

Volcanism Around the Solar System

By Sasha Mintz, RVAS Secretary & Mike Hutkin, RVAS President

The Celestial Café was opened at 7:00 pm by **President Mike Hutkin**. The Celestial Café is always a fun and engaging time where members and officers can catch up and tonight was no different. Members and officers spoke about various topics within astronomy, astrophotography, and big updates in their personal lives. Among the topics that were discussed included:

- · Bob Murray's travels to Ohio
- · The highs and lows of hybrid meetings
- Mike Hutkin's collection of paintings on the wall behind him
- The pros and cons of stabilizing binoculars and if they're worth it
- Image stabilizers and Mike's distance measuring device for golfing
- Resolving John Goss's issues with screen sharing
- The scale model of the solar system in Maine
- · Using a phone to take astrophotography images
- The upcoming comet sighting
- · Bob Murray's new AstroStar equipment
- The incoming cold weather and snowy climates

• Why would the sun damage the Hubble Telescope?

To view the recording of the Celestial Café, click <u>here</u>.

At 7:30, the Café closed and Mike, along with our Membership Coordinator, Frank Baratta, welcomed members and guests to the January meeting. To begin, Mike presented the evening's agenda and introduced the other club officers: John Wenskovitch, Vice President; Sasha Mintz, Secretary; Frank Baratta, Treasurer; Nancy Vogelaar, Member-At-Large; and our other Executive Committee members, John Goss, Immediate Past President; and Michael Martin, Past President, also recognizing Dave Thomas as our Newsletter and Webmaster.

Attendance: There were 40 members and 2 guests in attendance at this month's meeting. As membership coordinator, **Frank Baratta** made mention of members attending that we had not seen recently and we look forward to their future participation.

Astrophotography:

We thank **Ed Dixon**, **Clem Elechi**, **Bert Herald**, **Harry Kessler**, **and Dave Thomas** for providing (Meeting Continued from page 1)



Melotte 15- Clem Elechi photo

their work this month. We had a variety of work including the sun, moon, and distant nebula.

To provide each image with the focus it deserves, we are sharing each submission in a separate article within the newsletter. Don't miss checking out the rest of these images.

Observing Reports: With the past month exhibiting mostly cloudy skies there was not much to report.

David Thaler reported on his observation of sunspot activity using his Celestron binoculars. He was pleasantly surprised at how many sunspots he saw with a simple pair of binoculars.

Bill Krause tried out his new AVX Celestron mount and was pleased that he was able to operate it successfully. He also purchased the StarSence auto-alignment system and will report next month on how that worked out.

Outreach: There was no outreach provided in the past month, but Mike did mention an opportunity on January 26 from 1:00 to 2:00 pm at the East Salem Elementary school. This will be a presentation on the planets of the solar system, and he solicited help with the logistical aspects of bringing in the "show and tell" paraphernalia. There will be 60 4th-grade students participating.

Help Wanted: Mike continued to promote the April 22, 2023, Earth day event in Roanoke and his goal of having RVAS participation. He contacted the event organizers and RVAS is on the list of participants. More information will follow as it becomes available. So far, we want to thank - Erin Elliott, Nancy Vogelaar, David Kibler, Rand Bowden, and Mark Hodges (Solar scope) for their willingness to assist. Please email <u>presi-</u> <u>dent@rvasclub.org</u> to offer your help for the day of the event.

RVAS Challenge: There has been much reported on comet C/2022 E3 that will be visible in the late January and early February skies on its fly-by through the solar system. Mike expressed that he is hoping for this to be a highlight of observing reports at the February 20 meeting. Extra credit for images.

Suggestion Box: Mike shared a suggestion made by Harry Kessler. The idea is to help match up members working on the same Astronomical League checklist so they can work together toward the common goal of completing the list. Working together helps with motivation and getting out to those dark-sky sites for observation. If you are interested in a particular A.L. checklist, let Mike

(Meeting Continued on page 3)

The Roanoke Valley Astronomical Society is a membership organization of amateur astronomers dedicated to the pursuit of observational and photographic astronomical activities. **Meetings are held at 7:30 p.m. on the third Monday of each month. See calendar on last page of newsletter for location. Meetings are open to the public.** Observing sessions are held one or two weekends a month at a dark-sky site. For information regarding joining RVAS, including annual dues, <u>click here</u>. Articles, quotes, etc. published in the newsletter do not necessarily reflect the views of the RVAS or its editor.

