



# Maritime Planning in PR, USVI and the Caribbean

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**NWS Caribbean Tsunami Warning Program**

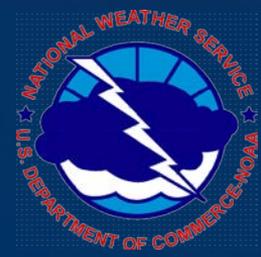
**NTHMP Summer Meeting**

**Seattle, WA**

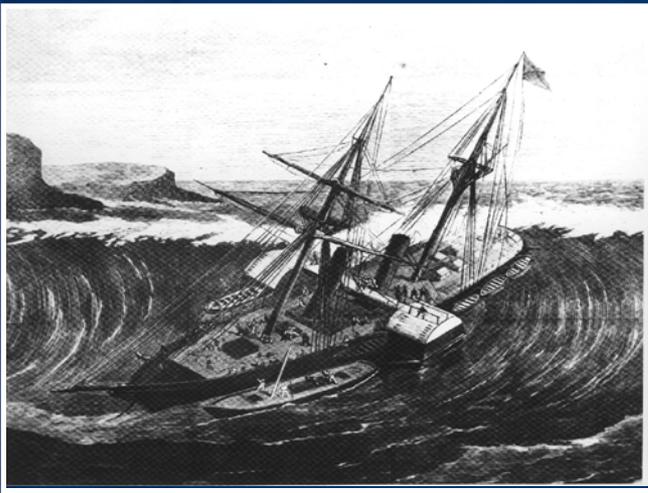
**August 20, 2014**

# Risk to Ports and Harbors

For example: Port at Charlotte Amalie Bay, St. Thomas, USVI .



20 Foot tsunami, November 18, 1867



30 people lost their lives on November 18, 1867 in a 20 ft tsunami.

Same bay in St. Thomas today with the lives of 25,000+ tourists & residents at risk ! **80% of jobs and Gross Territorial Product are Tourism Dependant**



- **Issues and Initiatives**

- Communities depend on Ports for Commerce, Tourism and Recreation

- Educational component of an NSF Grant

**TSUNAMOS: A Validated, Multi-Scale Tsunami Model for Hybrid Numerical-Experimental Simulation 2007-2011**

- Workshop to develop Response Guide for Ports and Harbor authorities
- Shipping routes study IOC in the Caribbean
- Caribbean Regional Response Team

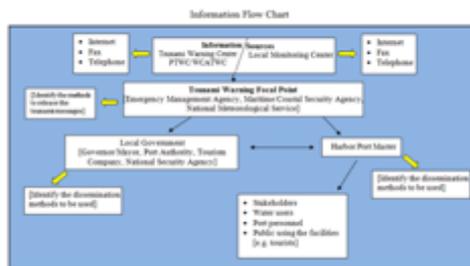
# Preparedness Materials Maritime Community

## Tsunami Protocol Template for the Caribbean Port and Harbor Operators

UPRM Puerto Rico Seismic Network, NOAA NW Caribbean Tsunami  
Warning Program, National Science Foundation

### INTRODUCTION

Tsunami (tsu=harbor, nami=wave) is a Japanese word meaning harbor wave. A tsunami is a series of waves with a long wavelength and period (time between crests) generated by a large, impulsive displacement of sea water. Time between crests of the wave can vary from a few minutes to over an hour, but generally are in the range of 15 to 25 minutes. Tsunamis are often incorrectly called tidal waves; they have no relation to the daily ocean tides, although depending on the stage of the tide, the tsunami will reach a higher or lower elevation. Tsunamis are generated by any large, impulsive displacement of the sea level. The most common cause of a tsunami is sea floor uplift associated with an earthquake. Tsunamis are also triggered by landslides into or under the water surface, and can be generated by volcanic activity and meteorite impacts.



