

Could a large tsunami ever hit the United States?

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This question gained currency after the catastrophic Sumatran earthquake and tsunami of December 2004. Nine months later interest in tsunamis was all but washed away by the deadly Gulf Coast hurricanes, Katrina and Rita.

The natural tendency to shift attention to the next big thing already has impacted the worldwide tsunami recovery effort, said Penn State geophysicist Kevin Furlong. It also may obscure a significant danger closer to home.

"Do we have a potential tsunami hazard in the U.S.?" Furlong asked. "Unfortunately, the answer is yes -- big time."

Undersea landslides triggered by small earthquakes could generate localized tsunamis along the coast of southern California -- but also, he noted, along the east coast. A volcanic landslide in the Canary Islands, British scientists have predicted, could produce a giant tsunami that would wreak havoc as far as Florida.

But Furlong's biggest concern is the so-called Cascadia Subduction Zone, a 600-mile fault formed by the meeting of two tectonic plates off the Pacific coast between northern California and central Vancouver Island. "At some point this area will host an earthquake and tsunami comparable in size to what happened in December in Sumatra," he said flatly. "And when it happens, we can expect a similar pattern of devastation."

Fifteen to 20 years ago, Furlong conceded, "people thought the Cascadia zone was a very safe margin." In the interim, however, several lines of research have converged to create a much different picture. First, researchers found deposits of sea-floor sediment in Oregon, Washington and British Columbia, in places too far inland to be reached by ordinary tidal activity. "When a tsunami comes in it's picked up a lot of sand," Furlong noted. "People talk about the wave looking black."

Tree-ring dating shows evidence of northwest forests killed by cataclysmic flooding, he added. In addition, anthropologists have noticed accounts of a doomsday event in the surviving legends of Native American tribes that populated the area. "Many of these tribes are culturally distinct," Furlong said. "They were isolated from one another. Yet they all had the same stories."

Combining this evidence, "researchers were able to figure out that sometime around the year 1700, a large earthquake shook the area. But initially we didn't know whether it was a single big event or a whole bunch of smaller ones."

What pinpointed the catastrophe was a study by Japanese seismologists of tsunami records from 18th-century Japan, specifically reports of flooding and damage by a tsunami that struck there on the evening of Jan. 26, 1700, seemingly out of nowhere. "There was no earthquake felt before it," Furlong explained.

Based on when this "ghost tsunami" was reported to have hit successive towns moving inland from the Japanese coast, the researchers were able to trace the big wave's origin all the way across the Pacific to Cascadia. "What we now know," said Furlong, "is that in 1700 the entire margin from northern California to Vancouver Island broke off in a magnitude 9-plus earthquake." Subsequent work has revealed that the enormous Cascadia fault most likely produces similar events at 300- to 500-year

intervals -- which means we may be due for another one.

"The scary part is that there would be very little warning," Furlong said. "The edge of that plate boundary is only 100 kilometers offshore. So if you're in Astoria, Ore., or Westport, Wash., or some other coastal town, you'll have less than half an hour between when the earthquake occurs and when the tsunami hits."

Since publication of these findings, construction standards in the region have been modified to incorporate the threat of a magnitude 9 earthquake. State and local officials have run simulations and devised evacuation routes for communities likely to be slammed by the giant wave that would follow such a tremor. And researchers in the United States, Canada and Japan are monitoring the Cascadia fault's activities carefully.

These all are important steps, Furlong said, but they may not be enough. "The day-to-day likelihood of a Cascadia event is quite low, much lower than the possibility that there's going to be an earthquake in L.A. But if and when it does happen, it could be really devastating. And as we've learned with Katrina, that devastation would affect not just the region but the entire country."

Source: By David Pacchioli, Research/Penn State

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