

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

SUMMARY. **This dark Moon period is a good time to enjoy the bright stars of winter, the winter Milky Way, and Jupiter before they are lost to lengthening evening twilight.** You may also spot evening zodiacal light by finding a western horizon that is free from urban light domes. During the early evening, fading Mars is still high in the south southwest, and brilliant Venus is climbing higher in the west and getting brighter. Mercury reappears in evening twilight on March 27, just 1.5 degrees from bright Jupiter. And Saturn reappears in morning twilight by late March. The Moon reaches last quarter on March 14, and on mornings from March 15 to 19, we can watch a crescent Moon wane. The Moon is new and invisible on March 21. On evenings from March 22 to 27, watch a lunar crescent wax to first quarter on March 28. The crescent Moon has close passes by Jupiter on March 22, Venus on March 23, Uranus on March 24, and Mars on the night of March 27-28. The Sun has been very active recently. Several sunspot groups are now present, and there have been many solar flares and coronal mass ejections of charged particles in the past few weeks, including X-class (extreme) solar flares. You can monitor solar activity safely in real time on the internet. **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.** High solar activity is triggering auroras (aka “northern lights”). You can view them in real time from Yellowknife, Canada on the [AuroraMax.com/live](https://www.auroramax.com/live) website and possibly from Colorado. And for western Colorado, there are some bright evening passes of both the International and Tiangong Space Stations.

WESTERN SLOPE SKIES. Since 2011, the BCAS and KVNF Community Radio have been producing Western Slope Skies (WSS), a biweekly astronomy feature. On March 17 and 22, Gina Loewen tells us about NASA’s Commercial Lunar Payload Services program. WSS features are linked here: <https://www.kvnf.org/show/western-slope-skies#stream/0>

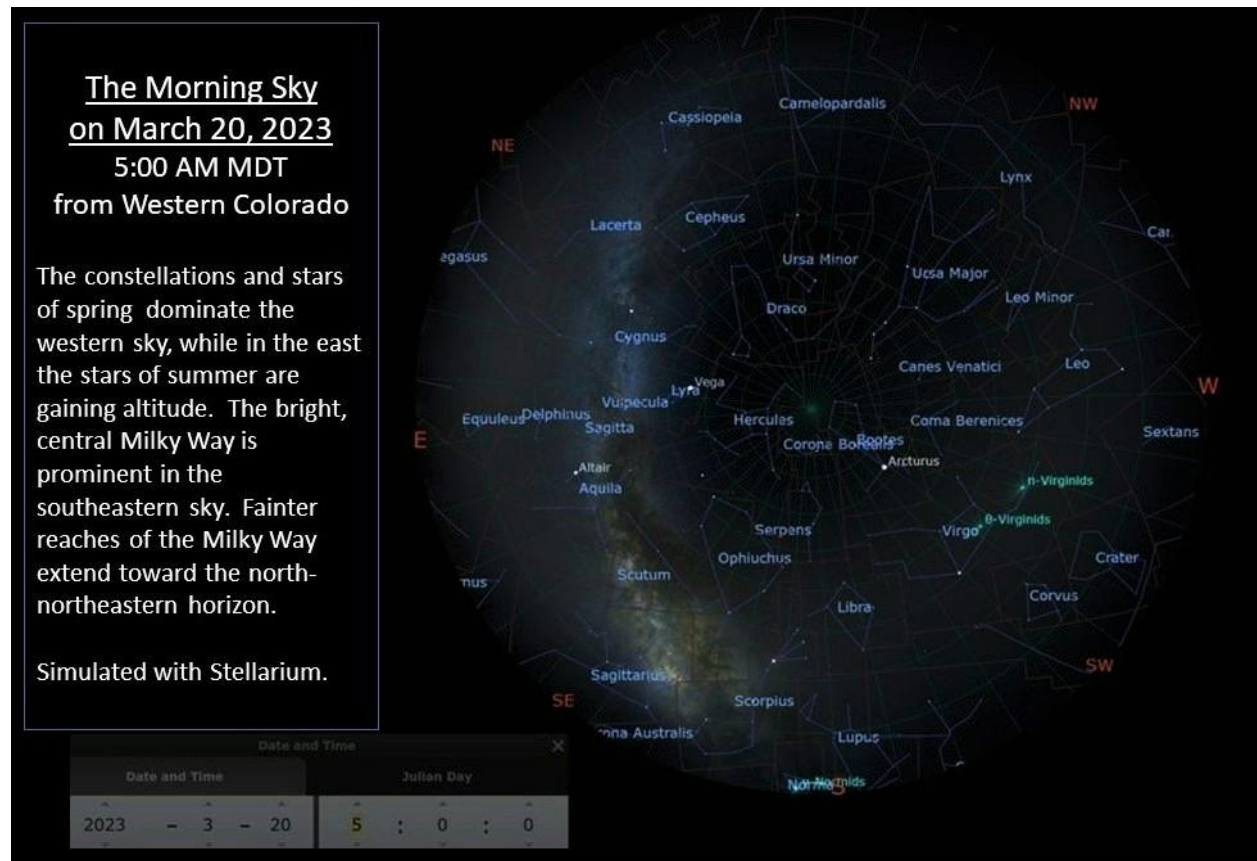
Note: The apparent brightness of sky objects is measured in “magnitude” units. Many bright stars are magnitude +1, while the faintest stars easily visible to unaided eyes under dark skies are magnitude +6. Some of the brightest stars are 0 magnitude (e.g., Vega, Arcturus), while the brightest sky objects 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>

