

Skies for December 2021

By Robert C. Victor. Twilight charts provided by Robert D. Miller

December highlights: Venus bright enough for daytime naked eye, of peak interest for optically aided viewing, and a spectacular pairing with a crescent Moon. An eye-catching lineup of three evening planets all month, with a fourth joining the party before Venus checks out in early January. A few hours of dark moonless skies coinciding with the year's best meteor shower. An extra-bright Moon, a northernmost Moon, and a southernmost Sun, all in a 3-day span. And two celestial gifts on the last day of 2021: A compact dawn gathering of an old crescent Moon with a planet and its namesake star; and the Dog Star reaching its high perch in time to howl at midnight.

Our evening twilight sky map shows the positions of the naked-eye planets and the brightest stars at mid-twilight, when the Sun is 9° below the WSW horizon. [See monthly links under The Sky at Dusk, below.] In December, this occurs nearly 45 minutes after sunset. Throughout the month, a **lineup of three planets** dominates the southwest quadrant of the sky. Brilliant **Venus**, in SW to WSW, anchors the lower right end of the lineup. In first two weeks, Venus gleams at mag. -4.9, as bright as it gets, and fades to mag. -4.3 at month's end.

Jupiter, next in brightness at mag. -2.3 to -2.1, marks the upper left end of the lineup. Jupiter's distance from Venus is 34.5° on Dec. 1, shrinking to 31.4° on Dec. 14, and expanding to 37.5° on Dec. 31. **Saturn**, at mag. +0.7, lies between the two brighter planets.

Moon passages (evenings): Follow the Moon at dusk December 5-18. [See link to December *Sky Calendar*, below.] The arrangement of Moon and three bright planets is especially

attractive as Moon grows from a thin young crescent 15° lower right of Venus on Dec. 5, through First Quarter phase, when the Moon is half full, 90° from Sun, and 23° east of Jupiter, on Dec. 10. **The very best evening is Monday, December 6**, when the 11-percent Moon appears 2.6° lower left of Venus at dusk. **Do not miss that!** For several hours that day, we are presented an easy opportunity to spot Venus in the daytime. Try looking when the 10-percent crescent Moon passes due south, 30° up on Dec. 6, at 2:19 p.m. PST in Palm Springs, CA for example. Venus then appears 3.2° to the Moon's upper left. A telescope magnifying only 45-power would make the 24-percent crescent Venus appear the same apparent size as the Moon with unaided eye. In addition, with Venus at its brightest, a Moon-Venus pairing seldom gets better than this! The Moon will close in on Venus until they set, more than 2½ hours after sunset, when they are 2.4° apart.

On the next evening, **Tuesday, Dec. 7, Saturn** will appear 5° upper right of the 19% crescent Moon. On **Wednesday, Dec. 8, find Jupiter** within 7° to the 29% crescent Moon's upper left at dusk. Four hours later, when they are about to set, they will be just more than 5° apart. On Thursday Dec. 9, the 40% fat crescent Moon is 10° east of Jupiter.

One week later, on Dec. 16, the 96% Moon is 5° from the Pleiades and within 9° of Aldebaran. On the next evening, find Aldebaran within 8° lower left of the 99% Moon.

Through the telescope: Venus appears larger than Jupiter in all of December, because it is unusually close to Earth. Inferior conjunction, Venus nearly between Earth and Sun, will occur on Jan. 8. **Venus grows more than 50 percent in apparent size this month**, ending up more than one arcminute

(1/60 degree) across. At that size, a magnification of 30-power would make Venus appear about as large as the Moon with unaided eye! **Venus is bright enough to be spotted in daylight.** In December 2021, find Venus to upper left of setting Sun, by 41° on Dec. 1; by 36° on Dec. 10; by 32° on Dec. 16; by 26° on Dec. 21; by 17° on Dec. 28; and by 13° on Dec. 31. If using optical aid such as telescope or binoculars, be sure to block the Sun from view or wait until it sets in late Dec. or early Jan., when Venus appears close to the Sun. **Even binoculars easily resolve Venus' crescent phases:** 28 percent illuminated on Dec. 1; 20% on Dec. 10; 15% on Dec. 16; 10% on Dec. 21; 5% on Dec. 27; 3% on Dec. 30; and 2% on Jan. 1.

Saturn with its ring system (still 18° from edgewise) and **Jupiter with its dark cloud belts and four large satellites** discovered by Galileo in 1610 are always impressive for telescopic viewing.

On December 1 at dusk, look for the *Summer Triangle* of **Vega, Altair, and Deneb**, in order of brightness, well up in the western sky. On that date, a line from Vega to Altair, 34° long, extended 31° to the south ends at Saturn, which is then 18.1° upper left of Venus and 16.5° lower right of Jupiter.

