

**OBSERVING HIGHLIGHTS for February 2 to 16, 2024, a “dark” Moon period.  
Black Canyon Astronomical Society (BCAS), western Colorado, USA**

**SUMMARY.** If we get clear skies, dark nights in February are great times to enjoy the winter sky. As twilight fades, the bright, yellow star, Capella, is nearly overhead, bright blue-white Rigel and reddish Betelgeuse in Orion are high in the south, and Sirius, the night sky’s brightest star, holds forth southeast of Orion’s belt. And take in the star clouds of the winter Milky Way, extending from the northwestern horizon, across the zenith to the southeast.

Keep an eye on Constellation Corona Borealis (the Northern Crown), now rising in the northeast by midnight, because a bright “new” star may suddenly appear there. Recurrent nova, T Coronae Borealis, may brighten 1500-fold and possibly become the brightest star in the Northern Crown sometime during next 2 years, most likely between now and September 2024.

Shortly after sunset, Jupiter shines brightly more than 50 degrees above the southwestern horizon and remains visible until it sets around midnight. With a telescope, you can watch the shadows of Jupiter’s moons, Io and Europa, cross the Giant Planet (see details in text under “JUPITER...”). During the first week of February, you may spot Saturn in evening twilight, less than 10 degrees above the west-southwestern horizon. But by February 16, Saturn is all but lost in solar glare, as the Ringed Planet approaches its February 28 conjunction with the Sun.

Morning-by-morning, brilliant Venus rises later, as its angular separation from the Sun decreases. Our Sister Planet rises in a dark sky at about 5:31 AM MST February 2, but by February 16 Venus rises at about 5:44 AM MST in early morning twilight. On February 16 at about 6:15 AM MST, find a place with a flat east-southeastern horizon and locate brilliant Venus about 5 degrees above the horizon (with the Sun still 10 degrees below that horizon). Then, using binoculars search for Mars, about 3 degrees below and left from Venus and more than 100 times fainter. This may be our first decent chance to see Mars during its 2024-2025 appearance.

The Moon is at last quarter on February 2. On mornings from February 3 to 8, the crescent Moon wanes. On the morning of February 7 at about 6:00 AM MST, watch the crescent Moon rise about 8 degrees to the right of and below brilliant Venus. The Moon is new and invisible on February 9. On evenings from February 10 to 15, we can watch a crescent Moon wax. The Moon reaches first quarter on February 16. On February 10, at about 6:30 PM MST, look for a skinny crescent Moon about 2 degrees below and left from Saturn. On the evening of February 14, a fatter crescent moon is about 5 degrees east of Jupiter. Enjoy seeing earthshine on the dark part of the lunar crescent, especially on mornings from February 5 to 7 and evenings from February 10 to 13 (binoculars will enhance your view).

