

# TsuInfo Alert



prepared by the Washington State Department of Natural Resources on behalf of the  
**National Tsunami Hazard Mitigation Program**  
 a state/federal partnership funded through the National Oceanic and Atmospheric Administration (NOAA)

FEBRUARY 2015

Volume 17, Number 1



## National Tsunami Hazard Mitigation Program (NTHMP) subcommittee and annual meetings

By Rocky Lopes NTHMP Administrator, NOAA/National Weather Service Tsunami Program

### In this issue:

NTHMP subcommittee and annual meetings 1

10 years after the Indian Ocean tsunami 2

NTHMP leadership transitions 4

Upcoming Caribbean, Atlantic, and Pacific tsunami exercises 5

Breaking ground on WA vertical evacuation site 6

Tsunamis in the Pacific Ocean 2011–2012 7

Potential tsunami impact, South China Sea 7

Insights from geochemistry and diatoms on tsunami deposits 8

Science of Tsunami Hazards 8

February 9–13, 2015, saw the nation’s tsunami, geological, earthquake, and coastal hazard experts convene in Portland, Oregon. Five concurrent and sequential meetings were held.

The NTHMP Mapping and Modeling Subcommittee convened a tsunami model evaluation and benchmarking workshop on February 9–10. The workshop was facilitated by Workshop Convener and NTHMP Co-Chairs Rick Wilson (California Geological Survey), Kara Gately (NWS National Tsunami Warning Center), and workshop leader Dr. Pat Lynett of the University of California. Fifty five representatives from National Oceanic and Atmospheric Administration offices, universities, states,



Attendees at the 2015 NTHMP Annual Meeting (Credit: Rocky Lopes)



MMS Benchmarking Workshop (Credit: Rocky Lopes)

territories, and professional organizations convened to compare model results, discuss outcomes, and make recommendations for future action. Representatives from Canada, Japan, Turkey, and Spain were among the participants. Results of this workshop will be posted on the NTHMP website and the partner website at the University of Southern California.

The NTHMP Mitigation and Education Subcommittee (MES) met for a half day on February 10. MES Co-Chairs Tamra Biasco (FEMA Region 10), Laura Kong (International Tsunami Information Center) and Kevin Miller (California Office of Emergency Services) led a spirited and productive meeting attended by 32 representatives from the United States and Canada.



MES Co-Chairs: Laura Kong, Kevin Miller, Tamra Biasco (Credit: Rocky Lopes)

Discussions during the MES meeting included: TsunamiReady Guidelines Project (Rocky Lopes, NWS Headquarters); Evacuation Support Tools and Economic Costs (Nate Wood, USGS); FEMA’s Risk Map and Resilience Meetings (Tamra Biasco, FEMA Region 10); the National Tsunami Education and Outreach Plan (Christa Rabenold, NWS Headquarters); MES Guideline Development for Maritime Tsunami Evacuation Mapping (Kevin Miller, California OES); and a review of FY15 strategies and FY14 achievements.

The NTHMP Warning Coordination Subcommittee (WCS), led by Co-Chairs Paul Whitmore (National Tsunami Warning Center), Chip McCreery (Pacific Tsunami Warning Center), and Althea Rizzo (Oregon Emergency Management), had a very thorough discussion about a number of topics with 33 participants from the U.S. and Canada.

Article 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](mailto:stephanie.earls@dnr.wa.gov)

**NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM LIBRARY CATALOG:**

<http://69.63.217.22/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.

## 10 years after Indian Ocean tsunami, Asia-Pacific region better prepared

By United Nations News Center

Ten years after the Indian Ocean tsunami hit South and Southeast Asia, countries in the region are better prepared to deal with tragedies, the United Nations Food and Agriculture Organization (FAO) said today, while stressing that there is still room for improvement.



"A decade later, while events marking the remembrance of the tsunami recall the human tragedy, FAO examines the lessons learned in mitigating damage to agricultural livelihoods, food security and nutrition wrought by such natural and climatic events," said Hiroyuki Konuma, FAO Assistant Director-General and Regional Representative for Asia and the Pacific.



"What we and our member countries have learned and now see in place is impressive, but there is still more that can and should be done to prevent and mitigate disasters," he added.

The world's worst recorded natural disaster hit the Asia Pacific region in December 2004, claiming the lives of more than 200,000 people and leaving the livelihoods of some 1.4 million survivors in tatters as it destroyed entire food production systems on which whole populations depended.

