charles Messier in 1771. Messier was a comet hunter, and was frustrated by objects which resembled but were not comets, so he compiled a list of them to avoid being fooled by them as he searched for comets. M42, the Orion Nebula, is easy to find in Orion's sword. Below and to Orion's left is M41, the Little Beehive, near Sirius in Canis Major. Harder to find because of the lack of bright stars in the area of Cancer the Crab is M44, the "big" Beehive. For more of a challenge, look toward the North, above and to the left of the Big Dipper to find M81 and M82, a pair of relatively bright galaxies.

Comets: There are no bright comets visible during February.

Meteor showers: There are no significant meteor showers during February.

Venus Was Once More Earth-like, But Climate Change Made It Uninhabitable

Richard Ernst, Ph.D., The Conversation

We can learn a lot about climate change from Venus, our sister planet. Venus currently has a surface temperature of 450°C (the temperature of an oven's self-cleaning cycle) and an atmosphere dominated by carbon dioxide (96 per cent) with a density 90 times that of Earth's.

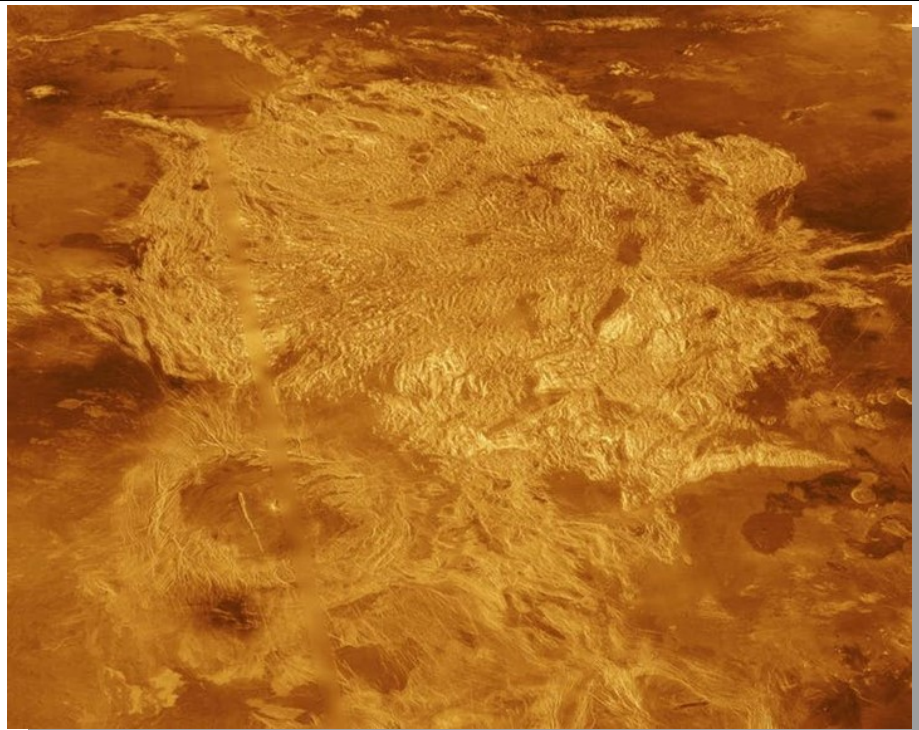
Venus is a very strange place, totally uninhabitable, except perhaps in the clouds some 60 kilometres up where [the recent discovery of phosphine may suggest floating microbial life](#). But the surface is totally inhospitable.

However, Venus once likely had an Earth-like climate. According to recent climate modelling, for much of its history [Venus had surface temperatures similar to present day Earth](#). It likely also had oceans, rain, perhaps snow, maybe continents and plate tectonics, and even more speculatively, perhaps even surface life.

Less than one billion years ago, the climate dramatically changed due to a runaway greenhouse effect. It can be speculated that an intensive period of volcanism pumped enough carbon dioxide into the atmosphere to cause this great climate change event that [evaporated the oceans and caused the end of the water cycle](#).

This hypothesis from the climate modellers inspired Sara Khawja, a master's student in my group (co-supervised with geoscientist Claire Samson), to look for [evidence in Venusian rocks for this proposed climatic change event](#).

Since the early 1990s, my Car-



A portion of Alpha Regio, a topographic upland on the surface of Venus, was the first feature on Venus to be identified from Earth-based radar. (Jet Propulsion Laboratory, NASA)

leton University research team — and more recently my Siberian team at Tomsk State University — have been mapping and interpreting the geological and tectonic history of Earth's remarkable sister planet.