<u>Officers/Executive Committee/Editor/Webmaster</u> Mike Hutkin, President (<u>president@rvasclub.org</u>) John Wenskovitch, Vice President (<u>vicepresident@rvasclub.org</u>) Sasha Mintz, Secretary (<u>secretary@rvasclub.org</u>) Frank Baratta, Treasurer (<u>treasurer@rvasclub.org</u>) Nancy Vogelaar, Member at Large (<u>memberatlarge@rvasclub.org</u>) John Goss, Immediate Past President (<u>immediatepastpresident@rvasclub.org</u>) Michael Martin, Past President (<u>pastpresident@rvasclub.org</u>) David E. Thomas, RVAS Newsletter Editor (<u>editor@rvasclub.org</u>) David E. Thomas, Webmaster (<u>webmaster@rvasclub.org</u>)

RVAS NL— February 2023— Pg 2 of 15

(Meeting Continued from page 2)

know and he will help with coordination. Thanks, Harry.

In the news: Mike shared an item raised to him by a neighbor who reported news about UFOs over the Star City on January 2. A report was supposedly filed with the Mutual UFO network on January 3 including videos. None of this could be corroborated and no one in the club had any validating information. Fans of the TV program the "X Files" know that "The Truth is Out There".

"How to": Mike introduced a new feature where he hopes to share different "How to" topics. In this inaugural presentation, Mark Hodges presented his take on "How to Focus Your Telescope or Why Does That Star Look Like a Donut". Mark included a discussion about the principles of telescopic imaging and magnification.

Watch Mark's presentation <u>here</u>.



Mark explains focusing - Zoom photo



Mark explains magnification - Zoom photo

What's Up?: Our monthly What's Up? sky review followed, with Frank Baratta guiding us through the happenings for February. After keeping us posted regarding sunsets and twilight ending times and moon phases, Frank offered a few celestial events for our consideration. Topping the list were following the approach of Venus and Jupiter as they head toward a close conjunction on March 1 st and tracking the passage of Comet C/2022 E3 (ZTF), which may reach naked-eye visibility on February 1st. Frank departed from his mid-month all-sky map by alternating between maps on the 1st and 28th to compare the changing constellations' positions and, especially, the closing of the Venus-Jupiter gap over the month. See the details in this issue's What's Up? Highlights, and play the entire Power-Point by clicking here.

Program: Tonight's program featured Dr. Caitlin Ahrens, who was introduced by Vice-President John Wenskovitch. A synopsis of her work, which was the heart of her presentation is described in her biography which follows.

Caitlin Ahrens' research involves remote sensing of icy surfaces and volatile interactions, including permanently shadowed craters at the lunar poles,



Dr. Ahrens - Biography photo

(Meeting Continued on page 4)

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Dr. Ahrens discusses Io - Zoom photo



Dr. Ahrens discusses Mars - Zoom photo

focusing on the composition and thermodynamics of ices. Dr. Ahrens' specific expertise focuses on modeling of thermal phases of ices, and applications to geomorphological and geophysical data on icy surfaces, including cryovolcanism. Dr. Ahrens also works on a number of planetary volcanism projects, including lava

flow morphology, caldera formation, and rheology, on Mars, Ceres, Titan, and Pluto. Dr. Ahrens is currently applying LRO Diviner data with a myriad of other remote sensing data to investigate the volatiles at the lunar surface and lunar volcanism.

Dr. Ahrens received her B.S. in Physics/Astrophysics and Geology from West Virginia University in 2015, and a Ph.D. in Space and Planetary Science at the University of Arkansas in 2020.

Dr. Ahrens is currently a NASA Postdoctoral Program Fellow at the Goddard Space Flight Center, advised by Dr. Noah Petro. She is also a member of the Diviner Science Team.

In 2018, Dr. Ahrens received the Ten Outstanding Young Americans award (presented by the Jaycees) for her efforts in science communication and outreach

Dr. Ahrens was an enthusiastic speaker who is passionate about the topic of volcanic activity around the solar system. She spoke with authority and humor, making this an outstanding presentation that held the interest of our members and generated a lot of guestions. The presentation can be viewed here.