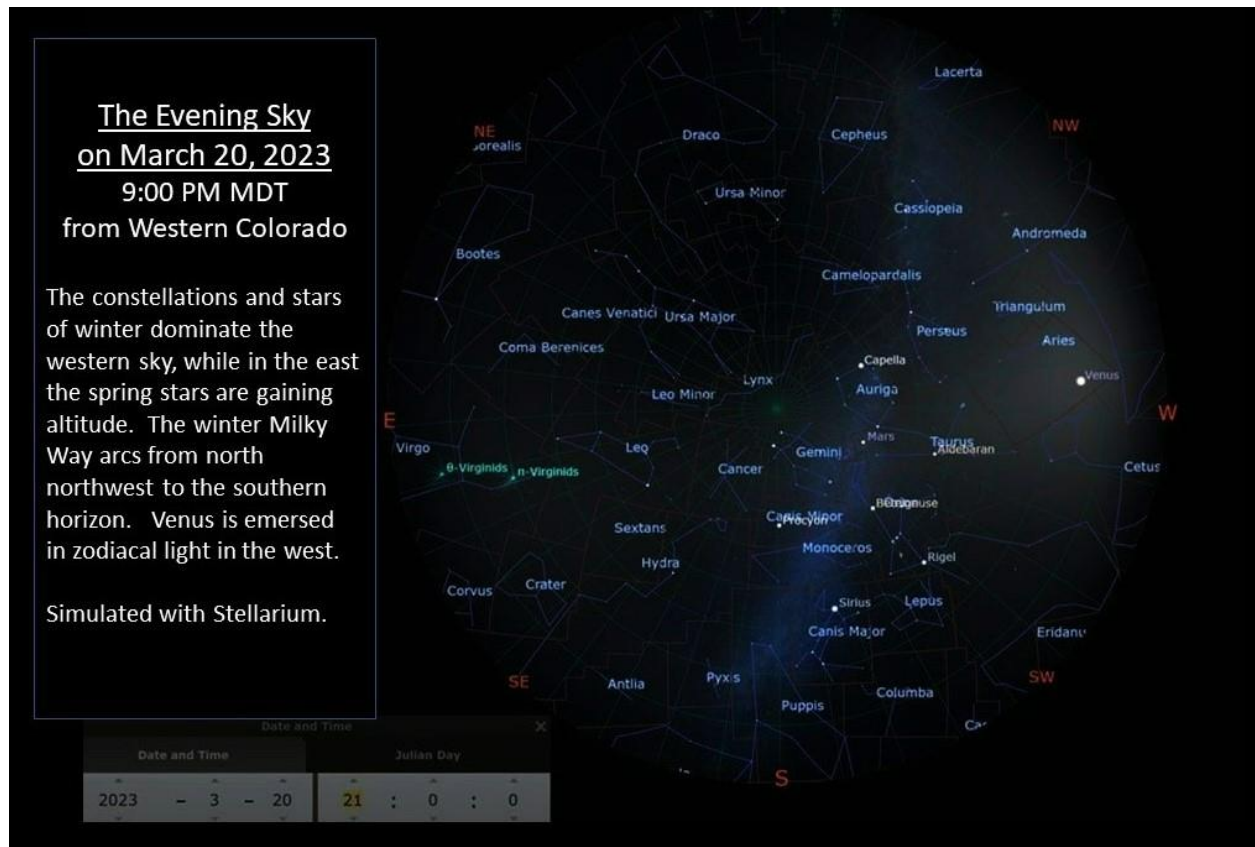
THE MOON. The Moon reaches **last quarter on March 14 (at 8:08 PM MDT)**. On mornings from March 15 to March 19, watch the crescent Moon wane. On March 19 at about 6:45 AM MDT (in bright twilight), look for a 7%-illuminated, lunar crescent just 2 degrees above an unobstructed east-southeastern horizon with Saturn about 3 degrees above and left from the Moon (you may need binoculars). **The Moon is new (and invisible) on March 21** (exactly new at 11:23 AM MDT). On evenings from March 22 to March 27, we can watch a crescent Moon wax. The Moon reaches **first quarter on the evening of March 28** (at 8:32 PM MDT). On the evening of March 22 at about 8:05 to 8:15 PM MDT, look for a thin (2%-illuminated) crescent Moon about 2 degrees above Jupiter (binoculars may help). On the evening of March 23, the crescent Moon, now 7% illuminated, is about 5 degrees below brilliant Venus. On March 24 at 8:15 PM MDT, the 13%-illuminated lunar crescent is about 1.5 degrees above and to the right of the planet, Uranus. You will need a telescope or binoculars to spot Uranus, which shines faintly at magnitude 6. And on the night of March 27-28, a fat lunar crescent (41% illuminated) is about 5 degrees below and to the right of reddish Mars. 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.

