



Ephemeris

The Official Newsletter of the Prescott Astronomy Club (PAC)
e-phem-er-is: a time-based listing of future positions of solar system objects.

April 2023



Original Photo: Lucas Pezeta

General Meeting of the Prescott Astronomy Club

Wednesday, April 5th, 2023 at 6:00pm
Prescott Public Library - Founders Room

Speaker: Dr. Richardson & Students – ERAU’s recent SOFIA flight

Topic: ERAU’s recent SOFIA flight

Background: Dr. Noel Richardson recently led students from Embry-Riddle Aeronautical University in a rare opportunity to travel aboard the world’s largest flying observatory, NASA’s Stratospheric Observatory for Infrared Astronomy (SOFIA) to study unusual dust-forming objects called Wolf-Rayet binary systems. They conducted hands-on research, glimpsed the aurora borealis and got front-row seats to their dream careers.

Bio: Dr. Noel Richardson, assistant professor of Physics and Astronomy recently received two grants from SOFIA totaling \$67,000 that helped fund student research and the unique experience of flying on two 10-hour flights aboard SOFIA. His infrared observations are being used to study the origins and properties of the universe’s first specks of dust, which could have helped form planets and stars.

UPCOMING SPEAKERS

May: Ernest Cisneros - Mastcam-Z/Perseverance rover MSL mission

Jun: To Be Announced

Grand Canyon Star Party 2023

June 10-17

- Attend this free, open to the public, event. The [park entrance fee](#), is good on both South and North rims for 7 days. No additional tickets or sign-up is required.
- The event begins at sunset, although the best viewing is after 9 pm and many telescopes come down after 11 pm; however, on nights with clear, calm skies, some astronomers continue sharing their telescopes into the night.
- [Campground](#) or [lodging](#) reservations are recommended.
- Dress warmly. Temperatures drop quickly after sunset — even during summer months.
- View an assortment of planets, double stars, star clusters, nebulae and distant galaxies by night, and perhaps the Sun or Venus by day.
- Skies will be starry and dark until the moon rises the first night. It rises progressively later throughout the week of the Star Party.

See <https://www.nps.gov/grca/planyourvisit/grand-canyon-star-party.htm> for more information.

NASA Night Sky Notes

Original Photo: unknown

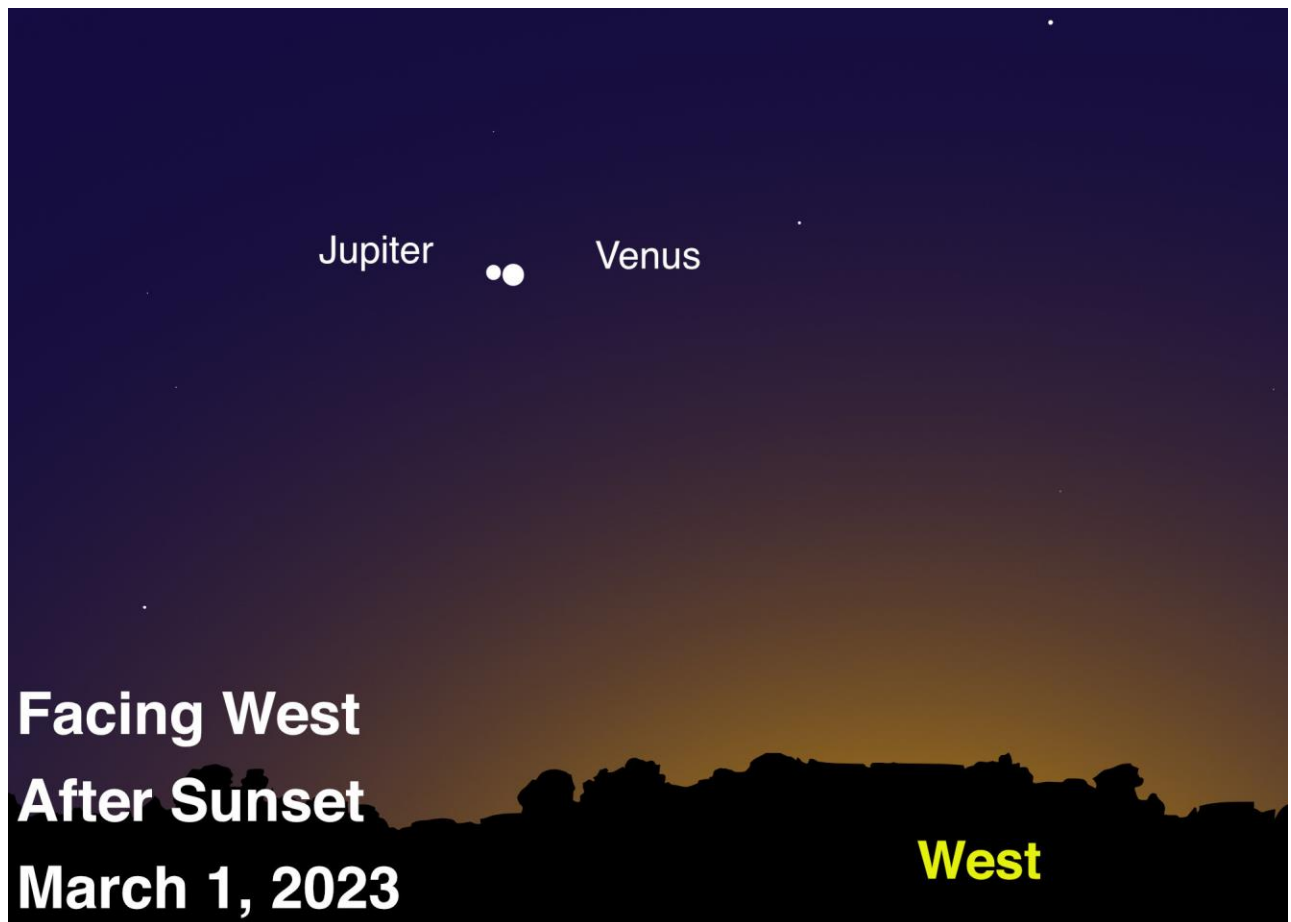
Spot the Morning and Evening Star: Observe Venus

