

Supermoon or Superstition

The closest supermoon of 2015 has just been, it was on 27 September. Its pull of gravity created higher-than-usual tides. Did you feel any different? Does a supermoon have a super effect on us?

The term supermoon denotes a new or full moon that occurs at roughly the same time the moon is nearest Earth in its monthly orbit. On the night of September 27-28 parts of Earth will undergo a total lunar eclipse, which is often called a Blood Moon because the double reflected sunlight turns the moon blood red. Astronomers use the term perigee to describe the moon's closest point to Earth, from Greek words *peri* meaning "near" and *gee* meaning "Earth." In astronomy and other sciences, a related term – perigean tides – refers to the higher tides that can occur when a new or full moon and the month's perigee coincide, as they fairly frequently do. Simply put, an extra-close new or full moon causes higher-than-usual perigean tides.

What's more, given the change in distance between the moon's farthest and closest points, the full moon can appear as much as 14% larger in the sky and 30% brighter to our eyes than at minimum size and brightness.

But remember, these changes do not come all of a sudden from day to day or even month to month, and without anything with which to compare them, the changes in the moon's size or brightness are hard to quantify by simple observation. To notice the difference, you would need to see the apogean (smallest) full moon and the perigean (largest) full moon side by side. For most of us, that's only possible through photography or through some form of direct measurement, although careful observers have claimed to be able to discern a supermoon's extra large size with the eye.

An astrologer, not an astronomer, coined the term supermoon, and it has come into wide usage only recently, and together with the term 'Blood Moon' may have some religious connotations. It's an example of modern folklore, largely accepted and spread by a now-global community, via word of mouth and the Internet. Some might suppose that a supermoon has some kind of effect on people on Earth. After all, when the moon is closest to the Earth, its gravitational pull is at its peak. But does it?

So the question becomes, how much does the moon's gravitational influence on Earth vary from minimum (apogee, or farthest point from the planet) to maximum (perigee)? Consider an 80-kilogram human being. The maximum difference between apogean and perigean moons is about 100 milligrams, or about the mass of an ordinary paper clip.

The effects are imperceptible, and far smaller than those encountered in other everyday situations, such as being near a mountain or even a large building.

So how come an extra-close full moon causes higher-than-usual tides. The tides are a very different situation from human beings. Tides work through what is called a differential gravitational effect. Specifically, the force of gravity exerted on the part of the Earth opposite the moon (the far side of Earth, as seen from the moon) is slightly less than the force of gravity exerted on the part of the Earth directly beneath the moon (the Earth's near side, as seen from the moon) at any given time. Why? Because there's an additional distance – about 12,000 km – from one side of Earth to the other. The force of gravity weakens rapidly with increasing distance, producing the differential. The result of this differential gravitational effect of the moon is that our planet is stretched slightly along a line between the Earth and moon. The effect piles up water on either side of Earth, and these piles of water – created by the differential gravitational effect – are the tides.

The bottom line is that any physical effects of supermoons are not exactly super. There is no reasonable evidence that they cause super disasters. The effects that people may attribute to them are psychological rather than physical.



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