

National Tsunami Hazard Mitigation Program Annual Meeting Recap

By Dr. Rocky Lopes, NTHMP Administrator

In this issue:

NTHMP Annual Meeting Recap	1
NTHMP Updates Safety Factsheet	2
NTHMP Recognizes Long-Term Contributors	6
US & Territories Tsunami Hazard Assessment	7
California Provides Tsunami Planning Playbooks	8
LANTEX Exercise March 2016	9
Tsunami Exercise in Caribbean March, 2016	10
Tsunami Animation: Cascadia 1700	11
New Tsunami Research	11
Tsunami Preparedness Week	12
NTHMP Annual Report	12
NTHMP Upcoming Events	12

Amidst a mammoth winter storm, the nation's tsunami, geological, earthquake, and coastal hazard experts convened in Boulder, Colorado, February 1–5, 2016. Five concurrent and sequential meetings were held.

NTHMP PRE-MEETING EVENTS (FEBRUARY 1-2, 2016): The NTHMP Mapping and Modeling Subcommittee (MMS) convened a tsunami source workshop collaboratively with the U.S. Geological Survey (USGS) on February 1–2. The workshop was jointly facilitated by MMS Co-Chairs Dmitry Nicolski (Alaska), Kara Gately (National Weather Service [NWS] National Tsunami Warning Center [NTWC]), and Stephanie Ross (USGS, Menlo Park.)



Mike Angove, NWS Tsunami Program Lead, gives an overview of the Tsunami Program

Sixty-five representatives from USGS offices across the country joined NTHMP representatives from the National Oceanic and Atmospheric Administration (NOAA), universities, states, and territories, to focus on identifying existing collaborations and needs, improving collaborations, building consensus on work, and trying to set an agenda for future work.

Presentations and results of this workshop are forthcoming, and when available, will be posted on the NTHMP website: <http://nws.weather.gov/nthmp/2016annualmeeting/index.html>

The NTHMP Mitigation and Education Subcommittee (MES) and Warning Coordination Subcommittee (WCS) had to reschedule and compress their meeting times due to weather impact -- participants were delayed and meeting location opened late due to snow.

When MES met for a two-hour meeting on February 4, Co-Chairs Tamra Biasco (FEMA Region 10), Dr. Laura Kong (International Tsunami Information Center [ITIC]), and Kevin Miller (California Office of Emergency Services) led a spirited and productive meeting attended by 32 representatives from the United States and Canada.



(Continues on Page 3)

TsuInfo Alert

Prepared and published bimonthly by the Washington State Department of Natural Resources,
Division of Geology and Earth Resources,
on behalf of the National Tsunami Hazard Mitigation Program (NTHMP),
a state/federal partnership funded through the National Oceanic and Atmospheric Administration (NOAA).

This publication is free upon request and is available in print by mail and online at:

<http://www.dnr.wa.gov/researchscience/topics/geologypublicationslibrary/pages/tsuinfo.aspx>

Assembled by Stephanie Earls, Librarian
Washington Geology Library
Washington Dept. of Natural Resources
Division of Geology and Earth Resources

1111 Washington St. SE, MS 47007

Olympia, WA 98504-7007

360-902-1473 (p) 360-902-1785 (f)

stephanie.earls@dnr.wa.gov

NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM LIBRARY CATALOG:

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



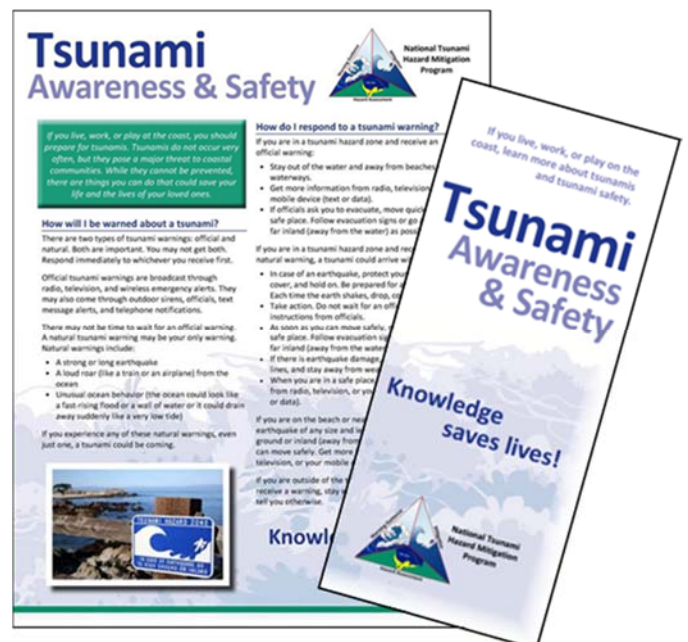
The views expressed herein are those of the authors and not necessarily those of NOAA, the Washington Department of Natural Resources, or other sponsors of TsuInfo Alert.