THE MARCH 20 EQUINOX AND EVENING ZODIACAL LIGHT. Our spring Equinox occurs on March 20 at 3:25 PM MDT, when the Sun shines directly on Earth's equator, and daylight and nighttime hours are approximately equal. After March 20 in Earth's northern hemisphere, daylight hours will expand rapidly, as nighttime hours shrink. This is also a great time to look for the zodiacal light after the end of evening twilight around 8:45 to 9:15 PM MDT. To see this triangular-shaped, faint glow, find a western horizon that is free from urban light domes. The zodiacal light is caused by forward scattering of sunlight from dust particles in the plane of the solar system. During late March the zodiacal light typically spans constellations Pisces and Aries in the western sky.

TIME FOR A MESSIER MARATHON? Dark Moon times in late March are notorious among amateur astronomers. During this period, it's possible to view, during one very long night, all 110 deep sky objects (including stars clusters, galaxies, and nebulae) from Charles Messier's famous catalog. Such excessive-compulsive behavior is known as a [Messier Marathon](#). Only people located between 20 to 34 degrees north latitude have a decent chance of seeing all 110 of these objects in one night. From the latitudes of Colorado, most people miss at least a few. For more information on Charles Messier and his catalog, listen to Bryan Cashion's [Western Slope Skies radio feature](#). Even if you don't attempt a Messier Marathon, late March is a great time to enjoy the stars and constellations of our winter and spring skies during evening hours and our emerging summer stars during predawn hours. You can use binoculars, telescopes, or just your eyes unaided! The following charts may help you navigate.