By David Prosper

Venus is usually the brightest planet in our skies, and is called “Earth’s Twin” due to its similar size to Earth and its rocky composition. However, Venus is a nightmare version of our planet, featuring a thick, crushing atmosphere of acidic clouds, greenhouse gasses, howling winds, and intense heat at its surface.

This rocky inner world’s orbit brings it closer to Earth than any of the other planets, and is the second closest to the Sun after Mercury. Like Mercury, Venus orbits between our planet and the Sun, so Earth-based observers can observe Venus in the morning before sunrise, or in the evening after sunset – but never high in the sky in the middle of the evening, unlike the outer planets. Since Venus is so striking in its twilight appearances, the planet features heavily in sky mythologies worldwide. Venus’s bright morning and evening appearances are the origin for its dual nicknames: the Morning Star, and the Evening Star. Some ancient astronomers never made the connection, and assumed the Evening Star and Morning Star were two unrelated objects! Observers can even spot Venus during the daytime, if the sky is very clear and the planet is bright enough. Venus also has phases, similar to the Moon and Mercury. Galileo’s observations of Venus’s phases helped turn the astronomy world upside down in the early 1600s, and you can see them yourself using a telescope or even a surprisingly low-power pair of binoculars.

Warning: Please be very careful when observing Venus with a telescope in the early morning or daytime. Never allow the Sun to enter your instrument’s field of view, as you could be permanently blinded.



Venus and Jupiter continue to move closer together in the evening sky this month. Jupiter will continue its descent towards the horizon while Venus will continue to climb and will be visible in the evenings through mid-summer of 2023. It's a great year for Venus fans!

Venus's other moniker of "Earth's Twin" is a bit misleading. In terms of their surface temperatures and atmospheres, Venus and Earth are extremely different! The surface of Venus is warmer than that of Mercury, despite Mercury being many millions of miles closer to the Sun. While Mercury is still a scorching 800 degrees Fahrenheit (427 degrees Celsius), Venus is even hotter: 900 degrees Fahrenheit (482 degrees Celsius). The vast amount of carbon dioxide in the thick Venusian atmosphere acts as an insulating blanket that retains much of the Sun's heat, creating the runaway greenhouse effect that dominates its present-day climate. The Venusian surface is a crushing 90 Earth atmospheres on top of its absurd temperatures. These extreme conditions mean that the mission life of any past Venusian robotic landers were measured in **hours** at best – and usually minutes! However, conditions in Venus's upper atmosphere may be much more hospitable, with temperatures and pressures at 30 miles (50 km) above the surface that are much more Earth-like in temperature and pressure. Studies of the Venusian atmosphere, including seasonal appearances of dark streaks and faint signals of suggestive chemistry, intrigue researchers with the possibility that some sort of life may persist in its clouds. But far more evidence is needed to confirm such a claim, since non-biological factors like volcanism and other processes could also be the source for these signals.

