

**OBSERVING HIGHLIGHTS for January 14 to 28, 2023, a “dark Moon” Period.**  
**Black Canyon Astronomical Society (BCAS), western Colorado, USA**

**SUMMARY.** During this dark Moon period, the brightest planets and some of the brightest stars are on fine display during early evening hours. And comet C/2022 E3 (ZTF) is brightening in the northern sky! Let’s hope for clearing skies, so that we can see all of these! The planets are aligned along the ecliptic, from Venus and Saturn in twilight above the southwestern horizon to Jupiter high in the southwest, to Mars high in the southeast. With optical aid and finder charts you can also spot Neptune west of Jupiter, and Uranus west of Mars. The bright stars of Orion are rising in the southeast, and Sirius, the brightest star, has cleared the southeastern horizon. Capella, Procyon, Aldebaran, Pollux, and Castor are other bright stars that decorate our winter evenings. In the pre-dawn sky, Mercury becomes visible in the east-southeast by about January 18 and then steadily brightens, making it easy to spot by January 28. The Moon reaches last quarter on the night of January 14-15. On mornings from January 16 to 20, we can watch a crescent Moon wane. The Moon is new and invisible on January 21. At 6:00 PM MST on January 22, try to spot a thin, crescent Moon just above the west-southwestern horizon, below Venus and Saturn, which are only 0.5 degrees apart from each other! On the evening of January 25, the waxing crescent Moon is near Jupiter. The Moon reaches first quarter on January 28. Enjoy seeing earthshine on the dark part of the crescent Moon, especially on the mornings of January 18, 19 and 20 and the evenings of January 22, 23, and 24 (use binoculars for stunning views!). If you have a telescope, watch a solar eclipse on Jupiter, when the shadow of Ganymede, the Solar System’s largest moon, crosses the Giant Planet on January 27 from 5:56 to 8:30 PM MST (Hope for clear skies!). Over the past several months the Sun has been very active, unleashing solar flares and ejecting charged particles. You can monitor the Sun safely online. Do not look at the Sun directly without safe, specialized solar filters. Looking at the Sun can be very dangerous unless you take adequate precautions. Severe eye damage and even blindness can result. Recent high solar activity is triggering auroras (“northern lights”) that may be visible in real-time on the AuroraMax.com website, from northern U.S. states, or even from Colorado if we get lucky. And for western Colorado, there are prime-time, evening passes of the bright International Space Station from January 14 to 27 and the nearly-as-bright Tiangong Space Station from January 16 to 28.

**WESTERN SLOPE SKIES.** Since 2011, the BCAS and KVNF Community Radio have been producing Western Slope Skies (WSS), a biweekly astronomy feature. On January 20 and 25, Zach Schierl will present “Mars with the Naked Eye.” WSS features are linked here:  
<https://www.kvnf.org/show/western-slope-skies#stream/0>

**Note:** The apparent brightness of sky objects is measured in “magnitude” units. Many bright stars are magnitude +1, while the faintest stars easily visible to the unaided eye under dark skies are magnitude +6. Some of the brightest stars are 0 magnitude (e.g., Vega, Arcturus), while the brightest sky objects have negative magnitudes (e.g., Sirius at -1.5, Jupiter at -2 to -3, Venus at -4 to -5, the full Moon at -12 to -13, and the Sun at -26.7 magnitude). Angular distances on the sky are usually cited in degrees of arc. Helpful ways to estimate 1, 5, 10, 15, and 25 degrees of arc can be found here:  
<https://www.timeanddate.com/astronomy/measuring-the-sky-by-hand.html>

**THE MOON.** The Moon reaches **last quarter on the night of January 14-15** at 7:10 PM MST. From January 16 to 20, the crescent Moon wanes in the mornings. **The Moon is new on January 21** at 1:53 PM MST. On evenings from January 22 to 27, watch the lunar crescent wax. The Moon reaches **first quarter on January 28** (at 8:19 AM MST). On the morning of January 18 between 6:00 and 6:35 AM MST, look for the 15%-illuminated crescent Moon about 2 degrees east of the red supergiant star,