Soviet Venera and Vega missions of the 1970s and 1980s did land on Venus and take pictures and evaluated the composition of the rocks, before [the landers failed due to the high temperature and pressure](#). However, our most comprehensive view of the surface of Venus has been provided by [NASA's Magellan spacecraft in the early 1990s](#), which used radar to see through the dense cloud layer and produce detailed images of more than 98 per cent of Venus's surface.

Our search for geological evidence of the great climate change event led us to focus on

the oldest type of rocks on Venus, called tesserae, which have a complex appearance suggestive of a long, complicated geological history. We thought that these oldest rocks had the best chance of preserving evidence of water erosion, which is a such an important process on Earth and should have occurred on Venus prior to the great climate change event.

Given poor resolution altitude data, we used an indirect technique to try to recognize ancient river valleys. We demonstrated that younger lava flows from the surrounding volcanic plains had filled valleys in the margins of tesserae.

To our astonishment these tesserae valley patterns were very similar to river flow patterns on Earth, leading to our suggestion that [these tesserae valleys were](#)

(Continued on page 7)

Venus (Cont'd)

(Continued from page 6)

formed by river erosion during a time with Earth-like climatic conditions. My Venus research groups at Carleton and Tomsk State universities are studying the post-tesserae lava flows for any geological evidence of the transition to extremely hot conditions.

In order to understand how volcanism on Venus could produce such a change in climate, we can look to Earth history for analogues. We can find analogies in super-eruptions like the last eruption at Yellowstone that occurred 630,000 years.

But such volcanism is small compared to large igneous provinces (LIPs) that occur approximately every 20-30 million years. These eruption events can

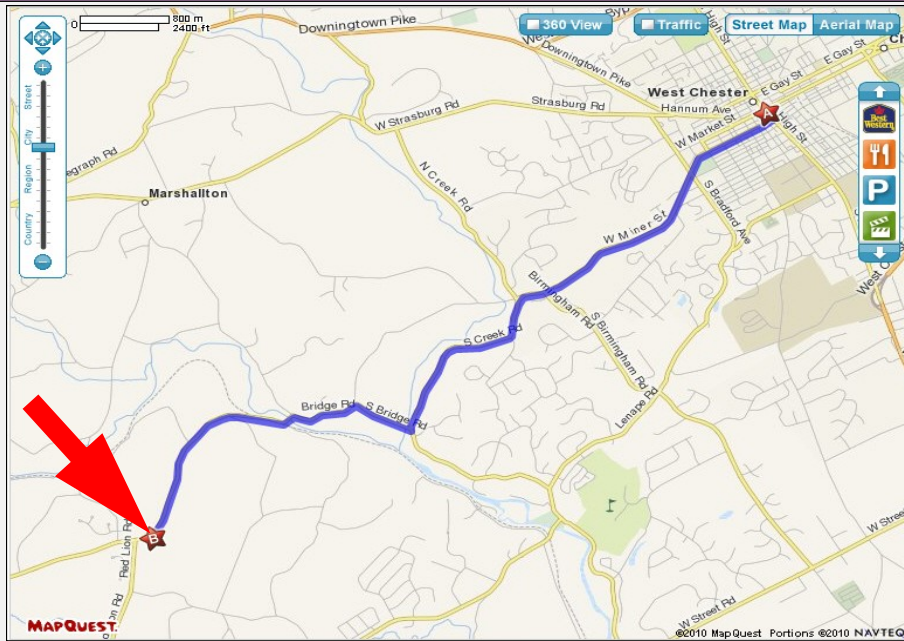
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Classic La Para

by Nicholas La Para



CCAS Directions



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 BRC 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).

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.

Through the Eyepiece: M52, the Salt-and-Pepper Cluster, an Open Cluster in Cassiopeia

by Don Knabb, CCAS Treasurer & Observing Chair



Star chart made using Stellarium, the free planetarium software

Open clusters are great objects to seek out in cold, clear February nights. The lack of moisture in the air really allows the pinpoint stars to “pop” out from the background glow. One of the objects that is a delight in the eyepiece is M52, a large open cluster in the constellation Cassiopeia. M52 is also designated NGC 7654.

