

March Special Events:

No March Meteor Showers, But it is Spring:

Unfortunately, there are no meteor showers this month. The Vernal Equinox, Spring, is on March 20.

Total Lunar Eclipse:

There will be a total lunar eclipse that will be visible from the entire United States and South America.

Unfortunately, it occurs late the night/early morning of March 13/14. I will give this for Eastern Daylight Saving Time, so adjust for that (minus three hours for the West Coast and Arizona, for example). The Moon enters the shadow of the Earth (the penumbra) at 11:56 p.m. (EDT, 8:56 Arizona and PDT). It will be a while before the darkening becomes noticeable. The Moon enters the main shadow of the Earth (the umbra) at 1:09 a.m. (the 14th). Totality begins at 2:25 a.m. and ends about 66 minutes later. The Moon leaves the umbra at 4:48 a.m. I will try to observe this but I do not expect a big crowd from my neighborhood (if they are up, they do not need me or my telescope to see it). This is for Tucson, just change your location.

<https://www.timeanddate.com/eclipse/in/usa/tucson?iso=20250314>

Some Pictures

We have had many cloudy days and, thankfully, finally, some rain (not enough). This has been the driest six months on record, with less than an inch of rain since August. Even the cacti are unhappy!

I was finally able to get some images of the Moon and Venus. I was using a higher power eyepiece for Venus and the image of Venus is also cropped. I estimate that the image of Venus is “blown up” about 3.7 times that of the image of the Moon. The Moon was near apogee (closest), so, the Moon was about 33 arcminutes in diameter, about 2,000 arcseconds in diameter, while Venus was a little less than 50 arcseconds in diameter, 1/40 the apparent diameter of the Moon. I broke down and purchased a “Moon filter” to cut down on the surface brightness of Venus. All of my previous images were overexposed.





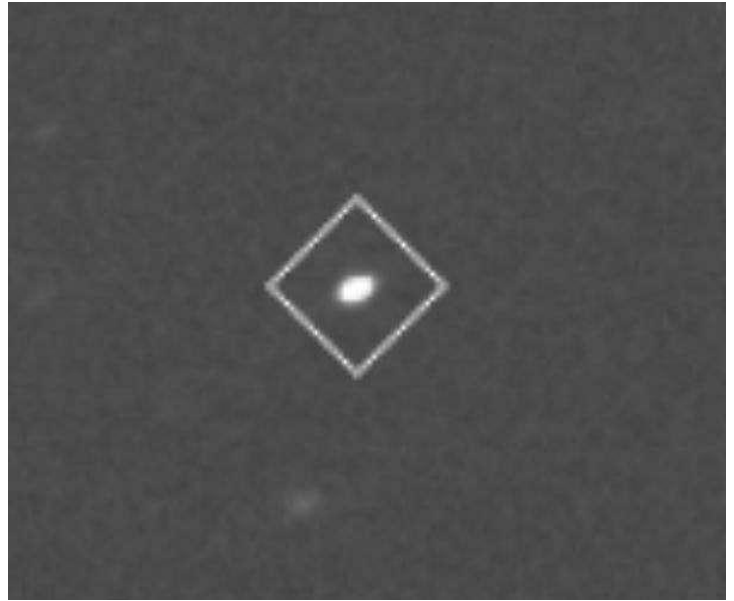
I have been very busy with school visits and preparing for the Tucson Festival of Books and a teacher workshop, which is, in part, why this Newsletter is so late, sorry. Here are four of my most recent events. The most recent event was in conjunction with the SARSEF Regional Fair Awards (we gave out six awards). Here is Rob Lorenz from the Vatican Observatory, upper left. A few days earlier, we participated in a STEM family night, upper right. The school across from the Planetary Science Institute had a middle school STEM event a few weeks ago. I did five separate classes. The students worked in pairs and twice a student was paired with a teacher, lower left. In early March, I was at the Tucson Children's Museum. At one point, at a lull in visitors, I went to a nearby table and the person I was with went a few tables away with her daughter. A group came up to the table and I started back to the table. Unfortunately, one of the exhibits decided it did not want me to leave, and wrapped itself around my leg, I think an albino Burmese Python (not sure), lower right.

Astronomy in the News

NASA, ESA, and Other Missions:

Lucy Update:

On its way to study Jupiter's Trojan asteroids, asteroids that co-orbit with Jupiter, the Lucy spacecraft will fly by the main belt asteroid 52246 Donaldjohanson. On April 20, Lucy will fly by at a distance of about 960 kilometers (600 miles). The asteroid is about 3.9 kilometers (2.4 miles) in diameter. Its reflectance is about 10% and is thought to be a C-type asteroid (carbonaceous). It is a slow rotator, rotating once in 250 hours. The image on the right is the first image of the asteroid. It is still just a point of light, so the shape you see is due to the mutual motions of the spacecraft and the asteroid as the picture was taken. It has a fairly large lightcurve and so is thought to be either very elongated or a contact binary.



https://www.spacedaily.com/reports/NASAs_Lucy_Spacecraft_Takes_Its_1st_Images_of_Asteroid_Donaldjohanson_99.html

March Night Sky

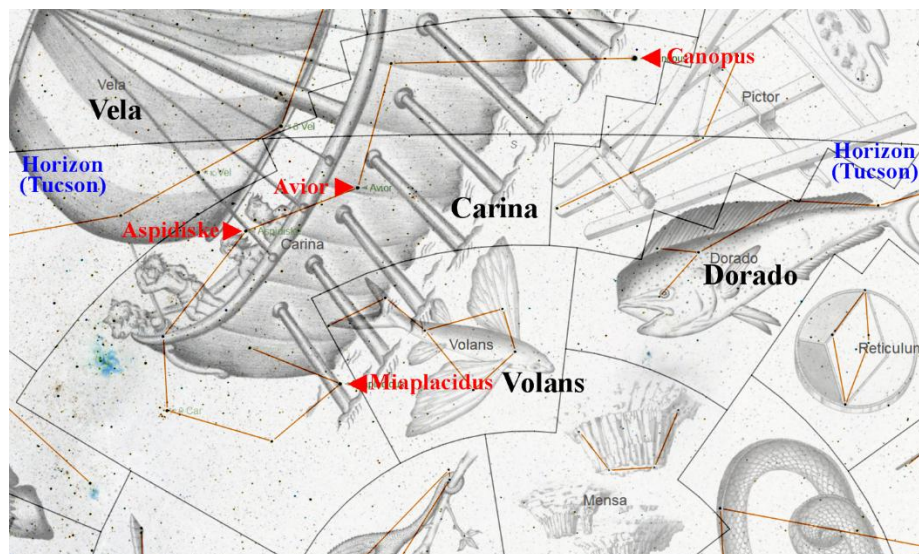
Sky Stories:

