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Not My Fault: Navigating the sometimes confusing U.S. Tsunami Warning system

Lori Dengler/For the Times-Standard
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Tuesday morning, my phone beeped at 6:09 am with a text from the National Tsunami Warning Center (NTWC) in Palmer Alaska. It told me that an earthquake with a preliminary magnitude of 7.7 had occurred ten minutes earlier in Papua New Guinea and that no tsunami was expected along the U.S. West Coast or Alaska.

This is not unusual. I have received 54 messages from the NTWC in 2019 and another 19 from the Pacific Tsunami Warning Center. Fortunately, all of them were information statements and not alerts. Like Tuesday's quake, they informed me about an earthquake that posed no threat. But each message serves as a reminder and, even if you think you know how tsunami warnings work, it is worth a review. With changes in protocol and messaging, I am even sometimes confused.

The U.S. tsunami warning system was established in 1949 with a center in Hawaii. It was the government response to the worst US tsunami disaster, the April 1, 1946 tsunami that killed 159 in Hawaii and at least six elsewhere in the country including one in Santa Cruz.

The problem for most victims of the 1946 tsunami was that the threat came from far away. The M8.6 earthquake that triggered the tsunami was in the Aleutians and no one in Hawaii or California felt it. The earthquake occurred over four hours before the tsunami arrived in Hawaii and was recorded on numerous seismographs all over the globe, but in 1946 there was no way to interpret the seismic information quickly and get that information to people in harms way.

The disaster of 1946 was the catalyst to organize a true warning system – not just detecting earthquakes, but also developing the entire downstream process of analysis, dissemination, reception, evacuation and education. It took nearly three years to put all the pieces into place. The National Weather Service became home to the new warning center because of their experience in issuing warnings and their connections with local civil defense organizations, as most state/county emergency offices were called at the time.

The first big test of the new system came in November 1952 with a M9 earthquake near Kamchatka. In 1952, the staff at the warning center had to rely on phone calls from participating seismic stations around the Pacific. Seismologists from the Philippines, Mexico, Berkeley and other member networks called in their readings of the seismic arrival times to PTWC and scientists at the center would locate the earthquake, estimate the magnitude and use bathymetry (ocean depth) charts to estimate when the first waves would arrive in Hawaii. It took over an hour, but they were able to alert coastal areas of Hawaii and county authorities issued evacuation orders several hours before the tsunami was expected.

The tsunami arrived as forecast and peak water heights of over 30 feet were observed on Kauai's north shore. Surges caused major damage but no lives were lost in Hawaii. The warning system worked well again in the 1957 M8.6 Aleutian earthquake tsunami with damage in Hawaii but again no casualties. In 1960, the May 22 M9.5 Valdivia earthquake caught Hawaii off guard. Alerts were issued but there had been some changes in protocol resulting in confusion and ineffective evacuation. Sixty-one people died.

After each deadly tsunami, a system review is made and improvements put in place. But the next tsunami not quite four years later, chose a different target. The 1964 tsunami ravaged Alaska and the North American West Coast. From the Hawaiian perspective, the system although still slow and dependent upon phoned in data, worked as designed and alerts were issued in just over an hour. But PTWC was primarily focused on Hawaii and information was much slower to reach the US West Coast. It took more than three hours before Crescent City received an official notification, less than an hour before the first surges arrived. As a result, a second tsunami warning center was established in Alaska with the responsibility of issuing alerts for North America.

Today, we still have two warning centers, PTWC and the Alaska Center, renamed the National Tsunami Warning Center. Technology has greatly speeded up the warning process. The ten-minute notification I received on Tuesday is typical for earthquakes far away. Of the 54 texts I've gotten this year, 42 were from earthquakes in Alaska and the West Coast and arrived in two to four minutes. Unless you pay close attention, you were unlikely to be aware of any of these notices as all of them were "Tsunami Information Statements," telling me about an earthquake that was either too small or too far away to pose a tsunami threat to me.

Both tsunami centers issue bulletins independent of each other. They have different areas of responsibilities and it is possible for one center to issue a warning while the other releases a statement that no tsunami is likely. It is important to pay attention to where an alert came from and for what area it is directed. PTWC has responsibility for issuing warnings to Hawaii, and US Pacific and Caribbean territories. It also issues "tsunami threat" messages to other nations in the Pacific and the Caribbean and is the interim tsunami warning center for the South China Sea. NTWC is responsible for all the other US and Canadian coasts.

If a tsunami warning is issued for our area, you won't need to sort through text messages or go on line to find out who issued it. You will likely be informed in numerous ways – through emergency alert messages, radio, television or, if there is sufficient time, door to door notifications. And for the largest tsunami threat to the North Coast, Mother Nature will provide all the warning you need – the longest earthquake you have likely ever felt. When that bell goes off in your head that this earthquake is going on and on, it's your signal to head to higher ground.

Note: Anyone can receive alerts from the National Tsunami Warning Center via twitter feed (@NWS_NTWC) or text 40404 with 'follow NWS_NTWC' for text messages. Read Tsunami! (Dudley and Min) for an informative and readable history of the tsunami warning system.

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