

## EXPLAINER

# Are the Haitian and Chilean Earthquakes Related?

They're like brothers.

BY BRIAN PALMER

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A devastated neighborhood of Port-au-Prince, Haiti, after the earthquake

An 8.8-magnitude earthquake struck near Concepcion, Chile, on Saturday, killing more than 700 people and displacing millions. The quake comes less than two months after a 7.0-magnitude earthquake killed 230,000 in Haiti. Are the two quakes related?

They may have the same parent. Most seismologists agree that the Haitian quake didn't cause Saturday's event in Chile. Earthquakes occur when the stress on a tectonic plate overcomes the friction holding it in place. The last stress-relieving earthquake at this location in Chile occurred in 1835. Since then, friction has held the edge of the Nazca plate in place while the rest of it slid 10 to 12 meters underneath the neighboring South American plate. As a practical matter, that displacement was the sole cause of Saturday's earthquake. But displacement isn't the only thing stressing a tectonic plate. Tides, dammed-up rivers, and pressure from other shifting plates can play a supporting role. Major earthquakes may shift plates slightly and thus increase the stress along fault lines. If another earthquake was poised to happen at some point soon, the added stress from a first quake could serve as a catalyst. While the Haitian earthquake really wasn't big enough to have that effect in Chile, some seismologists believe the much stronger Sumatran quake of 2004—and maybe even the 1960 Chilean quake, the most powerful ever recorded—may have set the stage for both of them.

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nearly five times the length of the original rupture, but that was considered a rare event. It would take an earthquake of heretofore-unseen proportions to trigger a major follow-on nearly 4,000 miles away—the distance between Port-Au-Prince and Concepcion.

While most seismologists agree that the Haitian quake was simply too small to have played a role in the recent shock, the question of whether larger earthquakes can cause lasting global reverberations is a major controversy. Over the long term, the earth averages one 8-magnitude earthquake per year and slightly less than one 9-magnitude quake every decade. But they don't seem to be evenly spaced. There have been five earthquakes of 9.0 magnitude or greater since 1900, four of which occurred between 1950 and 1964. The fifth was the Sumatra quake that triggered the 2004 tsunami. Some scientists believe that the most powerful earthquakes—the 2004 quake was 1,000 times more powerful than the one in Haiti—may contribute to a global release of built-up tectonic stress. If this theory is correct, both the Haitian and Chilean earthquakes were caused, in part, by the Sumatran quake, and there may be more to come. (Or the alternative theory: It's more or less random.)

Of more immediate concern to coastal-dwellers worldwide is a so-called doublet. When one end of a tectonic plate moves quickly, friction holding the other end in place can snap the plate in two, opening a new fault and causing a second quake of similar magnitude. An 8.3-magnitude quake in 2006 near the Kuril Islands, in the North Pacific, of similar geometry to Saturday's Chilean quake caused an 8.1-magnitude quake two months later when the plate cracked. If the same happens to the Nazca plate, a major tsunami could result.

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*Explainer thanks Paul Caruso of the USGS National Earthquake Information Center, Vicki Hansen of the University of Minnesota–Duluth, Thorne Lay of the University of California–Santa Cruz, and Paul Segall of Stanford University.*

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