I am taking this from Wikipedia. The ancient Greeks, 3,000 years ago, first recognized the constellation Argo Navis, the great ship of the mythical Jason and the Argonauts (they probably got this constellation from the Egyptians). It can be seen skimming across the “river of the Milky Way.” It was a huge constellation with about 160 visible stars. In his 1755 catalogue, Nicolas Louis de Lacaille divided Argo Navis into the three modern-day constellations of Carina (the Keel), Puppis (the poop deck, the stern), and Vela (the Sails). Several months ago, I discussed the precession of the poles. 5,000 years ago, Thuban in Draco, the Dragon was our Pole Star, and about 3,000 years ago, when Argo Navis was first mentioned by the Greeks, the Pole Star was Kochab, Beta Ursae Minoris. While much of Argo Navis is now below our horizon in the United States, it was well above the horizon for the Greeks (and us) 3,000 years ago.

Featured Constellation: Carina

Our featured constellation this month is Carina, the Keel. The Starry Night image on the right shows the usual stick figure. I have included an illustration of the Carina. You will notice in the image that I have removed the horizon so that you can see the entire constellation which is now below my horizon (and anyone farther north).

Carina has one star brighter than magnitude 0.0, no stars between magnitude 0.0 and 0.99, two stars between magnitudes 1.0 and 1.99, three stars between magnitudes 2.0 and 2.99, 12 stars between magnitudes 3.0 and 3.99, and an additional 28 stars between magnitudes 4.0 and 4.99.



Looking South at about 9:00 p.m. on March 15

Carina has 27 known (both confirmed and candidate) exoplanets orbiting 25 stars. One of the stars, HD 65216, is a three-star system with a pair of low-mass stars orbiting at a distance of about 250 AU. This solar-mass star is orbited by two Jupiter-mass exoplanets at distances of 1.3 and 5.8 AU from the central star.

The brightest stars in Carina are Canopus (Alpha Carinae) at magnitude -0.74 (the second brightest star in the sky) and Miaplacidus (Beta Carinae) at magnitude 1.69.

Canopus (“Pilot”) is an A9 II (white) bright giant star that has evolved off the Main Sequence. Canopus has a surface temperature (visible surface) of 7,400 K. It is about 17,000 times as luminous as the Sun with a mass that is about 10 times that of the Sun and a diameter that is about 70 times that of the Sun. Canopus is about 310 light-years from us. It is estimated to be 33 million years old. Miaplacidus (Arabic “waters” and Latin “Placid”) is an A1 III (white) giant star that has evolved off the Main Sequence. It is about 220 times as luminous as the Sun with a mass that is about 4 times that of the Sun and a diameter that is about 6 times that of the Sun. Miaplacidus is about 113 light-years from us. It is estimated to be about 260 million years old.

Telescope, Binocular, and Camera Targets:

Saturn is no longer visible in the evening sky, but you can still see Venus, Jupiter, and Mars. The Pleiades and the Orion Nebula are nice evening objects. If you are willing to stay up late, there will be the eclipse of the Moon on the evening of March 13 and on into the morning of March 14.

Moon and Planets:

New Moon was on March 29. First Quarter Moon was on March 6. March’s Full Moon, the Worm Moon, is on March 13 (on the West Coast, March 14 on the East Coast). Last Quarter Moon is on March 22. There is another New Moon on March 29.

From Timeanddate.com:

“The Worm Moon gets its name from the **earthworms that come out when the soil warms up**. The worms provide food for birds and other animals.

“It happens around the changing of the seasons, from astronomical winter to spring in the Northern Hemisphere.

“The Anglo Saxons called the March Full Moon the Lenten Moon. Lenten is derived from Germanic languages and means spring. The Lenten Moon has also given its name to the Christian Lent period before Easter.

“The March equinox has had great cultural significance through the times, and many cultures still celebrate new beginnings, rebirth, purity, cleaning, and chaste or lean living around this time.”

