Skywatchers

Newsletter of the China Lake Astronomical Society

JANUARY 08, 2024 CLAS MEETING 7:30

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January Meeting & Program

- Refreshments: 7:00 PM
- Announcements 7:30 PM
- Program 7:45: Annual Members Photo Show

Location: Maturango Museum

Meetings and programs are open to the public, and are held at Maturango Museum on the first Monday of every month (or the following Monday for holidays).

10 Interesting Astronomy facts to start off 2024

1 Dust in the Wind

Every day, several tons of material falls to Earth from space. Some of it is witnessed on arrival, as a bright meteor may result in a meteorite – a fragment of rock and metal crashing into the ground.

But a great deal of this cosmic material doesn't make such a spectacular entrance to our planet. Rather, it falls gently through the atmosphere in the form of space dust that is all but invisible to our eyes.
A surprisingly large quantity of space dust lands on our planet: about 5,200 tonnes per year, 100 tonnes per week, or 14 tonnes per day. This dust is made up of tiny particles of rock and metal that have been chipped off asteroids and comets, either in large collisions or by micrometeoroids. About 80 per cent of all this dust originates from Jupiter-family comets, which have orbital periods of less than 20 years.
The particles are so small – at most a few tenths of a millimetre across – that they are not generally visible to the naked eye and can only be detected using specialised instruments. Every time you're outside, you stand a chance of catching some of this space dust in your hair. It's very likely you've already caught some and later washed it out without knowing it.

2 How About A Spot of Tea.

In understanding the Sun is a star , we've come to think of all stars as blazing hot, fiery balls of plasma that could melt any material or alloy we could create. But this isn't true of all stars, and, in fact, there is a category of fascinating, supercool stars lurking within the Galaxy.

Brown dwarfs are colder than any known star and are classified as sub-stellar objects. They are often referred to as 'failed stars' because they are too small to sustain nuclear fusion in their cores, which is the process that powers the Sun. As a result, brown dwarfs emit very little light and heat, making them quite challenging to detect.
The surface temperatures of brown dwarfs vary, but one particular subclass – Y-type stars – are the coldest of all. Their surface temperatures are typically only a few hundred degrees Celsius above absolute zero. That corresponds to a temperature of some tens of degrees Celsius. Your skin has a temperature of around 35 °C and a warm mug of tea is just a bit hotter. Were it possible to touch the surfaces of these Y-type stars, you would be able to feel the warmth without even scalding your hand! -stellar objects. They are often referred to as 'failed stars' because they are too small to sustain nuclear fusion in their cores, which is the process that powers the Sun. As a result, brown dwarfs emit very little light and heat, making them quite challenging to detect.
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3 Billions & Billions

In 2019, astronomers combined data from the Kepler Space Telescope with new results from the European Space Agency's Gaia mission, concluding that, on average, as many as one in six stars hosts an Earth-sized planet in its habitable zone. Potentially tens of billions of such worlds are strewn across the Milky Way.
While the search for Earth-like planets continues, the range of environments that can be considered habitable is widening. An exact Earth analogue may not be necessary for complex life and the num-

4 Skinny Rings

Saturn, the sixth planet from the Sun, is known for its spectacular rings that encircle the gas giant. While they appear to be solid and continuous from afar, the reality is that they are made up of trillions of individual pieces of ice and small amounts of rock, ranging in size from tiny dust-like particles to giant boulders.

One of the most remarkable things about Saturn's rings is their incredible thinness. Despite stretching out to a distance of nearly 140,000 km from Saturn's equator, the rings are only a few hundred metres thick at most. Put another way, the rings are hundreds of thousands of times wider than they are tall.
For comparison, a Blu-ray disc is 120 mm wide and 1.2 mm thick. To match the scale of Saturn's rings at this thickness, the Blu-ray disc would need to be about 1 km wide!

