Exercise CARIBE WAVE 11/ LANTEX11

Participant Handbook

A Caribbean Tsunami Warning Exercise
March 23, 2011

UNESCO IOC Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions

US National Tsunami Hazard Mitigation Program
Warning Coordination Subcommittee

CDEMA
Caribbean Disaster Emergency Management Agency

NOTE: The contents of this handbook are patterned after the Exercise Pacific Wave 08 manual published by the Intergovernmental Oceanographic Commission. Citation: *Exercise Pacific Wave 08. A Pacific-wide Tsunami Warning and Communication Exercise, 28-30 October 2008.* IOC Technical Series No. 82. Paris, UNESCO, 2008, and the LANTEX 9 and 10 handbooks.

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1. Background

This tsunami exercise is being conducted to assist tsunami preparedness efforts throughout the Caribbean region. Recent events, such as the 2004 Indian Ocean, 2009 Samoa, and 2010 Haiti and Chile earthquakes and tsunamis, attest to the importance of proper planning for tsunami response.

Historical tsunami records from sources such as the National Oceanic and Atmospheric Administration's (NOAA) National Geophysical Data Center (NGDC) show that over 75 tsunamis with validity greater than 1 have been observed in the Caribbean over the past 500 years (Figure 1). These represent approximately 7-10% of the world's oceanic tsunamis. Earthquake, landslide, and volcanic tsunami sources have all impacted the region. Since 1842 at least 3,510 people have lost their lives to tsunamis in the Caribbean. In recent years, there has been an explosive population growth and influx of tourists along the Caribbean coasts increasing the tsunami vulnerability of the region. In addition to the tsunamis, the region also has a long history of destructive earthquakes. Historical records show that major earthquakes have struck the Caribbean region many times during the past 500 years.

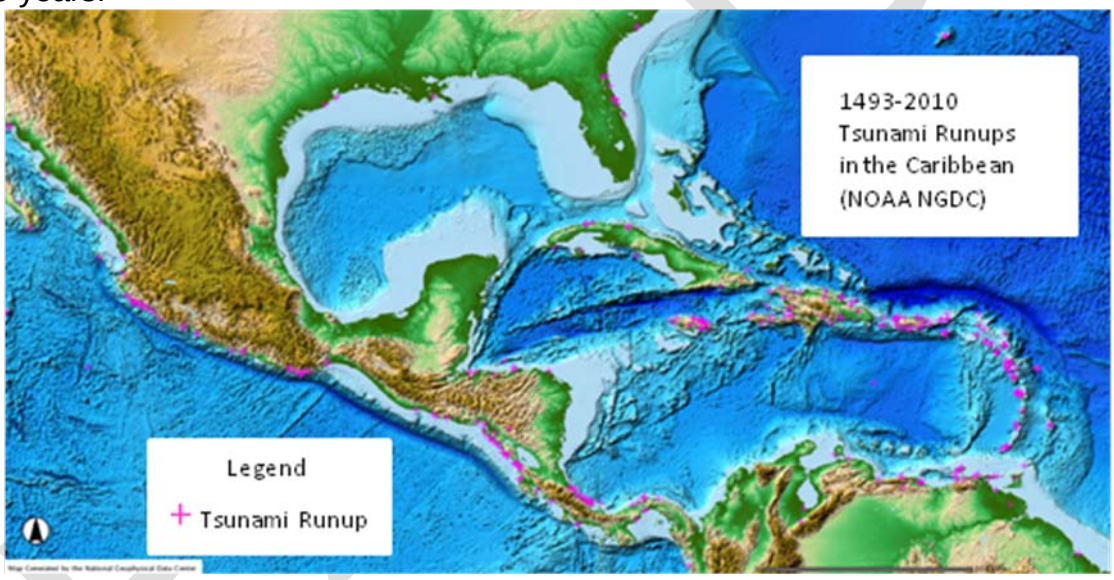

Figure 1. Map of tsunami runups in the Caribbean 1493-2010 (National Geophysical Data Center, http://www.ngdc.noaa.gov/hazards/tsu.shtml)

Within the region there are multiple fault segments and submarine features that could be the source of earthquake and landslide generated tsunamis (Figure 2). The perimeter of the Caribbean plate is bordered by no fewer than four major plates (North America, South America, Nazca, and Cocos). Subduction occurs along the eastern and northeastern Atlantic margins of the Caribbean plate. Normal, transform and strike slip faulting characterize northern South America, eastern Central America, the Cayman Ridge and Trench and the northern plate boundary (Tarr et al, 2007).

In the northeastern Caribbean, the Puerto Rico Trench, roughly parallel to and about 75 miles off the northern coast of Puerto Rico, is about 900 kilometers (560 miles) long and 100 kilometers (60 miles) wide (Figure 3). At 8,350 meters (27,362 feet)

below the sea surface, the trench is deepest point in the Atlantic Ocean. The Hispaniola Trench parallels the north coast of the Dominican Republic and Haiti, and is 550 kilometers (344 miles) long and only 4,500 meters (14,764 feet) deep. The Virgin Islands and Anegada troughs cut across the Antilles arc between the northern Virgin Islands and St. Croix and the Lesser Antilles. Tsunamis could be generated along these different structures, but the direction and size of the waves would depend on many factors, including where the earthquake occurred. In 1867, a M 7.3 earthquake occurred within the basin that generated a tsunami with wave heights near 7.6 meters in St. Croix, U.S.V.I; 10 m in Deshaies, Guadeloupe; and was observed across the Northeastern and Eastern Caribbean (Reid and Taber, 1920; Watlington, 1997). This event will be used as the basis for this exercise.

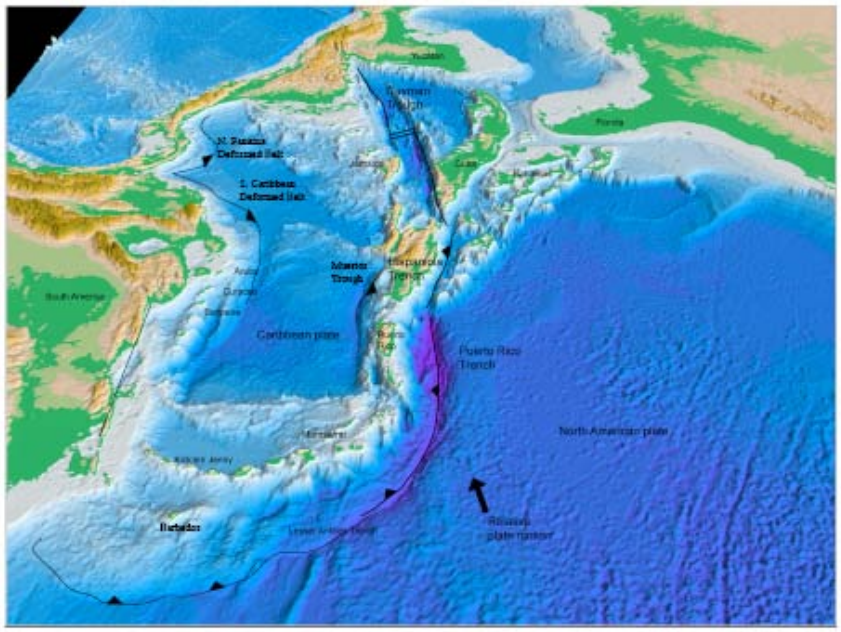

Figure 2. Tectonic features in the Caribbean (ten Brink et al., 2008).

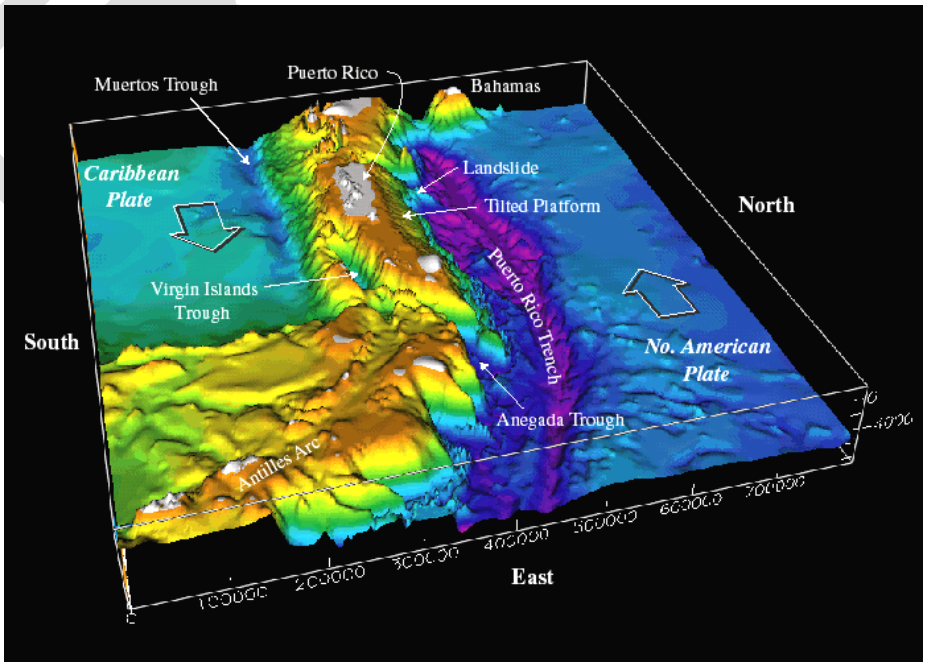

Figure 3 Tectonic features in the northeastern Caribbean (ten Brink et al., 2008).

Tsunami warning services for the Caribbean are currently provided by the West Coast/Alaska Tsunami Warning Center (WCATWC) in Palmer, Alaska for Puerto Rico and the Virgin Islands, while the Pacific Tsunami Warning Center (PTWC) in Ewa Beach, Hawaii is providing services for the non-US Caribbean. These Centers issue tsunami products to the region approximately two to ten minutes after an earthquake's occurrence. The WCATWC products include warnings, advisories, watches, and information statements, while the PTWC products include tsunami information and watch messages. Primary recipients of Tsunami Warning Center (TWC) messages include national tsunami warning focal points, Weather Forecast Offices (WFO), state/territory warning points/emergency operation centers, national Coast Guards, and military contacts. These agencies disseminate the messages to people potentially impacted by a tsunami. The Puerto Rico Seismic Network (PRSN) of the University of Puerto Rico at Mayagüez, Instituto Nicaraguense de Estudios Territoriales (*INETER*) in Nicaragua, La Fundación Venezolana de Investigaciones Sismológicas (FUNVISIS) in Venezuela, and other national and regional institutions also provide earthquake and tsunami information for their areas of responsibilities.

The United National Educational, Scientific, and Cultural Organization's (UNESCO) Intergovernmental Coordination Group for Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS), the Caribbean Emergency Management Agency (CDEMA), the Centro de Coordinación para la Prevención de los Desastres Naturales en América Central (CEPREDENAC), NOAA, and the U.S. National Tsunami Hazard Mitigation Program (NTHMP) are providing the framework for this exercise as a means for emergency responders throughout the Caribbean to test and update 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.

This exercise will provide simulated tsunami warning, watch, and advisory messages from the TWCs based on a hypothetical magnitude 7.6 earthquake located near the U.S. Virgin Islands at 18.2^{o}N, 65.3^{o}W. Exercises like this will help ensure that Caribbean coasts are ready to respond in the event of a dangerous tsunami. Similar recent exercises in the Pacific and Atlantic Basins have proven effective in strengthening preparedness levels of emergency management organizations.

2. Exercise Concept

2.1 Purpose

The purpose of the exercise is to improve Tsunami Warning System effectiveness along the Caribbean coasts. The exercise provides an opportunity for emergency management organizations throughout the Caribbean 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 Caribbean emergency management organization (EMO) is encouraged to participate.

2.2 Objectives

Each organization can develop their objectives for the exercise depending on their level of involvement in the scenario. The following are the exercise's overarching objectives.

- Ensure message transmission from the TWCs to Tsunami Warning Focal Points (TWFP) and from these primary contacts to the EMOs.
- Test tsunami response plans for Caribbean EMOs that have developed plans, and provide a catalyst for countries and EMOs that have not developed plans.
- EMOs, Tsunami Warning Focal Points (TFWP) and Tsunami National Contacts review, discuss, and evaluate the various communication alternatives for receiving and disseminating tsunami messages.
- EMOs, Tsunami Warning Focal Points and Tsunami National Contacts review, discuss, and evaluate potential response actions and challenges.
- Identify processes to issue local all-clear notices.

2.3 Type of Exercise

The exercise should be carried out such that communications and decision making at various organizational levels are exercised and conducted without disrupting or alarming the general public. Individual localities, however, may at their discretion elect to extend the exercise down to the level of testing local notification systems such as the Emergency Alert System (EAS), sirens or loudspeakers.

Exercises stimulate the development, training, testing, and evaluation of Disaster Plans and Standard Operating Procedures. Exercise participants may use their own past multi-hazard drills (e.g. flood, hurricane, tsunami, earthquake, etc.) as a framework to conduct CARIBE WAVE 11/LANTEX 11.

Exercises can be conducted at various scales of magnitude and sophistication. The following are examples of types of exercises conducted by EMOs:

1. **Orientation Exercise (Seminar):** An Orientation Exercise lays the groundwork for a comprehensive exercise program. It is a planned event, developed to bring together individuals and officials with a role or interest in multi-hazard response planning, problem solving, development of standard operational procedures (SOPs), and resource integration and coordination. An Orientation Exercise will have a specific goal and written objectives and result in an agreed upon Plan of Action.

2. **Drill:** The Drill is a planned activity that tests, develops, and/or maintains skills in a single or limited emergency response procedure. Drills generally involve operational response of single departments or agencies. Drills can involve internal notifications and/or field activities.

3. **Tabletop Exercise:** The Tabletop Exercise is a planned activity in which local officials, key staff, and organizations with disaster management responsibilities

are presented with simulated emergency situations. It is usually informal, in a conference room environment, and is designed to elicit constructive discussion from the participants. Participants will examine and attempt to resolve problems, based on plans and procedures, if they exist. Individuals are encouraged to discuss decisions in depth with emphasis on slow-paced problem solving, rather than rapid, real time decision-making. A Tabletop Exercise should have specific goals, objectives, and a scenario narrative (see Appendix A for a Sample Tabletop Exercise Outline).

4. **Functional Exercise:** A Functional Exercise is a planned activity designed to test and evaluate organizational capacities. It is also utilized to evaluate the capability of a community's emergency management system by testing the Emergency Operations Plan (EOP). It is based on a simulation of a realistic emergency situation that includes a description of the situation (narrative) with communications between players and simulators. The Functional Exercise gives the players (decision-makers) a fully simulated experience of being in a major disaster event. It should take place at the appropriate coordination location (i.e. emergency operations center, emergency command center, command post, master control center, etc.) and activate all the appropriate members designated by the plan. Both internal and external agencies (government, private sector, and volunteer agencies) should be involved. It requires players, controllers, simulators, and evaluators. Message traffic will be simulated and inserted by the control team for player response/actions, under real time constraints. It may or may not include public evacuations. A Functional Exercise should have specific goals, objectives, and a scenario narrative.

5. **Full-scale Exercise:** A Full-scale Exercise is the culmination of a progressive exercise program that has grown with the capacity of the community to conduct exercises. A Full-Scale exercise is a planned activity in a "challenging" environment that encompasses a majority of the emergency management functions. This type of exercise involves the actual mobilization and deployment of the appropriate personnel and resources needed to demonstrate operational capabilities. EOCs and other command centers are required to be activated. A Full-scale Exercise is the largest, costliest, and most complex exercise type. It may or may not include public evacuations.

Example Time Frames for Different Exercise Types

Style	Planning Period	Duration	Comments
Orientation Exercise	2 wks	1 day	Individual or mixed groups
Drill	2 days	1 day	Individual technical groups generally
Tabletop Exercise	2 weeks	1-3 days	Single or multiple agency
Functional Exercise	1-2 months	1-5 days	Multiple Agency participation

Full-scale Exercise	2-6 months	1 day/ week	Multiple Agency participation

3. Exercise Outline

3.1 General

The tsunami source is based roughly on observations of the 1867 Virgin Islands earthquake and tsunami. Background information on the 1867 event was obtained from: "Disaster and Disruption in 1867: Hurricane, Earthquake, and Tsunami in the Danish West Indies" (Watlington and Lincoln, 1997), "Caribbean Tsunamis" (O'Laughlin & Lander, 2003), the USC tsunami website (see below), "The 1867 Virgin Island Tsunami" (Zahibo, 2003), the USGS report for the Nuclear Regulatory Commission: "Evaluation of Tsunami Sources with the Potential to Impact the U.S. Atlantic and Gulf of Mexico Coasts" (ten Brink et al., 2008), and Tsunami Simulations of the 1867 Virgin Island Earthquake: Constraints on Epicenter Location and Fault Parameters (Barkan and ten Brink, 2010). The tsunami inundation maps for Puerto Rico included Virgin Islands/Anegada trough scenarios based on "Mode of Faulting in the Local Zone of Puerto Rico (LZPR) by Huérfano Moreno (2003). A brief summary of the 1867 event can be found at the University of Southern California's (USC) Tsunami Research Group's website at http://www.usc.edu/dept/tsunamis/caribbean/webpages/1867viindex.html. The approximate historic epicenter (based on USC information) is shown in the figure 4 below.

Tsunami models were computed using WCATWC's Alaska Tsunami Forecast Model (ATFM) and PTWC's Rapid Inundation and Forecasting of Tsunamis (RIFT) model to generate expected impacts throughout the region. The models indicated a significant tsunami in the eastern Caribbean with little impact outside the Caribbean. Based on the models, the exercise was limited to the Caribbean region, and does not include other TWC areas-of-responsibility in the Atlantic or Gulf of Mexico. The tsunami models are based on the 1867 event as a double quake source in the Virgin Islands Trough with approximately 60 km between epicenters and 5 minutes between origin times. The earthquake source parameters are:
Souce1:
time = 1300 UTC, Mw 7.6, epicenter at {18.21N, 65.26W}, strike = 71^{o}, dip, 8^{o}, slip 90^{o}.
Souce2:
time = 1305 UTC, Mw 7.6, epicenter at {18.36N, 64.73W}, strike = 71^{o}, dip, 8^{o}, slip 90^{o}.

Sea floor displacement formulae were used to generate the two initial uplifts, and the ATFM computed tsunami propagation from those sources to produce forecast amplitudes along the U.S. Atlantic and Gulf of Mexico coasts, and throughout the Caribbean. Appendix B provides model results.

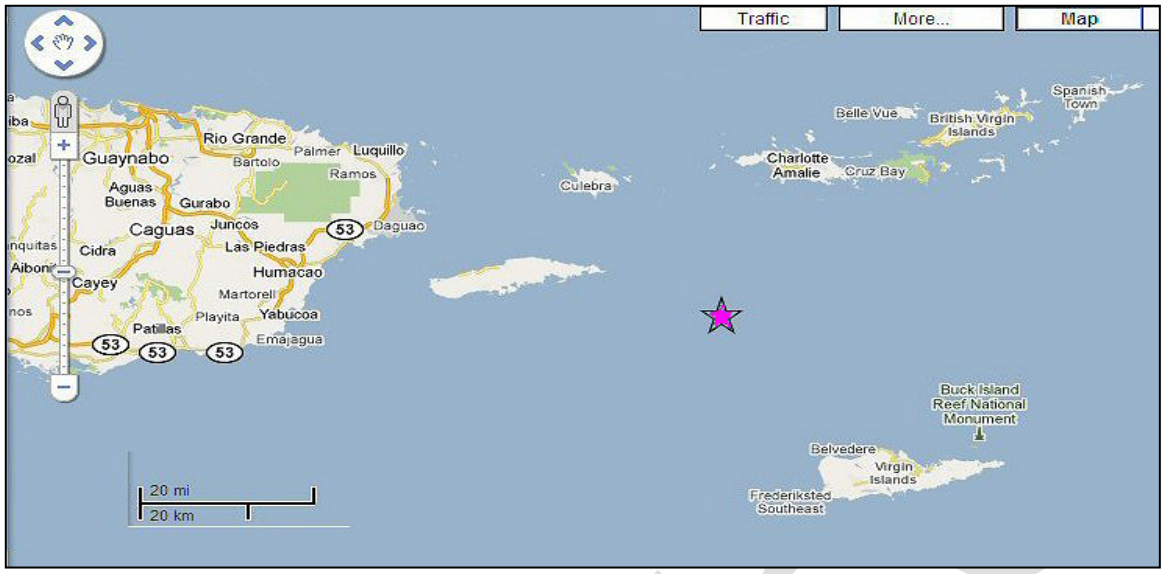

Figure 4. Approximate location of November 18, 1867 earthquake and tsunami.

Initially, a tsunami warning is issued by WCATWC which includes Puerto Rico and the Virgin Islands, while PTWC issues a Regional Tsunami Watch. The U.S. east coast and the Gulf of Mexico is included in the WCATWC message as information only since the tsunami threat there is minimal. Definitions of the products that will be issued by the TWCs during this exercise are provided below (Note that PTWC products differ from WCATWC products due to requirements set forth by the ICG/CARIBE-EWS):

West Coast Alaska Tsunami Warning Center:

Tsunami Warning - A tsunami warning is issued when a potential tsunami with significant widespread inundation is imminent or expected. Warnings alert the public that widespread, dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after arrival of the initial wave. Warnings also alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas, and the repositioning of ships to deep waters when there is time to safely do so. Warnings may be updated, adjusted geographically, downgraded, or canceled. To provide the earliest possible alert, initial warnings are normally based only on seismic information.

Tsunami Advisory - A tsunami advisory is issued due to the threat of a potential tsunami which may produce strong currents or waves dangerous to those in or near the water. Coastal regions historically prone to damage due to strong currents induced by tsunamis are at the greatest risk. The threat may continue for several hours after the arrival of the initial wave, but significant widespread inundation is not expected for areas under an advisory. Appropriate actions to be taken by local officials may include closing beaches, evacuating harbors and marinas, and the repositioning of ships to deep waters when there is time to safely do so. Advisories are normally updated to continue the advisory, expand/contract affected areas, upgrade to a warning, or cancel the advisory.

Pacific Tsunami Warning Center:

Tsunami Watch – Watches are issued by the TWCs based on seismic information without confirmation that a destructive tsunami is underway. It is issued as a means of providing an advance alert to areas that could be impacted by destructive tsunami waves. Watches are updated at least hourly to continue them, expand their coverage, upgrade them to a Warning, or end the alert. A Watch for a particular area may be included in the text of the message that disseminates a Warning for another area.