NTHMP Updates Tsunami Awareness and Safety Fact Sheet

By Christa Rabenold, Mitigation Specialist, NOAA/National Weather Service Tsunami Program

The NTHMP Mitigation and Education Subcommittee has updated and redesigned its Tsunami Awareness and Safety Fact Sheet. The fact sheet was developed for NTHMP partners and other interested parties to use to promote tsunami awareness and safety among their constituents. Two versions are available, a two-pager and a trifold. Both versions have space for the addition of logos and/or contact information and are available for download at <http://nws.weather.gov/nthmp/tsunamisafety.html>.

Additional tsunami awareness and safety resources available from NTHMP partners can be found on the NTHMP website's Partner Web Resources page at http://nws.weather.gov/nthmp/NTHMP_Web_Resources.html.



NTHMP ANNUAL MEETING

National Tsunami Hazard Mitigation Program Annual Meeting Recap

By Dr. Rocky Lopes, NTHMP Administrator

(Continued from Page 1)

Discussions during the MES meeting included: a joint meeting with the MMS to discuss NTHMP collaboration and capabilities on MES-related activities. Further, the MES reviewed its overall priorities; discussed post-tsunami protocols; the Cascadia Earthquake 2016 campaign; evacuation guidance; maritime guidance; and an update on activities at NWS Headquarters where an updated Tsunami Awareness and Safety Fact Sheet was released, as well as work being done on developing an on-line capability "one-stop-shop" for tsunami evacuation maps.



Dr. Chip McCreery, Director/Pacific Tsunami Warning Center, and Paul Whitmore, Director/National Tsunami Warning Center, provide an overview of the relationships between the NWS Tsunami Warning Centers and the USGS.

The WCS, led by Co-Chairs Paul Whitmore (NTWC), Chip McCreery (Pacific Tsunami Warning Center), and Althea Rizzo (Oregon Emergency Management), had a brief meeting involving 28 participants.

Topics discussed included: 2015 action item review; WCS strategic plan tasks; WCS Terms of Reference update; review of September 2015 tsunami advisory for California and Hawaii; update on tsunami alert products; and exercises and communications tests planned for 2016. The NTWC is considering offering Tsunami Warning System training again this year after a three-year hiatus.

More information will be shared with the WCS when known.

NTHMP ANNUAL MEETING (FEBRUARY 3-4, 2016): The NTHMP Annual Meeting was attended by some 79 people at peak, the largest crowd ever. Representatives from all over the United States and Canada attended. The meeting began with NTHMP Chair, Dr. Grant Cooper (NWS Western Region Director) recognizing three long-serving individuals for their contributions (see related story on page 6).

Dr. Michelle Hawkins, Acting Branch Chief, NWS Marine, Tropical, and Tsunami Services Branch, described the reorganization of the National Weather Service and where the Tsunami Program now resides in the NWS structure.

Mike Angove, NWS Tsunami Program Lead, provided an update on the Tsunami Program, its research activities, international activities, and new initiatives. This presentation provided an interesting opportunity for dialogue with NTHMP partners.

NTHMP subcommittee Co-Chairs updated meeting attendees on their respective subcommittees' activities and plans for 2016. One change to Co-Chairs was recommended by the MMS Subcommittee. This recommendation was affirmed by the NTHMP Coordinating Committee: Marie Eble of NOAA's Pacific Marine Environmental Laboratory will be serving as the NOAA MMS Co-Chair for a two-year term, replacing Kara Gately, who served admirably.

In the afternoon of Day 1, we heard from John Schelling of Washington Emergency Management Division who described the progress of the team involved with the tsunami vertical evacuation construction project at the Ocosta Elementary School in Westport, Washington. Progress is going well, with the new school opening planned for June, 2016.

(Continues on Page 4)

NTHMP ANNUAL MEETING

National Tsunami Hazard Mitigation Program Annual Meeting Recap

By Dr. Rocky Lopes, NTHMP Administrator

(Continued from Page 3)

Following John Schelling's presentation, his fellow Washington State Department of Natural Resources colleague, Tim Walsh, gave a fascinating presentation on the history of the NTHMP since its founding. Walsh is the longest-serving continuing member of the NTHMP Coordinating Committee.