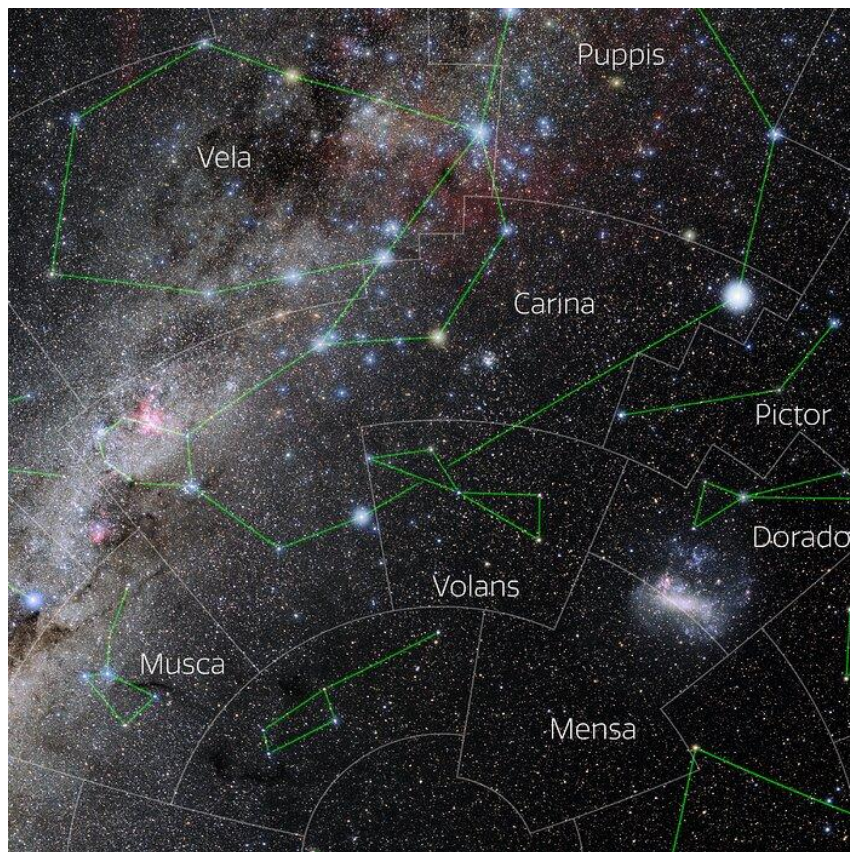


Photo of the constellation Carina with annotations from IAU and Sky & Telescope. **Credit:** E. Slawik/NOIRLab/NSF/AURA/M. Zamani

From Space.com:

“In this month the ground softens, and the earthworm casts reappear, inviting the return of the robins. The more northern tribes knew this as the Full Crow Moon, when the cawing of crows signals the end of winter, or the Full Crust Moon because the snow cover becomes crusted from thawing by day and freezing at night. The Full Sap Moon, marking the time of tapping maple trees, is another variation.”

The Moon was at perigee (361,964 km [224,914 miles] from Earth) on March 1. The Moon is at apogee (405,754 km [252,124 miles] from the Earth) on March 17. The Moon is at perigee again (338,128 km [222,530 miles] on March 29/30

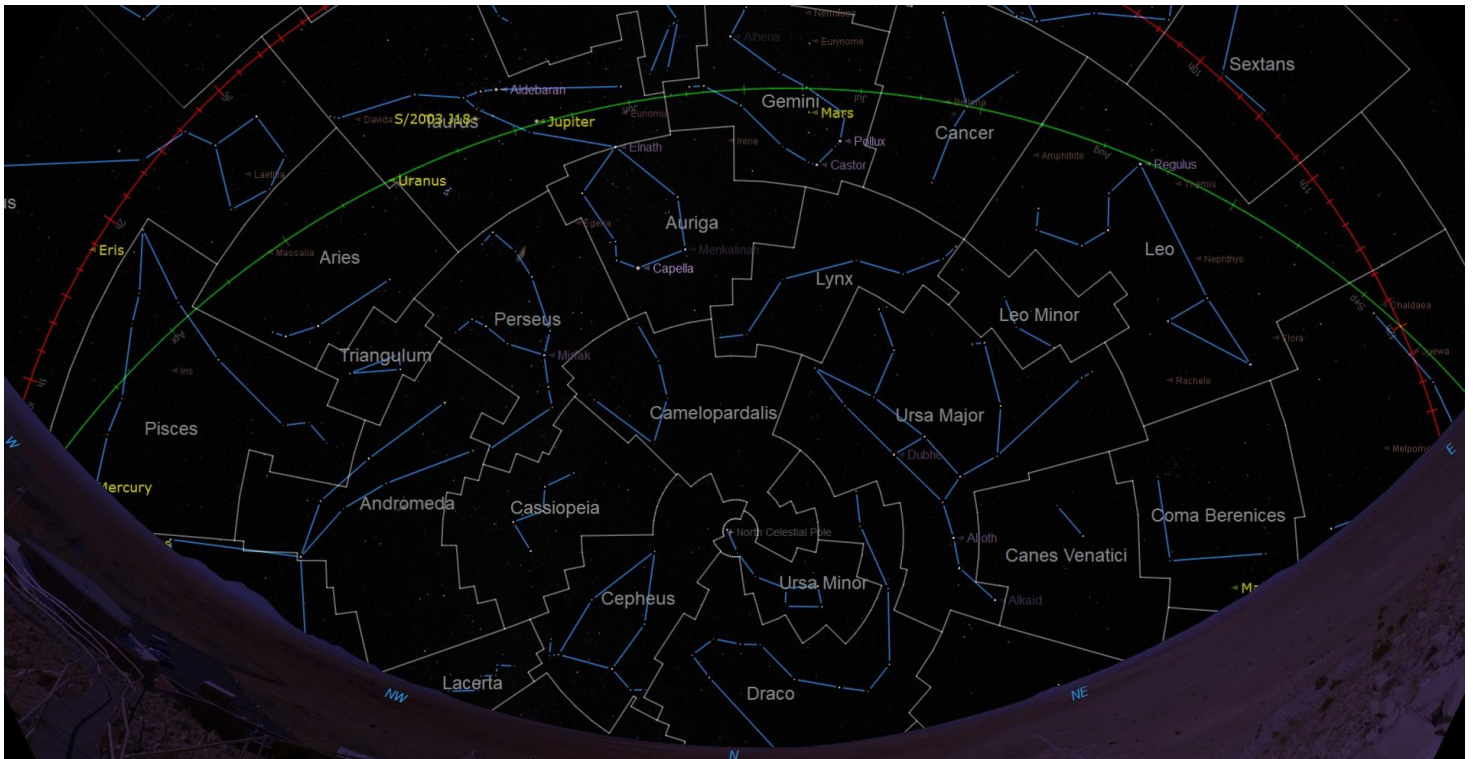
On March 1, the waxing crescent Moon passed 1.6 degrees north of Neptune at 4:00 a.m. (EST). On March 1, the Moon passed 6 degrees south of Venus at 10:00 a.m. (EST). On March 4, the waxing crescent Moon passed 5 degrees north of Uranus at 11:00 p.m. On March 6, the waxing crescent Moon passed 6 degrees north of Jupiter at 7:00 a.m. (4 hours before First Quarter Moon). On March 8, the waxing gibbous Moon passes 1.7 degrees north of Mars at 7:00 p.m. On March 28, the waning crescent Moon passes 9 degrees south of Venus at 10:00 a.m. (two days before New Moon). I hope that you noticed that the Moon passes by Venus twice this month, first in the evening and then in the morning. Venus transitions from an evening object to a morning object!

