

CARIBE WAVE 2021 Exercise

By Stephanie Soto and Christa von Hillebrandt-Andrade, NOAA Caribbean Tsunami Warning Program, & Elizabeth A. Vanacore, CARIBE WAVE Task Team Chair, Puerto Rico Seismic Network, Dept. Geology, UPRM

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The annual CARIBE WAVE exercise for the Caribbean and Adjacent Regions has been improving and validating tsunami readiness since 2011. With almost 350,000 participants, the 2021 exercise took place on March 11 in commemoration of the 10th anniversary of the Tohoku earthquake and tsunami in Japan. Despite the ongoing coronavirus emergency implications, the UNESCO IOC Intergovernmental Coordination Group for Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (CARIBE EWS) decided to continue with the exercise. The CARIBE WAVE Task Team recommended countries plan and execute accordingly, and take into consideration the CARIBE EWS COVID-19 guidelines.

The exercise included two components, communications from the Pacific Tsunami Warning Center (PTWC), the Regional Tsunami Service Provider, and evaluation of the tsunami procedures and programs within Member States/Territories. It was left up to the countries to determine their level of participation and activities, and to choose between the two proposed scenarios: Jamaica, and Northern Lesser Antilles. The first scenario simulated a tsunami generated by a magnitude 8.0 earthquake located along the Enriquillo-Plantain Garden Fault Zone (EPGFZ); the second scenario was a tsunami generated by a magnitude 8.5 earthquake located northeast of the Leeward Islands.

For the communications component, PTWC issued a “dummy” message at 14h00 UTC to all officially designated Tsunami Warning Focal Points (TWFP) and National Tsunami Warning Centers (NTWC). Several methods of communication were used to test and disseminate the message: The World Meteorological Organization Warning Information System (Global Telecommunication Systems), the Aeronautical Information Replacement System (AISR), NOAA Weather Wire, GEONETCAST Americas, Advanced Weather Interactive Processing System (AWIPS), Fax, Email, and Social Media. According to feedback as well as social media and web posts, the dummy message was successfully received, validating the communication platforms.



Figure 1: Participation of the CARIBE WAVE 21 Exercise in British Virgin Islands, Trinidad and Tobago, Mexico, Venezuela, France and Colombia.

TsuInfo Alert

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NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM LIBRARY CATALOG:

<http://d92019.eos-intl.net/D92019/OPAC/Index.aspx>

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RECENT TSUNAMI EVENT: March 4th, 2021, M8.1, Kermadec Islands Region

IOC Tsunami Programme Event Summary: At 1928Z, a M8.1 shallow thrust-fault earthquake in the Tonga-Kermadec Trench generated a tsunami that was observed locally and across the Pacific Basin. The earthquake followed nearby M7.4 foreshock that occurred ~107 minutes earlier and a M7.3 ~900 km to the south six hours earlier. The PTWC issued a Tsunami Threat Message at 1937Z based on the earthquake's magnitude, its first RIFT forecast at 1958Z, and its Final Tsunami Threat Message at 1222Z on 5 March (22 messages over 17 hours). In nearby Pacific Island Countries, warning or advisories were issued soon after, with some evacuations taking place, followed by cancellations after either no or only small waves were observed. In the eastern Pacific, the Galapagos, and parts of Central and South America had forecasts of 0.3-1m. Maximum observed amplitudes reported by PTWC were 0.56 m at Norfolk Island west of the epicenter and 0.48 m in the Galapagos, Ecuador to the east northeast. On Raoul Island, the largest of the Kermadec Islands and near to the epicenter, data communication were knocked out by the earthquake, including for the sea level gauges that would have been used to confirm the severity of any tsunami from the M8.1 earthquake. The event was recorded on nearby NZ and US DART systems, and used by the NZ GNS and PTWS to validate forecasts during the event. Post-event reconnaissance revealed at least 0.79g of ground acceleration was measured and numerous landslides.