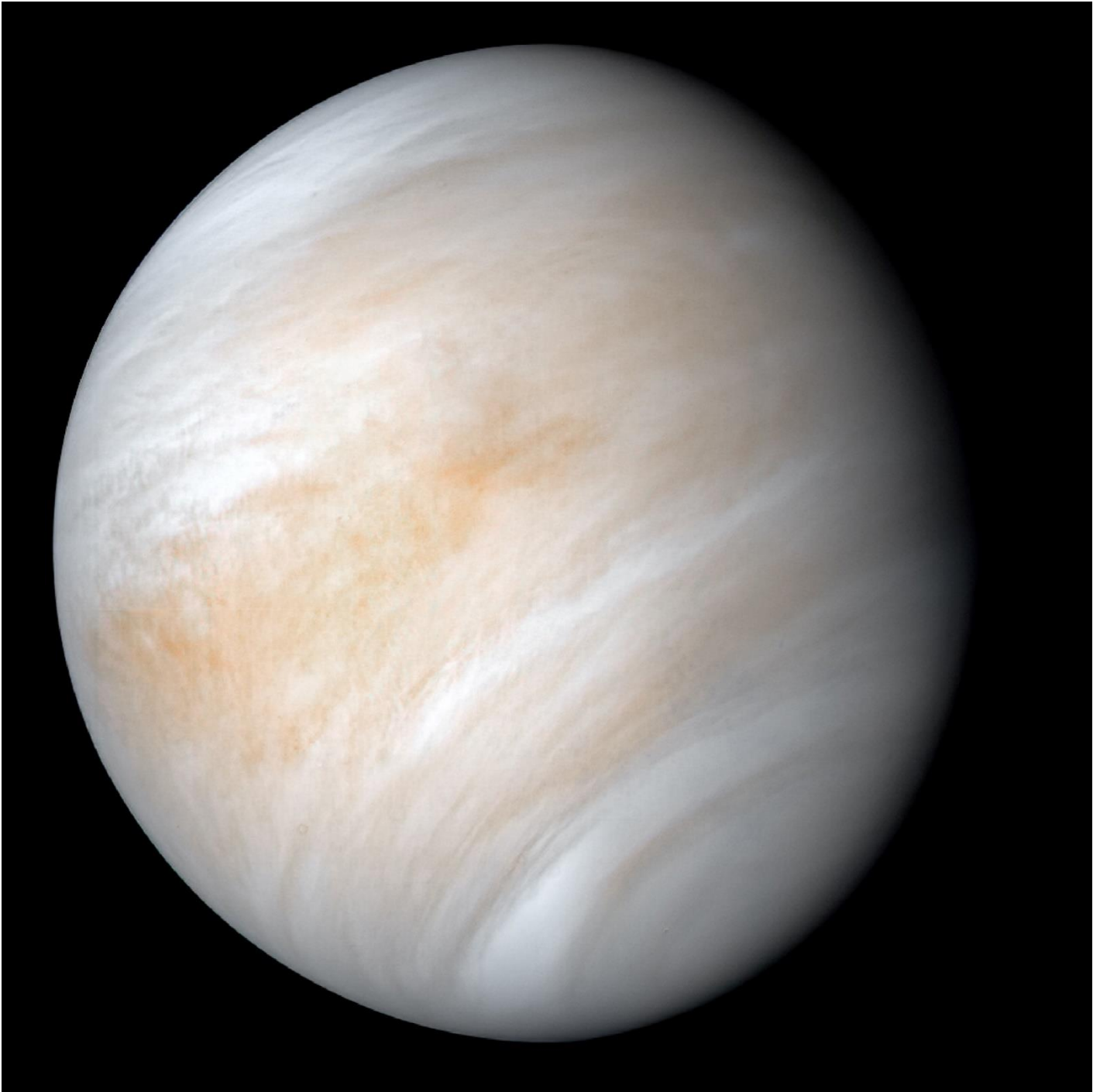


Image Credit: NASA/JPL-Caltech.

The top layers of Venus's cloud pop in this contrast-enhanced image, reprocessed with modern techniques from Mariner 10 data.

Venus's thick sulfuric acid clouds block direct visual observations of its surface from optical telescopes on Earth. Multiwavelength observations from space probes show evidence of active volcanoes and possibly some sort of plate tectonics, but follow up missions will be needed to confirm the presence of active volcanism, plate tectonics, and any possible signs of life. In order to do so, NASA is sending two new missions to Venus by the end of this decade: the orbiter **VERITAS**, which will map the surface in high detail and study the chemistry of its rocks and volcanoes, and **DAVINCI+**, which will study its atmosphere and possible tectonic surface features via a "descent sphere" that will plunge into Venus's clouds. Follow their development and discover more about Venus at solarsystem.nasa.gov/venus, and of course, continue your exploration of the universe at nasa.gov.