See full article: <http://www.un.org/apps/news/story.asp?NewsID=49664#.VO4k6XzF-So>

# NTHMP NEWS

## National Tsunami Hazard Mitigation Program (NTHMP) subcommittee and annual meetings

(Continued from page 1)

Topics discussed included: Complex Coast and Social Science TWC message proposed changes; impact of including new marine zones on EAS; PTWC International product update; NWR/EAS auto activation; WEA Polygons; NTWC Twitter study; EAS Activation for Advisories; tsunami exercises; review of Warning Effectiveness Survey for June event; TWC IT Modernization Project update; and meteotsunami alerts.



WCS Co-Chairs: Althea Rizzo and Paul Whitmore (Credit: Rocky Lopes)

The NTHMP Annual Meeting followed and was attended by the largest crowd ever—77 representatives from all over the United States and Canada. The meeting began with NTHMP Chair, Aimee Devaris (NWS Alaska Region Director) recognizing three long-serving members of the NTHMP Coordinating Committee (see related story on page 4) who will be leaving the NTHMP this year upon retirement or replacement due to change of office. Much appreciation was given to George Priest of Oregon, Erv Petty of Alaska, and Elton Lewis of the U.S. Virgin Islands.

Meeting attendees were greeted via video by Representative Suzanne Bonamici of Oregon's 1st Congressional District. The video was introduced by Kristen Rasmussen of Ms. Bonamici's Portland district office.

Mike Angove, NOAA Tsunami Program Manager, provided an update on the NOAA Tsunami Program and budget. This presentation provided an interesting opportunity for dialogue with NOAA/NWS leadership.

NTHMP subcommittee Co-Chairs updated meeting attendees on their respective subcommittees' activities and plans for 2015.

In the afternoon of Day 1, we heard from Nate Wood of the USGS who provided more information about evacuation modeling and costs associated with tsunami evacuation. Then we had a thorough presentation by Rick Wilson of the California Geological Survey about the evolution of the maritime safe-depth recommendation and its differences in different locations.



NOAA Tsunami Leadership: Chip McCreery, PTWC Director; Rocky Lopes, NTHMP Administrator; Paul Whitmore, NTWC Director; Mike Angove, NOAA/NWS Tsunami Program Manager (Credit: Rocky Lopes)

Most of the NTHMP 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! (Presentations are on the NTHMP website.)

During the morning of the second day of the NTHMP meeting, Christa Rabenold of the NWS Headquarters Tsunami Program updated us on Tsunami Preparedness Campaign Activities and the National Tsunami Education Plan. Following those discussions, Rocky Lopes, also of the NWS Headquarters Tsunami Program, presented an update on the TsunamiReady Guidelines and the NTHMP Return on Investment Report—a work still in progress.

The NTHMP Annual Meeting culminated with a lively discussion with Mike Angove (NWS Headquarters Tsunami Program Manager) on capacity-building and capacity-realization of investments by NTHMP Grants.

Copies of meeting notes and presentations are available on the NTHMP website.

Visit <http://www.weather.gov/nthmp/2015annualmeeting/index.html> for details.

# NTHMP NEWS

## Recognizing National Tsunami Hazard Mitigation Program (NTHMP) leadership transitions

By Rocky Lopes, NTHMP Administrator, NOAA/National Weather Service Tsunami Program

During the NTHMP Annual Meeting, held recently in Portland, Oregon, NTHMP Chair Aimee Devaris recognized three members of the NTHMP Coordinating Committee who will be retiring or stepping down this year.

### George Priest (17 Years)

George Priest serves as the Senior Geologist for the Oregon Department of Geology and Mineral Industries (DOGAMI). George was actually not an original member of the NTHMP, much to his chagrin, but he is definitely one of our sage advisors with a great corporate memory.

George was officially nominated as a member of the NTHMP Coordinating Committee in October, 1998. George was the person who started what became subcommittees.

We have appreciated George's steadfast and calm advice as the NTHMP has grown and changed over the years. He has provided steady, calm leadership during many transitions and growth periods that the NTHMP went through.



Dr. Vicki McConnell, George Priest, Aimee Devaris (Credit: Rocky Lopes)

### Dr. Vicki McConnell

Although not an official member of the NTHMP, we recognize and thank Dr. Vicki McConnell for her leadership and ongoing support of the NTHMP during her tenure as DOGAMI Director from 1999 through February, 2015. She is leaving DOGAMI to become Executive Director of the Geological Society of America. DOGAMI's chief scientist, Ian Madin, has been named interim head.

