

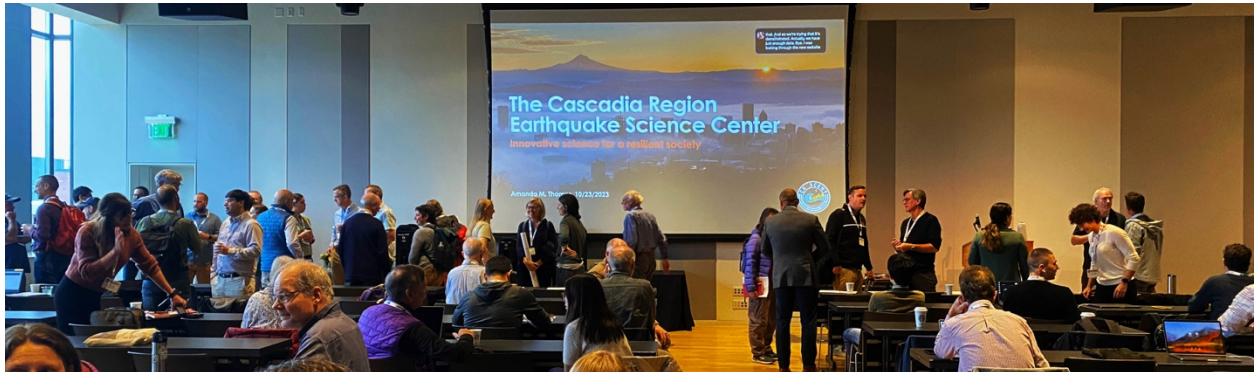
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Not My Fault: World Tsunami Awareness Day and the launch of a new Center to better understand them

Lori Dengler for the Times-Standard

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Over 150 earthquake and tsunami researchers and professionals at the inaugural meeting of the Cascadia Region Earthquake Science Center in Eugene, Oregon.

The United Nations sets aside November 5 as a day to remember tsunamis and the important role that everyone can play in reducing tsunami threats. The Japanese UN delegation proposed World Tsunami Awareness Day in 2015 in recognition of the horrors Japan experienced on March 11, 2011 but also as a reminder that all coastal areas of planet have a tsunami threat and actions of individuals and communities can make a difference in life or death.

The date was chosen to recognize the actions of one man more than a century ago. In 1854, Goryo Hamaguchi saved his village because he knew that tsunamis follow earthquakes. A magnitude 8.4 earthquake struck Japan's Kii Peninsula in Wakayama Prefecture. Great earthquakes were infrequent and few in the village were aware of the tsunami threat. After the earthquake, Hamaguchi-sensei set fire to piled sheaves of newly harvested rice to get the attention of villagers near the coast and guide them to high ground in the darkness. The 1854 tsunami caused damage and casualties, but his actions saved many.

I visited the Kii Peninsula in 2016. Four of us took the week before the 5-year commemoration of the 2011 tsunami to hike the Kumano Kodo pilgrimage trail. It is a beautiful area and has long been a sacred area in Shugendo, Shinto, and Buddhism. The terrain is rugged and small and large shrines and temples dot the way. Near the coast I could imagine the scene in 1854 with the rice sheaves safely stacked and the security of winter food in everyone's mind.

The 1854 earthquake was certainly a surprise, but it may have been even more of a shock to see the treasured rice aflame on the hillside. Villagers were likely enraged as they charged up the

hill to see what happened. But when the tsunami surged over the areas where they had been only moments before, they realized the village elder had saved their lives.

Hamaguchi saved his village but at the cost of a winter's food supply. World Tsunami Day is part of a global effort to improve tsunami awareness, the safety of coastal communities, and alert residents and tourists to quickly take action to save themselves in a less painful manner. It is a challenging proposition because deadly tsunamis are rare. Hundreds of years may elapse before they revisit a particular coastline, long after memories have faded.