Antares. Then on the evening of January 22 at 6:00 PM MST, try to spot a thin (2%-illuminated) crescent Moon about 7 degrees below Venus and Saturn, which are in a close conjunction (only 0.5 degrees apart!). By January 23 at 6:00 PM MST, the Moon has moved about 8 degrees east of Venus, which has separated from Saturn by more than 1 degree. On January 25 at 6 to 8 PM MST, look for the 23%-illuminated crescent Moon about 3 degrees south of bright Jupiter. You can find a stunning visualization of lunar phases for all of year 2023 here: [Moon Phase and Libration 2023 - Moon: NASA Science](#)  
**Please do your crescent Moon spotting before sunrise and after sunset. NEVER chance looking at the Sun directly; serious eye damage can result.**

**COMET C/2022 E3 (ZTF).** Comet C/2022 E3 (ZTF), now brightening in the northern sky, will likely be a nice sight in binoculars during this “dark Moon” period. And we may be able to see the Comet faintly with eyes unaided. So, let’s hope for clear skies! Last March, astronomers at the Zwicky Transient Facility (ZTF) of Palomar Observatory discovered this Comet, which was closest to the Sun on January 12 (at 102 million miles) and has its closest approach to Earth on February 1 (at just 26 million miles). Updates, finder charts, images, and ephemerides for this Comet can be found at these links:

<http://www.aerith.net/comet/catalog/2022E3/2022E3.html>

<http://astro.vanbuitenen.nl/comet/2022E3>

<https://www.cobs.si/cobs/comet/2323/>

<https://skyandtelescope.org/astronomy-news/sneak-peek-at-two-promising-ztf-comets/>

There’s a wonderful APOD image of Comet C/2022 E3 (ZTF) by Dan Bartlett from December 19 at this link...

<https://apod.nasa.gov/apod/ap221224.html>

And here’s another great APOD image of this Comet from early January by Jose Francisco Hernandez...

<https://apod.nasa.gov/apod/ap230109.html>

**VENUS IS EMERGING FROM EVENING TWILIGHT!** After appearing to pass just 1 degree north of the Sun’s far side last October, brilliant Venus is emerging from twilight into dark skies. On January 14 at 6:00 PM MST, try to spot Venus, shining at magnitude -3.9, 8 degrees above the west-southwestern horizon in moderate twilight (with the Sun 10 degrees below the horizon). By January 28 at 7:00 PM MST, Venus is 4 degrees above a flat horizon in a “darker” sky (at the end of astronomical twilight with the Sun 18 degrees below the horizon, but with a bright, first quarter Moon high in the sky). Venus will get even easier to spot during late winter and early spring, as it climbs higher in the early evening sky. Between January 14 and 28 Venus’ 11-arc sec wide, gibbous disk decreases from 94% to 92% illuminated, as its distance from Earth decreases from 145 to 141 million miles. If it’s clear on January 22, look west southwest between 6:00 and 6:20 PM MST and spot Venus only 0.5 degree (only one apparent moon diameter!) left from fainter Saturn. Try using binoculars or a telescope at low magnification for a dazzling view. This is the first of five planetary conjunctions that involve Venus in the evening sky during the next seven months. After January 22, Venus will move eastward toward conjunctions with Neptune on February 14, Jupiter on March 1, and Uranus on March 30. After early June, our Sister Planet will retrograde (move westward against background stars) toward a conjunction with Mercury in bright, evening twilight on July 26. **Please do your Venus spotting after sunset. NEVER chance looking at the Sun directly; serious eye damage can result.**