Early Evening Sky Viewing:

This was taken on Monday evening (February 10) and I did not want to have to reformat everything. This image is a 4x, 2 second exposure, of Venus (right) and Mercury, much fainter (left). It is also cropped by a factor of two. They are about 6 degrees apart.

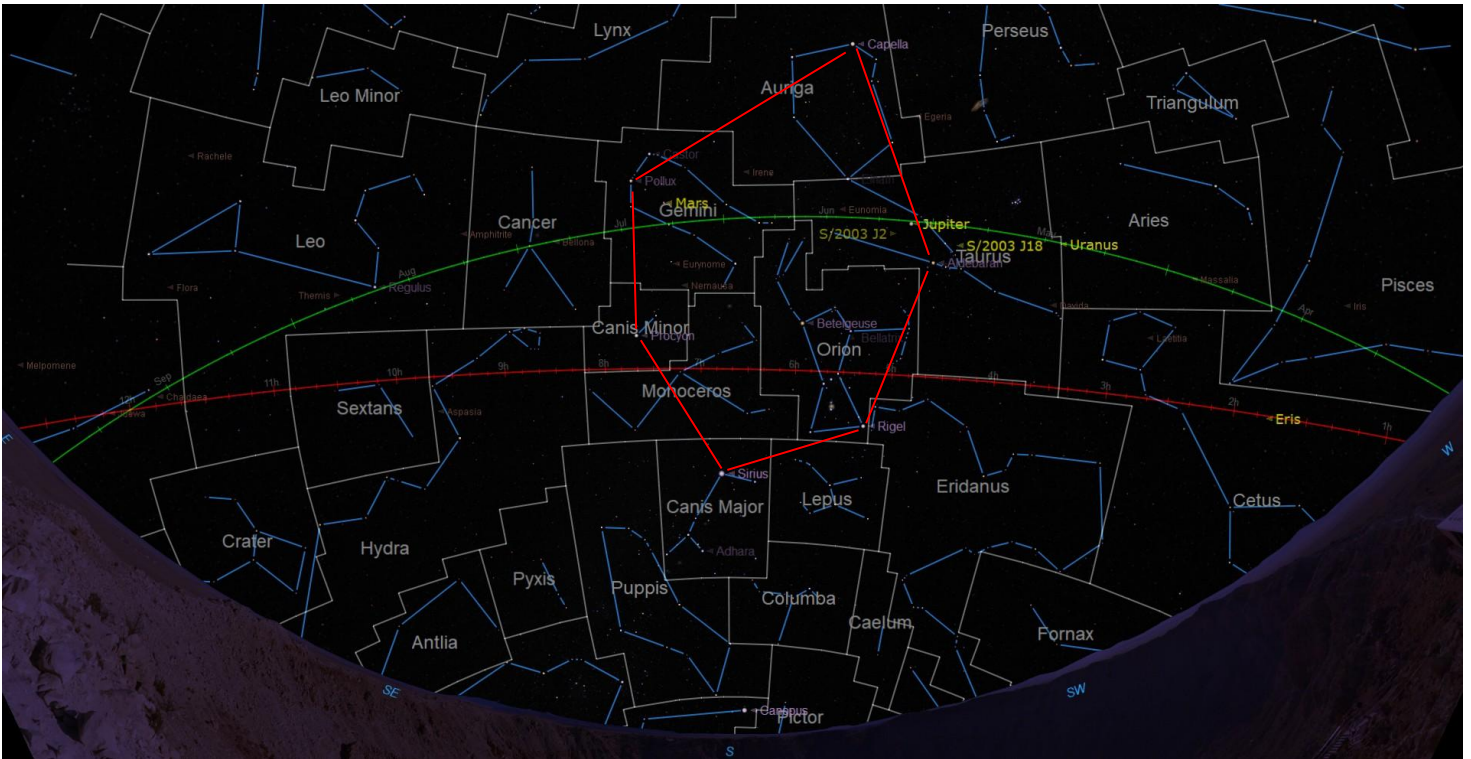


All times in this paragraph are for Tucson (Standard Time), so, since the rest of the country is now on Daylight Saving Time, we are now in the same zone as California. Any other differences will be related only to your latitude and location in your time zone. In Tucson, on the evening of March 15, 2025, sunset is at 6:31 p.m. (21 minutes later than on February 15), Civil Twilight is at 6:56 p.m. (21 minutes later), Nautical Twilight is at 7:24 p.m. (21 minutes later), and Astronomical Twilight is at 7:53 p.m. (21 minutes later). You may see a few of the brightest stars and planets after Civil Twilight. You start seeing fainter stars and planets by around Nautical Twilight and the sky is darkest by Astronomical Twilight. The length of the day in Tucson is 11 hours and 59 minutes on March 15 (55 minutes longer than on February 15). Times will also vary depending on where you are in your time zone and your latitude. In New York, sunset is at 7:03 p.m. on March 15 (92 minutes earlier than on February 15). The length of the day in New York is 11 hours 56 minutes on March 15 (85 minutes longer than on February 15). The differences reflect the change from Standard to Daylight Saving Time.



March 15, 2025, looking North at 8:30 p.m. (DST, 7:30 MST and HST). The + marks the Zenith (overhead). This is close to Nautical Twilight, so the sky is still a little light. The red line is the celestial equator, the projection of Earth's equator onto the sky and the green line is the ecliptic, the path of the Sun through the sky.