# TSUNAMI

## WHAT TO DO?

### TSUNAMI SAFETY FOR BOATERS

1. Since tsunami waves cannot be seen in the open ocean, do not return to port if you are at sea and a tsunami warning has been issued. Port facilities may become damaged and hazardous with debris. Listen to mariner radio reports when it is safe to return to port.
2. Tsunamis can cause rapid changes in water level and unpredictable dangerous currents that are magnified in ports and harbors. Damaging wave activity can continue for many hours following initial tsunami impact. Contact the harbor authority or listen to mariner radio reports. Make sure that conditions in the harbor are safe for navigation and berthing.
3. Boats are safer from tsunami damage while in the deep ocean (>200 fathoms, 1200 ft, 400 m) rather than moored in a harbor. But, do not risk your life and attempt to motor your boat into deep water if it is too close to wave arrival time. Anticipate slowdowns caused by traffic gridlock and hundreds of other boaters heading out to sea.
4. For a locally-generated tsunami, there will be no time to motor a boat into deep water because waves can come ashore within minutes. Leave your boat at the pier and physically move to higher ground.
5. For a tele-tsunami generated far away, there will be more time (one or more hours) to deploy a boat. Listen for official tsunami wave arrival time estimates and plan accordingly.
6. Most large harbors and ports are under the control of a harbor authority and/or a vessel traffic system. These authorities direct operations during periods of increased readiness, including the forced movement of vessels if deemed necessary. Keep in contact with authorities when tsunami warnings are issued.

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Photo: Tsunami on St. Thomas, V.L. Tomada de: Harper's Weekly, 23 Jan. 1868, p. 49. Private collection



available at:  
<http://www.srh.noaa.gov/srh/ctwp/>  
and <http://prsn.uprm.edu>

# IOC Study of Tsunami Threat for Cruise Activity in the Caribbean

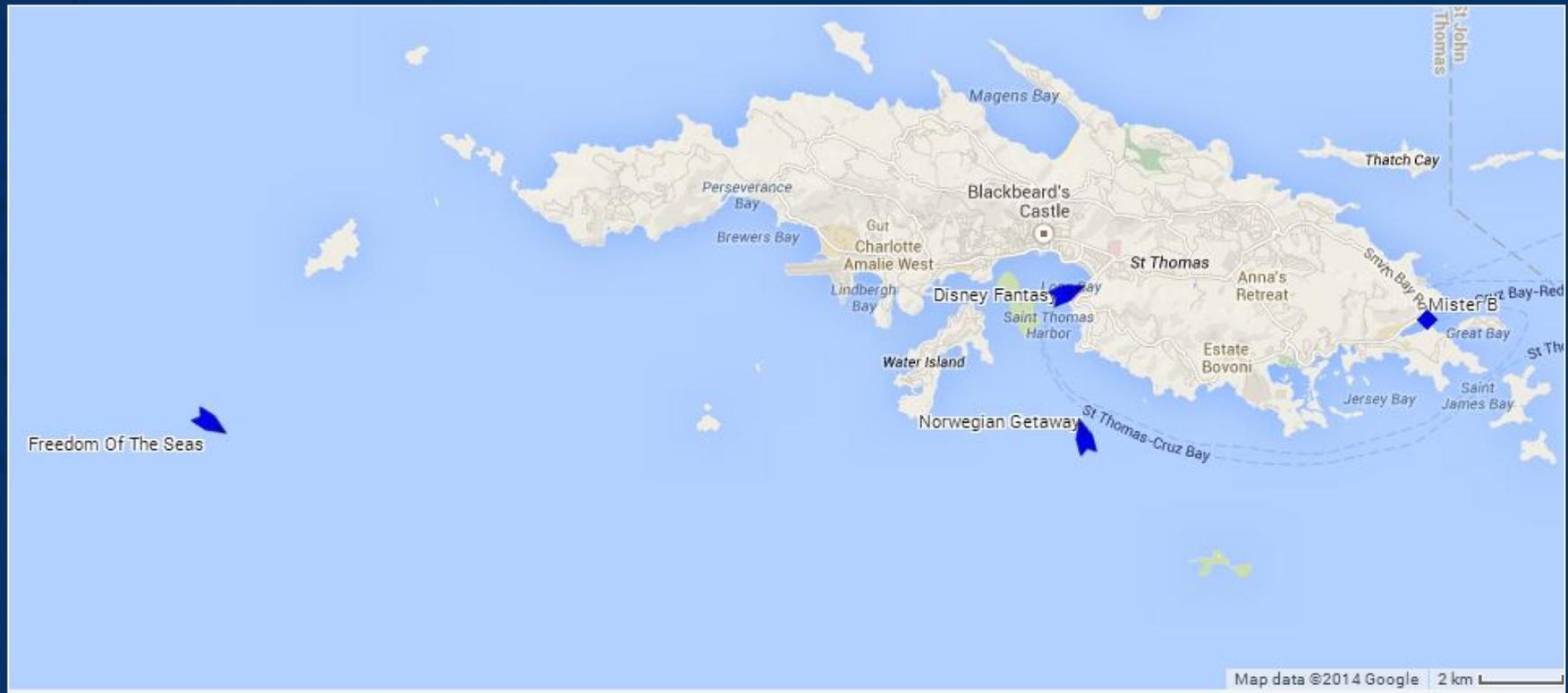
- Development of a Cruise Ships Database
  - Name/company
  - Size of vessel (length, beam, draught, number of decks)
  - Gross tonnage
  - Speed
  - Number of passengers
  - Number of crew

