

CARIBE WAVE 2014

CARIBE EWS TSUNAMI EXERCISE

At the Eighth Session of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS-VIII) it was decided to hold a third tsunami exercise, CARIBE WAVE 2014, on March 26, 2014. There will be two scenarios based on the 1755 Portugal event and another in the Gulf of Mexico. This tsunami warning exercise will be patterned after the very successful CARIBE WAVE 2011 and 2013 and the annual LANTEX Atlantic and US Caribbean (as of 2009) Exercises of the National Tsunami Hazard Mitigation Program, NOAA, as well as exercises held in the Pacific. This tsunami exercise is being conducted to assist tsunami preparedness in the Caribbean and to validate the understanding and use of the new PTWC Enhanced Products.

Historical tsunami records from sources such as the National Oceanic and Atmospheric Administration's (NOAA) National Geophysical Data Center (NGDC) show that almost 100 tsunamis have been observed in the Caribbean with 23 impacting the coasts of the region. Potential sources for tsunamis in the region include the faults in the Caribbean, steep shores offshore, subareal and submarine volcanoes, the region east of the Azores Islands, and portions of the continental slope off the US and Canadian coast due to sub-sea landslides. Two scenarios will be made available for the exercise.

Recognizing the need for an early warning system specially after the lessons learnt from the 2004 Indian Ocean tsunami, the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS) was established in 2005 as a subsidiary body of the IOC-UNESCO with the purpose of providing assistance to all member states of the region to establish their own regional early warning system. The main objective of the CARIBE EWS is to identify and mitigate the hazards posed by local and distant tsunamis. The goal is to create a fully integrated end-to-end warning system comprising four key components: hazard monitoring and detection; hazard assessment; warning dissemination; and community preparedness and response.

The Pacific Tsunami Warning Centre (PTWC) in Hawaii is the interim tsunami warning service provider for the Caribbean. The West Coast and Alaska Tsunami Warning Centre (WC/ATWC) is currently providing tsunami warning service for the USA territories in the Caribbean region. At the national level, each member state is responsible for issuing warnings to its own citizens through their Tsunami Warning Focal Points. These warnings are based either on the TWFP's own analysis of the situation, on the messages and graphical products received from PTWC and WC/ATWC (and some other sources), or on a combination of both.

This exercise will provide simulated tsunami messages from the PTWC and WCATWC triggered by a hypothetical earthquake located offshore Portugal (Fig. 1) and a submarine landslide within the Gulf of Mexico (Fig. 2). The Portugal event will be modeled off the November 1, 1755 earthquake and tsunami. The tsunami generated by the earthquake affected the coasts of Portugal, Spain, North Africa, and the Caribbean. While the first tsunami waves

reached Lisbon in about 20 minutes it was observed in Antigua about 9.3 hours after the earthquake. Later waves, with estimated runup heights of 7 meters, were observed at Saba, Netherlands, Antilles. The exact source for the earthquake and tsunami are still not fully understood, but both the PTWC and WCATWC will be providing modeling for the scenario based on current state of understanding. In the case of the submarine landslide in the Gulf, several studies have also been conducted evaluating this potential source (Knight, 2006; Horillo et al, 2010; and ten Brink, et al 2008, 2009).

The manual will be available in English. Additional funding would be needed if the exercise manuals are to be translated into Spanish and French (as for the CARIBE WAVE 2011). It will include suggested actions as well as a description of the scenario, the time table, travel times and expected wave heights, figures and samples of the messages that would be issued for such an event and an evaluation questionnaire.

Timetable for CARIBE WAVE 13

- Draft Circulated among ICG CARIBE EWS TNC/TWFP: August 15, 2013
- Deadline for Comments: September 16, 2013
- Final Exercise Manual Available on Line: November 4, 2013
- Circular Letter of IOC to MS: December 1, 2013
- Webinars: Mid January – Mid February 2014 –English, Spanish and French
- Exercise: March 26, 2014
- Exercise Evaluation Questionnaires due: April 9, 2014
- Final CARIBE WAVE 2014 report: ICG IX

As for the CARIBE WAVE 2011 and 2013 a task team was formed to coordinate the exercise,

For CARIBE WAVE 2011 and 2013, the Task Team below was recommended by the ICG. This team will work closely with the US NTHMP Team established for the LANTEX 2014 exercise.