**SATURN “BOWS OUT” IN THE EVENINGS, AFTER A DAZZLING CONJUNCTION WITH VENUS.** Saturn is visible low in the west-southwestern sky in the evenings, above brilliant Venus until their January 22 conjunction, and thereafter, below Venus. The Ringed Planet will be in conjunction with the Sun on February 16 and invisible during February. This “dark Moon” period will be our last chance to spot Saturn free from glaring twilight, until it emerges in the morning sky during March. Saturn sets in the

southwest at about 7:30 PM MST on January 14 and 6:48 PM MST on January 28. Saturn shines at magnitude +0.9 as its distance from Earth increases from 993 million miles on January 14 to 1,001 million miles (1.001 billion miles) on January 28. If it's clear on January 22, look west southwest between 6:00 and 6:20 PM MST to spot Saturn only 0.5 degrees to the right of brilliant Venus (that's only one apparent moon diameter!). Binoculars or telescopes at low magnification will offer dazzling views! **Please do your Saturn spotting after sunset. NEVER chance looking at the Sun directly; serious eye damage can result.**

**JUPITER – STILL BRIGHT IN THE EVENINGS.** As the sky darkens, Jupiter shines brightly, about 45 degrees above the southwestern horizon, and the Giant Planet remains visible for several more hours. Jupiter sets in the west at about 10:50 PM MST on January 14 and 10:08 PM MST on January 28. Jupiter, though still very bright, fades slightly from magnitude -2.26 to -2.20 between January 14 and 28, as its distance from Earth increases from 489 to 504 million miles. Using binoculars or a telescope, you can resolve Jupiter's disk, which appears 38 to 37 arc seconds wide. With a telescope you can easily see the dark belts and lighter colored zones in the Giant Planet's atmosphere. At times, you may also see the Great Red Spot, a giant storm in Jupiter's southern hemisphere. You can spot Jupiter's four, bright "Galilean" moons with binoculars and telescopes. Identify these moons by their changing positions near Jupiter, night-by-night, by using various astronomy apps, or the following link:

[https://skyandtelescope.org/wp-content/plugins/observing-tools/jupiter\\_moons/jupiter.html](https://skyandtelescope.org/wp-content/plugins/observing-tools/jupiter_moons/jupiter.html)

If you have a telescope, try viewing shadow transits (Jovian solar eclipses!) of Jupiter's moons on the nights listed below. **Ganymede, wider than the planet Mercury, casts the largest shadow of Jupiter's moons, and its shadow is the easiest to spot crossing Jupiter. There's a "prime time" transit of Ganymede's shadow on January 27 from 5:56 to 8:30 PM MST.** Europa's smaller shadow is more challenging to see. Io's shadow is larger than Europa's but smaller than Callisto's shadow.

January 16, 2023, 8:18 PM MST to 10:32 PM MST, Io's shadow crosses Jupiter (Locally, Jupiter sets at 10:44 PM MST).

January 19, 2023, 8:08 PM MST to 10:46 PM MST, Europa's shadow crosses Jupiter (Locally Jupiter sets at 10:35 PM MST).

January 23 to January 24, 2023, 10:14 PM MST to 12:28 AM MST, Io's shadow crosses Jupiter (Locally, Jupiter sets at 10:22 PM MST).