VENUS: BRILLIANT IN THE EARLY EVENING. Moving higher in the west, night by night, brilliant Venus (magnitude -4.0) is getting even more striking during and after evening twilight. Venus sets in a dark sky at about 10:04 PM MDT on March 14 and 10:34 PM MDT on March 28. During this period Venus continues moving east northeastward against the starry background of constellations Pisces and Aries. Between March 14 and 28, Venus' apparent diameter increases from 12.9- to 13.8-arc seconds wide, as its gibbous disk wanes from 82% to 78% illuminated. Venus' distance from Earth decreases from 120 to 112 million miles during this period. In the weeks ahead Venus will have a conjunction with Uranus on March 30 and then with Mercury during 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.**

MERCURY REAPPEARS IN EVENING TWILIGHT. On March 16 Mercury is in conjunction with the Sun, and effectively invisible. But by the end of March, you might spot Mercury low in evening twilight. On March 27 between 7:55 and 8:10 P MDT, look just north of due west and try to spot Mercury (magnitude -1.4) about 1.5 degrees to the right of brighter Jupiter (magnitude -2.1). An unobstructed western horizon and binoculars will help you spot the Innermost Planet in bright evening twilight. On March 27 Mercury's gibbous disc is 90% illuminated, and the "Speedster Planet" is 114 million miles distant, whereas Jupiter is 551 million miles from Earth. During early April, Mercury will get easier to spot, making its best evening appearance of the year for us northern hemisphere dwellers. **Please do your Mercury spotting after sunset. NEVER chance looking at the Sun directly; serious eye damage can result.**

JUPITER BOWS OUT AFTER AN EVENING CONJUNCTION WITH MERCURY ON MARCH 27. This period is the last good time to view Jupiter in the evening sky for many months. On March 27 between 7:55 and 8:10 PM MDT during evening twilight, look a bit north of due west, and you may spot Jupiter in a close conjunction with Mercury (see discussion above). As the sky darkens on March 14, Jupiter shines brightly at magnitude -2.1, about 15 degrees above the western horizon. By late March, it gets harder to spot the Giant Planet in the evening, as it edges closer to its solar conjunction on April 11. Jupiter sets in the west at about 8:57 PM MDT on March 14 and at 8:19 MDT on March 28, only 38 minutes after sunset. Jupiter's distance from Earth increases from 545 to 551 million miles during this period. Using binoculars or a telescope, you can resolve the Giant Planet's disk, which appears 34 to 33 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://skvandtelescope.org/wp-content/plugins/observing-tools/jupiter_moons/jupiter.html

Please do your Jupiter spotting after sunset. NEVER chance looking at the Sun directly; serious eye damage can result.

MARS IN THE EVENING. As the sky darkens, the Red Planet is almost 70 degrees high in the southwest, well above red giant star, Aldebaran. Mars shines at magnitude +0.6 on March 14, but it fades to magnitude +0.9 by March 28, as its distance from Earth increases from 120 to 133 million miles. Mars moves eastward against the stars of northeastern Taurus and then crosses into constellation Gemini on March 26. Mars is now about the same brightness as Aldebaran (below Mars) and a bit fainter than Betelgeuse, the red supergiant star that marks Orion's shoulder. It's possible to distinguish reddish Mars from reddish Aldebaran and Betelgeuse because those stars scintillate (or "twinkle"), but Mars usually shines with a steadier glow. Mars sets in the northwest at about 2:55 AM MDT on March 14 and at 2:30 AM MDT on March 28. Through telescopes Mars appears as a 90%-illuminated, gibbous disk. During this period, Mars' apparent diameter decreases from 7.3 to 6.6 arc seconds, and now it's challenging to see Mars' surface features through telescopes.