1. Christa von Hillebrandt-Andrade, Chair of CARIBE EWS, Caribbean Tsunami Warning Program an -- Chair
2. Jean Marie Saurel, Chair of Working Group 1, Martinique Volcano Observatory.
3. Narcisse Zahibo, Chair of Working Group 2, Université des Antilles et Guyane, Guadeloupe
4. Kerry Hinds, Chair of Working Group 4, Dept. of Disaster Management, Barbados
5. Director of Caribbean Tsunami Information Center, TBN
6. Charles McCreery, Chair of Task Team Enhanced Products and Director Pacific Tsunami Warning Center
7. Paul Whitmore, Director West Coast/Alaska Tsunami Warning Center and US National Tsunami Hazard Mitigation Program Contact Point
8. Ronald Jackson, Director of CDEMA or his Designate
9. Ivan Morales, Director of CEPREDENAC or his Designate
10. Technical Secretary ICG CARIBE EWS

The following recommendations from the CARIBE WAVE 2011 exercise should be taken into consideration:

- Webinars were considered useful for the organization of the exercise
- The emails that were sent with the products throughout the exercised were also very helpful
- Alternatives need to be identified at the local level for the reception and dissemination of messages
- Use the online evaluation system, but with fewer questions.
- Request that PMEL include in their database the sources used for the event.

In addition in 2013 the IOC published the manual “How to plan, conduct and evaluate tsunami exercises” which will also be a useful resource. The manual is available in English and Spanish.

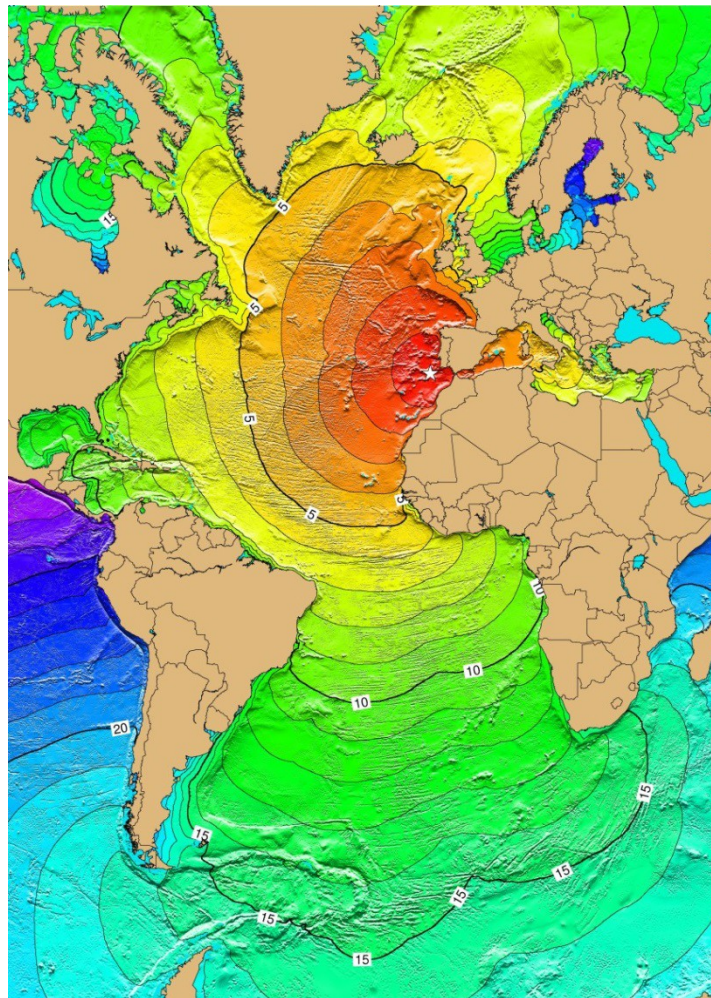


Figure 1. Travel Times for 1755 Lisbon Tsunami (http://www.ngdc.noaa.gov/hazard/tsu_travel_time_events.shtml#Atlantic)