Other bright stars: Look in S to SSW at dusk for **Fomalhaut**, mouth of the Southern Fish, 22° to 20° lower left of Jupiter. Watch for yellowish **Capella**, the Mother Goat star, ascending in NE, and red-orange **Aldebaran**, ascending in ENE to E, 31° lower right of Capella. On December 1, Aldebaran is at *opposition* as Earth passes between that star and the Sun. Look for Aldebaran low in ENE at dusk and low in WNW at dawn, as shown on the evening and morning twilight maps. Although Aldebaran marks the eye of Taurus the Bull, its name

translated from Arabic means “the Follower”, of the beautiful **Pleiades or Seven Sisters star cluster**, not plotted on the maps. Aim your binoculars 14° above Aldebaran as darkness falls, and enjoy!

As December progresses (or later in the evening), watch 21° below and 26° lower right of Aldebaran for Orion's two brightest stars, 19° apart: Reddish **Betelgeuse** rising north of east, and blue-white **Rigel** rising south of east. Within 45 minutes after you first spot them, look for the “Twin” stars of Gemini, **Castor and Pollux**, 4.5° apart, rising farther north, 30°-34° below Capella.

The **Geminid meteor shower** reaches its peak in the predawn hours of Tuesday, December 14. The bright waxing gibbous Moon sets four hours before sunrise, leaving 2½ hours of dark skies for excellent viewing of “shooting stars” until dawn brightens. Meteors can light up anywhere in the sky, but the tracks of Geminids, extended backward, will all radiate from a common point, not far from the star Castor in the constellation Gemini. Morning twilight gets underway about 1½ hours before sunrise, as the Pointer Stars of the Big Dipper stand directly above the North Star.

Later that same Tuesday, in the evening, we witness the least span of the three bright planets, Venus-Saturn-Jupiter, 31.4°. Two days later, on Thurs. Dec. 16, Venus approaches to within 14° west of Saturn, but no closer! Venus commences retrograde or westward motion against the stars, on night of Dec. 18-19.

Opposition surge: The Full Moon on Saturday evening, Dec. 18 will shine with extra brilliance, because it will lie

just outside the Earth's shadow and reflect much of its light back toward Earth. On the next evening, Sunday Dec. 19, witness **this month's northernmost moonrise**, 32° north of east, about half an hour after sunset for southern California. Northernmost moonset will take place the next morning, 32° north of west, about 1.4 hours after sunrise from SoCal. (Note: If you have surrounding mountains that would delay moonrise and hasten moonset.) Midway in time between Sunday evening's moonrise and Monday morning's moonset, soon after midnight very early on Monday morning, the Moon passes just south of overhead. High Moon!

Winter begins on Tuesday, Dec. 21 at 7:59 a.m. PST (10:59 a.m. EST), when the Sun stands directly over the Tropic of Capricorn, lat. 23.4° south. We residents of the Northern Hemisphere have our lowest midday Sun of the year that day, when the Sun passes directly south. For Palm Springs, CA, this occurs 33° above the horizon, at 11:44 a.m.

In the evening sky in late December 2021, Venus descends into the twilight glow, and displays a large, ever thinner crescent until its departure in early January. Even ordinary binoculars will resolve the crescent. Look very soon after sunset, to mute the contrast of brilliant Venus against the darkening sky.

A fourth planet, Mercury, adds its bright presence (mag. – 0.7) last ten days of month. On Dec. 22, find it 12° lower right of Venus. On Dec. 25, Mercury is 7° below Venus. On Dec. 28, Mercury passes 4.2° south (lower left) of Venus. The planets are moving in opposite directions, as Mercury is emerging from the far side of the Sun, and Venus is on the near side, plunging toward its inferior conjunction of Jan. 8. On Dec. 30, Mercury appears 5.5° to the left of sinking Venus, and

on Dec. 31, 7° to Venus' upper left. (Mercury remains in view until mid-January, but fades to mag. 0 by Jan. 12, and to mag. +1 by Jan. 15.)

New Year's Eve: On Dec. 31, **Venus** sets in WSW 65 minutes after sunset. Getting noticeably lower with each passing day, Venus now sets 7 minutes closer to the time of sunset daily. **Jupiter** is in SW at dusk, 37.5° upper left of Venus. **Saturn** is 19° upper left of Venus and nearly 19° lower right of Jupiter. **Mercury** is within 7° upper left of Venus and 14° lower right of Saturn.

On the last day of the year, the Sun reaches its highest point in the south at midday, which occurs at 12:03 p.m. PST as seen from longitude 120° west, and about four minutes earlier per degree of longitude, you are east of that longitude or later if you are west of it. Almost exactly 12 hours later, and therefore in the middle of the night, **Sirius**, the Dog Star, reaches its high point on New Year's morning, at 12:02 a.m. PST as seen from longitude 120° west.

So, in the waning minutes of 2021, step outside and look toward the south. Since the Moon and naked eye planets will all then be below the horizon, Sirius will stand out as the brightest object in the sky, a fitting occasion to close the year by reading Robert Frost's poem, *Canis Major*. [See links, below.] Notice that the 3-star belt of Orion, if extended, points directly to Sirius.