Tsunami Information Bulletin (TIB) – A text product is issued to inform that an earthquake has occurred and to advise regarding its potential to generate a tsunami. In most cases, a Tsunami Information Bulletin indicates there is no threat of a destructive tsunami, and are used to prevent unnecessary evacuations as the earthquake may have been felt in coastal areas. A Tsunami Information Bulletin may, in appropriate situations, caution about the possibility of a destructive local tsunami. A supplemental Tsunami Information Bulletin may be issued if important additional information is received such as a sea level reading showing a tsunami signal. A Tsunami Information Bulletin may also be upgraded to a watch, advisory, or warning if appropriate.

The TWCs will not issue live messages over broadcast dissemination channels other than to issue an initial dummy message to start the exercise at 1302 UTC on March 23, 2011. However, messages from the TWCs will be emailed and faxed to specific recipients who have requested live dissemination throughout the event. The content of the dummy message is given in Appendix C. The dummy message will indicate that exercise participants should refer to the first message provided in this handbook. From then on, participants should follow the schedule in Table 1 to look at new messages if they are not receiving them via email or fax. Table 1 is the timeline for when messages would be issued by the TWCs if this were a real event, and can be used by EMOs to drive the exercise timing. The warning messages (as shown in Appendix D) cover a 5-hour period, though in an actual event they would likely continue longer. World Meteorological Organization (WMO) and Advanced Weather Interactive Processing System (AWIPS) headers used in the dummy message are listed in Table 2.

During real events, the WCATWC issues two official products each time a message is issued. The first, and the ones provided in Appendix D, are known as the standard message. This message is a segmented message which includes encoded NWS zones, Valid Time Event Codes (VTEC), and their level of threat in the lower section of the message. The segmentation is used for automated processing systems which parse NWS products. The standard product also lists expected arrival times. The second product is known as the public message. This message has no segmentation and is written in a non-tabular, easier-to-read format. The products contain the same basic information. EMOs generally use the standard product for warning response as it has more complete information. WCATWC also issues additional graphical and web-based products to its web site. Examples of these are shown in Appendix E.

Participants may elect to exercise using their own timelines in order to achieve their particular objectives. For example, a particular EMO's Exercise Controller may

choose to feed the TWC bulletins into the exercise at times of their own choosing, or alternatively put them in envelopes with the time they must be opened written on each, with each key participant agency having their own set of envelopes. The messages, provided in Appendix D, will facilitate this approach. For this exercise, in addition to the first dummy message, the WCATWC and the PTWC will email and fax the messages to the participants who have requested this service.

EMOs are welcome to modify estimated arrival times and/or wave amplitudes to suit their exercise – for example, to have the tsunami arrive sooner and with larger amplitude. Other exercise injects, such as tsunami damage reports, are also encouraged.

3.2 Master Schedule (Exercise Script)

Table 1: Scenario Timeline
Tsunami generated by a magnitude 7.6 earthquake with epicenter at 18.2ºN, 65.3ºW occurring on March 23, 2011 at 1300 UTC and a second nearby earthquake which occurs 5 minutes later. The initial warning is being disseminated at 1302 UTC.

Date (UTC)	Time (UTC)	WCATWC Message				PTWC Message			
		#	Type	Dummy	Email	#	Type	Dummy	Email
03/23/2011	1300		------Earthquake Occurs------						
03/23/2011	1302	01	Warn	Yes	Yes	01	Watch	Yes	Yes
03/23/2011	1332	02	Warn	No	Yes				
03/23/2011	1401	03	Warn	No	Yes	02	Watch	No	Yes
03/23/2011	1431	04	Warn	No	Yes				
03/23/2011	1500	05	Warn	No	Yes	03	Watch	No	Yes
03/23/2011	1530	06	Warn	No	Yes				
03/23/2011	1601	07	Adv	No	Yes	04	Watch	No	Yes
03/23/2011	1630	08	Adv	No	Yes				
03/23/2011	1701	09	Can	No	Yes	05	Watch	No	Yes
03/23/2011	1802					06	Can	No	Yes

The initial dummy message will be disseminated over all standard TWC broadcast channels as listed in Table 2. This is being issued to test communications with EMOs and Tsunami Warning Focal Points, and to start the exercise. All messages will be disseminated over a special email list to provide the messages in real time to organizations requesting this service. To request this service, please contact Christa von Hillebrandt (address listed in 3.4) with your organization name and email address.

TWC Message Types:

Warn	Tsunami Warning
Advisory	Tsunami Advisory
Watch	Tsunami Watch
Can	Cancellation

Dummy:

Yes	Dummy Issued
No	Dummy Not Issued

Email:

Yes Message disseminated via special email list
No Message not disseminated via special email list

Table 2: Product Types
Product Types Issued for Dummy Message with Transmission Methods

Center	WMO ID	AWIPS ID	NWWS	GTS	EMWIN	Fax	Email
WCATWC	WEXX20 PAAQ	TSUAT1	Yes	Yes	Yes	Yes	Yes
PTWC	WECA41 PHEB	TSUCAX	Yes	Yes	Yes	Yes	Yes

NWWS NOAA Weather Wire Service
GTS Global Telecommunications System
EMWIN Emergency Manager's Weather Information Network

3.3 Actions in Case of a Real Event

In the case of a real event occurring during the exercise, the TWCs will issue their normal messages for the event. Such messages will be given full priority and a decision will be made by the TWCs whether to issue the dummy message and to send email messages to selected recipients. Smaller earthquakes that only trigger a Tsunami Information Statement will not disrupt the exercise. All documentation and correspondence relating to this exercise is to be clearly identified as "**CARIBE WAVE 11/LANTEX 11"** and "**Exercise**."

3.4 Procedure for False Alarm

Any time disaster response exercises are conducted, the potential exists for the public or media to interpret the event as real. Procedures should be set up by all participating entities to address public or media concerns involving this exercise in case of mis-interpretation by media or the public.

3.5 Resources

Although EMOs will have advance notice of the exercise and may elect to stand up a special dedicated shift to allow normal core business to continue uninterrupted, it is requested that realistic resource levels be deployed in order to reflect some of the issues that are likely to be faced in a real event.

Questions on the exercise can be addressed to:

Person	Telephone #	Email
Lorna Inniss, Chair	246-228-5950	linniss@coastal.gov.bb
Francisco Garces, Vice Chair	58-212-2575153	fgarces@funvisis.gob.ve
Frederique Martini, Vice Chair	Frederique.MARTINI@developpement-durable.gouv.fr	
Christa von Hillebrandt, Vice Chair; NWS CTWP Manager	787-833-8433	christa.vonh@noaa.gov

Emilio Talavera, Chair WG1	505-22492761	emilio.talavera@gf.ineter.gob.ni
Aurelio Mercado, Chair WG2	787-265-5461	aurelio.mercado@upr.edu
Rafael Mojica, Chair WG3	787-253-4586	rafael.mojica@noaa.gov
Dimas Alonso, Chair WG4	504-2290606 x401	alonzoaguadesastres@yahoo.com
Bernardo Aliaga, Technical Secretary	33-1-45683980	b.aliaga@unesco.org
Jeremy Collymore, Ex. Director CDEMA	246-425-0386	Jeremy.Collymore@cdema.org
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Ivan Morales, CEPREDENAC	502-2362-1981-83	imorales@sica.int
Melinda Bailey, NWS Southern Region	817-978-1100x107	melinda.bailey@noaa.gov
Wilfredo Ramos, PREMA Rep.	787-724-0124	wramos@aemead.gobierno.pr
Jacqueline Heyliger VITEMA Rep.	340-773-2244	jjheyliger@yahoo.com
Paul Whitmore WCATWC Director	907-745-4212	paul.whitmore@noaa.gov
Bill Knight WCATWC TWSO	907-745-4212	william.knight@noaa.gov
James Waddell WCATWC Rep.	907-745-4212	james.waddell@noaa.gov
Charles McCreery PTWC Director	808-689-8207	charles.mccreery@noaa.gov
Stuart Weinstein PTWC TWSO	808-689-8207	stuart.weinstein@noaa.gov
Gerard Fryer PTWC Rep.	808-689-8207	gerard.fryer@noaa.gov
Victor Huerfano PRSN Director	787-833-8433	victor@prsn.uprm.edu

3.6 Media Arrangements

One advantage in conducting exercises is that it provides a venue to promote awareness of the exercise topic. Many residents along the Caribbean coasts may not realize that a tsunami warning system exists for their region, let alone the proper response. Communities may wish to invite their local media to the exercise to promote local awareness of the tsunami hazard. Appendix F contains a sample press release which can be adapted as necessary.

NOAA will issue a press release several days before the exercise describing the exercise and its purpose.

4 Post-Exercise Evaluation

All participating agencies are requested to provide brief feedback on the exercise. This feedback will assist the ICG/CARIBE-EWS, NTHMP, and NOAA in the evaluation of CARIBE WAVE 11/LANTEX 11 and the development of subsequent exercises, and help response agencies document lessons learned.

Please provide feedback by April 11, 2011 at the NTHMP internet web site: http://nthmp.tsunami.gov/exercise2011.php.

5 References

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Appendix A. Example Table Top Exercise

Tabletop Exercise Development Steps

Source: California Office of Emergency Services

A Tabletop Exercise is a planned activity in which local officials, key staff, and organizations with disaster management responsibilities are presented with simulated emergency situations. It is usually informal and slow paced, in a conference room environment, and is designed to elicit constructive discussion from the participants to assess plans, policies, and procedures. Participants will examine and attempt to resolve problems, based on plans and procedures, if they exist. Individuals are encouraged to discuss decisions in depth based on their organization's Standard Operating Procedures (SOPs), with emphasis on slow-paced problem solving, rather than rapid, real time decision-making. An Exercise Controller (moderator) introduces a simulated tsunami scenario to participants via written message, simulated telephone or radio call, or by other means. Exercise problems and activities (injects) are further introduced. Participants conduct group discussions where resolution is generally agreed upon and then summarized by a group leader. A Tabletop Exercise should have specific goals, objectives, and a scenario narrative.

The following provides a Tabletop Exercise structure with sample text and example.

1. Vulnerability Analysis: Problem Statement

An example for a hurricane might be:
Due to the recent Hurricane incidents that the Southeast region of the United States, an awareness of the threat risk involved in these disasters has become more apparent, therefore the need for evacuation system is vital. The state of Louisiana continues its ongoing tasks of planning, preparing, and training for Hurricane preparedness.

2. Purpose (Mission): Intent, what you plan to accomplish (Policy Statement)

An example for a hurricane might be:
The State of Louisiana has realized and recognizes the need for a more efficient and effective evacuation system, and is responding with this Comprehensive Exercise Plan. These events will include seminars, workshops, a tabletop exercise, functional and full-scale exercises within an 18-month time frame, under the State Homeland Security grant program.

3. Scope: Exercise Activities
Agencies Involved
Hazard Type
Geographic Impact Area

An example might be:
Emergency Services coordinators at local levels of government will identify representative jurisdictions from each of the six mutual aid regions located throughout the State to participate as host jurisdictions in a series of disaster preparedness exercises. These host jurisdictions will develop a progressive series of exercises each type building upon the previous type of exercise. The process will begin with a vulnerability analysis for each jurisdiction and continue through a progression of exercise activities including: orientation seminars, workshops, and tabletop and functional exercises. The eventual objective of these activities will be to reduce disaster impacts to their populations and city infrastructure. All events will be evaluated utilizing US Homeland Security Exercise Evaluation Program (HSEEP) after action reporting (AAR)

standards. Steps for corrective actions will be made a part of the after action process and report. Surrounding jurisdictions in the mutual aid area will act as exercise design team members, exercise evaluators, or exercise observers for the purpose of information transfer to increase their operational readiness. Jurisdictions will participate on a rotational basis every two years to provide the opportunity for multiple jurisdiction participation.

4. Goals and Objectives:

Criteria for good objectives: Think SMART

- Simple (concise)
- Measurable
- Achievable (can this be done during the exercise?)
- Realistic (and challenging)
- Task Oriented (oriented to functions)

An example might be:

Comprehensive Exercise Program (CEP) Objectives

- *To improve operational readiness*
- *To improve multi-agency coordination and response capabilities for effective disaster response*
- *To identify communication pathways and problem areas pre-event between local jurisdictions and operational area, regional and state emergency operations centers*
- *To establish uniform methods for resource ordering, tracking, and supply for agencies involved at all levels of government.*

5. Narrative:

The Narrative should describe the following:

- Triggering emergency/disaster event
- Describe the environment at the time the exercise begins
- Provide necessary background information
- Prepare participants for the exercise
- Discovery, report: how do you find out?
- Advance notice?
- Time, location, extent or level of damage

6. Evaluation:

The Evaluation should describe the following:

- Objectives Based
- Train Evaluation Teams
- Develop Evaluation Forms

7. After Action Report (AAR): The AAR should be compiled using the evaluation reports

8. Improvement Plan (IP): The IP should reduce vulnerabilities.

Appendix B. Scenario Description

The tsunami source is based roughly on observations of the 1867 Virgin Islands earthquake and tsunami. Background information on the 1867 event was obtained from: "Disaster and Disruption in 1867: Hurricane, Earthquake, and Tsunami in the Danish West Indies" (Watlington and Lincoln, 1997), "Caribbean Tsunamis" (O'Laughlin & Lander, 2003), the USC tsunami website (see below), "The 1867 Virgin Island Tsunami" (Zahibo, 2003), the USGS report for the Nuclear Regulatory Commission: "Evaluation of Tsunami Sources with the Potential to Impact the U.S. Atlantic and Gulf of Mexico Coasts" (ten Brink et al, 2008) and Tsunami Simulations of the 1867 Virgin Island Earthquake: Constraints on Epicenter Location and Fault Parameters (Barkan and ten Brink, 2010).

A brief summary of the 1867 event can be found at the University of Southern California's (USC) Tsunami Research Group's website at http://www.usc.edu/dept/tsunamis/caribbean/webpages/1867viindex.html.

Tsunami models were computed using WCATWC's Alaska Tsunami Forecast Model (ATFM) and PTWC's RIFT model to generate expected impacts throughout the region. The models indicated a significant tsunami in the eastern Caribbean with little impact outside the Caribbean. Based on the models, the exercise was limited to the Caribbean region, and does not include other TWC areas-of-responsibility in the Atlantic or Gulf of Mexico. The tsunami models are based on the 1867 event as a double quake source in the Virgin Islands Trough with approximately 60 km between epicenters and 5 minutes between origin times. The earthquake source parameters are:

Souce1: time = 1300 UTC, Mw 7.6, epicenter at {18.21N, 65.26W}.
Souce2: time = 1305 UTC, Mw 7.6, epicenter at {18.36N, 64.73W}.
For both events the following parameters were used:

Strike:	71^o
Dip:	8^o
Slip:	90^o
Length:	70km
Width:	35km
Depth:	7km
Moment:	$7.5x10^{27}$ dyne-cm

Sea floor displacement formulae were used to generate the two initial uplifts, and the models computed tsunami propagation from those sources to produce forecast amplitudes along the U.S. Atlantic and Gulf of Mexico coasts, and throughout the Caribbean. Model outputs are shown in the Figures below with forecast coastal amplitudes provided in the Table. The forecast amplitudes are calculated for points offshore. The height of the wave on the shore could be double that of the model outputs due to the long-period nature of tsunamis.

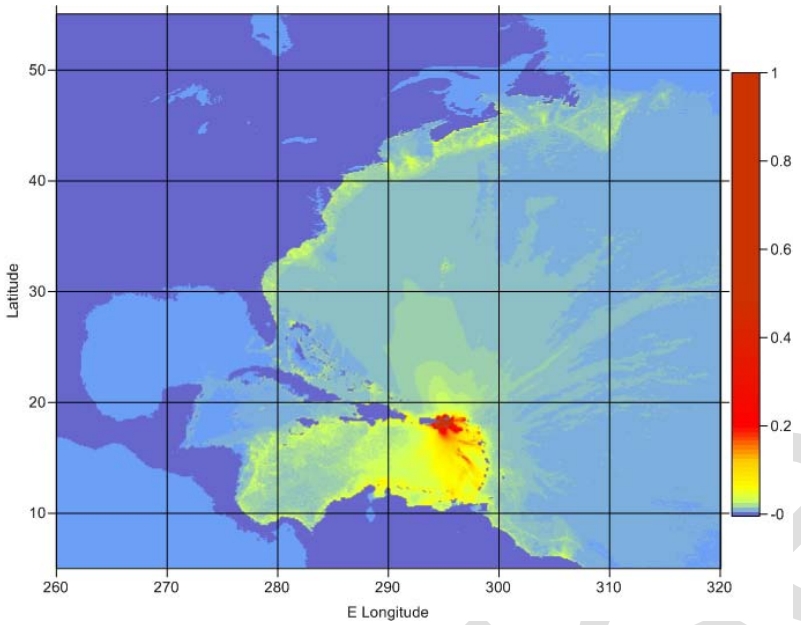

Figure B1. Maximum modeled tsunami amplitude throughout the northern Atlantic (scale in meters - ATFM).

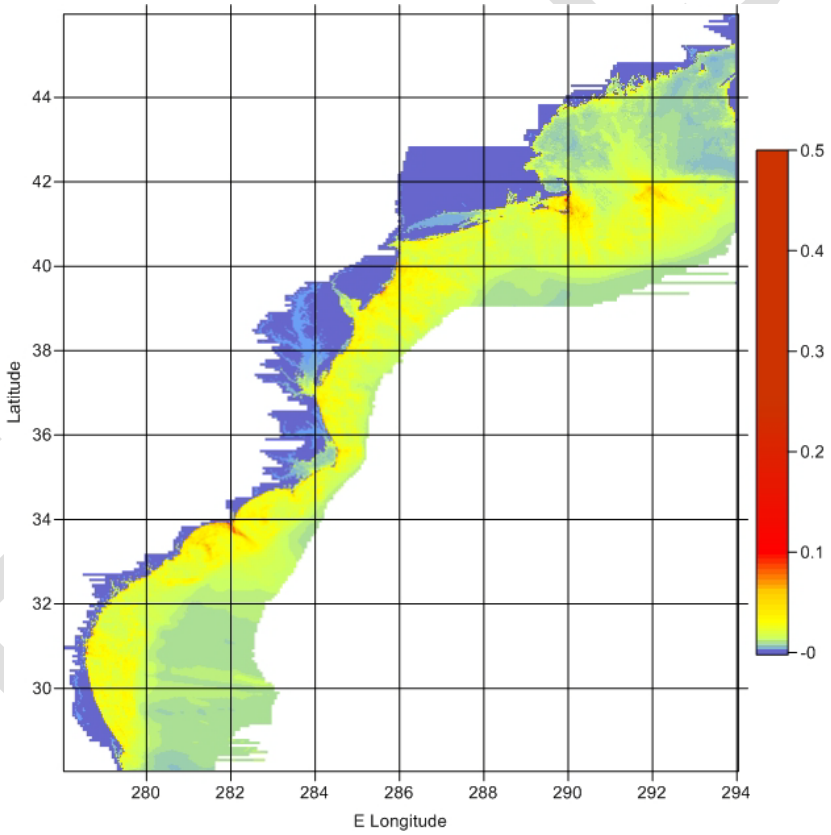

Figure B2. Maximum modeled tsunami amplitude in the finer grids near the U.S. Atlantic coast (scale in meters - ATFM).

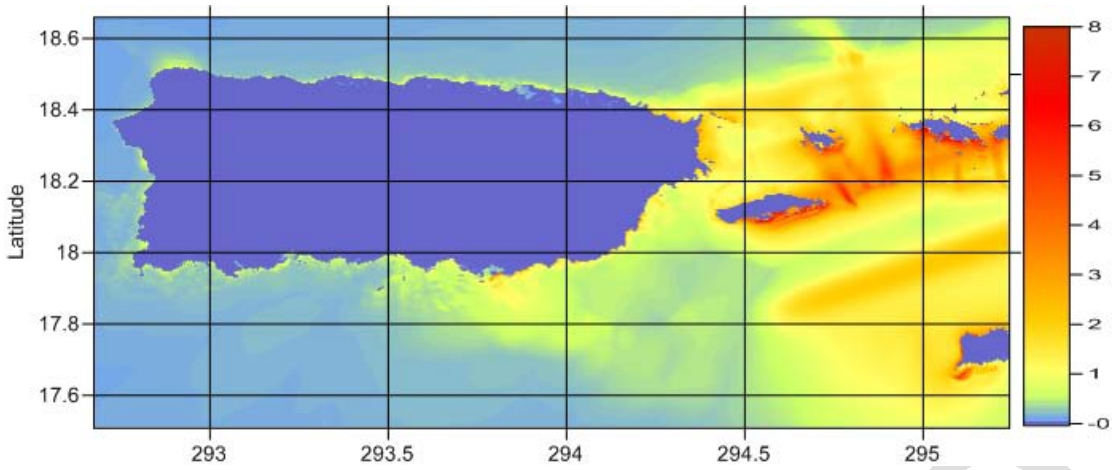

Figure B3. Maximum modeled tsunami amplitude in the finer grids near Puerto Rico and the Virgin Islands (scale in meters - ATFM).

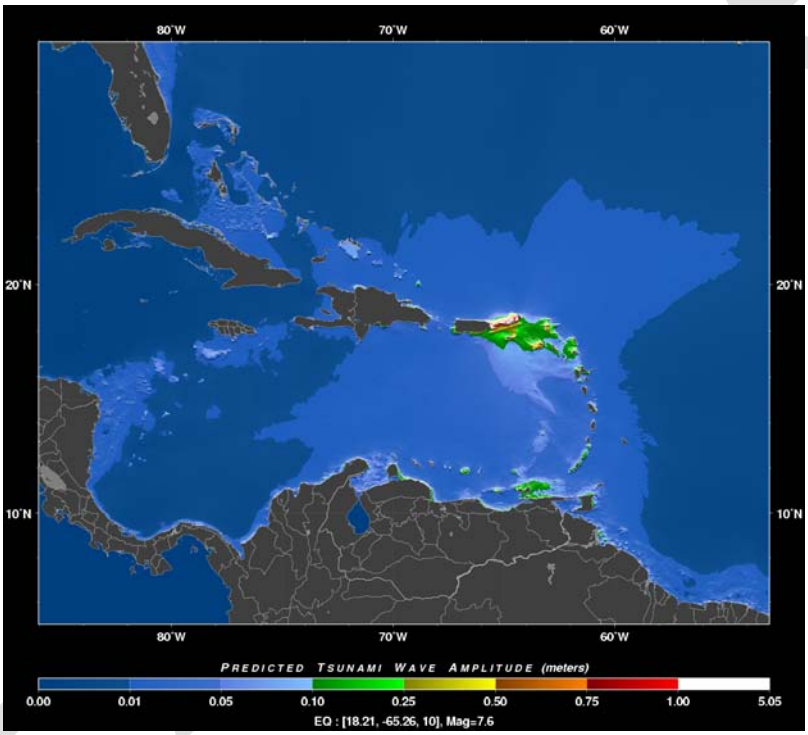

Figure B4. Maximum modeled tsunami amplitude in the Caribbean (scale in meters - RIFT).

