

Not My Fault: A December tsunami surprise and a note about the government shutdown

Lori Dengler/For the Times-Standard

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Krakatoa. The name evokes catastrophe and provides the dramatic backdrop of books, numerous TV treatments and of course the movie “Krakatoa, East of Java” with Maximillian Schell, Diane Baker and Sal Mineo. Only Krakatoa is actually west of Java and its name isn’t Krakatoa, but rather Krakatau.

Krakatau is a volcano in the Sunda Strait between the south coast of Sumatra and the west coast of Indonesia’s most populous island, Java. Indonesia has the dubious recognition of more active volcanoes and more deadly eruptions than any other place on earth. The most powerful and deadliest of these was in 1815 at MT. Tambora off the eastern tip of Java that killed somewhere between 71,000 – 92,000, blanketed the planet with ash causing the “year without a summer” and a global chill that led to famine throughout the world.

On August 27, 1883, Krakatau quite literally blew off its head. The explosion was so loud that it is called the “world’s loudest sound,” rupturing the eardrums of people 40 miles away on Java and reported hear in India’s Nicobar Islands 1300 miles away, New Guinea and Western Australia and even on Rodrigues Island 3000 miles away. According to <http://nautil.us/blog/the-sound-so-loud-that-it-circled-the-earth-four-times>, pressure waves from the explosion could be detected encircling the globe four times.

The explosion did far more than just ring people’s ears. It was accompanied by an enormous outpouring of ash and ejecta, emptying over four cubic miles of material into the atmosphere and sweeping into the ocean in flaming avalanches. About 2000 people died from direct eruption impacts of heat and ash. But effects didn’t end there. The eruption partially drained the magma chambers beneath the volcano and caused both the sea floor near the volcano and about 70% of the 1883 volcanic edifice to collapse into the ocean spawning a monster tsunami that killed at least 34,000 more people on Sumatra and Java and other nearby islands.

Simon Winchester’s book, “Krakatoa: The Day the World Exploded,” does a credible job of explaining the sequences of events before, during and immediately after the eruption. By the mid 1800s the teleprinter had been installed in a number of cities, capable of transmitting electronic messages via Morse code. British officials and newspaper staff had a teleprinter in their offices in Batavia (now the capitol city Jakarta) and submitted messages to England as the event unfolded. The last two letters of the volcano’s name were sent in error as ‘oa’ and not ‘au’ and a media error has led to the name most of us remember.

After the 1883 eruption, activity did not cease at Krakatau. The volcano began rebuilding. By 1930, a new cone made its way above the sea. It was named Anak Krakatau (child of Krakatau). Slowly the cone has continued to grow, now reaching nearly 1000 feet above the ocean. Volcanic activity is frequent but of low intensity. On clear days small ash plumes can be seen from nearby coastlines on Sumatra and Java.

Fast forward to Saturday December 22. A little before 9:30 pm Indonesia time, a series of surges flooded islands in the Sunda Strait and nearby coastlines. There had been no warning earthquake shaking. Indonesian authorities saw no sign that a tsunami may be on its way. Officials had issued an alert of potential flooding in low-lying areas due to high tides, but there was nothing anomalous to trigger the tsunami warning system.

Some people were asleep when the waves arrived. Others were attending events and parties near the beach. Video footage shows surges engulfing a stage at Java’s Tanjung Lesung beach resort and the pop band Seventeen who was performing their last set of the night. Over 100 people died near the hotel including several members of the band.

A few people mentioned feeling modest shaking, nothing unusual in this seismically active area. Others said they heard a low, vibrating roar as the waters approached. But for most, the only alert was screams of neighbors and seeing the water approach. It wasn’t a huge tsunami. Tide gauges nearby recorded heights of about three feet and eyewitness accounts suggest surges may have reached twice as high locally. The tsunami impacts were likely exacerbated by very high tides at the time and the large numbers of people living in very low-lying areas. As I write this, the death toll stands at 429, with more than 1500 injuries and 154 people still unaccounted for. More than 16,000 people have been displaced from their homes.

Indonesian and international tsunami scientists are working to piece together the events that led to the tsunami. A comparison of satellite images taken before and after the tsunami has confirmed that a large flank of the island is gone, caused by either lateral sliding into the ocean or collapse or both. Preliminary modeling suggests that the volume of material and timing of collapse is consistent with the observations. Confirmation will require more detailed bathymetry, which will likely take several months to acquire.

The December 22 tsunami underlines how difficult it can be to warn and protect coastal residents from tsunamis. Large earthquakes cause the overwhelming majority of tsunamis. Tsunami warning systems are based on the ability to detect earthquakes and quickly analyze them for their tsunami potential. In nearby areas, feeling an earthquake provides warning. But not all damaging tsunamis are caused by earthquakes. Landslide-generated tsunamis are perhaps the most difficult to prepare for. They can occur silently and send deadly surges to nearby areas in minutes.

Note – The current government shutdown has consequences for earthquake and tsunami safety. While most staff at the tsunami warning centers are considered essential personnel and will continue to issue alerts to states via established warning systems, the government’s foremost modeling group is furloughed. These are the folks that can advise the warning centers when earthquakes occur that are not “by the book” – such as strike-slip or normal faulting events that are not located in subduction zones. In addition, NOAA’s National Centers for Environmental Information (NCEI), the organization responsible for archiving global data about past tsunamis, earthquakes and volcanic eruptions, has turned off access to their information, making it much more difficult to place current events in an historic context. Any work not deemed immediately essential to public safety is prohibited. This includes planning meetings with state and local emergency managers. The effects on the USGS have been even greater as most scientists there are considered non-essential. Real-time earthquake data and displays may not be as current as we’ve come to expect. No other countries or international organizations display global earthquake data in nearly as accessible or usable way than the USGS.

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