

## Threat of Giant Waves?

tsunami

Scientists: Conditions for Tsunami May Exist in U.S.

*By Bruce Dunford  
The Associated Press*

H O N O L U L U, July 18 — Scientists suspect that an earthquake-triggered tsunami that killed more than 2,000 people in Papua New Guinea two years ago on Monday was bolstered by an undersea landslide. It's a danger that also exists for the U.S. East Coast and Southern California.

The southwestern coast of Hokkaido, July 14, 1993, one day after a major earthquake shook the island and a tsunami flattened the seaside area. (Katsumi Kasahara/AP Photo)

It appears the deadly wave in the South Pacific was the result of an undersea landslide or slump caused by the earthquake whose 7.1 magnitude is considered relatively too weak to generate a major tsunami, said Eddie Bernard, director of the National Oceanic and Atmospheric Administration's Pacific Marine Environmental Laboratory in Seattle.

The tsunami that swept ashore along six miles of coastline and destroyed four villages was too big and too late to have been the direct result of the earthquake, he said in a telephone interview Monday.

## Evidence of an Avalanche?

An international team of scientists using multi-beam bathymetric surveys and manned submersibles to explore the offshore area found evidence of oceanfloor landslides in August 1998.

"They could see an absence of sediments and exposed rocks that would be evidence of a landslide, but there was no previous surveys of the area so it's only speculation about when it occurred," Bernard said. "But they are pretty sure it was a recent event."

The team was able to determine that the first wave hit the shore 10 minutes later than would a tsunami generated solely by the earthquake, he said. The biggest wave was more than 40 feet high, according to witnesses.

Earlier this year, U.S. Geological Survey researchers found evidence of a similar land formation off the Southern California Coast.

A team from the Woods Hole Oceanographic Institution discovered faults in the ocean floor on the East Coast they say could trigger a tsunami, sending 18-foot waves toward the mid-Atlantic states.

## Loose Sediment at Most Risk

“These discoveries are drawing our attention to other causes of tsunamis, besides the traditional tectonic earthquake,” Bernard said. “The more we learn about possible causes, the better we can know when to issue warnings.”

Offshore areas most prone to landslides are those where eons of runoff sediments from rivers have created terraces built of loose materials, he said.

When it breaks loose, the material drops with the speed of a snow avalanche, displacing the water below and leaving a void the water fills with a bump that spawns the localized tsunami, Bernard said.

There’s no way of knowing what magnitude earthquake will set off a landslide, he said.

“It doesn’t have to be a big one. It doesn’t have to knock you down, but it could still trigger one of these events,” Bernard said. “Probably the safe thing to do is to head for higher ground anytime you feel an earthquake.”

## Detecting the Waves

University of Southern California civil engineering professor Costas Synolakis, who headed the National Science Foundation team to Papua New Guinea, has been preparing a computer model to determine which parts of the Southern California coast would be most susceptible to a tsunami.

The nation’s tsunami warning centers in Hawaii and Alaska use seismometers to detect earthquakes within minutes, but can’t detect resulting underwater landslides or slumps.

However, a series of buoys anchored along the Pacific Coast from Alaska to Monterey, Calif, use pressure sensors that could detect a tsunami generated by a landslide of slump, Bernard said.

Landslide-generated tsunamis likely would be close to shore, giving little time for coastal evacuations, he said.

“This reveals another hazard we’re not too well prepared to deal with,” Bernard said.

Tsunamis move at 500 to 600 mph in deep ocean waters but slow and get taller as they reach shallow offshore waters. □

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