Location	Travel time (hr:min)	Max Amp. (meters)	Leading Edge
Charlotte Amalie, VI	0:01	2.7	elevation
Christiansted, VI	0:01	2.5	recession
Fajardo, PR	0:01	0.95	recession
Lameshur Bay, VI	0:02	2.85	recession
Limetree Bay, VI	0:02	4.7	recession
Virgin Gorda, BVI	0:03	1.4	recession
Culebra, PR	0:05	2.0	elevation
St. John, VI	0:07	0.26	elevation
Tortola, BVI	0:07	0.47	elevation
San Juan, PR	0:12	0.59	elevation

Mona Island, PR	0:25	0.26	recession
Magueyes Island, PR	0:28	0.75	recession
D42407	0:32	.025	recession
Aquadilla, PR	0:36	0.50	recession
Saint Kitts	0:44	1.07	recession
Anguilla	0:45	1.23	
Montserrat	0:45	0.18	recession
Mayaguez, PR	0:47	0.50	recession
Basse Terre, Guadaloupe	0:51	0.19	recession
Cabo Engano, DR	0:54	0.12	recession
Barbuda	0:55	0.13	recession
Bonaire	0:55	0.07	recession
Roseau, Dominica	0:55	0.23	recession
Saint Maarten,	1:01	0.25	recession
Santo Domingo	1:02	0.18	
Fort-de-France, Martinique	1:03	0.21	recession
St Johns, Antigua	1:03	0.24	recession
Saint Lucia	1:05	0.11	recession
Saint Vincent	1:14	0.78	recession
Curacao	1:11	0.27	recession
Aruba	1:16	0.13	recession
Grand Turk, Turks and Caicos	1:18	0.05	
St. Georges, Grenada	1:24	0.54	recession
Maiquetia, VE	1:30	0.12	recession
Puerto Plata, DR	1:30	0.04	elevation
La Guaira, VE	1:31	0.15	recession
Bridgetown, Barbados	1:38	0.05	recession
Santa Marta, CO	1:57	0.095	recession
Barranqilla, CO	2:01	0.11	recession
Bermuda	2:05	0.09	repression
Cumana, VE	2:05	0.14	elevation
Cartagena, CO	2:18	0.02	recession
Kingston, JA	2:26	0.08	recession
Porlamar, VE	2:29	0.26	
Myrtle Beach, FL	3:02	0.08	elevation
Gibara, Cuba	3:08	0.02	
Puerto Limon,_CR	3:11	0.04	recession
Riohacha, CO	3:18	0.10	recession
Punta Fijo, VE	3:42	0.085	elevation
Port Au Prince, Haiti	3:57	0.04	recession
Guantanamo Bay, Cuba	3:58	0.035	elevation
Golfo_de_Venezuela, VE	4:20	0.02	recession
Porlamar, VE	4:21	0.04	elevation
Duck, NC	4:26	0.07	recession
Trident Pier, FL	4:29	0.06	elevation
Montego Bay, JA	4:35	~0.01	?
Ocean City, MD	4:54	0.11	recession
Wrightsville, NC	5:05	0.06	elevation
Flagler Beach, FL	5:06	0.075	elevation
Key West, FL		< 0.01	
Georgetown, Guyana	5:12	0.04	
Atlantic City, NJ	5:14	0.19	recession
Sunset Beach, NC	5:24	0.14	recession

Port-O-Spain	5:24	~0.01	recession
Springmaid Pier, SC	5:36	0.06	recession
Oregon Inlet, SC	5:44	0.02	elevation
Charleston, SC	5:48	0.03	elevation
Nantucket Is., MA	6:24	0.085	elevation
Providence, RI	7:03	0.055	elevation

Table B1: Coastal amplitude forecast for event (ATFM and RIFT). The amplitude is the elevation of the tsunami above sea level. The amplitude does not take into account uplift or subsidence of the location due to the earthquake. Also the amplitude is measure offshore, the onshore heights could be double those of the forecast models.

Tsunami Event

Date						Tsunami Cause		Tsunami Source Location				Tsunami Parameters			
Year	Mo	Dy	Hr	Mn	Sec	Val	Code	Country	Name	Latitude	Longitude	Max Water Height	Magnitude Abe	Magnitude Iida	Tsu Int	Warn Status
1867	11	18	18	45		4	1	USA TERRITORY	VIRGIN ISLANDS	18.100	-65.100	10.00		2.30		

Tsunami Runups

Addl Info	Doubtful Runup	Tsunami Runup Location							Tsunami Runup Measurements					Tsunami Runup Location Effects							
		Country	State/ Province/ Prefecture	Name	Latitude	Longitude	Distance from Source	Travel Time Hrs	Travel Time Min	Max Water Height	Max Inundation Distance	Type	Per	1st Mtn	Deaths Num	Deaths De	Injuries Num	Injuries De	Damage $Mill	Damage De	Houses Destroyed Num	Houses Destroyed De	Houses Damaged Num	Houses Damaged De
*		ANTIGUA AND BARBUDA		ANTIGUA: ST. JOHNS	17.193	-62.416	302			2.40		1											
*		ANTIGUA AND BARBUDA		BARBUDA: WEST COAST	17.717	-61.817	350			1.40		1											
*		BRITISH VIRGIN ISLANDS		PETER'S ISLAND	18.367	-64.633	58			1.20		1											
*		BRITISH VIRGIN ISLANDS		TORTOLA ISLAND: ROAD TOWN	18.414	-64.616	62			1.50	9.00	1		F					1		2		
*		DOMINICA		RUPERT'S BAY	15.500	-61.333	494			3.00		1											
*		GRENADA		GOUYAVE (CHARLOTTE TOWN)	12.167	-61.733	752			3.00		1							1				
*		GRENADA		SAINT GEORGE'S	12.015	-61.778	765			1.50		1		F									
*		GUADELOUPE		BASSE TERRE	16.000	-61.717	429			1.00		1											
*		GUADELOUPE		DESHAIES	16.317	-61.783	404			10.00		1		F					2				
*		GUADELOUPE		I'LES DES SAINTES: FOND-DU-CIRE	15.867	-61.617	446			1.00		1							2				
*		GUADELOUPE		POINTE-A-PITRE	16.233	-61.533	432					1											
*		GUADELOUPE		SAINT BARTHELEMY ISLAND	17.900	-62.833	241					1							1				
*		GUADELOUPE		SAINT MARTIN	18.670	-63.067	224					1							1				
*		GUADELOUPE		SAINTE-ROSE	16.333	-61.700	411			10.00		1		F					2				
*		MARTINIQUE		MARTINIQUE	14.667	-61.000	581					1											
*		NETHERLANDS ANTILLES		SABA ISLAND	17.633	-63.233	204					1											
*		SAINT KITTS AND NEVIS		SAINT KITTS: BASSETERRE	17.300	-62.717	268				2.40	1		F									
*		SAINT LUCIA		LAYON, ANSE-LA-RAYE	13.883	-60.967	644			.90		1											
*		SAINT VINCENT AND THE GRENADINES		BEQUIA ISLAND: ADMIRALTY BAY	13.280	-61.250	676			1.80	146.00	1							1		2		
*		SAINT VINCENT AND THE GRENADINES		SAINT VINCENT	13.130	-61.200	693					1											
*		USA TERRITORY	PR	PUERTO RICO: ARROYO	17.983	-66.050	101			.90	40.00	1											
*		USA TERRITORY	PR	PUERTO RICO: BAHIA DE SAN JUAN	18.450	-66.117	114			.90		1		F									
*		USA TERRITORY	PR	PUERTO RICO: PLAYA DE FAJARDO	18.333	-65.633	62					1		F									
*		USA TERRITORY	PR	PUERTO RICO: VIEQUES	18.150	-65.450	37					1		F									
*		USA TERRITORY	PR	PUERTO RICO: YABUCOA	18.033	-65.883	83			1.37		1		F									
*		USA TERRITORY	VI	VIRGIN ISLANDS: ALTONA	18.341	-64.949	31				76.20	1							2		2		
*		USA TERRITORY	VI	VIRGIN ISLANDS: CHARLOTTE AMALIE	18.333	-64.917	32			6.00		1	10	F	12	1			2				
*		USA TERRITORY	VI	VIRGIN ISLANDS: CHISTIANSTED	17.767	-64.733	54				91.00	1		F									
*		USA TERRITORY	VI	VIRGIN ISLANDS: FREDERIKSTED	17.717	-64.883	48	0	12	7.60	76.00	1		F	5	1			1	20	1		
*		USA TERRITORY	VI	VIRGIN ISLANDS: GALLOWS BAY	17.600	-64.700	70					1							1	20	1		
*		USA TERRITORY	VI	VIRGIN ISLANDS: HASSEL ISLAND	18.300	-64.960	27			4.90		1			3	1							
*		USA TERRITORY	VI	VIRGIN ISLANDS: SABA ISLAND	18.341	-64.982	30					1			10	1							
*		USA TERRITORY	VI	VIRGIN ISLANDS: SAINT CROIX	17.750	-64.750	54			7.00		1											

Figure B5. Historical Tsunami Data for the 1867 Event (NGDC)

Appendix C. TWC Dummy Messages

WCATWC

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WEXX20 PAAQ 231302
TSUAT1

TEST...TSUNAMI EXERCISE MESSAGE NUMBER 1...TEST
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
902 AM AST WED MAR 23 2011

...CARIBE WAVE 11/LANTEX 11 TSUNAMI EXERCISE MESSAGE. REFER TO WCATWC MESSAGE 1
IN THE EXERCISE HANDBOOK. THIS IS AN EXERCISE ONLY...

THIS MESSAGE IS BEING USED TO START THE CARIBE WAVE 11/LANTEX 11 CARIBBEAN
TSUNAMI EXERCISE.  THIS WILL BE THE ONLY EXERCISE MESSAGE BROADCAST FROM THE
WEST COAST/ALASKA TSUNAMI WARNING CENTER EXCLUDING SPECIAL EMAIL MESSAGES
DISCUSSED IN THE HANDBOOK.  THE HANDBOOK IS AVAILABLE AT THE WEB SITE
WCATWC.ARH.NOAA.GOV. THE EXERCISE PURPOSE IS TO PROVIDE EMERGENCY MANAGEMENT A
REALISTIC SCENARIO TO TEST TSUNAMI RESPONSE PLANS.

THIS IS ONLY AN EXERCISE.

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PTWC

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WECA41 PHEB 231302
TSUCAX

TEST...TSUNAMI EXERCISE MESSAGE NUMBER 1...TEST
NWS PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1302Z 23 MAR 2011

...CARIBE WAVE 11/LANTEX 11 TSUNAMI EXERCISE MESSAGE. REFER TO PTWC MESSAGE 1 IN
THE EXERCISE HANDBOOK. THIS IS AN EXERCISE ONLY...

THIS MESSAGE IS BEING USED TO START THE CARIBE WAVE 11/LANTEX 11 CARIBBEAN
TSUNAMI EXERCISE.  THIS WILL BE THE ONLY EXERCISE MESSAGE BROADCAST FROM THE
PACIFIC TSUNAMI WARNING CENTER EXCLUDING SPECIAL EMAIL MESSAGES DISCUSSED IN THE
HANDBOOK.  THE HANDBOOK IS AVAILABLE AT THE WEB SITE WCATWC.ARH.NOAA.GOV. THE
EXERCISE PURPOSE IS TO PROVIDE EMERGENCY MANAGEMENT A REALISTIC SCENARIO TO TEST
TSUNAMI RESPONSE PLANS.

THIS IS ONLY AN EXERCISE.

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Appendix D. TWC Exercise Messages

The following messages, created for the CARIBE WAVE 11/LANTEX 11 tsunami exercise, are representative of the official standard products issued by the WCATWC and PTWC during a large magnitude 7.6 earthquake and tsunami originating 25 miles southeast of Fajardo, Puerto Rico and 60 miles southeast of San Juan, Puerto Rico at 18.2°N, 65.3°W. During a real event, the TWCs would also issue graphical and html-based products to their web sites and via RSS.

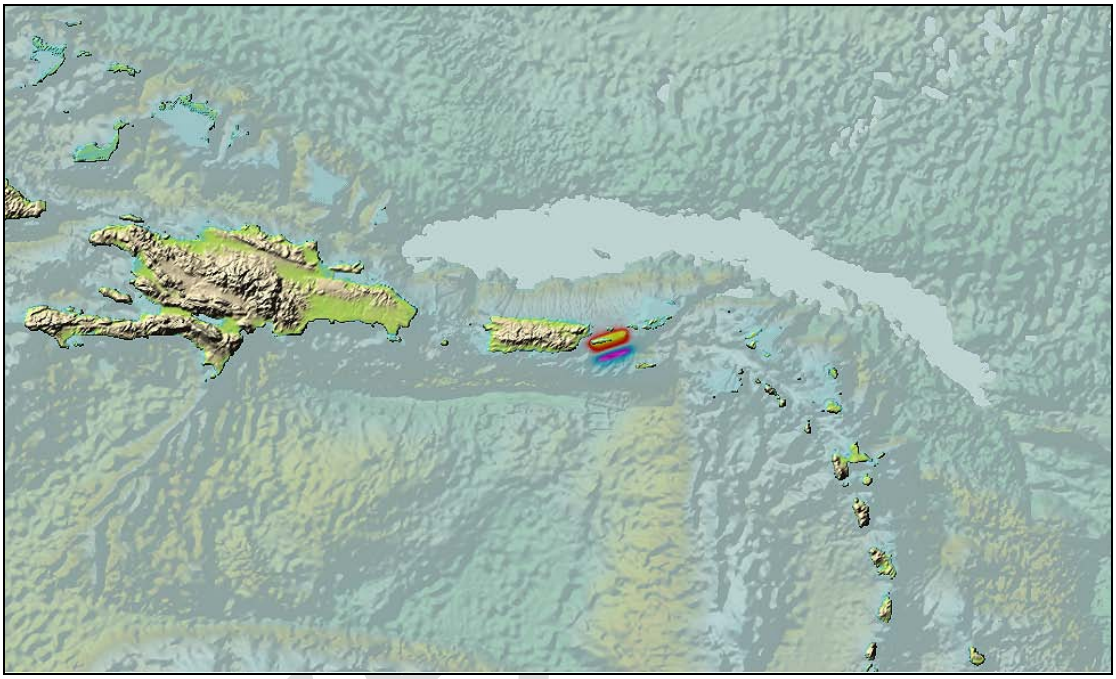

Figure D1: Tsunami source at zero minutes.

WCATWC Message #1

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WEXX20 PAAQ 231302
TSUAT1

BULLETIN
TSUNAMI MESSAGE NUMBER 1
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
902 AM AST WED MAR 23 2011

...A TSUNAMI WARNING IS NOW IN EFFECT FOR PUERTO RICO AND
   THE VIRGIN ISLANDS...

...THIS MESSAGE IS INFORMATION ONLY FOR COASTAL AREAS OF
   TEXAS - LOUISIANA - MISSISSIPPI - ALABAMA - FLORIDA -
   GEORGIA - SOUTH CAROLINA - NORTH CAROLINA - VIRGINIA -
   MARYLAND - DELAWARE - NEW JERSEY - NEW YORK - CONNECTICUT -
   RHODE ISLAND - MASSACHUSETTS - NEW HAMPSHIRE - MAINE - NEW
   BRUNSWICK - NOVA SCOTIA - NEWFOUNDLAND AND LABRADOR FROM
   BROWNSVILLE TEXAS TO CAPE CHIDLEY LABRADOR...

RECOMMENDED ACTIONS
 PERSONS IN LOW-LYING COASTAL AREAS SHOULD BE ALERT TO
 INSTRUCTIONS FROM THEIR LOCAL EMERGENCY OFFICIALS. EVACUATIONS
 ARE ONLY ORDERED BY EMERGENCY RESPONSE AGENCIES.
 - PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND OR TO
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```
   HIGHER GROUND.

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME      - 0900  EDT MAR 23 2011
             0900  AST MAR 23 2011
             0800  CDT MAR 23 2011
             1300  UTC MAR 23 2011
 LOCATION  - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             60 MILES/97 KM SE OF SAN JUAN PUERTO RICO
 DEPTH     - 56 MILES/90 KM

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  WARNINGS INDICATE THAT
WIDESPREAD DANGEROUS COASTAL FLOODING ACCOMPANIED BY POWERFUL
CURRENTS IS POSSIBLE AND MAY CONTINUE FOR SEVERAL HOURS AFTER THE
INITIAL WAVE ARRIVAL.

CARIBBEAN COASTAL REGIONS OUTSIDE PUERTO RICO AND THE VIRGIN
ISLANDS SHOULD REFER TO THE PACIFIC TSUNAMI WARNING CENTER MESSAGES
FOR INFORMATION ON THIS EVENT AT WWW.PRH.NOAA.GOV/PR/PTWC.

THIS MESSAGE IS BASED MAINLY ON EARTHQUAKE DATA. EARTHQUAKES OF
THIS SIZE OFTEN GENERATE DANGEROUS TSUNAMIS. AS MORE INFORMATION
BECOMES AVAILABLE THE WARNING AREAS WILL BE REFINED.

THIS MESSAGE WILL BE UPDATED IN 30 MINUTES OR SOONER IF
THE SITUATION WARRANTS. THE TSUNAMI WARNING WILL REMAIN IN EFFECT
UNTIL FURTHER NOTICE. REFER TO THE INTERNET SITE
WCATWC.ARH.NOAA.GOV FOR MORE INFORMATION.

AMZ712-715-725-735-742-745-PRZ001>003-005-007-008-010-011-
VIZ001-002-231402-
/T.NEW.PAAQ.TS.W.0003.110323T1302Z-000000T0000Z/
COASTAL AREAS OF PUERTO RICO AND THE VIRGIN ISLANDS.
902 AM AST WED MAR 23 2011

...A TSUNAMI WARNING IS NOW IN EFFECT FOR PUERTO RICO AND
   THE VIRGIN ISLANDS...

PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
HIGHER GROUND.

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  TSUNAMIS ARE A SERIES OF
WAVES POTENTIALLY DANGEROUS SEVERAL HOURS AFTER INITIAL ARRIVAL
TIME. ESTIMATED TIMES OF INITIAL WAVE ARRIVAL FOR SELECTED
SITES IN THE WARNING ARE PROVIDED BELOW.

CHRISTIANSTED-VI 0911  AST MAR 23 MAYAGUEZ-PR      0952  AST MAR 23
SAN JUAN-PR      0945  AST MAR 23 CHARLOT AMALI-VI 0955  AST MAR 23
FOR ARRIVAL TIMES AT ADDITIONAL LOCATIONS SEE
WCATWC.ARH.NOAA.GOV

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PTWC Message #1

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WECA41 PHEB 231302
TSUCAX

TSUNAMI MESSAGE NUMBER 1
NWS PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1302Z 23 MAR 2011

THIS MESSAGE IS FOR ALL AREAS OF THE CARIBBEAN EXCEPT
PUERTO RICO AND THE VIRGIN ISLANDS.  THE WEST COAST/
ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR
THESE AREAS.

...A REGIONAL TSUNAMI WATCH IS IN EFFECT...