View presentations and documents for the PTWS Post-Event Debrief and Hotwash that took place on March 17th, 2021:

http://www.ioc-tsunami.org/index.php?option=com_oe&task=viewEventRecord&eventID=2995

TSUNAMI PREPAREDNESS

CARIBE WAVE 2021 Exercise

By Stephanie Soto and Christa von Hillebrandt-Andrade, NOAA Caribbean Tsunami Warning Program, & Elizabeth A. Vanacore, CARIBE WAVE Task Team Chair, Puerto Rico Seismic Network, Dept. Geology, UPRM

(Continued from page 1)

There was great uncertainty on the level of participation there would be for the tsunami alerting and evacuation planning and exercising. For CARIBE WAVE 20 which took place at the onset of the pandemic, the exercise was reduced to just a communications test and a little over 5,000 people were reported having participated (much fewer than the 100,000 that had registered and the 800,000 that participated in CARIBE WAVE 19). For CARIBE WAVE 21, almost 350,000 registered on [TsunamiZone.org](https://www.tsunami-zone.org). The majority of the participants were from national, state, and local governments, followed by preparedness organizations and K-12 schools. In addition to these sectors, which consistently have had a high level of participation, this exercise had the highest number ever of non-profit organizations, museums/libraries/parks, volunteer radio groups, and media organizations. Social media platforms have been the primary source for communicating tsunami awareness, reaching over 2 million people worldwide for this exercise. This demonstrates that the CARIBE WAVE exercise continues to promote tsunami preparedness despite the ongoing pandemic situation.

The NOAA Caribbean Tsunami Warning Program (CTWP) used virtual meeting tools to monitor CARIBE WAVE 21, including the availability of sea level data, which would be critical for forecasting and confirming a real tsunami event. If a tsunami had indeed occurred on this day,

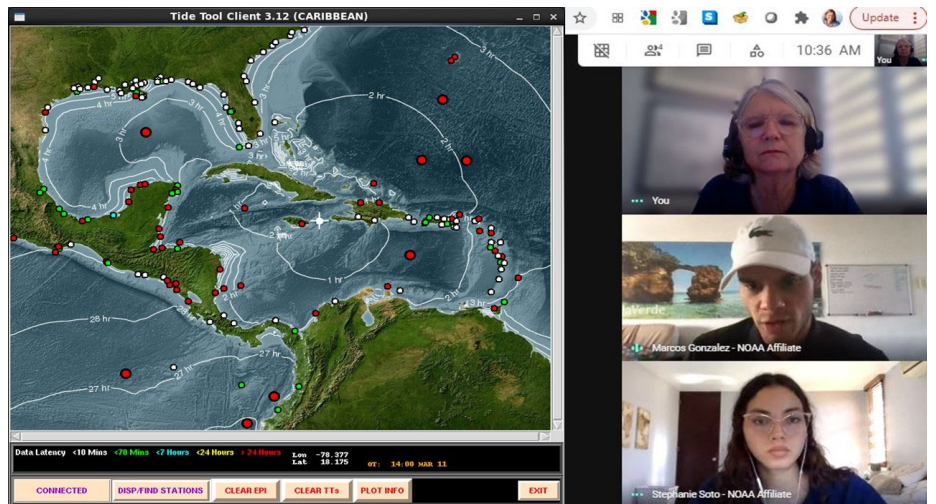


Figure 2: US NWS Caribbean Tsunami Warning Program staff virtual meeting on the day of the exercise.

30 of the 50 regional sea-level stations that would have been expected to record the tsunami were non-operational, including the five DART (Deep Ocean Assessment and Reporting of Tsunamis) buoys. For the first time, a regional hotwash was also held to receive feedback and discuss CARIBE WAVE 22 plans. CTWP is also gathering and processing feedback from the participating countries and territories through an online questionnaire. For more information on the exercise, the Jamaica and Northern Lesser Antilles scenarios, and reports please visit <https://www.weather.gov/ctwp/caribewave21>.

Planning for CARIBE WAVE 21 took over 10 months and was coordinated by a task team led by Dr. Elizabeth Vanacore of the Puerto Rico Seismic Network, coordinated by the US NWS Caribbean Tsunami Warning Program, and supported by the Caribbean Tsunami Information Center and the Pacific Tsunami Warning Center. [TsunamiZone.org](https://www.tsunami-zone.org) was used for the registration of the participants.