Next month: Dr. Diane Turnshek will be our guest speaker talking about light pollution. Dr. Turnshek is a special lecturer in the Physics Department of Carnegie Mellow University. Don't miss this presentation.

The meeting was adjourned at 9:10 pm

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Astro photos for publication on the RVAS Web page, or in the RVAS Newsletter. Send the photos to editor@rvasclub.org. Observing reports and articles are also welcome.

Use Our Message Line!

Want to check whether anyone is getting out on a scheduled observing session night or share that you're planning to do so? Have questions about the club or need its assistance? Call the RVAS Message Line,

540-774-5651, and leave a message or listen for any information available.

RVAS February 20th Monthly Meeting Resumes In-Person and Zoom

It's back to the hybrid in-person and Zoom format for the RVAS' February 20th meeting. Our informal "Celestial Café" chat session begins at 7:00 p.m., with the regular meeting to follow at 7:30 p.m. Mask wearing is optional for both in-person gatherings. Diane Turnshek, a dark-sky advocate and light pollution researcher at Carnegie Mellon University and the University of Pittsburgh, is our featured guest speaker. (See also the Calendar on the last page of this issue.)

Virginia Western Community College's Natural Science Center is again the meeting place. It's located on the southern side of Colonial Avenue, above the Community Arboretum, and is accessed via the roundabout at Winding Way. The Center and adjacent parking are indicated on the map below. Our thanks to VWCC and RVAS member Dr. Mallory White, Assistant Professor at VWCC, for use of these facilities.



The RVAS Astrophotographers

January 2023

There is a table with pertinent information following the pictures



RVAS NL— February 2023— Pg 6 of 15



LEGEND	
1	ED DIXON - First cut at a shot of the Moon from 1/6/22, about 12:32 AM. Taken here at home with a ZWO ASI174MM camera, Celestron C6N scope, and iOptron HEM27 mount. Exposure at 0.6860 ms and gain of 0. Taken as a video with 6215 frames, the best 5% stacked and post processed with AutoStakkert, Registax, Windows and Apple Edit.
2	BERT HERALD - Heart and soul nebula. Shot with the ASI 294, cooled to 0C, 30 sec subs, 1 hour of data total. Shot on 1/7/23 from my deck on a night with a full moon! Some of the gradient is likely still there but PixInsight's ABE (Automatic Background Extractor) got rid of most of it. This is the first test of the iOptron Skyguider Pro. Using the Samyang 135 mm lens, IR cut filter, no guiding, ASIAIR used for image capture and polar alignment help as well as some plate solving fun_
3	HARRY KESSLER - IC410 is a faint and dusty emission nebula of more than 100 light-years across approximately 12,000 light-years away from Earth in the northern constellation of Auriga. NGC 1893, an open cluster, is embedded inside IC410. (Wikipedia) It is also called The Tadpoles Nebula (can you see them?) Capture Data:12/28/2022 Celestron C8 AVX Mount; .63 Reducer Lens; Canon 60D imaging camera; ZWO ASI120 Guide Camera on 50mm Scope PHD2 Guiding Software – Dithered; APT image capturing Software; 35 light images x 190 sec = 1 Hr 51 Min exposure; Stacked in ASTAP (no calibration frames); Processed in Siril and Starnet++ ; Final tweaks in Photoshop and Topaz Denoise AI
4	HARRY KESSLER - Capture Data: 12/28/2022; Celestron C8 AVX Mount; 2x Barlow Lens; ZWO ASI224MC Imaging camera; Output Format=SER file (*.ser); Binning=1; Capture Area=488x488; Colour Space=RAW16; Gain=152; Expo- sure=37.9840ms; Lucky Imaging 300 of 5000 frames; PIPP to align and order frames according to quality then out- put to TIFF files; Astrostakkert to stack TIFF files; Astrosurface to process stacked image; PS to tweak final image (1.5 x enlargement)
5	CLEM ELECHI - The Melotte15ROI is just a diagram to orient the audience to the location of my image field. Ed note: <i>Cassiopeia: In the Heart Nebula: 7.100 Light years gway</i>
6	CLEM ELECHI - This is <u>Melotte 15</u> , imaged with a 6" RC scope through Ha and OIII filters.
7	DAVE THOMAS – Sunspots 1/9/2023
RVAS NL— February 2023— Pg 7 of 15	

