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Not My Fault: Monday's eclipse is pretty special – here is what we know

Lori Dengler/For the Times-Standard
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This is an exciting week for me. As the HSU community begins the fall 2017 semester, I will enjoy the perks of being retired from the classroom. I am heading to Oregon, along with a few million or so others, to view the total eclipse of the sun. This will be my first total eclipse and I am excited.

Two to five solar eclipses (the moon passing between the sun and the earth and completely blocking out the sun) occur somewhere on earth every year. But unless you are a solar eclipse chaser with a fat wallet, they are hard to see. The moon's orbit is inclined about 5% to the plane of the earth's orbit and the moon needs to slip perfectly between the sun and the earth to cause a solar eclipse. The moon's distance from earth also varies – when the moon is further from the earth, it won't create as large a shadow and can only produce an annular eclipse. The last zone of totality to cross the contiguous 48 states was in 1979 and it's been nearly a century since all of the lower 48 has been within the zone of total to partial obscurity. You will need to wait until 2024 for the next US solar eclipse. August 21, 2017 is a pretty special day.

The orbital relations of the sun, moon and earth and the cause of eclipses have been understood since the late 15th century. Christopher Columbus reportedly used orbital astronomy to convince the Taino people of Jamaica to continue to feed his crew. The Spaniards had been stranded on the island for six months and had long worn out their welcome. But Columbus consulted his astronomical almanac and noted a lunar eclipse (when the earth passes between the sun and the moon) in March of 1504. Columbus told the chief that his god was aggrieved by the Taino's lack of hospitality and would turn the full moon dull red. The ploy worked and they continued to be supplied.

We know a lot about the coming eclipse. A web site will tell you exactly what percent of the sun will be obscured by the moon's shadow for any location in the US (https://eclipse2017.nasa.gov/sites/default/files/interactive_map/index.html) and when the eclipse begins, is maximum, and ends. Crescent City reaches 91% obscurity and Eureka will hit 87%. The peak will occur at 10:14 am PDT, but will arrives in Eureka 31.4 seconds before Crescent City. The only uncertainty is what the visibility will be like at the time. Weather, unlike orbital mechanics, cannot be predicted with same level of precision. The Eureka National Weather Service Office is currently estimating a 55% chance of clear to partly cloudy skies at Eureka and a 93% chance of clear skies in Redding. Smoke from forest fires further complicates the viewing estimates.

While weather can't be forecast to the same degree as the eclipse, it is far more predictable than earthquakes. Earthquake prediction is the holy grail of seismology and scientists have been seeking for a reliable prediction methodology for more than a century. I remember coming across a Scientific American cover blaring "Earthquake Prediction Right Around the Corner." The date of the issue was 1913.

In the 1970s, laboratory experiments suggested a mechanism of faulting and some tantalizing field data indicated measurable precursors. Earth Scientists convinced the federal government to fund the National Earthquake Hazard Reduction Program in 1977 with the promise that an influx of funding would lead to meaningful prediction capability. Research programs were launched, instruments improved and new analytical techniques developed. Thanks to NEHRP, much was discovered and continues to be learned about faulting. Unfortunately, the more that was learned, the more complex the process appeared to be. The precursors that had been identified in early studies were either not seen again or turned out to be poor data.

There are two reasons why earthquake prediction continues to be so elusive: depth and recurrence. Even the shallowest of earthquakes are miles beneath the surface. It is not feasible to dig and instrument boreholes to be able to measure the in situ stresses and directly observe processes leading to fault rupture. The recurrence of earthquakes on a fault segment is on the order of hundreds of years. We don't have really good data on long-term earthquake periodicity. It's always possible that some new technology or way of interpreting existing data will uncover a reliable prediction method, but I am not holding my breath.

Could there be an extraterrestrial earthquake trigger? The moon and sun do exert a pull on our planet. Twice a day the oceans rise and fall. And it's not just the water that moves. Gravity distorts the solid earth as well – as

much as a foot depending on where you are. Seismologists have looked carefully for any correlation between earthquakes and this tidal cycle. No link has been found. Adding more planets to the alignment in the so-called Jupiter effect doesn't make any difference – they are too far away to add to the pull. Gravitationally speaking, the eclipse is nothing special – a similar pull occurs every month in the dark of the moon. So join me in wearing your eclipse glasses if you look at the sun next Monday morning and rest assured that the earthquake hazard is no different than on any other day.

Lori Dengler is an emeritus professor of geology at Humboldt State University, an expert in tsunami and earthquake. Questions or comments about earthquakes or this column can be sent to Kamome@humboldt.edu or (707) 826-6019.

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