This meeting was hosted by NOAA's National Centers for Environmental Information (NCEI), a consolidation of NOAA's geophysical, oceanic, and climatic data centers (i.e. NGDC, NODC, and NCDC). We heard from NCEI staff Paula Dunbar about the update of the Tsunami Hazards Assessment (see separate article, page 7), as well as from Mike Sutherland about Digital Elevation Map development, and Aaron Sweeney about how the NCEI receives, archives, and makes water level data available.

Furthering scientific inquiry, Doug Given, Project Chief for Southern California Earthquake Monitoring (USGS) gave a fascinating presentation about Earthquake Early Warning. His presentation explained how the U.S. is already implementing early warning for earthquakes and plans for improving density of seismic measuring devices to enable better earthquake early warning in the future.

Rick Wilson, NTHMP Science representative from California, provided an update about the evolution of maritime safe-depth recommendations and the differences in different locations of U.S. shorelines. Draft guidance is in development as a joint effort by the MMS and the MES.

At the end of a packed first day, Dr. Laura Kong (Director, ITIC) and Christa von Hillebrandt-Andrade (Manager, Caribbean Tsunami Warning Program) each provided a brief but thorough update of activities that they do to support international partners on tsunami education, outreach, training, capacity-development, and support in the Pacific, Atlantic, and Caribbean basins and around the world.

During the morning of the second day of the NTHMP meeting, we learned from Tetsuyuki Ueyama, Scientific Officer, Japan Meteorological Agency (JMA), about lessons learned by the JMA and the Government of Japan after the earthquake and tsunami of March 11, 2011. Key lessons included that outreach and education, along with drills, practice, and exercises, work. Thousands of lives were saved through preparedness actions.

To conclude the NTHMP Annual Meeting, partner states, territories, and universities recapped their respective activities over the past year. We were impressed by the activity and accomplishments by our NTHMP partners. The details of their activities are described in the 2015 NTHMP Annual Report, here: <http://nws.weather.gov/nthmp/documents/2015AnnualReport.pdf>. Copies of meeting notes and presentations are available on the NTHMP website 2016 Annual Meeting page. Visit: <http://nws.weather.gov/nthmp/2016annualmeeting/index.html>.

NTHMP COORDINATING COMMITTEE MEETING (February 5, 2016): The NTHMP Coordinating Committee met in person on February 5, 2016, at the NOAA National Centers for Environmental Information, Boulder, Colorado. 31 people were present for the meeting.

(Continues on Page 5)



Mr. Doug Given, Scientist and Leader of the USGS Earthquake Early Warning Project, presentation.

NTHMP ANNUAL MEETING

National Tsunami Hazard Mitigation Program Annual Meeting Recap

By Dr. Rocky Lopes, NTHMP Administrator

(Continued from Page 4)

Following is a summary of decisions and actions approved by the Coordinating Committee:

- ◆ The minutes of the Coordinating Committee meeting of November 10, 2015, were approved as presented.
- ◆ Dan Belanger was welcomed to the Coordinating Committee as the Emergency Management Representative for Alaska.
- ◆ Due to budget limitations, it is not possible for the National Weather Service to offer travel for an in-person meeting of the Mapping and Modeling Subcommittee this summer because most of the funds available to support invitational travel went into travel support for the Annual Meeting. This summer, there is adequate funding only to support a meeting of the Mitigation and Education Subcommittee. The MES will meet in Lynnwood, Washington, July 26 – 28, 2016. Additional travel funding will be available after September 1, 2016, when NTHMP grant funds can be applied to cover travel by grant-supported members of both the MES and MMS for the Annual Meeting and respective summer meetings.
- ◆ The Coordinating Committee members agreed to have regular meetings by conference call on March 22, May 17, July 19, September 20, and November 15.
- ◆ Marie Eblé of NOAA's Pacific Marine Environmental Laboratory was nominated as the NOAA Co-Chair for the MMS from January 2016-2018. The Coordinating Committee voted its approval.
- ◆ The MES nominated Gala Gulacsik of FEMA Region 10 to serve as the FEMA MES Co-Chair to replace Tamra Biasco who completed eight years of service. The Coordinating Committee voted its approval.
- ◆ Mike Mahoney announced that the Tsunami Vertical Evacuation Guidelines (P-646) can be updated via work through a contract with FEMA.
- ◆ External review: the Coordinating Committee wants to conduct its five-year external review during 2017. Ideas on how to execute this review were discussed. Rocky Lopes was appointed to organize and arrange this review.
- ◆ An annual meeting work group was appointed to include Kevin Richards, Dmitry Nicolsky, Roy Watlington, Kara Gately, Tim Walsh, Vasily Titov. Rocky Lopes will facilitate the group and provide reports.
- ◆ Island Caucus: Kevin Richards recommended that the NTHMP reconstitute an "island caucus" and include islands in the Caribbean as well as the Pacific. This caucus will meet during the Annual Meeting time.



