TsuInfo Alert

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CARIBE WAVE 2024 Exercise in the Caribbean and Adjacent Regions

By Kimberly Maisonet Gonzalez and Christa von Hillebrandt-Andrade,
NOAA International Tsunami Information Center Caribbean Office

The thirteenth CARIBE WAVE annual exercise was held on March 21, 2024 starting at 1500 UTC. Over 470,000 people were engaged from 48 member states, countries, and territories in the Caribbean and Adjacent Regions according to the registration system 'Tsunami Zone' (tsunamizone.org).

Compilation of CARIBE WAVE 24 exercise. From left to right, top to bottom: Turks and Caicos, St. Kitts and Nevis, Panama, PTWC, Grenada, Antigua and Barbuda, Venezuela, and Puerto Rico.

Each country had the choice between two earthquake/tsunami scenarios and the type of activities they would carry out. The first scenario was a tsunami generated by a magnitude 8.7 earthquake located in the Puerto Rico Trench. The second scenario was a tsunami generated by a magnitude 8.47 earthquake located in the North Panama Deformed Belt (NPDB).

CARIBE WAVE is one of largest simulation exercises in the world and one of the main activities of the UNESCO/IOC Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS). It is coordinated by its CARIBE WAVE Task Team through the NOAA International Tsunami Information Center Caribbean Office with the support of the Caribbean Tsunami Information Center, Pacific Tsunami Warning Center (PTWC) and the Central America Tsunami Advisory Center (CATAC). The objectives of the exercise are to test communications, practice and evaluate tsunami procedures, and strengthen overall preparedness. It also supports the US TsunamiReady and the UNESCO IOC's Tsunami Ready programs, which both include the conduct of community tsunami exercises.

At the start of the exercise, an initial "dummy" message was sent through all standard broadcast channels of the PTWC, the CARIBE-EWS Tsunami Service Provider (TSP), and by CATAC which is operating in experimental mode as a TSP for countries of Central America. This serves as a communications test between the Tsunami Service Providers and designated Tsunami Warning Focal Points (TWFPs) and National Tsunami Warning Centers (NTWCs) in each of the countries and territories. Shortly after, simulated text and then graphical products were

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NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM LIBRARY CATALOG:
http://d92019.eos-intl.net/D92019/OPAC/Index.aspx

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disseminated by the PTWC (Puerto Rico and Panama scenarios) and CATAC (only for the Panama scenario). The simulated products included information on earthquake location, magnitude, estimated wave arrival time/heights, and potential areas under threat and forecasted wave heights.

Full-scale exercises, drills, seminars, and communication tests were some of the many activities that were organized by the individual countries for CARIBE WAVE. According to the TsunamiZone website, the majority of the participants from across the region were from K-12 Schools and Districts. High levels of participation were also recorded for State Government, Colleges, and Universities, as well as a significant number of businesses, health care organizations, hotels, tourism groups, volunteer radio groups, and people with disabilities. Puerto Rico had 135,343 people registered, while the United States Virgin Islands had a total of 23,670 registrants (more than 20% of their total population). Details on CARIBE WAVE were widely disseminated, with many organizations and individuals sharing their participation through social media platforms.

To participate in upcoming CARIBE WAVE exercises, contact your Tsunami National Contact, TWFPs, or NTWCs, plan your activities, and register on TsunamiZone. For more information, check out the caribewave.org website where you can find guides, handbooks, and reports for past and future exercises.

Puerto Rico's Participation in Caribe Wave 2024

By Roy Ruiz-Vélez, Research Associate, Tsunami Program Coordinator and Víctor Huérfano, Director,
Puerto Rico Seismic Network (PRSN), University of Puerto Rico at Mayagüez

On March 21st at 11 a.m., Puerto Rico joined the Caribbean and Adjacent Regions to participate in the Caribe Wave 2024 tsunami exercise. In Puerto Rico, the exercise had two main objectives: (1) to test communication and emergency alert systems and (2) to allow people living in tsunami evacuation zones to practice their evacuation routes. The Puerto Rico Seismic Network (PRSN), the Puerto Rico Emergency Management Bureau (PREMB), the National Weather Service San Juan Forecasting Office (NWS-SJU), the Federal Emergency Management Agency (FEMA), Caribbean Area Office-PR, the PR E.A.S. Committee, the International Tsunami Information Center Caribbean Office (ITIC CAR), the Pacific Tsunami Warning Center (PTWC), the Puerto Rico Amateur Radio Association, and the Puerto Rico Broadcasters Association collaborated to carry out an educational and preparedness campaign, inviting people to participate in the tsunami exercise, Caribe Wave.