5 Where Dead Stars Collide Gold & Silver May Abide.

The remnants of exploding stars – neutron stars – will sometimes collide, producing and releasing vast quantities of precious metals among many other elements. The energy involved in these collisions is far greater than that released by a supernova. As a result, the heaviest naturally occurring elements, including uranium, are produced almost exclusively by these extreme events.
Both supernovae and neutron star collisions fuse heavy elements through 'r-process' nucleosynthesis. They create sufficient temperatures and pressures for atomic nuclei to undergo a rapid neutron capture. These nuclei are forced to absorb neutrons, bulking up their atomic numbers. Merging neutron stars can reach numbers like 47 (silver), 78 (platinum), 79 (gold) and 92 (palladium), making them forges for precious metals. If you invest in these metals, think about where they came from. Perhaps they'll seem more valu-

6 You can see what a supernova looks like nearly one thousand years later

In1054 CE, Chinese astronomers recorded a 'guest star' in the sky that was visible for several weeks. Nearly a thousand years later, in the same spot, we find the Crab Nebula. This is a supernova remnant, blasted out into space by the cataclysmic death of a massive star.
As one of the most spectacular supernova remnants in the Galaxy, it's a fascinating snapshot of an explosion – as chaotic and complex as the event that created it.

7 More Stars than Humans

Ask an astronomer how many stars there are in the Milky Way and the answer will range from 'hundreds of billions' to an approximate value: 'about 100 billion'; '300 billion'; '500 billion'. There must be a correct answer, so why does the value vary so much?
Unfortunately, figuring out the number of stars in our Galaxy isn't just a matter of counting. Most of the Milky Way is obscured from view and the regions we do see are so vast and distant that individual stars aren't readily identified, even with powerful telescopes. Determining the population of the Galaxy relies upon observations, assumptions and informed estimates.
Curiously, anthropologists are more confident about the total number of human beings that have ever lived – about 110 billion. So, we can say that there are probably more stars in the Galaxy than every human that has ever been born!

8 Asteroids can have Rings & Moons

Chariklo is a small celestial body that orbits the Sun between Saturn and Uranus. Chariklo is now known to be a Centaur asteroid – a class of asteroids that are characterised by their unstable orbits, which cross the orbits of the giant planets. What makes this 250 km-wide asteroid so special is that it has a pair of rings around it, making it the smallest known object in the Solar System with a ring system.

Asteroids can also have their own moons. Ida and Dactyl are a pair of space rocks that captured the world's attention thanks to a striking discovery by NASA's *Galileo* spacecraft. During a flyby of asteroid Ida in 1993, *Galileo*'s cameras spotted Dactyl, a much smaller 'moon' that orbits Ida. This pair provided the first observational evidence that asteroids can have their own natural satellites.

9 Spectroscopic Meteors

Meteors appear when the Earth slams into unsuspecting flecks of ice and rock drifting around the Sun. They immediately find themselves moving through the atmosphere at hypersonic speeds and the air in front of them can't get out of the way quickly enough. This generates ram pressure, which superheats the air. The air in turn transfers heat to the meteoroid, causing it to vaporise in a flash.

Look carefully when you spot a bright meteor and you may notice some vibrant colour. You can even, on occasion, spot several different colours as the meteor progresses. The brightest, most dazzling meteors, known as fireballs, are more likely to show you these colours as they burn for longer. The colours are associated with different elements, forming compounds trapped in the ice or rock. The compounds are raised to well beyond their burning temperatures and the elements give off varying colours of light. Magnesium shines blue-white or cyan; calcium looks violet; sodium is orange; iron glows yellow-white; nitrogen and oxygen produce distinct reds.

10 Trading Places

The outermost planets, Uranus and Neptune, are often referred to as the ice giants because they are primarily composed of water, ammonia and methane ice. Some simulations suggest that early in their history they effectively changed places, meaning Uranus might once have been the last planet in the Solar System, but it gave the role to Neptune.

An advanced model of the young Solar System's dynamics, called the Nice model, has been developed and refined since its inception in 2005. In the Nice model, the giant planets formed closer to the Sun and then migrated outwards to their present orbits as the protoplanetary disk dissipated.

Curiously, a significant number of simulations show Uranus and Neptune switching places as they both migrate away from the Sun. It's possible that Uranus was originally the outermost planet. While this hypothesis is speculative, it could explain one puzzling mystery surrounding Uranus – that the entire planetary system is tilted on its side.