Source: <https://solarsystem.nasa.gov/resources/2524/newly-processed-views-of-venus-from-mariner-10/>

Backyard Astronomer



Original Photo: Eberhard Grossgasteiger

The Backyard Astronomer - April 2023

Planetary Demotions

By Adam England, The Backyard Astronomer

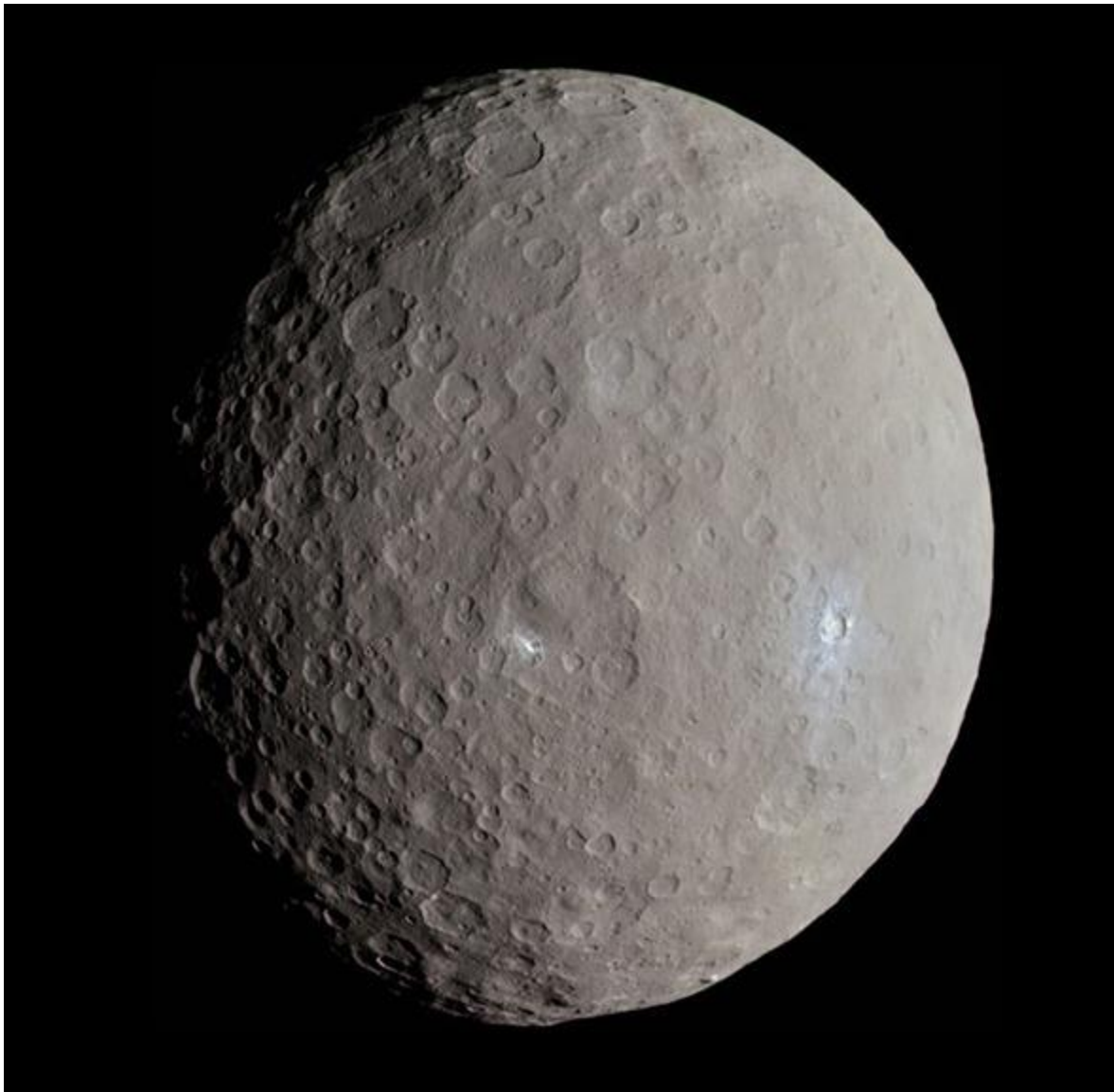


Photo: Ceres - Courtesy NASA, Dawn Spacecraft at 13,641 km, 05/04/2015.

When I was growing up, we remembered the names of the planets in order with the mnemonic *My Very Excellent Mother Just Sent Us Nine Pizzas*. However, on August 24th, 2006, the International Astronomical Union voted on a stricter definition of what it means to be a planet. You see, Pluto had become a problem - it was discovered by Clyde Tombaugh at Flagstaff, Arizona's Lowell Observatory in 1930, with nearly a dozen more distant worlds discovered within our solar system in the early 2000s. Our planetary family was expanding to include at least 9 more, or we needed a better way to classify different types of worlds. It was decided that a planet must be in orbit around the Sun, large enough that its own

gravity creates an essentially spherical shape, and that as the gravitationally dominant body in its orbit it has successfully cleared its neighborhood of other large bodies, excepting its natural satellites or moons. Pluto did not meet this definition, nor did the recently discovered Eris, Haumea, Makemake, Gonggong, Sedna, or Orcus. As such, planetary scientist Alan Stern is credited as coining the term Dwarf Planet to classify these worlds that border on the definition. Pluto lovers worldwide were disheartened as we amended it to *My Very Excellent Mother Just Sent Us Nachos*.

