

## From Solstice to Moonstice

By Lauren Likkell

About 1000 years ago, in what is now Chimney Rock National Monument, a “lunar observatory” was constructed with a perfect view of a moonrise event that only occurs every 18.6 years. The ancestral Puebloans (the Anasazi) built an extensive “Great House Pueblo” with a viewing area of the natural stone pillars of the Chimney Rock formation. Viewed from the Great House, these spires make a “target” through which the moon rises during a northern Major Lunar Standstill.



**Figure caption:** *These spires are in Chimney Rock National Monument in Colorado near the Four Corners area. At northern Major Lunar standstill, the farthest the moon ever rises to the north on the eastern horizon, the moon rises between Chimney Rock and Companion Rock as viewed from the Great House Pueblo built by the ancestral Puebloans of the Chaco culture.*

To understand a lunar standstill, consider that a solstice is a “solar standstill”. Every day from winter solstice to summer solstice, the sunrise point shifts northward, rising due East halfway through. At the summer solstice the sun rises as far north as possible and the movement to the north comes to a “standstill” as it reverses direction. After summer solstice, the sunrise position moves daily toward the south until at the winter solstice it “stops” moving in that direction. This cycle takes a year, caused by the axis tilt of the Earth relative to its orbit around the sun.

The moon changes the rise location more rapidly. As the moon reaches the farthest northern rise position each month, it slows to a “standstill” and then reverses direction. This lunar standstill could be called “northern moonstice” in analogy with “summer solstice”. A couple of weeks after northern lunar standstill, the moon reaches the southern lunar standstill – the farthest south on the horizon it will set that month. Since the moon orbits the Earth once per month, the lunar standstills occur monthly (this month, the southern one occurred July 12 and the northern one will occur July 26).

The time of each moonrise depends on the phase of the moon. Where on the horizon each phase rises depends on what time of year it is. For example, the full moon at the Winter Solstice always rises far north.

There is an even more complicated influence on moonrise location which gives the “major” lunar standstill.

The moon’s orbit is tipped about 5 degrees to Earth’s orbit, which allows the moon to rise farther north (or south) than the sun’s solstice rise locations. A 18.6 year wobble of the moon’s orbital plane around Earth complicates the moonrise location (this is the same cause of the 18.6 year cycle of eclipses).

The moonrise at the MAXIMUM location is called the “Major Lunar Standstill” and only occurs in a 18.6 year cycle. The farthest north the moon ever rises is during a Major Lunar Standstill near the winter solstice. The extreme northern moonrises last about three years. The last Major Lunar Standstill occurred in 2004-2007, and we are now in the 2021-2023 Major Lunar Standstill. Next December, the full moon near the winter solstice will rise between the stone pillars as seen from the Great House at Chimney Rock.

-- Lauren Likkel is a member of the Chippewa Valley Astronomical Society