A TSUNAMI WATCH IS IN EFFECT FOR
SAINT MAARTEN - ANGUILLA - SAINT KITTS -
MONTSERRAT - DOMINICAN REP - GUADELOUPE - DOMINICA - SAINT
```

MARTIN - BARBUDA - MARTINIQUE - SAINT LUCIA - BONAIRE -
CURACAO - TURKS N CAICOS - ST VINCENT - ANTIGUA - GRENADA -
HAITI - ARUBA - VENEZUELA - BAHAMAS - BARBADOS - CUBA -
TRINIDAD TOBAGO - COLOMBIA - JAMAICA AND GUYANA.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY
NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE
DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND
ANY ACTIONS TO BE TAKEN IN RESPONSE

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME   - 1300 UTC MAR 23 2011
 LOCATION - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             55 MILES/89 KM SE OF SAN JUAN PUERTO RICO
 DEPTH   - 56 MILES/90 KM

EVALUATION
 EARTHQUAKES OF THIS SIZE HAVE THE POTENTIAL TO GENERATE A
 DESTRUCTIVE LOCAL TSUNAMI AND SOMETIMES A DESTRUCTIVE REGIONAL
 TSUNAMI ALONG COASTS LOCATED USUALLY NO MORE THAN A THOUSAND
 KILOMETERS FROM THE EARTHQUAKE EPICENTER. AREAS FURTHER FROM THE
 EPICENTER COULD EXPERIENCE NON-DAMAGING SEA LEVEL CHANGES AND
 STRONG OR UNUSUAL COASTAL CURRENTS.

 HOWEVER - IT IS NOT KNOWN THAT A TSUNAMI WAS GENERATED. THIS
 WATCH IS BASED ONLY ON EARTHQUAKE EVALUATION. AUTHORITIES IN
 THE REGION SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS
 POSSIBILITY. THE WATCH WILL NOT EXPAND TO OTHER AREAS UNLESS
 ADDITIONAL DATA ARE RECEIVED TO WARRANT SUCH AN EXPANSION.

 DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT MAY NOT
 BE POSSIBLE FOR THIS CENTER TO RAPIDLY CONFIRM NOR EVALUATE THE
 STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

 ESTIMATED INITIAL TSUNAMI ARRIVAL TIMES. ACTUAL ARRIVAL TIMES
 MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. THE TIME
 BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION		COORDINATES		ARRIVAL TIME
SAINT MAARTEN	SIMPSON BAAI	18.0N	63.1W	1336Z MAR23
SABA	NETH ANTILLES	17.6N	63.2W	1338Z MAR23
ST EUSTATIUS	NETH ANTILLES	17.5N	63.0W	1344Z MAR23
ANGUILLA	THE VALLEY	18.3N	63.1W	1345Z MAR23
SAINT KITTS	BASSETERRE	17.3N	62.7W	1352Z MAR23
MONTSERRAT	PLYMOUTH	16.7N	62.2W	1354Z MAR23
DOMINICAN REP	CABO ENGANO	18.6N	68.3W	1354Z MAR23
GUADELOUPE	BASSE-TERRE	16.0N	61.7W	1401Z MAR23
DOMINICAN REP	SANTO DOMINGO	18.5N	69.9W	1402Z MAR23
DOMINICA	ROSEAU	15.3N	61.4W	1404Z MAR23
SAINT MARTIN	BAIE BLANCHE	18.1N	63.0W	1405Z MAR23
BARBUDA	PALMETTO POINT	17.6N	61.9W	1410Z MAR23
MARTINIQUE	FORT-DE-FRANCE	14.6N	61.1W	1411Z MAR23
SAINT LUCIA	CASTRIES	14.0N	61.0W	1412Z MAR23
DOMINICAN REP	PUERTO PLATA	19.8N	70.7W	1413Z MAR23
BONAIRE	ONIMA	12.3N	68.3W	1414Z MAR23
CURACAO	WILLEMSTAD	12.1N	68.9W	1418Z MAR23
TURKS N CAICOS	GRAND TURK	21.5N	71.1W	1418Z MAR23
ST VINCENT	KINGSTOWN	13.1N	61.2W	1419Z MAR23
ANTIGUA	SAINT JOHNS	17.1N	61.9W	1425Z MAR23
GRENADA	SAINT GEORGES	12.0N	61.8W	1428Z MAR23
HAITI	CAP-HAITEN	19.8N	72.2W	1430Z MAR23
ARUBA	ORANJESTAD	12.5N	70.0W	1433Z MAR23
TURKS N CAICOS	WEST CAICOS	21.7N	72.5W	1434Z MAR23
VENEZUELA	MAIQUETIA	10.6N	67.0W	1436Z MAR23
BAHAMAS	MAYAGUANA	22.3N	73.0W	1437Z MAR23
BARBADOS	BRIDGETOWN	13.1N	59.6W	1439Z MAR23
VENEZUELA	CUMANA	10.5N	64.2W	1442Z MAR23
BAHAMAS	GREAT INAGUA	20.9N	73.7W	1444Z MAR23
CUBA	BARACOA	20.4N	74.5W	1448Z MAR23
HAITI	JEREMIE	18.6N	74.1W	1450Z MAR23
TRINIDAD TOBAGO	PIRATES BAY	11.3N	60.6W	1451Z MAR23
BAHAMAS	SAN SALVADOR	24.1N	74.5W	1452Z MAR23
BAHAMAS	CROOKED IS	22.7N	74.1W	1455Z MAR23
CUBA	SANTIAGO D CUBA	19.9N	75.8W	1458Z MAR23

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COLOMBIA          SANTA MARTA          11.2N  74.2W  1501Z MAR23
COLOMBIA          RIOHACHA             11.6N  72.9W  1501Z MAR23
COLOMBIA          BARRANQUILLA         11.1N  74.9W  1504Z MAR23
BAHAMAS           ELEUTHERA IS         25.2N  76.1W  1507Z MAR23
CUBA              GIBARA               21.1N  76.1W  1508Z MAR23
JAMAICA           MONTEGO BAY          18.5N  77.9W  1516Z MAR23
COLOMBIA          CARTEGENA            10.4N  75.6W  1516Z MAR23
BAHAMAS           NASSAU               25.1N  77.4W  1519Z MAR23
VENEZUELA         PUNTO FIJO           11.7N  70.2W  1521Z MAR23
JAMAICA           KINGSTON             17.9N  76.9W  1525Z MAR23
BAHAMAS           ABACO IS             26.6N  77.1W  1525Z MAR23
HAITI             PORT-AU-PRINCE       18.5N  72.4W  1527Z MAR23
VENEZUELA         PORLAMAR             10.9N  63.8W  1529Z MAR23
TRINIDAD TOBAGO   PORT-OF-SPAIN        10.6N  61.5W  1541Z MAR23
BAHAMAS           FREEPORT             26.5N  78.8W  1542Z MAR23
CUBA              CIENFUEGOS           22.0N  80.5W  1552Z MAR23
VENEZUELA         GOLFO VENEZUELA      11.4N  71.2W  1554Z MAR23
COLOMBIA          PUNTA CARIBANA        8.6N  76.9W  1600Z MAR23
CUBA              SANTA CRZ D SUR      20.7N  78.0W  1703Z MAR23
CUBA              LA HABANA            23.2N  82.4W  1703Z MAR23
CUBA              NUEVA GERONA         21.9N  82.8W  1806Z MAR23
GUYANA            GEORGETOWN            6.8N  58.2W  1812Z MAR23

ADDITIONAL BULLETINS WILL BE ISSUED BY THE PACIFIC TSUNAMI
WARNING CENTER FOR THIS EVENT AS MORE INFORMATION
BECOMES AVAILABLE.
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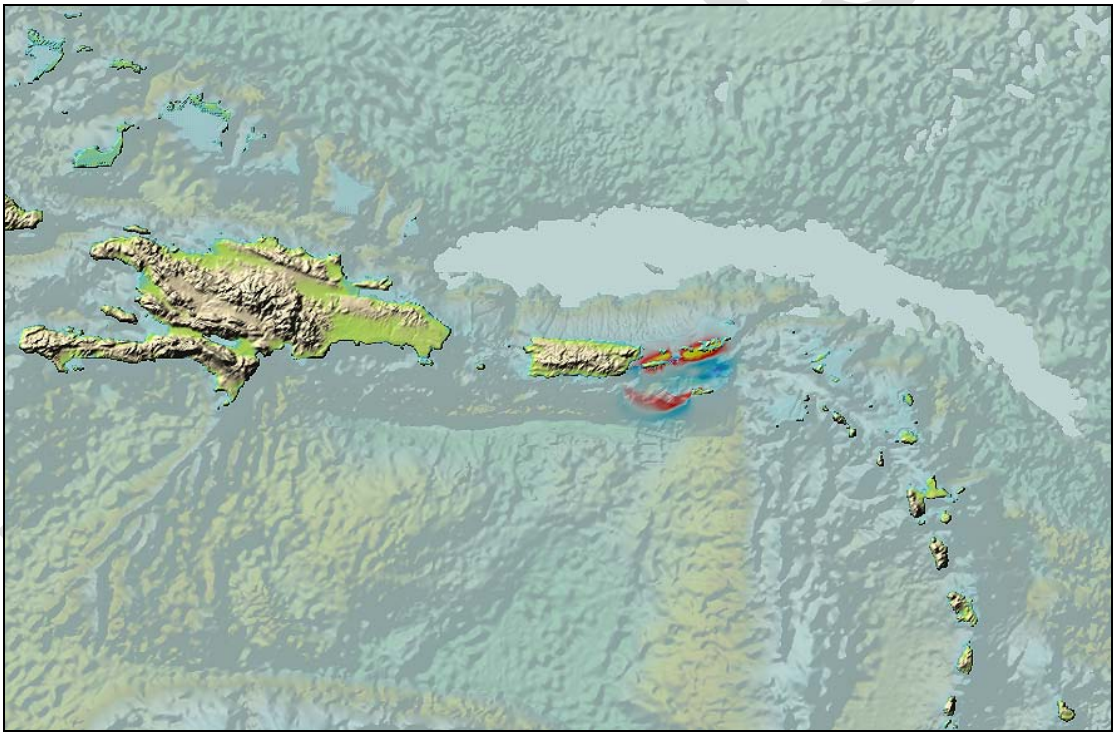

Figure D2: Tsunami at ten minutes.

WCATWC Message #2

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WEXX20 PAAQ 231332
TSUAT1

BULLETIN
TSUNAMI MESSAGE NUMBER 2
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
932 AM AST WED MAR 23 2011

THIS MESSAGE CONTAINS NEW OBSERVATIONS AND INFORMATION ON AN
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AFTERSHOCK.

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR PUERTO RICO
AND THE VIRGIN ISLANDS...

...THIS MESSAGE IS INFORMATION ONLY FOR COASTAL AREAS OF
TEXAS - LOUISIANA - MISSISSIPPI - ALABAMA - FLORIDA -
GEORGIA - SOUTH CAROLINA - NORTH CAROLINA - VIRGINIA -
MARYLAND - DELAWARE - NEW JERSEY - NEW YORK - CONNECTICUT -
RHODE ISLAND - MASSACHUSETTS - NEW HAMPSHIRE - MAINE - NEW
BRUNSWICK - NOVA SCOTIA - NEWFOUNDLAND AND LABRADOR FROM
BROWNSVILLE TEXAS TO CAPE CHIDLEY LABRADOR...

RECOMMENDED ACTIONS
A TSUNAMI HAS BEEN GENERATED WHICH IS EXPECTED TO DAMAGE THE
WARNING REGIONS LISTED IN THE HEADLINE. PERSONS IN LOW-LYING
COASTAL AREAS SHOULD BE ALERT TO INSTRUCTIONS FROM THEIR LOCAL
EMERGENCY OFFICIALS. EVACUATIONS ARE ONLY ORDERED BY EMERGENCY
RESPONSE AGENCIES.
- PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
HIGHER GROUND.

A 7.6 MW AFTERSHOCK WAS RECORDED AT 1305 UTC - 5 MINUTES AFTER THE INITIAL QUAKE.
ITS EPICENTER WAS POSITIONED AT 18.36N 64.73W. FIGURES WITHIN WCATWC MESSAGES
REFLECT THE IMPACT OF BOTH QUAKES ON THE EVENT.

A TSUNAMI HAS BEEN OBSERVED AT THE FOLLOWING SITES

LOCATION	LAT	LON	TIME	AMPL
CHRISTIANSTED VI	17.7N	64.7W	906 AST	8.23 FT/2.51 M
LIMETREE BAY VI	17.6N	64.6W	909 AST	15.41 FT/4.70 M
CHARLOTTE AMALIE VI	18.3N	65.0W	909 AST	8.83 FT/2.69 M
LAMESHUR BAY VI	18.3N	64.7W	918 AST	9.37 FT/2.86 M
CULEBRA PR	18.3N	65.3W	921 AST	6.79 FT/2.07 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

WAVES OF THIS SIZE ARE KNOWN TO CAUSE INUNDATION AND DAMAGE TO
COASTAL STRUCTURES. TSUNAMIS ARE EXPECTED TO CONTINUE AT DANGEROUS
LEVELS FOR AT LEAST TWO HOURS. A 15.0-FOOT/4.6-METER TSUNAMI IN
LIMETREE BAY VI WAS WITNESSED TEARING THE BOARDS FROM A LOCAL
PIER AND PUSHING THREE BOATS ASHORE.

PRELIMINARY EARTHQUAKE PARAMETERS
MAGNITUDE - 7.6
TIME - 0900 EDT MAR 23 2011
0900 AST MAR 23 2011
0800 CDT MAR 23 2011
1300 UTC MAR 23 2011
LOCATION - 18.2 NORTH 65.3 WEST
25 MILES/40 KM SE OF FAJARDO PUERTO RICO
60 MILES/97 KM SE OF SAN JUAN PUERTO RICO
DEPTH - 56 MILES/90 KM

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED. WARNINGS INDICATE THAT
WIDESPREAD DANGEROUS COASTAL FLOODING ACCOMPANIED BY POWERFUL
CURRENTS IS POSSIBLE AND MAY CONTINUE FOR SEVERAL HOURS AFTER THE
INITIAL WAVE ARRIVAL.

CARIBBEAN COASTAL REGIONS OUTSIDE PUERTO RICO AND THE VIRGIN
ISLANDS SHOULD REFER TO THE PACIFIC TSUNAMI WARNING CENTER MESSAGES
FOR INFORMATION ON THIS EVENT AT WWW.PRH.NOAA.GOV/PR/PTWC.

THIS MESSAGE IS BASED ON EARTHQUAKE DATA... OBSERVED TSUNAMI
AMPLITUDES... HISTORICAL INFORMATION AND FORECAST MODELS.

THIS MESSAGE WILL BE UPDATED IN 30 MINUTES OR SOONER IF
THE SITUATION WARRANTS. THE TSUNAMI WARNING WILL REMAIN IN EFFECT
UNTIL FURTHER NOTICE. REFER TO THE INTERNET SITE
WCATWC.ARH.NOAA.GOV FOR MORE INFORMATION.

AMZ712-715-725-735-742-745-PRZ001>003-005-007-008-010-011-
VIZ001-002-231432-

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/T.CON.PAAQ.TS.W.0003.000000T0000Z-000000T0000Z/
COASTAL AREAS OF PUERTO RICO AND THE VIRGIN ISLANDS.
932 AM AST WED MAR 23 2011

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR PUERTO RICO
   AND THE VIRGIN ISLANDS...

PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
HIGHER GROUND.

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  TSUNAMIS ARE A SERIES OF
WAVES POTENTIALLY DANGEROUS SEVERAL HOURS AFTER INITIAL ARRIVAL
TIME. ESTIMATED TIMES OF INITIAL WAVE ARRIVAL FOR SELECTED
SITES IN THE WARNING ARE PROVIDED BELOW.

CHRISTIANSTED-VI 0911  AST MAR 23 MAYAGUEZ-PR      0952  AST MAR 23
SAN JUAN-PR      0945  AST MAR 23 CHARLOT AMALI-VI 0955  AST MAR 23
FOR ARRIVAL TIMES AT ADDITIONAL LOCATIONS SEE
WCATWC.ARH.NOAA.GOV

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WCATWC Message #3

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WEXX20 PAAQ 231401
TSUAT1

BULLETIN
TSUNAMI MESSAGE NUMBER 3
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
1001 AM AST WED MAR 23 2011

THIS MESSAGE CONTAINS MORE OBSERVED TSUNAMI AMPLITUDES AND
DAMAGE INFORMATION.

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR PUERTO RICO
   AND THE VIRGIN ISLANDS...

...THIS MESSAGE IS INFORMATION ONLY FOR COASTAL AREAS OF
   TEXAS - LOUISIANA - MISSISSIPPI - ALABAMA - FLORIDA -
   GEORGIA - SOUTH CAROLINA - NORTH CAROLINA - VIRGINIA -
   MARYLAND - DELAWARE - NEW JERSEY - NEW YORK - CONNECTICUT -
   RHODE ISLAND - MASSACHUSETTS - NEW HAMPSHIRE - MAINE - NEW
   BRUNSWICK - NOVA SCOTIA - NEWFOUNDLAND AND LABRADOR FROM
   BROWNSVILLE TEXAS TO CAPE CHIDLEY LABRADOR...

RECOMMENDED ACTIONS
 A TSUNAMI HAS BEEN GENERATED WHICH IS EXPECTED TO DAMAGE THE
 WARNING REGIONS LISTED IN THE HEADLINE. PERSONS IN LOW-LYING
 COASTAL AREAS SHOULD BE ALERT TO INSTRUCTIONS FROM THEIR LOCAL
 EMERGENCY OFFICIALS. EVACUATIONS ARE ONLY ORDERED BY EMERGENCY
 RESPONSE AGENCIES.
 - PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
   HIGHER GROUND.

A TSUNAMI HAS BEEN OBSERVED AT THE FOLLOWING SITES
LOCATION                   LAT    LON         TIME          AMPL
--------------            ----- ------      ------- ---------------
CHRISTIANSTED VI          17.7N  64.7W       906 AST  8.23 FT/2.51 M
LIMETREE BAY VI           17.6N  64.6W       909 AST 15.41 FT/4.70 M
LAMESHUR BAY VI           18.3N  64.7W       918 AST  9.37 FT/2.86 M
VIRGIN GORDA BVI          18.5N  64.5W       919 AST  4.59 FT/1.40 M
CULEBRA PR                18.3N  65.3W       921 AST  6.79 FT/2.07 M
CHARLOTTE AMALIE VI       18.4N  64.9W       945 AST  8.27 FT/2.52 M
MONA ISLAND PR            18.1N  67.9W       948 AST  0.85 FT/0.26 M
MAGUEYES ISLAND PR        18.2N  67.2W       951 AST  2.48 FT/0.76 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
       IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
       VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).
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INITAL DAMAGE REPORTS NOTE FLOODED STREETS IN CHRISTIANSTED VI
AND MANY HOMES TORN FROM THE FOUNDATIONS IN LIMETREE BAY VI.

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME      - 0900  EDT MAR 23 2011
             0900  AST MAR 23 2011
             0800  CDT MAR 23 2011
             1300  UTC MAR 23 2011
 LOCATION  - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             60 MILES/97 KM SE OF SAN JUAN PUERTO RICO
 DEPTH     - 56 MILES/90 KM

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  WARNINGS INDICATE THAT
WIDESPREAD DANGEROUS COASTAL FLOODING ACCOMPANIED BY POWERFUL
CURRENTS IS POSSIBLE AND MAY CONTINUE FOR SEVERAL HOURS AFTER THE
INITIAL WAVE ARRIVAL.

CARIBBEAN COASTAL REGIONS OUTSIDE PUERTO RICO AND THE VIRGIN
ISLANDS SHOULD REFER TO THE PACIFIC TSUNAMI WARNING CENTER MESSAGES
FOR INFORMATION ON THIS EVENT AT WWW.PRH.NOAA.GOV/PR/PTWC.

THIS MESSAGE IS BASED ON EARTHQUAKE DATA... OBSERVED TSUNAMI
AMPLITUDES... HISTORICAL INFORMATION AND FORECAST MODELS.

THIS MESSAGE WILL BE UPDATED IN 30 MINUTES OR SOONER IF
THE SITUATION WARRANTS. THE TSUNAMI WARNING WILL REMAIN IN EFFECT
UNTIL FURTHER NOTICE. REFER TO THE INTERNET SITE
WCATWC.ARH.NOAA.GOV FOR MORE INFORMATION.

AMZ712-715-725-735-742-745-PRZ001>003-005-007-008-010-011-
VIZ001-002-231501-
/T.CON.PAAQ.TS.W.0003.000000T0000Z-000000T0000Z/
COASTAL AREAS OF PUERTO RICO AND THE VIRGIN ISLANDS.
1001 AM AST WED MAR 23 2011

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR PUERTO RICO
   AND THE VIRGIN ISLANDS...

PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
HIGHER GROUND.

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  TSUNAMIS ARE A SERIES OF
WAVES POTENTIALLY DANGEROUS SEVERAL HOURS AFTER INITIAL ARRIVAL
TIME. ESTIMATED TIMES OF INITIAL WAVE ARRIVAL FOR SELECTED
SITES IN THE WARNING ARE PROVIDED BELOW.

CHRISTIANSTED-VI 0911  AST MAR 23 MAYAGUEZ-PR      0952  AST MAR 23
SAN JUAN-PR      0945  AST MAR 23 CHARLOT AMALI-VI 0955  AST MAR 23
FOR ARRIVAL TIMES AT ADDITIONAL LOCATIONS SEE
WCATWC.ARH.NOAA.GOV

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PTWC Message #2

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WECA41 PHEB 231401
TSUCAX

TSUNAMI MESSAGE NUMBER 2
NWS PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1401Z 23 MAR 2011

THIS MESSAGE IS FOR ALL AREAS OF THE CARIBBEAN EXCEPT
PUERTO RICO AND THE VIRGIN ISLANDS.  THE WEST COAST/
ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR
THESE AREAS.

...A REGIONAL TSUNAMI WATCH IS IN EFFECT...

A TSUNAMI WATCH IS IN EFFECT FOR
SAINT MAARTEN - ANGUILLA - SAINT KITTS -
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MONTSERRAT - DOMINICAN REP - GUADELOUPE - DOMINICA - SAINT
MARTIN - BARBUDA - MARTINIQUE - SAINT LUCIA - BONAIRE -
CURACAO - TURKS N CAICOS - ST VINCENT - ANTIGUA - GRENADA -
HAITI - ARUBA - VENEZUELA - BAHAMAS - BARBADOS - CUBA -
TRINIDAD TOBAGO - COLOMBIA - JAMAICA AND GUYANA.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY
NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE
DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND
ANY ACTIONS TO BE TAKEN IN RESPONSE

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME   - 1300 UTC MAR 23 2011
 LOCATION - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             55 MILES/89 KM SE OF SAN JUAN PUERTO RICO
 DEPTH   - 56 MILES/90 KM

MEASUREMENTS OR REPORTS OF TSUNAMI ACTIVITY

LOCATION	LAT	LON	TIME	AMPL
CHRISTIANSTED VI	17.7N	64.7W	1306Z	8.23 FT/2.51 M
LIMETREE BAY VI	17.6N	64.6W	1309Z	15.41 FT/4.70 M
LAMESHUR BAY VI	18.3N	64.7W	1318Z	9.37 FT/2.86 M
VIRGIN GORDA BVI	18.5N	64.5W	1319Z	4.59 FT/1.40 M
CULEBRA PR	18.3N	65.3W	1321Z	6.79 FT/2.07 M
CHARLOTTE AMALIE VI	18.4N	64.9W	1345Z	8.27 FT/2.52 M
MONA ISLAND PR	18.1N	67.9W	1348Z	0.85 FT/0.26 M
MAGUEYES ISLAND PR	18.2N	67.2W	1351Z	2.48 FT/0.76 M
BASSETERRE SAINT KITTS	17.3N	62.7W	1352Z	3.21 FT/1.00 M