China Lake Astronomical Society

Membership or Renewal 2024

Name:_____

Address:_____

City, State, Zip:_____

Phone:_____Email:_____

Yearly Membership $ 25 (*due in January*) Family $ 40 Youth 18 & under $ 10.
Checks or Money Orders accepted _____

Contact Roger Brower 760-446-0454 (email brower@iwvisp.com)

Make Checks or Money Orders Payable to China Lake Astronomical Society.(CLAS)

Roger Brower
Treasurer

NASA's Juno spacecraft will get its closest look yet at Jupiter's moon Io on Dec. 30

Juno will feel the heat of the most volcanic body in the solar system, during the closest approach any spacecraft has made in 20-plus years.

NASA's Juno mission will come closer to Jupiter's moon Io than any spacecraft has in around 20 years on Saturday (Dec. 30).

The flyby will bring Juno to around 930 miles (1,500 kilometers) of Io, the most volcanic body in the solar system. This will allow the spacecraft to take a detailed look at Io as it gathers a treasure trove of hot data. It's close, but not the closest ever glimpse by a spacecraft: that record belongs to NASA's Galileo spacecraft, which skimmed just 181 kilometers (112 miles) above Io's south pole in 2001.

Juno launched on August 5, 2011, and reached the gas giant Jupiter, the largest planet in the solar system, on July 4, 2016, after a 1.7 billion-mile (2.8-billion-kilometer) journey. Since then, the Jupiter orbiter has made 56 flybys of the gas planet, collecting data on it and its moons, and is about to begin its next.

"By combining data from this flyby with our previous observations, the Juno science team is studying how Io's volcanoes vary," Southwest Research Institute scientist and Juno principal investigator Scott Bolton said in a statement. "We are looking for how often they erupt, how bright and hot they are, how the shape of the lava flow changes, and how Io's activity is connected to the flow of charged particles in Jupiter's magnetosphere." Now in the third year of its extended mission, with its primary mission having ended in July 2021, Juno will make another close flyby of Io on Feb. 3, 2024, when it comes to within around 930 miles (1,500 km) of the volcanic surface of this Jovian world.

The Dec. 2023 and Feb. 2024 flybys of Io will add to the wealth of information that scientists have gathered about Io thanks to Juno, which has been monitoring its volcanic activity from distances that range from 6,830 miles (11,000 km) to over 62,100 miles (100,000 km). In its time of operation, the NASA spacecraft has also supplied researchers with their first views of Io's north and south poles.

Source: NASA's Juno spacecraft will get its closest look yet at Jupiter's moon Io on Dec. 30 | Space

Why investigate Jupiter's "tortured moon" Io?

The surface of Io, which is around the size of Earth's moon, is littered with hundreds of actively erupting volcanoes capable of blasting lava dozens of miles into the thin, waterless atmosphere of the Jovian moon.

The innermost Galilean satellite of Jupiter, one of the four large Jovian moons, Io, is believed to be so extremely volcanic because of the gravitational influence of the gas giant planet and that of its three other Galilean moons—Europa, Ganymede, and Callisto. This generates tidal forces that are so powerful they can cause the surface of Io to rise and fall by as much as 330 feet (100 meters), triggering extreme volcanism.“With our pair of close flybys in December and February, Juno will investigate the source of Io’s massive volcanic activity, whether a magma ocean exists underneath its crust, and the importance of tidal forces from Jupiter, which are relentlessly squeezing this tortured moon,” Bolton added.

Io's volcanism is necessary to understand because it likely has an impact on the wider Jovian system. For example, volcanic particles escaping from the atmosphere of Io are thought to become trapped by the magnetic field of Jupiter, forming a hot donut of plasma around the gas giant planet.

How does Juno investigate Io

During the flyby of Io this weekend, all of Juno's three cameras will be active. The Jovian Infrared Auroral Mapper (JIRAM), will be collecting information about the volcanic moon's heat signature locating volcanoes and calderas across the Jovian moon. Meanwhile, the navigational star camera, the Stellar Reference Unit, will collect the highest resolution images of the volcano-riven surface of Io yet gathered.
Last, but by no means least, JunoCam, which is included in Juno's suite of instruments to drive public engagement, will catch full-color visible-light images of the volcanic moon.

JunoCam was designed to last for just eight flybys of Jupiter, making the images of Io it will collect during this 57th flyby even more remarkable. All three cameras and the Juno spacecraft itself have had to brave and withstand the punishing radiation environment around Jupiter, arguably the harshest in the solar system, barring that of the sun, to continue this remarkable science mission. But, this punishment has begun to show.