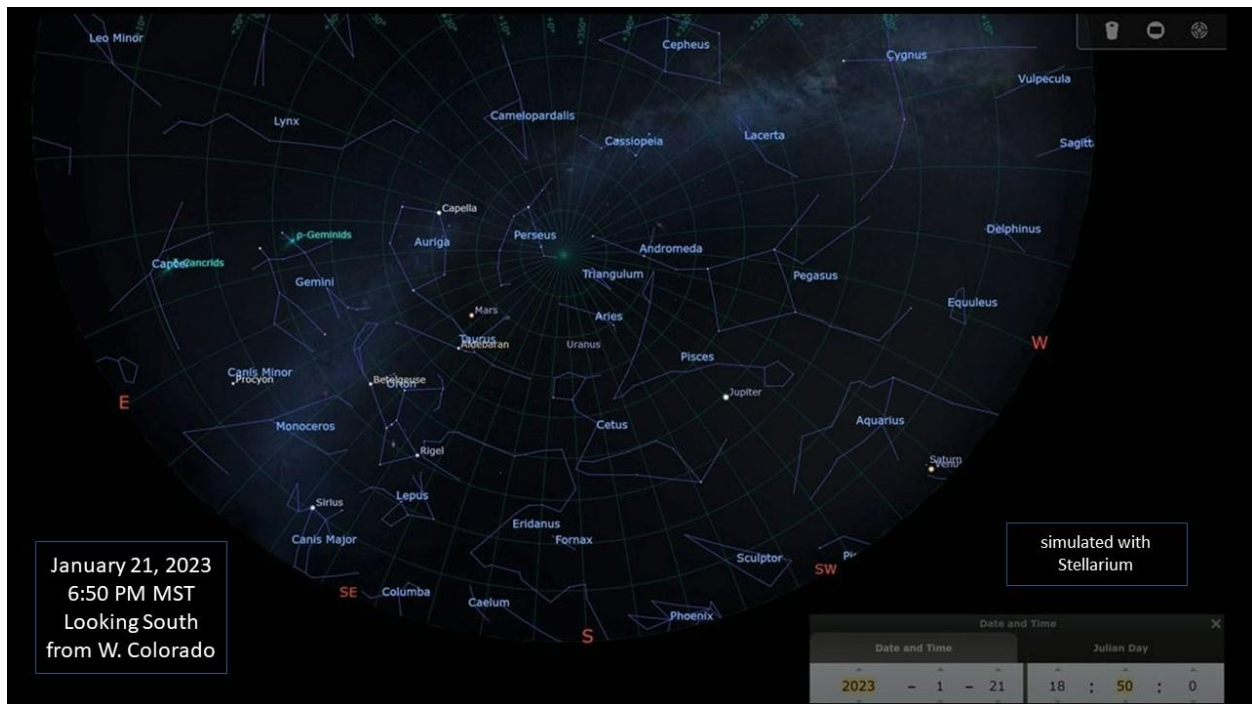
January 25, 2023, 4:42 PM MST to 6:56 PM MST, Io's shadow crosses Jupiter (Locally, the Sun sets at 5:27 PM MST).

**January 27, 2023, 5:56 PM MST to 8:30 PM MST, Ganymede's shadow crosses Jupiter (Locally, the Sun sets at 5:29 PM MST).**

**MARS IN THE EVENING – STILL BRIGHT, BUT FADING.** After a close approach last November 30, we on Earth are now speeding away from Mars. As darkness falls, the Red Planet still shines brightly in the south-eastern sky at magnitude -0.8 on January 14, but it fades a bit to magnitude -0.4 by January 28, as its distance from Earth increases from 68 to 79 million miles. Mars sets at about 4:26 AM MST on January 14 and at 3:35 AM MST on January 28. During this period Mars' apparent diameter decreases from 12.9 to 11.1 arc seconds, still large enough for seeing some surface features with telescopes. On January 12, Mars ceased its "retrograde" motion (i.e., appearing to move westward relative to the starry background) and resumed its "normal", eastward motion. Mars is still far north this month (its

declination is +25 degrees) in constellation Taurus, and it rises more than 70 degrees high in our Western Slope skies. **So, the current period is still a good time for observing Mars.** You can find an interactive chart of Mars' features that are visible from Earth at any time and date at this link... [https://skyandtelescope.org/wp-content/plugins/observing-tools/mars\\_profiler/mars.html](https://skyandtelescope.org/wp-content/plugins/observing-tools/mars_profiler/mars.html)