Discussion about tsunami safety and evacuation. In front, L-R: Stephanie Ross/USGS; Dr. Nate Wood/USGS; Kevin Miller, California OES; Dr. Dmitry Nicolsky, University of Alaska.

Full minutes of the Coordinating Committee meeting are on the NTHMP website:

<http://nws.weather.gov/nthmp/nthmpcc.html>

NTHMP ANNUAL MEETING

Recognition of Long-Term NTHMP Contributors

By Dr. Rocky Lopes, NTHMP Administrator

During the NTHMP Annual Meeting, Dr. Grant Cooper, Chair, recognized the following individuals for their contributions to the success of the NTHMP:

John Schelling of Washington. John served eight years with the NTHMP and the Coordinating Committee, and four years of that as Co-Chair of the Mitigation and Education Subcommittee.

John has accepted a new position with the Washington State Department of Commerce to become the agency's internal emergency manager and will be leaving the NTHMP in mid-February.

John's leadership, shared experience, and solution-oriented creative ability to think outside the box with collaborative work, and through the wealth of accomplishments from the State of Washington, have been important in providing solutions of how to move the organization forward, even during challenging times.

John enacted the first community-up approach to tsunami vertical evacuation siting with strong community input through Project Safe Haven. This project assisted local leaders to build the first vertical evacuation structure in the United States at the Ocosta Elementary School in Westport, Washington.

John served as the MES co-chair from 2009-2013. He was actively involved in the TsunamiReady program and the guidelines update, Hazus Tsunami model methodology development, media guidebook development, tsunami vertical evacuation modeling, baseline surveying, Washington local and state tsunami workgroup, and continuously increasing the resilience of Washington to recover from earthquakes and tsunamis.

The mutual respect and capability brought to bear by John's participation in the NTHMP have ultimately assisted with moving the nation forward toward making coastal residents and visitors more prepared and safer from tsunamis.

He's been a commanding, collegial, and integral part of this organization and will be sorely missed. We wish him well, and look forward to engaging with him in his new role whenever possible.

Paula Dunbar of the National Centers for Environmental Information, formerly the NGDC has made outstanding contributions to the NTHMP over many years.

Paula and her USGS collaborator, **Dr. Craig Weaver**, developed, assembled, organized, wrote, proofed, and disseminated the National Tsunami Hazard Assessment first in 2008 and again with the Second Edition of this Assessment being made available at this meeting. Paula has done exceptional work in gathering data, verifying it, and ensuring only accurate and complete information was made available to us. Thank you, Paula, for your outstanding contributions!



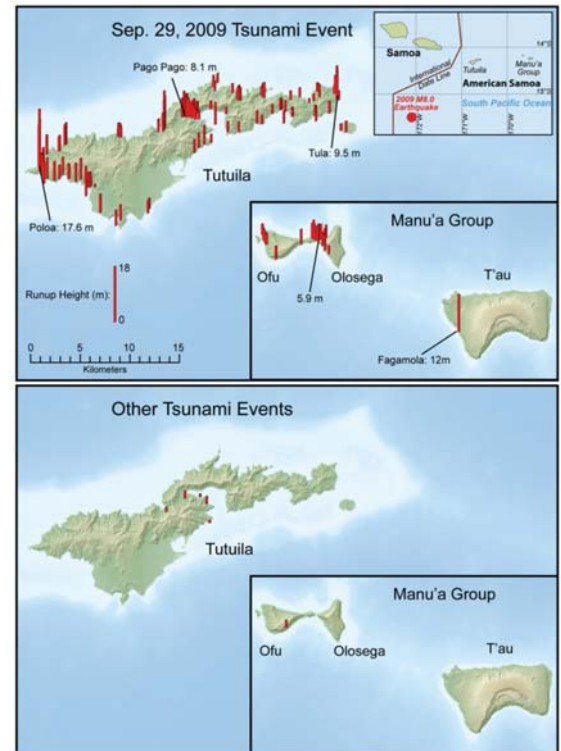
(Continues on Page 9)

NEWLY PUBLISHED

United States and Territories National Tsunami Hazard Assessment— Historical Record and Sources for Waves-Update

By Paula Dunbar, NOAA National Centers for Environmental Information, and Craig Weaver, USGS