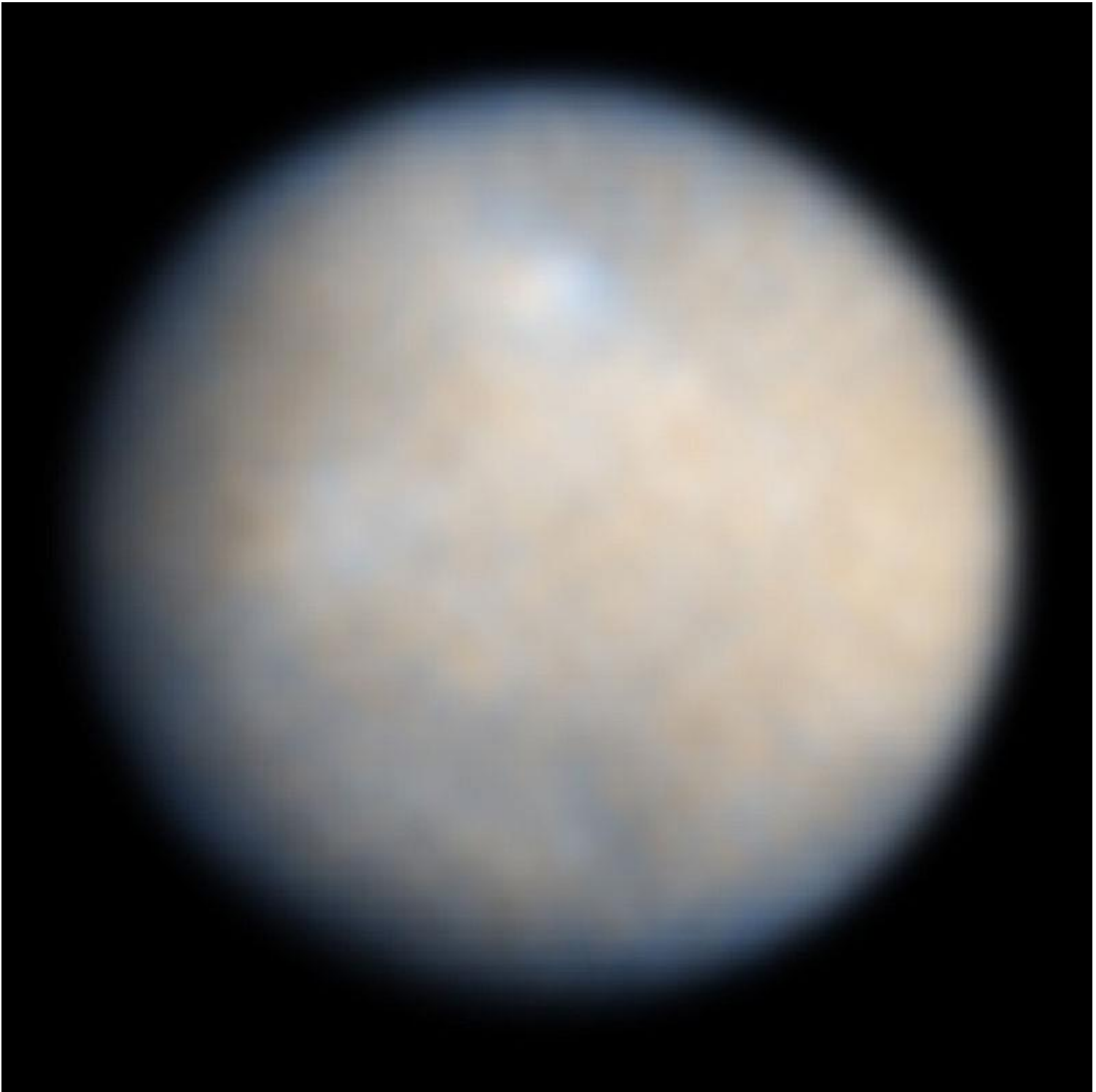
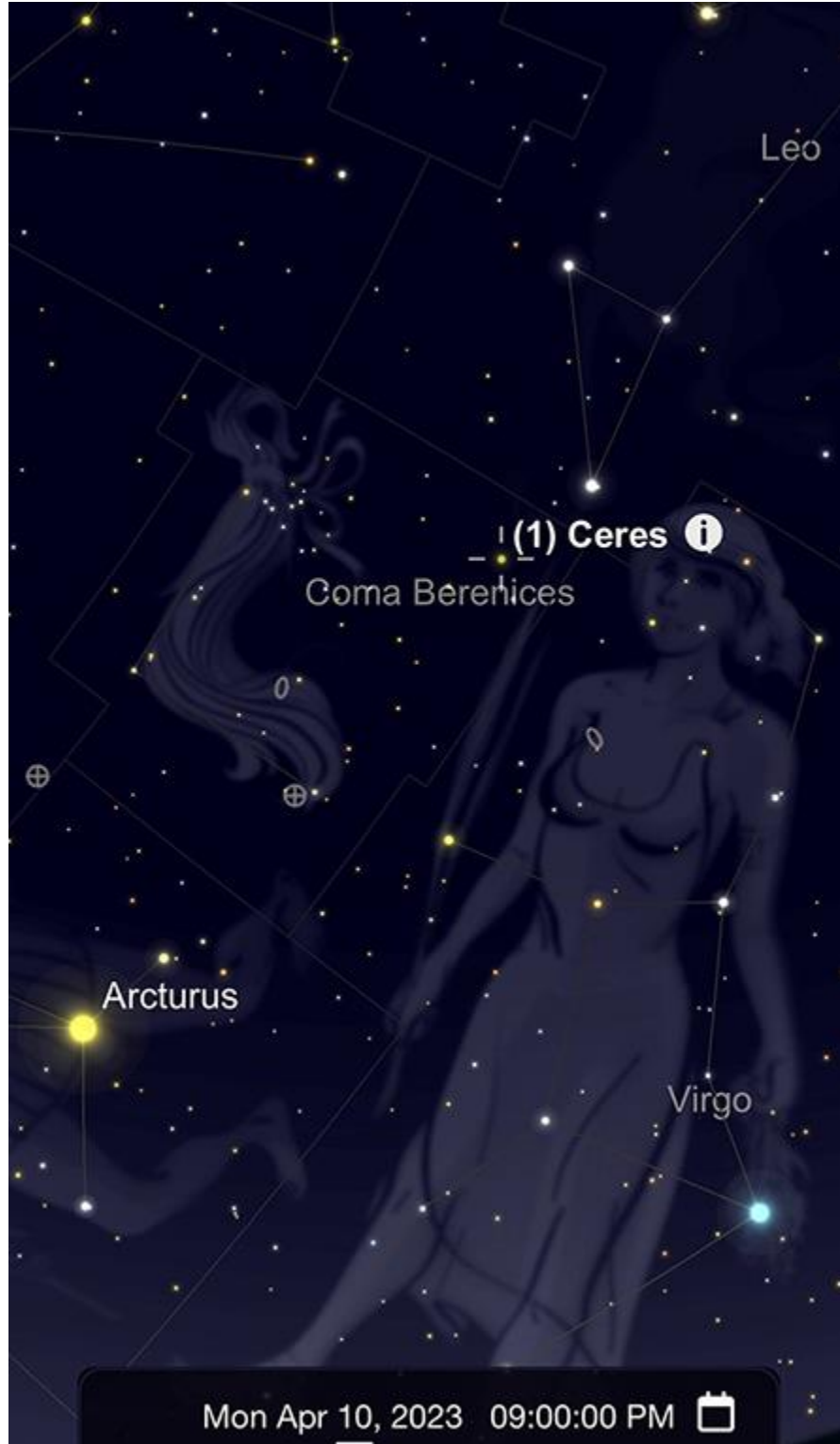


