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Myanmar just had 'the big one.' It should be a wake-up call for California.

The famed San Andreas Fault in California is nearly identical to the one that caused the destructive tremor in Myanmar, and is also overdue for an earthquake.

Updated yesterday at 2:42 p.m. EDT

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Rescue teams work to find residents trapped under the rubble of a collapsed condominium building in Mandalay, Myanmar, on Sunday. (Sai Aung Main/AFP/Getty Images)

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By Kasha Patel

For more than a century, stress was mounting across a section of an 800-mile-long crack in Myanmar. Known as the Sagaing Fault, the crack ran between the Indian and Eurasian tectonic plates, which were locked deeper below the surface. The Indian plate was moving north but snagged, building tension like a coiled spring — until it finally released as a deadly 7.7-magnitude earthquake Friday.

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"We absolutely thought that it would occur sometime in our lifetimes … but there's really no way to say when it would occur," Eric Lindsey, a geophysicist at the University of New Mexico, said in a phone interview. "It's absolutely devastating to see it actually take place."

The powerful earthquake has killed more than 2,000 people and damaged skyscrapers, airports and many buildings. The U.S. Geological Survey estimated that economic losses could exceed the entire gross domestic product of Myanmar, which is about $67 billion.

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As the effects of the earthquake continue to be uncovered, scientists say the hazard of this tremor is comparable to a potential event along the San Andreas Fault in the western United States — which many say is also overdue for an earthquake. Friday's disaster provides details on Southern California's potential Big One.

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"This fault is a very direct analog for the San Andreas Fault. It's very, very similar in almost every way," Lindsey said. "This is certainly an example of what can happen and what certainly will happen at some point."

Similarities thousands of miles apart

Earthquakes are caused by a sudden release of energy, typically from the collision of tectonic plates. Along Myanmar's Sagaing Fault, the Indian plate was pushing north relative to the rest of Southeast Asia. As the two plates rubbed against one another, the movement must be accommodated along the fault.

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In fact, Lindsey said there should be nearly an inch of movement each year across the fault. But the central section wasn't splitting as expected and built up a "split deficit."

To make up the deficit, the "faults slip in spurts due to friction," said Jaime Toro, a professor of geology at West Virginia University. "Those spurts are the earthquakes."

The area's last major earthquake was the even stronger 1838 Ava quake near Mandalay. If you were to ask where the next big temblor was going to be, "everybody would pick this location," Lindsey said.

Myanmar's convulsion was triggered when one block of Earth's crust slipped past the other and released stress, known as a strike-slip fault, seismologist Kusala Rajendran said. These are relatively shallow earthquakes but can cause heavy damage across a large area. These types of faults are common around the world and include the San Andreas Fault, which is between the Pacific and North American plates.

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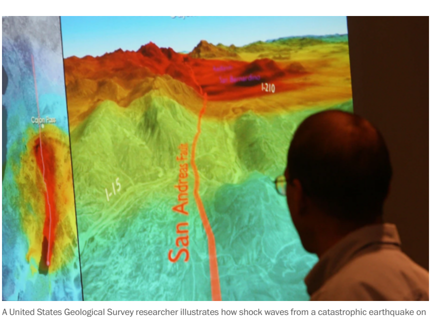
But the similarities go further. The two faults are similar in overall length, measuring around 750 miles to 800 miles. Both are also "right lateral" strike-slip faults: If you were to stand on one block, the other block would move to the right during an earthquake.

Perhaps most important, both faults also have plates slipping past each other at the same rate — moving at a fairly quick pace of 20 to 30 millimeters (0.8 to 1 inches) per year. The slip rates are critical because "that informs seismic hazard," said Amanda Thomas, a seismologist at University of California at Davis. "The faults with the fastest slip rates typically have large earthquakes the most frequently."

While other faults are slipping at faster rates, Thomas said these two faults are significant because they're in populated areas. The earthquake in Myanmar occurred near Mandalay, a city of more than 1 million. The city of Los Angeles, which lies about 30 miles from the San Andreas Fault, is home to more than 3 million people.



A United States Geological Survey researcher illustrates how shock waves from a catastrophic earthquake on the San Andreas Fault would probably fan out across Southern California. (David McNew/Getty Images)

Along the San Andreas Fault, scientists mostly worry about the southern region, which has gone more than 300 years without a major earthquake — another "seismic gap," as seen with Friday's earthquake.

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When the southern section ruptures, Thomas said scientists expect a 7.8-magnitude earthquake "similar in extent and size to the one that occurred last week in Myanmar."

But the effects of the quake would be different with California's infrastructure, said Thomas. Compared with Myanmar, the state has stricter building codes designed to resist strong shaking and reinforce older buildings. She said such precautions can create "really large differences in the number of fatalities and casualties from earthquakes."

What to expect from a San Andreas rupture

Computer models can simulate the extent of such a large earthquake, but researchers say Friday's catastrophe revealed new insights on what to expect.

For one, the Myanmar earthquake was probably a supershear event — when shaking is stronger than expected for a particular earthquake, said Zhigang Peng, a seismologist at Georgia Institute of Technology.

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Supershear events are rare and not fully understood. Scientists have found growing evidence that they usually occur on long, mature strike-slip faults, such as the Sagaing or San Andreas faults. But they don't know the exact conditions that may cause a rupture to trigger such extreme shaking.

Peng said that by examining what conditions caused this in Myanmar, "it informs our understanding of similar potential events, for example, on the San Andres Fault."

The intense shaking also triggered liquefaction in Myanmar, Thomas said, where loose, waterlogged ground sediments lose their strength and act like a fluid. This phenomenon, similar to wiggling your toes in damp sand near the beach, occurs near wet or saturated areas and can further damage infrastructure.

But a lot of unknowns persist about liquefaction. This earthquake could help answer several questions, Thomas said: How strong does the ground shaking need to be to trigger this? How damaging can it be to infrastructure?

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If liquefaction were to happen on the San Andreas Fault, she said, "you could do a lot of damage to infrastructure buildings, and you'd expect potentially to have more casualties than you otherwise would."

This process could be particularly extensive on the southern San Andreas Fault because of its proximity to a nearby water body, the Salton Sea, Peng said.

As Myanmar recovers, scientists say that perhaps this event will be an extra push to protect other earthquake-prone areas — along the San Andreas Fault and beyond.

"Even though we don't know when this is going to happen, we know where it's going to happen," Peng said. "That could help, for example, governments or local builders to design stronger buildings so that it will hopefully not collapse when that event happens eventually."

What readers are saying

The comments highlight concerns about the potential impact of a major earthquake on the San Andreas Fault in California, drawing comparisons to the recent earthquake in Myanmar. While California is noted for its strict building codes and preparedness, which are expected to… Show more

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By Kasha Patel
Kasha Patel writes the weekly Hidden Planet column, which covers scientific topics related to Earth, from our inner core to space storms aimed at our planet. She also covers weather, climate and environment news. @KashaPatel

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