M52 is comfortably placed for viewing in the early evening hours of February. Although it was higher in the sky during December and January, if you are using a refractor type telescope you will appreciate it being a bit lower in the sky so you don't need to bend over to look high

into the sky. You can find M52 using the star chart made with Stellarium, the free planetarium software.

There are actually two open clusters that are referred to as the Salt-and-Pepper Cluster. This one, M52, is “the” Salt-and-Pepper Cluster. But M37 in Auriga is called the January Salt-and-Pepper cluster. If you examine images of both clusters, you will see they are quite similar. Both clusters are made up of approximately 150 to 200 stars

Messier 52 is located in a rich Milky Way field. Nearly 200 stars have been identified as part of this cluster which is roughly

5000 light years away and 35 million years old.

Terence Dickinson, in his classic book *Nightwatch, a Practical Guide to Viewing the Universe*, compares M52 to the Pleiades, but M52 is much smaller because it is 10 times more distant.

M52 was an original discovery of Charles Messier, captured on the night of September 7, 1774. In his notes he writes: “Cluster of very small stars, mingled with nebulosity, which can be seen only with an achromatic telescope.”

Sir William Herschel would

(Continued on page 9)

Eyepiece (Cont'd)



Image credit: CCAS member Pete LaFrance

(Continued from page 8)

also observe M52. He writes on August 29, 1873: “All resolved into innumerable small stars without any suspicion of nebulosity.” Herschel’s son John would also add it to the General Catalog a few years later with less descriptive narrative, but it was Admiral Smyth who described M52’s beauty best when he said: “An irregular cluster of stars between the head of Cepheus and his daughter’s throne; it lies north-west-by-west of Beta Cassiopeiae, and one third of the way towards Alpha Cephei. This object assumes somewhat of a triangular form, with an orange-tinted 8th-mag star at its vertex, giving it the resemblance of a bird with outspread wings.”

Although I cannot say that I saw the “bird with outspread wings” I did most certainly see the triangular shape. This is a beautiful collection of stars that I enjoy staring at for many

minutes.

In binoculars M52 will show clearly as a star cloud and will appear as a hazy patch in a telescope finder scope. Even the smallest of telescopes can expect resolution from this multi-magnitude beauty and the more aperture you apply the more stars you will see. M52 is well suited to urban or light polluted skies and stands up well to fairly moonlit conditions and hazy skies.

As you can see in CCAS member Pete LaFrance’s photo, M52 will fill your eyepiece with stars!

Information credits:

- Pasachoff, Jay M. 2000. *A field guide to the stars and planets*. New York, NY. Houghton Mifflin.
- Dickinson, Terence. 2006. *Nightwatch, A practical guide to viewing the universe*. Buffalo, NY. Firefly Books.
- <http://www.universetoday.com/36015/messier-52/>

Venus (Cont'd)

(Continued from page 7)

release enough carbon dioxide to cause catastrophic climate change on Earth, including mass extinctions. To give you a sense of scale, consider that the smallest LIPs produce enough magma to cover all of Canada to a depth of about 10 metres. The largest known LIP produced enough magma that would have covered an area the size of Canada to a depth of nearly eight kilometres.

The LIP analogues on Venus include individual volcanoes that are up to 500 kilometres across, extensive lava channels that reach up to 7,000 kilometres long, and there are also associated rift systems — where the crust is pulling apart — up to 10,000 kilometres long.

If LIP-style volcanism was the cause of the great climate change event on Venus, then could similar climate change happen on Earth? We can imagine a scenario many millions of years in the future when multiple LIPs randomly occurring at the same time could cause Earth to have such runaway climate change leading to conditions like present-day Venus.

Perseverance Watch Party!

Join us on Zoom for a CCAS members-only “watch party” as the NASA Perseverance Rover executes the “EDL” phase of its mission — that’s Entry — Descent — Landing! We’ll gather at 3:00 p.m. on Thursday, February 18th, with touchdown expected around 3:55 p.m.

Look for a special invitation in an email from Don Knabb for the Zoom link to participate in the event.

NASA Night Sky Notes: Landing On Mars: A Tricky Feat!

by David Prosper

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach.

Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.

The Perseverance rover and Ingenuity helicopter will land in Mars's Jezero crater on February 18, 2021, NASA's latest mission to explore the red planet. Landing on Mars is an incredibly difficult feat that has challenged engineers for decades: while missions like Curiosity have succeeded, its surface is littered with the wreckage of many failures as well. Why is landing on



Mars so difficult?