### Erv Petty (12 years)

Erv has served at the State of Alaska Division of Homeland Security & Emergency for many years. He has provided a solid emergency management viewpoint to guide the NTHMP during its growth years.

Professionally, Erv has worked in one of the most challenging physical environments of an NTHMP partner. No other NTHMP state, commonwealth, or territory has the same environmental conditions that Alaska does. While the vast majority of NTHMP members enjoy warm, sandy beaches, Erv has been responsible for preparing remote populations to evacuate during some of the most severe weather conditions. I don't think many of us can fully appreciate the time and travel demands required to travel in such conditions to the remote island communities of the Aleutian Islands and Yukon territories, all in the name of tsunami preparedness. He has earned all of our utmost respect for building and successfully executing a state tsunami program as a part of the NTHMP.



Erv Petty, Aimee Devaris (Credit: Rocky Lopes)

### General Elton Lewis (4 years)

General Lewis has served as the Director of the Virgin Islands Territorial Emergency Management (VITEMA) agency and has been a member of the NTHMP Coordinating Committee for four years. He serves at the discretion of the Governor. A new Governor was elected and will be replacing members of the cabinet.

*Article continues on page 5*

# PROJECT UPDATES

## Caribbean, Atlantic and Pacific tsunami exercises to be conducted on March 25, 2015

By Christa von Hillebrandt-Andrade, Manager US NWS Caribbean Tsunami Warning Program

On March 25, 2015, three regional tsunami exercises will take place in the Caribbean and Adjacent Regions (CARIBE WAVE), Northwest Atlantic (LANTEX), and Northeast Pacific (PACIFEX). The U.S. National Tsunami Hazard Mitigation Program (NTHMP), together with UNESCO and other regional organizations, are providing the framework for these exercises as a means for emergency responders throughout the Northwestern Atlantic, Caribbean, Gulf of Mexico, and Northeastern Pacific to test and update tsunami response plans. The scenarios are based on tsunamis generated by a major earthquake located off the Caribbean coast of Panama (CARIBEWAVE), a submarine landslide off the Atlantic coast of Florida (LANTEX), and a major Kamchatka Peninsula earthquake (PACIFEX). The initial kick off messages will be issued by the U.S. National Tsunami Warning Center (NTWC) and the Pacific Tsunami Warning Center (PTWC). Messages will be disseminated over all standard broadcast channels. The dummy message is issued to test communications with Tsunami Warning Focal Points (TWFPs) and Emergency Management Organizations (EMOs), and to begin the exercise. It will be the only exercise message broadcast from the PTWC/NTWC, excluding special email messages. In the U.S., the Weather Forecast Offices of the National Weather Service and state offices of emergency services are the points of contact for coordinating activities as part of this exercise. The exercise handbooks, as well as additional background materials and the links for registration and evaluation, are posted at [caribewave.info](http://caribewave.info) and [ntwc.arh.noaa.gov](http://ntwc.arh.noaa.gov) under the Exercise tab. High levels of vulnerability and risk to life and livelihoods from tsunamis along the Caribbean and Adjacent regions, as well as the U.S. and Canadian coasts, should provide a strong incentive for countries and local jurisdictions to prepare for a tsunami and participate in this exercise.

## Recognizing National Tsunami Hazard Mitigation Program (NTHMP) leadership transitions

*(Continued from page 4)*

Director Lewis is a man of action and word. He has been fully committed to raising awareness and the level of preparedness in the USVI. By order of the Governor, he doubled efforts so that the USVI would be recognized as TsunamiReady®.

Things got done under his leadership. A tsunami response plan was signed, signs went up, evacuation maps were published, carnival floats were built, public announcements were made, and evacuation exercises were conducted.

And then came the proud moment, on May 13, 2014, at the Ninth Session of the UNESCO IOC Intergovernmental Coordination Group meeting, in front of delegates from 20 countries, he received with the Governor the recognition as the first full U.S. State/Territory in the Atlantic and Gulf to be recognized as TsunamiReady®.

The NTHMP will miss the participation and support from these fine individuals. We give a strong salute to them for their commitment to public service.



Gen. Elton Lewis, Aimee Devaris (Credit: Rocky Lopes)

# PROJECT UPDATES

## Breaking new ground on nation's first tsunami vertical evacuation site

By Washington Emergency Management Division

Hundreds of people turned out to celebrate the groundbreaking of the nation's first vertical evacuation center on January 15, 2015, at the Ocosta School District near Westport, Washington. School children stood tall with shiny golden clam guns, posing next to a who's who of participants with golden shovels that helped make the new building possible.