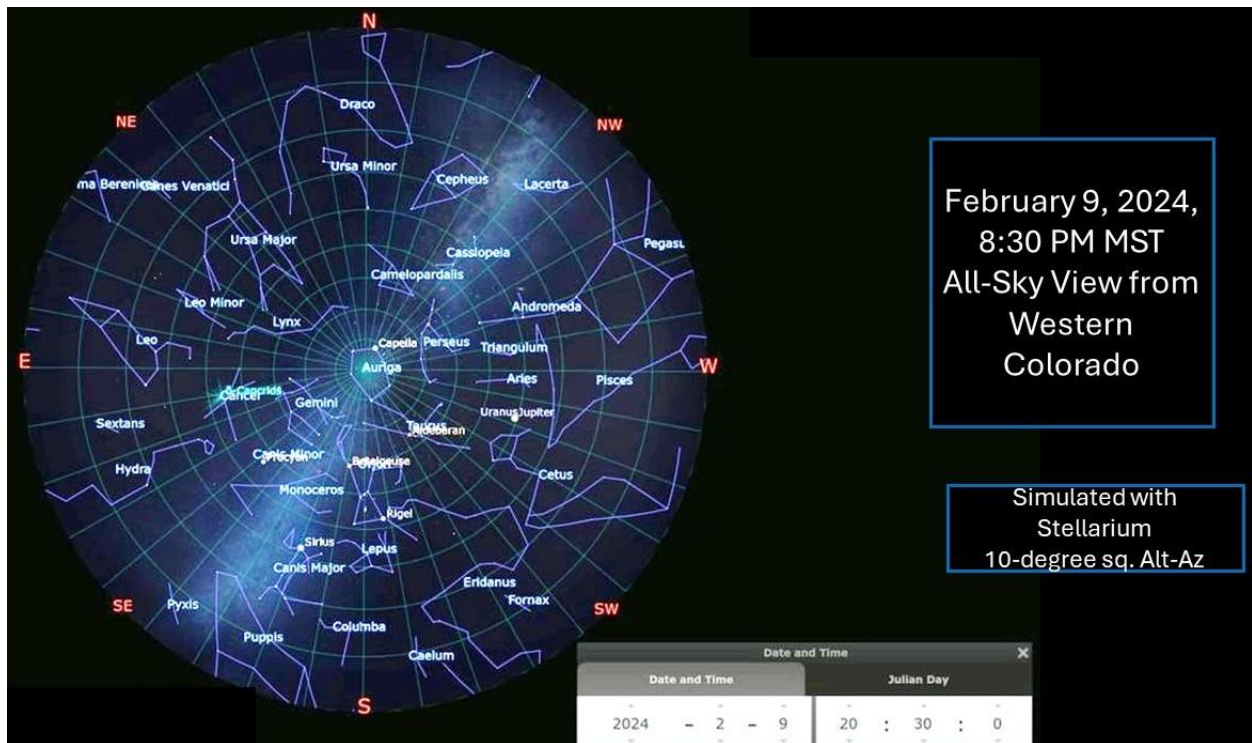
The Sun has been very active recently. An extreme (X5.0) solar flare that occurred on December 31 was the most energetic flare of the current solar cycle. You can monitor solar activity safely in real time on the internet. High solar activity is triggering auroras (aka “northern lights”) and airglow, which have been photographed and seen from Colorado in past months. So, keep watch for more of these phenomena!

There are evening passes of the bright International Space Station (ISS) from February 1 to 3 and morning ISS passes from February 14 to 16. And there are morning passes of the almost-as-bright Tiangong (Chinese) Space Station from February 2 to 16. Striking passes of Starlink satellite “trains” from recent launches may also be visible.

**WESTERN SLOPE SKIES.** Since 2011, BCAS and KVN Community Radio have been producing [Western Slope Skies](#) (WSS), a biweekly astronomy feature, which airs every two weeks at about 8:10 AM on Fridays and 7:00 PM on Wednesdays. On February 2 and 7, BCAS President, Bryan Cashion, tells us about the historic “Maunder Minimum” in solar activity.

**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 unaided eyes 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>

**A DARK, STARRY FEBRUARY SKY!** Enjoy the bright stars of winter and the winter Milky Way during this dark Moon period! Use a planetarium App or the chart below to help navigate. At 8:30 PM MST during early February, Constellation Orion, with its bright stars, Rigel and Betelgeuse, is high in the south. Follow the 3 stars of Orion’s “belt” to the southeast to find Sirius, the night sky’s brightest star in Constellation Canis Major (the big dog). Find the bright star, Capella, in Constellation Auriga (a mythical charioteer), which is directly overhead. Locate Constellation Gemini (the twins), with bright stars Pollux and Castor, northeast of Orion and southeast of Auriga. Constellation Leo (a mythical lion) is rising in the east. Star clouds of the winter Milky Way extend from the northwestern horizon across the zenith to the southeast.



**THE MOON.** The Moon reaches **last quarter on February 2** (at 4:18 PM MST). On mornings from February 3 to 8, the crescent Moon wanes. On the morning of February 7, around 6:00 AM MST, watch the 8%-illuminated, crescent Moon rise about 8 degrees to the right and below brilliant Venus. **The Moon is new on February 9** (exactly new at 3:59 PM MST), and therefore invisible. On evenings from February 10 to 15, we can watch a crescent Moon wax. The Moon reaches **first quarter on February 16** (at exactly 8:01 AM MST). Enjoy seeing earthshine on the dark part of the crescent Moon, especially on mornings from February 5 to 7 and evenings from February 10 to 13 (binoculars will enhance your view).