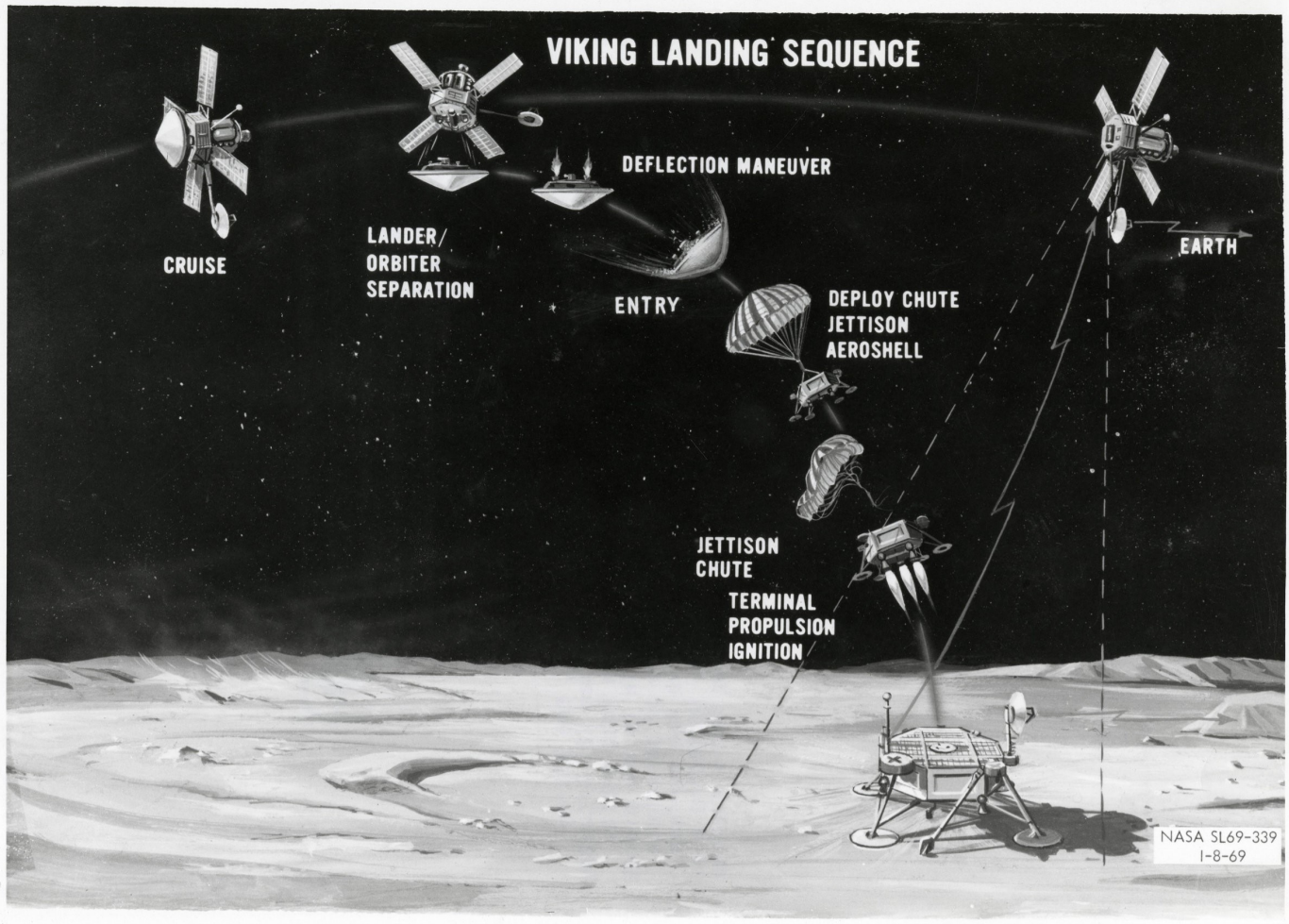
Mars presents a unique problem to potential landers as it possesses a relatively large mass

and a thin, but not insubstantial, atmosphere. The atmosphere is thick enough that spacecraft are stuffed inside a streamlined aeroshell sporting a protective heat shield to prevent burning up upon entry - but that same atmosphere is not thick enough to rely on parachutes alone for a safe landing, since they can't catch sufficient air to slow down quickly enough. This is even worse for larger explorers like Perseverance, weighing in at 2,260 lbs. (1,025 kg). Fortunately, engineers have crafted some ingenious landing methods over