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EMCOMM RUM, AREDN-PR and ARES Montgomery County, MD HAM Operators Participate in CARIBE WAVE 2021

By Victor J. Rivera, Professor-University of Puerto Rico at Mayaguez

INTRODUCTION—HAM amateurs have demonstrated for many years the important role they can play before, during and after a disaster. This year, EMCOMM RUM members (University of Puerto Rico at Mayaguez HAM emergency communications group), Puerto Rico Amateur Radio Emergency Data Network (PR-AREDN) HAMs and Winlink operators from ARES Montgomery County, Maryland participated in the EMCOMM RUM Caribe Wave 2021 Digital Net exercise to practice emergency communication routines as a response to a tsunami event in Puerto Rico.

EMCOMM RUM CARIBE WAVE 2021 OBJECTIVES AND STRATEGY—The objectives of the EMCOMM RUM Caribe Wave 2021 activation were to:

1. Relay tsunami products from the Puerto Rico Seismic Network (PRSN) to digital ham operators.
2. Practice the activation of a Digital HAM Net.
3. Use Winlink Express to send and receive tsunami reports and associated messages.
4. Use the Winlink Net Check In template to check into the Caribe Wave 2021 EMCOMM RUM Digital Net.
5. Test the AREDN-PR Winlink Telnet Post Office and other Winlink access points available in Puerto Rico and abroad.
6. Send the “Did you hear it?” tsunami report in .txt format using the Winlink Global Radio Email system.

EXERCISE PREPARATION—Preparation for the exercise required securing participation from EMCOMM RUM and PR-AREDN amateur radio operators, creating an exercise web page and establishing a tsunami message communication pathway from the PRSN. EMCOMM RUM secured participation from ten Winlink operators in Puerto Rico; three Winlink operators from Montgomery County, Maryland ARRL/ARES later joined the group. This later group was given the task of sending health and welfare (H&W) requests during the exercise using the Winlink Express NTS Radiogram template.

CARIBE WAVE 2021 MARCH 11, 2021—The EMCOMM RUM Digital Net NCS/NCO and PRSN independently alerted HAM operators on March 11 at 1400 UTC that a tsunami alert had been issued for Puerto Rico. At this time, the Digital Net NCO also asked stations to check in using Winlink Express’ Net Check In template. As the exercise continued stations sent their filled “Did you see it” reports using the PR AREDN MESH network, local Packet RMS and VARA FM nodes and international HF nodes. The Montgomery County, Maryland ARES Winlink operators sent H&W radiogram requests, which were answered from a Winlink-capable field station (see picture) and later on from a Winlink-capable fixed station located in Mayaguez, Puerto Rico. PRSN sent two more tsunami reports to HAM operators using the Winlink Global Email Radio system and digital messages continued to be exchanged until Digital Net check-outs were requested at 2300 UTC. Following the exercise, ICS-214 and ICS-309 reports were prepared by Montgomery County ARES and the EMCOMM RUM NCS/NCO.



EMCOMM RUM POST-EXERCISE ASSESSMENT—The EMCOMM RUM CaribeWave 2021 objectives were met. Future exercises will be conducted to validate exercise Standard Operating Procedures, request ICS-214 and ICS-309 from all digital stations, accommodate P2P stations, include other digital modes (NBEMS and JS8Call) and integrate phone traffic with HAM digital nets.

EMCOMM RUM Caribe Wave 2021 webpage is available at:

<https://sites.google.com/view/digitalnetemcommrum/caribewave-2021>

TSUNAMI PREPAREDNESS

Not My Fault: How We Did on the Tsunami Test

By Lori Dengler, Times-Standard March 28th, 2021

Can I grade last Wednesday's Tsunami Communication Test? The jury's still out, but here is a preliminary assessment.

Four factors to consider:

1. Did you do what you set out to do – test the systems that you had prioritized?
2. Did people understand it was only a test? More important, was anyone injured or overly frightened because they thought it was a real tsunami?
3. Was there bad publicity?
4. Did you identify problems? Do you have a plan to fix them?



A number of systems were included: emergency notification, emergency Alert (EAS) activation, EAS triggering of sirens, and civil air patrol audible messaging. All of these areas were tested on Wednesday, so check off #1.