Sor Isolina Ferré Center in Ponce. Tsunami evacuation drill with students and personnel.

This year, various initiatives were undertaken as part of the massive educational and promotional campaign for this exercise. The campaign included the usage of various communication media such as commercial radio (AM/FM), local television, social networks, press conferences, among others. A total of 135,932 people registered on the portal http://tsunamizone.org/puertorico. This represents an increase of 4,752 people compared to the previous year in 2023. The categories with the highest participation this year were: universities and schools with 46%, state and local government agencies or offices with 13%, healthcare centers with 11%, and non-profit organizations with 4% of the total registered.

The Caribe Wave promotional campaign took place from February 6th to March 21st. As part of that campaign, a total of 7,200 audio clips were broadcast on 50 radio stations throughout Puerto Rico. Around 15 radio interviews and a press conference were coordinated with all of the most relevant press media in the country. We made 30 posts on Facebook with a total reach of 615,752 people. These posts included 6 videos with sign language translation, to include people with hearing disabilities, which had a total of 15,000 views. On the social network Instagram, 20 posts were made with a total of 2,243 accounts reached. The posts with the greatest reach were short videos published in reels format with a total of 10,336 views. It is worth noting that the Puerto Rico Seismic Network's Instagram account was only created recently.

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Puerto Rico's Participation in Caribe Wave 2024

By Roy Ruiz-Vélez, Research Associate, Tsunami Program Coordinator and Víctor Huérfano, Director, Puerto Rico Seismic Network (PRSN), University of Puerto Rico at Mayagüez

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Regarding communities, several were observed to have participated by organizing their own self-managed evacuation drills, without intervention from Emergency Management or our office. In the municipality of Patillas, the GUPE organization (Guardarraya Unidos por un Patrimonio Educativo, Inc., name in Spanish), from the "La Guardarraya" community, organized an evacuation drill in which residents, several agencies, and local organizations participated. In the municipality of Ponce, the Sor Isolina Ferré Center organized a tsunami evacuation drill with all its staff and students. This exercise included the participation of Mr. Nino Correa, Commissioner of PREMB, Mr. Orlando Olivera, Coordinator of the Federal Emergency Management Agency, Caribbean Area Office (FEMA CAO-PR), Mr. Ernesto Morales, Warning Coordination Meteorologist at National Weather Service, San Juan Forecast Office (NWS-SJU), municipal emergency management personnel, members of the press, and the Puerto Rico Seismic Network. During the exercise, the level of preparedness and the unconventional alert systems they use for evacuation in this organization could be tested.

PRSN's personnel conducting a radio communication test with PREMB TWFP

Thousands of people participated in the Caribe Wave exercise this year, practicing their evacuation routes or reading and educating themselves on the topic of tsunamis. Many coastal communities, such as San José in Mayagüez and Villa del Carmen in Ponce, organized a tsunami evacuation drill. It was observed that many institutions outside the tsunami evacuation zone also participated in Caribe Wave, recognizing the importance of being prepared for the danger of tsunamis.

Finally, 27 out of 41 municipalities with siren systems activated their mass alert systems as part of the exercise. At the state level, E.A.S., W.E.A., NOAA Weather Radio, and other alert systems were activated as part of the communication protocol in case of a tsunami. All PTWC alert messages were received and disseminated by the Tsunami Warning Focal Points (TWFP) on time according to the communication protocol. Although we still have a long way to go, we can be certain that we are headed in the right direction.