Find a place with an unobstructed west-southwestern horizon, and on February 10 at about 6:30 PM MST look for a “skinny”, 2%- illuminated, crescent Moon about 2 degrees below and left from Saturn (binoculars will help). On the evening of February 14, the 33%-illuminated, lunar crescent is about 5 degrees east of Jupiter. NASA has published a [stunning visualization of lunar phases for year 2024](#). **Please do your crescent Moon spotting before sunrise and after sunset. NEVER chance looking at the Sun directly; serious eye damage can result.**

**WILL A BRIGHT “NEW” STAR APPEAR IN THE NORTHERN CROWN?** Will there soon be a bright “new” star in Constellation Corona Borealis (the “Northern Crown”), at least briefly? T Coronae Borealis (T CrB) is a recurrent nova that increased in brightness by about 1500 times (from magnitude +10 to +2 or +3) in the years 1866 and 1946 (and an earlier outburst was probably recorded in 1787). During February, Constellation Corona Borealis, marked by a conspicuous “semicircle” of stars between the Constellations Boötes and Hercules, rises in the east-northeast by midnight and is well placed for viewing from about 1 AM MST until morning twilight. T CrB is located on the east side of the “Northern Crown’s” semicircle (about half a degree south and east of the star Epsilon CrB). T CrB’s outburst periodicity is about 79 years, and a new outburst is anticipated within the next year or two. During a past outburst, T CrB became slightly brighter than 2<sup>nd</sup>-magnitude, Alphecca, normally the brightest star in Corona Borealis. For us skywatchers that’s great news! The bad news is that during past outbursts, T CrB brightened in less than 3 hours, stayed bright for only 12 hours, and then faded below naked-eye visibility in just one week. T CrB consists of a white dwarf closely orbiting a red giant star. The white dwarf continuously draws matter, including hydrogen, from the red giant star. As hydrogen accumulates on the white dwarf, it eventually reaches temperatures and pressures sufficient for hydrogen fusion, creating enormous, thermonuclear explosions that result in 1500-X increases in brightness about every 79 years. Brad Schaefer, an astrophysicist at Louisiana State University, noted that T CrB’s past, pre-outburst behavior showed a slight, multi-year brightening followed by a briefer “pre-eruption dip” (Schaefer, B. E., *Sky & Telescope*, March 2024, p. 34-40). T CrB again has brightened slightly from 2016 through 2022, followed by a marked dip during the past 11 months. Based on its past behavior, Schaefer predicts that the next outburst date for T CrB will be “2024.4 +/- 0.3.” That’s sometime between now and next September! **So, keep an eye on Corona Borealis!** Find more information on T CrB at these sites. [https://en.wikipedia.org/wiki/T\\_Coronae\\_Borealis](https://en.wikipedia.org/wiki/T_Coronae_Borealis)  
<https://skyandtelescope.org/observing/whats-up-with-t-crb04202016/>

**SATURN – LAST CALL IN THE EVENING.** As evening twilight fades on February 2, Saturn is less than 10 degrees above the west-southwestern horizon, and the Ringed Planet soon descends, setting at about 7:24 PM MST. By February 16 Saturn is all but lost in bright evening twilight, as the Ringed Planet approaches its February 28 solar conjunction. Between February 2 and 16, Saturn’s distance increases from 988 to 994 million miles. When on the far side of the Sun on February 28, Saturn will be 996 million miles distant. Saturn will reappear in morning twilight by late March. **Please do your Saturn spotting after sunset. NEVER chance looking at the Sun directly; serious eye damage can result.**

**JUPITER UNTIL ABOUT MIDNIGHT.** Not long after sunset, look for Jupiter, shining brightly, more than 50 degrees above the southwestern horizon. Between February 2 and 16, the Giant Planet fades slightly (from magnitude -2.33 to -2.25), as its distance from Earth increases from 465 to 485 million miles. Jupiter sets in the west northwest at about 12:28 AM MST on February 2 and 11:41 PM MST on February 16. Through telescopes or binoculars, the Giant Planet’s apparent equatorial diameter decreases from 39.5 to 37.7 arc seconds during this period. Use a telescope or binoculars to spot Jupiter’s four bright moons. You can identify them by their changing positions and referring to various planetarium apps or this website:

[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, the largest moon in the Solar System, casts the largest shadow of Jupiter's moons, and its shadow is usually the easiest to spot crossing the Giant Planet. Unfortunately, there are no transits of Ganymede's shadow that are visible from the Western Slope during this period. Europa's small shadow can be challenging to spot. Io's shadow is larger than Europa's but smaller than Ganymede's shadow. Callisto's shadow does not cross Jupiter during this period.