"The cumulative effects of all that radiation has begun to show on JunoCam over the last few orbits," Juno project manager Ed Hirst said. "Pictures from the last flyby show a reduction in the imager's dynamic range and the appearance of 'striping' noise. Our engineering team has been working on solutions to alleviate the radiation damage and to keep the imager going."
Following Juno's orbit of Io in Feb. 2024, the NASA orbiter will skim the Jovian moon on each of its subsequent orbits of Jupiter, but each will become subsequently further away from Io's volcanic surface.
The first flyby after Feb will be at an altitude of about 10,250 miles (16,500 km) over Io, while the last will bring the NASA spacecraft to within just around 71,450 miles (115,000 kilometers) of the volcanic moon.
Juno will also now begin to experience periods during which Jupiter eclipses the sun, blocking its access to solar power and leading it to experience darkness for the first time since it left Earth.

This isn't expected to impact the operation of Juno, and from April 2024, the spacecraft will use these occultation events to assist its Gravity Science Experiment to investigate the composition of the upper atmosphere of Jupiter and collect information about the planet's shape and its interior structure.

Juno's extended mission investigating the Jovian system will last until Sept. 2025, when NASA says the spacecraft will reach the end of its life and will likely be intentionally crashed into the atmosphere of the gas giant.

January DAILY CELESTIAL CALENDAR

1	The Moon is at apogee (251,599 miles from Earth), 7:28 A.M. PST
1	Mercury is Stationary 8:00 P.M. PST
2	Earth is at Perihelion (91.4 Million miles from the Sun), 5:00 P.M. PST
3	Last Quarter Moon at 7:30 P.M. PST
4	Quadrantid Meteor Shower Peaks
6	Venus passes 6 deg north of Antares 12:00 A.M. PST
8	The Moon passes 0.8 deg north of Antares 7:00 A.M. PST
8	The Moon passes 6 deg south of Venus 12:00 P.M. PST
9	The Moon passes 7 deg south of Mercury 11:00 A.M. PST
10	The Moon passes 4 deg south of Mars, 1:00 A.M. PST
11	New Moon occurs at 3:57 A.M. PST
12	Mercury is at Greatest Western Elongation at (24) deg, 7:00 A.M. PST
13	The Moon is at Perigee (225,102 miles from Earth) 2:36 A.M. PST
14	The Moon passes 2 deg south of Saturn, 2:00 A.M. PST
15	Asteroid Juno is Stationary 3:00 A.M. PST
15	The Moon passes .9° south of Neptune, 12:00 P.M.. PST
17	First Quarter Moon occurs at 7:53 P.M. PST
18	The Moon passes 3 deg north of Jupiter, 1:00 P.M. PST
19	The Moon passes 3 deg north of Uranus, 12:00 P.M. PST
20	Pluto is in Conjunction with the Sun, 6 A.M. PST
25	Full Moon occurs at 9:54 A.M. PST
27	Uranus is Stationary, 3:00 A.M. PST
28	Mercury passes 0.2 deg north of Mars, 8:0 A.M. PST
29	The Moon is at Apogee (252,138 Miles from Earth) 12:14 A.M. PST

2023/2024 New Moons

- January 11, 2024:
- February 9, 2024:
- March 10, 2024: .
- April 8, 2024:
- May 7, 2024
- June 6, 2024:
- July 5, 2024:
- August 4, 2024:
- September 2, 2024
- October 2, 2024

http://chinalakeastro.org/

UPCOMING STAR PARTIES AND EVENTS

Red Rock Spring Star Parties

2024 (*Tentative*)

- March 30th Saturday
- April 6th Saturday
- May 4th Saturday
- June 1st Saturday

Maturango Solar Observing

- January 13

Tentative

Directions: Brown road star parties are held in the desert. Take south China lake Boulevard to 395. Cross 395 and go 2.3 miles on Brown road until you come to signs in cones pointing to the left. Take this dirt road .5 miles to the star party site.

CLUB INFORMATION

Members receive discounted rates for Astronomy Magazine and /or Sky and Telescope Magazine.

The fee schedule is as follows: Verify current magazine prices with Roger!