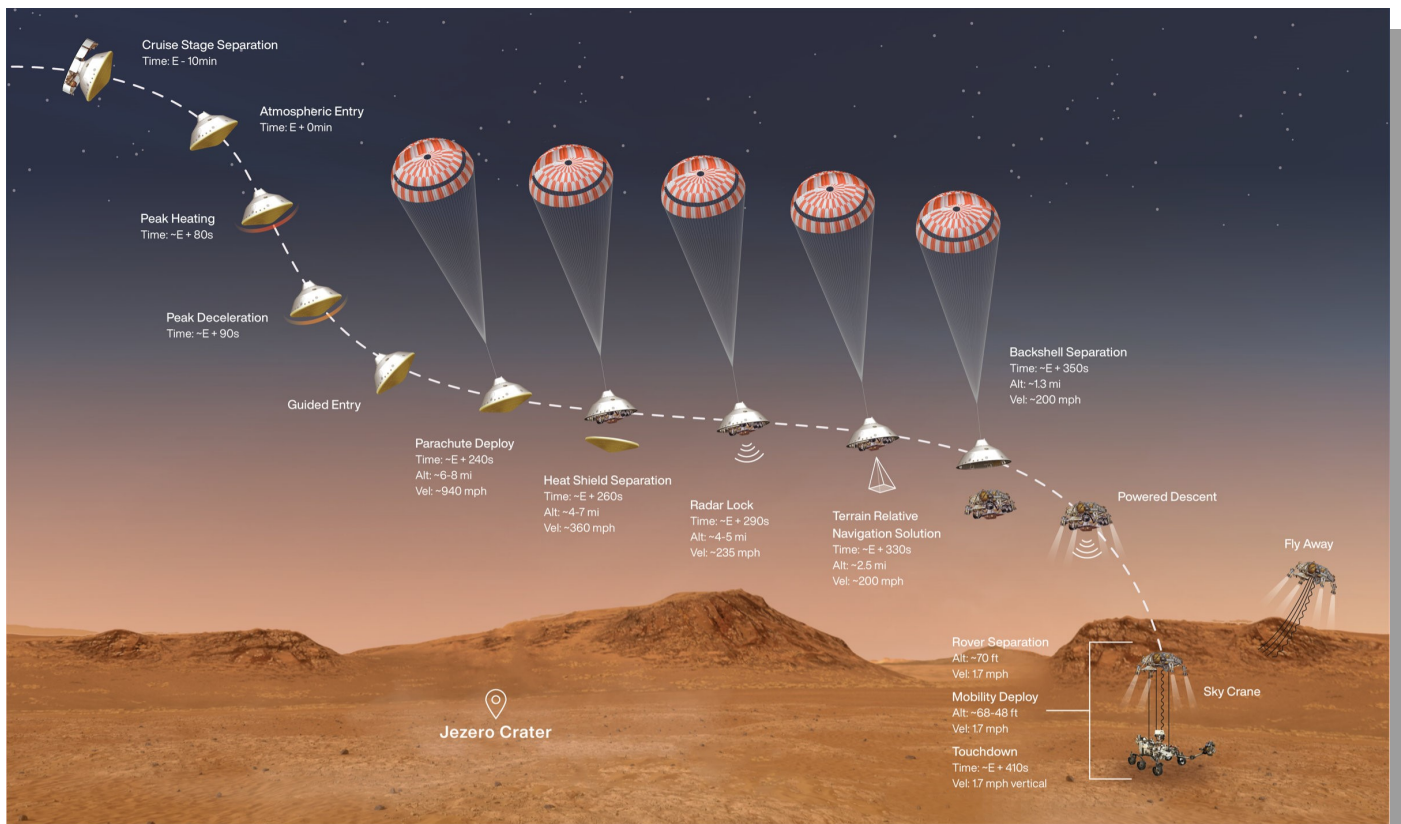
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NASA National Aeronautics and Space Administration

Headquarters
Washington, D.C.



Night Sky Notes (Cont'd)



Opposite & This Page: Illustrations of the Entry, Descent, and Landing (EDL) sequences for Viking in 1976, and Perseverance in 2021. Despite the wide gap between these missions in terms of technology, they both performed their landing maneuvers automatically, since our planets are too far apart to allow Earth-based engineers to control them in real time! (NASA/JPL/Caltech)

(Continued from page 10)

the decades to allow their spacecraft to survive what is called Entry, Descent, and Landing (EDL).