February 4 to 5, 2024, 10:04 PM to 12:16 AM MST, Io's shadow crosses Jupiter (Locally Jupiter sets at about 12:21 AM MST).

February 6, 2024, 4:32 PM to 6:46 PM MST. Io's shadow crosses Jupiter (Locally, the Sun sets at about 5:37 PM MST. This event begins in daylight and ends during late, evening twilight).

February 7, 2024, 5:14 PM to 7:44 PM MST. Europa's shadow crosses Jupiter (Locally, the Sun sets at about 5:38 PM MST. This event begins in daylight and ends under a dark sky).

February 13, 2024, 6:28 PM to 8:42 PM MST. Io's shadow crosses Jupiter. (Locally the Sun sets at 5:45 PM MST).

February 14, 2024, 7:50 PM to 10:20 PM MST, Europa's shadow crosses Jupiter.

**VENUS – RISING LATER, BUT STILL A BRILLIANT “MORNING STAR”!** Venus is still a beacon in the east-southeast, rising before the Sun in a dark sky at about 5:31 AM MST on February 2 and rising during early morning twilight at 5:44 AM MST on February 16. Morning-by-morning Venus rises later, as its angular separation from the Sun continues to decrease. Venus is still brilliant but continues to fade a bit (from magnitude -3.94 to -3.91) between February 2 and 16, as its distance from Earth increases from 127 to 134 million miles, and its apparent diameter (as seen through telescopes) decreases from 12.2 to 11.6 arc seconds. Use a telescope to watch Venus' gibbous phase wax from 86% to 89% illuminated between February 2 and 16. Venus is nearly at “full phase” now. **Please do your Venus spotting before sunrise. NEVER chance looking at the Sun directly; serious eye damage can result.**

**MARS IN MORNING TWILIGHT.** Since late last summer, Mars has been immersed in the Sun's glare. But having passed solar conjunction on November 18, Mars is starting to emerge from that glare, and you might spot it with binoculars in morning twilight. Find a place with an unobstructed east-southeastern horizon. On February 16 at about 6:15 AM MST, find brilliant Venus about 5 degrees above the horizon (with the Sun still about 10 degrees below the horizon). Then using binoculars look for Mars about 3 degrees above the horizon and about 3 degrees below and left from Venus. Venus and Mars will appear in the same field of view for most binoculars on February 16. Mars, shining at magnitude +1.23, is 210 million miles from Earth, while Venus is “only” 134 million miles distant on February 16. Venus now appears more than 100 times brighter than Mars. Morning-by-morning, Mars will appear to edge even closer to Venus, leading up to a conjunction on February 22, when Earth's “sibling planets” will appear less than 1 degree apart.

**THE SUN.** The Sun has been impressively active in the past year. M-class (“moderate”) solar flares have been occurring most weeks, and X-class (“extreme”) flares occurred on January 5, 9, 10, February 11, 17, March 3, 29, June 20, July 2, August 5 and 7, and December 14 and 31, 2023 (an X5 flare that occurred on December 31 was the strongest of the current solar cycle). There also have been many coronal mass

ejections (“CMEs”) of charged particles that have triggered auroras. [Airglow](#) also results from [high solar activity](#), and this phenomenon has been photographed and observed from Colorado. As of February 1, there are many sunspots and active regions on the Earth-facing side of the Sun. M- and even X-class solar flares are likely during this period. Some flares may be associated with 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://halph.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”).** It can be challenging to spot auroras from Colorado’s mid-northern latitudes, but in the past year auroras were photographed and seen from Colorado and even farther south in Arizona! Solar magnetic storms, when directed toward Earth, can cause auroras. With current, high solar activity, chances for auroras are good. You can get predictions and updates for auroras, their intensity, and geographic extent from NOAA’s Space Weather Prediction Center:

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

<https://www.swpc.noaa.gov/products/aurora-viewline-tonight-and-tomorrow-night-experimental>

We can watch aurora in real-time from Yellowknife, Northwest Territories on an all-sky camera at the [Canadian Space Agency’s AuroraMax website](#). After “prolonged technical difficulties” this season, AuroraMax has now been restored. Like Colorado, Yellowknife is in the Mountain Time Zone. Other aurora webcams are also operating. See this review article...