**BRIGHT PLANETS AND STARS IN THE EVENINGS!** The brightest planets and some of the sky's brightest stars are on fine display in early evenings throughout this "dark Moon" period. Use the chart below at about 6:50 PM MST to find Saturn and brilliant Venus near the west-southwestern horizon, bright Jupiter, higher in the southwest, and reddish Mars, high in the south southeast. With a telescope (or even with binoculars) and detailed [finder charts](#) (or a "Go-To" mount), you can also locate Neptune, west of Jupiter, and Uranus west of Mars. Look for the red giant star, Aldebaran, near Mars high in the southeast (Mars is the brighter of these two reddish objects, likely the one that does not twinkle). Bright, blue-white Rigel and the reddish, supergiant star, Betelgeuse, in constellation Orion are rising in the southeast, with brilliant Sirius, the sky's brightest star, nearer the southeastern horizon. Yellow-white Capella in constellation Auriga is high in the northeast. Procyon, "the Little Dog Star" in Canis Minor, is rising in the east, south of the "Twin Stars", yellowish Pollux and white Castor in constellation Gemini. As an added attraction the "winter" Milky Way spans the sky from constellation Monoceros in the southeast through Auriga and Perseus near the zenith to Lacerta and Cygnus in the northwest.



**MERCURY IN THE PRE-DAWN SKY.** Mercury was an "evening star" in late December, and now the "Speedster Planet" is again visible, but in the pre-dawn sky. On January 14 at 6:38 AM MST, it's tough to spot Mercury, shining at magnitude +1.24, in morning twilight, only 3 degrees above the east-southeastern horizon. But by January 18 at 6:38 AM MST, Mercury is 6 degrees above the horizon and has brightened to magnitude +0.42. By January 28 at 6:30 AM MST, Mercury is brighter still and easy to spot, shining at magnitude -0.02 in less glaring twilight with the Sun 11 degrees below the horizon. Mercury's disk appears to wax from 17% illuminated on January 14 to 59% illuminated on January 28, as

the Innermost Planet's distance from Earth increases from 67 to 90 million miles. **Please do your Mercury spotting before sunrise. NEVER chance looking at the Sun directly; serious eye damage can result.**

**THE SUN.** Solar activity has been increasing during the past two years, and it can be interesting to monitor the Sun as the new solar cycle "ramps up." M-class ("moderate") solar flares have been occurring frequently, and there were X-class ("extreme") flares on January 5, 9, and 10, 2023! There also have been coronal mass ejections ("CMEs") of charged particles that have triggered auroras recently. As of January 13, there are many sunspots and active regions visible on the Sun, so keep an eye out for solar flares with associated CMEs. You can monitor sunspots, solar flares, CMEs, and other solar activity safely and in "real time" at the following sites:

<https://sdo.gsfc.nasa.gov/data/>

<https://stereo.gsfc.nasa.gov/beacon/>

<http://halpha.nso.edu/>

<https://www.swpc.noaa.gov/>

<https://sohowww.nascom.nasa.gov/data/realtime-images.html>

<http://www.sidc.be/silso/ssngraphics>

**Do not look at the Sun directly without safe, specialized solar filters. Looking at the Sun can be very dangerous unless you take adequate precautions. Severe eye damage and even blindness can result.**

**AURORAS (aka "polar lights" or "northern lights").** Although it can be challenging to spot auroras from Colorado's mid-northern latitudes, "northern lights" have been seen from our region in the past year. Solar magnetic storms, when directed toward Earth, can cause auroras. With current, high solar activity, chances for auroras are good. You can get predictions for auroras, their intensity, and geographic extent from NOAA's Space Weather Prediction Center: <https://www.swpc.noaa.gov/> You may also view auroras online in "real time" via the Canadian Space Agency's "AuroraMax" all-sky camera at Yellowknife: <https://auroramax.com/live>

**EARTH SATELLITE HIGHLIGHTS.** The following predictions are for western Colorado, specifically Montrose, in Mountain Standard Time (MST). Numerous Earth satellites are visible every clear night. Brighter satellites have smaller magnitude numbers, and the brightest (e.g., the International and Tiangong Space Stations) may have negative magnitudes. These predictions are for selected passes of some bright and/or interesting satellites (as summarized from Heavens-Above.com).