2024 Caribe Wave Exercise: USVI Achieves Record-Breaking Participation

By Regina Browne, Virgin Islands Territorial Emergency Management Agency (VITEMA)

The 2024 Caribe Wave Exercise, an annual tsunami preparedness drill, has proven to be a resounding success for the U.S. Virgin Islands (USVI). The Virgin Islands Territorial Emergency Management Agency (VITEMA) is proud to announce that this year's participation has surpassed all previous records, with over 23,000 residents registering for the exercise through the Tsunami Zone platform. The high level of engagement from individuals, communities, and organizations across the islands showcases the commitment of USVI residents to enhancing their collective response to potential tsunami threats. The exercise provided an opportunity for participants to learn, practice, and improve their emergency preparedness skills, demonstrating the strength and resilience of the USVI community.

VITEMA attributes the success of the 2024 Caribe Wave Exercise to the dedication and cooperation of all those involved. The agency expresses its heartfelt gratitude to the participants for their incredible support and enthusiasm. The exercise also garnered significant support from local legislators, who actively took part in the drills and encouraged their constituents to do the same. Daryl Jaschen, Director of VITEMA, commended the efforts of the participants, stating, "The record-breaking participation in this year's Caribe Wave Exercise is a testament to the unwavering commitment of our residents to ensure the safety and well-being of our islands. We are incredibly proud of the way our communities have come together to strengthen our emergency preparedness capabilities."

As the USVI continues to prioritize emergency preparedness, VITEMA reminds residents to remain vigilant, stay informed, and be prepared for potential threats. The agency encourages all individuals to familiarize themselves with tsunami evacuation routes, assemble emergency kits, and stay tuned to official sources for updates and guidance. The record-breaking participation in the 2024 Caribe Wave Exercise serves as a powerful reminder of the importance of community involvement in emergency preparedness efforts. VITEMA extends its gratitude to all those who took part in the exercise and reaffirms its commitment to working alongside the community to build a more resilient and secure future for the U.S. Virgin Islands.

Santa Cruz Harbor, California Tabletop Exercise March 6, 2024

By Yvette LaDuke, California Governor's Office of Emergency Services (Cal OES)

On March 6, 2024, the California Tsunami Program (CA Governor's Office of Emergency Services and CA Geological Survey) hosted a tabletop exercise for response officials in Santa Cruz County. The exercise focused on the Santa Cruz Harbor tsunami response process and the role county officials hold in supporting harbor area tsunami response. Participants in the exercise included Santa Cruz Harbor, County Fire, County Sheriff's Office, City Fire, City Police, County Office of Emergency Services, County 9-1-1 Dispatch, National Weather Service, CA State Parks, U.S. Coast Guard Station Monterrey, and Marine Exchange.

Participants had robust discussion during the exercise which focused on the following objectives:

- NTWC alerts and California's tsunami response process.
- Local procedures/actions when receiving tsunami alerts.
- Processes for communicating tsunami alerts and messaging to response personnel and the public.
- Operational coordination and information sharing, and methodology for securing and evacuating the harbor and surrounding area.
- Gaps in available resources and coordination needs for harbor evacuation during tsunamis.

Information shared during the tabletop exercise will be used by local officials to update their tsunami response plan and protocols which will be tested during a full-scale tsunami evacuation exercise planned for March 2025. This exercise will be the first time California has hosted an evacuation exercise for people who live on their boats or operate a business within a harbor or marina.

Getting Our Steps In: Washington State Completes Evacuation Route Wayfinding Assessment

By Elyssa Tappero, Washington Emergency Management Division

Washington State has completed an evacuation wayfinding assessment years in the making thanks to two rounds of funding from the National Tsunami Hazard Mitigation Program (NTHMP) and a partnership with the University of Washington.

Starting in 2022, Washington Emergency Management Division (WA EMD) partnered with the University of Washington to have teams of undergraduate and graduate students assess the state's 1,050+ miles of mapped tsunami evacuation routes. This assessment provided vital information about where more signs were needed and the conditions and accessibility of designated evacuation routes.