Judie Lee Smith Snipes 1947 – 2023



It is with great sadness that we report the passing of our RVAS member and friend Judie Snipes on January 18, 2023. She and her husband, Lucas, became members in July 2016 and strong RVAS supporters and benefactors. The family was also a strong supporter of the Boy Scouts and other community activities in which they believed. Judie had a long and successful career in healthcare, mentoring many and contributing to the betterment of the health professions. She will be missed and remembered by many. The RVAS offers its condolences and deepest sympathies to Lucas and the Snipes family.

No memorial services are planned by the family. Those wishing to express their condolences and sympathy may visit the website of Oakey's Funeral Service - East Chapel, Roanoke, VA.

RVAS Member Anniversaries

Congratulations to the following members who reach the indicated number of consecutive years with the RVAS since joining during the month of February:

Paul and Grainne Caffrey (1999) - 24 years David Thaler (2000) - 23 years David, Brenda and Adam Urgo (2014) - 9 years Nancy, Bruce and Amy Vogelaar (2018) - 5 years

Thanks to all of you for being RVAS members!

Comet C2022/E3 (ZTF) From Poages Mill Observatory

By Michael Good



Photo by Michael Good

I got up at 11:50pm Jan 23, and worked till 4:30am to find and then capture this comet, waiting for the subject to clear the trees to my east. This is my first color image of the "green" comet they keep talking about (Comet C2022/E3 (ZTF)), with the 50,000 year orbital period around our sun. Looked bluish-green to me in my color data. To capture this, I took one minute images, 50 in all, binned 2x2: (LLRGB: lum lum red green blue) and repeat. I have 50 LLRGB images, and then I grabbed 11 each for darks, darks for flats, and flat frames. A lot of data for what I consider a "so-so" image!

This comet is NOT visible without binoculars, and is quite faint even then as a small fuzzy spot. To get this image, I had to subdue high winds by erecting a PVC frame and tarp I made for my observatory, which blocks the winds from the west. I re-mounted my 90mm Burgess refractor onto the C14 (to get a wider field of view), and put the heavy ST10xme and filter wheel in the refractor, as shown here:



Photo by Michael Good



Photo by Michael Good

This image took a day of processing. It will be faster next time, but I had to learn a new technique on how you **create two images**:

- 1) First image with just the comet, and the stars magically extracted
- 2) Second image of just the stars with the comet magically extracted

This is a neat technique involving using a mathematical technique called a sigma clip average stack. In one set of images (one for luminance, one for red, one for green, and one for blue) you combine the data tracking on the nucleus of the comet. This produces a "sharp" comet but a line of multiple stars for each star in the image. You import the image into Photoshop and perform a Filter - Dust and Noise filter which basically removes the stars. For the star image, after aligning all the data on the stars, you combine with an average stack of each color, and then the luminance, and create a color picture (L-R-G-B) which shows the stars in color but the comet is a streak. The processing of this takes some Photoshop wizadry subtracting one image from another. Take a look at this website posted by Bernhard Hubl in 2006: www.astrophoton.com/tips/ comet_images.pdf

What's Up? Highlights February 1 to 28, 2023

(As presented at the January 16th meeting. For the entire PowerPoint, click here.)

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This Month:

Our main event is the passage of Comet C/2022 E3 (ZTF), well placed for evening viewing. So, we'll forgo our usual narrative in favor of the map below that was shown at the meeting. See "Celestial Events" below.



Celestial Events:

- Wed., 1st Follow Venus (ascending) and Jupiter (descending) throughout February as they head toward their close conjunction (about 35 arcmin separation) on March 1st.
- Wed., 1st Comet C/2022 E3 (ZTF) closest to Earth (26.4 Mmi) and possibly mag. 5 or 6 at a dark site. Greenish hue to coma visible in photos. Perihelion was on January 12th.
- Sat., 4th Moon at apogee; 252,572 miles from Earth; diameter 29'24".
- Wed., 15th An hour after sunset, find Neptune, low in the west, about 35 arcmin south of Venus.
- Sun., 19th Moon at perigee; 222,617 miles from Earth; diameter 33'21" (11.8% wider than on the 4th).
- Mon./Tue., 27th/28th The Moon passes within 0.5° of Mars. Closest approach about 1:20 a.m. on the 28th. Latest of the occultation near misses for our area in recent months.

