

The Moon and Other Sky Objects

By Ken Drummond

The starry nights in Morongo Basin are remarkable. Three hundred nights per year of clear starry skies! If you spend a lot of time outdoors you can't help having questions about all those lights overhead.

The brightest light at night is the Moon. If you watch it night after night you become familiar with its patterns. It is most spectacular when it is full and bright, rising above the eastern horizon. They say it is an optical illusion that the Moon seems larger when it is low to the horizon. Our minds tell us, "Wow, that is large! Larger than any trees or buildings in the distance!" When it is high in the sky there are no trees or buildings to compare it with, so it just looks, well, rather small.

Things on the horizon are usually less than a hundred miles away. If the Moon is considered as a hundred miles away, then it must be truly huge, right? Way larger than the largest buildings we can see. Yet in fact, the Moon is much farther than a hundred miles. More than two thousand times farther in fact. Compared to our daily experience, the casual mind cannot truly encompass its size.

The Moon goes through phases. We have all seen its various sized crescents. When the Moon is truly a new Moon it cannot be seen at all. That is because it is in the direction of the Sun and there is no remaining crescent to reflect light.

But after a night or two, in the evening sky to the west, you begin to see a thin crescent. We see the crescent and often call it a new Moon, though the actual new Moon occurred a couple of days earlier.

Night after night the crescent increases in size, and as it does so it appears higher in the sky each evening. When the Moon is overhead at sunset, though somewhat to the south, it is called the first quarter and exactly half the Moon is illuminated.

The illuminated part of the Moon continues to increase in size each night and finally it becomes full. When the Moon is full it rises in the east at the same time that the Sun is setting in the west. Occasionally during full Moon, when the Sun, Moon, and Earth are perfectly aligned, we may have a total or partial eclipse of the Moon.

After the Moon becomes full it begins to wane. That is, its illuminated part becomes smaller in size each night. Also, it rises later each night. These are times that star gazers like because, without a Moon in the sky, the sky is dark and it is easier to see the stars.

When the Moon does not rise until around midnight you will see that it is in its third-quarter phase. At that time it is once again only half illuminated, though this time the other half.

Finally, about a week later, it becomes a new Moon again, rising along with the Sun. At this time the Sun and Moon are quite close together. Occasionally, when they are almost perfectly aligned, we may have an eclipse of the Sun, where the Moon blocks all or part of the Sun during the day.

When you watch the Moon over a period of time, you become familiar with its positions in the sky during its different phases.

At Sunset:

The new Moon is near the western horizon (not visible)

The first quarter Moon is overhead

The full Moon is near the eastern horizon

At Midnight:

The 1st quarter Moon is in the west

The full Moon is overhead

The 3rd quarter Moon is in the east

At Dawn:

The full Moon is in the west

The 3rd quarter Moon is overhead

The new Moon is in the east (not visible)

And during the day (around noon) and difficult to see:

The 3rd quarter Moon is in the west

The new Moon is overhead (not visible)

The 1st quarter Moon is in the east

The Moon's phases--new Moon, 1st quarter, full Moon, and 3rd quarter--each last approximately one week or a little over seven and one-third days. According to the Moon's phases, a month (or month) lasts about $29\frac{1}{2}$ days. So you can see the source of our months and weeks.

Apart from the Moon, the brightest objects in the night sky are some of the planets. Venus is the second brightest object after the Moon and is often seen as a morning or as an evening "star." Venus is so bright and often so low to the horizon that it is sometimes mistaken for a UFO.

I have had people point to a star high in the sky and tell me that it was Venus. But Venus never

gets much more than 45 degrees above the horizon, and usually it is much lower.

Jupiter is also very bright, though once in a while outshone by reddish Mars. Mars varies in brightness quite a lot depending on whether it is on our side of the Sun or not. Saturn is quite bright too, as is Mercury, though Mercury is difficult to see in the Sun's glare, often requiring binoculars.

In recent times, even brighter than most of the planets, is the International Space Station (ISS). For a while after sunset or before sunrise it can often be viewed as it passes overhead, in the light of reflected sunshine. To find out just when and where to look for the ISS, go to www.spaceflight.nasa.gov/realdata/sightings.

When I moved here several years ago, I wanted to know how to find the planets in the sky. I began to make models to show where the planets were located. There is a very good resource at www.ssd.jpl.nasa.gov/horizons.cgi. It gives the precise locations of the planets at any given time--and a lot of other information. I wrote some computer programs to scale down the distances and locations to fit the sizes of the models I was making. That was actually one of the most fun parts.

Then I began to place rocks, and later stepping stones, to indicate the locations of the planets and their orbits. The result is the Sky's The Limit solar system model discussed in the article on the Orrery.

When you live in the awesome Morongo Basin, there are many ways to explore the night sky and make it real to you. At Sky's The Limit we enjoy sharing what we have learned and making available our models and telescope so that everyone can enjoy the excitement and gain a greater appreciation for this breathtaking aspect of our desert--the starry night sky!