Looking North at about 8:30 p.m. (DST, 7:30 p.m. in Arizona and Hawaii) in mid-March, many of the constellations that were low in the West last month have set or are setting as the constellations and their stars rise earlier/set earlier. The Sun is setting later (and rising earlier), so the nights are getting shorter. Setting in the west are Lacerta (the Lizard), Pegasus (the Flying Horse), Pisces (the Fishes), and Cetus (the Whale). A little higher in the west are Cepheus (the King), Cassiopeia (the Queen), Andromeda (the daughter of Cassiopeia), Triangulum (the Triangle), and Aries (the Ram). Perseus (the Hero), and Camelopardalis (the Giraffe) are above and just to the west of north. Due north, above Polaris and above and to the right of Perseus and Camelopardalis are Auriga (the Charioteer) and Taurus (the Bull), along with Jupiter and Uranus. Below Polaris are Ursa Minor (the Little Bear) and Draco (the Dragon). Just east of north are Gemini (the Twins), along with Mars, Lynx (the Lynx), and Ursa Major (the Great Bear), on his tail. To the right of these are, high in east, Cancer (the Crab), and lower in the east, Leo Minor (the Lessor Lion) and Leo (the Lion), along with Canis Venatici (the Hunting Dogs), which is just rising in the northeast. Above Leo, just rising, are Sextans (the Sextant), and part of Hydra (the Sea Serpent).

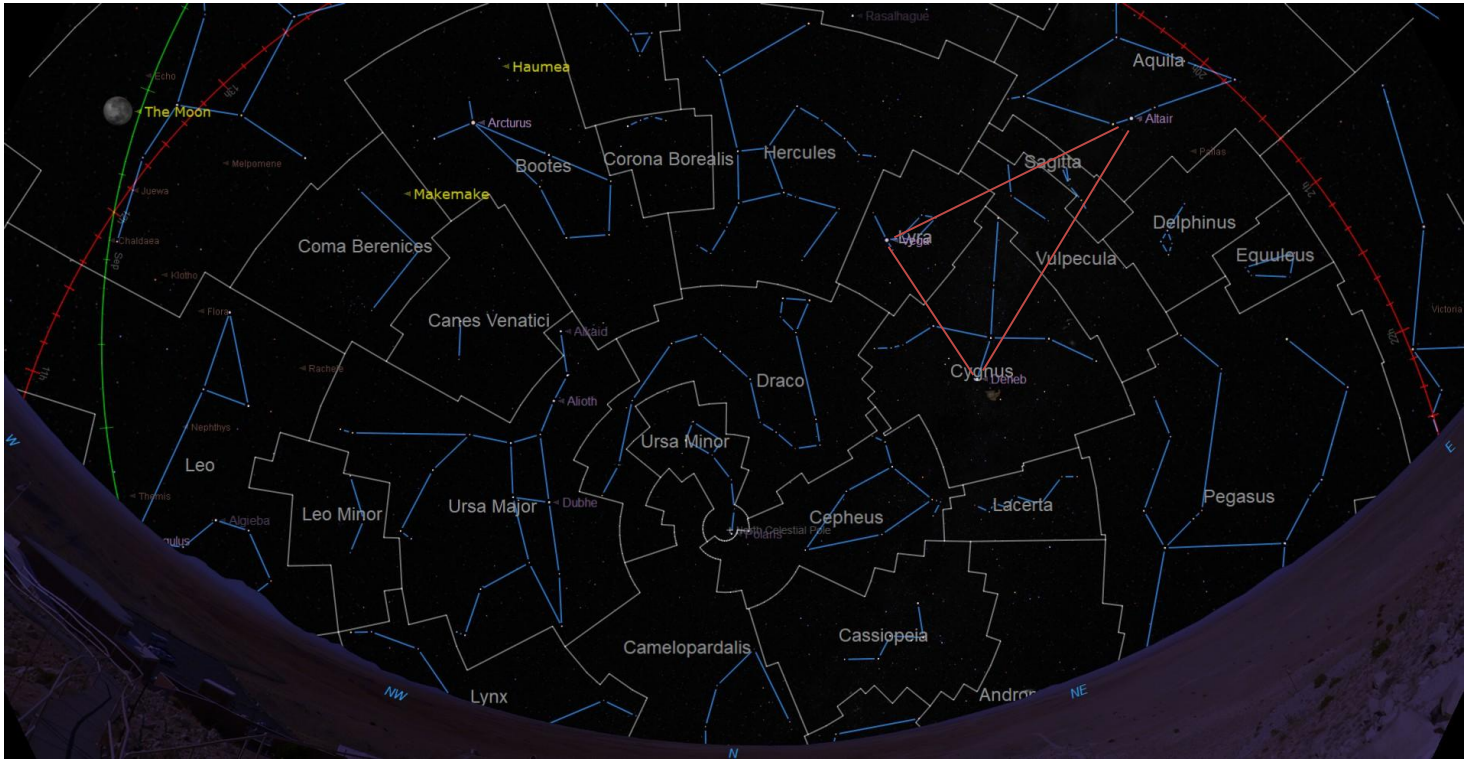


March 15, 2025, looking South at 8:30 p.m. (DST). The + marks the Zenith (overhead).

Describing constellations not discussed above, looking South, at 8:30 p.m., by mid-March, we can see, setting in the west, the rest of Cetus and Pisces, along with Neptune, Mercury, and Venus. Low in the southwest is Fornax (the Furnace). Above Fornax is Eridanus (the River). To the left (east) of Eridanus are Caelum (the Chisel), Lepus (the Hare), and Orion (the Hunter). Below Lepus are Columba (the Dove) and Puppis (the Poop Deck). Barely above the southern horizon are Pictor (the Painter’s Easel) and the tip of Carina (the Keel, our Featured Constellation). Above Puppis and just east of south are Canis Major (the Greater Dog), Monoceros (the Unicorn), and Canis Minor (the Lesser Dog). Low in the southeast, just rising is Pyxis (the Compass). I have included the stars that make up the asterism, the Winter Hexagon: Rigel (Orion), Aldebaran (Taurus), Capella (Auriga), Pollux (Gemini), Procyon (Canis Minor), and Sirius (Canis Major).