The Viking landers touched down on Mars in 1976 using heat shields, parachutes, and retrorockets. Despite using large parachutes, the large Viking landers fired retrorockets at the end to land at a safe speed. This complex combination has been followed by almost every mission since, but subsequent missions have innovated in the landing segment. The 1997 Mars Pathfinder mission added airbags in conjunction with parachutes and retrorockets to safely bounce its way to a landing on the Martian surface. Then three sturdy

“petals” ensured the lander was pushed into an upright position after landing on an ancient floodplain. The Opportunity and Spirit missions used a very similar method to place their rovers on the Martian surface in 2004. Phoenix (2008) and Insight (2018) actually utilized Viking-style landings. The large and heavy Curiosity rover required extra power at the end to safely land the car-sized rover, and so the daring “Sky Crane” deployment system was successfully used in 2012. After an initial descent using a massive heat shield and parachute, powerful retrorockets finished slowing down the spacecraft to about 2 miles per hour. The Sky Crane then safely lowered the rover down to the Martian surface using a

strong cable. Its job done, the Sky Crane then flew off and crash-landed a safe distance away. Having proved the efficacy of the Sky Crane system, NASA will use this same method to attempt a safe landing for Perseverance this month!

You can watch coverage of the Mars Perseverance landing starting at 11:00 AM PST (2:00 PM EST) on February 18 at [nasa.gov/nasalive](https://www.nasa.gov/nasalive). Touchdown is expected around 12:55 PM PST (3:55 PM EST). NASA has great resources about the Perseverance Rover and accompanying Ingenuity helicopter on mars.nasa.gov/mars2020. And of course, find out how we plan to land on many different worlds at [nasa.gov](https://www.nasa.gov).

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).



Dodson (Cont'd)

(Continued from page 3)

the formation histories of exoplanets and Solar System objects.

An important note to all CCAS members: we are limited to 100 attendees and we want to be sure CCAS members have priority to the Zoom meeting so they can actively participate in the meeting. We welcome guests, other astronomical societies, and members of the regional chapter of The Planetary Society to join the presentation via the YouTube link or the ZOOM link, if it is still available for attendees at the time when you join in.

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

Jan. 2021 Financial Summary

Beginning Balance	\$981
Deposits	\$269
Disbursements	-\$0
Ending Balance	\$1250

New Member Welcome!

Welcome new CCAS members Clare Carlton from Exton, PA, Debbie Belczyk from Downingtown, PA, Bryan Reese from Chadds Ford, PA, David Sutton from Pottstown, PA, and Thomas McCaffrey from Thorndale, 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.

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:

Dr. John C. Hepler
501 Main St.
Ashland, PA 17921

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 Dr. John Hepler, the newsletter editor, at: newsletter@ccas.us.

CCAS Website

Dr. John Hepler is the Society's Webmaster. You can check out our Website at:

<http://www.ccas.us>

Dr. Hepler 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 Dr. 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: Dave Hockenberry
610-558-4248

Vice President: Pete Kellerman
610-873-0162

ALCor, Observing, & Treasurer: Don Knabb
610-436-5702

Secretary: Beatrice Mazziotta
610-933-2128

Librarian: Barb Knabb
610-436-5702

Program: Bruce Ruggeri
484-883-5092

Education: Don Knabb
610-436-5702

Dennis O'Leary
610-701-8042

Webmaster & Newsletter: John Hepler
484-883-0533

Public Relations: Ann Miller
610-558-4248



CCAS Membership Information

The 2021 membership rates are as follows:

REGULAR MEMBER.....\$30/year
SENIOR MEMBER.....\$15/year
STUDENT MEMBER.....\$ 5/year
JUNIOR MEMBER.....\$ 5/year
FAMILY MEMBER.....\$40/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

The club membership subscription cost for *Sky and Telescope* magazine has increased to **\$43.95**. This is still a good saving from the regular rate of **\$54.95**.

There is no need to go through the CCAS treasurer for subscriptions or renewals. Just go to the Sky and Telescope website and select "Magazine", then under the FAQs you can subscribe at the club rate.

<https://skyandtelescope.org/subscribe/>

If you have **any** questions call Don Knabb 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).

There is no need to go through the CCAS treasurer for subscriptions or renewals. Just call customer service at 877-246-4835 and request the club rate for your new subscription or renewal.