**January 14, 2023. International Space Station (ISS). 6:18 to 6:20 PM MST, SSE to SE to ESE, disappears into Earth's shadow near maximum altitude 14 deg above ESE, max magnitude -1.7 (Passing through Fornax, Eridanus, and Lepus). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**January 15, 2023. International Space Station (ISS). 7:04 to 7:07 PM MST, SW to SSW, disappears into Earth's shadow at maximum altitude 58 deg above SSW, max magnitude -3.3 (Passing through Piscis Austrinus-near Fomalhaut, Cetus, and Pisces). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**January 16, 2023. International Space Station (ISS). 6:16 to 6:19 to 6:21 PM MST, SSW to SE to ENE, disappears into Earth's shadow 22 deg above ENE, maximum altitude 41 deg above SE, max magnitude -3.2 (Passing through Piscis Austrinus, Sculptor, Eridanus, Orion, and Gemini). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**January 16, 2023. Tiangong (Chinese Space Station).** 7:08 to 7:09 PM MST, SSW to S, disappears into Earth's shadow at max altitude 20 deg above S, max magnitude 0.0 (Passing through Sculptor and Fornax). **Tiangong's orbit may change frequently. Check for updates.**

**January 17, 2023. Tiangong (Chinese Space Station).** 6:10 to 6:12 to 6:14 PM MST, S to SE to ESE, max altitude 16 deg above SE, disappears into Earth's shadow 12 deg above ESE, max magnitude 0.0 (Passing through Sculptor, Fornax, Eridanus, Lepus, and Orion). **Tiangong's orbit may change frequently. Check for updates.**

**January 17, 2023. International Space Station (ISS).** 7:04 to 7:07 PM MST, WSW to NNW, disappears into Earth's shadow at max altitude 36 deg above NNW, max magnitude -2.6 (Passing through Aquarius, Pegasus, and Cygnus/Cepheus). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**January 18, 2023. International Space Station (ISS).** 6:15 to 6:18 to 6:21 PM MST, WSW to NW to NE, disappears into Earth's shadow 17 deg above NE, maximum altitude 62 deg above NW, max magnitude -3.5 (Passing through Capricornus-near Venus and Saturn, Aquarius, Pegasus, Cassiopeia, Camelopardalis, and Ursa Major). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**January 18, 2023. Tiangong (Chinese Space Station).** 6:47 to 6:50 to 6:51 PM MST, SW to SSE to SE, max altitude 49 deg above SSE, disappears into Earth's shadow 47 deg above SE, max magnitude -1.8 (Passing through Piscis Austrinus/Aquarius, Cetus, and Eridanus). **Tiangong's orbit may change frequently. Check for updates.**

**January 19, 2023. International Space Station (ISS).** 7:04 to 7:07 PM MST, WNW to NNW, disappears into Earth's shadow near max altitude 18 deg above NNW, max magnitude -1.6 (Passing through Delphinus, Vulpecula, Cygnus, and Draco). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**January 20, 2023. International Space Station (ISS).** 6:15 to 6:18 to 6:20 PM MST, W to NNW to NNE, disappears into Earth's shadow 11 deg above NNE, max altitude 25 deg above NNW, max magnitude -2.0 (Passing through Delphinus, Vulpecula, Cygnus, Draco, Ursa Minor-near Kochab, then Draco, again). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**January 20, 2023. Tiangong (Chinese Space Station).** 6:27 to 6:30 to 6:31 PM MST, WSW to SSE to ENE, max altitude 84 deg above SSE, disappears into Earth's shadow 29 deg above ENE, max magnitude -2.2 (Passing through Aquarius, Pegasus, Triangulum, Perseus, Auriga, and Gemini). **Tiangong's orbit may change frequently. Check for updates.**