A new version of the United States and Territories National Tsunami Hazard Assessment—Historical Record and Sources for Waves-Update Report is now available on the National Tsunami Hazard Mitigation Program (NTHMP) website. The NTHMP, a partnership of U.S. Federal and State agencies, provided the organizational framework for this collaborative effort between the NOAA National Centers for Environmental Information (NCEI, formerly the National Geophysical Data Center) and the United States Geological Survey (USGS). The first national tsunami hazard assessment was published in 2008. Since then, several significant tsunamis including the 2009 Samoa, 2010 Chile, and 2011 Japan tsunamis have occurred. As a result, the NTHMP requested an update to the 2008 report. The assessment is based largely on a careful examination of the NCEI historical tsunami data and the USGS National Seismic Hazard Map (NSHM) data to partially extend the record back in time beyond the historical record. The national assessment in this report is essentially the same as that in 2008 except for two changes in hazard levels. The hazard level was changed from “Moderate” to “High” for the U.S. Pacific Island Territories. This reflects both the devastating 2009 tsunami and



Qualitative tsunami hazard assessment based on NOAA/NCEI and USGS National Seismic Hazard Map database searches.

Region	Hazard based on Historical Record and Earthquake Probabilities	Number of reported deaths
U.S. Atlantic coast	Very low to low	None
U.S. Gulf coast	Very low	None
Puerto Rico and the Virgin Islands	High	164
U.S. West coast	High to Very high	25*
Guam and N. Mariana Islands	High	1
American Samoa	High	34
Alaska Arctic coast	Very low	None
Alaska	High to Very high	222
Hawaii	High to Very high	293

*Does not include any deaths caused by the 1700 Cascadia tsunami on the U.S. West coast

b e t t e r accounting for the tectonic setting of the Pacific Island Territories within major subduction zones. In this report the categories of hazard level from “Very Low” to “Very High” were more clearly defined based on the frequency and distribution of runup heights in each state. This resulted in the second change, raising the hazard level for the U.S. West Coast from “High” to “High to Very High”. Several research efforts that improve the confidence in the 2008 assessments of tsunami hazards are also identified in the report.

Access full report: http://nws.weather.gov/nthmp/documents/Tsunami_Assessment_2016Update.pdf

NEWLY PUBLISHED

Five-Years After the 2011 Tohoku Earthquake and Tsunami, California Provides Harbors with Detailed Tsunami Planning Playbooks

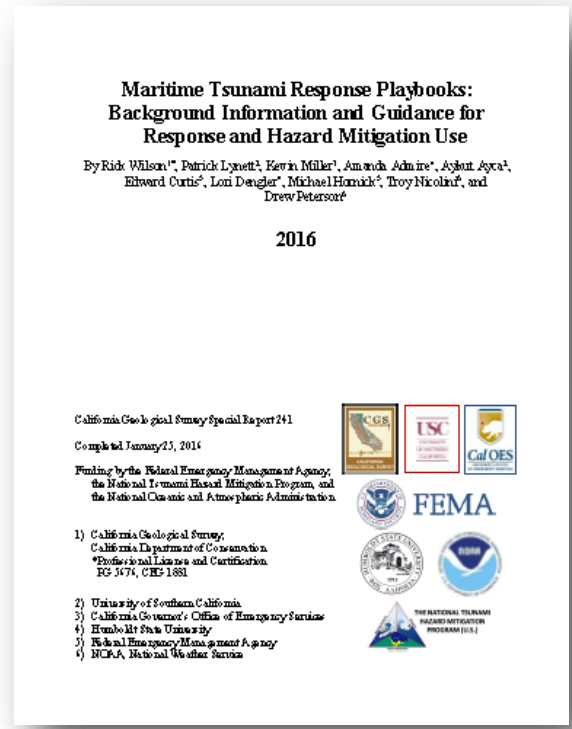
By Rick Wilson (California Geological Survey), Patrick Lynett (University of Southern California), and Kevin Miller (California Governor's Office of Emergency Services)

California's experience during 2010 Chile and 2011 Japan tsunamis has brought to light the desire by harbor/port authorities to obtain more detailed information on the estimated hazard and impact of tsunamis well ahead of their initial arrival time. To address the needs of the maritime communities, the California Tsunami Program, with primary support from the University of Southern California and Federal Emergency Management Agency (FEMA), has produced California Geological Survey Special Report 241, titled "Maritime Tsunami Response Playbooks: Background Information and Guidance for Response and Hazard Mitigation Use." This publication is accompanied by over 30 separate response Playbooks which cover and have been distributed to the 70+ at-risk coastal ports, harbors, and marinas in California.