Basic membership $25.00 per year.
Family $ 40
Youth under 18 $10
Is there interest in discount rates for Sky & Telescope & Astronomy Magazines

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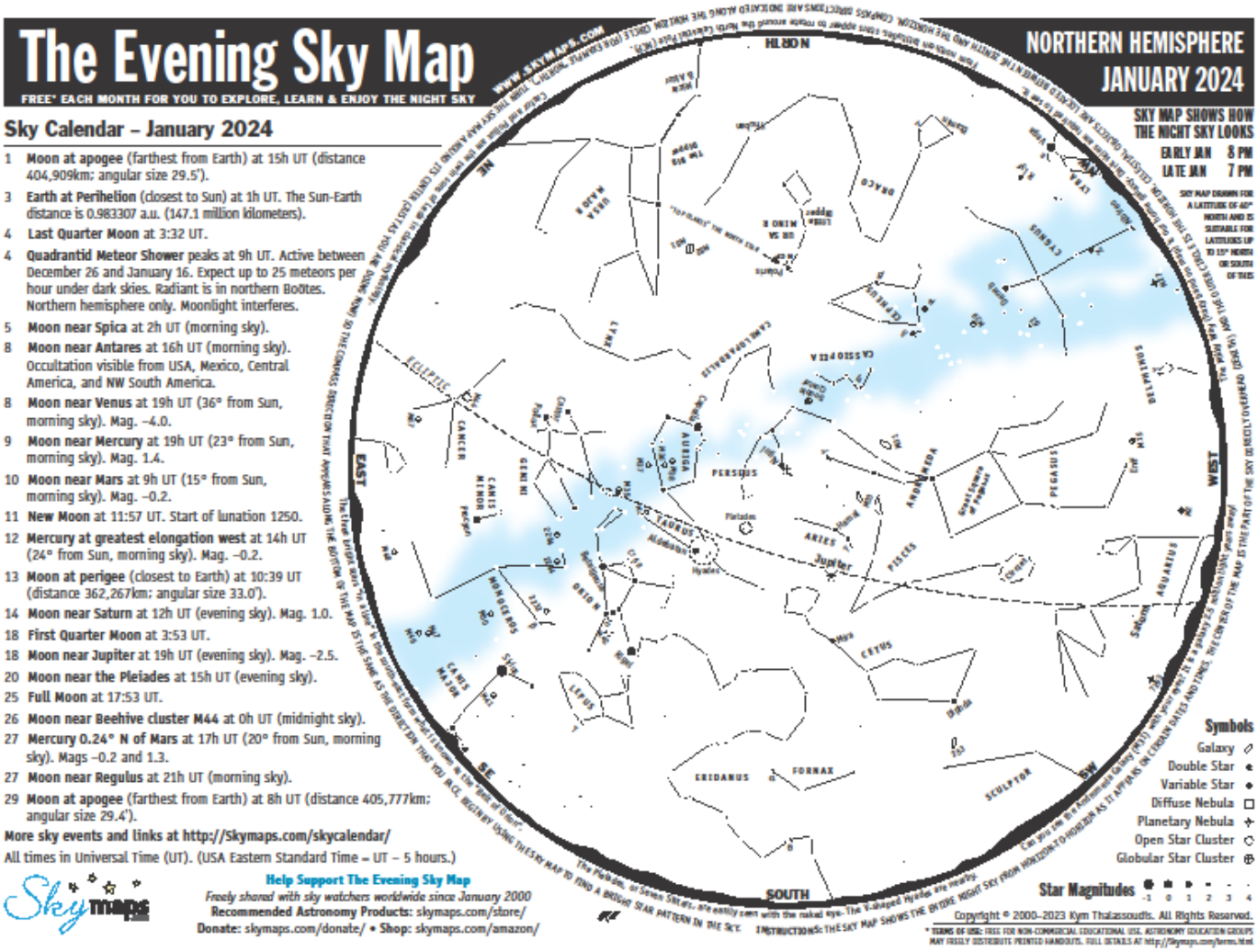
Meetings of the China Lake Astronomical Society are held at the Maturango Museum 7:30