**January 21, 2023. Tiangong (Chinese Space Station).** 7:05 to 7:08 PM MST, W to NW, disappears into Earth's shadow at max altitude 47 deg above NW, max magnitude -1.4 (Passing through Equuleus, Lacerta, and Cepheus/Cassiopeia). **Tiangong's orbit may change frequently. Check for updates.**

**January 21, 2023. International Space Station (ISS).** 7:05 to 7:06 to 7:07 PM MST, NW to NNW to N, disappears into Earth's shadow near max altitude 11 deg above N, max magnitude -1.1 (Passing through



Vulpecula, Cygnus, and Draco). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**January 22, 2023. International Space Station (ISS).** 6:15 to 6:18 to 6:19 PM MST, NW to NNW to NNE, max altitude 14 deg above NNW, disappears into Earth's shadow 8 deg above NNE, max magnitude -1.3 (Passing through Sagitta, Cygnus, Lyra, Draco, and Ursa Major-Big Dipper). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**January 23, 2023. Tiangong (Chinese Space Station).** 6:45 to 6:48 to 6:49 PM MST, WNW to N to NNE, max altitude 45 deg above N, disappears into Earth's shadow at max altitude 40 deg above NNE, max magnitude -1.6 (Passing through Delphinus, Cygnus, Cepheus, and Camelopardalis). **Tiangong's orbit may change frequently. Check for updates.**

**January 24, 2023. Tiangong (Chinese Space Station).** 7:24 to 7:25 PM MST, WNW, disappears into Earth shadow at max altitude 29 deg above WNW, max magnitude -0.3 (Passing through Delphinus and Cygnus/Lacerta). **Tiangong's orbit may change frequently. Check for updates.**

**January 25, 2023. Tiangong (Chinese Space Station).** 6:25 to 6:28 to 6:30 PM MST, WNW to N to ENE, max altitude 47 deg above N, disappears into Earth shadow at max altitude 23 deg above ENE, max magnitude -1.7 (Passing through Vulpecula, Cygnus, Cepheus, Camelopardalis, and Lynx). **Tiangong's orbit may change frequently. Check for updates.**

**January 26, 2023. Tiangong (Chinese Space Station).** 6:54 to 6:57 to 6:58 PM MST, WNW to NNE to ENE, max altitude 71 deg above NNE, disappears into Earth's shadow at max altitude 64 deg above ENE, max magnitude -2.3 (Passing through Cygnus, Lacerta, Cassiopeia, Perseus, and Auriga). **Tiangong's orbit may change frequently. Check for updates.**

**January 27, 2023. International Space Station (ISS).** 7:02 to 7:04 PM MST, NW to N, disappears into Earth shadow at max altitude 11 deg above N at max altitude, max magnitude -1.1 (Passing through Draco). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**January 27, 2023. Tiangong (Chinese Space Station).** 6:05 to 6:08 to 6:11 PM MST, WNW to N to E, max altitude 58 deg above N, disappears into Earth's shadow at 11 deg above E, max magnitude -2.0 (Passing through Vulpecular, Cygnus, Cepheus, Camelopardalis, Auriga, Gemini, and Canis Minor). **Tiangong's orbit may change frequently. Check for updates.**

**January 28, 2023. Tiangong (Chinese Space Station).** 6:44 to 6:47 to 6:49 PM MST, WNW to SSW to SE, max altitude 64 deg above SSW, disappears into Earth's shadow 28 deg above SE, max magnitude -1.9 (Passing through Pegasus, Ares/Pisces, Taurus/Cetus, and Orion). **Tiangong's orbit may change frequently. Check for updates.**

Satellite orbits can change. **These predictions for satellite passes may be inaccurate by up to several minutes, especially after January 18.** For more accurate predictions of these and other satellites, check Heavens-Above.com or other satellite prediction sites for updates on the nights you wish to observe. Be sure to set application(s) for your location and time zone.

**HAPPY OBSERVING!**