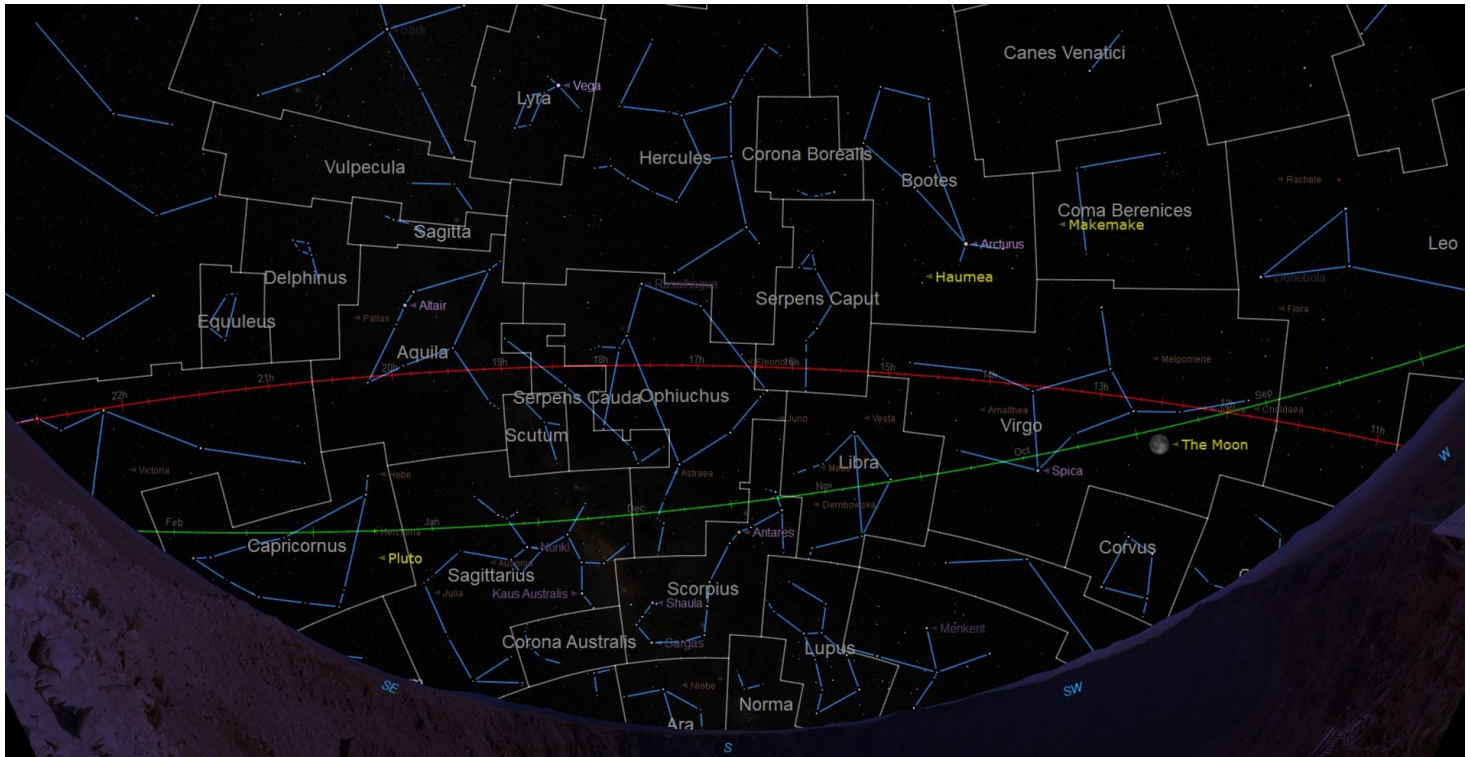
Early Morning Sky Viewing:

All times in this paragraph are for Tucson (Standard Time), so, since the rest of the country is now on Daylight Saving Time, we are now in the same zone as California. Any other differences will be related only to your latitude and location in your time zone. In Tucson, on March 15, in the morning, Astronomical Twilight is at 5:11 a.m. (32 minutes earlier than on February 15), Nautical Twilight is at 5:40 a.m. (29 minutes earlier), Civil Twilight is at 6:08 a.m. (32 minutes earlier), and sunrise is at 6:33 a.m. (32 minutes earlier). You start losing your fainter stars by around Nautical Twilight and lose all but the very brightest stars and planets before Civil Twilight. Times will also vary depending on where you are in your time zone and your latitude. Times will also vary depending on where you are in your time zone and your latitude. **Times will also vary depending on where you are in your time zone and your latitude. In New York, sunrise is at 7:07 a.m. on March 15 (18 minutes later than on February 15). The differences reflect the change from Standard to Daylight Saving Time.**



March 15, 2025, looking North at 6:30 a.m. (DST). The + marks the Zenith (overhead). This is close to Nautical, so the sky is still fairly dark.

Looking North at 6:30 a.m. (DST, 5:30 a.m. in Arizona and Hawaii) in mid-March, the constellations that are just rising in the evening are the ones that are setting in the west and northwest before dawn. The constellations that are in the east before dawn were evening constellations one or two months ago (if they are not circumpolar). Lynx (the Lynx), Leo Minor (the Little Lion), and Leo (the Lion) are setting in the west (and are also evening objects). Camelopardalis (the Giraffe) is low in the north. It is a circumpolar constellation, so the farther north you are, the more of it that you can see in the morning. Higher in northwest/west are Ursa Major (the Great Bear, on his head, west of Polaris), Canes Venatici (the Hunting Dogs), and Coma Berenices (the Hair of Berenice). East of these and just west of north are Boötes (the Herdsman) and Corona Borealis (the Northern Crown). Due north are Ursa Minor (the Little Bear) and Draco (the Dragon). Just east of Corona Borealis is Hercules (the Hero). High in the northeast are Lyra (the Lyre), Aquila (the Eagle), and Cygnus (the Swan)—the Summer Triangle. Sagitta (the Arrow) and Vulpecula (the Little Fox) share the sky with the constellations of the Summer Triangle. Below Cygnus are Cepheus (the King), Cassiopeia (the Queen), and Lacerta (the Lizard). Lower in the east are Delphinus (the Dolphin) and Equuleus (the Little Horse). Pegasus (the Flying Horse) and Andromeda (the daughter of Cassiopeia) are just rising in the east/northeast.