Sunset and Twilight:

Sunset Range: 5:44 p.m. (Feb. 1st) to 6:13 p.m. (Feb. 28th) Twilight Ends: 7:13 p.m. (Feb. 1st) to 7:39 p.m. (Feb. 28th)

Weekend Observing Opportunities: (Dark of the Moon Weekends) Feb. 10th/11th Feb. 17th/18th Moon Phases:

Wed., Feb. 15th, 7:00 p.m. (~30 min. before fully dark)

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Sun., 5th – Full Moon Mon., 13th – Last Quarter Mon., 20th – New Moon Mon., 27th – First Quarter

RVAS NL— February 2023— Pg 10 of 15

Welcome Mat

The Society bids a warm welcome to Erica Reed, of Botetourt County, who joined last month with an Individual membership. Erica's a native daughter of the Roanoke Valley who's made ample use of this area's postsecondary educational opportunities: an Associate Degree in Environmental Science from Virginia Western Community College; a B.S. in Biology and a Secondary Science Teaching Certificate from Roanoke College; and a M.S. in Natural Resources from Virginia Tech! Since 2019 she's been employed at the Virginia Department of Transportation's Salem District Office, currently as an Environmental Consultant, (Now-retired RVAS member Fred Davis was one of her co-workers!) A career in the environmental field had long been Erica's goal, but on the way came substitute teaching and other jobs. She fondly recalls her seven years of seasonal work in environmental wildlife biology for the Forest Service. "I loved that job. The woods were my office!" she joyfully declares. Erica feels an affinity for all creatures that need help, a trait that has led her to adopt feral neighborhood cats, including her current pals Whiskers, Siam and Tux, She also volunteers at local animal shelters and with Barn Cat Buddies. Astronomy is a natural extension of Erica's environmental interests. In fact, she can't remember a time when she wasn't enchanted by space, the stars and the universe. A childhood visit to Roanoke's Hopkins Planetarium made a lasting impression, as did receiving a telescope from her dad a couple of years thereafter. Dad's still at it, last month giving her the telescope he's owned for three decades, a 10-inch Meade LXD55 Schmidt-Newtonian! The RVAS is Erica's first experience as an astronomy club member, and she's looking forward to intellectual stimulation and opportunities to learn from others and share experiences.

Again, welcome, Erical We're glad to have you with us. Thanks for joining. We hope you'll become a regular at our meetings and activities. And be sure to reach out to your new fellow club mates for pointers on making use of that Meade 10"!

Welcome Mat

The Society bids a warm welcome to Bill Savage, of Roanoke County, who joined last month with a Senior Individual membership. Now retired, Bill and his wife, Blanche, moved to Roanoke in 2017 from the Philadelphia area to be near their daughter, who had come here for a job opportunity. Born in the Bronx, NY, his family moved when he was 12 to Old Bridge, NJ, just southeast across Raritan Bay from the Big Apple. Blanche is a native of South Amboy, NJ, which, coincidentally, borders Old Bridge! With a B.S. in Business Administration and an M.S. in Occupational Safety and Health, Bill enjoyed a career traveling throughout the U.S. as an inspector of large nursing facilities for a property insurer. Regarding astronomy, it's always been an interest of his. He especially remembers working on his astronomy merit badge when he was a Boy Scout. His troop leader for the merit badge had a telescope and wowed him with views of the moon and planets. Bill doesn't currently own a telescope, but may consider purchasing one in the future. Actually, he's among that special breed of amateurs, the "eclipse chasers"! It fits naturally with his love of traveling, and he's logged a number of events, such as experiencing one in the early 1990s from Normandy, France. So, of course, Bill's plans are already in place for being in the path of totality as the sun's shadow crosses Ohio on April 8, 2024. As often is the case, he found the RVAS through searching the Internet; we're his first experience with becoming a member of an amateur astronomy club. Given retirement, he has more time available now to participate in a group with common interests. Bill's looking forward to getting together to share that interest with other members, including getting out to stargaze. When not thinking about astronomy, Bill enjoys hiking the miles of area greenways and in the Read Mountain Preserve, and bicycling. Both he and Blanche love traveling and have a trip to Alaska coming up. In fact, in story book fashion, they met when each happened to be on a trip to London!