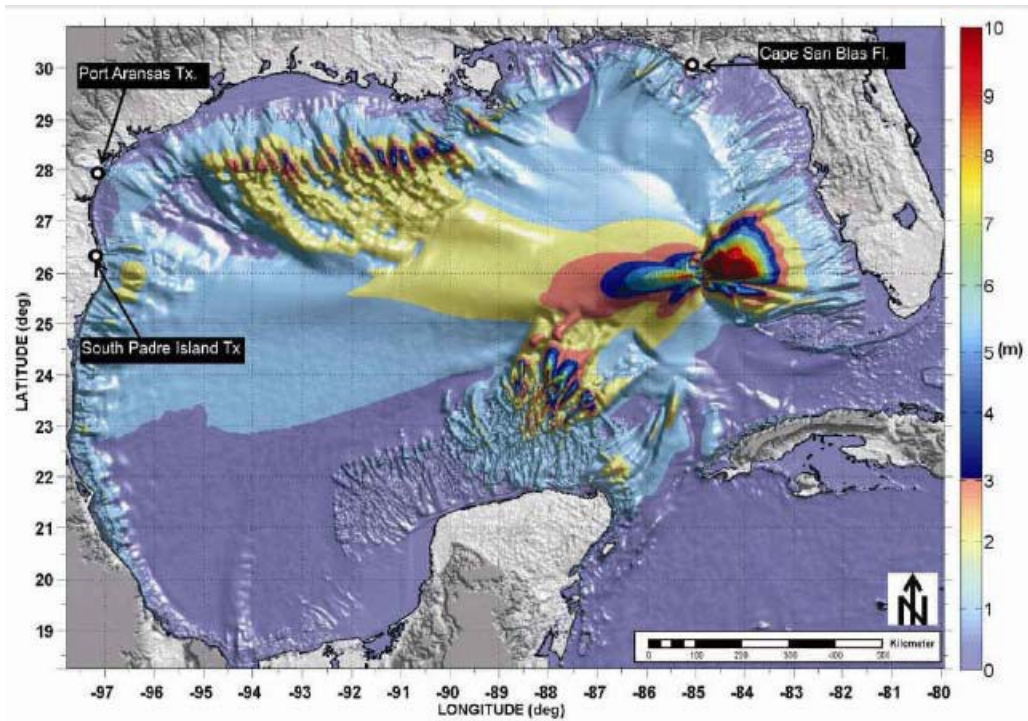


Figure 2. Potential Gulf of Mexico submarine landslide tsunami scenario (Exercise LANTEX 2012 Participant Manual, National Tsunami Hazard and Mitigation Program).

Goal	Result for 2011	Metric 2013	Result 2013	Metric 2014
Participation of Member States of ICG CARIBE EWS	75%	85%	94%	95%
Compliance with the time line	100%	100%	Close to 100%	100%
Community involvement (beyond TWFP)	61%	75%	69%	75%
TWP receive the dummy message	90%	100%	98%	100%
Countries submit exercise questionnaire	94%	100%	90%	100%

References

Knight, W. (2006). Model Predictions of Gulf and Southern Atlantic Coast Tsunami Impacts from a Distribution of Sources, *Science of Tsunami Hazards*, 24, 304-312.

Horillo, J. J., A. L. Wood, C. Williams, A. Parambath, and G. B. Kim (2010). Construction of Tsunami Inundation Maps in the Gulf of Mexico, Report to the National Tsunami Hazards Mitigation Program, 90 pp.

Roger, J.S., Allgyev, H. Hebert, M. A. Baptista, A. Loevenbruck, F' Schindele, 2010. The 1755 Lisbon tsunami in Guadeoupe Archipelago: Source sensitvity and investigation of resonance effects. *The Open Oceanography Journal*, v 4, pp. 58 – 70.

Roger, J., M. A. Baptista, A. Sahal, F. Acary, S. Allgeyer and H. Hebert. 2011. The transoceanic 1755 Lisbon tsunami in Martinique. *Pure Applied Geophysics*, V. 168, pp. 105-1031.

ten Brink, U., D. Twichell¹, E. Geist, J. Chaytor, J. Locat, H. Lee, B. Buczkowski, R. Barkan, A. Solow, B. Andrews, T. Parsons, P. Lynett, J. Lin, and M. Sansoucy (2008). Evaluation of tsunami sources with the potential to impact the U.S. Atlantic and Gulf coasts, USGS Administrative report to the U.S. Nuclear Regulatory Commission, 300 pp.

ten Brink, U., D. Twichell¹, P. Lynett, E. Geist, J. Chaytor, H. Lee, B. Buczkowski, and C. Flores (2009). Regional Assessment of Tsunami Potential in the Gulf of Mexico, USGS report to the National Tsunami Hazards Mitigation Program, 90 pp.