<https://www.space.com/northern-lights-webcams-watch-aurora-online>

Here’s a link to another aurora webcam in the Mountain Time Zone, at Banff, Alberta, Canada...

<https://www.youtube.com/watch?v=2zt8AUDH8Us>

An aurora webcam at the University of Alaska-Fairbanks is two hours behind the Mountain Time Zone...

<https://www.youtube.com/watch?v=O52zDyXg5QI>

**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](#)). Satellite orbits can change. **These predictions for satellite passes may be inaccurate by up to several minutes, especially after February 5.** 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.

**Starlink satellite “trains”, when viewed from less than 1 day to about 4 days after launch, can be very eye-catching! Check [Heavens-Above.com](#) (or other sites) for updated, local predictions of “trains” of Starlink satellites. Starlink satellites are launched often, [typically once or twice per week](#).**

**February 1, 2024. International Space Station (ISS). 6:41 to 6:44 to 6:47 PM MST. NW to NE to SE. Max altitude 81 deg above NE, disappears into Earth’s shadow 20 deg above SE, max magnitude -3.9**

(Passing through Cygnus, Cepheus, Cassiopeia, Perseus, Auriga, Taurus, Orion-near Betelgeuse, and Monoceros). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**February 2, 2024. Tiangong (Chinese Space Station). 6:30 to 6:32 to 6:34 AM MST.** S to SE to ESE, Max altitude 15 deg above SE, max magnitude +0.8 (Passing Centaurus, Lupus, Scorpius, and Sagittarius). **Tiangong's orbit may change frequently. Check for updates.**

**February 2, 2024. International Space Station (ISS). 7:31 to 7:33 to 7:35 PM MST.** W to SW to SSW. Max altitude 17 deg above SW, disappears into Earth's shadow 12 deg above SSW, max magnitude -1.0 (Passing through Pegasus, Pisces, Cetus, Fornax, and Eridanus). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**February 3, 2024. International Space Station (ISS). 6:42 to 6:45 to 6:48 PM MST.** WNW to SW to SSE. Max altitude 30 deg above SW, max magnitude -1.8 (Passing through Pegasus, Pisces, Cetus, Fornax, and Eridanus). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**February 4, 2024. Tiangong (Chinese Space Station). 6:02 to 6:05 to 6:08 AM MST.** SSW to SSE to E, Max altitude 24 deg above SSE, max magnitude +0.0 (Passing Centaurus, Scorpius, Ophiuchus, Scutum, and Aquila). **Tiangong's orbit may change frequently. Check for updates.**

**February 5, 2024. Tiangong (Chinese Space Station). 5:04 to 5:06 AM MST. (1<sup>st</sup> AM Tiangong pass of February 5).** SE to ESE, appears from Earth's shadow at max altitude 14 deg above SE, max magnitude +0.8 (Passing through Scorpius-near Moon, Ophiuchus, Scutum and Aquila). **Tiangong's orbit may change frequently. Check for updates.**

**February 5, 2024. Tiangong (Chinese Space Station). 6:37 to 6:40 to 6:43 AM MST. (2<sup>nd</sup> AM Tiangong pass of February 5).** WSW to SSE to ENE, max altitude 71 deg above SSE, max magnitude -1.9 (Passing through Virgo, Boötes/Serpens, Hercules, Cygnus/Sagitta, and Vulpecula). **Tiangong's orbit may change frequently. Check for updates.**

**February 6, 2024. Tiangong (Chinese Space Station). 5:38 to 5:39 to 5:42 AM MST.** S to SSE to E, appears from Earth's shadow 34 deg above S, max altitude 40 deg above SSE, max magnitude -1.1 (Passing through Libra, Ophiuchus, and Aquila). **Tiangong's orbit may change frequently. Check for updates.**