March 15, 2025 looking South at 6:30 a.m. (DST). The + marks the Zenith (overhead).

Looking South in mid-March at 6:30 a.m., for the constellations that are not mentioned looking North. In the south, low on the horizon, are Centaurus (the Centaur), Lupus (the Wolf), Norma (the Carpenter's Square), and Ara (the Alter). Corvus (the Crow) is setting in the west. Above these, from west to east are Virgo (the Maiden), Libra (the Scales), Scorpius (the Scorpion), Sagittarius (the Archer), and Capricornus (the Horned Goat), rising in the east. Ophiuchus (the Serpent-Bearer) is just east of south. On either side of him are Serpens Caput (the Head of the Serpent) and Serpens Cauda (the Tail of the Serpent). Below Serpens Cauda is Scutum (the Shield). Only partially above the horizon in the east and above Capricornus is Aquarius (the water bearer).

Where are the Planets?

Mercury is an evening object in early March. Mercury was at greatest eastern elongation on March 8, at magnitude -0.15 , and is now moving between us and the Sun. Mercury is near Venus in the sky the second week of March but fades to about magnitude 1.4 by mid-March when it is closest to Venus, 5 degrees or so. Even though Mercury is moving closer to us in its orbit (and so appears larger), we are seeing less and less of its illuminated disk. Mercury passes between us and the Sun on March 24.

Venus is visible after sunset, but is getting lower and lower in the sky. Venus was at greatest eastern elongation on January 9 and will be at inferior conjunction (between us and the Sun) on March 22. Venus started the month at magnitude -4.6 and fades to magnitude -4.0 by the third week of March. Thanks to the tilt of the orbit of Venus relative to the Earth's orbit around the Sun, Venus is over 8 degrees north of the Sun when it is at inferior conjunction. So, it rises before the Sun and sets after the Sun on March 22. There is a short period of time when Venus is both an evening and a morning planet (though a challenge observe either).

Mars is in our evening/night sky all month, still setting well after midnight by the end of the month. Mars is in Gemini all month. Mars starts out the month at magnitude -0.25 and fades to magnitude 0.45 by the end of the month.

Jupiter is in Taurus all month. It is in our sky most of the night all month, setting after midnight at the end of the month. Jupiter starts March at magnitude of -2.3 and fades to magnitude -2.1 by the end of the month.

Saturn reaches superior conjunction with the Sun (on the far side) on March 12, and so it will become a morning object, rising about 30 minutes before the Sun by the end of March. It remains in Aquarius all month.

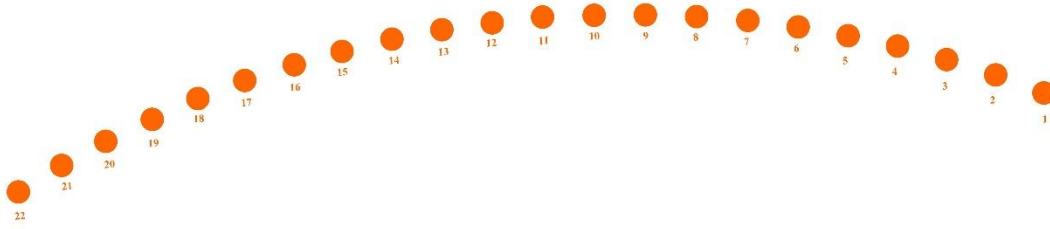
Uranus starts out March in Aries at a magnitude of 5.8. It moves into Taurus around March 3 and is there for the rest of the month. Uranus is a magnitude 5.8 all month. Uranus sets at about midnight (standard time) at the beginning of March and sets about 11:00 DST at the end of the month. You will need binoculars or a small telescope to see Uranus.

Neptune is in Pisces all month. Neptune is at magnitude 7.9 all month. At the beginning of March, Neptune is setting about 80 minutes after sunset and is lost in the glow of the Sun less than two weeks later. It is at superior conjunction on March 19. You will need binoculars or a small telescope to see Neptune.

Connecting with the Human Orrery

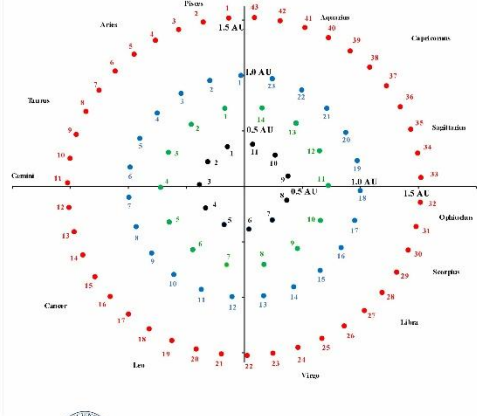
Using the Orrery, it is easy to model the positions of the planets relative to each other and to the Sun. Because the stars in the constellations are not at their true relative distances (many kilometers away in this model), the positions of the planets relative to the constellations may be “off” by more than a constellation. The first Orrery image below shows the planets out to Saturn. Jupiter and Saturn are at their correct relative distances. When printed out on 8.5 inch by 11 inch paper (standard paper), the scale is about 1.5 cm = 1 AU, the Sun-Earth distance. The second Orrery has circles relevant for March only. I have given the relative positions for March 14, 2025. Printed out on standard paper gives a scale of 5 cm = 1 AU. On the page-sized scale, Jupiter is 26 cm from the Sun’s position and Saturn is 48 cm from the Sun’s position. Because Jupiter and Saturn are “off the page,” the lines from the Earth to Jupiter and Saturn go off the page toward their true relative positions. I should note that the Orrery is not perfect. It uses circular rather than elliptical orbits. For this reason, the relative positions of the planets may be off by a few days. For March, for example, Saturn, on March 14, should be almost directly behind the Sun and not a little to the left (still in the evening sky).

