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Haiti Earthquake Disaster Little Surprise to Some Seismologists

Although seismic predictions work on geologic timescales and can miss big quakes by decades, one expert said last week that a temblor in Port-au-Prince was of greater concern than a San Andreas slip

By [Katherine Harmon](#)

COMBINATION FORCES: The combination of a large fault ready to rupture and a poor--and poorly prepared--area can lead to wide devastation when an earthquake strikes. This was one of the reasons one expert has been even more worried about cities like Port-au-Prince than Los Angeles

The devastating magnitude 7.0 quake that ripped through Haiti Tuesday, reportedly killing thousands, did not catch everyone by surprise.

In an interview last week for an unrelated story, Robert Yeats, a professor emeritus in geoscience at Oregon State University in Corvallis and co-author of a June 1989 article for Scientific American "Hidden Earthquakes," said that an imminent big west coast earthquake concerned him far less than a "big one" that might occur in Haiti, due to the large fault near the capital city of Port-au-Prince—and the poverty-driven low level of earthquake-preparedness there.

"If they have an earthquake on this fault that runs through Port-au-Prince," the death toll would be tremendous, he said January 6.

The fault, called the Enriquillo-Plaintain Garden Fault, runs some 16 kilometers from Port-au-Prince and is at the intersection of the North American and Caribbean tectonic plates, which are slowly sliding past one another. This movement creates a strike-slip fault, the same kind as the San Andreas Fault in California, where the North American and Pacific plates are sliding in different directions. And like the San Andreas, the Enriquillo-Plaintain Garden Fault has been building up pressure.

"The fault has been more or less locked for 200 years," British Geological Survey seismologist Roger Musson explained to TIME. In this area, where the Caribbean plate is moving east against the North American Plate, plate movement is about seven millimeters per year, the U.S. Geological Survey (USGS) said.

In fact, Michael Blanpied, an associate coordinator for the USGS Earthquake Hazards Program, explained in a podcast recorded hours after the quake, the two plates are "shearing the island, crushing it, grinding it." So although such a large earthquake has not shaken Haiti since the 18th century, "this is quite an earthquake-prone region," Blanpied said. And it is not the biggest quake to hit the Island of Hispaniola (which Haiti shares with the Dominican Republic) in recent history. A magnitude 8.0 earthquake rocked the Dominican Republic in 1946, the Associated Press noted.

Yeats was not the only one to raise concern about a large earthquake in Haiti. Geologic groups have been monitoring the area for decades, and a University of Texas team has been keeping a close eye on the Enriquillo-Plaintain Garden Fault. Two years ago at the 2008 Caribbean Geological Conference, the Austin-based group asserted that there was enough stress built up to cause a magnitude 7.2 earthquake, Nature News reported (Scientific American is part of Nature Publishing Group).

One reason the Tuesday quake, which subjected some three million people to "severe shaking," was so damaging is that it occurred at a relatively shallow depth, the fault having ruptured about 10 kilometers below the surface, Blanpied noted. It also occurred below relatively loose ground, Carrieann Bedwell, a USGS geophysicist, told LiveScience. "A mountainous and rocky setting is more characteristic of not as much ground shaking, opposed to abundant sediments...where there's a potential for higher ground shaking," he said. "Haiti would be a more sediment type, more severe ground-shaking geologic setting."

Although the earthquake has leveled countless buildings in the capital city of more than two million people—and triggered landslides throughout the heavily deforested region—it did not spur a tsunami as was initially feared for at sizeable Caribbean quake, and authorities canceled a tsunami watch two hours after the earthquake itself.

But magnitude and shake dynamics are not what really concerned Yeats and other seismologists. "It's really not the size of the earthquake that's the big concern," he noted last week, "it's its relationship to big cities." And an earthquake in this area was particularly worrisome, not just because of the tension-filled fault, but because "the infrastructure there is just terrible," said Yeats, who is also a senior consultant for geological hazards company, Earth Consultants International, and has studied earthquake preparedness around the world. In a book called *Active Faults of the World* that he is currently writing for Cambridge University Press, he estimated several months ago that "the poor state of construction in both [Haiti and the Dominican Republic], but especially Haiti, indicates that when the next large earthquakes strikes either [Port-au-Prince or Santo Domingo], it will be a catastrophe, in part because of the lack of a social-services network."

The Enriquillo-Plaintain Garden Fault is one of dozens around the world that run through populous, but often poorly prepared, areas. Last week, Yeats also called the city of Tehran "a time bomb that is waiting to go off." The North Tehran Fault could unleash an earthquake similarly massive to the one anticipated to strike southern California in the coming decades. But in the Iranian capital, he says, despite advanced regional technology, many of the buildings are not shake-proof. Other worrisome locales, he notes, are Lima, Peru, and Karachi, Pakistan, as well as and much of Turkey, where many areas are either unsafely built due to corruption or poverty.

Whether last weekend's 6.5 magnitude temblor off the coast of Northern California's Humboldt County and the Haiti earthquake two days later are linked is yet to be determined. Seismologists now widely recognize that a large earthquake in one place can trigger another vulnerable fault thousands of miles away. Yeats calls it the "pulling the buttons off your shirt" idea—by releasing tension on one stressed point, the force shifts and can rupture another "locked" point. "You pull one button off," he said, "and the next one is ready to go." A paper published last October in *Nature* reported the large 2004 seismic events near the Indonesian island Sumatra that spurred the devastating Indian Ocean tsunami had an impact on the San Andreas fault in California.

In the meantime, seismologists will be watching Haiti closely, Blanpied noted in the USGS podcast, and they expect to see aftershocks for days to come. The largest aftershocks so far have already rumbled in at magnitude 5.9, and more could strike at any time.

And Yeats is not convinced that this latest quake at Haiti is the most severe one the Caribbean is likely to see in the near future. "It's not the big one," he said in a January 13 follow-up interview. He added he is now worried that a larger one could hit other cities in the region, such as Santa Domingo in the Dominican Republic or Kingston, Jamaica. The Caribbean Plate, he noted, is "just sort of sitting there while the North American and South American plates move" west (due to sea floor spreading in the Atlantic). But the next big earthquake could be years or decades from now, he said. "We're good at placing these forecasts and probabilistic terms on a geological time scale, but we're not good at putting it at scales that matter to you and me." And even probability forecasts can turn out to be wrong. The southern San Andreas was pegged as likely to produce a major earthquake before this one was, he noted.

<http://www.scientificamerican.com/article.cfm?id=haiti-earthquake-prediction>