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SUPERMOON

Ken Tapping, 19th August, 2014

On Sunday, 10th August the Full Moon rose huge, and because of the smoke from local forest fires, was a mysterious coppery orange colour. One just wanted to sit outside and watch it. Moreover, this Moon had been described in the media as being a "Supermoon", looking especially large. Was it?

The rising Moon always looks big. It is really the same apparent size all the time. But when we see it low in the sky, close to the horizon, our brains do something that makes the Moon look spectacularly large. It is probably this illusion that leads to the Moon being depicted many times too large in movies, cartoons, comics and in many paintings.

The Moon's orbit is not exactly circular, so over its 29 day trip around the Earth its distance ranges between 363,000 and 406,000 km. A Supermoon happens when the Moon is Full when it is at its closest to the Earth. Its apparent diameter is about 12% bigger than when it is at its furthest. That is not really a lot. The horizon illusion usually makes the Moon look much larger than that.

The Earth's orbit around the Sun is not exactly circular either. We are at our closest to the Sun in January, when we creep in to about 147 million kilometres. We are at our furthest in July, at 152 million kilometres. The change in apparent size of the solar disc is not easy to discern, but it does affect other things, such as eclipses and the tides.

On Earth we enjoy something that is unique in the Solar System; in our skies the Sun and Moon are at the right distances to look about the same size. That gives us something really special, eclipses of the Sun. These happen on those rare occasions when the Moon moves precisely between the Sun and Earth. If we are on the right place on Earth at exactly the right time, we will see the lunar disc gradually block out the bright disc of the Sun for a minute or longer. During that time the landscape darkens, we see the stars and any planets too close to the Sun in the sky for us to see in broad daylight. We also get to see the pearly solar

corona, and red prominences, looking like loops and flames sticking out from the edge of the hidden solar disc.

If the Earth is at its furthest from the Sun, so its disc looks smaller, and the Moon is at its closest, so its disc looks larger, the Moon takes longer to pass in front of the Sun, and the eclipse is a long one. On the other hand, if we are at our closest to the Sun and the Moon is at its most distant, the lunar disc will be too small to completely cover the solar disc, so we see the dark disc of the Moon surrounded by a ring of solar disc that is not covered. We call these "annular" or "ring-shaped" eclipses. As we discussed in a previous article, the tides are making the Moon recede from the Earth a few centimetres a year. Over time this will make long eclipses rarer, and eventually, at some point in the distant future, the receding Moon will no longer be able to cover the solar disc - ever.

Actually, the most identifiable consequence of a Supermoon is not a dramatically bigger looking Moon, but the larger tides it causes. We can get "Supertides" if the Moon is at its closest to Earth when the Earth is at its closest to the Sun, and the Moon is Full or New, when the Sun, Moon and Earth are all in line. That is when their gravitational forces on the Earth's oceans are strongest and acting in line, so they combine. The coincidence of factors needed for supertides don't arise very often, but "nearly supertides" can arise whenever the Moon is Full or New when at its closest to us. Supermoons occur every 413 days. Supertides are rarer, occurring when a Supermoon falls in January. This will happen next on 2 January, 2018.

Jupiter and Venus, the two brightest planets lie close together in the predawn glow. Venus is the brightest one. Saturn and Mars lie close together in the sunset twilight. Mars is furthest west. The Moon will be New on the 25th.

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