[The Quadrantids](#) can be one of the strongest displays of the year, yet they are difficult to observe. The main factor is that the display of strong activity only has a duration of about 6 hours. The reason the peak is so short is due to the shower's thin stream of particles and the fact that the Earth crosses the stream at a perpendicular angle. Therefore the Earth passes through the densest portion of the stream quite quickly. Meteors from this source can be seen for two weeks centered on January 4th, but hourly rates away from the date of maximum activity are very low. Unlike most meteor showers which originate from comets, the Quadrantids have been found to originate from an asteroid. **Asteroid 2003 EH1** takes 5.52 years to orbit the sun. It is possible that 2003 EH1 is a "dead comet" or a new kind of object being discussed by astronomers sometimes called a "rock comet."
Source: [Viewing the 2024 Quadrantid Meteor Shower | IMO](#)

About the Celestial Objects

Listed on this page are several of the brighter, more interesting celestial objects visible in the evening sky this month (refer to the monthly sky map). The objects are grouped into three categories. Those that can be easily seen with the naked eye (that is, without optical aid), those easily seen with binoculars, and those requiring a telescope to be appreciated. **Note, all of the objects (except single stars) will appear more impressive when viewed through a telescope or very large binoculars.** They are grouped in this way to highlight objects that can be seen using the optical equipment that may be available to the star gazer.

Tips for Observing the Night Sky

When observing the night sky, and in particular deep-sky objects such as star clusters, nebulae, and galaxies, it's always best to observe from a dark location. Avoid direct light from street lights and other sources. If possible observe from a dark location away from the light pollution that surrounds many of today's large cities.

You will see more stars after your eyes adapt to the darkness—usually about 10 to 20 minutes after you go outside. Also, if you need to use a torch to view the sky map, cover the light bulb with red cellophane. This will preserve your dark vision.

Finally, even though the Moon is one of the most stunning objects to view through a telescope, its light is so bright that it brightens the sky and makes many of the fainter objects very difficult to see. So try to observe the evening sky on moonless nights around either New Moon or Last Quarter.

Astronomical Glossary

Conjunction – An alignment of two celestial bodies such that they present the least angular separation as viewed from Earth.

Constellation – A defined area of the sky containing a star pattern.

Diffuse Nebula – A cloud of gas illuminated by nearby stars.

Double Star – Two stars that appear close to each other in the sky; either linked by gravity so that they orbit each other (binary star) or lying at different distances from Earth (optical double). Apparent separation of stars is given in seconds of arc (").

Ecliptic – The path of the Sun's center on the celestial sphere as seen from Earth.

Elongation – The angular separation of two celestial bodies. For Mercury and Venus the greatest elongation occurs when they are at their most angular distance from the Sun as viewed from Earth.

Galaxy – A mass of up to several billion stars held together by gravity.

Globular Star Cluster – A ball-shaped group of several thousand old stars.

Light Year (ly) – The distance a beam of light travels at 300,000 km/sec in one year.

Magnitude – The brightness of a celestial object as it appears in the sky.

Open Star Cluster – A group of tens or hundreds of relatively young stars.

Opposition – When a celestial body is opposite the Sun in the sky.

Planetary Nebula – The remnants of a shell of gas blown off by a star.

Universal Time (UT) – A time system used by astronomers. Also known as Greenwich Mean Time. USA Eastern Standard Time (for example, New York) is 5 hours behind UT.

Variable Star – A star that changes brightness over a period of time.