# IOC Study of Tsunami Threat for Cruise Activity in the Caribbean

- Development of a Ports of Call Database for 80 sites
  - Geolocation
  - Cruise passenger per year
  - Number of cruise berths
  - Number of cruise moorings
  - Distance to 100 meters water depth



# Maritime Traffic Information for Ships with gross tonnage > 300 tons

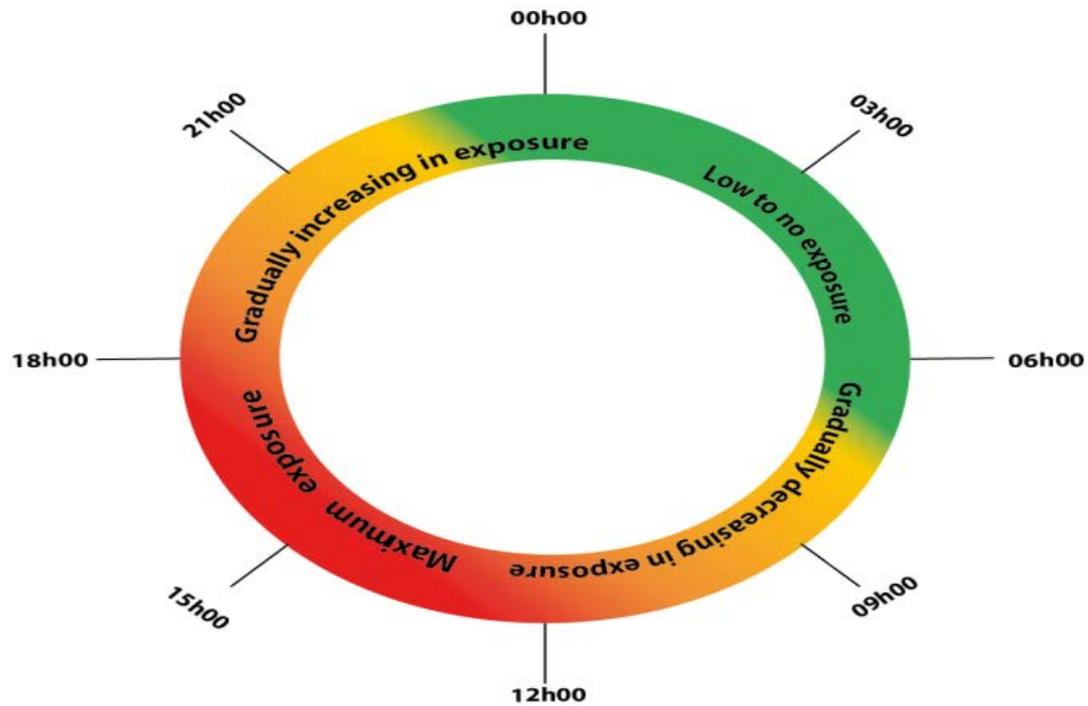


# Event specific risk analysis

## CW 13 MAXIMUM PEOPLE AT RISK



# Tsunami threat as a function of time



# Caribbean Regional Response Team

- **Responsible for preparedness activities including planning, training, and exercising to ensure an effective response to releases of hazardous substances and oil spills**
- **Lead agencies: EPA and USCG**
- **Meets twice a year (Puerto Rico and USVI)**
- **Venue for planning for tsunami response in port environments**

# Additional Comments

- Conversations with Cruise Ship captains
  - Time it takes for a ship to get underway
- Puerto Rico, thru Aurelio Mercado, UPRM, will be conducting tsunami current studies for San Juan harbor
- Easier and more successful to go to Port stakeholders meetings
- Ports Security Conference Dominican Republic, Oct. 21-24, 2014. Would like to have a speaker addressing tsunamis in harbors. Any volunteers?