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L.A. THEN AND NOW

1812 California Tsunami Carried a Ship Inland

An undersea quake in the Santa Barbara Channel sent a powerful wave smashing into the coast, carrying a ship half a mile inland.

By Cecilia Rasmussen
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January 9, 2005

Dec. 21, 1812: Capt. Issac Whittemore and the crew of the 283-ton brig Charon had been scouring California's coast for "soft gold": extraordinarily lush otter pelts. Sitting at anchor in Refugio Bay near Gaviota Pass, they planned to do a brisk but illegal business with the pious but practical Franciscan padres: swapping the pelts for cowhides.

About 10:30 a.m., the sea began to rise.

A tsunami related to a 7.2-magnitude earthquake in the Santa Barbara Channel lifted the ship and dumped it half a mile up Refugio Canyon. Then the receding wave yanked the ship back out to sea.

(Records fail to note whether the Charon was damaged or whether any crewmen were hurt. But the ship survived.)

The temblor is believed to have come from a fault under Santa Cruz Island.

The shocking tsunami off Sumatra last month that killed upward of 150,000 people was a reminder of potential danger close to home.

Computer models based on the 1812 incident suggest that a local tsunami caused by an underwater earthquake-induced landslide could hit the Southern California coast with little warning, according to Jose Borrero, an assistant research professor at USC's Viterbi School of Engineering. Borrero is in Sumatra studying last month's event.

No one knows how much time elapsed between the 1812 quake and the tsunami, but it could have been as little as 15 minutes, the U.S. Geological Survey says.

The temblor damaged several missions, destroying La Purisima near Lompoc. Native American villages and the Santa Barbara Presidio were also damaged.

The tsunami was reported as far north as San Francisco. Waves washed inland three blocks in Ventura.

California's population was small then, so there were few witnesses and little loss of life. Among the witnesses was Padre Luis Gil Taboada, who was in charge of the Santa Barbara Mission. He recorded the Charon's plight, as did an 1864 story in the San Francisco Bulletin.

"The sea receded and rose like a high mountain," Taboada wrote in mission records. " ... It has been necessary for us to withdraw for now, more than half a league inland" — about 1 1/2 miles.

In Ventura the whole San Buenaventura Mission "site appeared to settle, and the fear of being engulfed by the sea drove all away ... until April 1813," mission records report.

Aftershocks continued for nearly four months after the 1812 quake.

"The continuous tremors that even until now [Dec. 28] have followed to such an extent that 30 have been counted on a given night, not to mention the fact that some days they have recurred every quarter of an hour, have helped to paralyze everything," wrote Jose Arguello, commandant of the Santa Barbara Presidio. " ... In the bay of the Presidio, the sea has changed from its natural condition," suggesting an elevation change.

There were cultural casualties of the quake. For decades, hundreds of Chumash on Santa Rosa Island had fended off the mission padres, hanging on to their language and culture. After the quake and tsunami, many frightened survivors got into their canoes and headed for the mainland, according to an 1884 account by Chumash Indian Anisetto Pajilacheet, who had been living on the island in 1812.

As unusual as that tsunami seems, the phenomenon is relatively common. Dozens have come ashore in California over the last two centuries, scientists say.

But for the most part, the waves have been small and the damage minor. (The 1964 Crescent City tsunami was an exception. Triggered by a 9.2-magnitude temblor in Alaska, it washed away 29 city blocks and killed 11 people.)

But the history and the evidence in offshore topography went mostly unnoticed until 1998, when a surprise tsunami killed 3,000 people in Papua New Guinea, according to Borrero.

He and Costas Synolakis, a professor of civil and environmental engineering at USC, became part of a scientific team sent to Papua New Guinea. The team, led by Synolakis, determined that the quake had been centered on land, not 12 miles out to sea as originally believed.

When the scientists returned home, Synolakis suggested that research off the Southern California coast might turn up evidence of similar quake-induced landslides here.

Preliminary work discovered evidence of the 1812 landslide that caused the tsunami, as well as topographic parallels between offshore New Guinea and offshore Southern California.

"Tsunamis are more common than we had thought, and they can strike with only a few minutes' warning," Synolakis said in a telephone interview from Sri Lanka, where he is studying the recent disaster.

"While we can't precisely predict the size of the wave from the 1812 event, the fact remains that off Santa Barbara there are submarine landslide hazards that could trigger tsunamis," he said.

"Even a tectonic earthquake triggering a 12-foot tsunami can have substantial impact."

Although the 1812 tsunami indirectly resulted from an earthquake, scientists said an underwater landslide could occur without an earthquake.

Borrero and Synolakis, whose lab developed the tsunami warning model used by the National Oceanic and Atmospheric Administration in the Pacific, also have created maps that identify areas at greatest risk of inundation in a worst-case tsunami.

Danger zones include Santa Barbara, areas on Santa Monica Bay and Santa Catalina Island.

Because of the 1964 tsunami, Highway 101 from Crescent City north through the Pacific Northwest is lined with blue-and-white "Tsunami Hazard Zone" signs. Not so in Southern California.

State emergency managers say they hope to install signs coast-wide within a year or two.

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