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Not My Fault: A closer look at the Kamchatka tsunami

Lori Dengler for the Times-Standard

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Google Earth image of Severo-Kurilsk in the northern Kuril Islands. The harbor and a nearby fish processing plant were damaged in the July 29th tsunami. Inset shows the street grid of the town's 1952 location where at least 4000 people died in the last great tsunami. The town was moved to higher ground afterwards.

The July 29 M8.8 Kamchatka tsunami arguably caused more damage and certainly accrued more media coverage than the shaking losses. Two months out we have a better picture of what happened, how the tsunami affected areas both nearby and far away, and can identify some of the factors that reduced or exacerbated impacts.

Russia sent a team of scientists into the area two days after the earthquake and satellite imagery has been examined by a number of researchers. NOAA's National Center for Environmental Information has posted 353 water height measurements from the Kamchatka coast to Chile's research base in Antarctica over 10,000 miles away.

In the areas near the source, the first tsunami surges arrived in as little as 30 minutes after the earthquake. Most of the Kamchatka coastline is uninhabited and the highest tsunami water levels struck areas devoid of settlement. In Vestnik Bay, part of the South Kamchatka Nature Park, satellite imagery shows vegetation near river mouths stripped over a half mile inland and a field team measured splash heights of about 60 feet.

The most damage was at Severo-Kurilsk in the northern Kuril Islands just south of Kamchatka. Severo-Kurilsk today is a community of about 2,500 people and is the administrative head of the region. It's a community with a long history of tsunamis and one I had been aware of from my teaching years as the entire town was destroyed by the 1952 tsunami. The 1952 tsunami was triggered by a magnitude 9.0 earthquake, the fifth largest earthquake ever recorded. It is tied for tenth place on the list of deadliest tsunamis of the past millennium according to NOAA's Global Tsunami Data Base.

Severo-Kurilsk was the hardest hit community in 1952. Located next to the harbor at an elevation only just above the beach berm, the first surge slammed into the community about 40 minutes after the earthquake, reaching heights of at least 30 feet and completely overtopping the town. Numbers are a bit sketchy. A USSR report compiled a few years after the earthquake noted the pre-tsunami population at 15,000 and 4,000 deaths. Other reports range from 2,000 to over 14,000. Many of the casualties were likely undocumented Korean War refugees, the true number of which will remain unknown.

A quick online search will come up with several tsunami aftermath photos of Severo-Kurilsk. The debris-littered landscape is reminiscent of recent tsunamis in Indonesia and Japan. The USSR report described many people running out of their homes during the earthquake but returning after the shaking stopped, only to be caught in the tsunami surges that soon followed. Peak water height estimates in the town range from 20 to 30 feet.

The scars of the 1952 tsunami remain today. Take a Google Earth tour and you will see the harbor and the current location of Severo-Kurilsk. Zoom into the area just south of the harbor and you will see the grid of streets where the town was in 1952. Survivors wisely chose to relocate the town above the 1952 inundation line. The 2025 tsunami was not as large as 1952. It reached a height of 15 to 35 feet in the area, high enough to damage the harbor and a fish processing plant, knock vessels from moorings, and disrupt infrastructure. The modern town suffered earthquake damage but no deaths or injuries and was above the deepest tsunami penetration. The original town location would have been flooded.

The story of Severo-Kurilsk is one example of how mitigation measures taken after 1952 reduced losses in 2025. Memories of 1952 and the relatively frequent occurrence of large earthquakes and tsunamis in the region are strong motivation for emergency response planning and earthquake/tsunami preparedness.

More recent trans-oceanic tsunamis such as Indian Ocean (2004), Chile (2010), and Japan (2011), have helped to strengthen the tsunami system throughout the Pacific. More than a hundred countries now participate in UNESCO's Intergovernmental Oceanographic Commission (IOC) Tsunami Program, 46 in the Pacific region alone. Countries in the program participate in tsunami hazard assessment, warning dissemination training, and education and outreach programs through the International Tsunami Ready Program and receive tsunami bulletins from the Pacific Tsunami Warning Center (PTWC).

Increased awareness of tsunami vulnerabilities also launched the Pacific Catastrophe Risk Insurance Company (PCRIC) in 2013. Called a resiliency risk pool, PCRIC is supported by donors to create inexpensive disaster insurance options for Pacific Island nations. An

unusual aspect of the program is that it provides payouts to member nations as soon as PTWC issues a tsunami THREAT message that includes a country's shorelines as long as appropriate response actions are taken. This provides an incentive for countries to mobilize emergency response personnel and conduct evacuations with the assurance that these costs will be reimbursed.

Another advancement to the tsunami alert system is improved communications links between PTWC and member countries, better access to instrumental data, and the deep ocean pressure sensors known as DART. Three DARTs are located within a few hundred miles of the Kamchatka coast and others further away. As the tsunami travels over these instruments, the actual tsunami height is used to calibrate precomputed models of tsunami propagation. This allows forward modeling of the likely tsunami characteristics anywhere in the Pacific. As the tsunami front passes over more instruments, models are refined and the likely impact updated.

During the Kamchatka tsunami event, PTWC sent 24 messages to foreign countries in the Pacific region over a 26-hour time span. The messages not only included areas most likely to be affected but included an estimate of tsunami height. Most UNESCO/IOC members took action to evacuate vulnerable coastal populations. For example, Chile issued tsunami warnings evacuating hundreds of thousands of coastal residents, closing schools and beaches. Ecuador issued alerts to tour boat operators in the Galapagos Islands, and all maritime activities were suspended.

In most areas of the Pacific, response and evacuations appear to have been carried out smoothly. An exception is Japan. Japan issues its own tsunami warnings through the Japanese Meteorological Agency and issued evacuation warnings for over two million coastal residents in Hokkaido and northern Honshu coastlines only minutes after the earthquake.

Northern Japan was only two hours tsunami travel time away from the Kamchatka source. That puts the region under considerable stress to act very quickly, without the 8 hour or longer window that most of the rest of the Pacific region enjoyed. The initial estimates of tsunami height suggested a larger tsunami than actually occurred and memories of the 2011 tsunami spurred people to respond in some haste. One woman died while driving to higher ground when her car went over a cliff, 10 people in Hokkaido suffered injuries while evacuating, and 11 others suffered from heat exhaustion in the over 100° temperatures.

The July 29th tsunami was a test of the Pacific-wide tsunami alert system and, for the most part, appears to have performed very well. We were fortunate that the tsunami was not as large as 1952, and the highest amplitudes were in uninhabited parts of the region. But this was a major tsunami and the absence of any casualties due directly to wave impact is a testament that preparedness and alerting systems work and are worth the costs to maintain them.

A special thank you to Jody Bourgeois for her inside perspectives of Kamchatka and Severo-Kurilsk. Next week – the Kamchatka tsunami in U.S. states and territories. More about P CRIC and what happened in Samoa during the Kamchatka tsunami at <https://temblor.net/earthquake-insights/2025-kamchatka-tsunami-triggered-rapid-insurance-payout-in-the-south-pacific-16889/>

Lori Dengler is an emeritus professor of geology at Cal Poly Humboldt, and an expert in tsunami and earthquake hazards. The opinions expressed are hers and not the Times--Standard's. All Not My Fault columns are archived online at <https://kamome.humboldt.edu/taxonomy/term/5> and may be reused for educational purposes. Leave a message at (707) 826-6019 or email Kamome@humboldt.edu for questions and comments about this column or to request copies of the preparedness magazine "Living on Shaky Ground."