CELESTIAL OBJECTS

NORTHERN HEMISPHERE JANUARY 2024

Sky maps

Easily Seen with the Naked Eye

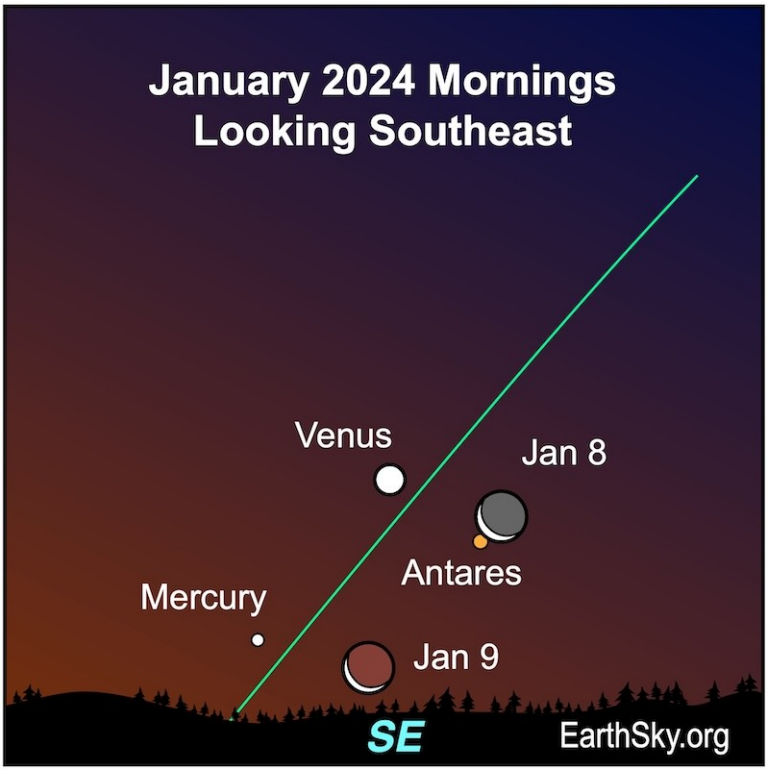
Capella	Aur	✦	The 6th brightest star. Appears yellowish in color. Spectroscopic binary. Dist=42 ly.
Sirius	CMa	✦	The brightest star in the sky. Also known as the "Dog Star". Dist=8.6 ly.
Procyon	CMi	✦	Greek name meaning "before the dog" - rises before Sirius (northern latitudes). Dist=11.4 ly.
δ Cephei	Cep	✦	Cepheid prototype. Mag varies between 3.5 & 4.4 over 5.366 days. Mag 6 companion.
Deneb	Cyg	✦	Brightest star in Cygnus. One of the greatest known supergiants. Dist=1,400 ±200 ly.
Castor	Gem	✦	Multiple star system with 6 components. 3 stars visible in telescope. Dist=52 ly.
Pollux	Gem	✦	With Castor, the twin sons of Leda in classical mythology. Dist=34 ly.
Vega	Lyr	✦	The 5th brightest star in the sky. A blue-white star. Dist=25.0 ly.
Rigel	Ori	✦	The brightest star in Orion. Blue supergiant star with mag 7 companion. Dist=770 ly.
Betelgeuse	Ori	✦	One of the largest red supergiant stars known. Diameter=300 times that of Sun. Dist=430 ly.
Algol	Per	✦	Famous eclipsing binary star. Magnitude varies between 2.1 & 3.4 over 2.867 days.
Pleiades	Tau	✧	The Seven Sisters. Spectacular cluster. Many more stars visible in binoculars. Dist=399 ly.
Hyades	Tau	✧	Large V-shaped star cluster. Binoculars reveal many more stars. Dist=152 ly.
Aldebaran	Tau	✦	Brightest star in Taurus. It is not associated with the Hyades star cluster. Dist=66.7 ly.
Polaris	UMi	✦	The North Pole Star. A telescope reveals an unrelated mag 8 companion star. Dist=433 ly.