It's hard to quantify how many people were confused by the test. There were only a few calls to dispatch in Humboldt and Del Norte Counties asking what was happening, and no reports of anyone who was overly upset or evacuated. I feel comfortable in saying we met the second criteria.

The third sign of a failed test is coverage that reflects poorly on the organizations or personnel involved with the test. Bad publicity can doom future testing and make it impossible to expand into other areas of the state. I judge the media coverage as balanced in both explaining the importance of the test and pointing out problems and I hope they continue to pursue progress in fixing those issues.

And yes, there were problems, some expected and some a surprise. I was pleased to get two emergency notifications at 10 AM on Wednesday. My phone dinged in quick succession with test messages from Humboldt County and HSU and I received emails as well. And from the comments on FaceBook, many others had similar experiences. County reps are following up with Everbridge this coming week to determine exactly how many messages were delivered. If you didn't get a message, Google or call your County OES office to make sure you are enrolled. I hope all of California incorporates an emergency notification test during next October's Great ShakeOut earthquake drill.

The EAS activation worked. NOAA radios automatically turned on and the message was loud and clear. Other parts of the EAS activation didn't work as well. If you were listening to a local radio station, you would have heard the EAS interruption, but the message was hard to understand on some stations. This has been a problem on every previous test. The EAS message from the County or the Weather Service is digital. Some stations still have analog equipment that receives and retransmits, resulting in distortion. This will continue to be a problem as long as stations don't upgrade equipment.

Local television stations carried the test. No problem with Del Norte County regardless of cable, satellite dish or stream. Suddenlink was a big problem in Humboldt. If you were watching a local station on cable, the broadcast was

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By Lori Dengler, Times-Standard March 28th, 2021

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interrupted at 11 AM and never resumed. County and Weather Service officials made repeated attempts to reach Suddenlink, but were unable to reach anyone with the authority I to lift the test message. Normal broadcasting did not resume until the evening, more than eight hours after it had been interrupted. This is an unacceptable situation and I will keep you posted as to its resolution. The good news is that the problem was identified during a test and not during a real emergency.

EAS should have activated six tsunami sirens in Del Norte and twelve in Humboldt. Only half of the sirens in each county triggered successfully. This was no surprise. Our sirens are old and the damp coastal conditions aren't kind to electronics. During our last test in 2018, there were 15 tsunami sirens in the region and nine were successfully activated via EAS. We've slipped down a notch but the same problem that plagued the sirens then – antiquated electronics – continues to the present. Both counties are looking into fixes.

For many people, sirens are synonymous with successful alerting. It is no longer the case today when there are so many other ways of disseminating information. The sirens on the North Coast have a very specific role in the alerting system. They are targeted to vulnerable areas where people congregate outdoors such as harbors and popular beaches. If you didn't hear a siren on Wednesday, think about where you were and what other methods of notification will reach you.

Two civil air patrol planes made passes over Humboldt and Del Norte Counties broadcasting an audible message. The flyover path is to alert people outside on the beach, in harbors or remote coastal trails. Last Wednesday, I heard from a hiker in Prairie Creek – no cell service, but she did hear the plane announcement loud and clear.

Don't rely on a single way of getting information. There is always a chance that it won't work. The systems tested on Wednesday were only the beginning of the notification process. For a tsunami coming from Chile, Japan or Alaska, there are hours between the initial notification and the arrival of the first tsunami waves. Emergency personnel would be deployed to hazardous areas, knocking on doors and using megaphones in neighborhoods at risk. You would receive information on areas that needed to be evacuated and how get there.

But remember - the greatest tsunami threat is a large earthquake beneath our feet. Don't count on the official notification system working. But Mother Nature will let you know. The ground will shake, and shake, and shake. If you are in a tsunami zone, the earthquake is your signal to evacuate as soon as you can.

One clear lesson from the test – it's great to identify the problems before an emergency.

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://www2.humboldt.edu/kamome/resources> 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 a free copy of the North Coast preparedness magazine "Living on Shaky Ground."