PLYMOUTH MONTSERRAT	16.7N	62.2W	1355Z	1.66 FT/0.51 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
       IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
       VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

SEVERE DAMAGE HAS BEEN REPORTED IN CHRISTIANSTED VI WITH NOTED
FLOODING AS FAR INLAND AS ROUTE 70. HOTEL ON THE CAY LOCATED
WITHIN THE HARBOR IS REPORTED AS TOTALLY DESTROYED WITH
SEVERAL PEOPLE REPORTED AS MISSING. WITNESSES NEAR LIMETREE
BAY VI REPORT A 15+ FOOT WAVE INUNDATING THE TANK FARM AT
JERUSALEM AND FIGTREE HILL RESULTING IN LEAKING FUEL. AN OIL
SLICK HAS BEEN NOTED IN THE AREA THAT IS 3-MILES LONG BY 500-FEET
WIDE. TWO TANKS AT THE FARM ARE CURRENTLY ON FIRE AND MANY
EMPLOYEES AT THE FACILITY ARE REPORTED MISSING. THE WAVE IN
THIS AREA IS REPORTED TO HAVE GONE PAST ROUTE 66 AND AS FAR
INLAND AS ROUTE 707. THE HENRY E. ROHLSEN AIRPORT REPORTS
FLOODING ON THE RUNWAY AND IS CURRENTLY NOT OPERATING. COMMUNICATIONS
WITH COUNTRIES IN THE NORTHEASTERN CARIBBEAN IS VERY SPORADIC AND
DAMAGE AND INUNDATION REPORTS ARE NOW JUST COMING IN.

EVALUATION
 SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE
 BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER.

 THE THREAT MAY CONTINUE FOR COASTAL AREAS LOCATED WITHIN ABOUT A
 THOUSAND KILOMETERS OF THE EARTHQUAKE EPICENTER. FOR THOSE AREAS
 WHEN NO MAJOR WAVES HAVE OCCURRED FOR AT LEAST TWO HOURS AFTER
 THE ESTIMATED ARRIVAL TIME OR DAMAGING WAVES HAVE NOT OCCURRED
 FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE
 THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN
 CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL
 CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE
 ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

 DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT IS NOT
 POSSIBLE FOR THIS CENTER TO RAPIDLY NOR ACCURATELY EVALUATE THE
 STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

 ESTIMATED INITIAL TSUNAMI ARRIVAL TIMES. ACTUAL ARRIVAL TIMES
 MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. THE TIME
 BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

 LOCATION   COORDINATES   ARRIVAL TIME

SAINT MAARTEN	SIMPSON BAAI	18.0N	63.1W	1336Z MAR23
SABA	NETH ANTILLES	17.6N	63.2W	1338Z MAR23
ST EUSTATIUS	NETH ANTILLES	17.5N	63.0W	1344Z MAR23
ANGUILLA	THE VALLEY	18.3N	63.1W	1345Z MAR23
SAINT KITTS	BASSETERRE	17.3N	62.7W	1352Z MAR23
MONTSERRAT	PLYMOUTH	16.7N	62.2W	1354Z MAR23
DOMINICAN REP	CABO ENGANO	18.6N	68.3W	1354Z MAR23
GUADELOUPE	BASSE-TERRE	16.0N	61.7W	1401Z MAR23
DOMINICAN REP	SANTO DOMINGO	18.5N	69.9W	1402Z MAR23
DOMINICA	ROSEAU	15.3N	61.4W	1404Z MAR23
SAINT MARTIN	BAIE BLANCHE	18.1N	63.0W	1405Z MAR23
BARBUDA	PALMETTO POINT	17.6N	61.9W	1410Z MAR23
MARTINIQUE	FORT-DE-FRANCE	14.6N	61.1W	1411Z MAR23
SAINT LUCIA	CASTRIES	14.0N	61.0W	1412Z MAR23
DOMINICAN REP	PUERTO PLATA	19.8N	70.7W	1413Z MAR23
BONAIRE	ONIMA	12.3N	68.3W	1414Z MAR23
CURACAO	WILLEMSTAD	12.1N	68.9W	1418Z MAR23
TURKS N CAICOS	GRAND TURK	21.5N	71.1W	1418Z MAR23
ST VINCENT	KINGSTOWN	13.1N	61.2W	1419Z MAR23
ANTIGUA	SAINT JOHNS	17.1N	61.9W	1425Z MAR23
GRENADA	SAINT GEORGES	12.0N	61.8W	1428Z MAR23
HAITI	CAP-HAITEN	19.8N	72.2W	1430Z MAR23
ARUBA	ORANJESTAD	12.5N	70.0W	1433Z MAR23
TURKS N CAICOS	WEST CAICOS	21.7N	72.5W	1434Z MAR23
VENEZUELA	MAIQUETIA	10.6N	67.0W	1436Z MAR23
BAHAMAS	MAYAGUANA	22.3N	73.0W	1437Z MAR23
BARBADOS	BRIDGETOWN	13.1N	59.6W	1439Z MAR23
VENEZUELA	CUMANA	10.5N	64.2W	1442Z MAR23
BAHAMAS	GREAT INAGUA	20.9N	73.7W	1444Z MAR23
CUBA	BARACOA	20.4N	74.5W	1448Z MAR23
HAITI	JEREMIE	18.6N	74.1W	1450Z MAR23
TRINIDAD TOBAGO	PIRATES BAY	11.3N	60.6W	1451Z MAR23
BAHAMAS	SAN SALVADOR	24.1N	74.5W	1452Z MAR23
BAHAMAS	CROOKED IS	22.7N	74.1W	1455Z MAR23
CUBA	SANTIAGO D CUBA	19.9N	75.8W	1458Z MAR23
COLOMBIA	SANTA MARTA	11.2N	74.2W	1501Z MAR23
COLOMBIA	RIOHACHA	11.6N	72.9W	1501Z MAR23
COLOMBIA	BARRANQUILLA	11.1N	74.9W	1504Z MAR23
BAHAMAS	ELEUTHERA IS	25.2N	76.1W	1507Z MAR23
CUBA	GIBARA	21.1N	76.1W	1508Z MAR23
JAMAICA	MONTEGO BAY	18.5N	77.9W	1516Z MAR23
COLOMBIA	CARTEGENA	10.4N	75.6W	1516Z MAR23
BAHAMAS	NASSAU	25.1N	77.4E	1519Z MAR23
VENEZUELA	PUNTO FIJO	11.7N	70.2W	1521Z MAR23
JAMAICA	KINGSTON	17.9N	76.9W	1525Z MAR23
BAHAMAS	ABACO IS	26.6N	77.1W	1525Z MAR23
HAITI	PORT-AU-PRINCE	18.5N	72.4W	1527Z MAR23
VENEZUELA	PORLAMAR	10.9N	63.8W	1529Z MAR23
TRINIDAD TOBAGO	PORT-OF-SPAIN	10.6N	61.5W	1541Z MAR23
BAHAMAS	FREEPORT	26.5N	78.8W	1542Z MAR23
CUBA	CIENFUEGOS	22.0N	80.5W	1552Z MAR23
VENEZUELA	GOLFO VENEZUELA	11.4N	71.2W	1554Z MAR23
COLOMBIA	PUNTA CARIBANA	8.6N	76.9W	1600Z MAR23
CUBA	SANTA CRZ D SUR	20.7N	78.0W	1703Z MAR23
CUBA	LA HABANA	23.2N	82.4W	1703Z MAR23
CUBA	NUEVA GERONA	21.9N	82.8W	1806Z MAR23
GUYANA	GEORGETOWN	6.8N	58.2W	1812Z MAR23

ADDITIONAL BULLETINS WILL BE ISSUED BY THE PACIFIC TSUNAMI
WARNING CENTER FOR THIS EVENT AS MORE INFORMATION
BECOMES AVAILABLE.

WCATWC Message #4

WEXX20 PAAQ 231431
TSUAT1

BULLETIN
TSUNAMI MESSAGE NUMBER 4
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
1031 AM AST WED MAR 23 2011

THIS MESSAGE CONTAINS UPDATED TSUNAMI OBSERVATIONS AND
DAMAGE INFORMATION.

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR PUERTO RICO

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   AND THE VIRGIN ISLANDS...

...THIS MESSAGE IS INFORMATION ONLY FOR COASTAL AREAS OF
   TEXAS - LOUISIANA - MISSISSIPPI - ALABAMA - FLORIDA -
   GEORGIA - SOUTH CAROLINA - NORTH CAROLINA - VIRGINIA -
   MARYLAND - DELAWARE - NEW JERSEY - NEW YORK - CONNECTICUT -
   RHODE ISLAND - MASSACHUSETTS - NEW HAMPSHIRE - MAINE - NEW
   BRUNSWICK - NOVA SCOTIA - NEWFOUNDLAND AND LABRADOR FROM
   BROWNSVILLE TEXAS TO CAPE CHIDLEY LABRADOR...

RECOMMENDED ACTIONS
 A TSUNAMI HAS BEEN GENERATED WHICH IS EXPECTED TO DAMAGE THE
 WARNING REGIONS LISTED IN THE HEADLINE. PERSONS IN LOW-LYING
 COASTAL AREAS SHOULD BE ALERT TO INSTRUCTIONS FROM THEIR LOCAL
 EMERGENCY OFFICIALS. EVACUATIONS ARE ONLY ORDERED BY EMERGENCY
 RESPONSE AGENCIES.
 - PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
   HIGHER GROUND.

A TSUNAMI HAS BEEN OBSERVED AT THE FOLLOWING SITES
LOCATION                   LAT    LON         TIME          AMPL
---------------           -----  ------      -------  ---------------
CHRISTIANSTED VI          17.7N  64.7W       906 AST   8.23 FT/2.51 M
LIMETREE BAY VI           17.6N  64.6W       909 AST  15.41 FT/4.70 M
LAMESHUR BAY VI           18.3N  64.7W       918 AST   9.37 FT/2.86 M
VIRGIN GORDA BVI          18.5N  64.5W       919 AST   4.59 FT/1.40 M
CULEBRA PR                18.3N  65.3W       921 AST   6.79 FT/2.07 M
CHARLOTTE AMALIE VI       18.4N  64.9W       945 AST   8.27 FT/2.52 M
MONA ISLAND PR            18.1N  67.9W       948 AST   0.85 FT/0.26 M
MAGUEYES ISLAND PR        18.2N  67.2W       951 AST   2.48 FT/0.76 M
SAN JUAN PR               18.5N  66.1W      1005 AST  1.94 FT/0.59 M
MAYAGUEZ PR               18.2N  67.1W      1008 AST  0.66 FT/0.20 M
AGUADILLA PR              18.4N  67.1W      1027 AST  4.82 FT/1.47 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
       IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
       VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

A 15.0-FOOT/4.6-METER TSUNAMI IN LIMETREE BAY VI HAS TORN BOARDS
FROM A PIER AND PUSHED THREE BOATS ASHORE. TWO PEOPLE ARE
REPORTED DEAD FROM DROWNING IN CHRISTIANSTED VI AND TWO SEASIDE
HOMES IN LAMESHUR BAY VI HAVE BEEN TORN FROM THE FOUNDATIONS.

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME      - 0900  EDT MAR 23 2011
             0900  AST MAR 23 2011
             0800  CDT MAR 23 2011
             1300  UTC MAR 23 2011
 LOCATION  - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             60 MILES/97 KM SE OF SAN JUAN PUERTO RICO
 DEPTH     - 56 MILES/90 KM

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  WARNINGS INDICATE THAT
WIDESPREAD DANGEROUS COASTAL FLOODING ACCOMPANIED BY POWERFUL
CURRENTS IS POSSIBLE AND MAY CONTINUE FOR SEVERAL HOURS AFTER THE
INITIAL WAVE ARRIVAL.

CARIBBEAN COASTAL REGIONS OUTSIDE PUERTO RICO AND THE VIRGIN
ISLANDS SHOULD REFER TO THE PACIFIC TSUNAMI WARNING CENTER MESSAGES
FOR INFORMATION ON THIS EVENT AT WWW.PRH.NOAA.GOV/PR/PTWC.

THIS MESSAGE IS BASED ON EARTHQUAKE DATA... OBSERVED TSUNAMI
AMPLITUDES... HISTORICAL INFORMATION AND FORECAST MODELS.

THIS MESSAGE WILL BE UPDATED IN 30 MINUTES OR SOONER IF
THE SITUATION WARRANTS. THE TSUNAMI WARNING WILL REMAIN IN EFFECT
UNTIL FURTHER NOTICE. REFER TO THE INTERNET SITE
WCATWC.ARH.NOAA.GOV FOR MORE INFORMATION.

AMZ712-715-725-735-742-745-PRZ001>003-005-007-008-010-011-
VIZ001-002-231531-
/T.CON.PAAQ.TS.W.0003.000000T0000Z-000000T0000Z/
COASTAL AREAS OF PUERTO RICO AND THE VIRGIN ISLANDS.
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1031 AM AST WED MAR 23 2011

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR PUERTO RICO
AND THE VIRGIN ISLANDS...

PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
HIGHER GROUND.

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED. TSUNAMIS ARE A SERIES OF
WAVES POTENTIALLY DANGEROUS SEVERAL HOURS AFTER INITIAL ARRIVAL
TIME. ESTIMATED TIMES OF INITIAL WAVE ARRIVAL FOR SELECTED
SITES IN THE WARNING ARE PROVIDED BELOW.

SAN JUAN-PR 0945 AST MAR 23 CHARLOT AMALI-VI 0955 AST MAR 23
MAYAGUEZ-PR 0952 AST MAR 23
FOR ARRIVAL TIMES AT ADDITIONAL LOCATIONS SEE
WCATWC.ARH.NOAA.GOV

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WCATWC Message #5

WEXX20 PAAQ 231500
TSUAT1

BULLETIN
TSUNAMI MESSAGE NUMBER 5
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
1100 AM AST WED MAR 23 2011

THIS MESSAGE CONTAINS UPDATED TSUNAMI OBSERVATIONS AND
DAMAGE INFORMATION.

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR PUERTO RICO
AND THE VIRGIN ISLANDS...

...THIS MESSAGE IS INFORMATION ONLY FOR COASTAL AREAS OF
TEXAS - LOUISIANA - MISSISSIPPI - ALABAMA - FLORIDA -
GEORGIA - SOUTH CAROLINA - NORTH CAROLINA - VIRGINIA -
MARYLAND - DELAWARE - NEW JERSEY - NEW YORK - CONNECTICUT -
RHODE ISLAND - MASSACHUSETTS - NEW HAMPSHIRE - MAINE - NEW
BRUNSWICK - NOVA SCOTIA - NEWFOUNDLAND AND LABRADOR FROM
BROWNSVILLE TEXAS TO CAPE CHIDLEY LABRADOR...

RECOMMENDED ACTIONS
A TSUNAMI HAS BEEN GENERATED WHICH IS EXPECTED TO DAMAGE THE
WARNING REGIONS LISTED IN THE HEADLINE. PERSONS IN LOW-LYING
COASTAL AREAS SHOULD BE ALERT TO INSTRUCTIONS FROM THEIR LOCAL
EMERGENCY OFFICIALS. EVACUATIONS ARE ONLY ORDERED BY EMERGENCY
RESPONSE AGENCIES.
- PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
HIGHER GROUND.

A TSUNAMI HAS BEEN OBSERVED AT THE FOLLOWING SITES

LOCATION	LAT	LON	TIME	AMPL
CHRISTIANSTED VI	17.7N	64.7W	906 AST	8.23 FT/2.51 M
LIMETREE BAY VI	17.6N	64.6W	909 AST	15.41 FT/4.70 M
LAMESHUR BAY VI	18.3N	64.7W	918 AST	9.37 FT/2.86 M
VIRGIN GORDA BVI	18.5N	64.5W	919 AST	4.59 FT/1.40 M
CULEBRA PR	18.3N	65.3W	921 AST	6.79 FT/2.07 M
CHARLOTTE AMALIE VI	18.4N	64.9W	945 AST	8.27 FT/2.52 M
MONA ISLAND PR	18.1N	67.9W	948 AST	0.85 FT/0.26 M
MAGUEYES ISLAND PR	18.2N	67.2W	951 AST	2.48 FT/0.76 M
SAN JUAN PR	18.5N	66.1W	1005 AST	1.94 FT/0.59 M
MAYAGUEZ PR	18.2N	67.1W	1008 AST	0.66 FT/0.20 M
AGUADILLA PR	18.4N	67.1W	1027 AST	4.82 FT/1.47 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

THREE PIERS AND MULTIPLE BOATS ARE REPORTEDLY DAMAGED IN SAN JUAN
PR. LARGE WAVES CONTINUE TO BE REPORTED IN ALL AFFECTED AREAS

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OF PUERTO RICO... U.S. VIRGIN ISLANDS AND BRITISH VIRGIN ISLANDS.

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME      - 0900  EDT MAR 23 2011
             0900  AST MAR 23 2011
             0800  CDT MAR 23 2011
             1300  UTC MAR 23 2011
 LOCATION  - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             60 MILES/97 KM SE OF SAN JUAN PUERTO RICO
 DEPTH     - 56 MILES/90 KM

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  WARNINGS INDICATE THAT
WIDESPREAD DANGEROUS COASTAL FLOODING ACCOMPANIED BY POWERFUL
CURRENTS IS POSSIBLE AND MAY CONTINUE FOR SEVERAL HOURS AFTER THE
INITIAL WAVE ARRIVAL.

CARIBBEAN COASTAL REGIONS OUTSIDE PUERTO RICO AND THE VIRGIN
ISLANDS SHOULD REFER TO THE PACIFIC TSUNAMI WARNING CENTER MESSAGES
FOR INFORMATION ON THIS EVENT AT WWW.PRH.NOAA.GOV/PR/PTWC.

THIS MESSAGE IS BASED ON EARTHQUAKE DATA... OBSERVED TSUNAMI
AMPLITUDES... HISTORICAL INFORMATION AND FORECAST MODELS.

THIS MESSAGE WILL BE UPDATED IN 30 MINUTES OR SOONER IF
THE SITUATION WARRANTS. THE TSUNAMI WARNING WILL REMAIN IN EFFECT
UNTIL FURTHER NOTICE. REFER TO THE INTERNET SITE
WCATWC.ARH.NOAA.GOV FOR MORE INFORMATION.

AMZ712-715-725-735-742-745-PRZ001>003-005-007-008-010-011-
VIZ001-002-231600-
/T.CON.PAAQ.TS.W.0003.000000T0000Z-000000T0000Z/
COASTAL AREAS OF PUERTO RICO AND THE VIRGIN ISLANDS.
1100 AM AST WED MAR 23 2011

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR PUERTO RICO
   AND THE VIRGIN ISLANDS...

PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
HIGHER GROUND.

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  TSUNAMIS ARE A SERIES OF
WAVES POTENTIALLY DANGEROUS SEVERAL HOURS AFTER INITIAL ARRIVAL
TIME.

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PTWC Message #3

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WECA41 PHEB 231500
TSUCAX

TSUNAMI MESSAGE NUMBER 3
NWS PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1500Z 23 MAR 2011

THIS MESSAGE IS FOR ALL AREAS OF THE CARIBBEAN EXCEPT
PUERTO RICO AND THE VIRGIN ISLANDS.  THE WEST COAST/
ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR
THESE AREAS.

...A REGIONAL TSUNAMI WATCH IS IN EFFECT...

A TSUNAMI WATCH IS IN EFFECT FOR
SAINT MAARTEN - ANGUILLA - SAINT KITTS -
MONTSERRAT - DOMINICAN REP - GUADELOUPE - DOMINICA - SAINT
MARTIN - BARBUDA - MARTINIQUE - SAINT LUCIA - BONAIRE -
CURACAO - TURKS N CAICOS - ST VINCENT - ANTIGUA - GRENADA -
HAITI - ARUBA - VENEZUELA - BAHAMAS - BARBADOS - CUBA -
TRINIDAD TOBAGO - COLOMBIA - JAMAICA AND GUYANA.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY
NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE
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DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND
ANY ACTIONS TO BE TAKEN IN RESPONSE

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME   - 1300 UTC MAR 23 2011
 LOCATION - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             55 MILES/89 KM SE OF SAN JUAN PUERTO RICO
 DEPTH   - 56 MILES/90 KM

MEASUREMENTS OR REPORTS OF TSUNAMI ACTIVITY

LOCATION	LAT	LON	TIME	AMPL
CHRISTIANSTED VI	17.7N	64.7W	1306Z	8.23 FT/2.51 M
LIMETREE BAY VI	17.6N	64.6W	1309Z	15.41 FT/4.70 M
LAMESHUR BAY VI	18.3N	64.7W	1318Z	9.37 FT/2.86 M
VIRGIN GORDA BVI	18.5N	64.5W	1319Z	4.59 FT/1.40 M
CULEBRA PR	18.3N	65.3W	1321Z	6.79 FT/2.07 M
CHARLOTTE AMALIE VI	18.4N	64.9W	1345Z	8.27 FT/2.52 M
MONA ISLAND PR	18.1N	67.9W	1348Z	0.85 FT/0.26 M
MAGUEYES ISLAND PR	18.2N	67.2W	1351Z	2.48 FT/0.76 M
PUNTA CANA DR	18.5N	68.4W	1357Z	2.35 FT/0.72 M
SANTO DOMINGO DR	18.5N	69.9W	1359Z	1.97 FT/0.60 M
PUERTO PLATA DR	19.8N	70.7W	1402Z	1.68 FT/0.51 M
SAN JUAN PR	18.5N	66.1W	1405Z	1.94 FT/0.59 M
MAYAGUEZ PR	18.2N	67.1W	1408Z	0.66 FT/0.20 M
AGUADILLA PR	18.4N	67.1W	1427Z	4.82 FT/1.47 M
BASSETERRE SAINT KITTS	17.3N	62.7W	1425Z	4.41 FT/1.34 M
PLYMOUTH MONTSERRAT	16.7N	62.2W	1440Z	2.11 FT/0.64 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
       IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
       VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

REPORTS NOTE THE OIL SLICK FROM THE JERUSALEM AND FIGTREE
HILL TANK FARM IN USVI TO BE SPREADING. THE TANK FARM HAS
REPORTED 23 EMPLOYEES DEAD AND 8 MISSING. RUNUPS IN SAINT JOHN
ANTIGUA ARE REPORTED TO EXCEED 2 METERS. SEVERAL PEOPLE
ARE REPORTED MISSING THERE. THE WEST COAST OF BARBUDA REPORTS TSUNAMI
RUNUPS NEAR 1.5 METER. A NEAR 3 METER RUNUP IN ROSEAU DOMINCA
IS REPORTED TO HAVE SEVERLY FLOODED SECTIONS OF TOWN. RUNUPS
MEASURING APPROXIMATELY 5 METERS ARE REPORTED IN SECTIONS OF GUADELOUPE
WITH LARGE CURRENT AND FLOODING INDUCED DAMAGE. HARBORS IN MARTINIQUE
HAVE EXPERIENCED STRONG SURGES WHICH HAVE PRODUCED DAMAGE TO MANY
STRUCTURES AND BOATS. MINOR INUNDATION HAS BEEN REPORTED SANTO
DOMINGO AND 23 PEOPLE WHO WERE CURIOUS ABOUT THE RECEDING TIDE
AND WALKED OUT TO SEE THE STRANDED SEALIFE ARE REPORTED DEAD.

EVALUATION
 SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE
 BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER.

 THE THREAT MAY CONTINUE FOR COASTAL AREAS LOCATED WITHIN ABOUT A
 THOUSAND KILOMETERS OF THE EARTHQUAKE EPICENTER. FOR THOSE AREAS
 WHEN NO MAJOR WAVES HAVE OCCURRED FOR AT LEAST TWO HOURS AFTER
 THE ESTIMATED ARRIVAL TIME OR DAMAGING WAVES HAVE NOT OCCURRED
 FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE
 THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN
 CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL
 CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE
 ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

 DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT IS NOT
 POSSIBLE FOR THIS CENTER TO RAPIDLY NOR ACCURATELY EVALUATE THE
 STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

 ESTIMATED INITIAL TSUNAMI ARRIVAL TIMES. ACTUAL ARRIVAL TIMES
 MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. THE TIME
 BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION		COORDINATES	ARRIVAL TIME
DOMINICA	ROSEAU	15.3N 61.4W	1404Z MAR23
SAINT MARTIN	BAIE BLANCHE	18.1N 63.0W	1405Z MAR23
BARBUDA	PALMETTO POINT	17.6N 61.9W	1410Z MAR23

MARTINIQUE	FORT-DE-FRANCE	14.6N	61.1W	1411Z MAR23
SAINT LUCIA	CASTRIES	14.0N	61.0W	1412Z MAR23
DOMINICAN REP	PUERTO PLATA	19.8N	70.7W	1413Z MAR23
BONAIRE	ONIMA	12.3N	68.3W	1414Z MAR23
CURACAO	WILLEMSTAD	12.1N	68.9W	1418Z MAR23
TURKS N CAICOS	GRAND TURK	21.5N	71.1W	1418Z MAR23
ST VINCENT	KINGSTOWN	13.1N	61.2W	1419Z MAR23
ANTIGUA	SAINT JOHNS	17.1N	61.9W	1425Z MAR23
GRENADA	SAINT GEORGES	12.0N	61.8W	1428Z MAR23
HAITI	CAP-HAITEN	19.8N	72.2W	1430Z MAR23
ARUBA	ORANJESTAD	12.5N	70.0W	1433Z MAR23
TURKS N CAICOS	WEST CAICOS	21.7N	72.5W	1434Z MAR23
VENEZUELA	MAIQUETIA	10.6N	67.0W	1436Z MAR23
BAHAMAS	MAYAGUANA	22.3N	73.0W	1437Z MAR23
BARBADOS	BRIDGETOWN	13.1N	59.6W	1439Z MAR23
VENEZUELA	CUMANA	10.5N	64.2W	1442Z MAR23
BAHAMAS	GREAT INAGUA	20.9N	73.7W	1444Z MAR23
CUBA	BARACOA	20.4N	74.5W	1448Z MAR23
HAITI	JEREMIE	18.6N	74.1W	1450Z MAR23
TRINIDAD TOBAGO	PIRATES BAY	11.3N	60.6W	1451Z MAR23
BAHAMAS	SAN SALVADOR	24.1N	74.5W	1452Z MAR23
BAHAMAS	CROOKED IS	22.7N	74.1W	1455Z MAR23
CUBA	SANTIAGO D CUBA	19.9N	75.8W	1458Z MAR23
COLOMBIA	SANTA MARTA	11.2N	74.2W	1501Z MAR23
COLOMBIA	RIOHACHA	11.6N	72.9W	1501Z MAR23
COLOMBIA	BARRANQUILLA	11.1N	74.9W	1504Z MAR23
BAHAMAS	ELEUTHERA IS	25.2N	76.1W	1507Z MAR23
CUBA	GIBARA	21.1N	76.1W	1508Z MAR23
JAMAICA	MONTEGO BAY	18.5N	77.9E	1516Z MAR23
COLOMBIA	CARTEGENA	10.4N	75.6W	1516Z MAR23
BAHAMAS	NASSAU	25.1N	77.4W	1519Z MAR23
VENEZUELA	PUNTO FIJO	11.7N	70.2W	1521Z MAR23
JAMAICA	KINGSTON	17.9N	76.9W	1525Z MAR23
BAHAMAS	ABACO IS	26.6N	77.1W	1525Z MAR23
HAITI	PORT-AU-PRINCE	18.5N	72.4W	1527Z MAR23
VENEZUELA	PORLAMAR	10.9N	63.8W	1529Z MAR23
TRINIDAD TOBAGO	PORT-OF-SPAIN	10.6N	61.5W	1541Z MAR23
BAHAMAS	FREEPORT	26.5N	78.8W	1542Z MAR23
CUBA	CIENFUEGOS	22.0N	80.5W	1552Z MAR23
VENEZUELA	GOLFO VENEZUELA	11.4N	71.2W	1554Z MAR23
COLOMBIA	PUNTA CARIBANA	8.6N	76.9W	1600Z MAR23
CUBA	SANTA CRZ D SUR	20.7N	78.0W	1703Z MAR23
CUBA	LA HABANA	23.2N	82.4W	1703Z MAR23
CUBA	NUEVA GERONA	21.9N	82.8W	1806Z MAR23
GUYANA	GEORGETOWN	6.8N	58.2W	1812Z MAR23

ADDITIONAL BULLETINS WILL BE ISSUED BY THE PACIFIC TSUNAMI
WARNING CENTER FOR THIS EVENT AS MORE INFORMATION
BECOMES AVAILABLE.

WCATWC Message #6

WEXX20 PAAQ 231530
TSUAT1

BULLETIN
TSUNAMI MESSAGE NUMBER 6
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
1130 AM AST WED MAR 23 2011

THIS MESSAGE CONTAINS UPDATED TSUNAMI OBSERVATIONS AND
DAMAGE INFORMATION.

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR PUERTO RICO
   AND THE VIRGIN ISLANDS...

...THIS MESSAGE IS INFORMATION ONLY FOR COASTAL AREAS OF
   TEXAS - LOUISIANA - MISSISSIPPI - ALABAMA - FLORIDA -
   GEORGIA - SOUTH CAROLINA - NORTH CAROLINA - VIRGINIA -
   MARYLAND - DELAWARE - NEW JERSEY - NEW YORK - CONNECTICUT -
   RHODE ISLAND - MASSACHUSETTS - NEW HAMPSHIRE - MAINE - NEW
   BRUNSWICK - NOVA SCOTIA - NEWFOUNDLAND AND LABRADOR FROM
   BROWNSVILLE TEXAS TO CAPE CHIDLEY LABRADOR...

RECOMMENDED ACTIONS
 A TSUNAMI HAS BEEN GENERATED WHICH IS EXPECTED TO DAMAGE THE

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 WARNING REGIONS LISTED IN THE HEADLINE. PERSONS IN LOW-LYING
 COASTAL AREAS SHOULD BE ALERT TO INSTRUCTIONS FROM THEIR LOCAL
 EMERGENCY OFFICIALS. EVACUATIONS ARE ONLY ORDERED BY EMERGENCY
 RESPONSE AGENCIES.
 - PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
   HIGHER GROUND.

A TSUNAMI HAS BEEN OBSERVED AT THE FOLLOWING SITES
LOCATION                    LAT    LON         TIME          AMPL
--------------             ----- ------      ------- ---------------
CHARLOTTE AMALIE VI        18.4N  64.9W       945 AST   8.27 FT/2.52 M
MONA ISLAND PR             18.1N  67.9W       948 AST   0.85 FT/0.26 M
MAGUEYES ISLAND PR         18.2N  67.2W       951 AST   2.48 FT/0.76 M
SAN JUAN PR                18.5N  66.1W       1005 AST  1.94 FT/0.59 M
MAYAGUEZ PR                18.2N  67.1W       1008 AST  0.66 FT/0.20 M
AGUADILLA PR               18.4N  67.1W       1027 AST  4.82 FT/1.47 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
       IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
       VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

A WITNESS REPORTED THAT FOUR PEOPLE WATCHING THE TIDE SUDDENLY
RECEDE ON MAGUEYES ISLAND PR WERE SWEPTED OUT TO SEA WHEN THE SURGE
OF WATER CAME BACK TOWARDS LAND.  THE WITNESS WAS SAFELY WATCHING
THE VICTIMS FROM A NEARBY HILL.

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME      - 0900  EDT MAR 23 2011
             0900  AST MAR 23 2011
             0800  CDT MAR 23 2011
             1300  UTC MAR 23 2011
 LOCATION  - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             60 MILES/97 KM SE OF SAN JUAN PUERTO RICO
 DEPTH     - 56 MILES/90 KM

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  WARNINGS INDICATE THAT
WIDESPREAD DANGEROUS COASTAL FLOODING ACCOMPANIED BY POWERFUL
CURRENTS IS POSSIBLE AND MAY CONTINUE FOR SEVERAL HOURS AFTER THE
INITIAL WAVE ARRIVAL.

CARIBBEAN COASTAL REGIONS OUTSIDE PUERTO RICO AND THE VIRGIN
ISLANDS SHOULD REFER TO THE PACIFIC TSUNAMI WARNING CENTER MESSAGES
FOR INFORMATION ON THIS EVENT AT WWW.PRH.NOAA.GOV/PR/PTWC.

THIS MESSAGE IS BASED ON EARTHQUAKE DATA... OBSERVED TSUNAMI
AMPLITUDES... HISTORICAL INFORMATION AND FORECAST MODELS.

THIS MESSAGE WILL BE UPDATED IN 30 MINUTES OR SOONER IF
THE SITUATION WARRANTS. THE TSUNAMI WARNING WILL REMAIN IN EFFECT
UNTIL FURTHER NOTICE. REFER TO THE INTERNET SITE
WCATWC.ARH.NOAA.GOV FOR MORE INFORMATION.

AMZ712-715-725-735-742-745-PRZ001>003-005-007-008-010-011-
VIZ001-002-231630-
/T.CON.PAAQ.TS.W.0003.000000T0000Z-000000T0000Z/
COASTAL AREAS OF PUERTO RICO AND THE VIRGIN ISLANDS.
1130 AM AST WED MAR 23 2011

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR PUERTO RICO
   AND THE VIRGIN ISLANDS...

PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
HIGHER GROUND.

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  TSUNAMIS ARE A SERIES OF
WAVES POTENTIALLY DANGEROUS SEVERAL HOURS AFTER INITIAL ARRIVAL
TIME.


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WCATWC Message #7

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WEXX20 PAAQ 231601
TSUAT1

BULLETIN
TSUNAMI MESSAGE NUMBER 7
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
1201 PM AST WED MAR 23 2011

THIS MESSAGE DOWNGRADES THE WARNING TO AN ADVISORY FOR
PUERTO RICO AND THE VIRGIN ISLANDS.

... A TSUNAMI ADVISORY IS NOW IN EFFECT FOR PUERTO RICO AND
   THE VIRGIN ISLANDS...

...THIS MESSAGE IS INFORMATION ONLY FOR COASTAL AREAS OF
   TEXAS - LOUISIANA - MISSISSIPPI - ALABAMA - FLORIDA -
   GEORGIA - SOUTH CAROLINA - NORTH CAROLINA - VIRGINIA -
   MARYLAND - DELAWARE - NEW JERSEY - NEW YORK - CONNECTICUT -
   RHODE ISLAND - MASSACHUSETTS - NEW HAMPSHIRE - MAINE - NEW
   BRUNSWICK - NOVA SCOTIA - NEWFOUNDLAND AND LABRADOR FROM
   BROWNSVILLE TEXAS TO CAPE CHIDLEY LABRADOR...

RECOMMENDED ACTIONS
 PERSONS IN LOW-LYING COASTAL AREAS SHOULD BE ALERT TO
 INSTRUCTIONS FROM THEIR LOCAL EMERGENCY OFFICIALS. EVACUATIONS
 ARE ONLY ORDERED BY EMERGENCY RESPONSE AGENCIES.
 - PERSONS IN TSUNAMI ADVISORY AREAS SHOULD MOVE OUT OF THE
   WATER... OFF THE BEACH AND OUT OF HARBORS AND MARINAS.

A TSUNAMI HAS BEEN OBSERVED AT THE FOLLOWING SITES
LOCATION                   LAT    LON         TIME          AMPL
---------------            -----  ------      -------  ---------------
SAN JUAN PR               18.5N  66.1W       1005 AST  1.94 FT/0.59 M
MAYAGUEZ PR               18.2N  67.1W       1008 AST  0.66 FT/0.20 M
AGUADILLA PR              18.4N  67.1W       1027 AST  4.82 FT/1.47 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
       IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
       VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

TSUNAMI HEIGHTS THROUGHOUT PUERTO RICO ARE DECREASING IN SIZE.  150
PEOPLE HAVE REPORTEDLY BEEN KILLED BY THE TSUNAMI IN PUERTO RICO...
U.S. VIRGIN ISLANDS... AND BRITISH VIRGIN ISLANDS.

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE  - 7.6
 TIME       - 0900  EDT MAR 23 2011
              0900  AST MAR 23 2011
              0800  CDT MAR 23 2011
              1300  UTC MAR 23 2011
 LOCATION   - 18.2 NORTH 65.3 WEST
              25 MILES/40 KM SE OF FAJARDO PUERTO RICO
              60 MILES/97 KM SE OF SAN JUAN PUERTO RICO
 DEPTH      - 56 MILES/90 KM

TSUNAMI ADVISORIES MEAN THAT A TSUNAMI CAPABLE OF PRODUCING
STRONG CURRENTS OR WAVES DANGEROUS TO PERSONS IN OR VERY NEAR THE
WATER IS EXPECTED.  SIGNIFICANT WIDESPREAD INUNDATION
IS NOT EXPECTED FOR AREAS UNDER AN ADVISORY.  CURRENTS MAY BE
HAZARDOUS TO SWIMMERS... BOATS... AND COASTAL STRUCTURES AND MAY
CONTINUE FOR SEVERAL HOURS AFTER THE INITIAL WAVE ARRIVAL.

CARIBBEAN COASTAL REGIONS OUTSIDE PUERTO RICO AND THE VIRGIN
ISLANDS SHOULD REFER TO THE PACIFIC TSUNAMI WARNING CENTER MESSAGES
FOR INFORMATION ON THIS EVENT AT WWW.PRH.NOAA.GOV/PR/PTWC.

THIS MESSAGE IS BASED ON EARTHQUAKE DATA... OBSERVED TSUNAMI
AMPLITUDES... HISTORICAL INFORMATION AND FORECAST MODELS.

THIS MESSAGE WILL BE UPDATED IN 30 MINUTES OR SOONER IF
THE SITUATION WARRANTS. THE TSUNAMI ADVISORY WILL REMAIN IN EFFECT
UNTIL FURTHER NOTICE. REFER TO THE INTERNET SITE
WCATWC.ARH.NOAA.GOV FOR MORE INFORMATION.
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AMZ712-715-725-735-742-745-PRZ001>003-005-007-008-010-011-
VIZ001-002-231701-
/T.CAN.PAAQ.TS.W.0003.000000T0000Z-000000T0000Z/
/T.NEW.PAAQ.TS.Y.0003.110323T1601Z-000000T0000Z/
COASTAL AREAS OF PUERTO RICO AND THE VIRGIN ISLANDS.
1201 PM AST WED MAR 23 2011

... A TSUNAMI ADVISORY IS NOW IN EFFECT FOR PUERTO RICO AND
   THE VIRGIN ISLANDS...

PERSONS IN TSUNAMI ADVISORY AREAS SHOULD MOVE OUT OF THE
WATER... OFF THE BEACH AND OUT OF HARBORS AND MARINAS.

TSUNAMI ADVISORIES MEAN THAT A TSUNAMI CAPABLE OF PRODUCING
STRONG CURRENTS OR WAVES DANGEROUS TO PERSONS IN OR VERY NEAR
WATER IS IMMINENT OR EXPECTED. SIGNIFICANT WIDESPREAD INUNDATION
IS NOT EXPECTED FOR AREAS IN AN ADVISORY. TSUNAMIS ARE A SERIES OF
WAVES POTENTIALLY DANGEROUS SEVERAL HOURS AFTER INITIAL ARRIVAL
TIME.

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PTWC Message #4

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WECA41 PHEB 231601
TSUCAX

TSUNAMI MESSAGE NUMBER 4
NWS PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1601Z 23 MAR 2011

THIS MESSAGE IS FOR ALL AREAS OF THE CARIBBEAN EXCEPT
PUERTO RICO AND THE VIRGIN ISLANDS.  THE WEST COAST/
ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR
THESE AREAS.

...A REGIONAL TSUNAMI WATCH IS IN EFFECT...

A TSUNAMI WATCH IS IN EFFECT FOR
SAINT MAARTEN - ANGUILLA - SAINT KITTS -
MONTSERRAT - DOMINICAN REP - GUADELOUPE - DOMINICA - SAINT
MARTIN - BARBUDA - MARTINIQUE - SAINT LUCIA - BONAIRE -
CURACAO - TURKS N CAICOS - ST VINCENT - ANTIGUA - GRENADA -
HAITI - ARUBA - VENEZUELA - BAHAMAS - BARBADOS - CUBA -
TRINIDAD TOBAGO - COLOMBIA - JAMAICA AND GUYANA.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY
NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE
DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND
ANY ACTIONS TO BE TAKEN IN RESPONSE

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME      - 1300  UTC MAR 23 2011
 LOCATION  - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             55 MILES/89 KM SE OF SAN JUAN PUERTO RICO
 DEPTH     - 56 MILES/90 KM

MEASUREMENTS OR REPORTS OF TSUNAMI ACTIVITY
LOCATION                   LAT    LON         TIME          AMPL
---------------           ----- ------      ------- ---------------
SAN JUAN PR               18.5N  66.1W        1405Z   1.94 FT/0.59 M
MAYAGUEZ PR               18.2N  67.1W        1408Z   0.66 FT/0.20 M
AGUADILLA PR              18.4N  67.1W        1427Z   4.82 FT/1.47 M
PUNTA CANA DR             18.5N  68.4W        1357Z    2.35 FT/0.72 M
SANTO DOMINGO DR          18.5N  69.9W        1359Z    1.97 FT/0.60 M
PUERTO PLATA DR           19.8N  70.7W        1402Z    1.68 FT/0.51 M
BASSETERRE SAINT KITTS     17.3N  62.7W        1425Z   4.41 FT/1.34 M
PLYMOUTH MONTSERRAT        16.7N  62.2W        1440Z   2.11 FT/0.64 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
       IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
       VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).
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THE LARGE INUNDATION ALONG THE GUADELOUPE COAST HAS REPORTEDLY KILLED
75 PEOPLE. TSUNAMI RUNUP IN SAINT GEORGE GRENADA IS REPORTED TO BE
NEAR 2 METERS. MINOR FLOODING OF THE WATERFRONT HAS BEEN REPORTED WITH
LARGE AMOUNTS OF DAMAGE TO BOATS AND HARBOR FACILITIES. MUCH OF
THE OIL SLICK NEAR LIMETREE BAY VI IS REPORTED TO BE ON FIRE.
THIS FIRE HAS SPREAD SHOREWARD TO THE VEGETATION AND THE 25-KT
SOUTHEAST WIND CONTINUES TO FAN IT INLAND. CHRISTIANSTED VI
NOW REPORTS 120 DEAD AND AN ESTIMATED $63M USD IN DAMAGE.
SAINT VINCENT REPORTS A WAVE APPROXIMATELY 1 METER IN HEIGHT COMING
INTO THE SHORE. THE SAINT VINCENT NATIONAL CONTACT REPORTS THE
MOORINGS FROM TWO VESSELS BROKE DUE TO TENSION. THREE SAILORS DIED
FROM THE RECOIL OF THE MOORING LINES. EXTENSIVE DAMAGE WAS
REPORTEDLY DONE TO A CRUISE SHIP AT SAINT VINCENT WHEN A GANGWAY
COLLAPSED AFTER THE SHIP WAS SUDDENLY LIFTED BY THE 1 METER WAVE.
THE SHIP'S GANGWAY COLLAPSED CAUSING THREE PASSENGERS TO FALL
INTO THE WATER. ONE OF THE PASSENGERS IS REPORTED DEAD. STRONG