Students collected a wealth of data in the field, including photos, GPS coordinates, locational accuracy, and conditions of current signage; GPS coordinates and photos of all locations where new signs were recommended; and notes and

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Getting Our Steps In: Washington State Completes Evacuation Route Wayfinding Assessment

By Elyssa Tappero, Washington Emergency Management Division

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photos regarding route conditions, accessibility, and other wayfinding issues that should be addressed. Unsurprisingly, the project revealed that Washington needs hundreds, potentially thousands, of new signs to fully cover its mapped evacuation routes and ensure people in the inundation zone are aware of the hazard and can quickly find their way to safety.

University of Washington students and WA EMD staff check a pedestrian evacuation walk map while conducting field training in western Washington (WA EMD, 2022).

Since the Google MyMaps platform is free and easy to use, the team chose to create MyMaps pages for each community to make the collected data easy to navigate (thanks for the tip, California!). Different icons were used for each type of tsunami sign, as well as different icon colors to differentiate between current signs, highest priority signs to install, and lower priority signs. The result is a simple, interactive map jurisdictions can use when planning tsunami sign installation projects. When a user clicks on a point on the map, the popup includes any relevant photos and other information about the sign or location to make planning a breeze.

A screenshot of the Long Beach Peninsula MyMaps page. Red and orange icons are places where new signs are recommended.

While the Washington tsunami program is pushing hard to get official tsunami evacuation signs installed, it's also looking to other NTHMP partners who have branched out from traditional highway signs for tsunami evacuation. For example, Washington is inspired by Oregon's blue line project, Puerto Rico's evacuation murals, and the electrical box wraps many cities are now using to make maps publicly available in different forms. Incorporating tsunami wayfinding into a community in such eye-catching, creative ways like these can increase overall accessibility of the information and even enhance the visual experience of a location.

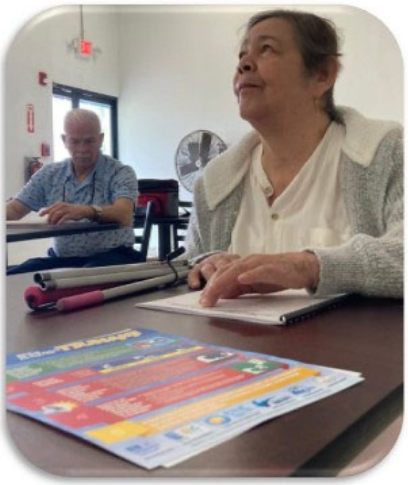
Electrical box wrap in Fort Lauderdale, FL with a map of the downtown on one side (FortLauderdale.gov).

With the wayfinding assessment complete, Washington's next step is to finish crafting a wayfinding methodology document that captures best practices and lessons learned from this project and partners across the US and internationally. This document will be immensely useful for other coastal communities who were not included in the original wayfinding assessment and who want to conduct their own wayfinding project, as well as communities who want to improve wayfinding for other hazards like lahars. It will hopefully dovetail nicely with the evacuation drill guidance document WA EMD is also in the process of completing.

Tsunami Safety Rules Flyer in Braille Now Available in English and Spanish for the Visually Impaired Community in the Caribbean

By Glorymar Gomez and Christa von Hillebrandt-Andrade, International Tsunami Information Center - Caribbean Office and Gladymar Aponte, Industries for the Blind

IFB Solutions (Industries for the Blind) in Cabo Rojo, Puerto Rico, is a sewing company that specializes in tailoring ARMY uniforms. Many of their employees have severe visual impairments and are experienced machine operators. For the CARIBE WAVE 24 tsunami exercise on March 21, eleven of these employees received an orientation on earthquakes and tsunamis and recommendations in the case of a tsunami threat. All employees were given a copy of the Tsunami Safety Rules flyer in Braille, for them to read and provide feedback on the content. These tsunami flyers, the first of its kind, were produced by the Caribbean Office of the International Tsunami Information Center. This educational material is available in English and Spanish, and copies can be shipped by request. ITIC-CAR coordinated this activity with Gladymar Aponte from IFB Human Resources and Adam Ramos from IFB Production. For copies of the Tsunami Safety Rules flyer in Braille, please email christa.vonh@noaa.gov.