<https://www.times-standard.com/2021/03/28/lori-dengler-how-did-we-do-on-the-tsunami-test/>

NTHMP PARTNER NEWS

Villa del Carmen, Ponce: First Community in Puerto Rico to Develop a Community Based Evacuation Plan

By Belinés Ramos (Psychological-Legal Clinic, community attorney), Lohary Munet (Junta Innovadora Comunitaria Villa del Carmen, Inc., President) and Roy Ruiz-Vélez, (UPRM - Puerto Rico Seismic Network Tsunami Program)

The Villa del Carmen Community in Ponce, Puerto Rico has a population of 4,500 and has two schools within its boundary. The community is located in a tsunami-prone and/or extreme flooding zone, which leaves it vulnerable to hazards resulting from a seismic or climatic event.

After the 6.4M earthquake on January 7, 2020, the University of Puerto Rico–Cayey Psychological-Legal Clinic (UPR-Cayey Clinic) was invited to provide psychological and legal assistance to residents impacted by the event. The community experienced emotional repercussions due to the earthquake and the emergency evacuation they had to undergo in the middle of the night when the earthquake occurred. The President of the Villa del Carmen Community Board of Residents, Lohary Munet, was the person who welcomed the UPR-Cayey Clinic team on January 9, 2021. The community meetings that took place were a great help to the devastated community.



Community meeting: Psychological-Legal Clinic, Lohary Munet and residents of Villa del Carmen

During the community meetings, residents raised concerns about the existing tsunami evacuation plan, so a decision was made to contact the Puerto Rico Seismic Network Tsunami Program (Tsunami Program) for guidance. The community wanted any recommendations from the Tsunami Program to reflect community concerns and local information shared by residents, especially those who have lived in the community for over twenty years and have experienced previous seismic and climatic events.



Art murals as part of an evacuation and route signaling escape plan

Various initiatives arose via this collaboration: the creation of a community evacuation map, an orientation for residents to explain the levels of alert and dynamics of the evacuation process, and a workshop to develop maps and murals as part of the program that identified and highlighted escape routes within the community. The Contemporary Art Museum of Puerto Rico and a group of local artists joined this initiative and have developed two murals that serve to delineate the tsunami escape routes (both primary and alternate routes). These initiatives brought confidence and peace of mind to the community. The community leader Lohary Munet expressed after one of these important meetings “I am extremely happy knowing that soon the community will have this information and will be able to feel at ease and peace. Yes, peace. Living in a tsunami zone in times of earthquakes is like living in a war zone. How truly happy I am! Thank you, team.”

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NTHMP PARTNER NEWS

Villa del Carmen, Ponce: First Community in Puerto Rico to Develop a Community Based Evacuation Plan

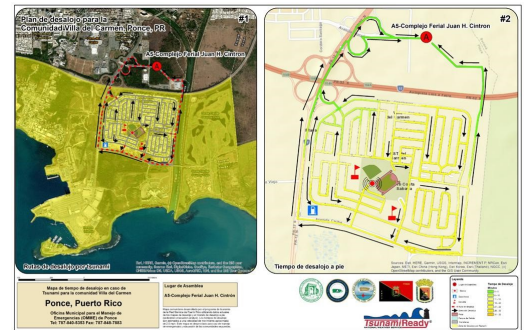
By Belinés Ramos (Psychological-Legal Clinic, community attorney), Lohary Munet (Junta Innovadora Comunitaria Villa del Carmen, Inc., President) and Roy Ruiz-Vélez, (UPRM - Puerto Rico Seismic Network Tsunami Program)

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Today we can say that the Villa del Carmen Community is the first community in Puerto Rico that participated in the development of a communal evacuation map, which includes alternate evacuation routes proposed by residents. In addition, it is the first community to utilize art murals as part of an evacuation plan, and that developed a local map to use in case of emergency.

The UPR-Cayey Clinic wants to thank community leaders for their efforts, and thank entities and agencies that participated in this project. Currently, the UPR-Cayey Clinic team continues to disseminate this plan via a door-to-door campaign, presenting the plan in community events, and offering workshops for the residents to encourage them to practice the evacuation plan.

All these efforts have been conducted in order to develop trust in the fact that the community is prepared. They can rest assured knowing that they have a well-devised evacuation plan developed by (and for) themselves and the community.