Earlier that evening, in bright twilight just after sunset, binoculars show Venus as a thin crescent 2.4 percent illuminated, and just more than one arcminute across, and 13° upper left of the setting Sun. On the next evening, Jan. 1, the

Venus crescent is 2 percent lit and 11.6° upper left of setting Sun. (*Important:* For eye safety, when Venus draws within several degrees of the Sun, look just *after* sunset, or just *after* the Sun's disk has disappeared behind your local horizon landscape features.) On Jan. 4, Venus will appear within 8° above the setting Sun. On Jan. 7 and 8, an extremely thin crescent Venus will pass within 5° upper right of the setting Sun. On what evening in early January will *you* last spot Venus?

The four brightest stars in morning twilight in December, in order of brightness, are **Sirius**, visible early in month, until it sinks below horizon in WSW; **Arcturus**, very high in E to ESE; **Vega**, climbing in NE; and **Capella**, dropping lower in NW. [See link to The Sky at Dawn, December 2021, below.]

The only morning planet is Mars, which is faint, mag. +1.6 to +1.5, low in ESE to SE. On Dec. 18, Mars passes 1.0° S of 2.6-mag. Beta Scorpii, northernmost of three bright stars in the head of the Scorpion. Watch for the emergence of brighter, 1.1-mag. **Antares**, heart of the Scorpion, within 8° below Mars that morning. By Dec. 24, Antares is 5° to the lower right of Mars.

On Dec. 27 and 28, Mars passes 4.5° N (upper left) of the star. Note their similar reddish colors, which influenced the naming of the star Antares. **In a beautiful compact gathering on the morning of December 31, Mars and Antares are 5.2° apart, with a 7-percent waning crescent Moon between and slightly above them, slightly more than 3° from each.** Best time to look might be one hour before sunrise. Look about 9° - 11° above the southeastern horizon. Binoculars recommended.

Follow Moon in morning sky Dec. 18-Jan. 1. On Dec. 20, the 98% Moon is 10° - 11° below Pollux and Castor. On Dec. 21, the 95% Moon is 3.5° from Pollux and 8° from Castor. On

Dec. 24, the 75% Moon is 5° from Regulus. On Dec. 28, the 34% crescent Moon is 5° from Spica. On Dec. 31, the 7% crescent forms a striking gathering with Antares and Mars, as described above. On January 1, binoculars are recommended to catch the last old Moon, a 2% crescent, 12° lower left of Mars.

Illustrations of many of these events appear on the Abrams Planetarium monthly *Sky Calendar*. To subscribe for \$12 per year or to view a sample, visit www.abramsplanetarium.org/skycalendar/

Mentions of star patterns in literature

Locksley Hall, by Alfred, Lord Tennyson:

<https://www.poetryfoundation.org/poems/45362/locksley-hall>

These lines from Tennyson's *Locksley Hall* describe the stars of Orion descending the western sky, perhaps during morning twilight on a date in November, or sometime in darkness hours on a night from December through March, or during evening twilight on a date in April:

*"Many a night from yonder ivied casement, ere I went to rest,
Did I look on great Orion sloping slowly to the West."*

The next lines in the same poem describe the Pleiades as they ascend the eastern sky at dusk on an evening in November or early December:

*"Many a night I saw the Pleiads, rising thro' the mellow shade,
Glitter like a swarm of fire-flies tangled in a silver braid."*

The poem, *Canis Major*, by Robert Frost, describes Sirius and the constellation of the Big Dog prancing across the southern sky:

<https://kellyrfineman.livejournal.com/542409.html>

<https://mistero.tripod.com/essays/canismajor.html>

Another Frost poem, *The Star-splitter*, opens with a description of the rising of Orion over the eastern horizon, a striking sight that can be witnessed at dawn in late July, and two hours earlier each month, until dusk in late December. The map, *November Evening Skies* (link below), depicts Orion just rising in the east during early evening hours, half an hour earlier each week, in November and December:

*“You know Orion always comes up sideways.
Throwing a leg up over our fence of mountains,
And rising on his hands, he looks in on me...”*

The complete poem tells an amusing story of a farmer who devised a scheme to purchase a telescope so he could split stars. Enjoy!

<https://www.poetryfoundation.org/poems/44273/the-star-splitter>

Here are monthly evening and morning mid-twilight sky maps through January 2022. Use them to follow seasonal changes in positions of bright stars, and wanderings of the planets.

THE SKY AT DUSK

December 2021
[S202112P.pdf](#)

January 2022
[S202201P.pdf](#)

THE SKY AT DAWN

December 2021
[S202112A.pdf](#)

January 2022
[S202201A.pdf](#)

For later in the evening, after twilight, use the detailed evening sky maps on the reverse sides of the *Sky Calendars* for December 2021 and January 2022. The evening sky map on the reverse side of the November calendar, depicting Orion just rising, can still be used through the end of December, early in the evening.

Robert C. Victor originated the Abrams Planetarium monthly Sky Calendar in October 1968, and still helps produce issues occasionally. He enjoys being outdoors sharing the wonders of the night sky, and hoping for the pandemic to end!

Robert D. Miller, who provided the twilight charts, did graduate work in Planetarium Science and later astronomy and computer science at Michigan State University and remains active in research and public outreach in astronomy.