Bill, we're glad to have you with us! Thanks for joining. We hope to meet you soon, and Blanche, too, if you can charm her into accompanying you. We also hope to hear more about your eclipse chasing and spend time with you under the stars.



This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. <u>nightsky.jpl.nasa.gov</u> to find local clubs, events, and more!

Spot the King of Planets: Observe Jupiter

David Prosper

Jupiter is our solar system's undisputed king of the planets! Jupiter is bright and easy to spot from our vantage point on Earth, helped by its massive size and banded, reflective cloud tops. Jupiter even possesses moons the size of planets: Ganymede, its largest, is bigger than the planet Mercury. What's more, you can easily observe Jupiter and its moons with a modest instrument, just like Galileo did over 400 years ago.

Jupiter's position as our solar system's largest planet is truly earned; you could fit 11 Earths along Jupiter's diameter, and in case you were looking to fill up Jupiter with some Earth-size marbles, you would need over 1300 Earths to fill it up – and that would still not be quite enough! However, despite its awesome size, Jupiter's true rule over the outer solar system comes from its enormous mass. If you took all of the planets in our solar system and put them together they would still only be half as massive as Jupiter all by itself. Jupiter's mighty mass has shaped the orbits of countless comets and asteroids. Its gravity can fling these tiny objects towards our inner solar system and also draw them into itself, as famously observed in 1994 when Comet Shoemaker-Levy 9, drawn towards Jupiter in previous orbits, smashed into the gas giant's atmosphere. Its multiple fragments slammed into Jupiter's cloud tops with such violence that the fireballs and dark impact spots were not only seen by NASA's orbiting Galileo probe, but also observers back on Earth!

Jupiter is easy to observe at night with our unaided eyes, as well-documented by the ancient astronomers who carefully recorded its slow movements from night to night. It can be one of the brightest objects in our nighttime skies, bested only by the Moon, Venus, and occasionally Mars, when the red planet is at opposition. That's impressive for a planet that, at its closest to Earth, is still over 365 million miles (*587 million km*) away. It's even more impressive that the giant world remains very bright to Earthbound observers at its furthest distance: 600 million miles (*968 million km*)! While the King of Planets has a coterie of around 75 known moons, only the four large moons that Galileo originally observed in 1610 – Io, Europa, Ganymede, and Calisto – can be easily observed by Earth-based observers with very modest equipment. These are called, appropriately enough, the *Galilean moons*. Most telescopes will show the moons as faint star-like objects neatly lined up close to bright Jupiter. Most binoculars will show at least one or two moons orbiting the planet. Small telescopes will show all four of the Galilean moons if they are all visible, but sometimes they can pass behind or in front of Jupiter, or even each other. Telescopes will also show details like Jupiter's cloud bands and, if powerful enough, large storms like its famous Great Red Spot, and the shadows of the Galilean moons passing between the Sun and Jupiter. Sketching the positions of Jupiter's moons during the course of an evening - and night to night – can be a rewarding project! You can download an activity guide from the

NASA Night Sky Notes

Astronomical Society of the Pacific at <u>bit.ly/drawjupitermoons</u>

NASA's Juno mission currently orbits Jupiter, one of just nine spacecraft to have visited this awesome world. Juno entered Jupiter's orbit in 2016 to begin its initial mission to study this giant world's mysterious interior. The years have proven Juno's mission a success, with data from the probe revolutionizing our understanding of this gassy world's guts. Juno's mission has since been extended to include the study of its large moons, and since 2021 the plucky probe, increasingly battered by Jupiter's powerful radiation belts, has made close flybys of the icy moons Ganymede and Europa, along with volcanic Io. In 2024 NASA will launch the Europa Clipper mission to study this world and its potential to host life inside its deep subsurface oceans in much more detail. Find the latest discoveries from Juno and NASA's missions at <u>nasa.gov</u>.



