

Not My Fault: The tsunami appetizers of March 2011

Lori Dengler/For the Times-Standard
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It's been a decade since the Great East Japan earthquake and tsunami. The recent magnitude 7.1 aftershock (see last week's column) is a reminder that the earthquake sequence is still in progress. For people living in the coastal communities of Fukushima, Miyagi and Iwate Prefectures, much of the land still shows tsunami scars and the barren landscape is a daily reminder that full recovery is still in the future.

What is the point of commemorating past disasters? We pause and acknowledge what happened and the loss and pain of so many. It is also a brief moment when attention is focused on tsunamis, earthquakes or whatever the event was. It is an opportunity to share what was learned and emphasize what it takes to build more tsunami-resilient societies. In this spirit, my next few columns will take a personal look back to what happened in March of 2011.

The story doesn't begin on March 11th. A little before 8 PM on March 8th 2011 my phone pinged. The West Coast Tsunami Warning Center (WCATWC) announced a 7.2 earthquake offshore of the Sendai plain. It was a Tsunami Information Statement and said there was no threat to Alaska or the west coast of North America.

A bit of background on how alerts work. The US tsunami centers continuously monitor earthquake activity and when an earthquake over a threshold magnitude occurs, messages are issued. The lowest level and most frequently issued is the Information Statement. These usually mean no threat, don't worry, no action required. The US tsunami centers issued 41 messages in the past month, 33 of which were Information Statements.

After the Statement, message categories diverge for the US and foreign countries. I'll just take up the US bulletins today. The next step up is a Tsunami Watch. Watches mean there is a possibility a damaging tsunami is on its way but there is time to further evaluate the threat long before the waves will arrive. During this time, the warning centers collect water level data, further analyze the seismic signals and run tsunami models. There was only one Watch issued in the past month – to Samoa after

the February 10 M7.8 in the Loyalty Islands and like many Watches, it was cancelled a few hours later.

No Tsunami Advisories or Tsunami Warnings were issued in the past month. These are alerts that require action. An Advisory is usually issued when a tsunami is expected, but the peak water height won't exceed a few feet and impacts are restricted to beaches and harbors where strong currents can damage to boats and marine structures.

A Tsunami Warning is the most serious and tsunami surges of three feet or higher are expected. County emergency officials are expected to take action when either an Advisory or Warning is issued – closing harbor areas and evacuating some beaches in the case of an Advisory and ordering larger scale evacuations in the case of a Warning. Only County officials can call for evacuations.

When a Watch, Advisory or Warning is issued, the warning centers continue to issue updated bulletins at intervals of 30 minutes to an hour for as long as the status is elevated. An initial Watch may become an Advisory or Warning in subsequent bulletins, or could be cancelled. In rare cases, an initial Statement of no threat may move to a higher level as more data is received.

The Japanese Meteorological Agency (JMA) also issued a bulletin back on March 8th 2011 (3/9 in Japan). JMA messages are only intended for Japan and are specific to the region affected. The 7.2 was expected to produce surges up to 20 inches high along the Sendai coast. The actual peak measured tsunami was 21 inches.

That 7.2 earthquake gave no indication that it would soon be eclipsed by a much larger earthquake and become a foreshock in an extraordinary sequence that continues to the present Japan has a written record of earthquakes and tsunamis that extends back into the Tokugawa Shogunate at least 400 years ago. The record is likely complete for earthquakes of magnitude 6.5 and larger.

Earthquakes in the low magnitude 7 range have recurred every 30 to 40 years in the area off the Sendai plain in historic times. There are a few larger earthquakes sprinkled in, such as the 1978 7.7. In 2008, JMA scientists assessed the seismic threat to the whole country and put the odds at 90% that a M7 earthquake would occur in the next 30 years and a 1 to 10% of a M8 event. The March 9th M7.2 was exactly what they were expecting.

400 years seems like a long time and far exceeds our 170-year North Coast written record. But “long” by human standards is only the wink of the eye to geologic forces. There were signs in the Japanese geologic record that something larger might be in store. Paleoseismologists had uncovered evidence of much larger earthquakes in the more distant past. I was familiar with some of the studies because I had worked on a project studying the tsunami threat to the San Francisco Bay area. We included a M9 off the Northern Japan coast as one of the possibilities.

I certainly wasn't thinking about that after the 7.2, nor even two days later when I got another text from WCATWC. It was just before 10 PM on March 10th. The first part of the message caused no alarm, “THIS TSUNAMI INFORMATION STATEMENT IS FOR ALASKA/ BRITISH COLUMBIA/ WASHINGTON/ OREGON AND CALIFORNIA ONLY. NO WARNING... NO WATCH AND NO ADVISORY IS IN EFFECT ...” But scrolling down, I saw the preliminary magnitude was 7.9 and that, unlike most Tsunami Statements, it did not say that no tsunami was expected. Instead, it said that the event was under evaluation and more information would be issued in the next bulletin.

And you too will need to wait until next week for the rest of the story.

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