Easily Seen with Binoculars

M31	And	⌓	The Andromeda Galaxy. Most distant object visible to naked eye. Dist=2.5 million ly.
M2	Aqr	◉	Resembles a fuzzy star in binoculars.
M38	Aur	✧	Stars appear arranged in "pi" or cross shape. Dist=4,300 ly.
M36	Aur	✧	About half size of M38. Located in rich Milky Way star field. Dist=4,100 ly.
M37	Aur	✧	Very fine star cluster. Discovered by Messier in 1764. Dist=4,400 ly.
M44	Cnc	✧	Praesepe or Beehive Cluster. Visible to the naked eye. Dist=590 ±20 ly.
M41	CMa	✧	First recorded observation by Aristotle in 325 BC as "cloudy spot". Dist=2,300 ly.
μ Cephei	Cep	✦	Herschel's Garnet Star. One of the reddest stars. Mag 3.4 to 5.1 over 730 days.
Mira	Cet	✦	Famous long period variable star. Mag varies between 3.0 & 10.1 over 332 days.
χ Cygni	Cyg	✦	Long period pulsating red giant. Magnitude varies between 3.3 & 14.2 over 407 days.
M39	Cyg	✧	May be visible to the naked eye under good conditions. Dist=900 ly.
ν Draconis	Dra	✦	Wide pair of white stars. One of the finest binocular pairs in the sky. Dist=100 ly.
M35	Gem	✧	Fine open cluster located near foot of the twin Castor. Dist=2,800 ly.
γ Leporis	Lep	✦	Visible with binoculars. Gold & white stars. Mags 3.6 & 6.2. Dist=30 ly. Sep=96.3".
R Lyrae	Lyr	✦	Semi-regular variable. Magnitude varies between 3.9 & 5.0 over 46.0 days.
2232	Mon	✧	A large scattered star cluster of 20 stars. Dist=1,300 ly.
2244	Mon	✧	Surrounded by the rather faint Rosette Nebula. Dist=5,540 ly.
M50	Mon	✧	Visible with binoculars. Telescope reveals individual stars. Dist=3,000 ly.
Cr 69	Ori	✧	Lambda Orionis Cluster. Dist=1,630 ly.
M42	Ori	◻	The Great Orion Nebula. Spectacular bright nebula. Best in telescope. Dist=1,300 light years.
M15	Peg	◉	Only globular known to contain a planetary nebula (Mag 14, d=1"). Dist=30,000 ly.
Double Cluster	Per	✧	Double Cluster in Perseus. NGC 869 & 884. Excellent in binoculars. Dist=7,300 ly.
253	Scl	⌓	Fine, large, cigar-shaped galaxy. Requires dark sky. Member of Sculptor Group.
Mizar & Alcor	UMa	✦	Good eyesight or binoculars reveals 2 stars. Not a binary. Mizar has a mag 4 companion.

Telescopic Objects

γ Andromedae	And	✦	Attractive double star. Bright orange star with mag 5 blue companion. Sep=9.8".
γ Arietis	Ari	✦	Impressive looking double blue-white star. Visible in a small telescope. Sep=7.8".
M67	Cnc	✧	Contains 500+ stars mag 10 & fainter. One of the oldest clusters. Dist=2,350 ly.
η Cassiopeiae	Cas	✦	Yellow star mag 3.4 & orange star mag 7.5. Dist=19 ly. Orbit=480 years. Sep=12".
61 Cygni	Cyg	✦	Attractive double star. Mags 5.2 & 6.1 orange dwarfs. Dist=11.4 ly. Sep=28.4".
γ Delphini	Del	✦	Appear yellow & white. Mags 4.3 & 5.2. Dist=100 ly. Struve 2725 double in same field.
θ Eridani	Eri	✦	Striking blue-white double star. Mags 3.2 & 4.3. Visible in a small telescope. Sep=8.2".
β Monocerotis	Mon	✦	Triple star. Mags 4.6, 5.0 & 5.4. Requires telescope to view arc-shape. Sep=7.3".
2264	Mon	✧	Christmas Tree Cluster. Associated with the Cone Nebula. Dist=2,450 ly.
σ Orionis	Ori	✦	Superb multiple star. 2 mag 7 stars one side, mag 9 star on other. Struve 761 triple in field.
M1	Tau	◻	Crab Nebula. Remnant from supernova which was visible in 1054. Dist=6,500 ly.
M33	Tri	⌓	Fine face-on spiral galaxy. Requires a large aperture telescope. Dist=2.3 million ly.
M81	UMa	⌓	Beautiful spiral galaxy visible with binoculars. Easy to see in a telescope.
M82	UMa	⌓	Close to M81 but much fainter and smaller.



When to watch: Mercury will become visible toward the end of December 2023 in the morning sky. Greatest elongation is – when Mercury will be farthest from the sunrise on our sky's dome – on January 12, 2024. And the planet will remain bright after that. Then, in early February, when it'll be edging back toward the sunrise, it'll brighten a little bit making Mercury easier to spot – although low – in the morning twilight.

Where to look: Look in the sunrise direction, as the sky is getting lighter.

Greatest elongation is on January 12 at 15:00 UTC (9:00 a.m. CDT). Mercury is shining at a 0.5 magnitude that morning. And it is 24 degrees from the sun.

Through a telescope on and around January 12, Mercury appears 64% illuminated, in a gibbous phase, and 6.8 arcseconds across.

Note: Once you spot it, notice that Mercury brightens quickly in January, reaching a magnitude of around -0.5 before slipping away in the morning glare in February. Source: