

SCIENCE FILE / An exploration of issues and trends affecting science, medicine and the environment; A Southland Tsunami?; Powerful waves generated by an earthquake--even one centered on land--could strike coastal areas quickly, scientists say. But such events are rare.:[Home Edition]

KENNETH REICH. The Los Angeles Times. (Record edition). Los Angeles, Calif.: Apr 27, 2000. pg. 2

Full Text (1240 words)

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Until quite recently, scientists were inclined to downplay tsunamis as anything other than a remote danger on the Southern California coast.

But their research in the last two years has altered that view. Scientists and emergency officials last week cautioned that tsunamis--often erroneously called tidal waves--could cause severe damage and loss of life in beach communities in Los Angeles, Orange and Ventura counties, perhaps with little or no warning.

At a state Office of Emergency Services conference in Anaheim last week, Jeff Terry of the Los Angeles County Office of Emergency Management noted, "You've got some of the most valuable property in L.A. County in the coastal areas--a waste treatment plant, LAX, several refineries, two of the major ports on the Pacific Coast and a couple of huge marinas."

After researching topographical records, scientists at the meeting presented a detailed map, projecting the shoreline areas of Los Angeles County most likely to be damaged in a tsunami.

If a tsunami is generated by an earthquake or undersea landslide, he said, it could take just five to 10 minutes to strike the coast with repeated waves 30 feet high or higher. That would not be enough time to sound much, if any, of a general alert.

In such a situation, said Rich Eisner, an Office of Emergency Services administrator, "an earthquake may be the only warning."

People living near beaches should be taught not to wait for radio or television announcements of the location of any quake that causes strong local shaking for 15 seconds or more, he said. Residents should head for higher ground without prompting.

So-called near-source tsunamis, which are generated very close to the beaches, pose a more potent threat, according to this analysis, than long-range tsunamis, which may strike after moving across thousands of miles of the Pacific at speeds as high as 600 mph, but which still allow hours of evacuation warnings.

Two discoveries by scientists since 1998 have prompted a more dire view of localized waves, even

though no one thinks tsunamis of either the long-range or near-source kind will be a frequent Southland occurrence.

First, a study by the National Science Foundation of the July 17, 1998, tsunami that killed 3,000 on the north coast of Papua New Guinea came up with a surprise conclusion about its origin. The study found striking topographic parallels between offshore New Guinea and offshore Southern California.

Initial reports of the New Guinea tsunami said it had been caused by a magnitude 7.1 quake centered 12 miles out to sea.

But the scientific team, which included USC's Costas Synolakis, was able to confirm that the quake had actually been centered on land.

The quake caused a series of underwater landslides on the steep slopes offshore, displacing large volumes of water and generating the tsunami indirectly.

When he returned to Southern California, Synolakis suggested that research off the Southern California coast might turn up evidence of similar past landslides here.

It was not long before there was a discovery by researchers from the U.S. Geological Survey that similar landslides probably caused the Santa Barbara tsunami of 1812. This too indirectly resulted from an earthquake, although scientists caution that a landslide can occur without an earthquake.

Since then, other studies have shown steep undersea slopes in the Santa Monica Bay and off San Clemente Island. There may be others in the Santa Catalina Channel.

That information seems to open a larger possibility of future local tsunamis in Southern California, those at the conference agreed.

Jose Borrero, a doctoral candidate who works with Synolakis at USC, said last week that historic records indicate there were five near-source tsunamis in Southland waters between 1812 and 1930.

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The most recent, in 1930, caused one drowning in Redondo Beach. It followed a magnitude 5.2 earthquake that caused landslides at sea. Waves as high as 20 feet were reported.

Such waves today, in an area with a much larger population, could cause sharply higher casualties.

In the last 50 years, there has been damage on several occasions from tsunamis arriving from such distant sources as the Chilean temblor of 1960 and the Alaskan quake of 1964 (the last tsunami to hit the Southern California region). The Alaskan event, in addition to causing a tsunami that killed 12 people in Crescent City, Calif., also was responsible for a surge of water that did \$575,000 damage in Marina del Rey and the Port of Los Angeles.

Synolakis and his colleagues have developed maps that show prospective run-ups on land from near-source tsunamis. The maps depict tsunamis submerging the harbors at both Marina del Rey and Redondo Beach and inundating a block of homes inward from the coast at Hermosa Beach.

Synolakis also said that residents of Balboa Island in Orange County, like those of Marina del Rey, could be particularly vulnerable because they have no high ground to flee to quickly. In that case, he suggested, the safest thing to do might be to go to the roof of one's house.

Eddie Bernard, director of the West Coast office of the National Oceanic and Atmospheric Administration in Seattle, who attended last week's conference, cautioned that these maps might not even show the largest run-ups that could occur. They assume a tsunami similar to the one in New Guinea, but he suggested that Southern California could be hit by one of greater magnitude.

Conference participants stressed that the public needs to be aware that tsunamis seldom are just one wave but several, and that curiosity seekers must stay away from the coast after the first one comes in to avoid being injured by a second or third, as happened in Crescent City in the 1964 event.

A tsunami is not really made up of waves, as commonly pictured, but is more like surges of water, filled with debris, that suddenly move onto land. Bernard said there is also a history of fire associated with

tsunamis, largely because they tend to breach fuel lines and may set off combustibles.

Altogether, a menacing picture is emerging although these events, the experts emphasized, do not happen often in any particular locale.

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Big Wave Action

This is one segment of a tsunami inundation map developed by scientists for the state Office of Emergency Services. It depicts Marina del Rey areas that would be covered by waves equivalent in size to a tsunami that occurred in Papua New Guinea in 1998. Scientists believe a similar event could take place in Santa Monica Bay, which, like offshore areas of New Guinea, has steep underwater slopes that could slump in an earthquake.

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Tips for Residents or Workers in Coastal Areas

* As soon as shaking from an earthquake is over, move on foot to higher ground or inland because a tsunami may be coming. Do not wait for an official warning. *

* Never go to the coast to watch for a tsunami if you hear that a warning has been issued. Tsunamis move faster than a person can run. Waves may continue to arrive for hours.

* Tsunamis are not surfable. They are not V-shaped or curling waves. Large tsunamis most frequently come onshore as rapidly rising turbulent surges of water choked with debris. Sources: Costas Synolakis, USC, and Eddie Bernard, National Oceanic and Atmospheric Administration

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