Using the Orrery, if you are on the Earth, as the Earth rotates in a counterclockwise direction, after the Sun sets, on March 14, **Saturn** is too close to the Sun to be seen and will soon become a morning planet. Just after sunset, you first see **Venus** and **Mercury**, very close to each other in the sky, low in the west. As you continue to rotate counterclockwise toward the east, before Venus and Mercury have set in the west, **Jupiter** is visible high in the southwest. As you rotate a little more, you will see Mars high in the southeast. So, in the early evening, you can see four planets. This model does not include Uranus and Neptune (or Pluto), but with binoculars, two more planets are visible at this time.



- 1 7/15/23
- 2 10/3/23
- 3 12/22/23
- 4 3/11/24
- 5 5/30/24
- 6 8/18/24
- 7 11/6/24
- 8 1/25/25
- 9 4/15/25
- 10 7/4/25
- 11 9/22/25
- 12 12/11/25
- 13 3/1/26
- 14 5/20/26
- 15 8/8/26
- 16 10/27/26
- 17 1/15/27
- 18 4/5/27
- 19 6/24/27
- 20 9/12/27
- 21 12/1/27
- 22 2/19/28

Tabletop Orrery: Inner Solar System



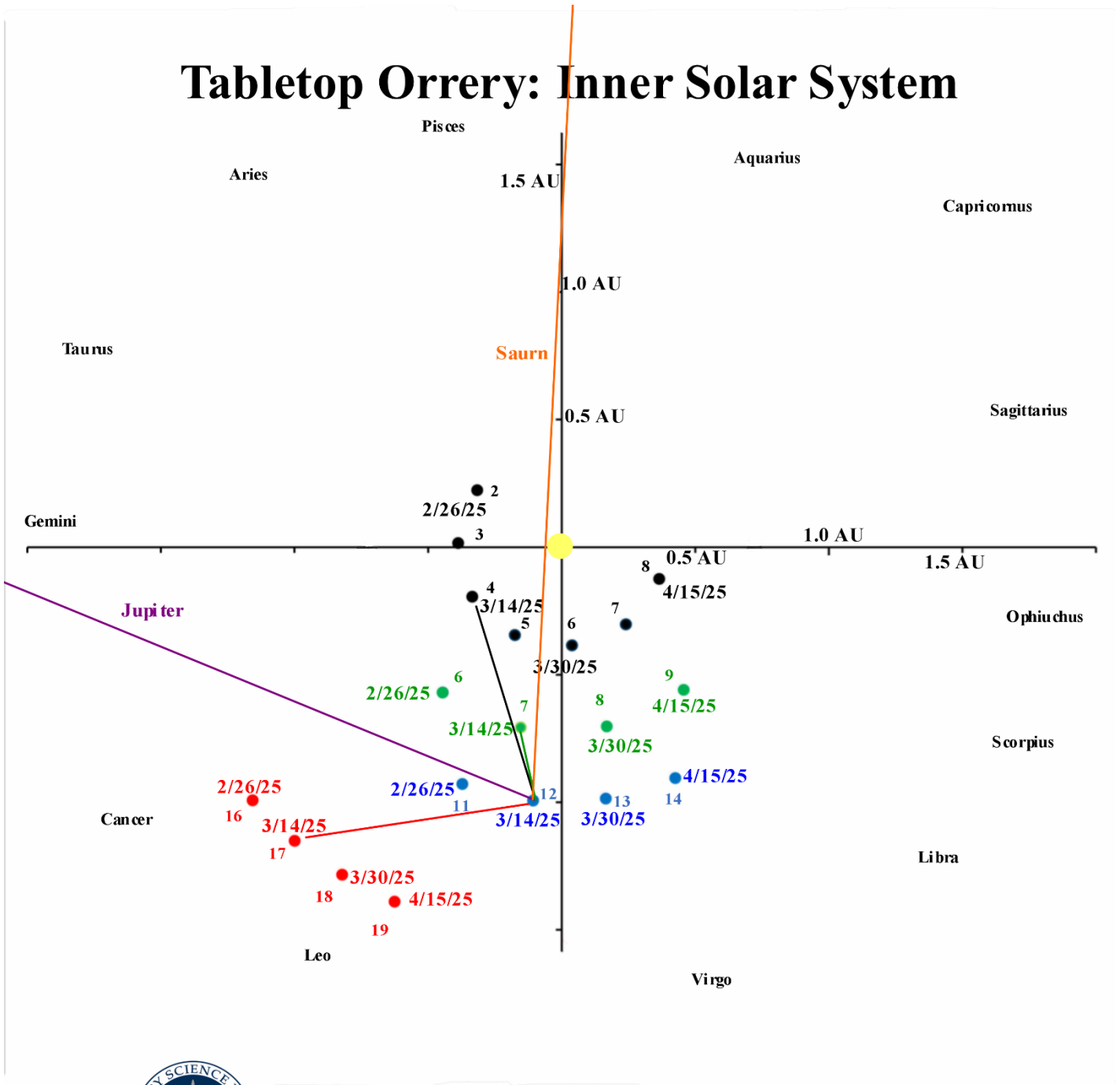
THE UNIVERSITY OF ARIZONA

girl scouts
science, technology
engineering, math

5 centimeters = 1 AU (Earth-Sun distance)
Step size: Mercury = 8 days
Venus, Earth, and Mars = 16 days
Jupiter and Saturn = 80 days

Mercury: 0.39 AU, orbital period = 88.0 days, 47.4 km/s
Venus: 0.72 AU, orbital period = 224.7 days, 35.0 km/s
Earth: 1.00 AU, orbital period = 365.25 days, 29.8 km/s
Mars: 1.52 AU, orbital period = 687.0 days, 24.1 km/s
Jupiter: 5.2 AU, orbital period = 11.86 years, 13.1 km/s
Saturn: 9.6 AU, orbital period = 29.46 years, 9.7 km/s

Tabletop Orrery: Inner Solar System



5 centimeters = 1 AU (Earth-Sun distance)

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