Communal evacuation map

Tsunami Awareness a Priority Nearly 60 years After Last Major Alaska Event

By Rod Boyce, University of Alaska Fairbanks Geophysical Institute

It has been more than half a century since a major tsunami washed itself upon Alaska. The magnitude 9.2 earthquake of March 27, 1964, in Prince William Sound unleashed tsunamis that devastated coastal communities. They wiped out the village of Chenega and wrought damage upon Whittier, Seward, Kodiak and Valdez.

A tsunami that day reached a height of 170 feet near the mouth of Shoup Bay in Port Valdez, 57 years ago this Saturday, March 27, 2021. The tsunamis — the main open-ocean wave caused by the earthquake and local waves caused by underwater landslides in bays — killed 124 people, some even in Oregon and California.

Today, in 2021, nearly 75% of the state's population was born after the last significant tsunami to strike Alaska, in the Aleutian Islands in 1965. Scientists have expressed concern about complacency.

Raising awareness of such tsunami risk has been a long-running effort of the Alaska Earthquake Center, part of the Geophysical Institute at the University of Alaska Fairbanks. The center also works closely with the Alaska Division of Geological and Geophysical Surveys, the Alaska Division of Homeland Security and Emergency Management and the National Oceanic and Atmospheric Administration.

To boost awareness, the Alaska Earthquake Center created two community-specific tsunami awareness brochures that are designed to fit in a pocket or purse and that contain information for coastal residents and visitors in easy-to-understand language. Each brochure also contains a detailed color map showing the inundation zone and safe places.

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NTHMP PARTNER NEWS

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By Rod Boyce, University of Alaska Fairbanks Geophysical Institute

The Alaska Earthquake Center created one brochure for the Prince William Sound city of Valdez and one for the Aleutian Islands city of Unalaska, each with the strong support and involvement of community officials.

"I hope every household will get one," said Elena Suleimani, tsunami modeler -with the Alaska Earthquake Center. "Then the people will start asking questions about how to evacuate, where, how to get the warning message, etc. The goal is to generate questions and concerns that local authorities will have to address."

Suleimani is co-author of the Valdez and Unalaska inundation mapping reports and assisted with the brochures' text and maps. She said the two communities were chosen because of their high tsunami hazard and because they represent different regions of Alaska.

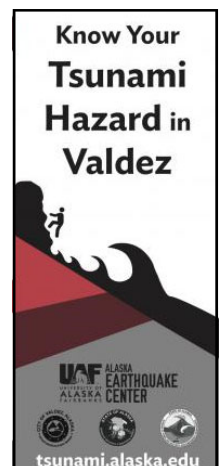
The Alaska Earthquake Center hopes to secure funding to produce the foldout brochures for more coastal sites. Other communities have asked to have tsunami brochures specific to their locations.

Tsunamis remain a significant concern in Alaska because the state has a high number of earthquakes and the longest coastline of any state.

Gov. Mike Dunleavy, in a proclamation declaring this week as the annual Tsunami Preparedness Week, encouraged Alaskans "to be mindful of, and prepared for, a tsunami hazard in their local areas, as we remember how Alaskans and others across the world have been impacted by tsunamis."

What's inside?

For the brochures, the Alaska Earthquake Center provided information about tsunami history for each community.



The Valdez brochure notes that the community "faces a double threat from tsunamis: those caused by earthquakes and those caused by landslides. Half a dozen tsunamis caused by earthquakes have damaged Valdez in the past 125 years."

The Unalaska brochure reads, "In the past 200 years, a dozen earthquakes have caused tsunamis in Unalaska. Most tsunamis were only a few feet high when they reached the community, but some caused damage."

To bring the situation home, each brochure includes a map showing the evacuation zone as determined by each city's officials. They show locations of shelters and other safe areas and include information on how long it would take a person to reach safety. They also point out locations of possible dangerous eddies and whirlpools.

The Valdez map includes an extra warning about the risk of landslide-generated tsunamis occurring in Shoup Bay, Barry Arm fjord, Gold Creek and other high-angle slopes in Prince William Sound.