Pilings will be driven 50 feet down and the building will be constructed using sound engineering methods that will allow the roof and upper level of the new structure on the school grounds to survive multiple tsunami waves. District officials said the building will be ready by the end of August, but won't be ready to be occupied until after the Christmas break of 2015.

After twice rejecting a bond measure, in 2013 residents cast their ballots in favor of a new bond measure for the dual-purpose school building, granting approval by 69.78 percent. The \$13.8 million bond, to be paid off within 20 years, replaced an outdated elementary building with a tsunami refuge for students, staff and community, among other things.



Besides the direct support of the taxpayers and the school district, the project wouldn't have been possible without a Washington Emergency Management Division-led effort on the coast called 'Project Safe Haven'. Project Safe Haven was a grassroots, community driven, public process that identified areas for future vertical evacuation structures. Partnering with local residents, its mission was to develop a community responsive vertical evacuation strategy along the Washington coast. With funding from National Tsunami Hazard Mitigation Program grants, Project Safe Haven, which ran from 2010–2012, was a collaboration between the University of Washington and the Washington Emergency Management Division, with assistance from the Federal Emergency Management Agency, the National Oceanic and Atmospheric Administration, the U.S. Geological Survey, the state Department of Natural Resources, and community stakeholders.

The original design in Grays Harbor County was for a series of towers and berms along the coastline, but funding concerns led to conversations about using vertical evacuation centers in a dual-purpose way. Ultimately, school officials in the Ocosta School District suggested that crafting a new building that could be utilized as both an instructional facility and a vertical evacuation structure would make the best sense.

According to the Project Safe Haven report for Grays Harbor, the county "has high risk/low frequency tsunamis triggered by a magnitude 9-plus Cascadia subduction zone earthquake. The last Cascadia earthquake to trigger such a tsunami was recorded in 1700 AD. The rate of occurrence is every 400 years. As a result, the concept of vertical evacuation as a strategy to provide refuge and high ground for evacuation along Washington's coast could not be timelier."

At the groundbreaking, Major General Daughtery, the Washington Adjutant General in charge of the Washington Military Department, which includes the Emergency Management Divisions, said that he hoped the Ocosta vertical evacuation site would be the first of many along the coast.

See full blogpost: <http://mil.wa.gov/blog/news/post/nations-first-tsunami-vertical-evacuation-center-breaks-ground>

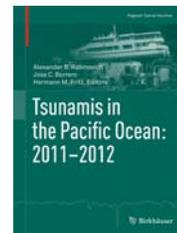
# RECENTLY PUBLISHED

## Tsunamis in the Pacific Ocean: 2011–2012

Editors: A. Rabinovich, J.C. Borrero, H.M. Fritz

*Journal:* Pure and Applied Geophysics Volume 171, Issue 12, Dec. 2014

The 2011 Tohoku earthquake generated a catastrophic tsunami that killed nearly 20,000 people along the coast of Japan and caused the nuclear disaster at the Fukushima Daiichi Nuclear Power Plant. The tsunami propagated throughout the Pacific Ocean and also affected many other countries, including Russia, the USA, New Zealand, French Polynesia and Chile, demonstrating once again the terrible threat that tsunami waves pose for Pacific countries and the need for basin-wide international scientific collaboration.



Following a brief introduction, this volume presents 21 scientific papers, including 12 on aspects of the 2011 Tohoku event. A first group of papers provides detailed field survey results from the coasts of Japan and Russia and examines the wave dynamics on the basis of these surveys, the source mechanism of the earthquake, and the far-field impacts of the Tohoku tsunami. The second group reports on the 2012 tsunamis in El Salvador, the Philippines, off the east coast of Honshu and the landmark Haida Gwaii event off the west coast of British Columbia, Canada, while the papers in a third set discuss a number of remaining challenging questions in tsunami science and warning.

The volume will be of interest to scientists and practitioners involved in all aspects of tsunamis from earthquake source processes to transoceanic wave propagation and coastal impacts. Postgraduate students in geophysics, oceanography and coastal engineering – as well as those in the broader geosciences, civil and environmental engineering – will also find the book a valuable resource, as it combines recent case studies with the latest advances in tsunami science and natural hazards mitigation.