Using a sports analogy, the Playbook approach provides the best defensive response "play" (or plan) against a tsunami of a particular size and source origin location. The Playbooks include detailed information regarding overall tsunami planning and response: 1) harbor-specific maps and other products about in-harbor tsunami hazards (strong currents and fluctuating water levels) and damage potential; 2) the minimum offshore safe depth for vessels to safely evacuate beyond prior to arrival of the tsunami; and 3) guidance for each harbor which can be tailored to future tsunamis of different size and damage potential. Ultimately, each maritime community is responsible for determining and implementing tsunami evacuations and response activities, however, during an emergency, harbors officials can reference their Playbook document to find the applicable response map and associated set of instructions for the recommended Playbook Plan.

In addition to using Playbooks for tsunami response, the California Tsunami Program, FEMA, National Oceanic and Atmospheric Administration (NOAA), and its partners encourage maritime communities to utilize these products and plans to pre-identify real-time response mitigation measures, determine where infrastructure enhancements should be initiated, and provide a mechanism for focused, pre-disaster hazard mitigation funding through additions to their Local Hazard Mitigation Plans. Although these products, plans, and related mitigation efforts will not eliminate all casualties and damages from future tsunamis, they will provide a basis for greatly reducing future tsunami impacts on life-safety, infrastructure, and recovery in California maritime communities.

CGS Special Report 241 and other information about tsunami preparedness can be found at:
http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Pages/MaritimePreparedness.aspx



UPCOMING TSUNAMI EXERCISES

LANTEX16 Tsunami Exercise March 16, 2016

By James Waddell, NOAA National Tsunami Warning Center

NOAA and the U.S. National Tsunami Hazard Mitigation Program will be conducting the LANTEX16 tsunami exercise on March 16, 2016 beginning at 0900 EDT (13:00 UTC). The purpose of the exercise is to improve Tsunami Warning System effectiveness along the United States and Canadian Atlantic coasts. It provides a realistic opportunity for emergency management organizations throughout the region to exercise their operational lines of communications, review their tsunami response procedures, and promote tsunami preparedness. Regular exercising of response plans is critical to maintain readiness for an emergency. This is particularly true for tsunamis, which are infrequent but high impact events. Every impacted emergency management organization (EMO) is encouraged to participate.

This exercise will provide simulated tsunami alert messages from the NOAA/NWS National Tsunami Warning Center for the eastern coasts of Canada and the United States. The alert is based on a magnitude 6.8 earthquake which triggers a sub-sea landslide approximately 130 miles south of Halifax, Nova Scotia and 400 miles east of Boston, Massachusetts at 42.7°N, 63.2°W. The sub-sea landslide in turn generates a tsunami.

The following are the exercise's overarching objectives.

- ◆ Ensure message transmission from the NTWC to primary customers
- ◆ Test tsunami response plans for EMOs that have developed plans, and provide a catalyst for EMOs that have not developed plans
- ◆ EMOs review, discuss, and evaluate the various communication alternatives for receiving and disseminating tsunami messages
- ◆ EMOs review, discuss, and evaluate potential response actions and challenges.

Please contact Paul Whitmore (paul.whitmore@noaa.gov) or James Waddell (james.waddell@noaa.gov) with any questions concerning this exercise.



Recognition of Long-Term NTHMP Contributors

By Dr. Rocky Lopes, NTHMP Administrator

(Continued from Page 6)

Sue McLean, the Director of the National Centers for Environmental Information, formerly the NGDC. Sue will be retiring this year.

Mike Angove recognized Sue for her many years of steadfast support of the NOAA Tsunami Program and the NTHMP. She is a woman of vision and action. We all have benefited from her diligent work over the years, which has included supervision of building and collecting data for the historical archive of tsunami events; water level data archiving; digital elevation modeling, and much more. We are all indebted to you for your support. Thank you.



UPCOMING TSUNAMI EXERCISES

Annual Tsunami Exercise in the Caribbean and Adjacent Regions

By Carolina Hincapie and Christa von Hillebrandt-Andrade, Caribbean Tsunami Warning Program

In accordance with the recommendation of the UNESCO/IOC Intergovernmental Coordination Group for Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions at its Tenth Session (ICG/CARIBE EWS-X), the Annual CARIBE WAVE 16 tsunami exercise will take place on March 17, 2016, with two hypothetical scenarios. The first tsunami scenario simulates a tsunami generated by a magnitude 8.4 earthquake with epicenter at 10.8°N, 66.0°W, off Venezuela, in the southern Caribbean Sea and has an event origin time of 14:00 Universal Time Coordinated (UTC). The second tsunami scenario simulates a magnitude 8.7 earthquake with epicenter at 20.2°N, 71.7°W, North of Hispaniola, in the Atlantic Ocean with an event origin time of 15:00 UTC. While maximum modeled coastal tsunami waves are 12 meters in the central coast of Venezuela for the first scenario, coastal wave heights of 17 meters were modeled along the Atlantic coast of Haiti and Bahamas for the second scenario.