CURRENTS ALONG SHORES OF CURACAO AND ARUBA HAVE BEEN REPORTED TO
CAUSE DAMAGE TO SEVERAL SHIPS.

EVALUATION
SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE
BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER.

THE THREAT MAY CONTINUE FOR COASTAL AREAS LOCATED WITHIN ABOUT A
THOUSAND KILOMETERS OF THE EARTHQUAKE EPICENTER. FOR THOSE AREAS
WHEN NO MAJOR WAVES HAVE OCCURRED FOR AT LEAST TWO HOURS AFTER
THE ESTIMATED ARRIVAL TIME OR DAMAGING WAVES HAVE NOT OCCURRED
FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE
THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN
CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL
CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE
ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT IS NOT
POSSIBLE FOR THIS CENTER TO RAPIDLY NOR ACCURATELY EVALUATE THE
STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

ESTIMATED INITIAL TSUNAMI ARRIVAL TIMES. ACTUAL ARRIVAL TIMES
MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. THE TIME
BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION		COORDINATES		ARRIVAL TIME
COLOMBIA	BARRANQUILLA	11.1N	74.9W	1504Z MAR23
BAHAMAS	ELEUTHERA IS	25.2N	76.1W	1507Z MAR23
CUBA	GIBARA	21.1N	76.1W	1508Z MAR23
JAMAICA	MONTEGO BAY	18.5N	77.9W	1516Z MAR23
COLOMBIA	CARTEGENA	10.4N	75.6W	1516Z MAR23
BAHAMAS	NASSAU	25.1N	77.4W	1519Z MAR23
VENEZUELA	PUNTO FIJO	11.7N	70.2W	1521Z MAR23
JAMAICA	KINGSTON	17.9N	76.9W	1525Z MAR23
BAHAMAS	ABACO IS	26.6N	77.1W	1525Z MAR23
HAITI	PORT-AU-PRINCE	18.5N	72.4W	1527Z MAR23
VENEZUELA	PORLAMAR	10.9N	63.8W	1529Z MAR23
TRINIDAD TOBAGO	PORT-OF-SPAIN	10.6N	61.5W	1541Z MAR23
BAHAMAS	FREEPORT	26.5N	78.8W	1542Z MAR23
CUBA	CIENFUEGOS	22.0N	80.5W	1552Z MAR23
VENEZUELA	GOLFO VENEZUELA	11.4N	71.2W	1554Z MAR23
COLOMBIA	PUNTA CARIBANA	8.6N	76.9W	1600Z MAR23
CUBA	SANTA CRZ D SUR	20.7N	78.0W	1703Z MAR23
CUBA	LA HABANA	23.2N	82.4W	1703Z MAR23
CUBA	NUEVA GERONA	21.9N	82.8W	1806Z MAR23
GUYANA	GEORGETOWN	6.8N	58.2W	1812Z MAR23

ADDITIONAL BULLETINS WILL BE ISSUED BY THE PACIFIC TSUNAMI
WARNING CENTER FOR THIS EVENT AS MORE INFORMATION
BECOMES AVAILABLE.

WCATWC Message #8

WEXX20 PAAQ 231630
TSUAT1

BULLETIN
TSUNAMI MESSAGE NUMBER 8

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NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
1230 PM AST WED MAR 23 2011

THIS MESSAGE CONTAINS NEW INFORMATION ON TSUNAMI OBSERVATIONS
AND CASUALTIES.

...THE TSUNAMI ADVISORY CONTINUES IN EFFECT FOR PUERTO RICO
   AND THE VIRGIN ISLANDS...

...THIS MESSAGE IS INFORMATION ONLY FOR COASTAL AREAS OF
   TEXAS - LOUISIANA - MISSISSIPPI - ALABAMA - FLORIDA -
   GEORGIA - SOUTH CAROLINA - NORTH CAROLINA - VIRGINIA -
   MARYLAND - DELAWARE - NEW JERSEY - NEW YORK - CONNECTICUT -
   RHODE ISLAND - MASSACHUSETTS - NEW HAMPSHIRE - MAINE - NEW
   BRUNSWICK - NOVA SCOTIA - NEWFOUNDLAND AND LABRADOR FROM
   BROWNSVILLE TEXAS TO CAPE CHIDLEY LABRADOR...

RECOMMENDED ACTIONS
 PERSONS IN LOW-LYING COASTAL AREAS SHOULD BE ALERT TO
 INSTRUCTIONS FROM THEIR LOCAL EMERGENCY OFFICIALS. EVACUATIONS
 ARE ONLY ORDERED BY EMERGENCY RESPONSE AGENCIES.
 - PERSONS IN TSUNAMI ADVISORY AREAS SHOULD MOVE OUT OF THE
   WATER... OFF THE BEACH AND OUT OF HARBORS AND MARINAS.

A TSUNAMI HAS BEEN OBSERVED AT THE FOLLOWING SITES

LOCATION                    LAT    LON         TIME         AMPL
---------------            ----- ------      ------- ---------------
AGUADILLA PR               18.4N  67.1W       1027 AST  4.82 FT/1.47 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
       IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
       VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

TSUNAMI HEIGHTS THROUGHOUT PUERTO RICO CONTINUE TO DECREASE IN SIZE.
150 PEOPLE HAVE REPORTEDLY BEEN KILLED BY THE TSUNAMI IN PUERTO RICO...
U.S. VIRGIN ISLANDS... AND BRITISH VIRGIN ISLANDS.  ANOTHER 75 ARE
REPORTED DROWNED IN GUADELOUPE.

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME      - 0900  EDT MAR 23 2011
             0900  AST MAR 23 2011
             0800  CDT MAR 23 2011
             1300  UTC MAR 23 2011
 LOCATION  - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             60 MILES/97 KM SE OF SAN JUAN PUERTO RICO
 DEPTH     - 56 MILES/90 KM

TSUNAMI ADVISORIES MEAN THAT A TSUNAMI CAPABLE OF PRODUCING
STRONG CURRENTS OR WAVES DANGEROUS TO PERSONS IN OR VERY NEAR THE
WATER IS EXPECTED.  SIGNIFICANT WIDESPREAD INUNDATION
IS NOT EXPECTED FOR AREAS UNDER AN ADVISORY.  CURRENTS MAY BE
HAZARDOUS TO SWIMMERS... BOATS... AND COASTAL STRUCTURES AND MAY
CONTINUE FOR SEVERAL HOURS AFTER THE INITIAL WAVE ARRIVAL.

CARIBBEAN COASTAL REGIONS OUTSIDE PUERTO RICO AND THE VIRGIN
ISLANDS SHOULD REFER TO THE PACIFIC TSUNAMI WARNING CENTER MESSAGES
FOR INFORMATION ON THIS EVENT AT WWW.PRH.NOAA.GOV/PR/PTWC.

THIS MESSAGE IS BASED ON EARTHQUAKE DATA... OBSERVED TSUNAMI
AMPLITUDES... HISTORICAL INFORMATION AND FORECAST MODELS.

THIS MESSAGE WILL BE UPDATED IN 30 MINUTES OR SOONER IF
THE SITUATION WARRANTS. THE TSUNAMI ADVISORY WILL REMAIN IN EFFECT
UNTIL FURTHER NOTICE. REFER TO THE INTERNET SITE
WCATWC.ARH.NOAA.GOV FOR MORE INFORMATION.

AMZ712-715-725-735-742-745-PRZ001>003-005-007-008-010-011-
VIZ001-002-231730-
/T.CON.PAAQ.TS.A.0003.000000T0000Z-000000T0000Z/
COASTAL AREAS OF PUERTO RICO AND THE VIRGIN ISLANDS.
1230 PM AST WED MAR 23 2011

...THE TSUNAMI ADVISORY CONTINUES IN EFFECT FOR PUERTO RICO
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   AND THE VIRGIN ISLANDS...

PERSONS IN TSUNAMI ADVISORY AREAS SHOULD MOVE OUT OF THE
WATER... OFF THE BEACH AND OUT OF HARBORS AND MARINAS.

TSUNAMI ADVISORIES MEAN THAT A TSUNAMI CAPABLE OF PRODUCING
STRONG CURRENTS OR WAVES DANGEROUS TO PERSONS IN OR VERY NEAR
WATER IS IMMINENT OR EXPECTED. SIGNIFICANT WIDESPREAD INUNDATION
IS NOT EXPECTED FOR AREAS IN AN ADVISORY. TSUNAMIS ARE A SERIES OF
WAVES POTENTIALLY DANGEROUS SEVERAL HOURS AFTER INITIAL ARRIVAL
TIME.


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WCATWC Message #9

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WEXX20 PAAQ 231701
TSUAT1

BULLETIN
TSUNAMI MESSAGE NUMBER 9
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
101 PM AST WED MAR 23 2011

...THE TSUNAMI ADVISORY IS CANCELED FOR PUERTO RICO AND THE
   VIRGIN ISLANDS...

EVALUATION
 DAMAGING TSUNAMIS ARE NO LONGER EXPECTED ALONG THE
 COASTS PUERTO RICO AND THE VIRGIN ISLANDS.
 AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE
 ACTION THE ALL CLEAR DETERMINATIONS MUST BE MADE BY LOCAL AUTHORITIES.

 TSUNAMI AMPLITUDES HAVE DROPPED BELOW DANGEROUS LEVELS AT MOST
 LOCATIONS ALONG THE COASTS OF PUERTO RICO
 AND THE VIRGIN ISLANDS. SEA LEVEL CONDITIONS STILL VARY GREATLY FROM
 LOCATION TO LOCATION ALONG THE COAST. DECISIONS RELATING TO REOCCUPATION OF
 COASTAL ZONES MUST BE MADE BY LOCAL AUTHORITIES.

WAVES THROUGHOUT THE PUERTO RICO AND THE VIRGIN ISLANDS ARE ALL PRESENTLY BELOW 0.5
METERS IN HEIGHT.  THE DEATH TOLL HAS NOW CLIMBED TO 500 PEOPLE TOTAL FOR PUERTO
RICO... THE VIRGIN ISLANDS AND GUADELOUPE.  DAMAGE TO COASTAL STRUCTURES THROUGHOUT
THESE ISLANDS IS EXTENSIVE... INCLUDING RESORTS AND CRUISE SHIPS.

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 7.6
 TIME      - 0900  EDT MAR 23 2011
             0900  AST MAR 23 2011
             0800  CDT MAR 23 2011
             1300  UTC MAR 23 2011
 LOCATION  - 18.2 NORTH 65.3 WEST
             25 MILES/40 KM SE OF FAJARDO PUERTO RICO
             60 MILES/97 KM SE OF SAN JUAN PUERTO RICO
 DEPTH     - 56 MILES/90 KM

CARIBBEAN COASTAL REGIONS OUTSIDE PUERTO RICO AND THE VIRGIN
ISLANDS SHOULD REFER TO THE PACIFIC TSUNAMI WARNING CENTER MESSAGES
FOR INFORMATION ON THIS EVENT AT WWW.PRH.NOAA.GOV/PR/PTWC.

THIS WILL BE THE LAST WEST COAST/ALASKA TSUNAMI WARNING CENTER
MESSAGE ISSUED FOR THIS EVENT. THIS INFORMATION IS ALSO POSTED
AT WCATWC.ARH.NOAA.GOV.

AMZ712-715-725-735-742-745-PRZ001>003-005-007-008-010-011-
VIZ001-002-231901-
/T.CAN.PAAQ.TS.Y.0003.000000T0000Z-000000T0000Z/
COASTAL AREAS OF PUERTO RICO AND THE VIRGIN ISLANDS.
101 PM AST WED MAR 23 2011

...THE TSUNAMI ADVISORY IS CANCELED FOR PUERTO RICO AND THE
   VIRGIN ISLANDS...

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PTWC Message #5

WECA41 PHEB 231701
TSUCAX

TSUNAMI MESSAGE NUMBER 5
NWS PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1702Z 23 MAR 2011

THIS MESSAGE IS FOR ALL AREAS OF THE CARIBBEAN EXCEPT
PUERTO RICO AND THE VIRGIN ISLANDS. THE WEST COAST/
ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR
THESE AREAS.

...A REGIONAL TSUNAMI WATCH IS IN EFFECT...

A TSUNAMI WATCH IS IN EFFECT FOR
SAINT MAARTEN - ANGUILLA - SAINT KITTS -
MONTSERRAT - DOMINICAN REP - GUADELOUPE - DOMINICA - SAINT
MARTIN - BARBUDA - MARTINIQUE - SAINT LUCIA - BONAIRE -
CURACAO - TURKS N CAICOS - ST VINCENT - ANTIGUA - GRENADA -
HAITI - ARUBA - VENEZUELA - BAHAMAS - BARBADOS - CUBA -
TRINIDAD TOBAGO - COLOMBIA - JAMAICA AND GUYANA.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY
NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE
DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND
ANY ACTIONS TO BE TAKEN IN RESPONSE

PRELIMINARY EARTHQUAKE PARAMETERS
MAGNITUDE - 7.6
TIME - 1300 UTC MAR 23 2011
LOCATION - 18.2 NORTH 65.3 WEST
25 MILES/40 KM SE OF FAJARDO PUERTO RICO
55 MILES/89 KM SE OF SAN JUAN PUERTO RICO
DEPTH - 56 MILES/90 KM

MEASUREMENTS OR REPORTS OF TSUNAMI ACTIVITY

LOCATION	LAT	LON	TIME	AMPL
CHRISTIANSTED VI	17.7N	64.7W	1306Z	8.23 FT/2.51 M
LIMETREE BAY VI	17.6N	64.6W	1309Z	15.41 FT/4.70 M
LAMESHUR BAY VI	18.3N	64.7W	1318Z	9.37 FT/2.86 M
VIRGIN GORDA BVI	18.5N	64.5W	1319Z	4.59 FT/1.40 M
CULEBRA PR	18.3N	65.3W	1321Z	6.79 FT/2.07 M
CHARLOTTE AMALIE VI	18.4N	64.9W	1345Z	8.27 FT/2.52 M
MONA ISLAND PR	18.1N	67.9W	1348Z	0.85 FT/0.26 M
MAGUEYES ISLAND PR	18.2N	67.2W	1351Z	2.48 FT/0.76 M
SAN JUAN PR	18.5N	66.1W	1405Z	1.94 FT/0.59 M
MAYAGUEZ PR	18.2N	67.1W	1408Z	0.66 FT/0.20 M
AGUADILLA PR	18.4N	67.1W	1427Z	4.82 FT/1.47 M
PUNTA CANA DR	18.5N	68.4W	1357Z	2.35 FT/0.72 M
SANTO DOMINGO DR	18.5N	69.9W	1359Z	1.97 FT/0.60 M
PUERTO PLATA DR	19.8N	70.7W	1402Z	1.68 FT/0.51 M
BASSETERRE SAINT KITTS	17.3N	62.7W	1425Z	4.41 FT/1.34 M
PLYMOUTH MONTSERRAT	16.7N	62.2W	1440Z	2.11 FT/0.64 M

TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

STRONG CURRENTS INDUCED BY APPROXIMATELY 1 METER AMPLITUDE WAVES
IN SAINT LUCIA REPORTED HAVE DESTROYED MOORINGS AND DOCKS IN
THE REGION. BASSETERRE ST. KITTS REPORTS A 4+ FOOT WAVE THAT HAS
INUNDATED ITS SHORELINE AS FAR INLAND AS CANYON STREET. A DOCKED
FERRY WAS TORN FROM ITS MOORINGS IN BASSETERRE BAY AND WAS CARRIED
INLAND TO THE BUS TERMINAL LOCATED NEAR THE DOCK. THE VANCE W.
AMORY INTERNATIONAL AIRPORT AT PLYMOUTH MONTSERRAT REPORTS FLOODING
ON THE RUNWAY AND HAS TEMPORARILY SHUTDOWN FLIGHT OPERATIONS.

EVALUATION
SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE
BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER.

THE THREAT MAY CONTINUE FOR COASTAL AREAS LOCATED WITHIN ABOUT A
THOUSAND KILOMETERS OF THE EARTHQUAKE EPICENTER. FOR THOSE AREAS
WHEN NO MAJOR WAVES HAVE OCCURRED FOR AT LEAST TWO HOURS AFTER
THE ESTIMATED ARRIVAL TIME OR DAMAGING WAVES HAVE NOT OCCURRED
FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE
THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN
CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL
CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE
ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT IS NOT
POSSIBLE FOR THIS CENTER TO RAPIDLY NOR ACCURATELY EVALUATE THE
STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

ADDITIONAL BULLETINS WILL BE ISSUED BY THE PACIFIC TSUNAMI
WARNING CENTER FOR THIS EVENT AS MORE INFORMATION
BECOMES AVAILABLE.

PTWC Message #6

WECA41 PHEB 231802
TSUCAX

TSUNAMI MESSAGE NUMBER 6
NWS PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1802Z 23 MAR 2011

THIS MESSAGE IS FOR ALL AREAS OF THE CARIBBEAN EXCEPT
PUERTO RICO AND THE VIRGIN ISLANDS. THE WEST COAST/
ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR
THESE AREAS.

... THE TSUNAMI WATCH IS CANCELLED ...

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY
NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE
DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND
ANY ACTIONS TO BE TAKEN IN RESPONSE

PRELIMINARY EARTHQUAKE PARAMETERS
MAGNITUDE - 7.6
TIME - 1300 UTC MAR 23 2011
LOCATION - 18.2 NORTH 65.3 WEST
25 MILES/40 KM SE OF FAJARDO PUERTO RICO
55 MILES/89 KM SE OF SAN JUAN PUERTO RICO
DEPTH - 56 MILES/90 KM

500 PEOPLE HAVE BEEN REPORTED DEAD DUE TO THIS EVENT AND
NUMEROUS REPORTED MISSING. DAMAGE CAUSED BY THE FIRE IN LIMETREE
BAY, VI AND THE TSUNAMI'S INUNDATION IN THE CARIBBEAN IS ESTIMATED
TO BE MORE THAN $350M USD THUS FAR. THE FIRE AND OIL SLICK AT
LIMETREE BAY VI HAS BEEN CONTAINED BUT INLAND FIRES WEST OF
LIMETREE BAY CONTINUE TO BE FAUGHT. STRONG CURRENTS ARE ONGOING
IN HARBORS THROUGHOUT THE EASTERN CARIBBEAN REGION.
SIGNIFICANT FLOODING HAS CEASED HOWEVER DANGER IN THE
WATER PERSISTS. FOOD AND PERSONNEL AID IS CURRENTLY BEING
FLOWN FROM NAVAL AIR STATION KEY WEST TO SEVERAL COMMUNITIES THROUGHOUT THE
CARIBBEAN.

EVALUATION
A DAMAGING TSUNAMI WAS OBSERVED IN THE NE CARIBBEAN SEA. MANY
REPORTS OF DAMAGE HAVE BEEN RECEIVED BY THE CENTER. SEA LEVEL
GAGES AND FORECAST MODELS INDICATE THAT THREAT LEVELS IN AFFECTED
REGIONS SHOULD NOW AT LOW LEVELS.

FOR ANY AFFECTED AREAS - WHEN NO MAJOR WAVES HAVE OCCURRED FOR AT
LEAST TWO HOURS AFTER THE ESTIMATED ARRIVAL TIME OR DAMAGING WAVES
HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES
CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL
STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS.
AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE
ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL
AUTHORITIES.

THIS WILL BE THE FINAL BULLETIN ISSUED BY THE PACIFIC TSUNAMI
WARNING CENTER FOR THIS EVENT UNLESS ADDITIONAL INFORMATION

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BECOMES AVAILABLE.
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Appendix E. Web-based Products

Graphical and web-based products are posted to the TWC web sites during an event. This Appendix contains examples of several. The first is the html-based text message with embedded links.

To: U.S. and Canadian Atlantic, and Gulf of Mexico coastal regions
From: NOAA/NWS/West Coast and Alaska Tsunami Warning Center
Subject: Tsunami Warning #1 issued 3/23/2011 at 9:02AM AST

A Tsunami Warning is now in effect for Puerto Rico and the Virgin Islands.

This message is for **Information Only** for coastal areas of Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, Virginia, Maryland, Delaware, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, New Hampshire, Maine, New Brunswick, Nova Scotia, Newfoundland and Labrador from Brownsville, Texas to Cape Chidley, Labrador.

A **Tsunami Warning** means that all coastal residents in the warning area who are near the beach or in low-lying regions should move immediately inland to higher ground and away from all harbors and inlets including those sheltered directly from the sea. Those feeling the earth shake, seeing unusual wave action, or the water level rising or receding may have only a few minutes before the tsunami arrival and should move immediately. Homes and small buildings are not designed to withstand tsunami impacts. Do not stay in these structures.