Access/purchase articles: <http://www.springer.com/earth+sciences+and+geography/natural+hazards/book/978-3-0348-0864-4>

## A Potential Tsunami impact assessment of submarine landslide at Baiyun Depression in Northern South China Sea

By Sun Yongfu and Huang Bolin

*Journal:* Geoenvironmental Disasters Volume 1, Number 7 (Open Access Journal)

**Background:** With mature hydrocarbon industry, Northern South China Sea (NSCS) is a hot spot for future economic development. However, the local government and researchers lack of estimations about damages brought by a submarine landslide-generated tsunami. According to oceanographic surveys, eleven landslides in different scale have been discovered in Baiyun Depression of NSCS. Hence, the need to study potential tsunamis generated by submarine landslides in NSCS is urgent and necessary. This research, focused on potential threat linked to local tsunami sources, is in its early stage in China but it is of capital importance for the local people, local government and offshore economics.

**Finding:** Taking landslide S4 for example, the formation, spreading and run-up are predicted. As calculated, the greatest height of tsunami generated by Landslide S4 is 17.5 m, occurring near Dongsha Islands, and the greatest run-up formed on the coastal line is 5.3 m, occurring near Shanwei City; the general height of waves attacking the coastal line is no more than 1.5m, but abnormally high waves might occur in 32 regions.

**Conclusions:** Prediction of tsunami generated by Landslide S4 suggests that local landslides in NSCS may trigger tsunami hazards. Therefore, more efforts shall be made to investigate potential damages caused by a submarine landslide, particularly the submarine landslides at Baiyun Depression in NSCS.

Access to article: <http://www.geoenvironmental-disasters.com/content/1/1/7>

# RECENTLY PUBLISHED

## Insights from geochemistry and diatoms to characterise a tsunami's deposit and maximum inundation limit

By Catherine Chagué-Goff, James Goff, Henri K.Y. Wong, and Marco Cisternas

Journal: Marine Geology Volume 359, 2015

**Abstract:** Geochemical proxies and diatom assemblages were used in combination with grain size characteristics not only to describe the deposit left behind by the 27 February 2010, Maule tsunami at Las Cañas, Maule Region, Chile, but also to trace the maximum inundation limit of the event. The sandy deposit was laid down between 160 and 260 m inland behind an eroded sand dune and a lagoon but reached only 60% of the total tsunami inundation distance of 380 m, which was marked by organic debris, pumice clasts and wooden logs. It consisted of coarse to medium sand that thinned and fined inland. At the most seaward point, the 22 cm thick deposit exhibited a fining upward unit overlain by a couplet of coarsening–fining upward units, suggesting deposition by at least two waves, while farther inland the fining upward deposit was probably left behind by only one wave. Chemical proxies (Ca/Ti vs Sr/Ba) allow us to distinguish the deposit from the surrounding soil and indicate that it was sourced from the beach and/or dune area, with diatom assemblages confirming the marine origin of the deposit. Saltwater indicators (e.g. Cl, S) provide evidence for the maximum inundation limit beyond the extent of the sandy deposit, despite dilution and dissolution by 500 mm of rainfall in the six months since the tsunami. Marine and marine/brackish diatom assemblages decreased landward but were found up to the inundation limit and immediately beyond, suggesting the effect of diatom-bearing sea spray at the wave front or redistribution of the detrital assemblage associated with tsunami inundation due to wind. While the latter might result in a slight over-estimation of the inundation distance, they can be used in combination with chemical proxies to trace the maximum inundation distance of recent and past tsunamis, thus allowing for a better estimation of the magnitude of past events. Post-depositional processes were found to have affected the thinner sandy deposits (< 5 cm), suggesting that these are unlikely to be preserved in the geological record. This highlights the need to be able to trace the tsunami inundation limit with geochemical and/or diatom proxies without having to rely on sedimentological evidence, as it is now widely recognised that conventional approaches used by tsunami researchers have led to an under-estimation of previous events.



Access/purchase article: <http://www.sciencedirect.com/science/article/pii/S0025322714003545>

## Science of Tsunami Hazards

Volume 34, Number 1, 2015

Journal of Tsunami Society International

**An ocean depth-correction method for reducing model errors in tsunami travel time: Application to the 2010 Chile and 2011 Tohoku tsunamis—By Dailin Wang**

Link to article: <http://tsunamisociety.org/34|Wang.pdf>

**The spatial-temporal distributions of the tsunamigenic earthquake sources—By Boris Levin and Elena Sasorova**

Link to article: <http://tsunamisociety.org/34|LevinSasorova.pdf>

**Numerical simulations of an evacuation from a tsunami at Parangtritis Beach in Indonesia—By Radiana Triatmadja**

Link to article: <http://tsunamisociety.org/34|Triatmadja.pdf>