Scientists have been paying particular attention to the Barry Arm fjord recently due to ground instability.

The brochures include key phone numbers, websites and recommendations for where to learn more about tsunami hazards and safety.

Valdez and Unalaska officials intend to make good use of the brochures. Valdez has 5,200 copies of them; Unalaska has 1,500.

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NTHMP PARTNER NEWS

Tsunami Awareness a Priority Nearly 60 years After Last Major Alaska Event

By Rod Boyce, University of Alaska Fairbanks Geophysical Institute

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“The brochure is a key component of education in the city,” Valdez Emergency Manager Aaron Baczuk said. “Much of its content is a direct manifestation of years of dedicated effort within the scientific community in Alaska.”

The city intends to blanket the area with the brochures, sending them to every post office box and putting them at key locations such as City Hall, the harbor, the visitor center and at least 20 businesses.

“The new brochure provides people who live, work and recreate on or near Prince William Sound with a depiction as accurate as possible of the reach and extent of a localized tsunami without them having to be a scientist,” Baczuk said.

Unalaska officials will be spreading the brochures around their city as well, said Bill Simms, deputy chief of police at the Unalaska Department of Public Safety.

“The brochures will serve as a condensed version of our current Tsunami Hazard Map and will be distributed to all public-facing city entities, industry infrastructure and the Unalaska Visitors Bureau,” he said.

The brochures were created with input from Dmitry Nicolsky, the lead scientist for the Alaska Earthquake Center's tsunami program, with development and coordination by communications specialist Beth Grassi and graphic design and maps by seismologist and cartographer Lea Gardine.

“We’re looking for a way to make this possible for all coastal communities in Alaska,” said Michael West, director of the Alaska Earthquake Center.

“We had damaging tsunamis in 1938, 1946, 1964, 1965 and then nothing,” he said. “We have grown complacent, and I don't mean that in a critical sense, but most people living in coastal Alaska today have not actually experienced a tsunami.”

Other Alaska Earthquake Center tsunami resources

The new brochures, and any that will follow for other communities, build on the interactive tsunami inundation map that the Alaska Earthquake Center launched in 2019.

The Tsunami Hazard Map Tool shows a projected maximum tsunami inundation for 55 Alaska communities. The Alaska Earthquake Center staff determined the inundation zone by running multiple scenarios based on earthquakes of different geologically plausible sizes, locations and styles. The zone includes any part of town that is covered by one or more of the scenarios, West said.

Users can zoom in on the highly detailed satellite imagery to zero in on specific buildings to see if they are inside or outside the inundation zone. There's also a feature that shows the estimated water depth.

The map can be found online at <https://earthquake.alaska.edu/sites/all/tsuMap/html/tsunami.html>

The Alaska Earthquake Center also has an extensive library of community-specific tsunami inundation reports, which detail a community's seismic and tsunami history and provide various scenarios. They were produced in partnership with the Alaska Division of Geological and Geophysical Surveys and the Alaska Division of Homeland Security and Emergency Management.

The reports can be found on the tsunami page of the Alaska Earthquake Center's website: <https://earthquake.alaska.edu/tsunamis>

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NTHMP PARTNER NEWS

Tsunami Awareness a Priority Nearly 60 years After Last Major Alaska Event

By Rod Boyce, University of Alaska Fairbanks Geophysical Institute

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Tsunami awareness is a priority for the Alaska Earthquake Center. West and Suleimani both believe Alaskans have become complacent in the more than half a century since the last major tsunami to hit the state.

“This is why our most important job is to keep talking about tsunami hazards, keep reminding people about what Alaskans experienced in 1946 and 1964, and educate them about their options for survival,” Suleimani said.

And it’s not just residents of coastal communities who need to be tsunami-aware.

“People travel to coastal areas all the time, both in the U.S. and internationally. Everyone needs to be aware of the tsunami warning signs,” she said.