SATURN REAPPEARS BEFORE DAWN. Saturn was in conjunction with the Sun on February 16 and effectively invisible for more than a month. But by March 19 at 6:45 AM MDT, you may spot Saturn about 3 degrees above a thin (7% illuminated) crescent Moon (binoculars may be necessary). On March 28 at around 6:15 AM MDT look for Saturn with eyes unaided shining at magnitude +0.94 low in the southeastern sky during morning twilight. On March 28 the Ringed Planet is 986 million miles distant from Earth. Through telescopes Saturn's disk spans 16 arc seconds, and its rings span 36 arc seconds. **Please do your Saturn spotting before sunrise. NEVER chance looking at the Sun directly; serious eye damage can result.**

THE SUN. Solar activity has been increasing, and it can be interesting to monitor the Sun. M-class ("moderate") solar flares have been occurring frequently, and there were X-class ("extreme") flares on January 5, 9, 10, February 11, 17, and March 3, 2023. There also have been coronal mass ejections ("CMEs") of charged particles that have triggered auroras recently. As of March 13, there are several sunspot groups and active regions on the visible face of the Sun. M- and even X-class solar flares, some with associated CMEs, are possible during this period. 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://halphi.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. However, BCAS member and IDA-Colorado Chair, Aaron Watson saw and [photographed an aurora \(or aurora-like phenomenon\) from our region](#) in late February. This was possibly a STEVE occurrence ([The Aurora Named STEVE | NASA](#)). 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 Daylight Time (MDT). 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](#)).

March 13, 2023. Tiangong (Chinese Space Station). 9:08 to 9:11 PM MDT, WNW to NW, disappears into Earth’s shadow at max altitude 35 deg above NW, max magnitude -0.6 (Passing through Andromeda and Cassiopeia). Tiangong’s orbit may change frequently. Check for updates.

March 14, 2023. Tiangong (Chinese Space Station). 8:07 to 8:10 to 8:13 PM MDT, WNW to N to ENE, max altitude 45 deg above N, disappears into Earth’s shadow 17 deg above ENE, max magnitude -1.4 (Passing through Andromeda, Cassiopeia, Camelopardalis, Draco, Ursa Major-Big Dipper, and Coma Berenices). Tiangong’s orbit may change frequently. Check for updates.

March 14, 2023. International Space Station (ISS). 8:54 to 8:57 PM MDT, SW to SSW, disappears into Earth’s shadow at max altitude 42 deg above SSW, max magnitude -3.0 (Passing through Eridanus, Lepus, and Monoceros). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

March 15, 2023. International Space Station (ISS). 8:07 to 8:10 to 8:12 PM MDT, SSW to SE to E, max altitude 32 deg above SE, disappears into Earth’s shadow 17 deg above E, max magnitude -2.9 (Passing through Caelum, Columba, Canis Major, Hydra, and Leo). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

March 15, 2023. Tiangong (Chinese Space Station). 8:43 to 8:46 to 8:48 PM MDT, WNW to N to NE, max altitude 54 deg above N, disappears into Earth’s shadow 50 deg above NE, max magnitude -1.9 (Passing through Andromeda, Cassiopeia, Camelopardalis, Draco, and Ursa Major-Big Dipper). Tiangong’s orbit may change frequently. Check for updates.

March 16, 2023. Tiangong (Chinese Space Station). 7:42 to 7:45 to 8:48 PM MDT, WNW to N to E, max altitude 46 deg above N, disappears into Earth's shadow 8 deg above E, max magnitude -1.5 (Passing through Pegasus, Cassiopeia, Camelopardalis, and Ursa Major-Big Dipper). Tiangong's orbit may change frequently. Check for updates.

