# Do moon phases produce big earthquakes? Study debunks that idea

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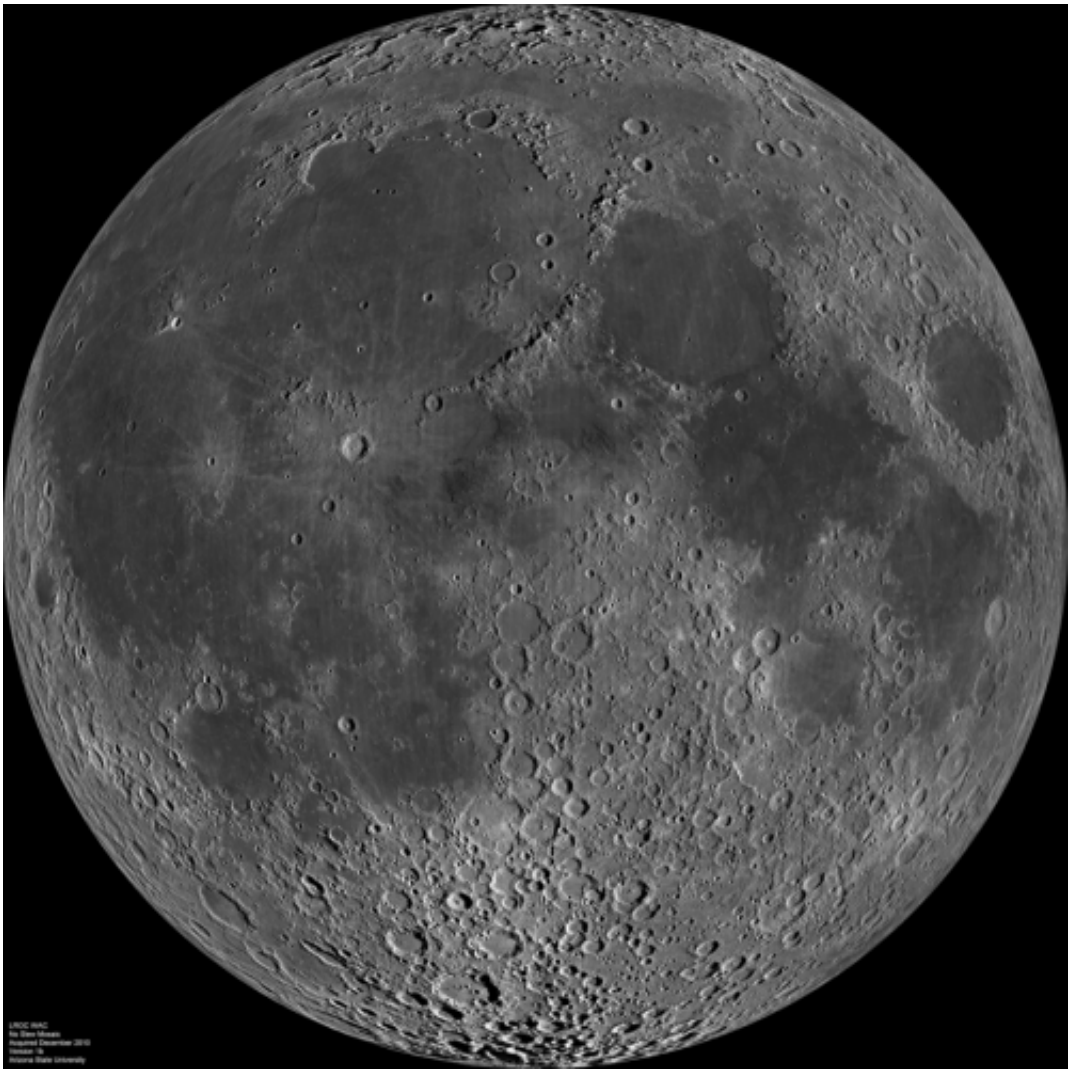

This is a composite image of the lunar nearside taken by the Lunar Reconnaissance Orbiter in June 2009, note the presence of dark areas of maria on this side of the moon. Credit: NASA

Huge earthquakes are not significantly influenced by the moon, a new study says.