[Download the Unalaska brochure](#)

[Download the Valdez brochure](#)

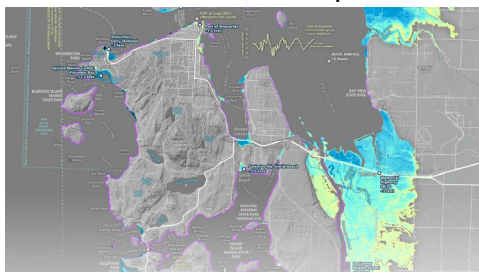
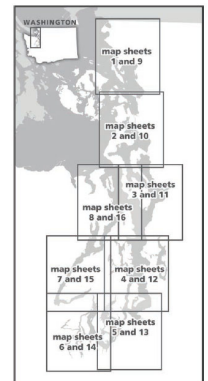
Link to article: <https://www.gi.alaska.edu/news/tsunami-awareness-priority-nearly-60-years-after-last-major-alaska-event>

New Tsunami Hazard Maps of the Puget Sound and Adjacent Waters from a Large Cascadia Scenario

By Alex Dolcimascolo, Washington Geological Survey

The Washington Geological Survey has released a new publication showing tsunami model results from a large magnitude 9.0 Cascadia subduction zone megathrust earthquake scenario for the Puget Sound and adjacent waters. This publication includes 16 supplemental map sheets showing maximum tsunami inundation, estimated first wave arrival times, and current speeds for locations extending from the Washington—Canada Border to the southern extent of the Puget Sound.

These are the first published tsunami hazard maps for many areas within this region using a Cascadia subduction zone scenario. The first tsunami waves generated by the offshore earthquake in the Pacific Ocean would travel through the Strait of Juan de Fuca and reach Whidbey Island within 1 hour and 30 minutes, causing large waves to travel north into the Strait of Georgia and south into the Puget Sound. The tsunami would arrive within 2–4 hours after the earthquake for the majority of locations in this study area and the first wave may not necessarily be the largest. Modeling results suggest certain locations would experience inundation depths greater than 10 feet, and some waterways (including harbors)



would experience destructive current speeds in excess of 9 knots. Tsunami wave activity would likely continue over 14 hours and remain hazardous to maritime operations for more than 24 hours.

The intent of the modeling is to encourage hazard planning and increase community resilience in the Puget Sound and its adjacent waterways. All tsunami hazard zones should be evacuated immediately after an earthquake when safe to do so and any felt earthquake shaking is an immediate warning. We recommend using this modeling as a tool to assist with emergency preparation and evacuation planning prior to a Cascadia subduction zone event.

This publication is available on our [tsunami hazard maps](#) webpage and downloadable using the following hyperlink: https://fortress.wa.gov/dnr/geologydata/tsunami_hazard_maps/ger_ms2021-01_tsunami_hazard_puget_sound.zip

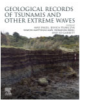
TSUNAMI RESEARCH & EVENTS

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Burns, P. O.; Barbosa, A. R.; Olsen, M. J.; Wang, H., 2021, Multihazard Damage and Loss Assessment of Bridges in a Highway Network Subjected to Earthquake and Tsunami Hazards: *Natural Hazards Review*, v. 22, no. 2, [https://doi.org/10.1061/\(ASCE\)NH.1527-6996.0000429](https://doi.org/10.1061/(ASCE)NH.1527-6996.0000429).



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UPCOMING NTHMP & RELATED EVENTS

- ◆ May 26,2021—NTHMP WCS Winter Meeting (Virtual) <https://nws.weather.gov/nthmp/index.html>
- ◆ March 27,2021—NTHMP MMS Winter Meeting (Virtual) <https://nws.weather.gov/nthmp/index.html>
- ◆ March 27,2021—NTHMP MES Winter Meeting (Virtual) <https://nws.weather.gov/nthmp/index.html>
- ◆ March 27,2021—NTHMP CC Winter Meeting (Virtual) <https://nws.weather.gov/nthmp/index.html>
- ◆ June 7-8,2021—International Conference on Earthquake Engineering and Seismology (Virtual) <https://waset.org/earthquake-engineering-and-seismology-conference-in-june-2021-in-san-francisco>
- ◆ September 20-26,2021—AEG Annual Meeting (San Antonio, TX) <https://www.aegannualmeeting.org/>
- ◆ December 13-17,2020—AGU Fall Meeting (New Orleans, LA) <https://www.agu.org/fall-meeting>

