

An Obscure Fault in Southern California Is More Dangerous Than We Thought

George Dvorsky, Gizmo News, 2-15-17

A little-known fault underneath the southern Californian city of Santa Barbara is capable of producing stronger shaking and more damage during an earthquake than previously thought, according to new research. Called the Ventura-Pitas Point Fault, it's now thought to be capable of producing magnitude 8.0 earthquakes, and even tsunamis.

A new study published in *Geophysical Research Letters* confirms that the Ventura-Pitas Point Fault has a staircase-like structure, and that it's closer to the surface than previous estimates. The fault, which runs westward 60 miles (100 km) from the city of Ventura, through the Santa Barbara Channel dividing the mainland from the northern Channel islands, and beneath the cities of Santa Barbara and Goleta, is capable of producing strong quakes at the surface. And because the fault extends under the Pacific Ocean, it may also be capable of triggering tsunamis.

The Ventura-Pitas Point Fault wasn't identified as an active and potentially dangerous fault until the 1980s. Since that time, there's been considerable controversy about its exact location and shape, leading to two competing theories about its geometry and destructive potential.

One model suggests that the fault is smooth and steeply dipping to a depth of 13 miles (21 km), similar to a sheet of plywood that's leaning against a house. The other model proposes a "ramp-flat geometry," with a smooth horizontal section positioned between two tilting sections, similar to a staircase.

To resolve this seismological conundrum, a team of researchers from the University of California, Riverside, used computer models to test the two geometries. The researchers represented the subterranean crust as a 3D volume of space, allowing them to visualize any strengths and weaknesses in the region's faults. During the simulations, the volumes were squeezed at the rate and direction that reflected the way the region itself is being squeezed by the plate tectonics. By inserting actual seismic data into their models, and by comparing their simulations to GPS data, the researchers were led towards the staircase-like structure.

Which is good news for science—but not so good for the people who live and work above the fault. This means that more of the fault is closer to the surface, so a potential quake could cause more damage.

"Our models confirm that the Ventura-Pitas Point fault is a major fault, that lies flat under much of the coast between Ventura and Santa Barbara," noted Gareth Funning, an associate professor of geophysics at UC Riverside, and a coauthor of the study. "This means that a potential source of large earthquakes is just a few miles beneath the ground in those cities. We would expect very strong shaking if one occurred."

The finding bolsters previous research by California Geological Survey scientists, who have suggested the fault is capable of producing a magnitude 8.0 quake, along with a tsunami affecting Santa Barbara, Ventura, and Santa Monica. The CGS says a big earthquake happens on the fault every 400 to 2,400 years. The last one occurred about 800 years ago.

Looking ahead, the UCR researchers would like to see how their new model matches with these prior estimates. Armed with their new model, they can now run more accurate earthquake simulations. Specifically, they'd like to predict where the shaking will be the strongest, and confirm if the fault could ever produce a sizeable tsunami.