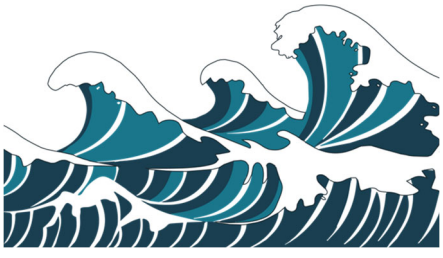
From top to bottom: Adam Ramos (forefront) and Carlos Lugo (background), Machine Operators, IFB; William Fractichelly, Machine Operator, IFB; and Ibette Lopez (forefront) and Nazario Cortes (background), Machine Operators at IFB.

Updated Washington Tsunami Design Zone for the New Washington State Building Code

By the Washington Geological Survey

Tsunami hazards in Washington State

Tsunamis are large and potentially dangerous waves caused by earthquakes, landslides, volcanic eruptions, exceptional weather systems, and meteorite impacts. Tsunamis have struck Washington in the past, and are expected to do so again in the future. You can learn more about tsunami hazards on the WGS website.



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Updated Washington Tsunami Design Zone for the New Washington State Building Code

By the Washington Geological Survey

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The Washington Geological Survey (WGS) investigates the potential impacts of tsunamis on Washington State. From this research, WGS has developed models that simulate specific aspects of how a tsunami could affect waterways and inundate land. These include quantifying inundation (flooding caused by a tsunami), current velocities (the speed that water will flow during a tsunami), arrival times of waves, and wave duration for a range of tsunami scenarios.

Building Codes and the Washington Tsunami Design Zone (WA-TDZ)

To make critical structures such as hospitals, police stations, and vertical evacuation refuges more resilient to tsunamis, the latest update to the Washington State Building Code (the 2021 International Building Code with amendments) requires certain structures located in areas affected by tsunamis to adhere to specific engineering and construction standards. To determine if a location could be inundated by a tsunami—and therefore must adhere to these higher engineering standards—engineers use a product from the Washington Geological Survey called the Washington Tsunami Design Zone (WA-TDZ). The WA-TDZ delineates inundation areas and compiles the best available tsunami modeling from WGS and from partners for this purpose.

Accessing the WA-TDZ

The WA-TDZ is hosted on the WGS website on its own dedicated page.

The webpage features an interactive map where users can access site-specific tsunami information. The webpage also links to the original map publications cited in the building code. The interactive map and publications include tsunami inundation extent (runup), inundation elevation, and maximum current velocity. Zooming in and clicking on a location of interest in the interactive map will display these key parameters for that location.

More technical details, and links to the interactive map and TDZ publications, are all available on the WA-TDZ webpage.

Link to original post:
https://washingtonstategeology.wordpress.com/2024/03/19/updated-washington-tsunami-design-zone-for-the-new-washington-state-building-code/

TSUNAMI RESEARCH & EVENTS

RESEARCH

Bahrouni, Nejib; Meghraoui, Mustapha; et al, 2024, Tsunami deposits in Tunisia contemporaneous of the large 365 CE Crete earthquake and Mediterranean Sea catastrophic event: Scientific Reports, v. 14, article 4537, https://doi.org/10.1038/s41598-024-53225-7.

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Karasözen, Ezgi; West, M. E., 2024, Toward the Rapid Seismic Assessment of Landslides in Coastal Alaska: The Seismic Record, v. 4, no. 1, p. 43-51, https://doi.org/10.1785/0320230044.

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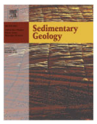

UPCOMING NTHMP & RELATED EVENTS

- April 29-May 3, 2024—Seismological Society of America Meeting (Anchorage, AK) https://meetings.seismosoc.org/
- May 23, 2024—PACIFEX 24 Tsunami Exercise (Pacific US and Canada) https://tsunami.gov/?page=exercises
- July 26-August 1, 2024—NTHMP 2024 Summer Meeting (Pago Pago, American Samoa) https://nws.weather.gov/nthmp/
- September 10-14, 2024—AEG Annual Meeting (Philadelphia, PA) https://www.aegannualmeeting.org/
- September 22-25, 2024 Geological Society of America Annual Meeting (Anaheim, CA) https://community.geosociety.org/gsa2024/home

Exercise
PACIFEX24