It is also challenging because of the many uncertainties great quakes pose. Nowhere is this more of a problem than in the Cascadia region of the Pacific Northwest. The Cascadia subduction zone extends over 650 miles from Cape Mendocino in Northern California to Vancouver Island, Canada, the only fault system believed capable of producing earthquakes as large as magnitude 9 in the lower 48 states. Its existence lay dormant to earthquake professionals who only became aware of this sleeping giant less than forty years ago.

We've learned a lot about Cascadia in the past forty years. We've nailed down the date of the last great rupture to January 26, 1700 from written accounts of the damaging tsunami it produced in Japan. Oral accounts of shaking and flooding cover the Cascadia region from the Wiyot, Yurok, and Tolowa of Northern California to the Nuu-chah-nulth peoples on Vancouver Island. Paleoseismologists have found evidence of land subsidence, tsunami inundation, and strong shaking at numerous sites in the region. Trees, submerged and killed in that earthquake confirm the Japanese accounts; their last growth rings were in the summer of 1699.

But there is so much more that we don't know. At the top of the list is how strongly will the ground shake, how large will the tsunami be, impacts in terms of building and infrastructure damage, and might there be any way of telling how soon it will come. Answering those questions requires basic science and engineering studies to define fault sources, material characteristics that determine the speed of seismic waves and features that amplify them, and fault slip that controls tsunami generation. There are a multitude of other unknowns such as what is happening offshore, and the role of smaller crustal faults and deeper buried ones.

Enter the Cascadia Region Earthquake Science Center (CRESCENT). This fall, the National Science Foundation provided funding for a regional consortium of 16 universities to establish a center to prioritize the most important questions, support studies to provide answers, and engage regional partners that will result in societal actions that will reduce impacts from the next Cascadia earthquake.

I attended the kickoff meeting of CRESCENT held the week of October 23 in Eugene Oregon. CRESCENT is built on three basic pillars: science, developing the next generation of geoscientists, and partnerships. The roughly 150 in-person attendees spent three days in collaborative discussions about process and priorities.

Cal Poly Humboldt is one of the 16 university collaborators in CRESCENT and a number of us with Humboldt connections attended the meeting. Humboldt is a lead in the workforce development leg of CRESCENT. The geosciences have lagged behind many other STEM fields in including people from diverse backgrounds. This is limiting in several ways. Scientific advances require thinking in new ways and narrowing the workforce to a small segment of society

hobbles the effort. We need researchers and credible spokespeople from every part of society to engage all at-risk communities in taking action to reduce hazards.

One of the first big efforts of the workforce leg will happen in summer 2024. Cal-Poly Humboldt is instituting a Cores to Codes summer field experience for undergraduates from underrepresented backgrounds. Students will learn techniques of paleoseismic investigations, spend time in the field coring and collecting samples and return to campus to analyze their findings. A huge ovation to Harvey Kelsey (Geology Dept.) and Nievita Bueno Watts in the Indian Natural Resources Science and Engineering Program for launching this program so quickly.

My role in CRESCENT is primarily in the partnership leg. From my perspective, the best science is of little use unless it results in risk reduction. To do this, we need to identify all of the potential users of the science and what it is they need. Some are obvious – state agencies such as the California Geological Survey, federal agencies such as the USGS, NOAA, and NASA. These groups aren't just recipients of data but will be active research participants. But we need to cast a much wider net – utilities, resilience/emergency management groups, tribes, local government, businesses, information/media sectors, and many more.

Next year CRESCENT will be hosting a meeting for partners. The Redwood Coast Tsunami Group will be represented. I encourage anyone who thinks their organization should be at this table to contact me. Science that will actually make us safer – what a great idea! Much better than burning the rice fields.

More about CRESCENT at <https://cascadiaquakes.org/>.

Lori Dengler is an emeritus professor of geology at Humboldt State University, 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. Downloadable copies of the North Coast preparedness magazine "Living on Shaky Ground" are posted at <https://rctwg.humboldt.edu/prepare/shaky-ground>.