The study, conducted by U.S. Geological Survey seismologist Susan Hough, looked at earthquakes of magnitude 8 or greater over the past four centuries. And a review of more than 200 earthquakes demonstrated that there is no connection between the phase of the moon and the time when huge seismic events of magnitude 8 and greater strike.

"That's obviously a big earthquake myth: that big earthquakes happen on the full moon," Hough said in an interview. Her study was published Tuesday in the journal *Seismological Research Letters*, a publication of the Seismological Society of America.

Hough said the myth can gain more attention when a large earthquake strikes on a full moon or when scientific studies show a weak influence on earthquake rates by tidal or other forces.

"In recent years, there have been a couple of nice studies that show that tidal forces do modulate earthquake rates slightly. It makes sense: The tides create stress in the solid earth, and not just the oceans. And in some cases, that small force can be 'the straw that breaks that camel's back' and nudges the fault to produce an earthquake," Hough said.

But it's also important to understand that "this isn't of any practical value for prediction," Hough said.

"A recent study ... for example, concluded that very large earthquakes, with magnitudes close to 9, tend to occur near the time of maximum tidal stress," Hough said in her study, adding that researchers "point out, however, that the relationship is not clear-cut and does not hold when low-magnitude events are included in the analysis."

Indeed, other scientists who have authored studies on the impact of tides with earthquakes have been careful to point out that many earthquakes will still happen when tidal stress is low, and note that the studies don't mean that the public can get a warning about the exact date, time and location of the next big earthquake.

But sometimes reports of those studies, Hough said, "turn into headlines that say the moon causes earthquakes."

Exactly when and where earthquakes strike is a random process, a scientific reality that often frustrates people who prefer patterns and having clues to warn before catastrophic events. The primary driving force behind earthquakes is the movement of tectonic plates.

In an interview in October, USGS research geophysicist Ken Hudnut explained why earthquakes are impossible to predict. To show how a fault gathers seismic stress that eventually ruptures into an earthquake, he showed a model of bricks sitting on sandpaper—equivalent to the two sides of the fault.

The bricks are attached to a rubber band connected to a handcrank, which, when it is moving, is like the accumulating seismic stress of plate tectonics. (In Southern California, the Pacific plate, where downtown L.A. sits, is moving northwest, while the North American plate is moving southeast.)

As Hudnut moved the handcrank, friction would keep the brick steady on the sandpaper, until at one point the accumulating force from the pulling rubber band was unbearable, and the brick would suddenly move—analogous to an earthquake. But when the movement happened wasn't predictable. It was random.

There are other myths out there, such as the one in which hot, sunny

"earthquake weather" somehow makes seismic events more likely; it doesn't. Earthquakes happen underground, and the weather has no effect on their timing.

Hough said she decided to work on this study to rigorously test an idea that seismologists have long stated—that earthquakes aren't more likely to happen on certain days of the calendar year or the cycle of the moon.

There are sometimes weird coincidences. For instance, in California, June 28 is the anniversary of a couple of memorable earthquakes: the magnitude 7.3 Landers earthquake that struck the Mojave Desert in 1992 (and the subsequent 6.5 Big Bear aftershock hours later); and the magnitude 5.6 Sierra Madre earthquake in 1991 that killed two people.

The next day, June 29, is the anniversary of the magnitude 6.8 Santa Barbara earthquake of 1925.

But those coincidences don't mean anything.

"One analogy: if you had a classroom of 36 kids, on average, you'd expect to see three birthdays every month. You'd probably have a couple of kids on the exact same birthday," Hough said, a result that does not hold some kind of larger meaning.

For her study, out of the more than 200 earthquakes she studied, if 20 or 30 of them happened on the full moon, "that would've actually been significant." But that's not what the results showed.

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