Photo: Ceres – Courtesy NASA, Hubble Space Telescope, 2004.

This wasn't the first time that a planet had been demoted. On January 1st, 1801, a Catholic priest searching for a dim star from the Academy of Palermo in Sicily found a star that moved from night to night. First assuming it to be a comet, 24 consecutive observations led Giuseppe Piazzi to conclude, "since its movement is so slow and rather uniform, it has occurred to me several times that it might be something better than a comet." Mathematical predictions placed this new object's orbit as coming back into view on the other side of the sun, and astronomers worldwide looked skyward for its return. On December 31st of that same year, Ceres orbit was confirmed, and astronomers celebrated the addition of a new planet. Located partway between the orbits of Mars and Jupiter, Ceres is in the location we now refer to as the Asteroid Belt,

so named because of its high concentration of solid bodies, both large and spherical, and small and irregular in shape. Just 15 months after the discovery of Ceres, Heinrich Olbers found Pallas, and by 1807, Vesta and Juno joined the planetary family. William Herschel, who discovered Uranus in 1781, suggested the term asteroid for these new worlds, meaning "Star Like." By 1868, over 100 asteroids had been discovered, and by 1921, primarily due to the introduction of astrophotography in 1891, the number of asteroids discovered tallied over 1000. The term asteroid stuck, and we now count around 1 million within our Solar System.