March 16, 2023. International Space Station (ISS). 8:56 to 8:59 to 9:00 PM MDT, WSW to NW to NNE, max altitude 43 deg above NW, disappears into Earth's shadow 32 deg above NNE, max magnitude -2.7 (Passing through Cetus, Aries, Perseus, Camelopardalis, and Ursa Minor). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

March 17, 2023. International Space Station (ISS). 8:08 to 8:11 to 8:15 PM MDT, SW to NW to NE, max altitude 76 deg above NW, disappears into Earth's shadow 8 deg above NE, max magnitude -3.7 (Passing through Eridanus, Taurus, Auriga, and Ursa Major-Big Dipper). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

March 17, 2023. Tiangong (Chinese Space Station). 8:16 to 8:18 to 8:21 PM MDT, WNW to NNE to E, max altitude 71 deg above NNE, disappears into Earth's shadow 25 deg above E, max magnitude -2.1 (Passing through Andromeda, Perseus, Camelopardalis, Ursa Major, Leo Minor, and Leo). Tiangong's orbit may change frequently. Check for updates.

March 18, 2023. International Space Station (ISS). 8:58 to 9:00 to 9:02 PM MDT, WNW to NNW to NNE, max altitude 20 deg above NNW, disappears into Earth's shadow 13 deg above NNE, max magnitude -1.3 (Passing through Pisces, Andromeda, Cassiopeia, Cepheus, and Draco). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

March 18, 2023. Tiangong (Chinese Space Station). 8:53 to 8:56 PM MDT, W to SSW, disappears into Earth's shadow near maximum altitude 46 deg above SSW, max magnitude -1.6 (Passing through Pisces near Venus, Taurus, and Orion). Tiangong's orbit may change frequently. Check for updates.

March 19, 2023. International Space Station (ISS). 8:09 to 8:12 to 8:15 PM MDT, W to NNW to NNE, max altitude 28 deg above NNW, max magnitude -1.9 (Passing through Pisces, Andromeda, Cassiopeia, Cepheus, and Ursa Minor/Draco). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

March 20, 2023. Tiangong (Chinese Space Station). 8:28 to 8:30 to 8:32 PM MDT, W to SSW to SSE, maximum altitude 28 deg above SSW, disappears into Earth's shadow at 16 deg above SSE, max magnitude -0.5 (Passing through Pisces, Cetus, Eridanus, Lepus, Canis Major, Puppis, and Pyxis). Tiangong's orbit may change frequently. Check for updates.

March 20, 2023. International Space Station (ISS). 9:00 to 9:02 to 9:03 PM MDT, NW to NNW to NNE, max altitude 12 deg above NNW, disappears into Earth's shadow 8 deg above NNE, max magnitude -0.9 (Passing through Andromeda, Lacerta/Cassiopeia, Cepheus, and Draco). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

March 21, 2023. International Space Station (ISS). 8:11 to 8:13 to 8:16 PM MDT, WNW to NNW to NNE, max altitude 15 deg above NNW, max magnitude -1.0 (Passing through Andromeda, Lacerta, Cepheus, and Draco). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

March 22, 2023. Tiangong (Chinese Space Station). 8:02 to 8:04 to 8:06 PM MDT, WSW to SW to S, maximum altitude 17 deg above SW, max magnitude +0.5 (Passing through Pisces, Cetus, Eridanus, Columba, and Puppis). Tiangong's orbit may change frequently. Check for updates.

March 23, 2023. International Space Station (ISS). 8:14 to 8:15 to 8:16 PM MDT, NNW to N, max altitude 10 deg above NNW, max magnitude -0.8 (Passing through Pegasus, Lacerta, Cepheus, and Draco). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

March 26, 2023. International Space Station (ISS). 9:04 to 9:05 to 9:06 PM MDT, N to NNE, max altitude 12 deg above NNE, max magnitude -1.1 (Passing through Lacerta, Cepheus, and Draco). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

March 28, 2023. International Space Station (ISS). 9:04 to 9:06 PM MDT, NNW to NNE, disappears into Earth's shadow at max altitude 19 deg above NNE, max magnitude -1.8 (Passing through Cepheus and Draco). Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.

Satellite orbits can change. **These predictions for satellite passes may be inaccurate by up to several minutes, especially after March 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!