To start the exercise the US Pacific Tsunami Warning Center (PTWC), the regional tsunami service provider for CARIBE EWS as well as the domestic tsunami warning center for Puerto Rico, US and British Virgin Islands (as of April 1, 2016), will issue initial dummy messages at 14:05 UTC for the Venezuela scenario and at 15:05 UTC for the North of Hispaniola scenario. These messages will be disseminated over all standard broadcast channels of the PTWC to test communications with the Tsunami Warning Focal Points (TWFPs), National Tsunami Warning Centers (NTWCs) of the ICG/CARIBE EWS Member States, as well as other stakeholders and systems. In addition to the dummy messages, the PTWC will be emailing all the simulated tsunami products, to the officially designated TWFPs and NTWCs in the CARIBE EWS region.

The ICG/CARIBE EWS, the US National Oceanic and Atmospheric Administration (NOAA), and the Caribbean Regional Stakeholders (Center for the Coordination of Natural Disasters for Central America, Caribbean Disaster and Emergency Management Agency, and L'Etat Major de Zone, the regional emergency management agencies for Central America, the English speaking Caribbean, and the French territories, respectively) are providing the framework for this exercise as a means for emergency responders and communities throughout the Caribbean and adjacent regions to test and update their tsunami response plans. High levels of vulnerability and threat in many Caribbean nations should provide a strong incentive for local jurisdictions to prepare for a tsunami and participate in the exercise. Detailed coordination for this exercise will be organized through national TWFPs, NTWCs and Tsunami National Contacts (TNCs) who will decide on the level of participation of each country and territory. The participant handbook and additional information relevant to the exercise are available at <http://www.caribewave.info>. The registration for the exercise is being managed by TsunamiZone.org. The goal for this year is that 210,000 people take part, which would represent an increase of 10% from 2015, when all 31 Member States and 17 Territories in the CARIBE EWS participated, with a total of 191,420 people engaged.

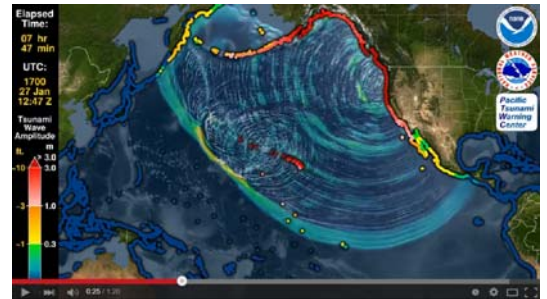


TSUNAMI NEWS & RESEARCH

NOAA Science on a Sphere: Tsunami Historical Series: Cascadia - 1700

By Nathan Becker and Leon Geschwind, NOAA

Just before midnight on January 27, 1700 a tsunami struck the coasts of Japan without warning since no one in Japan felt the earthquake that must have caused it. Nearly 300 years later scientists and historians in Japan and the United States solved the mystery of what caused this "orphan tsunami" through careful analysis of historical records in Japan as well as oral histories of Native Americans, sediment deposits, and ghost forests of drowned trees in the Pacific Northwest of North America, a region also known as Cascadia.



See full article: <http://sos.noaa.gov/Datasets/dataset.php?id=590>

See animation: <https://www.youtube.com/watch?v=4W2iUI0VB8c&feature=youtu.be>

NEW TSUNAMI RESEARCH

Brothers, D. S.; Haeussler, P. J.; Liberty, Lee; Finlayson, David; Geist, Eric; Labay, Keith; Byerly, Mike, 2016, A submarine landslide source for the devastating 1964 Chenega tsunami, southern Alaska: Earth and Planetary Science Letters, v. 438, p. 112-121.

Goff, James; Knight, Jasper; Sugawara, Daisuke; Terry, J. P., 2016, Anthropogenic disruption to the seismic driving of beach ridge formation: The Sendai coast, Japan: Science of The Total Environment, v. 544, p. 18-23.