Ceres is not visible to the naked eye, but a good pair of binoculars or small telescope should allow you to find this dim world, which fluctuates in apparent magnitude from 6.7 to 9.3 throughout its orbit. At 2.97 AU and just 595 miles in diameter, it represents approximately 25% of the asteroid belt's total mass. Look for it this month as it approaches Denebola, the bright star marking the tail of Leo.



vPhoto: Ceres near Virgo, 04-10-2023 at 9PM MST, courtesy SkySafari.

Adam England is the owner of Manzanita Insurance and Accounting and moonlights as an amateur astronomer, writer, and interplanetary conquest consultant. Follow him @ Facebook.com/ BackyardAstronomerAZ and Instagram.com/TheBackyardAstronomerAZ.



Original Photo: Camille Cox

April 2023:

This calendar is put together from several sources & shows the objects & events visible during April 2023.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2 The Sombrero Galaxy is Well-Placed	3	4 Messier 94 is Well-Placed	5 The Jewel Box Cluster is Well-Placed Full Moon (Pink Moon)	6	7	8 Moon at Aphelion Mercury at Dichotomy
9 Lunar Occultation of Delta Scorpii	10	11 Mercury at Highest Altitude in Evening Sky Mercury at Greatest Elongation East Jupiter at Solar Conjunction	12	13 Last Quarter Moon Jupiter at Apogee Centaurus A is Well-Placed	14 Omega Centauri is Well-Placed The Whirlpool Galaxy is Well-Placed 136199 Eris at Solar Conjunction	15 Moon at Perigee Conjunction of Moon & Saturn Close Approach of Moon & Saturn
16 Messier 83 is Well-Placed	17 Venus at Perihelion Moon at Perihelion	18 Messier 3 is Well-Placed	19 New Moon Hybrid Solar Eclipse	20 136108 Haumea at Opposition	21 Conjunction of Moon & Mercury	22
23 Lyrid Meteor Shower 2023 Close Approach of Moon & Venus Conjunction of Moon & Venus Messier 101 is Well-Placed	24 Pi-Puppid Meteor Shower 2023	25 Conjunction of Moon & Mars Close Approach of Moon & Mars	26	27 First Quarter Moon Moon at Apogee	28	29
30 Asteroid 7 Iris at Opposition						



Exploring the Web

Original Photo: Unknown

Our club webmaster, E. J. Van Horne, shares tips on how to get the most out of our website.

I am excited about a YouTube channel I recently discovered about how citizen scientists can contribute to the search for exoplanets. The Planet Hunters group has been looking at light curves for some time just using their eyeballs and the human being's innate ability to find patterns. Frankly, this approach does not work for me, but this new channel, hosted by two women, one astronomer and the other a non-specialist describes how to help find planets in the data from TESS using Python programming and publicly available data.

Ok, there's a lot to unpack here. First, light curves are used in transit method of exoplanet detection, which has discovered thousands of exoplanets over the last decade. When the plane of a star system is edge on to us, the brightness of the light from the star dips whenever one of its planets passes between us and the star. Most system aren't lined up this way, of course, but TESS (the Transiting Exoplanet Survey Satellite) and its famous predecessor, Kepler, can watch so many stars at the same time that many planets have been found. Second, Planet Hunters is an online collaboration between citizens and scientist that have made several major discoveries. There is much data from TESS (and Kepler) that scientists need help to go through it all. Finally, the YouTube channel, Planet Hunters Coffee Chat, is a charming and informative set of short videos where science communicator Kassie Perlongo and astronomer Nora Eisner tells us about how exoplanets are found, online resources, and how citizens can contribute.

I am just getting started with the channel and very much looking forward to what I will learn.

You can find a link to [Planet Hunter Coffee Chat](#) on our website at **Resources > Astronomy Websites**.

I hope this information helps increase your enjoyment of the club and our shared interest in astronomy.

E. J.



Call for Images & Ideas

Original Photo: Egil Sjøholt

We'd Love Your Photos & Ideas for the Newsletter!

I am requesting any & all photographer members of PAC to submit astronomical &/or sky photographs to share with all the members by their inclusion in Ephemeris. Images can be sent to Hilary Legacy at ed@prescottastronomyclub.org. Please include descriptions of equipment, cameras, image capture parameters & processing, as well as what's in the image & when & where you took it. Or, for anyone who likes to photo edit or make their own images, I'd love to hear from you too. Thanks!