This stunning image of Jupiter's cloud tops was taken by NASA's Juno mission and processed by Kevin M. Gill. You too can create amazing images like this, all with publicly available data from Juno. Go to <u>missionjuno.swri.edu/junocam</u> to begin your image procession journey – and get creative!

Full Image Credit: NASA/JPL-Caltech/SwRI/MSSS; Processing: Kevin M. Gill, license: CC BY 2.0) <u>https://creativecommons.org/licenses/by/2.0/</u> Source: <u>https://apod.nasa.gov/apod/ap201123.html</u>



Look for Jupiter as it forms one of the points of a celestial triangle, along with Venus and a very thin crescent Moon, the evening of February 22, 2023. This trio consists of the brightest objects in the sky – until the Sun rises! Binoculars may help you spot Jupiter's moons as small bright star-like objects on either side of the planet. A small telescope will show them easily, along with Jupiter's famed cloud bands. How many can you count? Keep watching Jupiter and Venus as the two planets will continue to get closer together each night until they form a close conjunction the night of March 1. Image created with assistance from Stellarium.

Monthly Calendar

RVAS Monthly Meeting: Monday, February 20th, 7:30 p.m. (Informal "Celestial Café" chat session begins at 7:00 p.m.) Natural Science Center, Virginia Western Community College, Colonial Avenue, Roanoke, VA. For our February meeting the RVAS resumes its hybrid in-person and Zoom format, and welcomes Diane Turnshek as guest speaker. Ms. Turnshek is a lecturer in the Department of Physics at Carnegie Mellon University and the Department of Physics and Astronomy at the University of Pittsburgh. A recipient of the International Dark-Sky Association's (IDA) Dark Sky Defender Award, she conducts light pollution research focusing on measuring the light of cities, aided by drones, aircraft, satellites and astronauts aboard the ISS. An author as well, with a love of both astronomy and science fiction, she has been among the crews at the Mars Desert Research Station. Founder of the Pennsylvania Chapter of IDA, she's an untiring advocate for the human right to and need for dark sky. She'll share her work and experiences with us as, and her views about how the RVAS can contribute to combating light pollution. Make plans to attend our February 20th meeting for Ms. Turnshek's program. Further information and the Zoom invitation will be forthcoming in the days prior to or during the weekend before the meeting.

WEEKEND OBSERVING OPPORTUNITIES: The following information on Fridays and Saturdays that may be suitable for observing is provided as a courtesy to RVAS members and other readers. The RVAS assumes no responsibility for the health and safety of anyone venturing out to stargaze, and cautions all who may do so to observe appropriate COVID-19 health and safety precautions.

- Friday and Saturday, February 10th & 11th. Sunset is at 5:56 p.m. Astronomical twilight ends at 7:23 p.m. The Moon rises at 10:43 and 11:46 p.m., respectively.
- Friday and Saturday, February 17th & 18th. Sunset is at 6:03 p.m. Astronomical twilight ends at 7:29 p.m. The Moon sets at 2:49 and 4:06 p.m., respectively.

Future Weekend Observing Opportunities: March 10th & 11th; 17th & 18th.

Astro-Quiz

It is generally accepted that our observable universe has existed for about 13.8 billion years. Yet, the estimated radius of observable universe is not 13.8 billion light years, but rather about 46.5 billion light years. What accounts for this greater size?

Answer to Last Month's Quiz: Last month we asked which of a comet's "orbital elements"—the six parameters that define its orbit's shape and orientation—determines whether it's a recurring or one-time visitor to our solar system, and what are this orbital element's three numerical factors that classify the trajectories? The orbital element in question is "eccentricity", which is a measure of how much the trajectory departs from a circle. Circles have an eccentricity of 0; ellipses more than 0 but less than 1; parabolas equal to 1; and hyperbolas greater than 1. The greater an ellipse's eccentricity, the more stretched out it is. But it is a "bound" ("closed") orbit, and results in periodic returns. Parabolic and hyperbolic orbits are "unbound" ("open" or "escape") orbits and result in a one-time visit, never to return. Have an answer to this month's guiz (or a future guiz question and answer to suggest)? E-mail it to <u>astroguiz@rvasclub.org</u>!