Lin, F. C.; Sookhanaphibarn, Kingkarn; Choensawat, Worawat, 2016, Detection of tsunami radiation at Illapel, Chile on 2015-9-15 by remote sensing: Science of Tsunami Hazards, v. 35, no. 1, p. 1-17. <http://tsunamisociety.org/35|LinEtAl.pdf>

Melar, Diego; Allen, R. M.; Riquelme, Sebastian; Geng, Jianghui; Bravo, Francisco; Baez, J. C.; Parra, Hector; Barrientos, Sergio; Fang, Peng; Bock, Yehuda; Bevis, Michael; Caccamise II, Dana J.; Vigny, Christophe; Moreno, Marcos; Smalley Jr., Robert, 2016, Local tsunami warnings: Perspectives from recent large events: Geophysical Research Letters, v. 43, no. 3, p. 1109-1117.

Necmioğlu, Öcal, 2016, Design and challenges for a tsunami early warning system in the Marmara Sea: Earth, Planets and Space, v. 68, no. 1, p. 1-9. <http://www.earth-planets-space.com/content/pdf/s40623-016-0388-2.pdf>

Rodriguez, Fabian; D'Howitt, M. C.; Toulkeridis, Theofilos; Salazar, Rodolfo; Romero, G. E. R.; Moya, V. A. R.; Padilla, Oswaldo, 2016, The economic evaluation and significance of an early relocation versus complete destruction by a potential tsunami of a coastal city in Ecuador: Science of Tsunami Hazards, v. 35, no. 1, p. 18-33. <http://www.tsunamisociety.org/35|RodriguezEtAl.pdf>



Witter, R. C.; Carver, G. A.; Briggs, R. W.; Gelfenbaum, Guy; Koehler, R. D.; La Selle, SeanPaul; Bender, A. M.; Engelhart, S. E.; Hemphill-Haley, Eileen; Hill, T. D., 2016, Unusually large tsunamis frequent a currently creeping part of the Aleutian megathrust: Geophysical Research Letters, v. 43, no. 1, p. 76-84.

NTHMP NEWS & EVENTS

2016 Tsunami Preparedness Week of the National Tsunami Hazard Mitigation Program (NTHMP) and its State/Territory Partners

In 2016, the NTHMP will recognize Tsunami Preparedness Week the last week in March (March 27-April 2, 2016) to coincide with the date of the 1964 Great Alaska Earthquake and Tsunamis (March 27). While some states and territories also plan to promote tsunami preparedness this week, others do so at different times. Below are some dates for state and territorial tsunami preparedness campaigns in 2016:

- ◆ March 13-19: Puerto Rico, U.S. Virgin Islands
- ◆ March 20-March 26: California
- ◆ March 27-April 2: Alaska, Guam
- ◆ April: Hawaii
- ◆ September 24-30: American Samoa
- ◆ October: Oregon, Washington

Tsunami Preparedness Week
March 27–April 2, 2016



For more information, visit <http://nws.weather.gov/nthmp/tpw/tsunami-preparedness-week.html>. To see activities that may be happening in your state or territory, visit TsunamiZone.org or follow NTHMP partners on social media (<http://nws.weather.gov/nthmp/documents/NTHMPSocialMedia.pdf>)

2015 NTHMP Annual Report Now Available!

Title: Accomplishments of the National Tsunami Hazard Mitigation Program: An Annual Report

Authored By: The National Tsunami Hazard Mitigation Program Coordinating Committee Members

Date Published: January 2016

Access: <http://nws.weather.gov/nthmp/documents/2015AnnualReport.pdf>



UPCOMING NTHMP & RELATED EVENTS

- ◆ March 16, 2016—LANTEX Tsunami Exercise (East Coast and Gulf Coast, USA and East Coast, Canada) <http://tsunamizone.org>
- ◆ March 17, 2016—CARIBE WAVE Tsunami Exercise (Caribbean and Adjacent Regions) <http://caribewave.info> and <http://tsunamizone.org>
- ◆ March 27–April 2, 2016—Tsunami Preparedness Week <http://nws.weather.gov/nthmp/tpw/tsunami-preparedness-week.html>
- ◆ April 17–22, 2016—EGU General Assembly (Vienna, Austria)
- ◆ April 20–22, 2016—Seismological Society of America Meeting (Reno, Nevada, USA)
- ◆ June 2016—Cascadia Rising 2016/PACIFEX2016 Tsunami Exercise (West Coast U.S./Pacific Ocean Region) <http://wcatwc.arh.noaa.gov/?page=exercises>
- ◆ June 20-22, 2016—IASPEI Regional Assembly Latin-American and Caribbean Seismological Commission (San José, Costa Rica) <http://lacsc2016.com/>
- ◆ July 31-August 5, 2016—Asia Oceania Geosciences Society Annual Meeting (Beijing, China) <http://www.asiaoceania.org/aogs2016>
- ◆ September 5-7, 2016—7th International Tsunami Symposium (Brussels, Belgium)