I'm also asking for anyone with ideas of things we could put in our newsletter to contact me. If there's something you'd like to see here, then tell me about it. Email Hilary Legacy at ed@prescottastronomyclub.org.



Observing Lists

Original Photo: Joonas Kääriäinen

Observing lists are available in PDF format on the PAC website to provide guidance & goals for visual & astrophotography programs. These lists graciously provided by Past President David Viscio to assist in planning your observation activities. The lists are in PDF format and may be viewed, downloaded or printed with the permission of David Viscio.

Astroleague Lunar 100
Bright Nebulae Dunlop 100.
Globular Clusters
Messier
Planet Maps

Binocular Showpieces Caldwell
Face-On Spiral Galaxies
Herschel II
Herschel 400

Royal Astronomical Society of Canada Finest NGC Saguaro Astronomy Club Best NGC S&T

SCAVENGER HUNTS IN THE SKY Lists for Any Occasion

Need ideas for your visual or astrophotography program? We have you covered with observing lists for your personal exploration or use at a star party. Click on the links below to open an observation list in another window to view or print it.

[Astroleague Lunar 100](#)

[Astroleague Urban](#)

[Binocular Showpieces](#)

[Bright Nebulae](#)

[Caldwell Objects](#)

[Double Stars](#)

[Dunlop 100 \(Southern Hemisphere\)](#)

[Face-On Spiral Galaxies](#)

[Globular Clusters](#)

[Herschel 400](#)

[Herschel II](#)

[Hidden Treasures](#)

[Messier Objects](#)

[Open Clusters](#)

[Planet Maps](#)

[Planetary Nebulae](#)

[RAS of Canada Finest NGC](#)

[Saguaro Astronomy Club Best NGC](#)

[Secret Deep](#)

[Space & Telescope Lunar 100](#)

[Telescope Showpieces by Month](#)



Get to Know . . .

Original Photo: Rajesh S. Balouria

Astronomy Apps

By Hilary Legacy

I hope last month's review of the app **Night Sky**. There are many astronomy apps available on both the Apple & Android platforms, but not all are created equal. Each offers different functions & information, each with a different design & style. Some focus on constellations & stars, others on the moon, yet others on education. I'll begin with the ones I myself have, one per month, & then other apps will follow in the next issue.

Sky Guides

Sky Guides gives the usual constellations & stars. The button in the top left gives you the date & time, a button to set the date/time & playback buttons so you can see what the sky looked like before or will look like later. The top right button gives you a compass, with two other vertical buttons: the top gives the app access to your camera & the bottom takes photos. Then there are four buttons horizontally along the bottom (in

order from left to right): a Settings button, the specifics of which I'll relate shortly; then a Featured button which shows articles on different things that are going on or will; a Calendar to see what is visible on given dates; & a Search function that gives you many options on how to search objects & events. Under the settings button, you have the following options: the first section of buttons are all for settings, notifications & upgrading; the second section is all reference information you can access when looking at different objects; then comes the Interface section, which lets you change settings like Atmosphere & Ground, Night Vision, Music & Sounds the app makes & your Language preference; the fourth section is only available on the Pro version (which I don't have); & the rest are to rate the app, share it, a help button, their privacy policy, the terms of use & their listed acknowledgments. I haven't used this app as much as the ones listed previously, & most functions of it can be already found in the previously listed apps.

I hope these gives you a good look at some of the astronomical apps out there!



Original Photo: Samer Daboul

These are photographs from non-PAC members that you might enjoy.



Photo Credit: Greg Rakozy





Original Photo: Tobias Björkli

PAC Board of Directors:

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Vice-President: Brian Blau
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Membership: Roland Albers
METASIC: John Dwan
Newsletter: Hilary Legacy
Night Sky Network: Open
Outreach Coordinator: Brian Blau
Refreshments: Open
Speakers: Lisa Anderson
Starry Nights Coordinator: Brian Blau
Summer Picnic: Doug Tilley
Webmaster: EJ Van Horne

PAC Contact Information:

Website: <http://www.prescottastronomyclub.org>

Email: pacinfo@prescottastronomyclub.org

PAC Mentors:

If you need advice on the purchase of astronomy equipment, setting up equipment, astrophotography, etc., contact a PAC mentor.

Astrophotography: Brian Blau

General & Astrophotography: David Viscio

Visual Observation: Greg Lutes



Need to Know?

Original Photo: Jeremy Müller

Ask a Member!

A 15-minute segment is being added to the regular general meetings where members can have their burning questions answered by other knowledgeable members. If you have an astronomy-related question you would like answered, submit it to Art Arnold-Roksandich at p@prescottastronomyclub.org. You can also bring up the question at the meeting.