**February 7, 2024. Tiangong (Chinese Space Station). 6:11 to 6:14 to 6:17 AM MST.** WSW to NNW to ENE, appears from Earth's shadow 20 deg above WSW, max altitude 78 deg above NNW, max magnitude -2.2 (Passing through Leo, Canes Venatici, Draco/Hercules, and Cygnus). **Tiangong's orbit may change frequently. Check for updates.**

**February 9, 2024. Tiangong (Chinese Space Station). 5:46 to 5:47 to 5:50 AM MST.** NW to NNW to ENE, appears from Earth's shadow 49 deg above NW, max altitude 58 deg above NNW, max magnitude -2.0 (Passing through Ursa Major-Big Dipper, Draco, and Cygnus). **Tiangong's orbit may change frequently. Check for updates.**

**February 10, 2024. Tiangong (Chinese Space Station). 6:20 to 6:22 to 6:25 AM MST.** WNW to N to ENE, appears from Earth's shadow 15 deg above WNW, max altitude 45 deg above N, max magnitude -1.6 (Passing through Ursa Major, Draco, Ursa Minor, and Cepheus/Cygnus). **Tiangong's orbit may change frequently. Check for updates.**

**February 11, 2024. Tiangong (Chinese Space Station). 5:21 to 5:23 AM MST.** NE to ENE, appears from Earth's shadow at max altitude 39 deg above NE, max magnitude -1.1 (Passing through Cygnus and Vulpecula). **Tiangong's orbit may change frequently. Check for updates.**

**February 12, 2024. Tiangong (Chinese Space Station). 5:54 to 5:55 to 5:58 AM MST.** NW to N to E, appears from Earth's shadow 29 deg above NW, max altitude 47 deg above N, max magnitude -1.6 (Passing through Ursa Major, Ursa Minor, Draco, and Cygnus). **Tiangong's orbit may change frequently. Check for updates.**

**February 13, 2024. Tiangong (Chinese Space Station). 6:27 to 6:30 to 6:33 AM MST.** WNW to NNE to ESE, appears from Earth's shadow 11 deg above WNW, max altitude 77 deg above NNE, max magnitude -2.1 (Passing through Leo, Leo Minor, Ursa Major-Big Dipper, Draco/Hercules, Lyra, and Cygnus/Sagitta, and Delphinus/Aquila). **Tiangong's orbit may change frequently. Check for updates.**

**February 14, 2024. Tiangong (Chinese Space Station). 5:28 to 5:31 AM MST.** N to E, appears from Earth's shadow at max altitude 55 deg above N, max magnitude -1.9 (Passing through Ursa Minor, Draco, Cygnus, and Sagitta/Delphinus/Aquila). **Tiangong's orbit may change frequently. Check for updates.**

**February 14, 2024. International Space Station (ISS). 6:37 to 6:40 to 6:44 AM MST.** SW to SE to ENE. Max altitude 52 deg above SE, max magnitude -2.9 (Passing through Libra Ophiuchus, Aquila, Vulpecula, and Cygnus). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**February 15, 2024. International Space Station (ISS). 5:49 to 5:52 to 5:55 AM MST.** SSW to SE to ENE. Max altitude 28 deg above SE, max magnitude -1.8 (Passing through Centaurus, Lupus, Scorpius, Ophiuchus/Sagittarius, Scutum, Aquila, and Delphinus). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**February 15, 2024. Tiangong (Chinese Space Station). 6:01 to 6:03 to 6:06 AM MST.** WNW to SSW, to ESE, appears from Earth's shadow 23 deg above WNW, max altitude 73 deg above SSW, max magnitude -2.2 (Passing through Leo, Boötes, Hercules/Serpens, Ophiuchus, and Aquila). **Tiangong's orbit may change frequently. Check for updates.**

**February 16, 2024. International Space Station (ISS). 5:03 to 5:04 to 5:06.** SSE to SE to E. Appears from Earth's Shadow 13 deg above SSE, max altitude 16 deg above SE, max magnitude -1.0 (Passing through Scorpius, Ophiuchus/Sagittarius, Scutum, and Aquila). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

**February 16, 2024. Tiangong (Chinese Space Station). 5:03 to 5:04 AM MST.** In E, appears from Earth's shadow at max altitude 32 deg above E, max magnitude -0.4 (Passing through Aquila). **Tiangong's orbit may change frequently. Check for updates.**

**HAPPY OBSERVING!**