All residents within the warned area should be alert for instructions broadcast from their local civil authorities. This tsunami warning is based solely on earthquake information - the tsunami has not yet been confirmed.

At 9:00 AM Atlantic Standard Time on March 23, an earthquake with preliminary magnitude 7.6 occurred 25 miles/40 Km southeast of Fajardo, Puerto Rico . (Refer to the United States Geological Survey for official earthquake parameters.) This earthquake **may have** generated a tsunami. If a tsunami has been generated, the waves will first reach Christiansted, USVI at 9:11 AM AST on March 23. Estimated tsunami arrival times and maps along with safety rules and other information can be found on the WCATWC web site.

Tsunamis can be dangerous waves that are not survivable. Wave heights are amplified by irregular shoreline and are difficult to forecast. Tsunamis often appear as a strong surge and may be preceded by a receding water level. Mariners in water deeper than 600 feet should not be affected by a tsunami. Wave heights will increase rapidly as water shallows. Tsunamis are a series of ocean waves which can be dangerous for several hours after the initial wave arrival. DO NOT return to evacuated areas until an all clear is given by local civil authorities.

Caribbean coastal regions outside Puerto Rico and the Virgin Islands should refer to the Pacific Tsunami Warning Center messages for information on the event.

This message will be updated in 30 minutes or sooner if the situation warrants. The tsunami warning will remain in effect until further notice. For further information stay tuned to NOAA Weather Radio, your local TV or radio stations, or see the WCATWC web site.

Link to Standard Warning Message
Link to Public Warning Message
Link to XML/CAP Message
Link to Printable Message

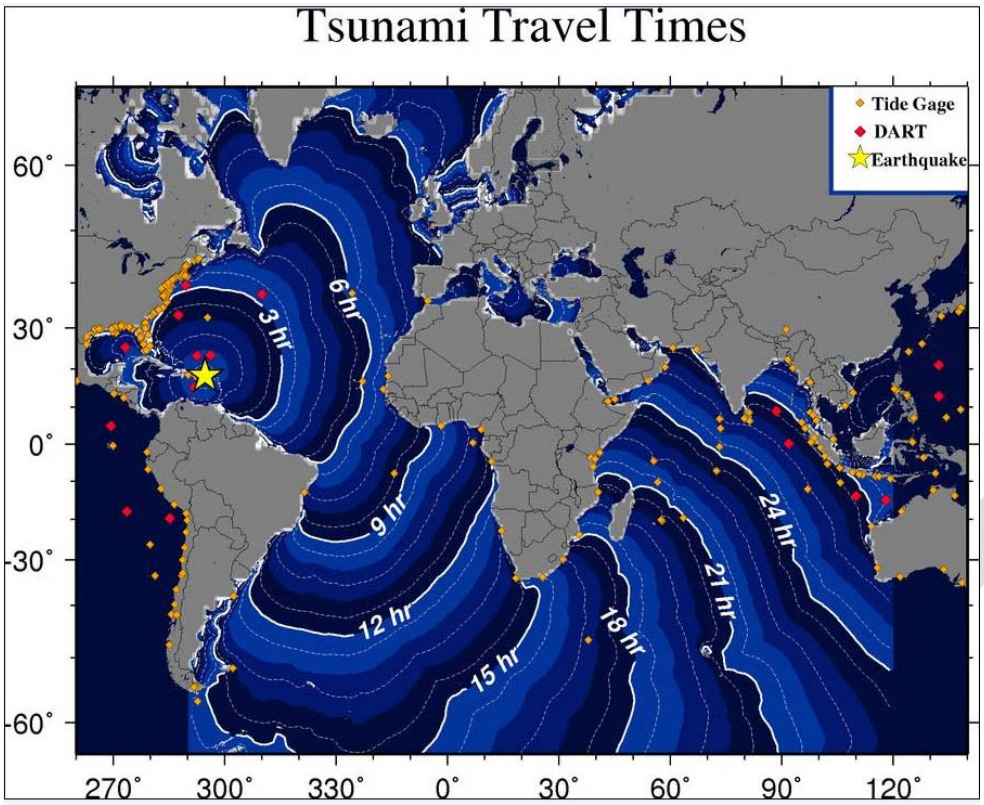

Figure E1: Example of a travel time map that would be issued with event.

Tsunami travel time list example below.

The following list gives estimated times of arrival for locations along the U.S. and Canadian Atlantic coast from a tsunami generated at the given source location. The list is ordered chronologically. Since tsunami speed is directly related to water depth, tsunami ETAs can be computed independent of tsunami amplitude. THE LISTING OF A TSUNAMI ARRIVAL TIME BELOW DOES NOT INDICATE A WAVE IS IMMINENT. The listed arrival time is the initial wave arrival. Tsunamis can be dangerous for many hours after arrival, and the initial wave is not necessarily the largest.

Source:
Lat: 18.2N
Lng: 65.3W
Mag: 7.6
O-time: 1300UTC
Date: MAR 23

Estimated times of initial tsunami arrival:

Christiansted, U.S. Virgin Is	0911 AST MAR 23	1311 UTC MAR 23
Vieques Is., Puerto Rico	0911 AST MAR 23	1311 UTC MAR 23
Limetree Bay, U.S. Virgin Is.	0919 AST MAR 23	1319 UTC MAR 23
Lameshur Bay, U.S. Virgin Islands	0921 AST MAR 23	1321 UTC MAR 23
Culebra, Puerto Rico	0922 AST MAR 23	1322 UTC MAR 23
Mona Island, Puerto Rico	0937 AST MAR 23	1337 UTC MAR 23
Virgin Gorda, British Virgin Islands	0939 EDT MAR 23	1339 UTC MAR 23
Magueyes Island, Puerto Rico	0941 AST MAR 23	1341 UTC MAR 23
San Juan, Puerto Rico	0945 AST MAR 23	1345 UTC MAR 23

Aguadilla, Puerto Rico	0948 AST MAR 23	1348 UTC MAR 23
Mayaguez, Puerto Rico	0952 AST MAR 23	1352 UTC MAR 23
Charlotte Amalie, U.S. Virgin Is	0955 AST MAR 23	1355 UTC MAR 23
DART 41421	0959 EDT MAR 23	1359 UTC MAR 23
DART 41420	1004 EDT MAR 23	1404 UTC MAR 23
Samana Cay, Bahamas	1039 EDT MAR 23	1439 UTC MAR 23
Guantanamo Bay, Cuba	1055 EDT MAR 23	1455 UTC MAR 23
Bermuda	1121 EDT MAR 23	1521 UTC MAR 23
DART 41424	1128 EDT MAR 23	1528 UTC MAR 23
Settlement Point, Bahamas	1150 EDT MAR 23	1550 UTC MAR 23
Virginia Key, Florida	1217 EDT MAR 23	1617 UTC MAR 23
DART 44401	1218 EDT MAR 23	1618 UTC MAR 23
Jupiter Inlet, Florida	1220 EDT MAR 23	1620 UTC MAR 23
DART 44402	1223 EDT MAR 23	1623 UTC MAR 23
Ocean Reef, Florida	1229 EDT MAR 23	1629 UTC MAR 23
Miami, Florida	1233 EDT MAR 23	1633 UTC MAR 23
Cape Hatteras, North Carolina	1234 EDT MAR 23	1634 UTC MAR 23
Cancun, Mexico	1141 CDT MAR 23	1641 UTC MAR 23
Oregon Inlet, North Carolina	1258 EDT MAR 23	1658 UTC MAR 23
Key West, Florida	1315 EDT MAR 23	1715 UTC MAR 23
Beaufort, North Carolina	1320 EDT MAR 23	1720 UTC MAR 23
Vaca Key, Florida	1322 EDT MAR 23	1722 UTC MAR 23
Duck, North Carolina	1329 EDT MAR 23	1729 UTC MAR 23
Port Canaveral, Florida	1329 EDT MAR 23	1729 UTC MAR 23
DART 42409	1330 EDT MAR 23	1730 UTC MAR 23
Currituck Beach Lighthouse, North Carolina	1334 EDT MAR 23	1734 UTC MAR 23
Ocean City, Maryland	1347 EDT MAR 23	1747 UTC MAR 23
Melbourne, Florida	1347 EDT MAR 23	1747 UTC MAR 23
Lockeport, Nova Scotia	1453 ADT MAR 23	1753 UTC MAR 23
Surf City, North Carolina	1356 EDT MAR 23	1756 UTC MAR 23
Wrightsville Beach, North Carolina	1356 EDT MAR 23	1756 UTC MAR 23
Pilots Station East, Louisiana	1301 CDT MAR 23	1801 UTC MAR 23
Montauk Point, New York	1404 EDT MAR 23	1804 UTC MAR 23
South Santee River, South Carolina	1405 EDT MAR 23	1805 UTC MAR 23
Virginia Beach, Virginia	1408 EDT MAR 23	1808 UTC MAR 23
Flagler Beach, Florida	1413 EDT MAR 23	1813 UTC MAR 23
Cape Henlopen, Delaware	1414 EDT MAR 23	1814 UTC MAR 23
Atlantic City, New Jersey	1414 EDT MAR 23	1814 UTC MAR 23
Fire Island Light, New York	1415 EDT MAR 23	1815 UTC MAR 23
Watch Hill, Rhode Island	1417 EDT MAR 23	1817 UTC MAR 23
Lewes, Delaware	1417 EDT MAR 23	1817 UTC MAR 23
Jacksonville Beach, Florida	1421 EDT MAR 23	1821 UTC MAR 23
Chesapeake Bridge, Virginia	1427 EDT MAR 23	1827 UTC MAR 23
Newport, Rhode Island	1428 EDT MAR 23	1828 UTC MAR 23
Woods Hole, Massachusetts	1429 EDT MAR 23	1829 UTC MAR 23
Myrtle Beach, South Carolina	1432 EDT MAR 23	1832 UTC MAR 23
Charlesville, Nova Scotia	1534 ADT MAR 23	1834 UTC MAR 23
Springmaid Pier, South Carolina	1434 EDT MAR 23	1834 UTC MAR 23
Sandy Hook, New Jersey	1436 EDT MAR 23	1836 UTC MAR 23
Chezzetcook, Nova Scotia	1538 ADT MAR 23	1838 UTC MAR 23
New London, Connecticut	1439 EDT MAR 23	1839 UTC MAR 23
Port Aux Basque, Newfoundland	1609 NDT MAR 23	1839 UTC MAR 23
Nantucket Island, Massachusetts	1440 EDT MAR 23	1840 UTC MAR 23
Yarmouth, Nova Scotia	1540 ADT MAR 23	1840 UTC MAR 23
Halifax, Nova Scotia	1540 ADT MAR 23	1840 UTC MAR 23
Charleston, South Carolina	1441 EDT MAR 23	1841 UTC MAR 23
Fernandina Beach, Florida	1441 EDT MAR 23	1841 UTC MAR 23
Cape Ray, Newfoundland	1613 NDT MAR 23	1843 UTC MAR 23
Savannah, Georgia	1443 EDT MAR 23	1843 UTC MAR 23
Scatarie Island, Nova Scotia	1544 ADT MAR 23	1844 UTC MAR 23

Cape May, New Jersey	1444 EDT MAR 23	1844 UTC MAR 23
St Lawrence, Newfoundland	1615 NDT MAR 23	1845 UTC MAR 23
Flamingo, Florida	1446 EDT MAR 23	1846 UTC MAR 23
Kiptopeke, Virginia	1450 EDT MAR 23	1850 UTC MAR 23
Cutler NAS, Maine	1452 EDT MAR 23	1852 UTC MAR 23
Saint Pierre/Miquelon	1622 NDT MAR 23	1852 UTC MAR 23
Grand Isle, Louisiana	1354 CDT MAR 23	1854 UTC MAR 23
Money Point, Virginia	1456 EDT MAR 23	1856 UTC MAR 23
Meat Cove, Nova Scotia	1557 ADT MAR 23	1857 UTC MAR 23
Altamaha Sound, Georgia	1459 EDT MAR 23	1859 UTC MAR 23
Quonset Point, Rhode Island	1500 EDT MAR 23	1900 UTC MAR 23
Destin, Florida	1403 CDT MAR 23	1903 UTC MAR 23
Argentia, Newfoundland	1634 NDT MAR 23	1904 UTC MAR 23
St. Simons Is., Georgia	1506 EDT MAR 23	1906 UTC MAR 23
Bar Harbor, Maine	1507 EDT MAR 23	1907 UTC MAR 23
Grand Manan Is., New Brunswick	1608 ADT MAR 23	1908 UTC MAR 23
Windmill Point, Virginia	1509 EDT MAR 23	1909 UTC MAR 23
the U.S.-Canada border	1511 EDT MAR 23	1911 UTC MAR 23
North Sydney, Nova Scotia	1612 ADT MAR 23	1912 UTC MAR 23
Port Fourchon, Louisiana	1413 CDT MAR 23	1913 UTC MAR 23
Alvarado, Mexico	1416 CDT MAR 23	1916 UTC MAR 23
Panama City, Florida	1417 CDT MAR 23	1917 UTC MAR 23
New Point Comfort, Virginia	1519 EDT MAR 23	1919 UTC MAR 23
La Manche, Newfoundland	1649 NDT MAR 23	1919 UTC MAR 23
Fort Point, New Hampshire	1523 EDT MAR 23	1923 UTC MAR 23
Stonington, Maine	1525 EDT MAR 23	1925 UTC MAR 23
Merrimack River, Massachusetts	1527 EDT MAR 23	1927 UTC MAR 23
Manhattan, New York	1530 EDT MAR 23	1930 UTC MAR 23
Saint John, New Brunswick	1631 ADT MAR 23	1931 UTC MAR 23
Tampico, Mexico	1431 CDT MAR 23	1931 UTC MAR 23
Brownsville, Texas	1433 CDT MAR 23	1933 UTC MAR 23
Ship John Shoal, New Jersey	1534 EDT MAR 23	1934 UTC MAR 23
Bergen Point, New Jersey	1535 EDT MAR 23	1935 UTC MAR 23
New Haven, Connecticut	1537 EDT MAR 23	1937 UTC MAR 23
Saint Johns, Newfoundland	1708 NDT MAR 23	1938 UTC MAR 23
Portland, Maine	1541 EDT MAR 23	1941 UTC MAR 23
Apalachicola, Florida	1442 CDT MAR 23	1942 UTC MAR 23
Port Isabel, Texas	1447 CDT MAR 23	1947 UTC MAR 23
Yorktown, Virginia	1552 EDT MAR 23	1952 UTC MAR 23
Corpus Christi, Texas	1454 CDT MAR 23	1954 UTC MAR 23
the Mississippi-Alabama border	1457 CDT MAR 23	1957 UTC MAR 23
Bridgeport, Connecticut	1600 EDT MAR 23	2000 UTC MAR 23
Lewisetta, Virginia	1601 EDT MAR 23	2001 UTC MAR 23
Boston, Massachusetts	1601 EDT MAR 23	2001 UTC MAR 23
Baffin Bay, Texas	1506 CDT MAR 23	2006 UTC MAR 23
Clearwater Beach, Florida	1607 EDT MAR 23	2007 UTC MAR 23
Providence, Rhode Island	1619 EDT MAR 23	2019 UTC MAR 23
Bonavista, Newfoundland	1753 NDT MAR 23	2023 UTC MAR 23
Port O'connor, Texas	1530 CDT MAR 23	2030 UTC MAR 23
Harrington Harbour, Quebec	1732 ADT MAR 23	2032 UTC MAR 23
Rock Port, Texas	1533 CDT MAR 23	2033 UTC MAR 23
Waveland, Mississippi	1534 CDT MAR 23	2034 UTC MAR 23
Freeport, Texas	1535 CDT MAR 23	2035 UTC MAR 23
Pointe Saint Pierre, Quebec	1738 ADT MAR 23	2038 UTC MAR 23
Battle Harbour, Labrador	1815 NDT MAR 23	2045 UTC MAR 23
Kings Point, New York	1655 EDT MAR 23	2055 UTC MAR 23
Naples, Florida	1657 EDT MAR 23	2057 UTC MAR 23
Holton Harbour, Newfoundland	1833 NDT MAR 23	2103 UTC MAR 23
Champoton, Mexico	1605 CDT MAR 23	2105 UTC MAR 23
Port Manatee, Florida	1706 EDT MAR 23	2106 UTC MAR 23

Bonita Beach, Florida	1709 EDT MAR 23	2109 UTC MAR 23
Galveston, Texas	1610 CDT MAR 23	2110 UTC MAR 23
Fort Myers, Florida	1712 EDT MAR 23	2112 UTC MAR 23
St. Petersburg, Florida	1712 EDT MAR 23	2112 UTC MAR 23
Biloxi, Mississippi	1614 CDT MAR 23	2114 UTC MAR 23
Suwannee River, Florida	1717 EDT MAR 23	2117 UTC MAR 23
Eugene Is., Louisiana	1618 CDT MAR 23	2118 UTC MAR 23
Boat Harbour, Newfoundland	1850 NDT MAR 23	2120 UTC MAR 23
Morgan City, Louisiana	1630 CDT MAR 23	2130 UTC MAR 23
Lanse au Clair, Newfoundland	1904 NDT MAR 23	2134 UTC MAR 23
Wood Islands, Prince Edward Is.	1835 ADT MAR 23	2135 UTC MAR 23
Sept Iles, Quebec	1836 ADT MAR 23	2136 UTC MAR 23
Cape Chidley, Labrador	1742 AST MAR 23	2142 UTC MAR 23
Nuuk, Greenland	1751 EDT MAR 23	2151 UTC MAR 23
Cedar Key, Florida	1754 EDT MAR 23	2154 UTC MAR 23
Sabine Pass, Texas	1655 CDT MAR 23	2155 UTC MAR 23
High Island, Texas	1656 CDT MAR 23	2156 UTC MAR 23
Hebron, Newfoundland	1906 ADT MAR 23	2206 UTC MAR 23
Escuminac, New Brunswick	1913 ADT MAR 23	2213 UTC MAR 23
Charlottetown, Prince Edward Is.	1918 ADT MAR 23	2218 UTC MAR 23
Nain, Newfoundland	1920 ADT MAR 23	2220 UTC MAR 23
Brevoort Harbour, Nunavut	1821 EDT MAR 23	2221 UTC MAR 23
Belledune, New Brunswick	1922 ADT MAR 23	2222 UTC MAR 23
Cape Dyer, Nunavut	1831 EDT MAR 23	2231 UTC MAR 23
Shediac, New Brunswick	2030 ADT MAR 23	2330 UTC MAR 23
Clyde River, Nunavut	1954 EDT MAR 23	2354 UTC MAR 23
Thule AFB, Greenland	2101 EDT MAR 23	0101 UTC MAR 24
Dundas Harbor, Nunavut	2110 EDT MAR 23	0110 UTC MAR 24

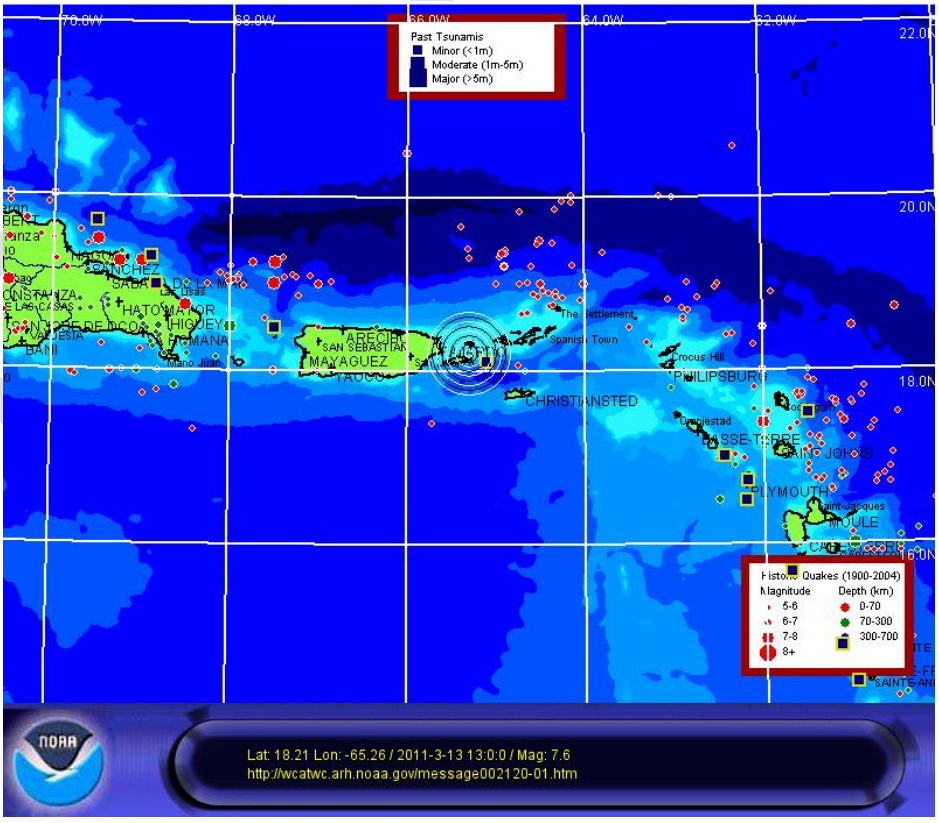

Figure E2: Example of large scale map that would be issued with bulletin 1.

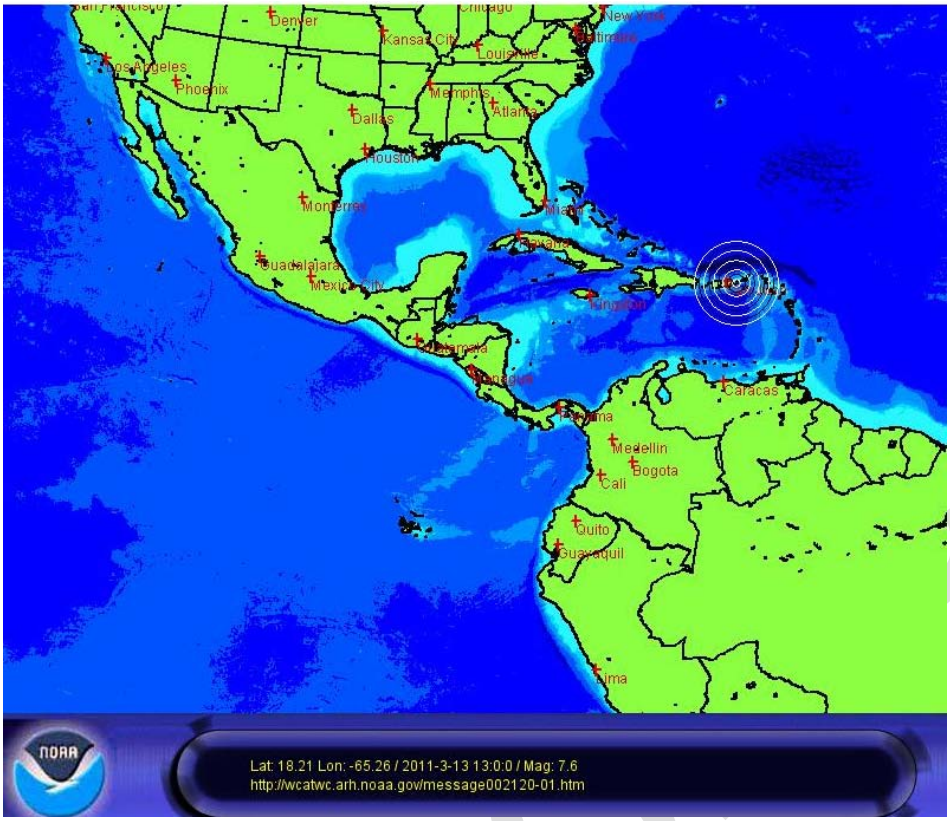

Figure E3: Example of a source zone map issued with bulletin 1

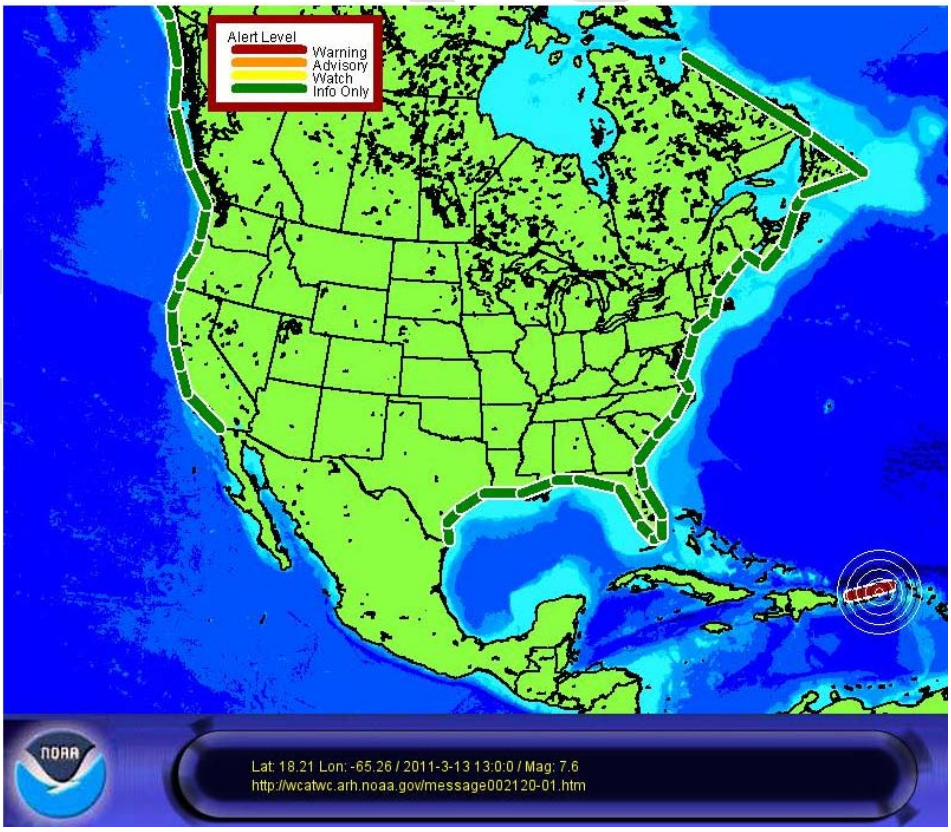

Figure E4: Example of an warning zones map issued with bulletin 1.

Appendix F. Sample Press Release for Local Media

TEMPLATE FOR NEWS RELEASE

USE AGENCY MASTHEAD

Contact: (insert name)
(insert phone number)
(insert email address)

FOR IMMEDIATE RELEASE
(insert date)

CARRIBEAN TSUNAMI EXERCISE TO BE CONDUCTED March 23, 2011

(*insert community/county/state name*) will join other localities in the Caribbean as a participant in a tsunami response exercise on March 23, 2011. The purpose of this exercise is to evaluate local tsunami response plans, increase tsunami preparedness, and improve coordination throughout the region.

(*insert a promotional comment from a local official, such as "The 2010 Haiti and Chile earthquakes and tsunamis have reminded the world again of the urgent need to be more prepared for such events," said* (*insert name of appropriate official*). "This important exercise will test the current procedures of the Tsunami Warning System and help identify operational strengths and weaknesses in each community." (*Please modify for uniqueness.))*

The exercise, titled CARIBE WAVE 11/LANTEX 11, will simulate a widespread Tsunami Warning and Watch situation throughout the Caribbean which requires implementation of local tsunami response plans. It is the first such international exercise in the Caribbean region. The exercise will (*insert "include" or "not include")* public notification.

The exercise will simulate a major earthquake and tsunami generated 25 miles southeast of Fajardo, Puerto Rico and 55 miles southeast of San Juan, Puerto Rico at 9:00am Atlantic Standard Time (*or appropriate local time*) on March 23, 2011. Exercise participants will be provided with a handbook which describes the scenario and contains tsunami messages from the West Coast/Alaska Tsunami Warning Center (WCATWC) and the Pacific Tsunami Warning Center (PTWC). The WCATWC is currently responsible for providing tsunami information to the Atlantic coasts of U.S. and Canada, the Gulf of Mexico coast, Puerto Rico, and the Virgin Islands while the PTWC is the interim Regional Tsunami Watch Provider for the other countries in the Caribbean Sea and Adjacent Regions.

Insert paragraph tailored for specific community. Could identify participating agencies and specific plans. Could describe current early warning program, past tsunami exercises (if any), ongoing mitigation and public education programs, etc. Could describe tsunami threat, history of tsunami hazards, if any.

If any real tsunami threat occurs during the time period of the exercise, the exercise will be terminated.

The exercise is sponsored by the UNESCO/IOC Intergovernmental Coordination Group for Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS), the Caribbean Emergency Management Agency (CDEMA), the Centro de Coordinación para la Prevención de los Desastres Naturales en América Central (CEPREDENAC), the U.S. National Oceanic and Atmospheric Administration (NOAA) and by the U.S. National Tsunami Hazard Mitigation Program (NTHMP – a partnership of 29 states and territories and three federal agencies). For more information on the U.S. tsunami warning system, see www.tsunami.gov. For more information on the NTHMP, see nthmp.tsunami.gov. For more information on the ICG/CARIBE-EWS, see http://www.ioc-tsunami.org.

###

On the Web:

West Coast/Alaska Tsunami Warning Center	http://wcatwc.arh.noaa.gov
Pacific Tsunami Warning Center	http://www.prh.noaa.gov/ptwc
NOAA Tsunami Program	http://www.tsunami.gov
NTHMP:	http://nthmp.tsunami.gov

Insert state/local emergency response URLs